2. DESCRIPTION OF THE PROPOSED PROJECT

2.1 INTRODUCTION AND OVERVIEW OF THE PROPOSED PROJECT

This section of the EIAR describes the overall site and main components of the proposed project and provides details on the construction, operation, and decommissioning of the wind farm and associated infrastructure.

The proposed wind farm site is situated at the border of County Tipperary and Offaly, 5 km south of Birr and 3.6 km north of Shinrone. The eastern boundary of the site is delineated by the Little Brosna River.

The proposed project is expected to have an Export Capacity (EC) of between 61.6 to 77 MW with the erection of 11 no. wind turbines. The proposed project comprises a wind farm of 11 no. wind turbines and all associated infrastructure including Battery Energy Storage System (BESS), turbine foundations, hardstanding areas, borrow pits, access tracks, 110kV grid connection and works along the road network for turbine/material delivery.

The proposed grid connection route (GCR) and works areas of the proposed turbine delivery route (TDR) form part of proposed project and are assessed in the EIAR.

The 'proposed project' refers to an eleven turbine wind farm, 110 kV substation, BESS, GCR and the proposed works required on the TDR.

The 'proposed wind farm site' refers specifically to the area enclosed within the wind farm site boundary and includes the wind farm, 110 kV substation and BESS.

The proposed project is a renewable energy development and will constitute the provision of:

- Assembly of 11 Wind Turbine Generators (including tower sections, nacelle, hub, rotor blades) with an estimated capacity of 61.6 to 77 MW and a blade tip height between 179.5 and 180 m, rotor diameter between 149 to 163 m, hub height of between 98.5 and 105 m.
- Associated hardstanding and turbine foundations at each turbine location;
- Works along the public road and private land for a 12.23 km grid connection to the existing Dallow 110 kV substation including installation of 17 joint bays along the grid connection route ("GCR") which runs across the townlands of Cronekill, Castletown, Cornhill, Caherhoereigh, Pallas, Kylenamuck, Tinnakilly, Ballyloughnane, Killeen, Croghan, in Co. Tipperary and Townparks, Dovegrove, Woodfield or Tullynisk, and Clondallow in Co. Offaly;
- Turbine Delivery Accommodation works, road surfacing works, temporary wall/vegetation removal, load bearing surface will be laid to provide a minimum 4.5 m running width and a 5.5 m clearance width for turbine delivery at Sharavogue crossroads, Sharavogue, Co. Offaly.

- Upgrading of existing access tracks, construction of new founded access roads and floating roads. Total length of access roads is 9.7 km, and upgrades of two site entrances on R492 and L1071;
- Erection of 104 m permanent meteorological mast and including lightning pole;
- All associated excavation, earthworks and spoil management, Surface water drainage system and sediment control; Installation of new clear span watercourse or drain crossings on proposed wind farm site; Excavation and restoration of three borrow pits (borrow pit 1 to borrow pit 3) and one peat deposition area;
- Wheel wash, security fencing & hut;
- Four Temporary construction compounds including site office and staff facilities;
- Installation of 33 kV medium voltage electrical and communication cabling underground between the proposed turbines and the proposed on-site substation and associated ancillary works; All electrical plant and infrastructure and grid ancillary services equipment;
- 110 kV electricity on-site substation and switch rooms; including one EirGrid control building containing welfare facilities and storeroom, wastewater and rainwater holding tank;
- One Independent Power Producer (IPP) control building containing HV switch room, site offices, welfare facilities, wastewater holding tank;
- One Battery energy storage system (BESS) control building containing worker welfare facilities and equipment store, wastewater holding tank; 90 BESS container units, inverters, underground water storage tank and associated works;
- All associated infrastructure and services including site works and temporary construction signage,
- Operational stage site signage;
- All related site works and ancillary development including berms, landscaping, and soil excavation;
- Tree felling (7.2 ha) and hedgerow removal (1.1 km) to facilitate construction and operation of the proposed project,
- Biodiversity enhancement including hedgerow replanting (1.3 km), peatland enhancement and tree planting.

An overview of the proposed project is shown in Drawing No. 11333-2005 (a full set of planning drawings are available as part of this planning application) and Figure 2.2.

A 10-year planning permission and 35-year operational life from the date of commissioning of the entire wind farm is being sought for the proposed project and does not include elements of the overall proposed project, such as works required within the public road corridor to accommodate the proposed turbine delivery route (TDR). These works along the proposed TDR to the proposed wind farm site include hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening. For these locations, works associated with road infrastructure have been identified and assessed in the EIAR, however, permission for these works will be sought separately.

A permanent planning permission is being sought for the proposed grid connection (GCR) and substation as these will remain as a permanent part of the national infrastructure, which will be operated by the Transmission System Operator, EirGrid and owned by ESB the Transmission System Owner and will remain in place upon decommissioning of the wind farm.

2.2 PROPOSED PROJECT

The study area assessed will be separately defined within each chapter as required, but where this is not the case, it refers to the areas outlined in Figure 1-1 of this EIAR, which includes the proposed wind farm site, the GCR and the works area for the TDR. The BESS and substation and associated infrastructure form part of the proposed wind farm site.

Proposed Wind Farm Site

The proposed wind farm site encompasses approximately 355 hectares, primarily consisting of agricultural land, forestry, and peatland. The proposed wind farm site is situated west of the Little Brosna River, with elevations ranging from 45 to 65 meters above ordnance datum (AOD). The surrounding landscape is predominantly low-lying, except for Knockshigowna Hill to the southwest. To the east of the Little Brosna River lies the Sharavogue Bog Special Area of Conservation (SAC), which is characterized by peatland habitats.

The site predominantly comprises raised bog, cutover bog, wet grassland, mixed broadleaved woodland, oak-birch-holly woodland, bog woodland, and scrub. The surrounding area has a relatively high density of individual residential developments. Access to the proposed wind farm site is currently provided via the local road L1071 and regional road R492. The N62 is located approximately 3 km to the east, and the site has good access via the local road network. The proposed wind farm site is situated on lands owned by local landowners, who have consented to the planning application. The primary site entrance is located approximately 2.5km to the south-east of the Sharavogue N62 and R492. Access to the site will be at this location along the R492.

Some equestrian activity is noted in the surrounding area. Wraymount Stud is located approximately 1.4 km north east of the proposed wind farm site and Birr Equestrian centre located 9km to the north east.

Figure 2-1 Proposed Wind Farm Site – view looking south from location of T5

The Grid Reference co-ordinates (ITM) of the proposed turbine locations are listed in Table 2-1 below.

Table 2-1 Proposed Project WTG Locations (ITM Co-ordinates)

Turbine ID	Easting's (m)	Northing's (m)
T1	603543	700238
T2	603357	699569
T3	602829	699234
T4	603454	699010
T5	603559	698402
T6	603608	697889
T7	603978	697624
T8	604497	697630
T9	604826	697259
T10	604588	696601
T11	604897	696234

Grid Connection Route

The proposed GCR spans approximately 12.23 km, running north from the proposed project 110 kV substation in County Tipperary to the existing ESB Dallow 110 kV substation in County Offaly. The route begins on private land before joining the L1071 public road for 4.7 km, then merges onto the N52 near Riverstown Village, where horizontal directional drilling (HDD) is proposed to avoid National Inventory of Architectural Heritage (NIAH) protected bridge which

was built to cross over the disused Parsonstown (Birr) to Portumna Bridge railway line. After a short stretch on the N52, the proposed GCR turns northwest onto the R489, then north on the L5045, and east on the L1077. It will cross the Little Brosna River using HDD within private land, continuing along local roads to the R439, and finally transitioning to private land near the L70152 junction before reaching the Dallow substation. The methodology includes a combination of HDD and standard open trenching, primarily within the public road network.

Location of Works on the proposed TDR

It is proposed that turbine components will be delivered to the site via Foynes Port, Co. Limerick. The route heads west along the N69, where it will join the N18 on the outskirts of Limerick. The route continues onto the M7 and depart the M7 at Junction 21 near Derrinsallagh and join the northbound R435 towards Kyle Manor. At Kyle Manor loads will turn left and join the R445. the route will continue west along the R445 to the Dublin Road Roundabout where loads will turn right and then left to travel west towards Roscrea. The route continues along the Dublin Road onto the N62 travelling northwest through Roscrea. It continues north-westerly on the N62 to Sharavogue where it turns left onto the R492 and continues southwest to the proposed wind farm site entrance.

Pell Frischmann completed an assessment of the proposed TDR (see Appendix 2-1). Several potential pinch points have been identified and assessed. An assessment was carried out using site visits and Autotrack to determine what, if any, works are required at these pinch points to allow the turbine components to be moved to the site. Works range from hedgerow trimming/clearing to facilitate oversail of turbine blades to the temporary placement of hardcore to allow the oversize vehicles to pass. The current planning applications include the proposed temporary works required for turbine delivery within private lands. A further consenting process will be used to obtain permission for the other works areas along the route (within the public road corridor), as required. The works required are detailed below in Section 2.6.5.

2.3 COMMUNITY BENEFIT

The proposed project has the potential to bring significant positive benefit to the local community. The project will contribute to a community benefit fund will be put in place for the lifetime of the project to provide direct funding to areas surrounding the project.

The RESS 5 Terms and Conditions[1] were published in September 2025 and provide details on the Government requirements for community benefit funds for renewable energy projects that participate in the scheme. A significant annual community benefit fund of €378,000 to €472,000 per year for the first 15 years of the project will be established in line with Government policy which will include funding for both wider community initiatives and a Near Neighbour scheme focused on houses in close proximity to the project. Therefore, over the expected 15-year of RESS 5, the Community Benefit Fund will be in the order of €5.7 to €7.1 million. Post RESS - RWE will also commit to maintaining a Community Benefit Fund for the duration of the project in line with best practice and guidelines.

1 https://www.gov.ie/en/publication/36d8d2-renewable-electricity-support-scheme/ [Accessed April 2026].

Fund usage and administration

The Community Benefit Fund belongs to the local community. The premise of the fund is that it should be used to bring about significant, positive change in the local area. To make this happen, our first task will be to form a benefit fund development working group that clearly represents both the closest neighbours to the project as well as nearby communities. This group will then work on designing the governance and structure of a community entity that will administer the Community Benefit Fund. The fund will be based on the Government of Ireland's Good Practice Principles Handbook for Community Benefit Funds, which will mean that the Fund will deliver initiatives that are in alignment with the UN Sustainable Development Goals[2].

2.4 Land Ownership

The proposed wind farm site measures approximately 355 ha, is owned by third-party private landowners who have consented to the planning application and proposed project. The proposed temporary works on the proposed TDR at Sharavogue crossroads are part of the planning application. Landowner letters of consent are included in Appendix 2-6.

2.5 On-site Wind Resource

The layout of the proposed wind farm has been designed to minimise the potential environmental impacts of the wind farm, while at the same time optimising energy yield by utilising the natural wind resource across the site. Available wind speed is a key factor in determining the economic viability of potential wind energy locations. In 2003, the Sustainable Energy Authority of Ireland (SEAI) produced a Wind Atlas with information on wind speed modelled at 50 m, 75 m and 100 m height above the ground. With turbine technology innovation, turbine models can now capture more of the wind current and have bigger rotors that radically change the economic viability of wind power. This has been reflected in the updated SEAI 2013 Wind Atlas which re-modelled wind speed data for a much wider range of 30 m-150 m height above ground level. The 2013 SEAI Wind Speed Atlas identifies the site as having a wind speed of between approximately 6.5 m/s and 8.8 m/s at 100 m above ground level. Lidar data measurements at the site over a two year period indicates an average wind speed of 6.9 m/s during the survey period. This indicates that the site has a suitable wind resource for a commercial wind energy development.

