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ENVIRONMENTAL SCIENCE &
PLANNING

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED BARNADIVANE WIND FARM & SUBSTATION, CO. CORK

VOLUME 2 – MAIN EIAR CHAPTER 2 - DESCRIPTION OF THE PROPOSED DEVELOPMENT

Prepared for:

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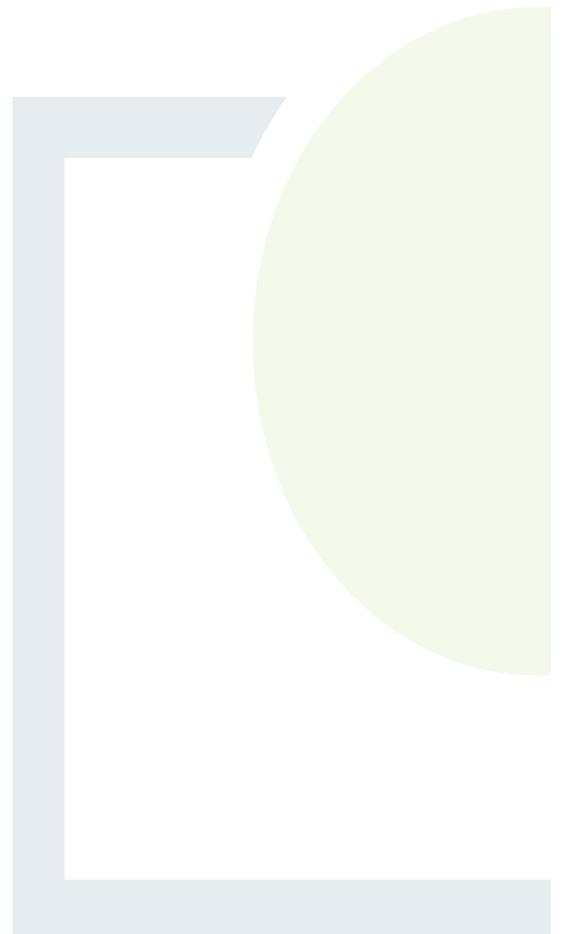


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2. DESCRIPTION OF PROPOSED DEVELOPMENT

2.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the existing site and the main components of the Proposed Development. This section also provides details on the construction, operation and decommissioning of the Proposed Project (as hereinafter defined) in compliance with the EIA Directive.

A detailed description of the Proposed Project assessed in the EIAR is contained in Section 2.3.1 and a description of the Proposed Development for which consent is sought is contained in Section 2.3.2.

In summary, the Proposed Project for EIA purposes is made up of the Proposed Development which includes 6no. wind turbines (1) and a 110kV substation (2), for which planning consent is sought and, other elements of the project for which permission has already been granted which includes enabling works to facilitate the delivery of turbines to site (3) and if necessary, an alternative grid connection (4).

1. Proposed 6 no. turbine windfarm also referred to in this report as ‘the Proposed Wind Farm’ (pending under An Bord Pleanála planning ref. PL04.308208);
2. Proposed 110kV substation within the site of the Proposed Wind Farm, also referred to as ‘the proposed substation’ (pending under An Bord Pleanála planning ref. PL04.308210);

The in-combination effects of the following elements of the Proposed Project are include in the assessment.

3. Enabling works for the Turbine Delivery Route, also referred to in this report as ‘enabling TDR works’ (permitted under Cork County Council planning ref. 14/6803);
4. Potential alternative grid connection, also referred to in this report as the ‘the AGCR’ (permitted under Cork County Council planning ref. 15/730 & An Bord Pleanála Ref. PL04.246353).

This EIAR is provided in response to An Bord Pleanála (the Board/ABP) correspondence dated the 13th May 2021 requesting an update to the previous Environmental Impact Statement (EIS) and/or Environmental Report submitted for both the Proposed Windfarm (ABP Case reference: PL04.308210) and the Proposed Substation application (ABP Case reference: PL04.308208). Both applications are currently before the Board as separate applications but are assessed in tandem in this EIAR. As such, this EIAR can be considered to represent the client's response to ABP correspondence relating to both applications.

An overview of the Proposed Project is shown in Figure 2-2. This illustrates the general layout of the Proposed Development site together with the alternative grid connection route (AGCR) and Turbine Delivery Route (TDR).

The Proposed Development includes the wind turbines, internal access tracks, hard standings, permanent meteorological mast, onsite substation, internal electrical and communications cabling, temporary construction compound, drainage infrastructure and all associated works related to the construction of the Proposed Development. Refer to Figure 2-3 for the general arrangement of the Proposed Development site.

The Proposed Development includes lands in the townlands of Lackareagh, Garranereagh and Barnadivane (Kneeves).



Turbines will be delivered along the TDR via the N22 Cork-Killarney road, as far as the junction with the R585 at Inchirahilly. From here, the route will follow the R585 road (Crookstown-Bantry) as far as the junction with the local road L6008, at Bengour West. From here it will follow the local road network through Lackareagh, as far as the proposed entrance to the site.

2.1.1 Project Background

The current EIAR study area has been subject to previously permitted planning applications. There was a previously permitted planning permission for the development of 14 turbines and a substation at this site, this permission was valid until December 2016. The development comprised 14 turbines with a tip height of 105m, a meteorological mast, a 110kV substation and switching station and all associated access roads, handstands, drainage, cabling and ancillary infrastructure. The relevant planning references for this permitted development are Cork County Council (CCC) Pl. Ref. 05/5907, An Bord Pleanála (ABP): PL04.219620 and CCC PL. Ref. 11/6605 (extension of duration of permission).

Construction of the Previously Consented Development did not take place for various reasons of a commercial, economic and technical nature that were outside of the control of the developer, as acknowledged by Cork County Council in granting an extension for a period of 5 years under Section 42 of the 2000 Act (CCC: 11/6605).

Advances in turbine technology in the intervening years meant the Previously Consented Development had a number of limitations and in December 2014 the applicant submitted a new application to maximise the efficiency of the site. This application was for a 6 no. turbine wind farm and was made to replace CCC Pl. Ref. 05/5907 which was extended under CCC Pl. Ref.11/6605. The planning reference for this application was CCC Pl. Ref. 14/6760. The Proposed Wind Farm comprised 6 turbines with a tip height of 131 m, a meteorological mast, access roads and handstands, a new access junction and improvements to the public road, a temporary compound, a borrow pit, underground electrical cables and ancillary infrastructure. An Environmental Impact Statement (EIS) was submitted as part of the application.

In December 2014, a separate planning application for the Proposed Substation was submitted to Cork County Council (Pl. Ref. 14/557). A Planning and Environmental Report was submitted as part of the application. This application was required in order to meet current standards in substation design at that time. The substation was to replace the substation granted under CCC Pl. Ref. 05/5907 which was extended under CCC Pl. Ref.11/6605, and ABP PL04.219620. The decision was quashed by order of the High Court in November 2016 with the case reactivated in March 2017 (ABP PL04.248152) and granted permission in April 2019. This decision was quashed by order of the High Court in May 2020.

In November 2015, the applicant received a grant of permission by Cork County Council for a revised wind farm layout consisting of 6 no. wind turbines which was appealed to An Bord Pleanála (Ref: PL04.245824). The decision was quashed by order of the High Court in November 2016. It was ordered that the case be remitted back to the Board and the case was reactivated in March 2017 (ABP PL04.248153). and granted permission in April 2019. This decision was quashed by order of the High Court in May 2020.

These cases were remitted back to ABP for re-decision for the Proposed Wind Farm site (PL04.308210) and the Proposed Substation (PL04.308208). This EIAR has been produced in response to a request from An Bord Pleanála to provide an updated assessment given the passage of time since the submission of the 2014 applications.



In December 2014, a separate planning application was made by the applicant for improvements to the public road, to facilitate turbine delivery at the junction of the R585 and the local road, L6008, at Bengour West (CCC Pl. Ref. 146803 and ABP PL04.245034). A separate planning application was necessitated by Cork County Council, as the planning/land ownership boundary was not contiguous with that of the Proposed Wind Farm. However, where required, the potential impacts of these proposed road improvement works were considered within the EIS (EIAR) as part of CCC Pl. Ref. 14/6760, ABP PL04.245824 and ABP PL04.248153.

Underground grid connection cabling linking the Proposed Wind Farm to the Carrigarierk Wind Farm is also being cumulatively assessed as part of this Project. This is being assessed cumulatively as in the event that the loop-in loop-out connection to the 110kV overhead line (OHL) becomes unviable, the permitted underground cabling will provide an alternative means of connecting the Proposed Wind Farm to the National Grid at the Carrigangan 110kV substation.

The flowchart shown in Figure 2-1 details the timeline of the site planning history, including associated developments:

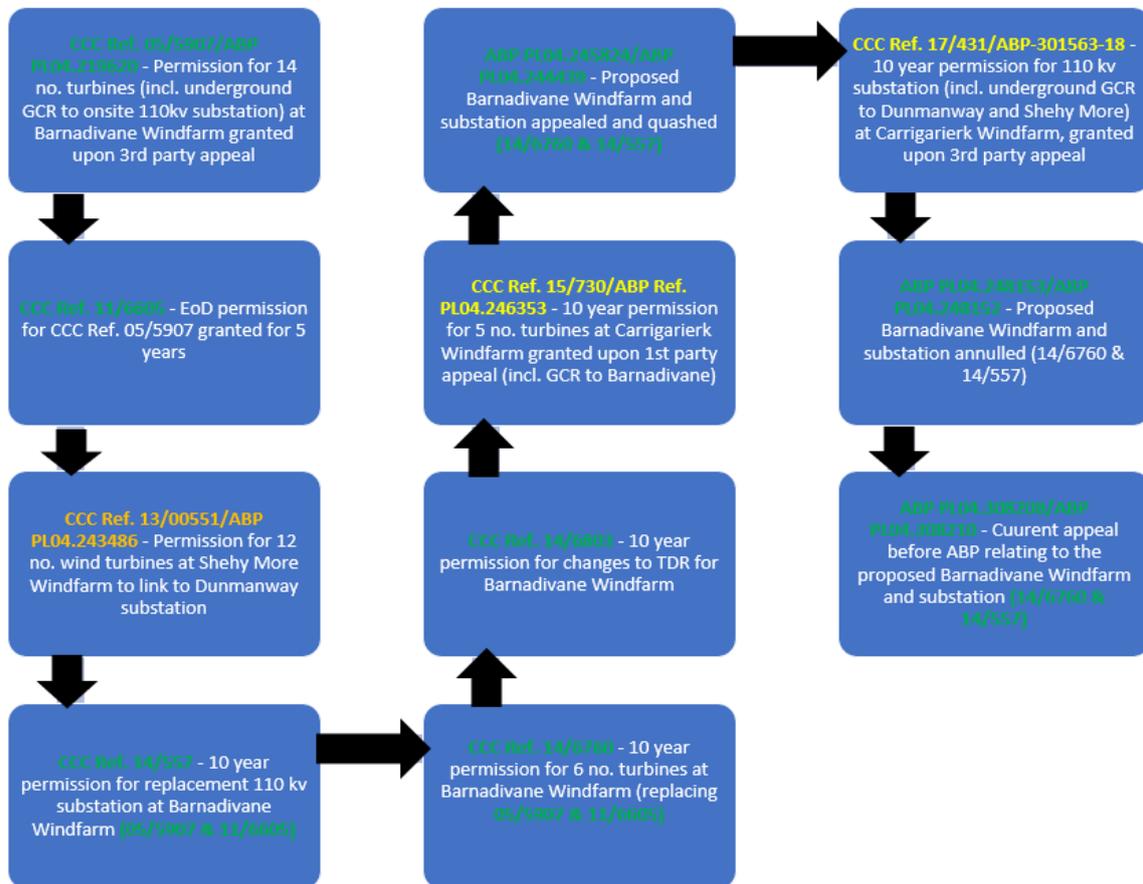


Figure 2-1: Site planning history timeline

2.2 Existing Environment

2.2.1 Proposed Development

The Proposed Development site is located in the townlands of Lackareagh, Garranereagh and Barnadivane (Kneeves), near Teerelton, Co. Cork.



The Proposed Substation sits within the same study area as the Proposed Wind Farm, together considered 'The Proposed Development', and therefore is the subject of the same existing environment.

The Proposed Substation will be sited underneath the existing 110kV overhead line within an agricultural field, allowing for a loop-in loop-out connection to the existing grid network.

