FEHILY TIMONEY

DESIGNING AND DELIVERING A SUSTAINABLE FUTURE

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED SHANCLOON WIND FARM,CO. GALWAY

VOLUME 1 - NON-TECHNICAL SUMMARY

Prepared for:

RWE Renewables Ireland Ltd.

RWE

Date: **August 2025**

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1. INTRODUCTION

1.1 Introduction

Fehily Timoney & Company (FT) has prepared this environmental impact assessment report (EIAR) on behalf of RWE Renewables Ireland Ltd. RWE Renewables Ireland Ltd. intends to apply to An Bord Pleanála for planning permission to construct the proposed Shancloon Wind Farm, County Galway. The Proposed Development consists of the following main elements:

- The wind farm site (referred to in this EIAR as the 'Site') which includes the on-site 110 kV substation and loop-in connection to the existing Cashla-Dalton overhead line;
- The turbine delivery route (referred to in this EIAR as the 'TDR').

1.2 Site Description

The Proposed Development is located within the townlands of Beagh, Beagh More, Cloonbar, Cloonmweelaun, Cloonnaglasha, Cloonteen, Corillaun, Derrymore, Ironpool, Shancloon, Toberroe and Tonacooleen, County Galway. Of these, the on-site substation is located within Corillaun and loop-in connection within neighbouring Tonacooleen.

The TDR will be from Galway Port and will pass through the following townlands along the road network: Airgloony, Annagh, Annagh Beg, Annagh Hill, Ballinphuil, Ballintober, Ballybaan Beg, Ballybackagh, Ballybanagher, Ballybrit, Ballygaddy, Beagh, Brockagh, Bullaun, Caherateemore North, Caherateemore South, Caherbriskaun, Caraunduff, Carnmore, Carnmore West, Castlegrove West, Castlelambert, Cloonascragh, Cloondarone, Cloonkeen North, Cloonkeen South, Cloonmore, Cloonmweelaun, Cloonnavaddoge, Cloonteen, Cloontooa, Coolagh, Doughiska, Fartagar, Garraun North, Garrauncreen, Glenmore, Glennascaul, Ironpool, Killaloonty, Killeelaun, Kilmore, Kilskeagh, Laragh More, Lisheenkyle East, Lisheenkyle West, Mahanagh, Mira, Palmerstown, Pollacorragune, Pollnagroagh, Rathmore, Rathmorrissy, Sheeaunpark, Tobernavean and Townparks.

The Proposed Development application area (i.e. the red line boundary depicting the land to which the application relates) encompasses a land area of 154 ha (1.54km^2). The development footprint within the application area of the Proposed Development is 19.6 ha (0.196 km^2).

The site location is presented in Figure 1.1 and site layout in Figure 1.2 within this Non-Technical Summary.

1.3 Development Description

On 28th May 2025 An Bord Pleanála (The Board) (later referred to as An Coimisiún Pleanála)[1] deemed the Proposed Development is eligible as Strategic Infrastructure Development (SID) by way of a notice served under section 37B(4)(a) of the Planning and Development Act 2000 as amended and the application is being made directly to the Board (case ref. ABP-321507-24). The Board are the competent authority for the purposes of the Environmental Impact Assessment (EIA).

[1] NOTE: Part 17, Section 495(3) of the Planning and Development Act 2024 provides that references in any enactment, legal proceedings or document to An Bord Pleanála shall, on and after the commencement of said section, be construed as references to An Coimisiún Pleanála. Part 17, Section 495(3) of the Planning and Development Act 2024 was commenced

An EIA is a legal requirement contained in *Schedule 6 of the Planning & Development Regulations 2001*, which contains the following:

1. *A description of the proposed development comprising information on the site, design, size and other relevant features of the proposed development….*
2. *Additional information, relevant to the specific characteristics of the development or type of development concerned and to the environmental features likely to be affected, on the following matters, by way of explanation or amplification of the information referred to in paragraph 1:*
    (a) a description of the proposed development, including, in particular—
    (b) a description of the location of the proposed development,
    (c) a description of the physical characteristics of the whole proposed development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases,
        i. (iii)a description of the main characteristics of the operational phase of the proposed development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used, and
    (d) *an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases*"

The Proposed Development by RWE Renewables Ireland Ltd. (the Applicant) includes 11 no. wind turbine generators (WTG's), a 110 m meteorological mast, and 1 no. 110kV substation along with ancillary civil, drainage and electrical infrastructure (including loop-in connection to the National Electricity Grid) and all associated works related to the construction of the wind farm as well as measures designed to protect and enhance existing habitats.

On 16th December the Applicant made a request to An Bord Pleanála for a design flex opinion (case ref. ABP-321495-24). The Planning and Development, Maritime and Valuation (Amendment) Act 2022, provides for design flexibility in the case of applications for development specified in the Seventh Schedule relating to rapidly changing technology and the potentially long lead-in times between the making of a planning application and the procurement of equipment. Under Section 37CC (1) of the Planning and Development Act 2000 (as amended), it states that a prospective applicant who proposes to make an application for development specified in the Seventh Schedule may request a meeting with the Board for the purpose of Section 37CD as part of consultation referred to in Section 37B (1). Accordingly, RWE Renewables Ireland Limited commenced pre-application consultation under Section 37B (1) seeking the Boards opinion on design flexibility. The Board, on 13th June 2025, provided an opinion under section 37CD of the Planning and Development Act 2000 (as amended) the following details may be confirmed after the proposed application has been made and decided:

- Turbine Dimensions
    a) Turbine tip height
    b) Rotor diameter
    c) Hub height

on 18th June 2025. Any reference to An Bord Pleanála in this EIAR can be construed as meaning An Coimisiún Pleanála where it relates to a time after 18th June 2025.

The proposed application is consistent with the opinion provided by the Board in accordance with section 37CD of the Act. The EIAR has been prepared to reflect the opinion provided by the Board.

The Proposed Development has been designed in accordance with The Department of Housing, Local Government and Heritage's *'Wind Energy Development Guidelines 2006*' (the Wind Energy Guidelines 2006). These current national guidelines are subject to targeted review, with the *'Draft Revised Wind Energy Development Guidelines 2019*' (draft WEGs) having been published by the Department of Housing, Planning and Local Government in December 2019.

The draft WEGs propose an increase in minimum turbine setback from nearby dwellings, requiring that a turbine should be located no closer than 500m from involved properties and a minimum setback of 4 times the turbine tip height from all third party properties (720m based on the proposed turbine tip height of 180 m). In this regard, the layout and design of the wind farm complies with the current Draft Revised Wind Energy Development Guidelines, 2019.