2.6 Proposed Project Layout and Components

The overall layout of the proposed wind farm is shown in Figure 2-2. This figure shows the proposed locations of the wind turbines and associated hardstanding areas, passing bays, electrical substation, meteorological mast, temporary construction compounds, borrow pits, internal access roads and the main site entrance. Site layout drawings of the proposed project are available as part of this planning application.

2 Renewable Electricity Support Scheme *Good Practice Principles Handbook for Community Benefit Funds* (2021) https://www.gov.ie/pdf/?file=https://assets.gov.ie/140382/b5198da9-c6c7-4af2-bbb5-2b8e3c0d2468.pdf#page=null

The layout reflects the outcome of the iterative design process. Further detail on the design philosophy, constraints, alternative turbine layouts and dimensions considered is detailed in Chapter 3 (Consideration of Reasonable Alternatives) of this EIAR.

7°55'0"W

N

T1

N62

R491

Met Mast Location

T10

T11

53°13'0"N

606000

695000

Legend

- Proposed Wind Farm Site Boundary
- Proposed Grid Connection Route

Site Layout

- Proposed Turbine locations
- Proposed BESS
- Proposed Construction Compounds
- Proposed Borrow Pit 1
- Proposed Borrow Pit 2
- Proposed Borrow Pit 3
- Deposition Areas
- Turbines Hardstands
- Met Mast Location
- Overrun Area
- Proposed Passing Bay
- Proposed Site Roads
- Proposed Substation Location
- Turbine Foundations
- Turning areas
- Wheelwash

0 500 1,000
Meters

Spatial Reference
Datum: IRENET95
EPSG: 2157

Rev	Date	Description	By	Chkd.
A	16/01/2026	Draft issue	K.K	J.D

Client: RWE

Project:

Ballincor Wind Farm

Title:

Figure 2-2:
Proposed Wind Farm Site Layout

Scale @ A3: 1:20,000

Prepared by:	Checked by:	Date:
K.Kale	J.Dillon	January 2026

TOBIN
Tel: +353-(0)1-8030406
Email: info@tobin.ie
www.tobin.ie

Map Ref: 11333-030-LAY_INFR-P.App.BO-TOB-A

Draft: A

2.6.1 Wind Turbine Generator (WTG) Specifications

The proposed project turbine parameters which are assessed as part of this EIAR are summarised in Table 2-2 and detailed below. The options in Table 2-2 are assessed in the EIAR and provide the basis of the design flexibility submission to An Coimisiún Pleanala.

Table 2-2 Proposed WTG Design Flexibility Parameters

Proposed Turbine Parameters		N149	N163	V150
Turbine				
Tip Height		179.5m	180m	180m
Rotor Diameter	149-163m	149m	163m	150m
Hub Height	98.5-105m	105m	98.5m	105m
Colour	White/Light Grey	White/Light Grey	White/Light Grey	White/Light Grey
Number of Blades	Three	Three	Three	Three
Tower Type	Tubular tower with horizontal axis	Tubular tower with horizontal axis	Tubular tower with horizontal axis	Tubular tower with horizontal axis
Turbine Foundations				
Diameter	24-26m	24	26	26
Volume of Concrete Required	650-700m3	650-700 m3	650-700 m3	650-700 m3
Turbine Hardstands				
Turbine Hardstands	*	75m length and 40m width	75m length and 40m width	75m length and 40m width

*excluding assist crane pads and boom assembly hardstands – approximately 75m length to be added to include these. See Drawing 11333-2031 for further information.

The proposed turbines will have a tip height of between 179.5 - 180 m inclusive. Detailed drawings, which accompany the planning application, available as part of this planning application, show the parameters of the turbine that is proposed. The exact make and model of the turbine will be dictated by a competitive tender process of the various turbines on the market at the time and will have dimensions within the parameters set out within the development description (i.e. overall blade tip height of between 179.5-180 m inclusive, a rotor diameter of between 149-163 m inclusive, a hub height of between 98.5-105 m inclusive).

A drawing showing the size envelope of the proposed wind turbine parameters is shown in on Drawing 11333-2032.

Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics with only minor cosmetic details differentiating one from another.

The wind turbines that will be installed on site will be conventional three-blade turbines, geared to ensure that the rotors of all turbines rotate in the same direction at all times. Each discipline within this EIAR has assessed the proposed turbine parameters, as presented in Table 2-2, to ensure all scenarios have been assessed. The exact combination of rotor diameter and hub height will be dictated by the final selection of the turbine make and model at turbine selection stage / pre-construction. New turbine models or variants may be

available, due to advancements in technology, that were not on the market at the pre-planning / EIA stage, but which will fit within the parameters assessed.

The design is in line with the Wind Energy Development Guidelines (2006), which are currently in force and are also the subject of a targeted review. The current design will be capable of operating in compliance with the 2019 draft Guidelines, in particular in relation to:

- Shadow flicker – it is proposed to have near-zero shadow flicker (See Chapter 16);
- GCR – grid connection cables are proposed to be underground; and
- Proximity to sensitive receptors – a minimum turbine set-back of 4 times the tip height (179.5m to 180m) is provided.

Further to this, the proposed layout has achieved a high level of separation between dwellings and turbines by providing a minimum separation distance of >720m with the exception of one involved landowner (550m).

The layout reflects the outcome of the iterative design process. Further detail on the design philosophy, constraints and alternative turbine layouts and dimensions considered is detailed in Chapter 3 (Consideration of Reasonable Alternatives) of this EIAR.

2.6.1.1 Turbine Details and Power Output

The proposed wind farm will have an estimated Export Capacity (EC) of 61.6 - 77 MW. Each turbine has a tip height of between 179.5 m - 180 m, rotor diameter of between 149 m - 163 m, hub height of between 98.5 m - 105 m. Drawing No. 11333-2032 which accompanies the planning application detail the parameters of the turbine which may be used for the proposed project. Turbines of the exact same make, model and dimensions can have different power outputs depending on the capacity of the electrical generator installed in the turbine nacelle. The exact combination of rotor diameter and hub height will be dictated by the final selection of the turbine make and model at turbine selection stage/pre-construction. Each discipline within this EIAR has assessed the full range of various types and sizes of turbines within the above-mentioned envelope to ensure all scenarios within the proposed range have been assessed. The exact rating and design of the proposed turbine will be subject to a competitive procurement process that will only commence if the project receives consent. Final dimensions and EC of the final turbine technology installed will be on submitted to the Local Authority and An Coimisiún Pleanála pre-construction.

A rated capacity of 61.6 - 77 MW used below (represents the range of generation capacity) to calculate the power output of the proposed wind farm.

Assuming an installed capacity of 61.6 MW, the proposed wind farm has the potential to produce approximately 194,261 MWh (megawatt hours) of electricity per year, based on the following calculation:

A x B x C = Megawatt Hours of electricity produced per year where:

A = The number of hours in a year: 8,760 hours

B = The capacity factor, which considers the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor[3] of 37 % is applied here.

C = Rated capacity of the wind farm: 61.6 MW

Assuming an installed capacity of 77 MW the proposed wind farm has the potential to produce approximately 222,591 MWh (megawatt hours) of electricity per year.

The electricity produced by the proposed wind farm would be sufficient to supply approximately 36,690 to 45,860 Irish households with electricity per year, based on the average Irish household using 4.5 MWh of electricity[4].

The turbines are multi-ply coated to protect against corrosion. It is proposed that the turbines will be of an off-white or light grey colour to blend into the sky background. This minimises visual impact as recommended by the following guidelines on wind energy development:

- Wind Farm Development – Guidelines for Planning Authorities (2006);
- Draft Revised Wind Energy Development Guidelines (2019);
- "The Influence of Colour on the Aesthetics of Wind Turbine Generators" – ETSU W/14/005333/00/2000.

The Wind Energy Development Guidelines (2006) are currently in force and are also the subject of a targeted review.

Furthermore, the proposed layout has achieved a high level of separation between dwellings and turbines by providing a minimum separation distance of 720 m (with the exception of an involved landowner) which is following the setback requirements in the 2006 and Draft 2019 Guidelines.

2.6.1.2 Turbine Blades and Nacelle

The turbines will be of the generic three bladed, tubular tower model with horizontal axis. The rotor blades are bolted to the central hub, which is connected to the nacelle. The nacelle typically holds the following turbine components:

- Generator
- Electrical components
- Aviation lighting
- Control Unit

The blades of modern turbines are generally made of fibreglass or carbon fibre reinforced polyester and are aerodynamically shaped to improve efficiency and lower noise production. A turbine begins generating electricity at a wind speed of 2 to 4 m/s, with optimum power generation at wind speeds of approximately 9 to 16 m/s generating between 3 and 20 revolutions per minute, for modern WTGs depending on wind speed and make of turbine.

[3] The capacity factor of 35% is based on an EirGrid study of wind and solar energy in the region of the proposed project, classed as Region K in the study, from December 2022 (https://www.eirgridgroup.com/site-files/library/EirGrid/ECP-2-2-Solar-and-Wind-Constraints-Report-Area-K-v1.0.pdf

[4] https://www.seai.ie/data-and-insights/seai-statistics/residential

The turbines usually shut down at wind speeds greater than 25m/s, although some machines are designed to operate at up to 30 m/s. The yaw mechanism turns the nacelle and blades into and out of the wind. A wind vane on the nacelle controls the yaw mechanism. Blades are pitched to match the wind conditions.

The entire nacelle (shown in Figure 2-3) and rotor are designed to rotate, or 'yaw', in order to face the prevailing wind. A wind vane located on the nacelle of the turbine controls the yaw mechanism. Rotors of all the proposed turbines will rotate in the same direction. A control unit is located at the base of the turbine and an internal ladder or lift leads up to the nacelle where the shaft, gearbox and generator are located.

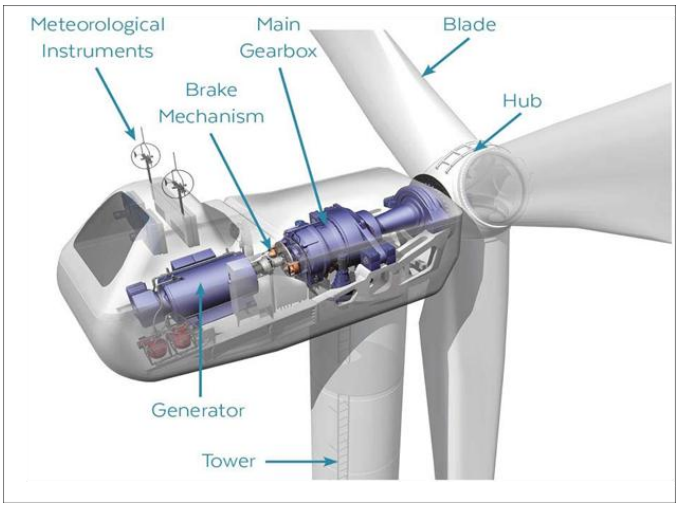


Figure 2-3 Turbine nacelle and hub components

2.6.1.3 Turbine Tower

The turbine tower is a conical steel tube with multiple-layer paint finish. Modern tower design also provides for the use of concrete sections. Towers generally comprise a steel ring at the base of the tower which is assembled on top of the concrete foundations using locally supplied concrete and then pre-stressed. The tower is delivered to site in three to six sections. The first section is bolted to the steel base, which is cast into the concrete foundation. The base of the tower is around 5 m in diameter, tapering to approximately 2 and 3 m where it is attached to the nacelle (Figure 2-3). The tower is accessed by a galvanised steel hatch door, which will be kept locked except during maintenance. The nacelle dimensions can vary depending on the final hub height and the model which is used. The exact details of the turbine tower will be dictated by final selection of the turbine make and model, but will be within the design envelope assessed, as described above.