There is a good network of local roads accessing the Site. The nearest national route, the N22, is the main arterial route for traffic commuting between Cork and Killarney and is located approximately 5km to the north at its closest. The nearest regional route, the R585 between Cork and Bantry, passes 1km to the south of the site. The R585 connects to the N22 at Crookstown, 5km to the east of the site.

The Proposed Development is located on a ridgeline within the Bride River valley. The Site ranges in elevation from 180m on the southern boundary to 270m to the north of the Site. The land to the south slopes downwards towards the River Bride and low-lying rolling farmland. To the north, the land slopes to the River Lee, which lies at approximately 70m OD.

The land to the east of the Site drops to below 200m OD, with hills separated by river valleys. To the west of the Site there is a series of hills with peaks in the region of 220m OD to 240m OD. A site layout is shown in Figure 2-2.

The Proposed Development site is currently used for agricultural grazing. The field boundaries are defined both by the hedgerows and by sod and stone banks. The land to the south of the Proposed Wind Farm, at the location of the permitted road improvement works (junction of L6088 and R585, permitted pursuant to CCC 146803) is in Coillte lands, adjacent to existing forestry.

There are a number of occupied dwellings within 1.5km of the site, with the closest being approximately 267m from the nearest turbine. This dwelling is occupied by a stakeholder. Refer to Figure 2-2.

The Proposed Development site is currently primarily utilised for agriculture. There are no hospitals, schools, hotels or guesthouses within 1km of the Site. There are no recreational activities associated with this Site. The nearest watercourse is a tributary of the River Bride in the south-eastern portion of the Site.

The landform reflects the underlying geology of the region which is dominated by east-west anticlines and synclines. The anticlines form the hills with sandstone dominated bedrock and the synclines form the main river valleys (Lee, Bride and Bandon Rivers) which are underlain by limestone.

The Proposed Development site does not lie within any Natura 2000 sites. There are three Natura 2000 sites (two cSACs and one SPA) within a 10 km radius. The Gearagh cSAC (site code 000108) and the Gearagh SPA (004109) lie over 6.5 km to the north. The Bandon River cSAC (002171) lies over 9.5 km southwest of the Proposed Development site. Figure 2-4 for designated sites within 15km of the Site.

Two recorded monuments occur within close proximity to the Proposed Development site. These are a ringfort (CO083-078) and an enclosure (CO094-036). The ringfort is to the north of the Proposed Development site, being approximately 270m north of the proposed turbine, T2. The enclosure is located in a small mature forestry plantation to the south-western corner of the Proposed Development site, approximately 376 m from proposed turbine, T6.

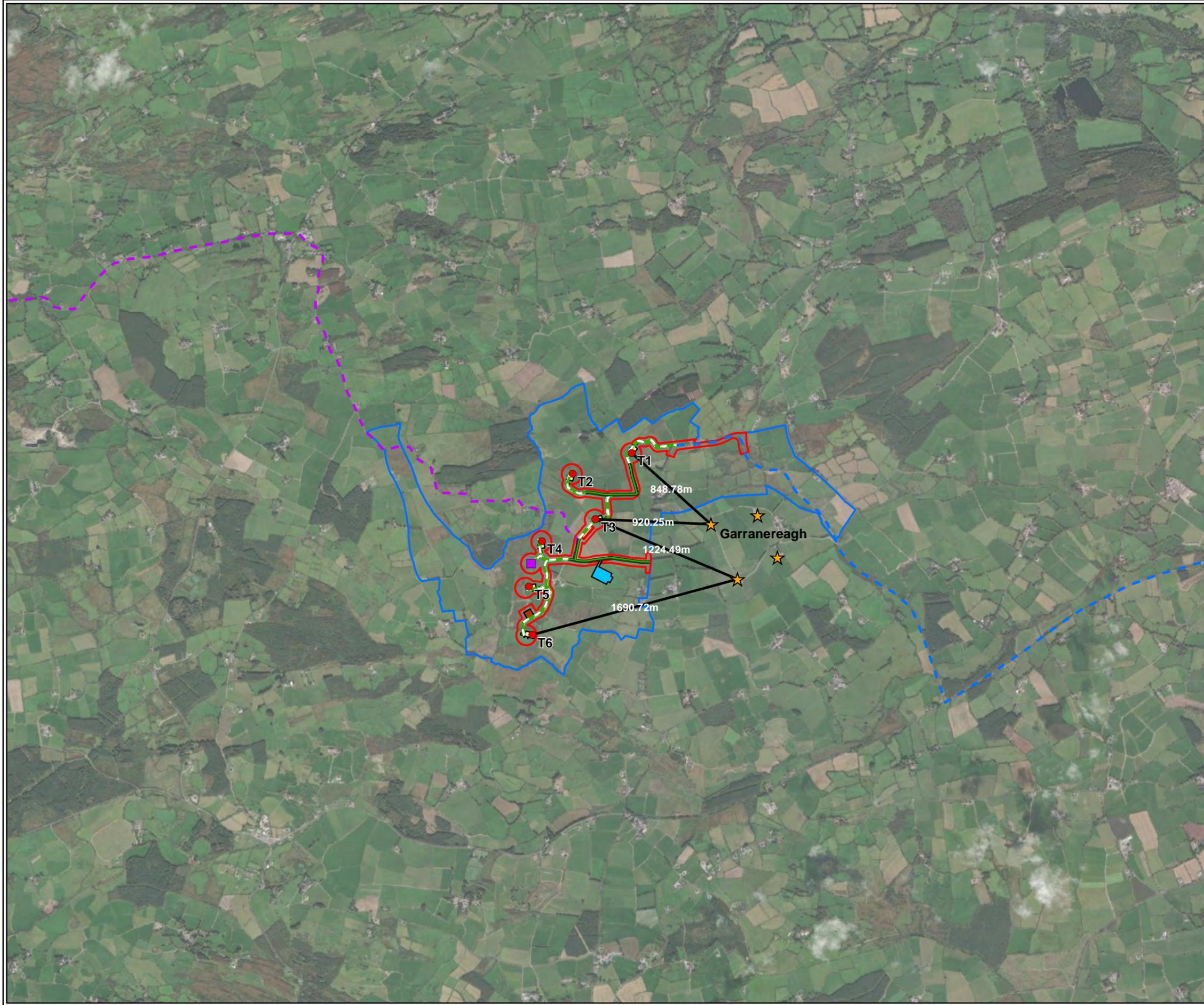
Existing land use in the area surrounding the Proposed Development site is predominately agricultural, with some forestry nearby, particularly adjacent to the Enabling TDR works at the junction of the R585 and L6088 (subject to separate planning application). Figure 2-5 illustrates Corine land cover.



Figure 2-6 illustrates existing wind farms within 20km of the Proposed Development site. There are a number of existing and permitted wind farm developments nearby. There is an existing wind farm, namely Garranereagh Wind Farm with 4 operational turbines adjacent to the site. The nearest turbine at Garranereagh is over 800m to the east of the nearest proposed turbine. This Proposed Development, along with any other planned or permitted wind farms in the vicinity, will be considered in the environmental assessment to evaluate any cumulative impacts that may arise.

On-Site Wind Resource

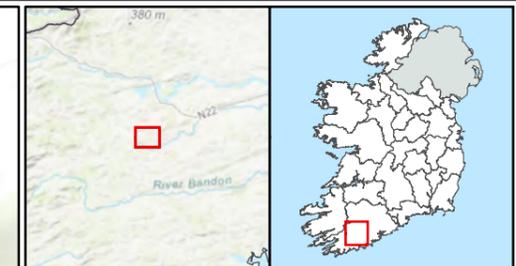
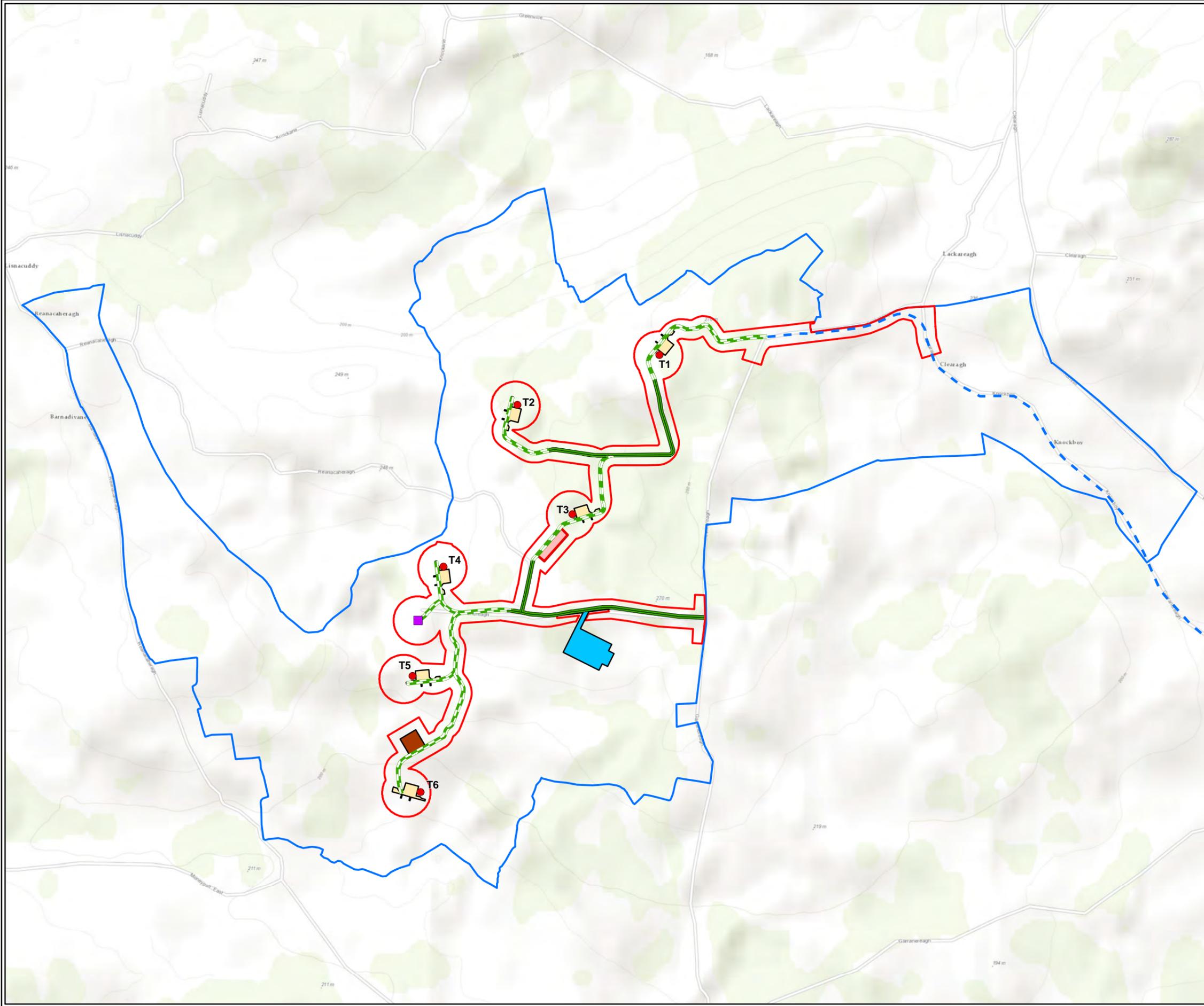
An initial assessment of wind has been undertaken by the developer, based on the wind atlas for Ireland and an onsite met mast wind campaign has concluded that the Proposed Development site is suitable for a commercial wind farm. The analysis has also confirmed the developer's decision to apply for planning permission for wind turbine generators with a maximum tip height of 131m. Figure 2-7 illustrates the Site's wind resources.