1.4 EIAR Structure

The EIAR has been prepared using the "grouped format structure" as outlined in the EPA's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (2022). Using this structure there is a separate chapter for each topic, e.g. air quality and climate, biodiversity, hydrology. The description of the existing environment, the Proposed Development and the Potential Impacts, mitigation measures and residual effects are grouped in the chapter. The grouped format makes it easy to investigate topics of interest and facilitates cross-reference to specialist studies.

The EIAR consists of the following chapters:

- Chapter 1 – Introduction;
- Chapter 2 - Development Description;
- Chapter 3 - Site Selection and Alternatives Considered;
- Chapter 4 – Policy;
- Chapter 5 - Scoping and Consultation;
- Chapter 6 - Population and Human Health;
- Chapter 7 - Air Quality and Climate;
- Chapter 8 - Noise and Vibration;
- Chapter 9 – Biodiversity;
- Chapter 10 – Ornithology;
- Chapter 11 – Soils, Geology and Hydrogeology;
- Chapter 12 – Hydrology and Water Quality & FRA;
- Chapter 13 - Shadow Flicker;
- Chapter 14 - Traffic and Transportation;
- Chapter 15 - Archaeology, Architectural and Cultural Heritage;
- Chapter 16 - Landscape and Visual Impact;
- Chapter 17 - Material Assets, Telecommunications and Aviation;
- Chapter 18 - Interactions of the Foregoing.

The EIAR is structured as follows:

- Volume 1 – Non-Technical Summary (NTS)
- Volume 2 – Main EIAR
- Volume 3 – Appendices to the Main EIAR
- Volume 4 – Figures and Photomontages

It should also be noted, for the sake of completeness, that a separate Natura Impact Statement (NIS) has also been submitted with the planning application. The application is also supported by Planning Drawings.

1.5 Permission Period

A ten-year consent is being requested for this Proposed Development. That is, planning consent for the construction of the Proposed Development would remain valid for ten years following the grant of permission. The applicant requests a grant of permission on the basis of a 30-year operational period from the date of commissioning of the Proposed Development.

A permanent planning permission is being sought for the Grid Connection and substation as these will become an asset of the national grid under the management of EirGrid and will remain in place upon decommissioning of the Proposed Development.

1.6 Difficulties Encountered

There were no difficulties encountered during the preparation of this EIAR.

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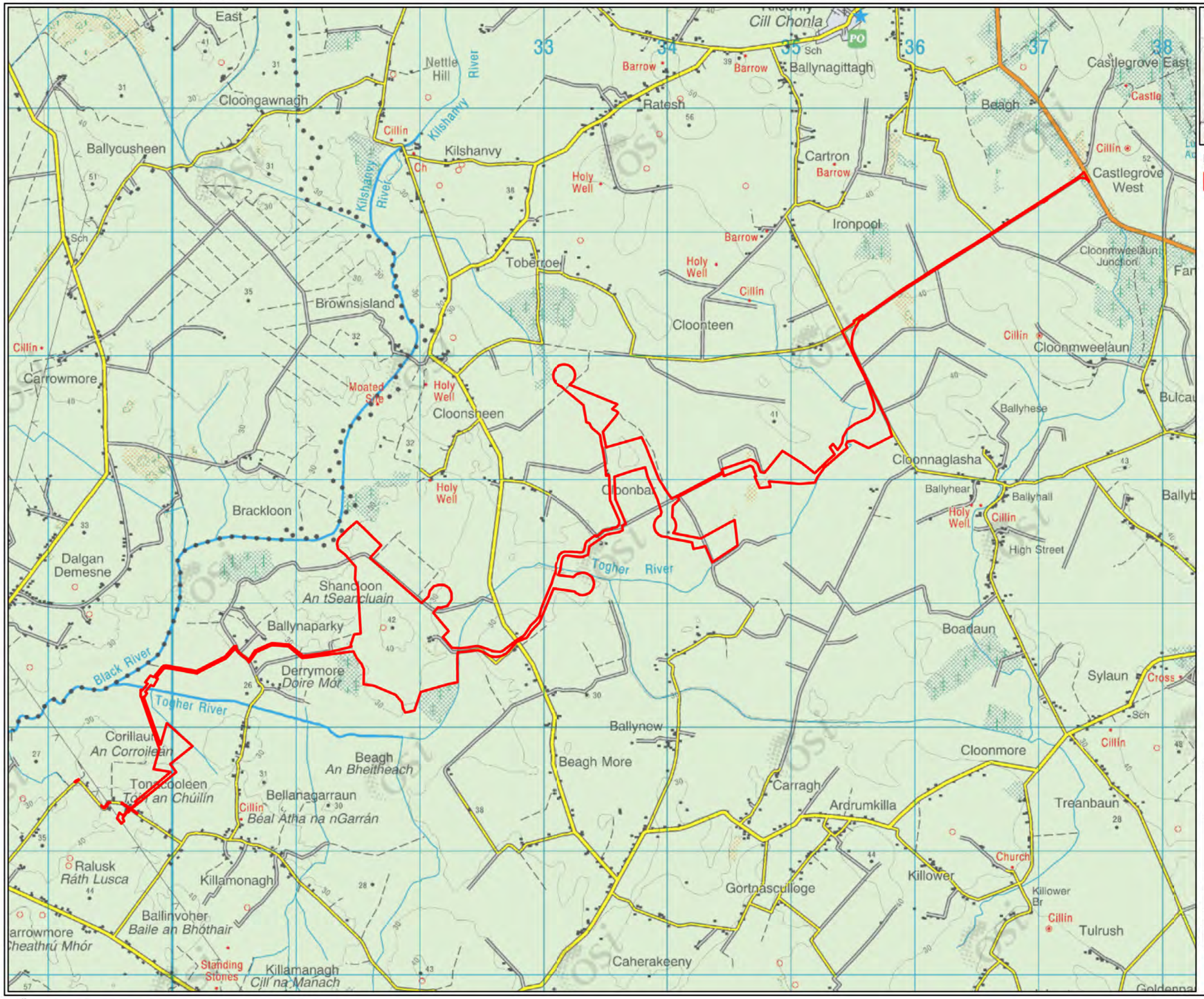

Legend

Proposed Development Boundary

TITLE:	Site Location
PROJECT:	Shancloon Windfarm EIS
FIGURE NO:	2.1
CLIENT:	RWE Renewables Ireland Ltd
SCALE:	1:30,000
REVISION:	0
DATE:	11/07/2025
PAGE SIZE:	A3