2.6.1.4 Turbine Transformer

When operating, the rotational energy of the blades is utilised to drive the WTG. The generated power is in the form of low voltage (approximately 660 volts) and connected via low voltage cables to the WTG transformer located within the tower or in the turbine nacelle. This transformer steps up the generated low voltage to medium voltage (approximately 33 kV) which supports a reduction of electrical losses when transmitting power over large distances. The medium voltage from the WTG transformers connects to the proposed on-site 110 kV

substation which again will be stepped up to high voltage for connection to the transmission system.

2.6.2 Hardstanding Area

Hardstanding areas consisting of levelled and compacted hardcore are required around each turbine base to facilitate access, turbine assembly and turbine erection. Hardstanding formation will consist of a minimum 500mm hardcore on geo-textile membrane.

Each hardstanding area consists of a main crane pad hardstanding of 40m x 75m intended to safely accommodate a large SWL crane during turbine assembly and erection. Additional sections of the hardstanding area must facilitate the offloading and temporary storage of WTG components, and generally provide a safe, level working area around each WTG position. The size, arrangement and positioning of hardstanding areas are dictated by turbine suppliers, but for the purposes of this planning application, a worst-case design has been used to cover the largest WTG model. The turbine hardstanding areas are shown on drawing 11333-2031.

The hardstanding areas are extended to cover the WTG foundations once the turbine foundation is in place. The area will facilitate parking for operation and maintenance staff.

Occasional surface maintenance may be required in the operational phase of the proposed wind farm, but this is anticipated to be very minimal and infrequent.

2.6.3 Turbine foundations

Each wind turbine will require piled foundations or a gravity foundation of reinforced concrete (RC) foundation comprising a base slab bearing onto rock or other competent substrata with a central upstand to support the tower. The foundations for each turbine will be designed by the appointed Civil Designer. Piled foundation bases are generally 24-26 m in diameter and gravity foundation bases are typically 24-26 m in diameter with detailed foundation design being dictated by the local ground conditions.

The foundation solutions have been identified:

- Gravity Foundations; and
- Concrete driven or bored piles;

Gravity Foundation

A gravity foundation (also called a spread footing or mass concrete foundation) resists turbine loads primarily through its own weight and the bearing capacity of the soil beneath it. A gravity base spreads the loads over a large area. Foundation bases will consist of circular concrete base which will be 24m – 26m m in diameter and 4-5 m in depth with a central circular raised plinth which will be used to anchor the turbine tower at its base.

For gravity type turbine foundations, unsuitable material will be excavated and replaced by granular fill (6N). Each turbine foundation will be investigated before and during construction.

Piled Foundation

For the piled turbine foundations, the piling type and configuration, as shown on Planning Drawing 11333-2042 and 11333-2043, could be up to 60 no. 300 mm x 300 mm square concrete driven piles 9-89 or up to 16 no. 1200 mm– 1600 mm diameter bore piles. While final piling depths will depend on localised ground conditions as discussed, the drawings detail a piling depth of 20 m for indicative purposes.

The foundation area is first stripped and topsoil stored for later reinstatement. Pile locations are set out precisely to ensure the correct alignment and spacing. Driven piles—usually steel or precast concrete—are driven into the ground using hydraulic piling rigs until they reach a suitable load-bearing layer. In other cases, bored piles are drilled, reinforced with steel cages, and filled with concrete. Once all piles are installed, a reinforced concrete pile cap is cast on top, tying the piles together to distribute the loads evenly. A circular turbine pedestal is then constructed on the pile cap, containing the bolt ring where the turbine tower will later be anchored.

2.6.4 Internal Access Roads and Site Entrance

2.6.4.1 Site Entrance

The site will be accessed by two site entrances, located on the regional road R492 (Co. Offaly) and local road L1071 (Co. Tipperary).

The R492 access point will be the main site access/egress point for the construction phase, as this is the only suitable access point to the existing road network to accommodate construction vehicles. A temporary contractor's compound will be located at the site entrance to accommodate vehicles and a temporary lay by / set down area is located along the first portion of the access track (See Figure 2-2).

During the operational phase, all vehicles will use the operational site entrance L1071, as described above.

2.6.4.2 Internal Access Roads

Internal access roads of circa 9.7 km will be constructed as part of the initial phase of the construction of the wind farm. Material will be sourced from the proposed on-site borrow pits to provide the required base material of the internal roads. The final graded surface material will be sourced from local quarries (such as Loughnane Quarry in Birr. Dowling Quarry in Lisduff or Kilsaran Quarry in Tullamore), which are discussed in Chapter 14 (Traffic & Transportation).

The internal access tracks for the wind farm start at the construction phase entrance near Sharavogue, located off the R492. The track runs northward past the met mast location where it meets the first two WTGs: T9 and T8. The track continues avoiding the bog curving slightly northwest, traversing several fields before reaching Ballincor Demesne, at the centre of the proposed wind farm site. From Ballincor Demesne the access tracks split three ways; north to Cloonaheen, through the area to access T5, T4, T3, and extends northwards to connect to T2 and T1. The substation, BESS and Borrow Pit 1 are situated along the route between T2 and T1; south to access T7 and T6, Borrow Pit 2 and 3 are located in proximity to T6; and east to access T10 and T11.

New roadways will have a running width of approximately five metres, with wider sections (which vary but are up to 7m), and on the final approaches to turbine hardstands, as shown on the drawings accompanying the application.

All new roadways will be constructed with a 2% camber to aid drainage and surface water runoff. A drainage design has been provided for the proposed site access tracks. Road construction details and associated drainage design are included in the drawings.. The roads on-site will be of the floating and excavated road type. Floating roads will be utilised in areas

of peat with slopes less than 3%. Further details on the road construction is included in Section 2.7.2.

The access tracks have been aligned for extensive site coverage, ensuring access to all key locations while carefully navigating around environmentally significant features, such as bogs and water courses.

2.6.4.3 Watercourse Crossings within the Proposed Wind Farm Site

There is one proposed river/stream crossing between T2 and T3 on the proposed wind farm site, as shown on the site layout drawings (available as part of this planning application. The crossing methodology is detailed below in Section 2.7.2.4. The clear span bridge crossing method will avoid in-stream works. The sediment control measures including silt fences will be installed before the works occur within 50m of the river

2.6.5 Works Areas on the Proposed Turbine Delivery Route (TDR)

It is proposed that turbine components will be delivered to the site via Foynes Port, Co. Limerick. The route heads west along the N69, where it will join the N18 on the outskirts of Limerick. The route continues onto the M7 and depart the M7 at Junction 21 near Derrinsallagh and join the northbound R435 towards Kyle Manor. At Kyle Manor loads will turn left and join the R445. the route will continue west along the R445 to the Dublin Road Roundabout where loads will turn right and then left to travel west towards Roscrea. The route continues along the Dublin Road onto the N62 travelling northwest through Roscrea. It continues north-westerly on the N62 to Sharavogue where it turns left onto the R492 and continues southwest to the proposed wind farm site entrance.

Pell Frischmann completed an assessment of the proposed TDR (see Appendix 2-1). A number of pinch points have been identified and assessed. An assessment was carried out using site visits and Autotrack to determine what, if any, works are required at these pinch points to allow the turbine components to be moved to the site. Works range from hedgerow trimming/clearing to facilitate oversail of turbine blades to the temporary placement of hardcore to allow the oversize vehicles to pass. The current planning application includes the proposed temporary works required for turbine delivery within third party privately owned lands at Sharavogue cross roads. These works will be required at the N62 / R492 Junction, where a new offline track will be constructed in advance of the junction to provide the required turn radii for loads to access the R492.

A further consenting process will be used to obtain permission for the other temporary works areas along the route (within the public road corridor), as required. The temporary works not covered within this planning application are detailed below:

- Temporary removal of marker poles in the middle of the road at Foynes Port exit gate.
- Temporary road signage demounting and vegetation clearance at the N69 junction.
- Temporary road signage demounting and vegetation trimming at the N69 left bend at Shrylane.
- Temporary road signage demounting and vegetation trimming at the left bend west of Borrigone on the N69.
- Vegetation (tree canopy) to be trimmed along N69 west of Toreen.

- Temporary removal of two bollards where the N69 bends northwest of Knockbrack West.
- Temporary road signage demounting and vegetation clearance at the N69 Roundabout West of Clarina.
- Temporary road signage demounting, temporary removal of one lighting column and vegetation clearance at the N69 / N18 Slip Road Roundabout 1.
- Temporary road signage demounting, temporary removal of three lighting column and section of the safety barrier, vegetation clearance and load bearing surface to be laid temporarily at the M7 Junction 21/R435.
- Temporary road signage demounting, vegetation clearance and load bearing surface to be laid temporarily at the R435 Mountain View Roundabout.
- Temporary road signage demounting, vegetation clearance and load bearing surface to be laid temporarily at the R435 / R445 Roundabout.
- Temporary road signage demounting, temporary removal of two lighting column and section of the fence, vegetation clearance and load bearing surface to be laid temporarily at R445 / Dublin Road Roundabout.
- Temporary road signage demounting, removal of planters and bollards, and load bearing surface to be laid temporarily at the Dublin Road / N62 Junction.
- Vegetation to be trimmed and load bearing surface to be laid temporarily on the Dublin Road in Roscrea.
- Vegetation to be trimmed along the N62 Right Bend North of Gloster House.

A review of overhead utility line clearances will be undertaken with the statutory providers along the whole route. Details of the proposed TDR are included in Appendix 2-1.

2.6.6 On-site Substation

It is proposed to construct one on-site 110kV electricity substation, as shown on Figure 2-2 and the site layout Drawing 05876-DR-300 (available as part of this planning application). This will provide a connection point between the proposed wind farm and the proposed grid connection point at the existing 110kV Dallow substation (via approximately 12.23 km of cables – see Figure 2-4, pg24 to see this route).

The construction and electrical components of the on-site substation will be to EirGrid and ESB specifications within the parameters assessed in the application[5]. The dimensions of the proposed substation and IPP compound will be 110.5 m in length by 84.5 m in width. The

5 EirGrid specification for the underground cabling can be accessed at: https://www.eirgridgroup.com/site-files/library/EirGrid/10-110-kV-Underground-Cable-Functional-Specifications.pdf

substation footprint will include one control building and electrical components necessary to export generated power from the wind to the transmission system.