- Development Planning Boundary
- Study Area
- Proposed Substation
- Turbine Hardstandings
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Met Mast
- Proposed Turbine Layout
- Tracks-Existing
- Tracks-Proposed
- Alternative Grid Connection Route
- Turbine Delivery Route
- ★ Garranereagh Wind Farm

TITLE:	Overview of Proposed Project
PROJECT:	Barnadivane Wind Farm, Co.Cork
FIGURE NO:	2-2
CLIENT:	Barna Wind Energy Ltd. & Arran Windfarm Ltd.
SCALE:	1:30000
REVISION:	0
DATE:	20/02/2023
PAGE SIZE:	A3

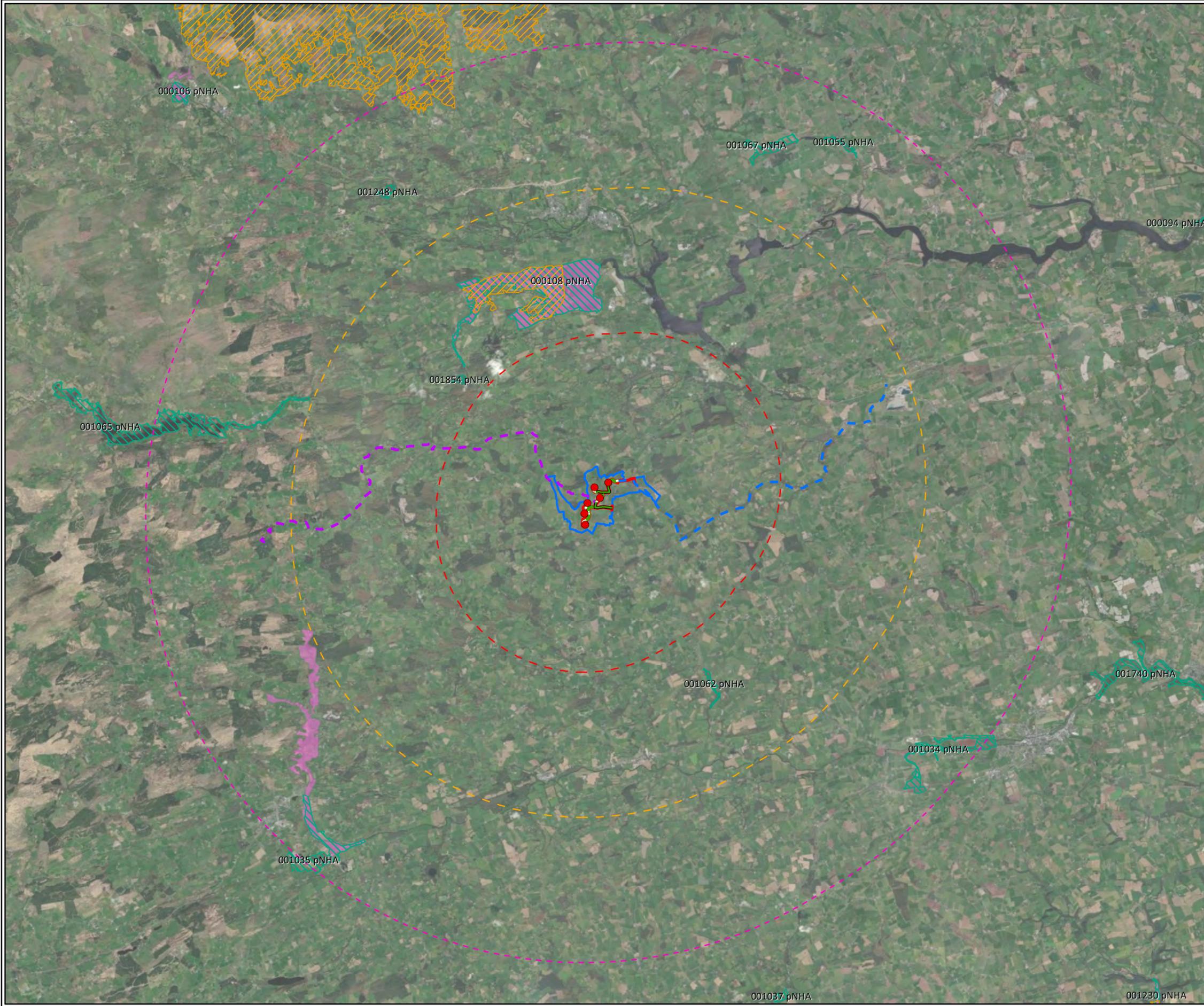




- Legend**
- Development Planning Boundary
 - Study Area
 - Proposed Substation
 - Turbine Hardstandings
 - Proposed Temporary Construction Compound
 - Proposed Borrow Pit
 - Proposed Met Mast
 - Proposed Turbine Layout
 - Turbine Delivery Route
 - Tracks-Existing
 - Tracks-Proposed

TITLE:	Site Layout
PROJECT:	Barnadivane Wind Farm, Co.Cork
FIGURE NO:	2-3
CLIENT:	Barna Wind Energy Ltd.
SCALE: 1:12500	REVISION: 0
DATE: 14/02/2023	PAGE SIZE: A3



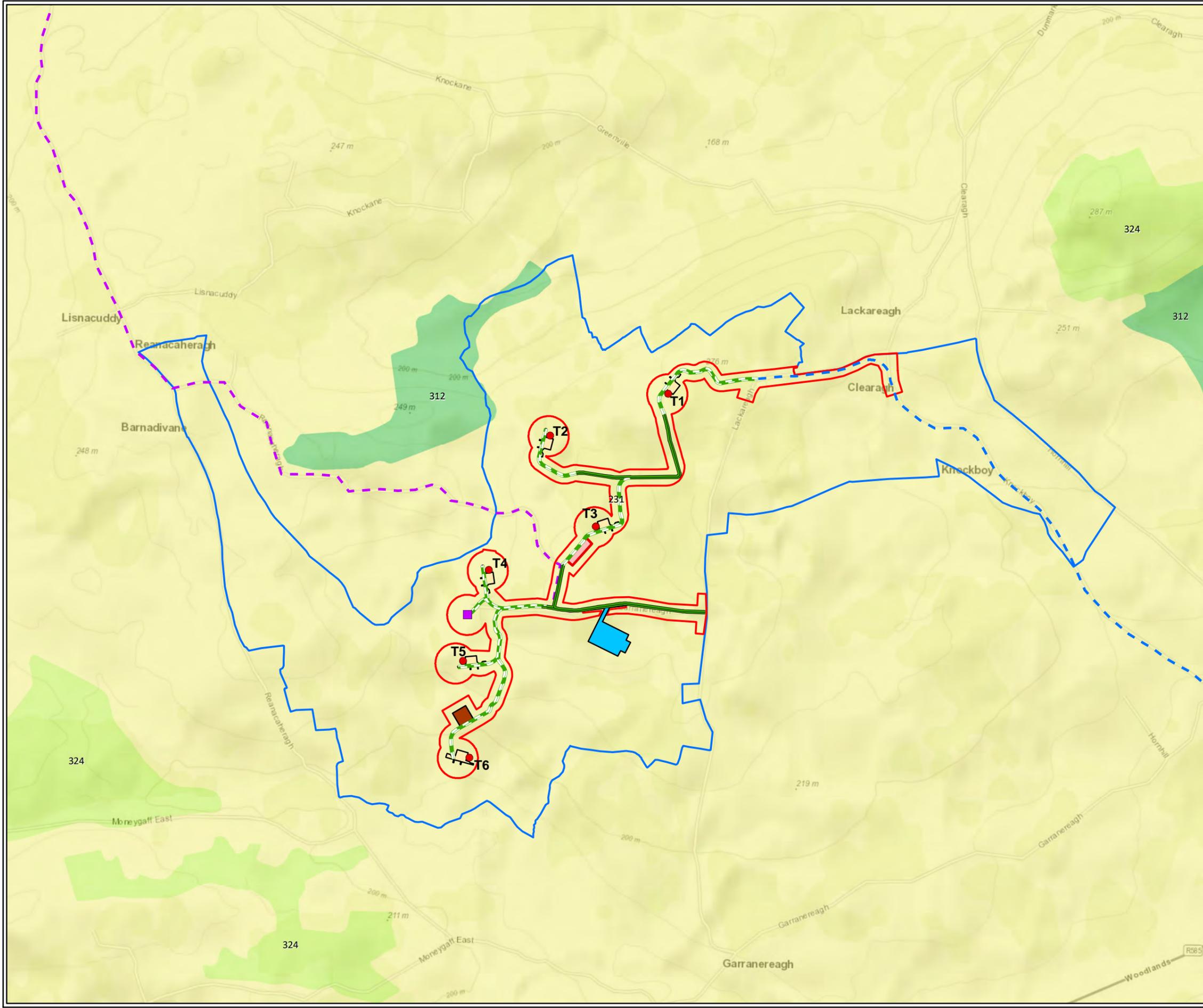


Legend

- Development Planning Boundary
- Study Area Boundary
- 15km of Proposed Development Boundary
- 10km of Proposed Development Boundary
- 5km of Proposed Development Boundary
- Special Protection Area (SPA)
- Proposed Natural Heritage Area (pNHA)
- Special Area of Conservation (SAC)
- Proposed Turbine Layout
- Tracks-Existing
- Tracks-Proposed
- Alternative Grid Connection Route
- Turbine Delivery Route

TITLE:	Designated Sites within 15km of the Proposed Site		
PROJECT:	Barnadivane Wind Farm, Co.Cork		
FIGURE NO:	2-4		
CLIENT:	Barna Wind Energy Ltd.		
SCALE:	1:130000	REVISION:	0
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Legend

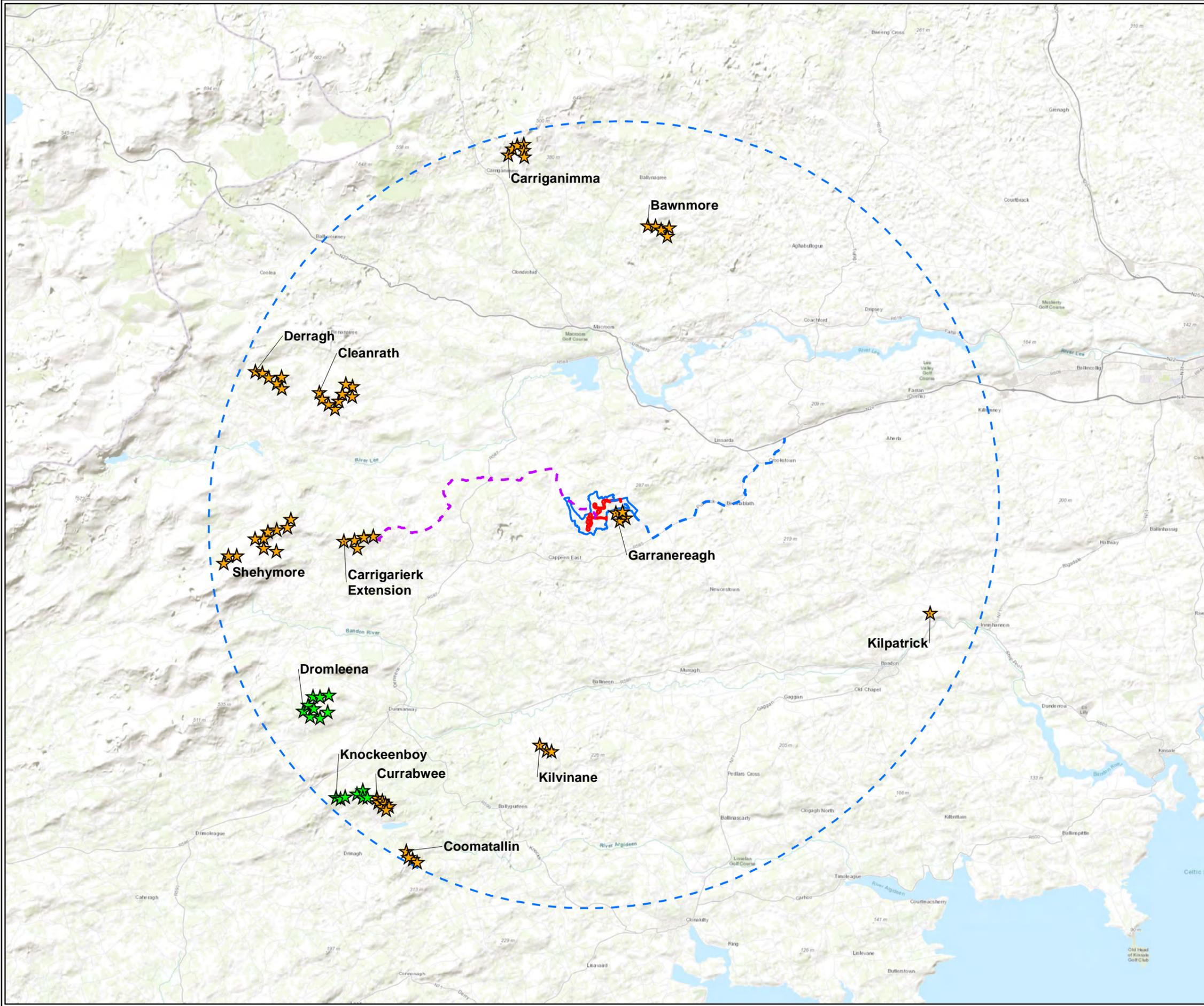
- Development Planning Boundary
- Study Area Boundary
- Proposed Substation
- Turbine Hardstandings
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Met Mast
- Proposed Turbine Layout
- Alternative Grid Connection Route
- Turbine Delivery Route
- Tracks-Existing
- Tracks-Proposed