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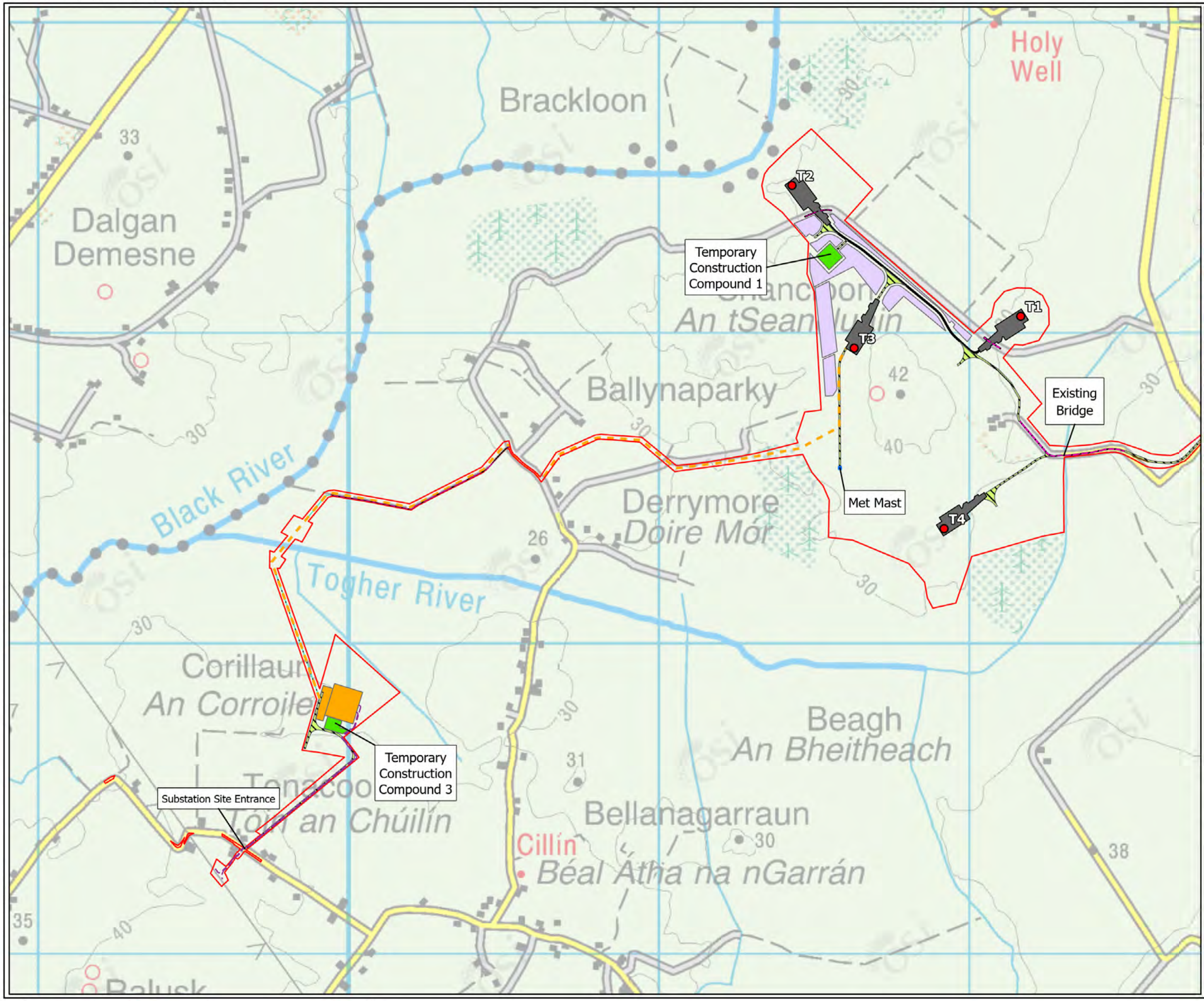

Legend

- Proposed Development Boundary
- Substation
- Hardstandings
- Construction Compound
- Passing Bays
- Wheel Wash
- Peat and Spoil Storage Areas
- Met Mast Location
- Floating Roads
- New Road
- Temporary Road for HDD Crossing
- Existing Roads
- 33kW Cable
- 110kV Lead-In Cable
- Turbine Locations

Turbine No.	ITM Easting	ITM Northing
T1	532132.67	754078.86
T2	531396.16	754500.54
T3	531596.37	753976.43
T4	531885.92	753394.59

*For Turbine Delivery Route see Figure 2.3

TITLE:	Wind Farm Site Layout
PROJECT:	Shancloon Windfarm
FIGURE NO:	1.2
CLIENT:	RWE Renewables Ireland Ltd
SCALE: 1:12,000	REVISION: 0
DATE: 11/07/2025	PAGE SIZE: A3

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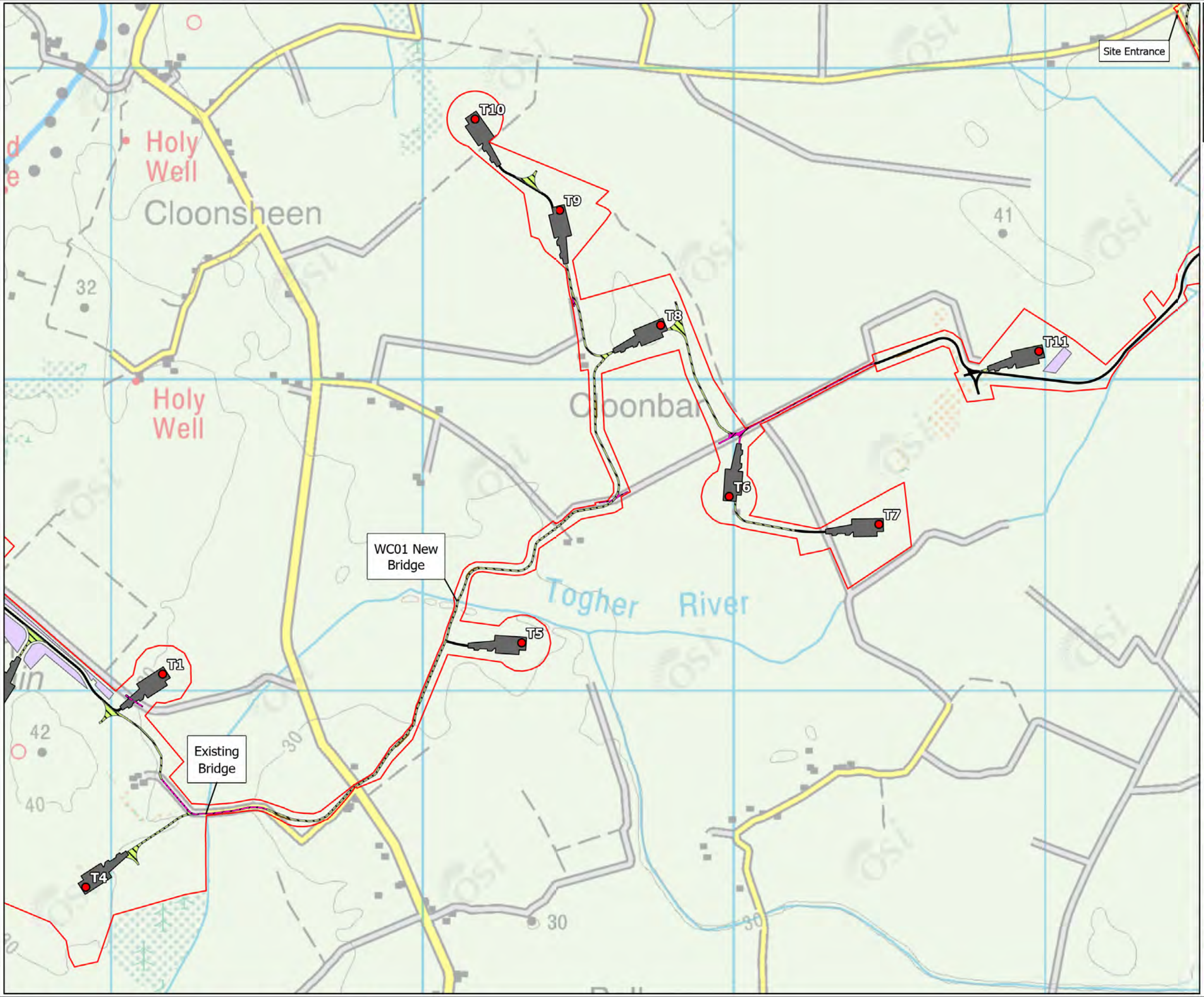