2.6.7 Battery Energy Storage System (BESS)

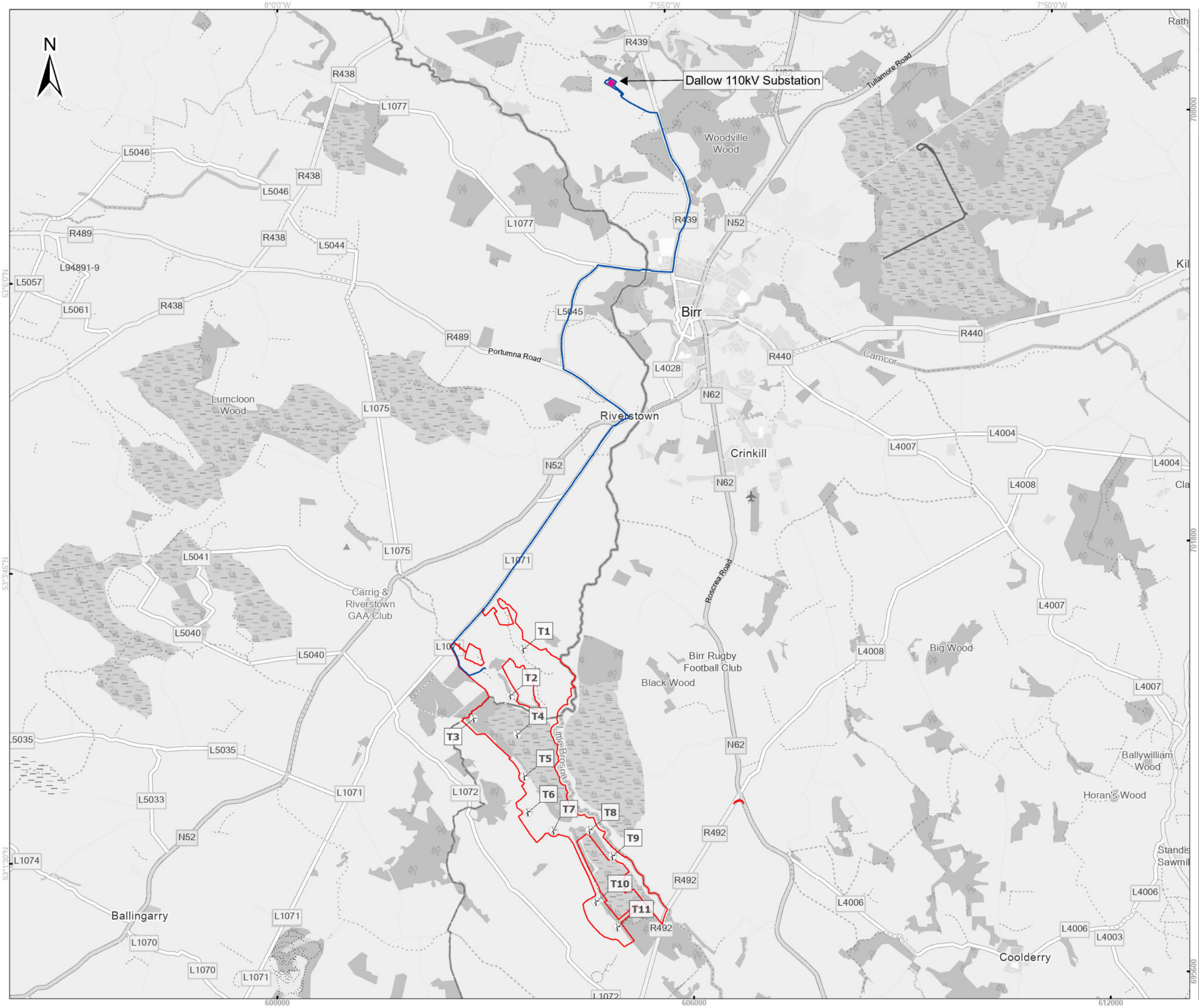
The proposed BESS is located 0.3km to the west of T2 and will consist of new internal access tracks, provision of site security fencing up to 2.5m in height, 90 no. battery energy storage system units, 17 no. power conversion system units, building, CCTV, carparking, underground cable connections to a proposed onsite 110kV substation, landscaping and all associated ancillary development services and works.

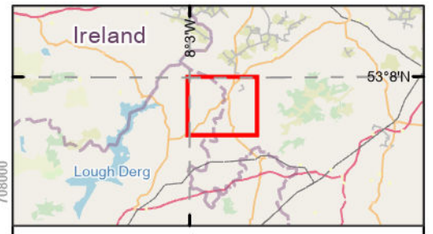
It is proposed to install CCTV cameras on site for security purposes. The CCTV would be remotely monitored via a 24/7 operational team who would alert all relevant personnel in the event of a break-in or vandalism at the site.

The battery enclosures and associated equipment will sit on reinforced concrete slabs. The surrounding site areas will be surfaced using a permeable gravel surface. The site access track will also be constructed and surfaced using a permeable gravel surface.

The BESS containers are self-contained with a fire risk assessment included in Appendix 2-7. The BESS system will have an inert gas fire suppression system. Water from an onsite water tank and ponds will only be used to dampen down the site boundaries.

The BESS will be located as shown on the site layout drawing in Figure 2-2 as shown in Drawing 11333-2021.





Legend

- Proposed Wind Farm Site Boundary
- Proposed Grid Connection Route
- Proposed Turbine locations
- Dallow 110Kv Substation

0 1 2
Kilometers

Spatial Reference
Datum: IRENET95
EPSG: 2157

Rev	Date	Description	By	Chkd.
A	13/01/2026	Draft issue	K.K	J.D

Client: RWE

Project:
Ballincor Wind Farm

Title:
Figure 2-4
Proposed Grid Route

Scale @ A3: 1:50,000

Prepared by:	Checked by:	Date:
K.Kale	J.Dillon	January 2026

TOBIN
Tel: +353-(0)1-8030406
Email: info@tobin.ie
www.tobin.ie

Map Ref: 11333-031-GCR-P.App.BO-TOB-A

Draft: A

2.6.8 Proposed Grid Connection Route (GCR)

The proposed GCR is approximately 12.23 km in length and will travel in a northerly direction from the proposed project substation to the existing Dallow 110 kV substation, with most of the GCR situated in the public road network. The first 8.57 km of the GCR will be in County Tipperary, with the final 3.66 km of the GCR located in County Offaly.

The GCR begins by exiting the proposed on-site 110kV substation. The GCR exits under the northwest boundary of the proposed project substation, travelling northwest for a short distance through private land before reaching the L1071 public road. The GCR will be constructed along the L1071 road for approximately 4.7 km before merging onto the N-52 national secondary road around Riverstown Village.

The route continues northeast through Riverstown Village along the N52 for approximately 160 m before turning northwest onto the R489 regional road. The route continues northwest on the R489 regional road for approximately 1.2 km before turning north on to the L5045 local road. The route continues northward along the L5045 before turning east at the T-junction with the L1077 Croghan Road heading toward Birr Town. Croghan bridge marks the county boundary on the L1077. The GCR will travel along the local road to the R439 Birr-Banagher Road. The GCR follows the R439 north for approximately 2.44 km. Just south the R439 regional road junction with the L70152 local road the GCR will turn eastward transition from the regional road to private land on the south side of the junction where the R439 regional road meets the local road approaching Dallow 110 kV substation.

2.6.8.1 Watercourse Crossings along the proposed GCR

The proposed GCR contains three stream / river crossings and four drain crossings. These are shown on the site layout drawings (available as part of this planning application)and in Appendix 2-5 (TLI Construction Methodology Report). Table 2-3 details the proposed methodologies for crossing the given watercourses.

Table 2-3 Proposed GCR watercourse crossing details

Crossing No.	TLI number[6]	Crossing details	Proposed crossing methodology	In Stream works required?
1	W1	Drainage channel	HDD	No
2	W2	Drainage Channel	Flat Formation overpass	No
3	W3	Little Brosna River	Directional Drilling – off road HDD	No
4	W6	Drainage channel	Flat Formation overpass	No
5	W7	Drainage channel	Flat Formation overpass	No
6	W8	Small Stream	Flat Formation overpass	No

[6] W5 and W6 are storm culverts

7	W9	**Small Stream**	Dam and Flume	Yes

The construction methodologies for the crossings are discussed in Section 2.7.2 and in Appendix 2-5 (TLI Construction Methodology Report).

2.6.9 Local Electricity Supply

As part of the proposed project, a local electricity supply will be required as a power supply to the proposed substation for light, heat and power purposes, and to the proposed met mast. The local supply will be designed and constructed by ESB Networks.

No significant works are anticipated for this (placement of local poles with cable from a nearby power line), as it will be similar to what normally occurs for new house connections. Should permission be granted the details (regarding the exact location of each pole) of the connection route and works will need to be determined by ESB Networks prior to construction, but as it will be a local electrical connection, the works will be minimal in nature. A number of existing low voltage power lines will be undergrounded to accommodate the proposed windfarm.

Currently, there is a live electricity supply <100m to the southeast of the proposed BESS and 300m to the southeast of the proposed substation location. The route will utilise access tracks to get to the substation, and no additional felling will be required. It will also utilise existing road/field boundaries to get to the substation to avoid placing poles in an open field.

2.6.10 Met Mast

One meteorological mast is proposed the south of T8. The mast will be equipped with wind monitoring equipment at various heights. The mast will be located as shown on the site layout drawing in Figure 2-2 and will be a slender, free-standing lattice structure of 100m and 4m lightening rod (total of 104m) in height, as shown in Drawing 11333-2038.

2.6.11 Borrow Pits

It is proposed that three on-site borrow pits will be constructed, in order to provide a source for the majority of stone material requirements within the site itself. These are located north and west of T6 and south of the BESS, covering an area of approximately 4.2 ha). The locations of these borrow pits can be seen on the site layout drawings (available as part of this planning application). Having 3 no. borrow pits on-site will significantly reduce materials transport to site and will minimise the depth to which the borrow pit excavations will be required.

The proposed borrow pits will be at locations with very gently sloping terrain. Their reinstatement will also utilise mineral soil and stone excavated as part of the proposed project. See the Spoil & Peat Management Plan (Appendix 8-3) for further details.

Further details of the site investigations that were carried out and the stone type/suitability are provided in Chapter 8 (Land, Soils & Geology).

2.6.12 Temporary Construction Compounds

Four temporary compound areas will be constructed to provide office space, welfare facilities, car parking and hardstands for storing materials. The BESS site will initially be

utilised as a temporary compound (Compound 1). One will be located at the southern end of the site, while the second will be at the centre of the site. A compound will be located to the north.

Table 2-4 Site Compounds

Compound	Location	Area (hectares)
1	Main compound - at location of BESS	1.4
2	Substation Compound	0.15
3	Central Compound	0.48
4	Southern Compound	0.4

The construction compound locations are shown on Figure 2-2 and site layout drawings (available as part of this planning application).

At the commencement of the construction phase, the temporary compounds will be constructed to provide office space, welfare facilities, car parking and hardstands for storing materials. The site compound will consist of temporary porta-cabins constructed on a granular platform.

The construction compound will contain a designated, bunded area for storing fuels and site generators, fitted with a full retention oil interceptor. It will also include a temporary site offices, waste storage area, toilets, staff facilities, and parking for employees and visitors. Sanitary facilities will be located within a staff portacabin. Wastewater from these toilets will be collected in a sealed storage tank and removed by a licensed contractor for treatment at an off-site facility. A temporary water supply tank will also be installed for hygiene purposes.

At the end of the construction phase, the compounds will be removed, with any stone being used towards reinstatement of the nearest onsite borrow pits. After removal of the compound, the area will be restored to agricultural land use or biodiversity end use.

2.6.13 Forestry

A small portion of the proposed wind farm is located within an area which is currently planted with forestry. This area is located within private lands. There will be a requirement to fell forestry in the areas immediately around the footprint of the wind farm infrastructure. The total area of forestry to be felled is estimated to be 7.2 ha, as shown in Appendix 2-8 Forestry Report. As a commercial crop, this forestry is scheduled to be felled in the future regardless of the proposed project being constructed or not.

2.7 Construction Methodology

2.7.1 Turbine Hardstand, Foundations and Erection

The topsoil will be stripped where development of the hardstands are proposed. The hardstands will be built up to create a level base which will be <0.5m above existing ground level.

Ground investigations in the form of trial pitting, boreholes, peat probing, and use of augers have been carried out along the proposed turbine locations and hardstanding locations to inform the depth of excavation and upfill required (See Appendix 8-1 (Site Investigation Report)).

Construction of the turbine bases will require excavation of the surrounding soil or peat from the foundation and crane hardstanding area to founding level with access being provided from adjacent roads at or near the surrounding ground level. The soil or peat will be replaced with granular fill where required.

Each wind turbine will require piled foundations or a gravity foundation of reinforced concrete (RC) foundation comprising a base slab bearing onto rock or other competent substrata. The foundations for each turbine will be designed by the appointed Civil Designer. Piled foundation bases are generally 24-26 m in diameter and gravity foundation bases are typically 24-26 m in diameter with detailed foundation design being dictated by the local ground conditions.

Three main foundation solutions have been identified:

- Gravity Foundations;
- Concrete driven piles; and
- Bored piles.