CORINE Land Cover 2018

- 231 Pastures
- 312 Coniferous forest
- 324 Transitional woodland scrub

TITLE:	Corine Land Cover
PROJECT:	Barnadivane Wind Farm, Co.Cork
FIGURE NO:	2-5
CLIENT:	Barna Wind Energy Ltd.
SCALE: 1:15000	REVISION: 0
DATE: 14/02/2023	PAGE SIZE: A3

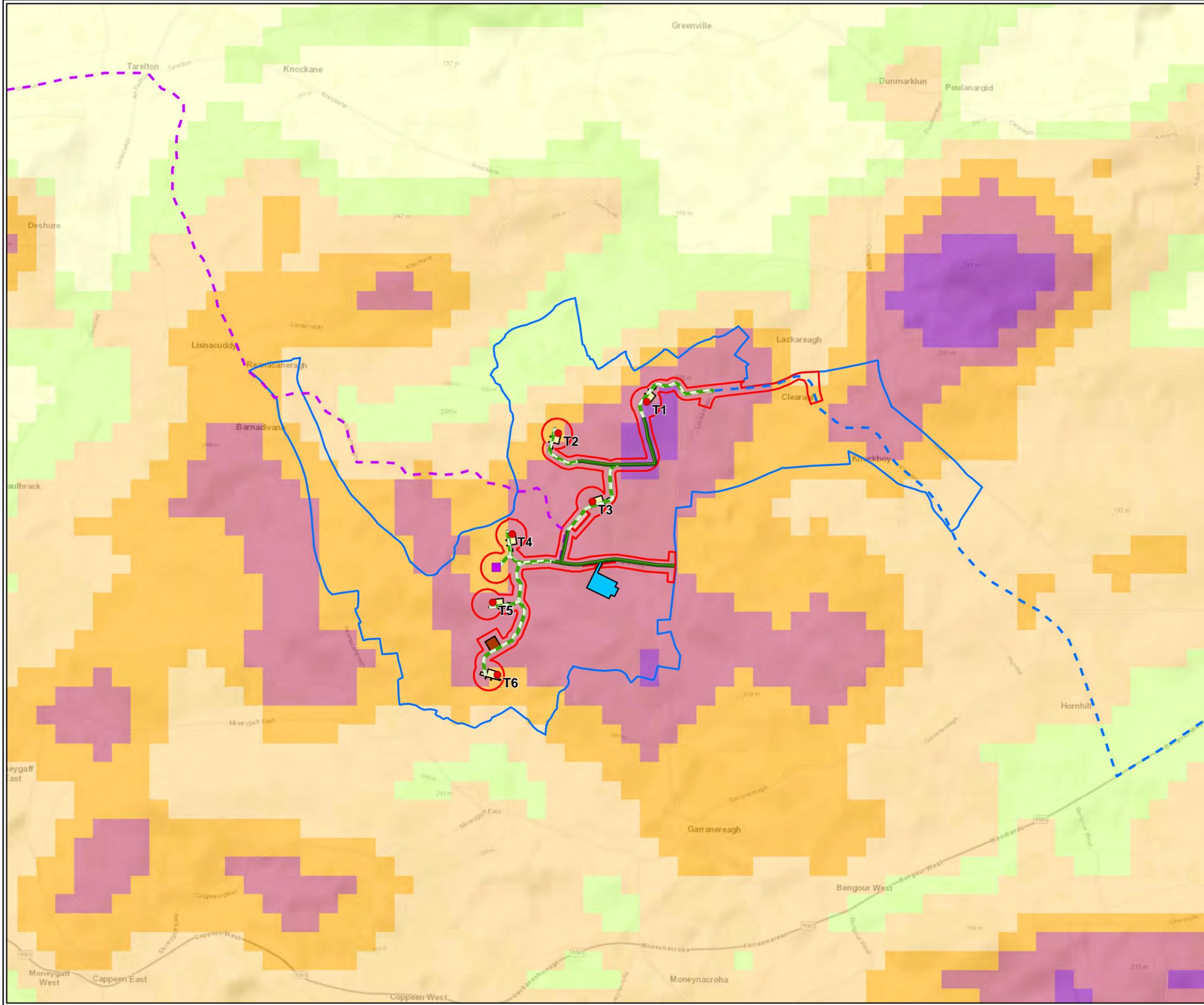




- Development Planning Boundary
 - Study Area
 - Development Planning Boundary 20km Buffer Zone
 - Alternative Grid Connection Route
 - Turbine Delivery Route
- Additional Surrounding Windfarms**
- ★ Consented
 - ★ Operational

TITLE: Wind Energy Developments in the Vicinity	
PROJECT: Barnadivane Wind Farm, Co.Cork	
FIGURE NO:	2-6
CLIENT:	Barna Wind Energy Ltd.
SCALE:	1:200000
REVISION:	0
DATE:	2/15/2023
PAGE SIZE:	A3





Legend

- Development Planning Boundary
- Study Area
- Proposed Substation
- Turbine Hardstandings
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Met Mast
- Proposed Turbine Layout
- Tracks-Existing
- Tracks-Proposed
- Alternative Grid Connection Route
- Turbine Delivery Route

SEAI Wind Speed 75m (2013)

- 6 - 7
- 7 - 7.25
- 7.25 - 7.5
- 7.5 - 7.75
- 7.75 - 8
- 8 - 9

TITLE:	Onsite Wind Resource
PROJECT:	Barnadivane Wind Farm, Co.Cork
FIGURE NO:	2-7
CLIENT:	Barna Wind Energy Ltd.
SCALE:	1:20000
REVISION:	0
DATE:	2/15/2023
PAGE SIZE:	A3





2.2.2 Alternative Grid Connection Route (AGCR)

A consented 38kV grid connection cable route between the permitted and constructed Carrigarierk Wind Farm and Proposed Development will be developed as an alternative should the proposed looped-in connection via the Proposed Substation currently under consideration by An Bord Pleanála (PL04.308208) be refused consent and/or unviable at the time of development. In the event that the AGCR is developed, the Proposed Substation will not be developed.

The majority of the consented AGCR is located within the public road corridor. The AGCR travels from the L8514-0 within the Proposed Wind Farm Site and follows the public road network for approximately 16.4km to location 523,095E 562,474N (ITM) before joining an existing forestry road in the townland of Gortatanavally (523,095E 562,474N). The AGCR follows this forestry road for 240m and traverses approximately 280m of coniferous forestry to location 522,709E 562,203N (ITM). From here the AGCR will be laid following a southwestern direction and connect into the Carrigarierk Wind Farm site infrastructure. The Carrigarierk Wind Farm will connect to the Carrigdangan 110kV substation, which in turn will connect to the Dunmanway ESB substation (CCC reference: 17/431; ABP reference: 301563-18).

This AGCR route between the Proposed Development and connection point at Carrigarierk Wind Farm measures approximately 17.1 kilometres, and passes through the following townlands:

- Garranareagh;
- Barnadivane (Kneevies);
- Barnadivane;
- Reanacaheragh;
- Lisnacuddy;
- Teerelton;
- Deshire;
- Cooldorragha;
- Carrigboy;
- Coolaclevane;
- Dromleigh;
- Teeranassig;
- Clonmoyle;
- Gorteenadrolane;
- Haremont;
- Johnstown;
- Carrigdangan;
- Gortatanavally;

The AGCR is located within the following sub-catchments:

- Bandon_SC_010;
- Lee[Cork]_SC_010;
- Lee[Cork]_SC_030;
- Lee[Cork]_SC_050.



The majority of the AGCR is underlain by Till derived from Devonian Sandstones with areas of bedrock sub-crop or outcrop. Given that the AGCR is consented, the potential environmental effects of this alternative option will be considered cumulatively with the Proposed Development. Given that the AGCR has already been consented, this element of the Proposed Project will be considered under a cumulative assessment in each impact assessment chapter of the EIAR.

2.2.3 Turbine Delivery Route (TDR)

Large components associated with the wind farm construction will be transported to the Site via the identified TDR. The point of arrival for the wind farm plant is likely to be Cork Harbour. The TDR includes the following routes:

- Turn off the N22 national secondary road at Inchirahilly;
- R585 through Crookstown and Béal na Bláth;
- R585 / L6008 junction at Bengour West;
- Local road network through Lackereagh;
- Access junction and route through the Site.

A grant of permission by Cork County Council was received for road improvement works at the junction of the R585 and L6088 (CCC PL Ref. 14/6803) (enabling TDR works) to facilitate the delivery of turbine components to the site .

The study area and existing environment associated with the TDR shall be confined to the public road corridor associated with the above roads. The applicant applied for planning permission for improvements to the public road to facilitate the Enabling TDR Works, as a standalone application (CCC PL Ref. 14/6803) to Cork County Council. The application was granted permission in May 2015 for 10 years. Given that the Enabling TDR Works have already been consented, this element of the Proposed Project will be considered under a cumulative assessment in each impact assessment chapter of the EIAR.

2.2.4 Land Ownership

The entire site of the Proposed Development is in private ownership, with landowner consent in place.

2.3 Proposed Project

As described in Section 2.1, the Proposed Project in this EIAR is comprised of the following key elements:

1. Proposed 6 no. turbine windfarm also referred to in this report as ‘the Proposed Wind Farm’ (pending under An Bord Pleanála planning ref. PL04.308208);
2. Proposed 110kV substation within the site of the Proposed Wind Farm, also referred to as ‘the Proposed Substation’ (pending under An Bord Pleanála planning ref. PL04.308210);

The in-combination effects of the following elements of the Proposed Project are include in the assessment.



3. Enabling works for the Turbine Delivery Route, also referred to in this report as ‘Enabling TDR Works’ (permitted under Cork County Council planning ref. 14/6803);
4. Potential alternative grid connection, also referred to in this report as the ‘the AGCR’ (permitted under Cork County Council planning ref. 15/730 & An Bord Pleanála Ref. PL04.246353).

A detailed description of each element of The Project is contained hereunder. Sections 2.3.1 and 2.3.2 below outline the elements of the Proposed Project for which planning consent is being sought, namely The Proposed Development.

2.3.1 Summary of the Proposed Project Assessed in the EIAR

In summary the Proposed Project assessed will consist of the following:

- Erection of 6 no. wind turbines with a blade tip height of 131m, a hub height of 72.5m and a rotor diameter range of 117m;
- Construction of turbine foundations and crane pad hardstanding areas;
- Construction of approximately 2,346m of new site tracks and associated drainage infrastructure;
- Upgrading of approximately 1,381m of existing tracks and associated drainage infrastructure where necessary;
- Construction of new access junction and improvement to the public road;
- All associated drainage and sediment control;
- Construction of 1 no. permanent onsite 110kV electrical substation (which is under a separate planning application under consideration by An Bord Pleanála, reference PL04.308208) to ESBN specifications including:
 - Control Building with welfare facilities;
 - Electrical infrastructure;
 - Parking;
 - Wastewater holding tank;
 - Rainwater harvesting;
 - Security fencing;
 - All associated infrastructure, services and site works.
- Consented temporary accommodation works associated with the Turbine Delivery Route to facilitate the delivery of turbine components (CCC PL Ref. 14/6803);
- 1 no. Temporary construction site compound and associated ancillary infrastructure including parking;
- Installation of underground medium voltage (20/33kV) and communication cabling between the proposed turbines and the proposed on-site substation and associated ancillary works;
- Erection of 1 no. permanent meteorological mast with a height of 90m above ground level and associated access track;
- Installation of a consented medium voltage (up to 38kV) underground cabling and associated ancillary works between the Carrigierk and Proposed Barnadivane Wind Farms. The grid connection cable works are consented in accordance with CCC Ref. 15/730 and An Bord Pleanála Ref. 04.246353;



1 no. borrow pit;

- All associated site development works;
- A 10 year planning permission and 25 year operational life from the date of commissioning of the entire wind farm.