Legend

- Proposed Development Boundary
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Turbine No.	ITM Easting	ITM Northing
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T4	531885.92	753394.59
T5	533285.84	754179.26
T6	533952.48	754649.09
T7	534433.24	754559.89
T8	533732.73	755199.29
T9	533408.47	755568.2
T10	533136.03	755860.91
T11	534946.66	755115.37

For Turbine Delivery Route see Figure 2.3

TITLE: Wind Farm Site Layout

PROJECT: Shancloon Windfarm

FIGURE NO: 1.2

CLIENT: RWE Renewables Ireland Ltd

SCALE: 1:12,000 **REVISION:** 0

DATE: 11/07/2025 **PAGE SIZE:** A3

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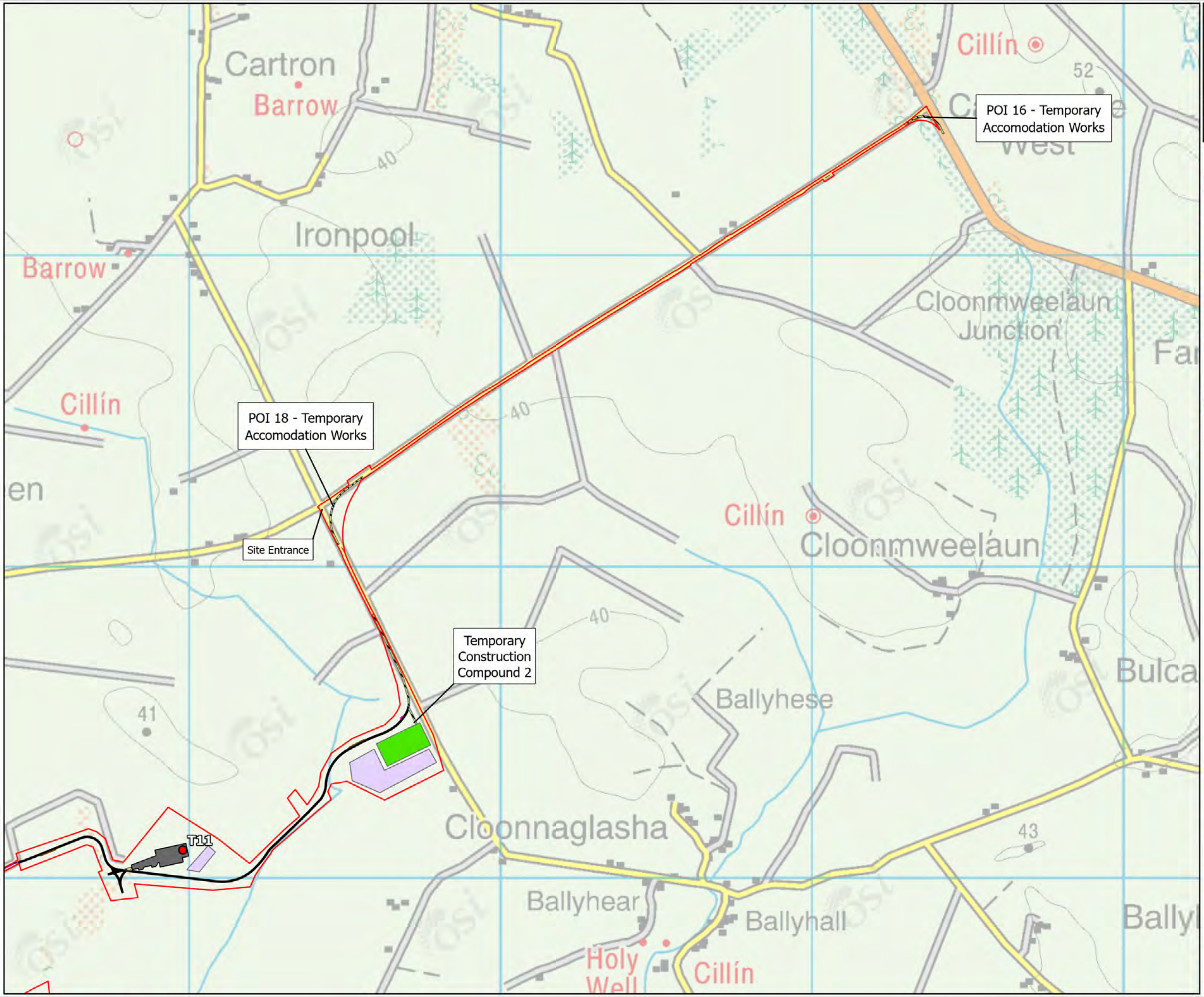

Legend

- Proposed Development Boundary
- Substation
- Hardstandings
- Construction Compound
- Passing Bays
- Wheel Wash
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SCALE: 1:12,000	REVISION: 0
DATE: 11/07/2025	PAGE SIZE: A3

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0 0.25 0.5 1 Km

2. DESCRIPTION OF PROPOSED DEVELOPMENT

2.1 Description of Proposed Development

The Proposed Development consists of an 11 no. turbine wind farm and associated infrastructure including internal access tracks, hard standings, permanent meteorological mast, onsite substation, internal electrical and communications cabling, temporary construction compounds, drainage infrastructure and all associated works related to the construction of the wind farm as well as measures designed to protect and enhance existing habitats and a connection to the National Electricity Grid (NEG).