The material encountered in the trial pits excavated at each turbine location was generally soft to stiff (See appendix 8-1). Deeper excavations to more competent material w ill be required to construct the turbine foundations. It should be noted that, although it is anticipated that most foundations will be required to be piled, it is likely that some turbines could utilise gravity foundations. Where foundations are not piled, additional fill material will be needed to upfill the excavation to the levels required for the wind turbine foundations. An excavation of up to 4.5 m below ground level is anticipated at each turbine foundation. Gravity, bored pile and driven pile details are shown on Planning Drawings 11333-2041 to 2043.

Following site visits and site design, volume calculations provide an estimation of fill required for the hardstands. This is predicted to be approximately 110,000 m^3 of gravel and stone material. Some material (c.40%) will be obtained from the on-site borrow pits with only the surface 150mm layer to come from local quarries which are within reasonable proximity to the site. Each turbine foundation will require between 650-750 m^3 of concrete which will be sourced from offsite suppliers.

The geotechnical investigations indicate that the foundations at the proposed wind farm will be excavated. Piling is anticipated for a number of Turbines including T3, T4, T8 and T9.

Each of the turbines to be erected on site will have a reinforced concrete base. Overburden will be stripped off the foundation area to a suitable formation using a 360° excavator and will be stored as detailed in the CEMP (Appendix 2-3), Section 2.8.4 and in the Peat and Spoil Management Plan (Appendix 8-3). The sides of the excavated areas will be sloped sufficiently (2:1 for mineral soil, 1:1 for rock) to ensure that slippage does not occur. Excavations will be approximately 4 metres deep.

In the case of gravity foundations, if the formation level is reached at a depth lower than the depth of the foundation, the ground level will have to be raised with clause 804 hardcore material and/or lean mix concrete, compacted in layers as required. An interceptor drain will be formed around the upgradient perimeter of the turbine and hardstand to divert the clean water away from the works. This will outfall out at the lowest point level to a spreader.

Water within the excavation will be treated via a settlement pond and level spreader. If the water has a heavy silt load, then an additional measure such as a Siltbuster will be employed.

An embankment and a fence will be constructed around the perimeter of each turbine base to prevent construction traffic from driving into the excavated hole and also to demarcate the working area. All necessary health and safety signage will be erected to warn of deep excavations etc. Access to and from excavated bases will be formed by excavating a gangway to a standard 1:12 grade, thereby allowing safe passage into/out of the foundation area.

The construction methodology for hardstandings will be as follows:

- The formation will be prepared to receive the geotextile membrane.
- Stone will be placed and compacted in layers
- A drainage ditch will be formed, within the excavated width and along the sides of the hardstanding.
- Surplus topsoil will be placed along the side of the hardstanding and dressed to blend in with surrounding landscaping.

The hardstand area subbase material will be sourced on site, with concrete locally sourced, in quarries in proximity to the site.

2.7.1.1 Assembly Area and WTG Erection

Once the turbine components arrive on site they will be placed on the hardstand in a designated lay down area prior to assembly. The delivery methodology has been robustly assessed based upon the known issues along the access route.

It is anticipated that each WTG will take approximately 7 days to erect, once there is a suitable weather window the WTG will be assembled. Once complete, the WTGs will be commissioned and tested.

It is expected that the entire construction phase, including civil, electrical and grid works, and WTG assembly will take between approximately 24 months.

2.7.2 Wind Farm Site Access tracks

Site access tracks will be constructed to each turbine location, and to all proposed site infrastructure as shown in the Figure 2-2 and planning drawings (A full set of planning drawings are available as part of this planning application), with a proposed running width of 5m to 6m. The access track at the main site entrance to Compound 4 is 7m-10m to allow for ease of access from the R492. Passing bays will be included along internal access tracks strategically, as indicated in the planning drawings. There are three road construction methodologies; floating roads, upgrading of existing site access tracks, and excavated new founded roads. These are described below in further detail below.

Sections of founded roads and floating roads are shown on Drawing 11333-2024. Where required, the road widths will be increased to a maximum of 10m to form the indicated passing bays, as shown in Figure 2-2 and the application planning drawings.

The access sites will be designed in accordance with the Transport Infrastructure Ireland's DN-GEO-03060 (May 2023) Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated, and compact grade separated junctions).

2.7.2.1 Excavated New Road

Tracked excavators will be used to carry out excavations. Surplus excavated material will be dealt with as set out in the CEMP, (Appendix 2-3 of this EIAR) and the Peat & Spoil Management Plan – Appendix 8-3 of this EIAR). The excavated tracks will be constructed as per Drawing 11333-2033.

When the topsoil has been removed and/or the formation layer (bedrock/firm subsoils) has been reached, stone from the on-site borrow pits will be placed to form the track foundation. The sub grade will be compacted with the use of a roller or other similar approved compaction method. The top dressing will be added to the tracks at this point. As a final measure to ensure long term stability of the track this layer will be checked and repaired as required after all turbine bases have been poured (i.e. after the heavy wearing traffic is largely finished).

Site access tracks will be maintained for the duration of the construction and operational phases of the project. Access tracks material not in use during the operational phase will be reused for surfacing the operational areas. They will be used for forestry (and agricultural) purposes after decommissioning of the wind farm.

2.7.2.2 Upgrade of Existing Site Access Tracks

The site of the proposed project has an existing network of site access tracks present which have been incorporated into the proposed design as much as possible.

Where an existing track needs to be widened, it will be carried out on both sides, and the same steps as described in the new track construction above will generally be followed (without excavating the existing track material) – see cross section Drawing 11333-2033. There are no significant known constraints running alongside the access tracks to be upgraded, but where forest or drainage channels are located alongside the track (as they occur frequently through the site), they will be moved as required during dry weather periods.

Tracked excavators will be used to construct this track type. Surplus excavated material will be dealt with as set out in Section 2.6.11. When the topsoil has been removed and/or the formation layer has been reached, stone from the on-site borrow pits will be placed to form the track foundation. The foundations of the new and existing sections of the track will be built up to the required level. The sub grade will be compacted with the use of a roller or other similar compaction method. The top dressing will be added to the tracks at this point. As a final measure to ensure long term stability of the track this layer will be checked and repaired as required after all turbine bases have been poured (i.e. after the heavy wearing traffic is largely finished).

On-site access tracks will be maintained for the duration of the construction and operational phases of the project. Where access tracks are not in use, material will be reused for track maintenance. Further details of the construction methodology for upgrading existing site access tracks is provided in the CEMP in Appendix 2-3 and further detail is provided in the Peat and Spoil Management Plan, provided as Appendix 8-3.

2.7.2.3 Floating roads

The construction methodology for permanent floating roads, is summarised as follows:

- A geotextile separation layer is placed on the existing ground surface.
- A biaxial geogrid is then placed over the geotextile.

- Where the CBR of the underlying material is >1%, 400mm of class 1A/6F2/6I/6J material followed by 100 mm of a compacted Clause 804 will be used for a running layer to give a total road thickness of 500m.
- Where CBR of the underlying material is <1%, 300 mm of Class 1A/6F2/6I/6J material will be placed, followed by a second layer of biaxial geogrid, followed by 300 mm of Class 1A/6F2/6I/6J material, followed by a 100 mm of a compacted Clause 804 running layer for a total road thickness of 700 mm.
- Permanent floating roads for wind farm access will be designed to a running width of 5.0m.

Typical sections of a new permanent road are shown on Planning Drawing 11333-2023. Where required, the road widths will be increased to form the indicated passing bays.

2.7.2.4 Wind Farm Site access tracks – Proposed Clear Span Bridges & Culverts

There is one proposed river/stream crossing, over the Holy Well Clohaskin River, between T2 and T3 as shown on the planning drawings. The crossing method of a clear span bridge will avoid in-stream works.

At the stream crossing, the site access tracks will firstly be constructed to allow easy access to the works area (as described in the previous section), as there are currently no access roads at this location. The sediment control measures including silt fences will be installed before the works occur within 50m of the river (see Section 2.9.3 below, Chapter 9 of this EIAR (Hydrology and Hydrogeology) and Appendix 2-3 of this EIAR (CEMP). Following this, the topsoil will be stripped from the foundation footprint on either side of the watercourse, taking care to avoid disturbing the river/stream bed or banks.

Topsoil will be stripped and used as part of the construction of new site access roads and turbine hardstands. Only tracked machines will be permitted to travel off the road surface. No excavations will be permitted within the river channel. Suitable stone fill material (clause 804 or similar) will be added in layers and compacted to form the base of the foundation. The precast clear-span bridge will be placed onto this either as one or more pieces using a mobile crane. There will be no requirement for large-scale casting Where plastic or concrete culverts are required for forest /field drainage ditch crossings by new or upgraded roads, they will be installed with a minimum gradient of 1%. The pipe will be placed into the drain bed, and some of the underlying material will be placed within the pipe to benefit biodiversity (for further information see Chapter 6 of this EIAR (Biodiversity). The use of corrugated culverts will aid in the retention of sediment, thereby naturalising the culvert bed. Large stones will be placed at the culvert outfall to dissipate any flow and reduce the potential for erosion. The culverts will be inspected regularly to ensure they do not become blocked.

2.7.3 110 kV Substation, BESS and Electrical Works

The proposed substation will be designed and constructed to meet all the required EirGrid/ESB standards. An area will be levelled and built to the required level with stone fill material, capped by high quality compacted stone. Two control buildings will be constructed using traditional techniques for constructing small buildings (i.e. concrete block walls, timber and slate tile roof). Foundations will be built for the proposed electrical infrastructure. All the electrical equipment will be installed to EirGrid/ESB requirements. Perimeter fencing will be constructed around the substation compound for security and safety purposes. Further information and drawings of the substation and electrical

infrastructure are provided in the planning drawings while the associated construction methodologies provided in Appendix 2-5.

The BESS will compromise a series of 90 battery containers and associated equipment will sit on reinforced concrete slabs. The containers are standard ISO 668 sizes (e.g., 20-foot) for transport. BESS containers arrive pre-assembled and pre-tested with inbuilt fire and monitoring.

The containerised system is optimised for easy delivery, construction and for safety. The container system integrates thermal management (air/liquid cooling), fire suppression, and monitoring. The surrounding site areas will be surfaced using a permeable gravel surface. The BESS access track will also be constructed and surfaced using a permeable gravel surface. A local electricity supply will be made from the nearest suitable power lines at the time of construction in the same way that residential houses are connected. Standard overhead electricity poles and cables will be installed avoiding sensitive habitats and using a minimal footprint.

Internal cables connecting the wind turbines to the on-site substation will be laid within or immediately adjacent to the on-site access roads. All cables will be laid in underground ducts. Ducts will be installed by open trenching. Information on trench construction methodology is provided in Section 2.7.4.

2.7.4 Battery Energy Storage System (BESS)

The 90 battery containers and associated equipment will sit on reinforced concrete foundations. The surrounding site areas will be surfaced using a permeable gravel surface. The site access track will also be constructed and surfaced using a permeable gravel surface.

The BESS system will have an inert gas fire suppression system. Water from an onsite water tank and ponds will only be used to dampen down the site boundaries.

It is proposed to install CCTV cameras on site for security purposes. The CCTV would be remotely monitored via a 24/7 operational team who would alert all relevant personnel in the event of a break-in or vandalism at the site.

2.7.5 Proposed Grid Connection Route

It is proposed to supply the power from the Ballincor Wind Farm to the Irish electricity network via tail fed 110kV underground cables (approximately 12.23 km cable length to the existing EirGrid substation in the townland of Clondallow Co. Offaly, as detailed above in Section 2.6.6.

The proposed GCR is located in the townlands of:

- Cronekill, Pallas, Caherhoereigh, Kylenamuck, Tinnakilly, Cornhill, Ballyloughnane Killeen, Croghan, County Tipperary; and
- Townparks, Dovegrove, Woodfield, Clondallow in County Offaly

It is proposed to HDD at one river crossings (Little Brosna River), drainage channel crossing W2, at a cattle underpass and at TN-N52-008 (former) railway bridge.