2.3.2 Summary of the Statutory Development Description for Proposed Wind Farm

The development description as per the statutory newspaper notice and the application form for which consent from the planning authority is being sought is as follows:

- Construction of 6 no. wind turbines with a blade tip height 131m, a hub height of 72.5m and a rotor diameter range of 117m;
- Construction of turbine foundations and crane pad hardstanding areas including associated drainage infrastructure;
- Construction of approximately 2,346m of new permanent site tracks and associated drainage infrastructure;
- Upgrading of approximately 1,381m of existing tracks and associated drainage infrastructure;
- Upgrade of 2 no. existing agricultural access junctions for construction and operational access from the local roads;
- 1 no. on site borrow pit and associated ancillary drainage within the townland of Barnadivane (Kneeves), Co. Cork;
- 1 no. temporary construction site compounds and associated ancillary infrastructure including parking;
- Installation of medium voltage underground electrical and communication cabling connecting the wind turbines to the proposed on-site substation and associated ancillary works;
- Erection of 1 no. permanent meteorological mast with a height of 90m above ground level and associated access track;
- All related site works and ancillary development including landscaping and drainage;
- A 25 year operational life from the date of commissioning of the entire wind farm is being sought.

2.3.3 Summary of Statutory Development Description for Proposed Substation

The development description as per the statutory newspaper notice and the application form for which consent from the planning authority is being sought is as follows:

- Construction of 1 no. permanent on-site 110kV electrical substation (which is under a separate planning application under consideration by An Bord Pleanála, reference PL04.308208) including:
- 3 no. single storey control buildings with dimensions as follows:
 - Control Building A & B with an approximate floor area of 195m² and a maximum height of approx. 6.2m above finished ground level; and
 - Control Building C with an approximate floor area of 223m² and a maximum height of approx. 6.5m above finished ground level.
- an access track approx. 200m in length;
- 2 no. steel lattice mast structures located directly underneath the existing overhead 110kV line, with a maximum height of approx. 18m;



- electrical plant and equipment;
- welfare facilities;
- carparking;
- water and wastewater holding tanks;
- security fencing;
- lightning protection and telecommunications masts;
- security cameras;
- external lighting; and
- all associated infrastructure;
- Installation of a grid connection point from the Proposed Substation to the existing 110kV Macroom to Dunmanway overhead line, the substation will be situated beneath this line.

2.3.3.1 Turbine Layout

The layout of the Proposed Wind Farm has been designed to minimise the potential environmental effects of the wind farm while at the same time maximising the energy yield of the wind resource passing over the site. Figure 2-3. shows the Proposed Wind Farm site layout. The layout reflects the outcome of an iterative design process. Further detail on the design philosophy, constraints and alternative layouts is provided in Section 2.8.

Turbine location co-ordinates in Irish Transverse Mercator (ITM) are detailed in Table 2 1:

Table 2-1: Proposed Turbine Coordinates

Turbine ID	ITM Coordinates	
	X	Y
T1	5344865072	5638612568
T2	5340160003	5636957039
T3	5341985662	563333788
T4	5337720877	5631599199
T5	5336691692	5627981353
T6	5336955772	562414011

The Proposed Development has been designed in accordance with the current Section 28 Ministerial Guidelines (Section 28 of the Planning and Development Act 2000, as amended), Wind Energy Guidelines 2006. These Guidelines are currently under review, which is evidenced by the Draft Revised Wind Energy Development Guidelines published in 2019.



The Draft Revised Wind Energy Development Guidelines, December 2019 (WEGs), amongst other changes, propose an increase in minimum turbine setback from nearby dwellings. This is a draft document and it received significant attention in the consultation period which concluded on 19th February 2020. Notwithstanding this, consideration is given to achieving the requirements of the draft revised WEGs in relation to turbine set back. The original site layout was designed to maximise the generating potential of the Proposed Development on the involved properties, with reduced setback distances afforded to H34 and H36 in consultation with the relevant landowners, in accordance with the current 2006 WEGs. The draft revised WEGs propose that no turbine should be located closer than 500m from involved properties and a minimum setback of 4 times the turbine tip height should be achieved for all third party properties (524 metres based on the proposed tip height of 131m). Other aspects of the draft revised WEGs such as noise and shadow flicker can be managed by turbine control if required. At time of writing the 2019 revised WEGs remains in draft form and has not yet been finalised, however, should the revised guidance come into force as currently proposed during the planning application process, it is acknowledged that H34 and H36 would no longer be inhabitable to accord with the revised guidance as currently proposed. Further to this the proposed layout achieves an optimum separation distance between dwellings and the proposed turbines by providing a minimum separation distance of 525m between turbines and the closest dwellings, apart from 1 no. financially involved landowner whose dwelling is located approximately 343m from the proposed turbine location. There are 143 no. dwellings located within 1.5km of the wind turbines.

2.3.3.2 Power Output

The Proposed Development will have an estimated Export Capacity (MEC) of up to 25MW. This is calculated based on standard industry assumptions and proposed turbine dimensions.

The above MEC has been fully assessed in the Air and Climate chapter with respect to emissions calculations.

A rated capacity of 25MW is used below to calculate the power output of the Proposed Wind Farm.

Assuming an installed capacity of 25MW, the Proposed Wind Farm has the potential to produce approximately 76,650MWh (megawatt hours) of electricity per year, based on the following calculation:

$A \times B \times C = \text{Megawatt Hours of electricity produced per year}$

where:

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

B = The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 35% is applied here

C = Rated capacity of the wind farm: 25MW

The electricity produced by the Proposed Wind Farm would be sufficient to supply approximately 18,250 Irish households with electricity per year, based on the average Irish household using 4.2MWh of electricity (this latest figure is available from the March 2017 Commission for Energy Regulation (CER) Review of Typical Consumption Figures Decision Paper¹).

¹ <https://www.cru.ie/wp-content/uploads/2017/07/CER17042-Review-of-Typical-Consumption-Figures-Decision-Paper-1.pdf>



EirGrid in their All-Island Generation Capacity Statement (2017-2026) estimates a capacity factor of approximately 31% for onshore wind. The capacity factor applied for the Proposed Wind Farm is greater than the EirGrid estimation as a result of improvements in turbine technology and the good wind flows at the site. The proposed turbine layout allows for the use of fewer, taller turbines with an increased efficiency and in return greater economic benefit to the consumer.

2.3.3.3 *Wind Turbines*

Turbine General Description

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

The wind turbines that will be installed on site will be conventional three-blade horizontal axis turbines, which will be designed to ensure the rotors of all turbines rotate in the same direction at all times.

The rotor blades are bolted to the central hub, which is connected to a generator located in the nacelle. The nacelle holds the following turbine components:

- Generator;
- Electrical components;
- Control unit.

A glass fibre reinforced polyester hood covers the nacelle. Earthing and isolation protect all components from lightning strikes.

The proposed turbines will have a tip height of 131m, 72.5m hub height and a rotor diameter of 117m.

Turbine Blades

The blades of the proposed turbine) are made up of glass fibre reinforced polyester consisting of 3no. blades.

They turn at between 7.9 and 14.1 revolutions per minute depending on wind speed and in general will shut down at wind speeds greater than 25m/s. A 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.

Turbine Tower and Foundation

The tower of the turbine is a conical steel tube, with multiple layered painted finish to protect against corrosion. It is generally delivered to site in four or five sections. The first section is bolted to the steel base, which is cast into the concrete foundation. The proposed turbine foundations will be 22m in diameter and 3m in depth.

The base of the tower is approximately 4-4.5m in diameter, tapering to approximately 2-3m where it is attached the nacelle. The first floor of the tower is approximately 2-3m above ground level and is accessed by a galvanised steel staircase and a steel hatch door which will be kept locked except during maintenance.

The turbine will be anchored to the foundation as per the turbine manufacturer's guidelines which will be incorporated in the civil foundation design.

The turbine foundations shall be constructed using standard reinforced concrete construction techniques. Detailed construction methodologies for turbine foundations are provided in the CEMP in Appendix 2.2.



In summary the works shall be carried out as follows:

- The extent of the excavation will be marked out.
- Around the perimeter of the foundation formation a shallow drain will be formed.
- The base of the foundations will be excavated to competent bearing strata.
- Excavated soil will be used as turbine ballast or deposited within designated spoil deposition areas in accordance with the Spoil Management Plan in Appendix 6.1.
- A layer of concrete blinding will be laid approximately 75mm thick directly on top of the newly exposed formation.
- Formwork and reinforcement will be fixed in accordance with the designer's drawings & schedules.
- Ductwork will be installed as required for cables, and formwork erected around the steel cage.
- Concrete will be placed using a concrete pump and compacted using vibrating rammers to the levels and profile indicated on the construction drawings.
- Upon completion of the concreting works the foundation base will be covered from the elements.
- Steel shutters will be used to pour the upper plinth section.
- Once the concrete is set the earthing system is put in place and the foundation is backfilled with suitable material.
- The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation and landscaped using the top-soil set-aside during the excavation.

Turbine foundations will be designed to Eurocode Standards. Foundation loads will be provided by the wind turbine supplier, and factors of safety will be applied to these in accordance with European design regulations.

Turbine Transformer

The turbines will have transformers located within the base of the tower, which shall step up the initial generating voltage from c.400V to either 20kV or 33kV, and will then connect to the Proposed Substation via a network of underground medium voltage cable circuits to be located adjacent to the proposed site track network. See Section 2.3.4.8 for further detail.

Turbine Colour

The turbines have a multiple painted coating to protect against corrosion. They are coloured off-white or light grey to blend into the sky background, this minimises visual impact.

Turbine Erection

Once the turbine components arrive on site they will be placed on the hardstand and lay down areas prior to assembly. The towers will be delivered in sections and each blade will be delivered in a separate delivery. Once there is a suitable weather window the turbine will be assembled.

It is anticipated that each turbine will take approximately 3 to 4 days to erect (depending on the weather), requiring two cranes. Finally, the turbines will be commissioned and tested.

It is expected that the entire construction phase, including civil, electrical and grid works, and turbine assembly will take between approximately 12-18months.



2.3.3.4 Proposed Wind Farm Internal Site Tracks

Access to the proposed turbines will be via the proposed internal site track network as shown on Figure 2-2 and the accompanying planning drawings. The proposed internal site track layout will permit access for vehicles during the construction phase, for maintenance during the operation phase, and for vehicles to decommission the turbines at the end of the life of the development.

Approximately 2.4km of new site access tracks are proposed at the development site. All access tracks will be a minimum of 6m wide along straight sections but wider at bends as required.

The gradients of the site access tracks have where possible been limited to 10% to allow delivery of the turbines without towing.

The proposed access track will typically be constructed using conventional excavate and replace methods. This will generally involve placing compacted stone to a minimum 500mm depth on mineral soils or rock formation after removal of the topsoil. Depths would be increased for fill areas. The stone will be compacted in 200mm layers. Geogrids or similar may be used in certain areas of the site, depending on ground conditions. Material for the site tracks will be sourced on site from the Proposed Developments borrow pit shown on Figure 2-2 as much as possible. Otherwise, the material will be sourced locally where possible. Tracks will be finished with a well graded aggregate. The location of licensed quarries, waste facilities and haulage routes are identified in Chapter 11 – Traffic and Transportation.

Sections of the internal access roads will need to be provided with edge protection especially in areas of fill or where the road approaches a steep section of the existing terrain. In general, earthen berm type edge protection will be provided.

Roadside drainage, generally consisting of roadside swales, will be provided along the proposed roads and will discharge into stilling ponds. The discharge from these ponds will generally be by means of diffuse outfall over existing vegetated areas. SuDS design approach shall ensure that existing drainage patterns shall be maintained throughout the Proposed Development site. Drainage is discussed in more detail in Chapter 7 – Hydrology and Water Quality of this EIAR.

Further details on access track construction are provided in the CEMP in Appendix 2.2.

2.3.3.5 Turbine Hardstandings

A turbine hardstanding area is detailed at each turbine location under this application, as shown on the accompanying planning drawings. This area will accommodate a main crane and an assist crane during the assembly of the turbine, as well as during occasional maintenance during the operation of the Proposed Wind Farm. The area of the hardstanding provided is deemed suitable for the assembly of a turbine with the proposed dimensions. The hardstanding areas will measure approximately 45m x 35m on plan, with blade fingers and tailing pad area.

2.3.3.6 Borrow Pit

The Proposed Development shall include the opening of a borrow pit on site. The location of the proposed borrow pit is shown in Figure 2-3. Detailed drawings of the proposed borrow pit are included in planning application drawings. Detailed methodologies outlining the excavation and management of the proposed borrow pit are contained in the CEMP in Appendix 2.2.



The proposed borrow pit location has been identified as a source of site won general fill for construction activities. The location was selected as potential sources of general fill (Class 1 material) for the Proposed Development using the criteria of no peat deposits, low landslide susceptibility and proximity to existing access tracks and proposed infrastructure.