The associated grid connection will consist of an underground cable that will connect the proposed on-site substation with a loop-in connection to the existing Cashla-Dalton 110 kV overhead line.

The TDR begins at Galway Port and utilizes the R339, R336, N6, M6, M17 and N17 and local road network to the proposed site entrance off of the L-2234 local road.

The Proposed Development for which consent is being sought will consist of the following:

- Construction of 11 no. wind turbines with a ground to blade tip height range of 179.25 m to 180 m. The wind turbines will have a rotor diameter ranging from 149.1 0 m to 155 m and a hub height ranging from 102.5m to 105m.
- Construction of permanent turbine foundations and crane pad hardstanding areas and associated drainage;
- Construction of 13,725 m of internal access tracks and associated drainage infrastructure (of which 1,770 m will be floated road);
- Upgrading of 3,565 m of existing tracks and road and associated drainage infrastructure;
- Construction of 1,180 m of temporary access track to facilitate HDD cable crossing of the Togher River;
- Creation of 1 no. new construction and operation access to the wind farm Site from the L-2234 local road and one road crossing of the L-2220-21 local road;
- All associated drainage and sediment control including interceptor drains, cross drains, settlement ponds and swales;
- Installation of new watercourse crossings including 1 no. 18.5 m single span bridge crossing and 14 new piped culverts;
- All associated excavation, earthworks and spoil management;
- 3 no. temporary construction compounds and associated ancillary infrastructure including parking;
- Construction of 1 no. permanent onsite 110kV electrical substation, associated new access road off of the L-6100 local road, and associated construction compound including:
    - Welfare facilities;
    - Electrical infrastructure;
    - Parking;
    - Wastewater holding tank;
    - Rainwater harvesting tank;
    - Security fencing;

- Works associated with the connection of the wind farm to the national electricity grid, which will be via a loop-in 110 kV underground cable connection 650 m in length to the existing Cashla-Dalton 110 kV overhead line in the townland of Tonacooleen, with two new 16m high steel loop-in lattice tower end masts for loop-in connection at the connection point.
- Installation of 33 kV medium voltage electrical and communication cabling underground between the proposed turbines and the proposed on-site substation and associated ancillary works including Control Building;
- Erection of 1 no. permanent meteorological mast to a height of 110 m above ground level with a 4m lightning pole on top.
- Turbine Delivery Accommodation works:
    - R332 / L6483 Junction (Beagh Townland) - temporary load bearing surface will be laid and the drainage ditch temporarily culverted. Vegetation will be cleared. One utility pole will be temporarily removed.
    - L6483 (Beagh, Cloonmweelaun and Ironpool Townlands)- temporary load bearing surface will be laid to provide a minimum 4.5 m running width and a 5.5 m clearance width for turbine delivery.
    - L6483 (Ironpool Townland) – temporary load bearing surface will be laid and vegetation will be cleared. Two road signs will be temporarily removed.
- Felling of 0.54 ha of conifer plantation forestry;
- 2,032 m Treeline/hedgerow removal;
- 9.7 ha of Biodiversity Enhancement lands plus 2,457.50 m of hedgerow/treeline planting;

Certain temporary accommodation works associated with the Turbine Delivery are assessed within this EIAR but for which planning consent is not being sought within the current application (Refer to Table 2.6). These works to facilitate the delivery of turbine components and haulage to Site include hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening. For these locations, works associated with road infrastructure have been identified and assessed in the EIAR, however, permission for these works will be sought separately as necessary.

2.2 Wind Turbines

The final choice of make and model of the turbine that will be developed at the Site will be dictated by a competitive tender process of the various turbines on the market at the time, but will be within the following design parameters/turbine specification as per the design flexibility opinion of the Board:

- ground to blade tip height range of 179.25 m to 180 m
- rotor diameter ranging from 149.1 m to 155m
- hub height ranging from 102.5m to 105m
- Blade length ranging from 72.4m to 76m (rotor length of 74.55m to 77.5m)
- Blade width (maximum chord length) ranging from 4.2m to 4.5m
- Blade swept area of ranging from 17,460 m^2 to 18,869 m^2

The turbine model will be a conventional three-blade horizontal axis turbine. Schematic drawings of the design parameters accompany the planning application. The plans and particulars are precise and provide specific dimensions for the turbine structures which have been used in this assessment.

The turbine blades comprise fibreglass reinforced epoxy, carbon fibres and solid metal tip. The turbines will have a cut in wind speed of 3 m/s and cut out speed of between 25 m/s and 27 m/s. Turbine rotor rotation is in a clockwise direction. The turbine begins generating electricity at a wind speed of 3 m/s, with rated power generation at wind speeds of approximately 12 to 14 m/s.

The turbines will be anchored to a foundation. Following detailed site investigations, it has been determined that the wind turbine foundations will be piled foundations. While load bearing resistances may be achievable in the subsoils, the piles will be extended into the bedrock in order to provide certainty on stability given the occurrence of dolines[2] in the area.

The piles to be constructed will be large diameter reinforced concrete piles and will range in the order of 600mm to 1200mm diameter. Approximately 14 to 16 piles will be used at each piled turbine foundation. The turbine foundation will sit on top of the piles and will be 20m -25 m in diameter and 5 m in depth with a central circular raised plinth which will be used to anchor the turbine tower at its base.

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

Table 2-1: Turbine Coordinates

Turbine No.	ITM Easting	ITM Northing
T1	532132.67	754078.86
T2	531396.16	754500.54
T3	531596.37	753976.43
T4	531885.92	753394.59
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T6	533952.48	754649.09
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T8	533732.73	755199.29
T9	533408.47	755568.20
T10	533136.03	755860.91
T11	534946.66	755115.37

[2] A doline, also known as “Dropout” or “Cover Collapse” is a subsidence features limited to overburden deposits (soils) overlying the bedrock. ”. Based on the Site’s geology it is thought that fractures in the bedrock caused by regional scale faulting have allowed for overburden material to migrate downward thereby causing voiding and subsequent collapse of the overlying superficial deposits.

2.3 Turbine Transport

Large turbine components will be transported to the site via the identified TDR.

The proposed access route to site, which is as follows:

- Loads will exit the Galway docks and head northeast on Lough Atalia Road;
- Loads will take a slight right onto College Road / R339. They will then continue to follow R339;
- Loads will turn left at Connolly Avenue;
- Loads will then turn right onto Tuam Road / R336;
- Loads will turn right at the R386 / N6 junction and will proceed eastbound on the N6;
- Loads will continue on the N6 and the M6 eastbound;
- At Junction 18 loads would turn left onto the M17 northbound;
- Loads would follow the Tuam bypass onto the N17;
- Loads will turn left onto the R332;
- Loads will turn left onto the L6483 and continue west to the L-2234-24 and on to the proposed site entrance.