Connection works from the on-site substation to Dallow 110 kV substation will involve the installation of ducting, joint bays and ancillary infrastructure along the existing road network –

See Appendix 2-5. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches and road surfaces.

It is expected that partial road closures will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems – See Chapter 14 Traffic. Local diversions will be in place. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. These works shall be undertaken on a rolling basis with short sections closed for short periods before moving onto the next section.

As part of the scoping and consultation process for the project, searches of existing utility services were carried out to identify areas where major assets exist such as high voltage electricity cables or gas mains – See Chapter 15 Material Assets. Private utility and telecommunications companies were also consulted during this period. No gas or high voltage cables are present on the site. Water infrastructure and other services are detailed in Appendix 2-5.

Connection works from the on-site substation to Dallow 110 kV substation will involve the installation of ducting, joint bays and ancillary infrastructure along the existing road network. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches and road surfaces.

A rope will be inserted into the ducts to facilitate cable-pulling later.

The cables will be laid in trenches as per EirGrid Specification (See Trench Bedding Details in Appendix 2-4). There will be three stream/river crossing and four drainage channel crossings along the proposed GCR.

The drilling process involves pumping a drilling fluid through the drill head, which is inert, natural and biodegradable (e.g. Clear Bore™). This fluid will be used sparingly and only as required to avoid an excess and will be appropriately stored in a sealed containers when not in use. This fills voids locally around the drill head and enables the drill to progress. Should any excess drilling fluid occur, it will be contained and removed for disposal at a licensed waste facility. The duct will be positioned, and the launch and reception pits will be refilled.

Further details of this crossing method are provided in Appendix 2-5 of this EIAR.

Instream works are proposed for the Woodfield_25 stream where a dam and flume methodology will be utilised. Further information on the grid connection stream crossings can be found in Section 2.6.8.1.

2.7.5.1 110kV Underground Cable Trenches

The number and layout of cables is an important consideration in the design of the proposed wind farm site and proposed GCR. Minimum safety distances and angles etc. must always be maintained. This has been a fundamental consideration in determining the final location of the substation buildings and electrical infrastructure. Further information and drawings of the underground 110kV cable trenches are provided in Appendix 1-1 while the associated construction methodologies are provided in Appendix 2-5. A copy of the EirGrid 110 kV cable installation specifications are provided as Appendix 2-4.

The 110kV cables will be installed within the internal access roads in the proposed wind farm site and within the existing public road corridor as described in Section 2.6.4 above.

A section of the route (approximately 0.8km) will be located off road on the Clondallow local road as there is limited capacity to install within the local road. A service/maintenance access track will be put in place over the entire route. It should be noted that works within the public road corridor will also be subject to further consents/agreements with local authorities, for example a Road Opening Licence as appropriate.

A Traffic Management Plan has been prepared for the proposed project and is included as Appendix 2-2. This is a living document and will be updated ahead of construction to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by An Coimisiún Pleanála, in the event planning permission/approval is granted. Also, a confirmatory survey of road condition, including the condition of all road water crossings on the route, will be carried out along the GCR in advance of any works.

All cables will be laid in underground ducts. Ducts will be installed mostly by open trenching. The sequence of operations for installing ducts in trenches is to firstly strip off the ground material. A trench is then formed to the required depth and width. The ducts are generally laid on a bed of Cement Bound Granular Mixture (CBGM) and surrounded with CBGM. Where contaminants are found (or where bitumen-based materials are present) in excavated material, it will be removed from site by a licensed operator and disposed at an appropriately licenced facility. The top of the trench will generally be finished at ground level with stone as per EirGrid/ESB specifications (or in the case of trenches within public roads, it will be finished in a suitable road surface (at a minimum to the pre-existing standard) that will be agreed with the local authority in advance of works. The use of stone in this instance (off the public road corridors) will ensure the track is permeable and eliminate the potential for surface water runoff, as well as allowing vehicular access on the rare occasion it might be required.

The 110kV underground cable required to facilitate the proposed GCR will be laid beneath the ground surface and/or public road using the following methodology:

- The area where excavations are planned will be the subject of a confirmatory survey, prior to the commencement of works, with a cable locating tool and all existing underground services will be identified.
- A verification condition survey will be carried out for all parts of the route within the public road. Details of this survey will be agreed with the local authority in advance of the survey.
- Traffic management will be put in place before any works on public roads.
- A trench will be opened using an excavator to accommodate the required depth and width.
- The excavated material will be cast to the side to be reused as appropriate. This material will not be stored in the vicinity of any watercourse and will be smoothed with the back of an excavator bucket to minimise runoff. It will be cast on the upgradient side of the trench, so if any runoff did occur it will run into the down gradient trench. Excavated tar and excess material from the public road network will be transported off site by an appropriately authorised waste collector and disposed of at an appropriately licenced waste facility.

- Excess material will be used on the site of the proposed wind farm for borrow pit reinstatement and local landscaping. In the case of any material deemed as contaminated, a licenced waste carrier will transfer to an appropriate waste facility.
- Silt fences will be installed alongside the road/works areas as required near streams.
- Clay dams/plugs will be installed at regular intervals (depending on the gradient) to prevent conduit flow of water within the trench. These utilise low porosity clays over the full depth of the trench at regular intervals to prevent water moving along the trench.
- Works will not be carried out during periods of heavy precipitation. In the event that some surface water does accumulate in the trench, this will be allowed to percolate into the ground naturally.
- The trench will be surfaced in accordance with the road surface specifications of the local public road, or (in the case of off-road section) an EirGrid/ESB specification gravel access track to allow very occasional access for maintenance vehicles if required.
- Cable joint pits are normally located at regular intervals as shown in the site layout drawings. Each joint pit will be approximately 2.5m x 6m in size with a communications chamber and an earth link box in close proximity to the joint pit as shown in the detail drawing.). They will be constructed off narrow sections of the public road where this is possible (i.e. before/after it enters the road corridor, in lay-bys, etc.) A temporary surface is provided over these for safety and to allow easy access until the cables are pulled, after which time the area will be permanently reinstated/surfaced as appropriate. The location of these joint pits are provided on site layout drawings Drawing 05725-DR-101 and 05725-DR-102 in Appendix 2-5.
- It is anticipated that construction will be carried out by a single team (with plant items likely to include excavators and dumpers) along the route, but there is a possibility to use two separate teams to speed up the construction. It is expected that each team will lay approximately 150m of the route per day.

Further details on the design for the grid connection cable trenches are provided in Appendix 1-1 while the associated construction methodologies are provided in Appendix 2-5.

2.7.5.2 Stream Crossings

The proposed GCR contains three stream/river crossings and four drain crossings, as detailed above in Section 2.6.8 and Appendix 2-3 (CEMP).

The construction methodologies for the crossings are provided below. The route also contains minor forestry/field/road drains which are usually dry and only contain water during periods of heavy rainfall. These will be crossed using open trench crossings during dry periods.

2.7.5.3 Crossing Methodology - Former Railway Bridge and Cattle underpass

There are two (non-aquatic) HDDs along the proposed GCR to cross a former railway and a cattle underpass bridge. See the planning drawings and Table 2-5 for details.

Table 2-5 Proposed GCR HDD crossing details – Railway bridge and Cattle underpass

TLI number	Crossing details	Proposed crossing methodology	In Stream works required?
Bridge 1	Former railway Bridge	HDD off road	N/A
S10	Cattle underpass	Flat Formation overpass	N/A

A launch and reception pit is required for directional drilling, with each measuring approximately 1m wide, 2m long and 1m deep. The UGC will consist of 3 no. 160 mm diameter HDPE power cable ducts, 2 no. 125 mm diameter HDPE communications duct and a 125 mm Earth Continuity Conductor duct to be installed in an excavated trench between the proposed wind farm substation and existing Dallow 110 kV Substation. A specialised directional drill machine will be anchored to the ground and will drill at a suitable shallow angle to allow it to achieve the required depth for the bore. If ground conditions are unfavourable, the drilling process will need to be repeated using progressively larger drill heads until the required size is achieved. The drilling process involves pumping a drilling fluid through the drill head, which is inert, natural and biodegradable (e.g. Clear Bore™). This fluid will be used as required to avoid an excess and will be appropriately stored in a sealed container. This fills voids locally around the drill head and enables the drill to progress without the hole collapsing. Should any excess drilling fluid occur, it will be contained and removed for disposal at a licensed waste facility. The duct will be positioned, and the launch and reception pits will be refilled.

Further details of this crossing method are provided in Appendix 1-1 while the associated construction methodologies are provided in Appendix 2-5.

2.7.6 Borrow Pits

Material will be extracted from the borrow pits. There will be some small stockpiling of material, but these will be kept to a minimum. In general, construction will start from the south and centre of the site and work northwards. Borrow Pit 1 is located to the south of the BESS and on-site 110 kV substation. This borrow pit will not be reinstated as it will act as a flood compensation area as detailed in the FRA – See Appendix 9-3.

Borrow pit 2 and 3 will be used for the construction of the infrastructure in the southern half of the site. As construction moves to the northern half of the site a second and third borrow pit will be used. The borrow pits will be reinstated with any mineral and peat soils, or any spoil remaining once landscaping works have been completed. Further detail on the construction of the borrow pits is provided in Chapter 8 (Land, Soils and Geology).

Any soils/subsoils removed from the borrow pits will be temporarily stockpiled in accordance with best practice. During the extraction of the first borrow pit, removed spoil will be stored in a temporary stockpile with appropriate gradient (i.e. 1:2) and appropriate mitigation will be used to ensure the protection of downgradient watercourses (i.e. the use of silt fences, collector drains, Siltbuster, etc.).

Details on the borrow pit drainage is included in Appendix 9-4 SWMP. All surface water run-off from the borrow pits will pass through settlement ponds. It is proposed to locate settlement ponds downstream of borrow pits and associated stockpile areas, each hardstand and along the proposed wind farm site access tracks.

Groundwater encountered will be managed and treated in accordance with CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016).

All of the spoil temporary stockpiles will be located on relatively flat areas with the exception to where material is side cast from small/narrow pieces of infrastructure.

Once the material has been extracted from each borrow pit, they will be reinstated using any suitable material from the site and made secure using permanent stock proof fencing.

2.7.7 Permanent Meteorological Mast

The met mast installation works will be carried out by a small crew and are described as follows. An access track will be extended towards the mast location from the existing forestry track. The access track will be 3.5 m in width. Associated drainage infrastructure will be extended also. A small stone crane pad will be constructed in front of the proposed mast location. General construction methods for the above access track and hardstanding will match those described for wind farm access tracks and hardstandings.

The foundation will be excavated followed by shuttering, steel fixing and finally concrete pouring by ready mix truck. Excavation and concrete operations will be carried out in accordance with the CEMP (Appendix 2-3). The foundation will be 10 m x 10 m x 1.8 m in size. Following crane setup, the mast sections will be delivered and unloaded by truck. In accordance with an agreed lifting plan, mast sections will be lifted by crane into place. Wind speeds will be monitored at all times during lifting operations by the lead climber and crane operator. Mast sections will be bolted together by climbers.

Following erection of main mast sections, lightning protection and other ancillary components will be fixed to the mast. The mast will be decommissioned using a similar methodology as the construction except in reverse.

2.7.8 Forestry Felling

For the footprint of the infrastructure and associated felling buffers, there will be full tree removal.

A report detailing the forestry felling is provided as Appendix 2-8. It should be noted that the clear-felling of trees requires a felling licence. The associated afforestation of alternative lands equivalent in area to those lands being permanently clear felled is also subject to licensing ('afforestation licensing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing.