The proposed borrow pit shall provide site-won stone that will significantly reduce the amount of construction aggregates that would need to be delivered to site. The proposed borrow pit shall also be reinstated with excavated soil material which will avoid the need to export excess spoil to off-site facilities.

The borrow pit shall have its own drainage network to manage surface runoff which will be implemented prior to excavation.

The proposed borrow pit has a footprint area of approximately 0.36ha. This will provide a potential volume of approximately 11,489m³ of site won general fill based on an aggregate resource thickness of 6.0m at the borrow pit.

All works associated with the opening, excavation and reinstatement of the borrow pit shall be carried out in accordance with the measures set out in the CEMP and associated Soil Management Plan in Appendix 2.2 and 6.1 respectively.

It is proposed that all onsite materials excavated shall be retained on site and re-used as part of the construction phase to minimise the import materials requirements.

2.3.3.7 *Proposed Substation*

A new permanent onsite electricity substation will be constructed within the Proposed Development site as shown in Figure 2-2.

This will provide a connection point between the Proposed Wind Farm and the proposed grid connection point to the existing 110kV Macroom to Dunmanway overhead line. The Proposed Substation will be situated beneath this line.

The Proposed Substation location is within the EIAR boundary for the Proposed Development. Although the Proposed Substation is subject to a separate planning application, the relevant environmental impacts have been appropriately assessed.

The Proposed Substation will cover an area of approximately 163m x 106m on plan including a buffer area to the perimeter. There will be three single storey control buildings on the site. The control buildings will be of standard masonry construction, rendered externally with a pitched roof. Finishes will be in keeping with the surrounding buildings. The floor area of Control Building A&B will be 195m², with the maximum floor area of Control Building C being 223m². The height of the Control Buildings A&B will be approximately 6.2m above finished ground level, and the height of Control Building C will be approximately 6.5m above finished ground level. The control buildings and electrical equipment will be enclosed by a 2.4m high steel palisade perimeter fence painted green encompassing an area of approximately 76m x 97m. The Proposed Substation will be connected to the public road via a short access track approximately 200m long. An image of a typical 110kV substation layout is shown in Figure 2-8.

The Proposed Substation will contain assorted electrical equipment including transformers, switch gear including circuit breakers, metering transformers, busbars, post insulators, lightning protection masts, line gantries, etc., all in accordance with EirGrid requirements. Two steel lattice mast structures will be located approximately 10m from the edge of the Proposed Substation compound and directly underneath the line of the existing 110 kV overhead line. They will have a maximum height of approximately 18m.



Although not permanently staffed, maintenance personnel will visit the Proposed Substation on average three to four times a week. Any general office waste will be regularly disposed of to a licensed facility.

Two underground foul water storage tanks will be provided within the Proposed Substation compound. The underground foul water storage tanks will be sealed storage tanks with all wastewaters tankered off site as required by an authorised waste collector to a wastewater treatment plant. 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 Proposed Development site. The proposed foul water storage tanks will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The foul water storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. This approach for managing foul water on site has become standard practice on wind farm sites, which are often proposed in areas where finding the necessary percolation requirements for on-site treatment can be challenging and has been accepted by numerous Planning Authorities and An Bord Pleanála as an acceptable proposal (example planning reference: PL19.301619). Existing facilities in the surrounding area have been assessed for the purposes of this planning application. A list of waste facilities in the locality can be found in Table 2-4. Potable water shall be delivered to site and stored in a holding tank in the substation control building.

The Proposed Substation is presented in accompanying planning application drawings.



Photograph taken at Mount Lucas Wind Farm, courtesy of Bord Na Móna

Figure 2-8: Representative 110kV Substation



2.3.3.8 On-Site Electrical Cabling

Electricity generated from the wind turbines shall be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks. This circuit shall be connected to the Proposed Substation or if not considered viable to the Permitted AGCR. The Proposed Substation is shown on Figure 2-2 and the AGCR is shown on Figure 2-1.

The electricity will be transmitted as a three-phase power supply so there will be three individual conductors (or individual cables) in each cable circuit. The three conductors will each be laid in separate/single duct(s) which will usually be laid in a trefoil formation but may also be laid in a flat formation where conditions require it such as where the ducts need to cross an existing structure or culvert.

The width of the internal cable trench with a trefoil formation will be 600mm, a flat formation will require a wider trench width. The depth of cover to the ducts carrying the cables will be 750mm to the top of the upper ducts. The depth of trench for the cables will be 1,200mm. The diameter of the ducting will be selected to suit the range of cross-sectional areas of electrical cables and is likely to fall between 100mm and 200mm diameter.

Internal cable trench section types associated with on-site electrical cabling are presented in the accompanying planning application drawings.

Further details on cable trench construction methodologies can be found in the CEMP in Appendix 2.2.

2.3.3.9 Temporary Site Compound

During the construction phase, it will be necessary to provide temporary facilities for construction personnel. The location of the temporary site compound is shown on Figure 2-2. Wheel wash facilities will be provided within the site near the site entrance points.

Facilities to be provided in the temporary site compounds will include the following:

- site offices, of Portacabin type construction;
- employee parking;
- Portaloos;
- banded fuel storage;
- bottled water for potable supply;
- contractor lock-up facility;
- a water tanker to supply water used for other purposes;
- diesel generator;
- canteen facilities;
- waste management areas;
- material/non-fuel storage areas.

The temporary compound shall be constructed on aggregate hard standings surrounded by security fencing, located as shown on the accompanying drawings. Temporary facilities will be removed and the lands reinstated on completion of the construction phase.



2.3.4 Soil and Peat Management

The total volume of excavation required for turbine bases, hardstanding areas and site tracks is estimated to be of the order of 72,984 m³ and this material will be reused in the construction of the works on site and in the restoration of the borrow pit. Any further excess material will be utilised for the construction of landscape berms within the site in line with the Spoil Management Plan provided in Appendix 6.1 of this EIAR.

The estimated volume of material required from the borrow pit is estimated at 11,489 m³.

Due to the possibility of soil-borne diseases, all topsoil recovered from each individual farm property within the Proposed Development site will remain on the same property. These temporary stockpiles will be covered and where required, drainage and sediment controls including temporary silt fencing will be put in place until such time as the soil is reused on site.

2.3.5 Drainage

The drainage system will be constructed alongside all turbine hardstands, internal access tracks, substation (under separate application for consideration by ABP) and the temporary construction compound.

The drainage system for the existing tracks and field boundaries will be retained. Where the roads require widening, this will involve the re-location of existing roadside swales to allow for widening.

Minor drains such as manmade agricultural drains will be crossed using 450mm diameter pipes.

Silt Protection Controls (SPCs) are proposed at the location of any drain crossing. SPCs will consist of a minimum of silt traps containing filter stone and filter material staked across the width of the swales.

Further details on hydrology and drainage are contained in Chapter 7 Hydrology and Water Quality which includes the Surface Water Management Plan, and in the Planning Drawings. The number of stilling ponds and their locations are shown on the planning drawings accompanying this application for consent.

2.3.6 Permanent Metrological Mast

A 90m permanent meteorological mast will be installed on site. This will allow independent monitoring of wind farm performance. Anemometers and wind vanes will be mounted at various levels and connected to a locked data-logger near the base of the mast or connected to the site SCADA system.

The mast will be constructed with a shallow concrete foundation and will include a concrete base 8m by 8m and 1.5m in depth. The mast will be accessed from the proposed internal track. A turning head will be constructed adjacent the mast site. The met mast access track will be 3.5m in width and will include drainage.

The location of the proposed meteorological mast is shown in Figure 2-2 and the accompanying planning drawings provide a typical drawing of the proposed mast. A construction sequence for the proposed mast is described in Section 2.4. .



2.3.7 Turbine Delivery and Construction Haul Route

Large components associated with the Proposed Development construction will be transported to the Proposed Development site via the identified TDR. The TDR to the site is shown in Figure 2-1. It is likely that turbines will be delivered via the N22 Cork-Killarney road, as far as the junction with the R585 at Inchirahilly. From here, the route will follow the R585 road (Crookstown-Bantry) as far as the junction with the local road L6008, at Bengour West. From here it will follow the local road network through Lackareagh, as far as the proposed entrance to the site.

The study area and associated existing environment associated with the TDR shall be confined to the public road corridor associated with the above roads with the exception of locations where temporary accommodation works will be required to facilitate the delivery of oversized loads. A grant of permission by Cork County Council was received for the Enabling TDR Works at the junction of the R585 and L6088 at Bengour West (CCC Pl. Ref. 146803).

The Enabling TDR Works will only be required during the operational phase in the unlikely event of a major turbine component replacement. It is expected that these temporary accommodation works will not be required for the decommissioning phase as turbine components can be broken up on site and removed using standard HGVs.

For additional information relating to the TDR, please refer to Chapter 11 Traffic and Transportation.

2.3.7.1 *Turbine Delivery Route (TDR) Watercourse Crossings*

The TDR crosses a number of watercourses along the route between the N22 and the Proposed Development site. There are no specific accommodation works required at bridge points along the TDR.

2.3.8 Grid Connection

Electricity generated from wind turbines shall be collected at medium voltage (20/33 kV) by an internal circuit of buried cables which will follow on-site access tracks. Underground cables from each of the turbines will connect to a new permanent onsite electricity substation within the Proposed Wind Farm site. The location of the Proposed Substation is shown in Figure 2-2. The Proposed Substation will provide a connection point between the wind farm and the proposed grid connection point on the existing 110kV Macroom to Dunmanway overhead line through a looped-in connection. The Proposed Substation will be situated beneath this line. No overhead lines or underground cables will therefore be required outside of the Proposed Wind Farm site, to connect this wind farm to the national grid, if this arrangement is progressed.

2.3.8.1 *Alternative Grid Connection*

Should the Proposed Substation prove not to be viable a consented 38kV grid connection cable route between the permitted Carrigarierk and Proposed Wind Farm will be developed.

The permitted underground AGCR option will consist entirely of underground 20/33kV cable and will connect the Proposed Wind Farm to the Carrigarierk Wind Farm (CCC reference: 15/730; ABP reference: PL04.246353). The Carrigarierk Wind Farm connects to the onsite Carrigdangan 110kV substation, which in turn will connect to the Dunmanway 110kV substation (CCC reference: 17/431; ABP reference: 301563-18).

The permitted AGCR is shown in Figure 2-2. No overhead lines are proposed for this connection.



As shown in Figure 2-2, the permitted AGCR travels:

- From the entrance of the proposed 110kV substation;
- Along the public road corridor to location 523,095E 562,474N (ITM) where it then enters the Carrigarierk Wind Farm site boundary;
- Joins and travels along an existing forestry road for 240m;
- Traverses approximately 280m of coniferous forestry to location 522,709E 562,203N (ITM) where it connects to the Carrigarierk Wind Farm onsite Carrigdangan 110kV Substation;

To note, due to the passage of time and development of the applicant's wind farm portfolio, the AGCR will not be developed to connect to the proposed 110kV substation (ABP case reference: PL04.308208). In the event that the AGCR is developed, it will be developed as a tail-fed underground connection which will not require the construction of a substation onsite.

The AGCR will connect to the Site at between T3 and T4, as previously consented and as shown in Figure 2-2.

Connection works from the Proposed Wind Farm to Carrigarierk Wind Farm will involve the installation of ducting, joint bays and ancillary infrastructure and the subsequent running of cables 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 traffic management system will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. No works will be carried out on the cable route during the general bird breeding season from (the 1st of March to the 31st of August inclusive) to ensure there are no impacts on breeding birds.

These works shall be undertaken on a rolling basis with short sections closed for short periods before moving onto the next section. This is described in more detail in Chapter 11 - Traffic and Transportation.

2.3.8.2 *Watercourse Crossings Along the AGCR*

There are 15 no. main existing watercourse/culvert crossings located along the consented AGCR. The crossing methods are set out in the EIS/EIAR prepared for the cable works as consented pursuant to Cork Co.Co. Planning Ref. 15/730 and ABP Ref. 04.246353.

Construction and installation of the ducts shall not require works within the watercourse and shall not affect the watercourse. Watercourse pollution control measures and mitigation will be put in place during the construction phase.

2.3.9 Traffic Management

A careful approach will be taken to planning the entirety of the works associated with the Proposed Project to ensure minimal impacts on road users and the general public.



Traffic Management at the Proposed Development site will be coordinated by an appointed Traffic Manager for the duration of the construction phase of the Proposed Development. A TDR has been selected from the N22 National Primary Road to the local road network through Lackareagh, as far as the proposed entrance to the Proposed Development site. This will be used for HGV traffic to avoid impact on other unsuitable roads in the area of the Proposed Development site.