2.4 Construction

The construction sequence is expected to take c. 24 months. There are a number of items which will be conducted in parallel, but the basis of the construction programme will involve site establishment, site access road and drainage construction, hardstanding construction. Substation works will likely take place in parallel with the main wind farm site works with loop in connection to follow.

A SuDS design approach will ensure that existing drainage patterns will be maintained. Drainage ditches will be formed within the excavated width and along the sides of the internal access tracks. Drainage infrastructure will be constructed in parallel with the access track construction.

2.5 Operation, Maintenance and Decommissioning/Reinstatement

Permission is sought for a 30-year operation period commencing from full operational commissioning of the wind farm.

During the operation of the Proposed Development, some maintenance work may be required for the turbines and underground cabling. It will require maintenance and operations crews to tend to the site periodically throughout the lifetime of the project. It is unlikely that the turbine delivery route will be used during the operational phase unless replacement or maintenance of turbine components is required.

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 foundation pedestals will be covered over and allowed to re-vegetate naturally. Leaving the turbine foundations in situ is considered a more environmentally sustainable option as to remove the reinforced concrete would result in environmental nuisances such as noise, vibration, and dust. It is proposed that the internal site access tracks will be left in place.

3. SITE SELECTION AND ALTERNATIVES CONSIDERED

3.1 The Need for the Proposed Development

The Proposed Development is necessary to produce renewable energy for the Irish national grid in order to transition Ireland to a low carbon economy. The Proposed Development will have an Export Capacity ranging from 61.6 MW to 72.6 MW depending on the power rating employed.

At a strategic level, the need for the Proposed Development is supported by International, European, and National environmental and energy commitments and policies. In Chapter 4: Policy of this EIAR, a detailed analysis of these commitments and policies is outlined. This is in the context of substantial and continuing failure by Ireland in meeting climate targets to date, as noted in Ireland's Greenhouse Gas Emissions Projections 2023-2050, which indicates that Ireland will not meet its non- Emissions Trading System EU targets of a 42 per cent emissions reduction by 2030.

Increased renewable energy generation, from wind and solar, if delivered as planned in the Climate Action Plan 2024 and 2025 (CAP24 / 25), can reduce Energy Industry emissions by 62 over the period 2022 to 2030. However, this would require the achievement of an ambitious renewable electricity share of 80%.

CAP24 and CAP25 provides a framework for delivering the Government's target of a 51% reduction (relative to 2018) in greenhouse gas (GHG) emissions by 2030. CAP24 and CAP25 follows the Climate Action and Low Carbon Development (Amendment) Act 2021, which commits Ireland to a legally binding target of net zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030.

These targets have been incorporated into national policy in the Climate Action Plan (CAP 2024/25) which aims to:

- The electricity system must achieve a 75% reduction in CO2, reaching 3MtCO2eq in the final year of 2026 - 2030 carbon budget period.
- Deliver up to 9 GW onshore wind (with 6GW by 2025), 8 GW solar, and at least 7 GW of offshore wind by 2030 (with 2GW specifically for green hydrogen production).
- Complete a revised version of Shaping our Electricity Future to define required new grid construction and reinforcements to achieve sectoral ceilings and carbon budgets.
- As an urgent priority, establish the investment framework and competitive market, arrangements needed to deliver zero carbon system services.
- Align the relevant constituent elements of the planning and permitting system to support accelerated renewable energy development and ensure renewables will be considered to be in the overriding public interest.
- New, dynamic Green Electricity Tariff will be developed by 2025 to incentivise people to use lower cost renewable electricity at times of high wind and solar generation.

Furthermore, the Climate Action and Low Carbon Development (Amendment) Act 2021 are five-yearly carbon budgets which commence in 2021, with provisions already in place for the first two, with the five-yearly carbon budgets equating to a total reduction of 51% emissions over the period to 2030. This reduction in emissions is in line with the programme for Government which commits to a 7% average yearly reduction in overall greenhouse gas emissions over the next decade to achieve net zero emissions by 2050.

3.2 Alternatives Considered

The requirement in relation to alternatives in the EIA process is set out in Directive 2011/92/EU, amended by Directive 2014/52/EU, in Article 5 (1)(d), which states that an EIAR should include:

> *"A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment" Article 5(1)(f) of the EIA Directive requires that the EIAR contains "any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*

Annex IV of the EIA Directive states that the information provided in an EIAR should include a;

> *"Description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

This section has particular regard to the environmental considerations which influenced the selection of alternatives and details the evolution of the Proposed Development through alternatives considered, indicating the main reasons for selecting the chosen option taking into account the effects of the Proposed Development on the receiving environment and considering the comparison of environmental effects of each alternative.

The alternatives considered have been described in line with the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (2022). The Guidelines state that:

> *"It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required."*

Furthermore, the Guidelines note the following regarding high level plans and strategies which may influence or pre-determine decisions in the development process:

> *"Higher level alternatives may already have been addressed during the strategic environmental assessment of relevant strategies or plans. Assessment at that level is likely to have taken account of environmental considerations associated. Thus, these prior assessments of strategic alternatives may be considered and referred to in the EIAR."*

The section also details non-environmental factors of the development process where they are relevant to the evolution of the Proposed Development.

3.2.1 Do-Nothing Alternative

Under the "Do-Nothing" scenario, the Proposed Development would not go ahead, the development of a renewable energy project is not pursued, and the likely evolution of the baseline is that the site would remain in use as agriculture and forestry.

In the "Do-Nothing" scenario, the prospect of creating sustainable energy through County Galway's wind energy resource would be lost at this site.

The nation's ability to produce sustainable energy and reduce greenhouse gas emissions to meet EU targets and National targets, as set out above, would be stifled. This may result in the nation incurring significant financial penalties from the EU if targets are not achieved, and result in continued global warming and impact upon the intention to "pursue efforts" to limit warming as agreed to in the Paris Agreement (2015). This will result in continued negative impacts to air quality and climate.

According to EirGrid Group's All-island Generation Capacity Statement 2020 – 2029 (EirGrid, 2020), the growth in energy demand for the next ten years on the Island of Ireland will be between 17% and 41%. In the 'Do-nothing' scenario, importation of fossil fuels to maintain growing energy supply will continue and Ireland's energy security will remain vulnerable. A "Do-nothing" scenario would contribute to strain on existing energy infrastructure and may impact on economic growth if energy demand cannot be met. This may be exacerbated by the government's plans to cease the burning of coal at Moneypoint as well as the termination of all peat burning at Bord na Móna's powerplants in 2020.