For the purposes of the proposed project, the Applicant commits that the location of any commercial forestry replanting (alternative afforestation) associated with the project will be greater than 10 km from the proposed wind farm site and also outside any potential hydrological pathways of connectivity i.e. outside the catchment within which the proposed project is located. Broadleaf replanting will take place on the proposed wind farm as part of the Biodiversity enhancement and management plan (BEMP) – See Appendix 6-4. The

BEMP includes a number of measures On this basis, it is reasonable to conclude that there will be no more than imperceptible indirect or in-combination effects associated with the replanting. In addition, the Applicant commits to not commencing the proposed project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority. Trees will be manually felled inside the 10m stream buffer.

The approach to afforestation requirements associated with the project is attached in Appendix 2-8.

2.7.9 Temporary Construction Compounds

Four temporary construction compounds are located within the proposed wind farm site, as detailed in Figure 2-2. The temporary construction compounds will be constructed in the sequence of Compound 4, then 3 followed by 2 and 1, and are as follows:

1. Compound 1 - The BESS compound will be initially utilised at the early stage as the main construction compound to minimise the landtake;
2. Compound 2 - Substation Compound to the south of the on-site 110kV substation;
3. Compound 3 - Central Construction compound near T7; and,
4. Compound 4 - Southern construction compound near the southern site entrance.

Construction of the bases for the compounds will require excavation of the surrounding soil or peat from the compound area to founding level with access being provided from adjacent roads at or near the surrounding ground level. The soil or peat will be replaced with granular fill where required. Any mineral soils removed during construction will be stored for later use in reinstatement. At the end of the construction phase, the compounds will be removed, with any stone being used towards reinstatement of the nearest on-site borrow pits. After removal of the compound, the area will be recovered in soil and replanted with forestry as described in Appendix 2-8.

2.8 Construction Management

2.8.1 Construction Phase Monitoring and Oversight

A CEMP has been prepared for the proposed project and is included in Appendix 2-3. The CEMP will be updated prior to commencement of development to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the planning authority for written approval. Any updates will be minor and not affect the conclusions and mitigation measures specified in the EIAR and NIS.

The construction contractor will be responsible for implementing the mitigation measures specified in the EIAR and CEMP and for communicating the requirements with all staff on-site. Their implementation of the mitigation measures will be overseen by the supervising site staff, including the Environmental Manager, Ecological Clerk of Works (ECoW), site supervisor, archaeologists and/or geotechnical engineers, as appropriate.

The surface water drainage system will undergo weekly and daily inspections depending on the construction phase works to ensure that it is working optimally. Settlement ponds will require

regular inspection and cleaning where sediment collects. The drainage and treatment system for the proposed wind farm monitored more frequently during/after heavy rainfall events during the construction phase. A programme of inspection and maintenance will be designed and dedicated construction personnel assigned to manage the inspection programme. This is discussed further in the SWMP (Appendix 9-4) and the CEMP (Appendix 2-3).

A CEMP is included as Appendix 2-3 of this EIAR. The CEMP will be a key construction contract document, which will ensure that all mitigation measures, which are considered necessary to protect the environment are implemented. The commitments in the EIAR will be fully complied with by the contractor. In the event that planning permission/approval is granted any condition(s) relating to a CEMP which may be attached by An Coimisiún Pleanála to such a permission/approval, will be implemented in accordance with the requirements of the condition.

2.8.2 Construction Activities and Timing

It is anticipated[7] that 120 persons will be employed during the peak construction period and it is estimated that the main civils construction phase will take approximately 24 months from starting on-site (including forestry felling and vegetation clearance, drainage, construction of site access tracks, hardstands, turbine foundations). With the exception of the localised commercial forestry felling, vegetation clearance will commence outside the breeding birds season, which runs from the 1st of March to the 31st of August. If any minor clearance or trimming is required within those dates for health and safety reasons, or if the initial vegetation clearance extends past the 1st of March due to unsuitable weather conditions, the works will be preceded by an ecological survey (from a qualified and suitably experienced ecologist) to ensure there are no sensitivities associated with the action.

The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations will generally be restricted to between 7:00 hrs and 19:00 hrs Monday to Friday (excluding public holidays) and between 07:00 hrs and 14:00 hrs on Saturdays.

However, during the following critical periods longer hours will be required:

- Concrete pours for turbine foundations;
- During turbine installation when the weather is suitable (i.e. light winds);
- Delivery of oversized loads;
- In the unlikely event of an emergency (this is unlikely - see Chapter 17 (Major Accidents and Natural Disasters)).

Any such out of hours working will be agreed in advance with Offaly and Tipperary County Council apart from in the case of an emergency and in line with the Schedule of Mitigation requirements of this EIAR (Chapter 20).

Due to the volume of concrete required for each turbine foundation, and the requirement for the concrete pours to be continuous, deliveries are often carried out outside normal working hours. Such activities are limited to the day of turbine foundation concrete pours, which are completed in a single day per turbine (can take >12 hours). Because of the scale of the main

7 http://www.ewea.org/fileadmin/files/library/publications/reports/Wind_at_work.pdf

concrete pours that will be required to construct the proposed wind farm, the main pours will be planned weeks in advance and refined in the days leading up to the pour. Concrete pours are required for 11 No. wind turbines so they will require 15 days of longer working hours. A similar number of days with longer working hours would be needed for installation of the turbines during a period of calm weather (this is mostly limited to on-site activity).

To accommodate delivery of large turbine components along public routes it could be necessary on occasion to work outside of the core hours, with delivery of these oversized loads typically late evenings. It is expected 24-40 delivery events will be needed on a maximum of 24-40 days for delivery of these oversized loads which usually travel in convoys of 3-5 vehicles with a Garda escort.

The construction phase can be broken down into five main phases as follows (there will be overlap between these):

- 24 months – Civils (including forestry felling and vegetation clearance, drainage, construction of site access tracks, hardstands, turbine foundations);
- 9 months – Electrical grid connection/substation installation and commissioning;
- 12 months – Site electrical (installing between turbines and substation, pulling cables);
- 4 months – Turbine deliveries and erection;
- 2 months – Commissioning.

2.8.3 Traffic Management

A comprehensive and methodical approach will be employed in planning all works related to the proposed project ensuring minimal disruption to road users and the public.

A Traffic Management Plan – Appendix 2-2, developed in consultation with TCC and OCC, will be implemented to maintain a safe environment for both road users and construction personnel. This plan is detailed in the CEMP in Appendix 2-3. Should planning permission be granted for the proposed project, the Traffic Management Plan will be finalised following the appointment of the main construction contractor. This finalisation will incorporate the requirements of any relevant planning conditions, including any additional mitigation measures stipulated, and will be submitted to the planning authority for approval.

2.8.3.1.1 Quarries and Associated Haul Routes

The stone required for constructing internal access roads, hardstands, the temporary construction compound, and the substation is expected to be sourced from the on-site borrow pits. In the event that suitable site-won material is unavailable for the finishing layer on the access roads and hardstands, this material will be imported from nearby quarries.

Details of the operational licensed quarries in the vicinity, along with the indicative haul routes to the site, are provided below.

The hardstand subbase material will be primarily sourced on site with capping and concrete locally sourced, in quarries in the local area. It is assumed that the construction haul route vehicles will have these routes:

- Route 1 – Loughnane Concrete (Birr) - N52, N62, R492
- Route 2 – Lisduff Quarry – R433, L3247, L3246, N62, R492

- Route 3 – Kilsaran Tullamore - N52, N62, R492

Traffic surveys were undertaken in May 2024 in order to analyse the impact that the proposed project generated traffic will have on the road network. Junction Turning Counts (JTC) were undertaken from 7:00 to 19:00 on the 16th of May 2024 and Automatic Traffic Counts (ATCs) speed survey were undertaken between the 16th and the 29th of May 2024, at the locations below:

Site 1 - N62/R492 Crossroads

Site 2 – ATC 1 – R492 in the vicinity of the site entrance

Site 3 – ATC 2 – L1071 in the vicinity of the site entrance

2.8.4 Soil and Peat Management

The management of all excavated soils and peat will be conducted in accordance with the Soils Management Plan (Appendix 8-3).

Peat will be reused on site in accordance with the circular economy. Any peat excavated during the construction of access roads on the site will be reused on-site in the borrow pits reinstatement, peat deposition area, for berms, landscaping, and along the margins of the access roads. Additionally, topsoil will be repurposed for landscaping and reinstatement around turbine bases and hardstanding areas.

Further information on soils management is available in Chapter 8 of this EIAR and the CEMP in Appendix 2-3. A Water Framework Directive (WFD) Compliance assessment has been prepared (Appendix 9-1).

2.9 Surface Water Management and Site Drainage

A key design philosophy for proposed project involves utilising existing forestry and agricultural tracks, along with their associated drainage, while implementing Sustainable Drainage Systems (SuDS). This approach ensures the preservation of existing drainage patterns across the site.

An appropriately designed drainage system serves as the primary mitigation measure for protecting nearby water bodies. This system incorporates silt protection infrastructure and control measures to reduce the rate of surface water runoff from the wind farm site.

The drainage system will be constructed alongside all turbine hardstands, internal access tracks, the substation, BESS, and the temporary construction compound. The existing drainage systems for tracks and roads will largely be retained. Where road widening is necessary, existing roadside swales will be relocated to accommodate the expansion.

The design of access roads and associated drainage infrastructure will follow natural contours as much as possible to minimise road and swale gradients. This approach will reduce velocities within the swales, thereby reducing erosion.

Further details on the existing and proposed site drainage are provided in Chapter 9 of this EIAR, Hydrology & Hydrogeology and Surface water management plan (SWMP - Appendix 9-4).

2.9.1.1 Existing Site Drainage

The proposed wind farm is located within the Shannon Water Framework Directive catchments (hydrometric area) in Offaly and Tipperary.

These waters are of low gradient near the proposed wind farm, representing natural watercourses typical depositing rivers. The Little Brosna River flows in a northerly direction to the east of the proposed wind farm site.

The site and adjacent lands also include man-made drains which flow into the watercourses mentioned above. These are primarily used to assist in the drainage of forestry, peatland and agricultural land-use. Natural watercourses and drainage ditches on site will be crossed by the proposed access tracks.

Further details on the existing and proposed site drainage are provided in Chapter 9 of this EIAR, Hydrology & Hydrogeology and Surface water management plan (SWMP - Appendix 9-4).

2.9.1.2 Drainage and Silt Control

The proposed surface water drainage system utilises sustainable drainage devices and methods. Surface water management on wind farm construction sites utilises well-established and well-understood techniques. These management methods are standard ones in the industry and they have a long-term record of a high level of efficacy. Wind farm construction has been ongoing in Ireland for over 30 years, and where the mitigation and methods are correctly implemented, water quality is generally not a significant issue over that period. The measures outlined in this project have been developed are based on the CIRIA (Construction Industry Research and Information Association) C648 (Control of water pollution from linear construction projects) guidance, and that guidance has itself been developed based on site experience in Ireland and the UK over recent decades.

Construction Phase

During the construction phase, all run-off from construction areas will be controlled and treated to reduce suspended solids concentration prior to being discharged into the existing drainage network or overland. A number of temporary settlement ponds will be established during the construction phase along roadways and in areas of high construction activity (adjacent to turbine foundations, borrow pits, construction compounds etc) to minimise silt laden run-off entering the drainage network.

The settlement ponds will be designed to provide sufficient retention time and a low velocity environment to allow suspended solids to fall out of suspension prior to allowing the water to outfall to the receiving environment. Further information on the runoff calculations and site drainage is provided in Chapter 9 (Hydrology & Hydrogeology). The proposed locations of the permanent and temporary settlement ponds, and details of same are shown on Drawings 11333-2040/ 11333-2041/ 11333-2042 of the planning drawings and Appendix 9-4.