A pre-condition survey will be carried out on all public roads that will be used in connection with the development to record the condition of the public roads in advance of construction commencing. A post-construction survey will also be carried out after the works are completed. All roads will be reinstated expeditiously on completion of the construction works.

Letter drops will be carried out to notify members of the public living near the proposed works to advise them of any particular upcoming traffic related matters. Clear signage relating to the Proposed Development, both temporary and permanent, will be provided for accessing the Proposed Development site. The entrances to the Proposed Development site will be secured when the site is not in use. When necessary, a flagman will be used to assist traffic movements at the site entrance or in other areas as required.

In the event the alternative grid connection is used, construction and cable trenching will be carried out with the aid of a traffic management plan, which will ensure that the trenching works are completed as expeditiously as possible. The cabling to be installed within the road corridor will be conducted over a period of up to 5-months (ca. 20 weeks). Road closures will be applied for by the appointed contractor and will outline local diversions whilst maintaining local access at all times for residents, farms and businesses.

Road closures will be subject to the applicable statutory processes as implemented by the Roads Authority. Road closures will be facilitated by the existing road network. 'Rolling road closures' will be implemented, whereby the site will progress each day along a road, which will have the effect of reducing the impact for local residents.

A traffic management plan for the cable trenching will be adopted, in consultation with Cork County Council, to provide a safe environment for road users and construction workers.

Turbine delivery will require the transportation of abnormal loads. This will be completed at off-peak times under agreement with the local authority and An Garda Síochána. A turbine delivery route assessment was carried out to identify the most appropriate transport route for turbine deliveries and includes the identification of temporary accommodation works required. Temporary accommodation works will be carried out with the use of lane closures or road closures, where required, and in agreement with the local authority. A programme for turbine deliveries will dictate dates and times of each component delivery. The deliveries will be escorted by An Garda Síochána to ensure greater road safety.

For construction of the proposed 90m met mast and associated access track, access will be through the same entrance as the Site.

A Traffic Management Plan is contained in the Construction Environmental Management Plan (CEMP) which is included in Appendix 2.2 of Volume 3 of this EIAR. In the event permission is granted for the Proposed Development the Traffic Management Plan shall be finalised following the appointment of the contractor for the main construction works to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned and shall be submitted to the planning authority.



2.4 Project Construction

2.4.1 Construction Programme

The construction of the Proposed Development in its entirety is expected to take between 12 – 18 months. The proposed construction programme upon which assessments in the EIAR have been based is presented in Figure 2-9 below.

Activity	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Mobilisation and site setup	■																	
Site clearance	■	■																
Internal access tracks	■	■	■	■	■	■	■											
Turbine hard standings			■	■	■	■	■	■										
Turbine foundations				■	■	■	■	■	■									
TDR accomodation works								■										
Turbine Installation										■	■	■	■	■				
Onsite substation			■	■	■	■	■	■	■	■	■	■	■	■	■			
Grid connection cable works							■	■	■	■	■	■	■	■	■	■		
Private electrical network												■	■	■	■	■	■	
Landscaping, reinstatement																■	■	■
Demobilisation																		■

Figure 2-9: Proposed Construction Programme

2.4.2 Construction and Environmental Management Plan (CEMP)

A Construction and Environmental Management Plan (CEMP) is contained in Appendix 2.2 of Volume 3.

The CEMP sets out the key environmental management measures associated with the construction, operation and decommissioning of the Proposed Development, to ensure that during these phases of the Proposed Development, the environment is protected, and any potential impacts are minimised.

The final CEMP will be developed further at the construction stage, on the appointment of the main contractor to the Proposed Development to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned.

The CEMP document is divided into six sections:

- Section 1: Introduction provides details on the existing site and the Proposed Development.
- Section 2: Existing Site Environmental Conditions provides details of the main existing geotechnical, hydrological, ecological and archaeological conditions onsite. These conditions are to be considered by the Contractor in the construction, operation and decommissioning of this Proposed Development.
- Section 3: Overview of Construction Works, this section provides an overview of the construction works proposed and drainage and sediment controls to be installed.
- Section 4: Environmental Management Plan (EMP), this section defines the work practices, environmental management procedures and management responsibilities relating to the construction of the Proposed Development in order to meet the specified contractual, regulatory and statutory requirements and ensure implementation of the identified mitigation measures throughout the EIAR.



Section 5: Safety & Health Management Plan, this section defines the work practices, procedures and management responsibilities relating to the management of health and safety during the design, construction and operation of the Proposed Development.

Section 6: Emergency Response Plan contains predetermined guidelines and procedures to ensure the safety, health and welfare of everybody involved in the project and to protect the environment during the construction phase of the Proposed Development.

2.4.3 Construction Activities

In the event that the Planning Authority decides to grant planning permission for the Proposed Development, upgrading of existing site tracks, the provision of new site tracks and vegetation clearance will precede all other activities (Figure 2-1). Drainage infrastructure will be constructed in parallel with the track construction. This will be followed by the construction of the turbine hardstanding areas and foundations.

In parallel with these works the on-site electrical works i.e. the Proposed Substation (if granted, currently under consideration as part of separate application) and internal cable network as well as off-site connection works to the national grid will be completed. Construction techniques are outlined in the CEMP in Appendix 2.2.

The hours of construction activity for the Proposed Development will be limited to avoid unsociable hours as per Section 8.5 (d) of the code of practice for BS 5228: Part 1: 1997. Construction operations shall generally be restricted to between 07:00 hours and 19:00 hours Monday to Saturday. It should be noted that it may be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Work on Sundays or public holidays will only be conducted in exceptional circumstances or in an emergency. Additional emergency works may also be required outside of normal working hours as quoted above. Further details on working hours and restrictions of same are provided in the CEMP in Appendix 3.1.

2.4.3.1 Material Requirements

Material for the new site access tracks and the hardstanding areas will be largely sourced on site from the proposed borrow pit. Otherwise, the building material will be sourced locally where possible.

Table 2-2 over shows the estimated volumes of crushed stone, concrete and bedding sand required for the Proposed Development.

Table 2-2: Estimate of Material Requirements for Proposed Wind Farm

Infrastructure Element	Total Factored Volume (m3)	Total Soil (m3)	Total Rock (m3)
Access Tracks	28,762	28,762	-
6 no. Wind Turbines/Hardstand Areas	44,222	44,222	-
On Site Electrical Substation Note 1	19,837	19,837	-
Temporary Site Compound	1,296	1,296	-



Infrastructure Element	Total Factored Volume (m3)	Total Soil (m3)	Total Rock (m3)
Permanent Meteorological Mast	504	504	-
On-Site Borrow Pit	11,489	1793	9,696
Total =	106,110	96,027	9,696

The foundation for the turbine is critical and requires good quality stone. These figures could be an over-estimate if competent bedrock is encountered at shallow depths.

The typical plant associated with the construction phase of the Proposed Development will consist of the following:

- Hydraulic Excavators
- Dump Trucks
- General construction delivery vehicles (e.g. steel reinforcement bar, electrical components etc.)
- Concrete trucks and pumps
- Cranes of various lifting capacities (up to 1000 tonnes)
- Oversized articulated delivery vehicles (for turbine component transport)
- Site Jeeps (off-road 4x4 all purpose vehicles)
- Private vehicles of those employed on site for the construction phase.

2.4.3.2 Site Access Tracks and Drainage

Access tracks are required to facilitate the construction of the Proposed Development and to provide access to each of the turbines and the Proposed Substation. Drainage infrastructure will be constructed in parallel with the access track construction.

SuDS design approach shall ensure that existing drainage patterns shall be maintained throughout the Proposed Development site.

The drainage system for the existing tracks and roads will largely be retained. It is proposed to upgrade approximately 1,381m of existing agricultural tracks. All track widening will be undertaken using clean uncrushable stone with a minimum of fines. This will involve minimal vegetation clearance and hedge trimming and the upgrade of existing roadside ditches to allow widening.

2.4.3.3 Cable Trenches along the AGCR

The following construction methodologies in relation to the alternative grid connection cable route works were described in the Carrigarierk Wind Farm Environmental Impact Statement (EIS).



For cable trenches located in public roads, the contractor will excavate cable trenches and then lay high density polyethylene (HDPE) ducting in the trench in a surround of cement bound material (CBM). A rope will be inserted into the ducts to facilitate cable-pulling later. The as-constructed detail of the cable duct locations will be carefully recorded. Cable marker strips will be placed above the ducts and two communication ducts will also be laid. An additional layer of cable marker strips will be laid above the communication ducts and the trench back-filled. Back-filling and reinstatement in public roads will be to a specification to be agreed with the road authority, at a minimum matching the pre-construction surface.

- All relevant bodies i.e. ESBN, Gas Networks Ireland, Eir, Cork County Council, Irish Water etc. will be contacted and all drawings for all existing services will be sought to reconfirm the conditions identified in this EIAR.
- Immediately prior to construction taking place the area where excavations are planned will be surveyed and all existing services will be identified, and temporary warning signs erected where necessary.
- For cable works in the public road, the traffic management plan will be implemented. Clear and visible temporary safety signage will be erected all around the perimeter of the live work area to visibly warn members of the public of the hazards of ongoing construction works.
- A road opening licence will be obtained where required and all plant operators and general operatives will be inducted and informed as to the location of any services.
- At road crossings, the road will be cut to the required width of the trench using a road saw.
- A rubber tracked 360-degree excavator will be used to excavate the trench to the dimensions specified in the ESB Networks “Functional Specification for The Installation of Ducts and Ancillary Structures for 38kV Underground Power Cables and Associated Communication Cables for Contestable Projects”.
- All excavated material will either be removed for off-site disposal/reuse or if suitable, stockpiled and reused for backfilling where appropriate.
- A silt filtration system will be installed on all existing drainage channels for the duration of the cable construction to prevent contamination of any watercourse.
- Any ingress of ground water will be removed from the trench using submersible pumps and pumped to the nearest available existing drainage channel following filtration.
- The trench depth is specified at 1,220 mm and trench support will not be required, however where depths exceed 1,250 mm trench support will be installed or the trench sides will be benched or battered back where appropriate.
- Once the trench has been excavated a base layer of 15 N CBM4 concrete will be installed and compacted. All concrete will be offloaded directly from the concrete truck directly into the trench.
- Once the ducts have been installed, couplers will be fitted and capped to prevent any dirt etc. entering the unjointed open end of the duct. In poor ground conditions, the open end of the duct will be shimmed up off the bed of the trench to prevent any possible ingress of water and dirt into the duct. The shims will be removed once the next length of duct has been joined to the duct system.
- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to ensure recording of exact location of the ducts, and hence the operational electricity cable. These co-ordinates will be plotted on as-built record drawings for the grid connection cable operational phase.
- When ducts have been installed in the correct position on the trench base layer, sand (in road trench) or Lean-mix CBM4 (CL1093) (off road trench) will be carefully installed in the trench around the ducts so as not to displace the duct.
- Spacer templates will be used during installation to ensure that the correct cover of duct surround material is achieved above, below and at the sides of the duct in the trench.



- A red cable protection strip will be installed above duct surround layer of material and for the full length of the cable route.
- A layer of Lean-mix CBM4 (CL1093) (in road) or excavated material (off road) will be installed on top of the duct surround material to a level 300mm below the finished surface level.
- Yellow marker warning tape will be installed for the full width of the trench, and for the full length of the cable route, 300mm from the finished surface level.
- The finished surface of the road, road verge, or agricultural land will be reinstated as per its original condition or to the requirements of the Cork Area Engineer.
- Precast concrete cable joint bays will be installed within excavations in line with the trench. The cable joint bays are backfilled and the finished surface above the joint bay reinstated as per its original condition. The cable joint bays are re-excavated a second time during cable pulling and jointing, after which the finished surface above the joint bays is reinstated again to its original condition.
- When trenching and ducting is complete, the installation of the grid connection cable will commence between the Barnadivane Wind Farm to Carrigarierk Wind Farm.
- Construction work areas and traffic management measures will be setup at 2 no. consecutive cable joint bays simultaneously. The underground cable will be pulled through the installed ducts from a cable drum set up at one joint bay and using a winch system which is set up at the next joint bay, the cable is pulled through.
- The cables are jointed within the precast concrete cable joint bays.
- The finished surface above each cable joint bay is reinstated to its original condition, and the construction work area removed.