Under the "Do-Nothing" scenario, the socio-economic benefits associated with the Proposed Development will be lost. These benefits include between 103 and 124 no. jobs during the construction phase of the project, and between 73.8 and 87.2 long-term jobs once operational. Furthermore, under the "Do-Nothing" scenario the local community will not benefit economically from the community benefit fund associated with the project which could be used to improve physical and social infrastructure in the area of the Site.

In the "Do-Nothing" scenario, the potential environmental impacts of the Proposed Development as set out throughout this EIAR will not occur. Chapter 3 - Site Selection and Alternatives Considered sets out the potential impacts of the 'do-nothing scenario' compared to the residual impacts associated with the Coumnagappul Wind Farm Project in relation to the various environmental topics covered in the individual chapters of this EIAR.

Alternatives Considered

The site selection criteria considered the following criteria:

- Available wind resource;
- Environmental constraints including low potential for impact on Natura 2000 sites;
- Population density
- Proximity to dwellings;
- Planning Policy;
- Reasonable access to the national electricity grid;
- Archaeological features;
- Landscape and visual constraints.

In addition to the criteria noted above acute attention is paid to the wind energy guidelines, local development plans, past wind farm planning applications and any planning case law that is published in relation to renewable/ energy projects.

The key policy, planning and environmental considerations for the selection of a potential wind farm site include:

- Site location relative to Galway County Council's 'Local Authority Renewable Energy Strategy (LARES) classification of areas considered suitable for wind farm development;
- Low population density;
- Consistent wind speeds;

- Protection of visual amenity;
- Access route availability;
- Proximity to water bodies;
- Land Ownership title constraints,
- Low potential for impact on designated National and European sites;
- Located outside areas designated for protection of ecological species and habitats;
- Access to the national electricity grid possible within a viable distance;
- Suitable topography / ground conditions;
- Sufficient area of unconstrained land that could potentially accommodate wind farm development and turbine spacing requirements

A number of sites were considered for a wind energy development, and, having applied the above criteria, it was concluded that the proposed Site is optimal for wind energy development.

Alternative layouts for the Proposed Development considered the following criteria:

- Set back from houses;
- Set back from designated sites;
- Set back from other constraints such as watercourses, public roads and power lines;
- Suitable wind speeds;
- Landscape and visual sensitivity;
- Ecology;
- Ornithology;
- Soils and Geology;
- Hydrology;
- Noise; and
- Cultural Heritage.

Three separate design iterations were produced in the development of the Proposed Development, which considered different numbers of turbines and a range of different turbine heights.

4. POLICY

4.1 EU Directives and Policies

This section details the latest policies and targets with a view to 2030 and beyond. The various International, European, National and Regional directives and policies set a clear mandate for each member state to transition to sustainable, renewable energy and reduce greenhouse gas emissions.

International and European legally binding agreements to reduce the reliance on fossil fuels and to manage climate change internationally have been adopted into Ireland's National Energy Policy. Relevant international policies in relation to renewable energy and the need to prevent climate change include the *United Nations Framework Convention on Climate Change* and the *Kyoto Protocol*, which are legally binding agreements which are being facilitated through national energy and climate policy with a clear mandate to support onshore wind energy development within the state.

The various directives and policies of the EU set a clear mandate for each member state to transition to sustainable, renewable energy and reduce greenhouse gas emissions. This is reflected in the theme of European Commission President, Ursula von der Leyen's inaugural 'State of the Union' address delivered on 16 September 2020 which emphasised the need to transform the European economy and society to deal with the climate change emergency. It was also stated that the EU aims to reduce the EU's net greenhouse gas emission by at least 55% on 1990 levels by the end of this decade. These include:

- European Union Targets and the Irish Context;
- Paris Agreement 2015;
- Recast Renewable Energy Directive (RED2);
- Clean Energy for all Europeans Package (2019);
- 2030 Climate and Energy Framework;
- Clean Energy for all Europeans Package (2019);
- European Green Deal (December 2019);
- European Green Deal 'Fit for 55';
- European Climate Law (July 2021);
- Second EU Renewable Energy Directive (RED II);
- Directive (EU) 2023/2413 of The European Parliament and of the Council (2023) (RED III);
- RePower EU Plan.

4.2 National Energy and Climate Policy

National energy and climate policy is derived from the overarching European Policy which aims to unify the European Union in energy and climate goals. The following section sets out the relevant national policies which will influence the development of the country in the coming decades with respect to energy production, carbon neutrality and climate change mitigation.

These policies are supported by the latest Programme for Government '*Our Shared Future*' which presents strong climate governance in rapidly reducing climate change in order to protect and improve public health and quality of life. The government are committed to rapid decarbonisation of the energy sector with an aim of providing the necessary actions to deliver national renewable electricity targets. These government ambitions support the ongoing generation of renewable energy from onshore wind sources, as detailed in the following section.

The importance in complying with the national energy policy at a local level cannot be overstated if Ireland is to achieve its national renewable energy targets. The recent increase in renewable electricity targets to 80% by 2030 indicates the need for significant escalation in renewable energy production in Ireland. The following National Legislation and Policies include:

- The White Paper: Ireland's Transition to a Low Carbon Energy Future 2015-2030;
- Climate Action and Low Carbon Development (Amendment) Act 2021;
- Ireland's National Energy and Climate Plans 2021-2030 (NECP's);
- Project Ireland 2040: National Development Plan 2021 – 2030 (NDP) and the National Planning Framework (NPF);
- Climate Action Plan 2024 (CAP24);
- Climate Action Plan 2025 (CAP25);
- EirGrid Assessment of Progress with Carbon Budget Compliance;
- Climate Change Advisory Council (CCAC) Assessment;
- National Onshore Wind Targets – State of play;
- Timing for delivery of consented projects;
- Onshore RESS Auctions Progress to Date;
- National Energy Security Framework.

4.3 Regional and Local Plans

Regional and Local plans have also been adhered to, including the Regional Spatial and Economic Strategy 2020-2032 (RSES): Northern and Western Region, the Galway County Development Plan 2022-2028 which sets out the wind energy strategy for the county. The Proposed Development is located within an area described as a 'settled' landscape, which allows for enterprise in which renewable energy is envisioned as a use within, and therefore, can be considered compatible with the existing land use on the site.

The Proposed Development contributes to the nation's target increase of renewable energy from 30% to 80% by 2030 and supports the doubling of onshore wind energy in Ireland by 2030 as set out in the Climate Action Plan 2024/2025.

4.4 Irish Energy & Environment Policies

The Proposed Development is in support of national policy. The project supports the enhancement of the competitiveness of rural areas and facilitates the development and diversification of the rural economy by supporting the energy sector and increasing the share of renewables in Ireland's energy mix.

The project supports national targets of climate change mitigation and reduction in greenhouse gas emissions where significant focus has been set out in the recent Climate Action and Low Carbon Development (Amendment) Act 2021. The ambitious new programme for government is prioritising carbon neutrality and renewable energy generation. In light of this, it is important to rely on proven technologies such as on shore wind in order to meet the near-term objectives, as well as long-term objectives.