A Surface Water Management Plan (SWMP) has been prepared (Appendix 9-4) and a Water Framework Directive assessment completed (Appendix 9-1). The purpose of this plan is to ensure that all site works are conducted in an environmentally responsible manner so as to minimise any potential adverse impacts from the proposed project on surface water quality. The plan incorporates the following specific objectives:

- Provide overall surface water management principles and guidelines for the construction phase of the proposed project;
- Address erosion, sedimentation and water quality issues; and
- Present measures and management practices for the prevention and/or mitigation of potential downstream impacts.
- A summary of the surface water mitigation is included in Table 2-6 below.

Table 2-6 Surface water mitigation matrix

	Turbines	Substation and compounds	Deposition areas	Access tracks	Borrow Pits	GCR
Utilise existing bridges and access roads	-	-	-	‡‡	-	‡‡
>50m Buffer	‡‡	‡‡	‡‡		‡‡	
Interceptor drains	‡‡	‡‡	‡‡	‡‡	‡‡	
Check Dams or similar	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡
Swales	‡‡			‡‡	‡‡	
Sediment traps	‡‡		‡‡			‡‡
Settlement Ponds	‡‡	‡‡	‡‡		‡‡	
Proprietary Settlement tanks	+	+			‡‡	
Weather dependant	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡
Silt Fences	‡‡		‡‡	‡‡		‡‡
Clear Span Bridge				‡‡		
Concrete washout control measures	‡‡	‡‡				‡‡
Chemical/fuel bunds	‡‡	‡‡	‡‡		‡‡	‡‡

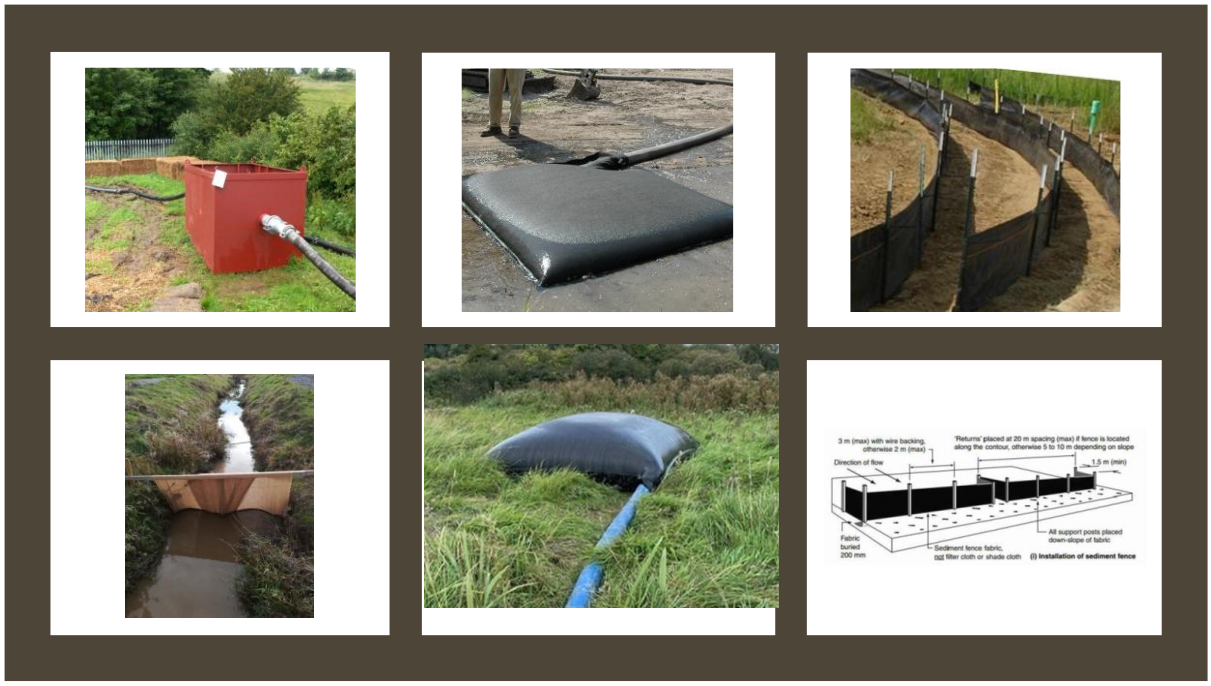


Figure 2-5 Examples of Proprietary Silt Control measures

Effective sedimentation requires still water, necessitating a retention period of several hours within the settlement pond to allow suspended solids to settle. The retention time is influenced by factors such as particle size, water disturbance, depth, temperature, and particle density. For this project, a retention time of two hours will be applied in designing the ponds, as recommended by CIRIA C648, to ensure adequate silt settlement.

CIRIA C648 also advises designing pond outfalls to accommodate a 1-in-10-year storm event. However, for this project, the outfalls will be engineered to handle flows associated with a 1-in-100-year event. The settlement ponds will have a depth of 1.0 meter. The proposed dimensions of the settlement ponds are detailed in the Surface Water Management Plan (SWMP) located in Appendix 9-4.

Where necessary, existing access roads will be upgraded. If the current drainage infrastructure does not adequately prevent the mixing of clean and dirty water, improvements will be made by implementing the drainage methods proposed for new access roads.

Further information on hydrology and drainage is provided in Chapter 9 Hydrology and Hydrogeology as well as in the SWMP in Appendix 9-4 and the accompanying planning application drawings. The proposed drainage layout is illustrated in Drawing No. 11333-2061 to 11333-2065.

2.9.2 Waste Management

A Spoil and Peat Management Plan for the proposed project has been included in Appendix 8-3. The plan outlines procedures for managing waste generated during the construction phase of the project. In accordance with the circular economy soils will be reused on site.

During construction, waste will be collected and sorted at source, then stored in designated containers at the temporary compound. The appointed contractor will bear the responsibility of assigning a Waste Manager, who could be a Project Manager, Site Manager, or Site Engineer.

This individual will oversee all waste-related activities, to ensure efficient management of waste throughout the proposed project.

Efforts will be made to follow the waste hierarchy and limit waste generation through prevention, reduction, reuse, and recovery, wherever feasible. Any remaining waste will be transported to licensed facilities for disposal. This approach complies with the Waste Management Act of 1996 (as amended), following the principles of the European Waste Management Hierarchy and National Waste Management Guidelines.

2.9.3 Wastewater Management

It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off-site by a permitted waste collector to a wastewater treatment plant. It is not proposed to treat wastewater on-site, and therefore the EPA's *'Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses'* (EPA, 2021) does not apply. Similarly, the EPA's manual on *'Treatment Systems for Small Communities, Business, Leisure Centres and Hotels'* (EPA, 1999) also does not apply, as it too deals with on-site treatment of wastewater.

The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. Full details of the proposed tank alarm system will be submitted to the Planning Authority in advance of any works commencing on-site.

The wastewater storage tank alarm will be integrated with the on-site electrical equipment for alarm notification that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended), will be employed to transport wastewater away from the site. When the final destination of the wastewater is known following the appointment of a permitted contractor, this information will be submitted to the Planning Authority.

2.10 Operation

The wind farm's operations will be managed remotely, with a technician overseeing daily operations from an offsite location.

The turbines will function autonomously throughout the operational phase, adjusting to variations in wind speed and direction through anemometry equipment and control systems. Regular maintenance, typically conducted twice annually, will be carried out either by the turbine manufacturer or a contracted service provider.

The applicant is seeking a 35-year operational period for the wind farm, starting from the date of commissioning. In addition, permission for the on-site substation is requested to be granted indefinitely, as it will become a permanent component of the national electricity grid. As such, the substation will remain in place after the wind farm's operational life concludes.

35 years is the anticipated minimum useful lifespan of wind turbines which are being produced for the market today. The lifespan of wind turbines has been increasing steadily in recent years and allowing this duration will improve the overall carbon balance of the development, therefore maximising the amount of fossil fuel usage that will be offset by the wind farm. Leaving the wind turbines in-situ until the end of their useful lifespan would be optimum from an environmental viewpoint, particularly in relation to carbon savings.

2.10.1 Operation and Maintenance Facilities

Three dedicated control buildings will be constructed to facilitate operation and maintenance staff, as well as necessary equipment and spare parts. Regular maintenance activities will be scheduled to ensure the efficient operation of the wind farm, access roads, substation and BESS. Drainage infrastructure including the clear span bridge, culverts and drainage channel will be maintained during the operational phase.

2.10.2 Operational Phase

The WTG's will be connected together, and data relayed from the wind turbines to a control centre. Each turbine will also be monitored off-site by the WTG supplier or Operations and Maintenance (O&M) service provider. The monitoring of WTG output, performance, wind speeds, and responses to any key alarms will be monitored at a control centre 24-hours per day.

Typically, maintenance works will be undertaken by a small team of 2-3 individuals commuting to the development by Light Vehicles (LV). The 110kV substation components and site tracks will also require periodic maintenance in accordance with appropriate operation maintenance plans, procedures and health and safety plans. Residual effects and emissions are detailed in the relevant chapters i.e. Chapter 10 Air Quality and Chapter 14 Traffic and Transportation.

All the trips identified are a conservative assumption with occasional construction machinery to assist with maintenance of access tracks, drainage and each WTG would be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. These vehicles will arrive to site from two access points, one on the L1071 (Co. Tipperary) and the R492 (Co. Offaly).

Once operational, it is estimated that the wind farm will support 2-3 full-time long term, high quality technical jobs on site in operation and maintenance as well as a more significant number of jobs in ancillary functions (estimated to be a total of between 22-32 jobs between direct and indirect employment based on research). See Section 5 (Population and Human Health) for further information.

During the operational phase only site management and intermittent maintenance of the BESS will be required for the proposed project. Lithium batteries are classified as hazardous waste. Should any batteries need replacing during the operational phase, these will be removed using licenced/permitted waste management companies.

2.11 DECOMMISSIONING

As the project reaches the end of its operational life a decision will be made whether to decommission or repower the site. If the decision is taken to repower the site, this would be subject to a separate planning application. The EIAR assessment had assumed decommissioning will be undertaken.

When decommissioning takes place, cranes will be used to dismantle above-ground turbine parts, which will then be transported off-site for recycling.

The turbine foundations will be left in place, with their pedestals covered over to allow natural re-vegetation. This approach is preferred from an environmental standpoint, as removing the

reinforced concrete foundations would cause significant disturbances such as noise, vibrations and dust.

The existing site access roads and hardstandings around the turbines will remain in place after decommissioning. These will continue to serve for forestry or agricultural purposes. The turbine hardstandings and foundation pedestals will be covered with topsoil, originally stripped during construction, and landscaped to promote natural re-vegetation.

The proposed GCR, substation and other electrical equipment, will be integrated into the national grid and will remain operational. The BESS will be removed during the decommissioning phase.

It is anticipated that the entire decommissioning phase will be completed within six months. A comprehensive decommissioning plan will be established and agreed upon prior to the start of construction with Offaly and Tipperary County Councils.

2.12 Assumptions and Limitations of Assessment

Specific assumptions relevant to environmental aspects are set out in the corresponding EIAR Sections. Some general assumptions that have been made during preparation of this EIAR are set out below:

- In undertaking cumulative assessments, consented, but as yet un-built, developments have been assumed to be built in accordance with and within the duration permitted by the associated grant of permission (see Appendix 4-1); and
- Information provided by third parties, including publicly available information and databases, is correct at the time of publication.

Specific limitations relevant to certain environmental aspects are set out in the corresponding EIAR Section. Some general limitations associated with the preparation of this EIAR are set out below:

- Baseline conditions and assessments are assumed to be accurate at the time of the physical surveys but may be subject to change, due to the nature of the surrounding environment and surrounding activities; and
- The assessment of cumulative effects from built or consented developments is partially reliant on the availability of information provided by relevant third parties. Local Authority and An Coimisiún Pleanála public planning registers were reviewed and relied upon as part of the assessment process.

The activities carried out in researching, surveying and preparing this EIAR were carried out, in the main.

2.13 REFERENCES

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