Plate 2-1: Cable Duct Laying in Trefoil Configuration

2.4.3.4 Watercourse Crossings

Watercourse crossings can generally be classified as follows:

- Existing structures (bridges or culverts) that need to be crossed by infrastructure (access tracks or cables) associated with the AGCR, without a need to modify the existing structure;
- Installation of new structures to facilitate the crossing of existing watercourses by infrastructure associated with the AGCR;
- Existing structures that need to be either replaced or upgraded to facilitate the crossing of existing watercourses by infrastructure associated with the AGCR; and
- Crossing of existing open streams or drains by cable ducts.

A total of 15 no. watercourse crossings have been identified along the consented AGCR.

The methodology/sequence of works associated with the proposed watercourse crossing methods for the AGCR are outlined in the CEMP prepared for the Carrigarierk Wind Farm Environmental Impact Statement (EIS).

Instream works are not required at any watercourse crossing along the ACGR.



2.4.3.5 Temporary Site Facilities

During the construction phase of the Proposed Development footprint, it will be necessary to provide temporary facilities for the construction personnel. The location of the proposed temporary site compound is shown on Figure 2-2 close to the proposed turbine, T3.

Facilities to be provided in the temporary site compound will include the following:

- Site office, of Portacabin type construction;
- employee parking;
- portaloo;
- bunded fuel storage;
- bottled water for potable supply;
- contractor lock-up facility;
- a water tanker to supply water used for other purposes;
- diesel generator.

The temporary facilities will be removed on completion of the construction phase.

2.4.3.6 Erection of Permanent Met Masts

The works shall be carried out by a small crew in line with the following sequence of works:

- The site of the mast location shall be marked out, and the necessary area cleared of vegetation.
- Mark out mast base in accordance with detailed design drawings.
- A temporary access track shall be extended towards the mast location from the existing agricultural track. The access track shall be up to 3.5m in width. Temporary and permanent drainage infrastructure shall be extended also.
- General construction methods for the above access track and hard standing shall match those described in Sections 2.4.3.2 however the dimensions and stone depth requirements of the access infrastructure will be considerably less than that required for that serving the wind turbine construction.
- A crane pad of approximately 10m x 10m in size shall be put in place in front of the proposed mast location. Hardcore will be used for the crane pad.
- The foundation of the mast shall be excavated followed by shuttering, steel fixing and finally concrete pouring by ready mix truck. Excavation and concrete operations shall be carried out in accordance with the CEMP.
- Following crane setup, the mast sections shall be delivered and unloaded by truck.
- Mast sections will be assembled on the ground.
- In accordance with an agreed lifting plan, mast sections shall be lifted by crane into place. Wind speeds shall be monitored at all times during lifting operations by the lead climber and crane operator.
- Mast sections shall be bolted together by climbers.
- Following erection of main mast sections, lightning protection and other ancillary components shall be fixed to the mast.



The masts will be decommissioned using a similar methodology as the construction except in reverse.

2.4.4 Waste Management

A Waste Management Plan for the Proposed Development has been included in the CEMP in Appendix 2.2.

The Developer, in conjunction with appointed contractor, will prevent, reduce, reuse and recover as much of the waste generated on site as practicable and ensure the appropriate transport and disposal of residual waste off site to licensed facilities. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

Any waste generated during the Proposed Development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary compound during construction.

It will be the responsibility of the contractor for the main construction works (when appointed) to nominate a suitable site representative such as a Project Manager, Site Manager or Site Engineer as Waste Manager who will have overall responsibility for the management of waste.

The waste manager will have overall responsibility to instruct all site personnel including sub-contractors to comply with on-site requirements. They will ensure, at an operational level, that each crew foreman is assigned direct responsibility.

Waste Generated

It is envisaged that the following categories of waste will be generated during the construction of the Proposed Development:

- Municipal solid waste (MSW) from the office and canteen;
- Construction and demolition waste;
- Waste oil/hydrocarbons;
- Paper/cardboard;
- Timber;
- Steel.

Sanitary waste will be removed from site by a licensed waste disposal contractor. All portaloos located on site during the construction phase will be operated and maintained in accordance with the manufacturer's instructions and will be serviced under contract with the supplier. All such units will be removed off-site following completion of the construction phase.

A fully authorised waste management contractor will be appointed prior to construction works commencing. This contractor will provide appropriate receptacles for the collection of the various waste streams on site and will ensure the regular emptying/and or collection of these receptacles.

Waste Recycling, Recovery & Disposal

In accordance with national waste policy, source separation of recyclable material will take place. This will include the provision of receptacles for the separation and collection of dry recyclables (paper, cardboard, plastics etc.), biological waste (canteen waste) and residual waste.



Receptacles will be clearly labelled, signposted and stored in dedicated areas.

The following source segregated materials containers will be made available on site at a suitable location:

- Timber;
- Ferrous metals;
- Aluminium;
- Dry mixed recyclables;
- Packaging waste;
- Food waste.

The materials will be transported off-site by an authorised contractor to a permitted recovery centre and these materials will be processed through various recovery operations.

Residual waste generated on-site may require disposal. This waste will be deposited in dedicated receptacles and collected by the permitted waste management contractor and transported to an appropriate facility. All waste movements will be recorded. Records will be held by the waste manager on-site.

Authorised waste management facilities have been identified in the greater County Cork area as listed on the Local Authority Waste Facility Register by the National Waste Collection Permit Office. The authorised waste facilities utilised during the construction and decommissioning of the Proposed Development will depend on the contractors appointed and will depend on the capacity of the various facilities at the time of construction and decommissioning. A list of existing licensed waste facilities in proximity to the Proposed Development is presented in Table 2-4 below. These facilities were identified at the time of the preparation of this EIAR.

Table 2-3: Licensed Waste Facilities in the Vicinity of Proposed Development

Licensed Waste Facility Location	Type of Waste
Dunisky, Lissarda	Waste from forestry, sawdust, shavings, cuttings, wood, particle board and veneer wood, wooden packaging
Ballinphellic, Innishannon	Concrete, bricks, tiles and ceramics
Lisnacunna, Enniskeane	Iron and steel
Kilnaglory, Ballincollig	Concrete, bricks, tiles, ceramics, soil and stone
Clonfadda, Macroom	Soil and Stone
Gurranenagappul, Clondrohid, Macroom	Soil and Stone
Tooreen South/Glashaboy South Carrignavar	Soil and Stone
Ballykenly, Glanworth	Soil and Stone



In relation to quantities of waste, materials excavated during the construction phase will be reused on-site. Therefore, excavated materials are not expected to require export from the construction site as detailed in Chapter 6. It is expected that general waste and recyclables will be collected from the site no more than 2 times per week by Heavy Goods Vehicle (HGV). This has been factored into the traffic calculations detailed in Chapter 11. Waste management will be coordinated in line with the Waste Management Plan included in the project CEMP, located in Appendix 2.2, Volume 3 of this EIAR.

Waste is not expected to be produced during the operation phase of the Proposed Development.

2.5 Community Gain Fund

The developer intends to put in place a community gain scheme, to ensure the local community benefits from the Proposed Development. This scheme is likely to comprise the developer paying into a Community Gain Fund. This fund (generally) would be operated by an independent committee of local residents or community representatives. Local and voluntary groups can then apply for funding to the committee on an annual basis. It is proposed that the Community Gain Scheme, in the case of the Proposed Development would be more focussed on local residents, with benefits delivered to local residents in a variety of ways, including:

- Annual financial contributions to the electricity costs of local homeowners;
- Once-off funding for home energy upgrades;
- Local road upgrades/improvements;
- Minor works to local properties during construction of wind farm.

Renewable energy projects which are developed under the current RESS will have a significantly increased community benefit fund associated with them and for wind energy, this contribution is currently set at €2/MW hr.

Should the Proposed Development be developed under RESS, it would attract a community contribution in the region of approx. €120,000/year for the local community. The value of this fund would be directly proportional to the electricity generated by the Proposed Wind Farm. Under current T&C's of RESS, the following would be required for the Proposed Development:

- Direct payments – to those living closest to the Proposed Development. A minimum €1,000 payment per annum for houses within 1km of the Proposed Development;
- Energy Efficiency – Up to €50,000/year would be available for the development of energy initiatives to benefit people living in the local area. This is to be provided to not for profit community enterprises.
- Support for local groups – Up to €50,000/year would be available for local groups, clubs and not for profit organisations that provide services in the local area. This would include services for the elderly, local community buildings, and the development of sporting facilities such as all weather playing pitches etc.
- Administration costs - a maximum of 10% of this fund to be made available for the administration and governance costs of the fund.



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, the first task will be to form a benefit fund development working group that clearly represents both the close neighbours to the Proposed Development as well as nearby communities. This group will then work on designing the governance and structure of a community entity that would administer the Community Benefit Fund.

2.6 Operation and Lifespan

During the operational period, the turbines will operate automatically on a day-to-day basis, responding by means of anemometry equipment and control systems to changes in wind speed and direction. The turbine manufacturer or a service company will carry out regular maintenance of the turbines. Scheduled services will typically occur twice a year.

The operation of the wind turbines will be monitored both remotely and on-site. An operative working from a remote headquarters will oversee the day to day running of the Proposed Development.

The applicant requests the grant of permission is on the basis of a 25-year operational period from the date of full operational commissioning of the Proposed Wind Farm. With permission for the proposed onsite substation (under separate application) sought in perpetuity given that the substation could form part of the national electricity network. Therefore, the Proposed Substation will be retained as a permanent structure and will not be removed.

25 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 Proposed 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. During this operational period the wind turbines will generally operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction.

2.7 Decommissioning

On decommissioning, cranes will disassemble the above ground turbine components which will be removed off site for recycling. All the major component parts are bolted together, so this is a relatively straightforward process.

The foundations will be covered over and allowed to re-vegetate naturally. Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise and vibration and dust.

It is proposed that the internal site access tracks and turbine hard standings will be left in place. The access tracks will continue to be used for agriculture access. Turbine hardstandings shall be covered over with topsoil and left to revegetate naturally.

It is expected that the temporary accommodation works along the TDR will not be required for the decommissioning phase as turbine components can be broken up on site and removed using standard HGVs.

Grid connection infrastructure including the Proposed Substation, internal cabling, AGCR and ancillary electrical equipment shall form part of the national grid and will be left in situ.

It is expected that the decommissioning phase will take no longer than 6 months to complete.



A detailed decommissioning plan will be agreed in advance of construction with Cork County Council.

2.8 Alternatives and Site Suitability

Guidance on the consideration of alternatives to the Proposed Development is set out in Section 3.4 of the EPA's "Guidelines on the Information to be contained in Environmental Impact Assessment Reports" (March 2022). This section sets out the main reasons for choosing the Proposed Development site. It considers alternative sites and outlines why the preferred site was selected. It also considers alternative site layouts, technologies and outlines how the current design was selected.

In the case of the Proposed Wind Farm, there is planning precedent for a wind farm at this site, by virtue of the expired planning permission for 14 turbines, under planning reference 05/5907 (Cork County Council), 04.219620 (An Bord Pleanála) and the extension of duration of this planning permission, reference 11/06605.

The developer wishes to apply for permission to construct 6 turbines at the Proposed Wind Farm site, in place of the previously consented 14 turbines. In this respect, the consideration of alternatives or site selection has already been addressed in the original applications and the planning authorities have accepted the principle of wind energy development on this site. For this reason, alternative sites were not considered in this application.

The proposal to reduce the number of turbines from 14 to 6, is due to the developments in turbine technology in the intervening period. A number of turbine layouts were considered, in the wind farm design. An initial 8 turbine layout was designed. A constraints assessment was then carried out, based on the various environmental and landowner constraints, prior to the selection of the proposed layout. This iterative process (with the various layouts provided in Appendix 2.1 of Volume 3), reduced the number of turbines to 6, with the final layout being that included herein.

In terms of the 'do nothing' scenario, should the Proposed Development not be developed, fossil fuel power stations will be the primary alternative to provide the required quantities of electricity. This will further contribute to greenhouse gas and other emissions, and hinder Ireland in its commitment to meet its target to increase electricity production from renewable sources and to reduce greenhouse gas emissions.

In terms of turbine delivery routes, the route as outlined in Chapter 11 – Traffic and Transportation is the only viable delivery route, from the N22. No other suitable delivery routes are available.

For the grid connection route, two alternative connections are considered –

1. The 110kV substation loop in loop out to existing 10kV overhead lines; and
2. A tail fed underground grid connection utilising a permitted cable route connecting to the permitted Carrigarierk Windfarm.



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