The Proposed Development promotes the generation of renewable energy at appropriate locations and supports the achievement of a low carbon economy by 2050. It is therefore considered that the Proposed Development is in line with national policy and supports the achievement of national energy and sustainability targets.

4.5 Galway County Development Plan 2022-2028

Specific policies relating to wind energy development in County Galway are contained within the current Galway County Development Plan (2022-2028), which came into effect on Tuesday 20th June 2022.

In relation to Renewable Energy, the Galway County Development Plan 2022-2028 (GCDP) has climate action as a core component, with each chapter of the GCDP containing a section that "climate proofs" each spatial strategy and objective. An example of this can be seen in 'GCDP, Chapter 14: Climate Change, Energy and Renewable Resource', where it is an objective of the GCDP:

> *''To reduce the carbon footprint by integrating climate action into the planning system in support of national targets, support indigenous renewable sources in order to reduce dependence on fossil fuels and improve security of supply and the move to a competitive low carbon economy."*

The Proposed Development site was chosen as the result of a feasibility study which analysed the Proposed Development site, the surrounding environmental and other material factors pertinent to the current Galway County Development Plan 2022-2028. Following the conclusion of the feasibility study, the Proposed Development site was deemed suitable on the basis on the criteria as provided within the County Development Plan 2022-2028 and Appendix 1 - Local Authority Renewable Energy Strategy.

The Proposed Development site is located in close proximity to County Mayo to the northwest, with the proposed wind farm contained entirely within County Galway. The wind farm design and layout process and turbine delivery route etc. involved detailed and repeated site surveys, environmental impact assessments and consultations with relevant authorities as outlined in the GCDP and the LARES. As shown on the LARES Wind Development Potential map the Project site is located in close proximity to County Mayo to the northwest, with the proposed wind farm contained entirely within County Galway. This shows the northern portion of the Project is located within an area Wind Development Potential designation as '*Open to Consideration'*, and the southern section of the Project shown as located in an area designated '*Generally to be Discouraged*', with no turbines in the part of the site within the area designated 'Generally to be Discouraged'

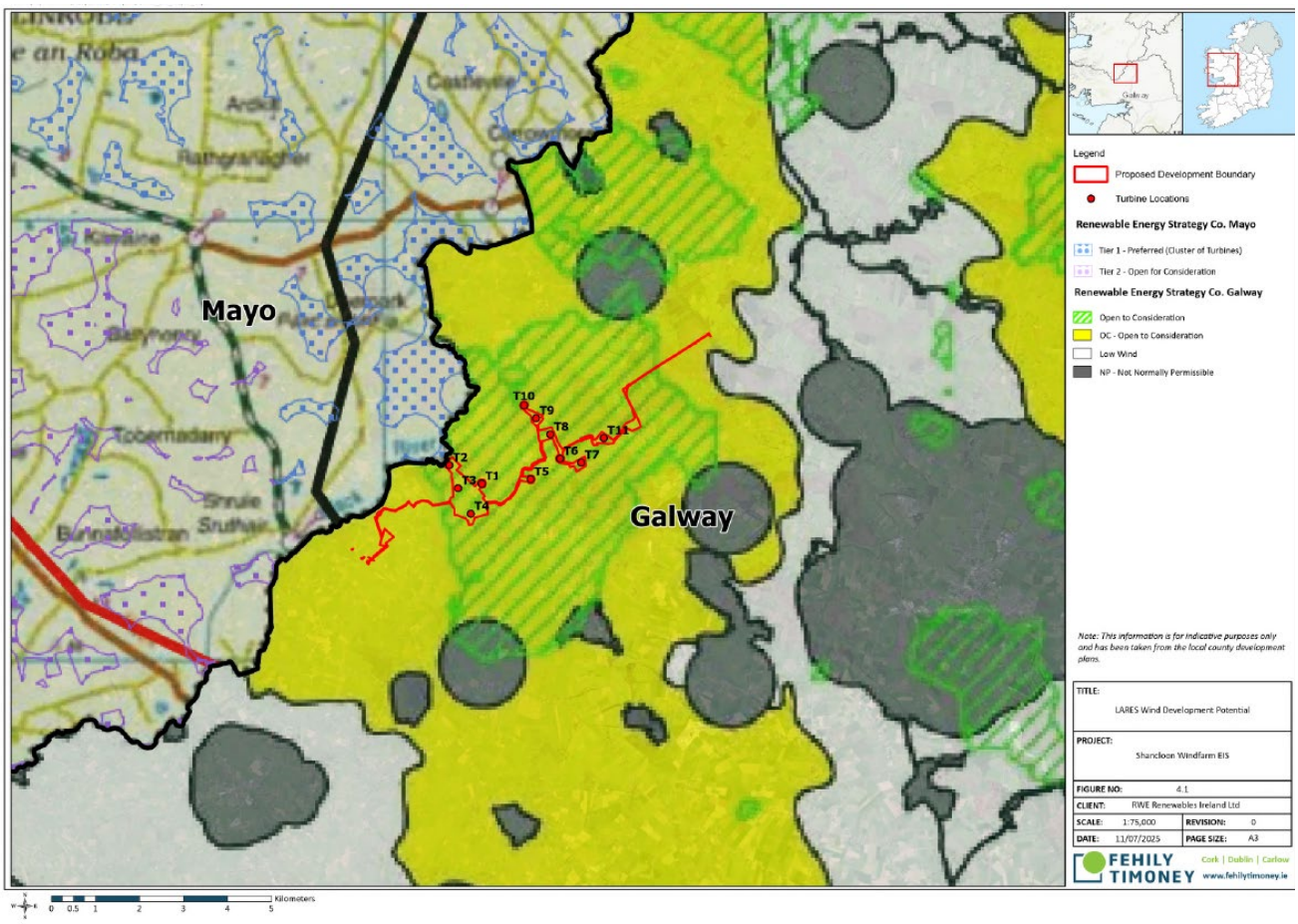

Figure 4-1: Proposed Development shown within the context of LARES

The Proposed Development aligns with the strategic aims and vision of the LARES in relation to increasing Galway County's renewable energy generation capacity and lessening Galway's dependence on traditional fossil fuels while contributing to Ireland's national climate change targets. The GCDP policies and objectives with regard to renewable energy development and its efforts to implement climate change mitigation aims to support Wind Energy and the States national targets and contribute to the States national targets. GCDP and the LARES aims to transition Galway County towards a low-carbon economy by promoting renewable energy technologies and energy efficiency while respecting the need to conserve the landscape, the community and environmentally sensitive areas.

5. SCOPING AND CONSULTATION

5.1 Purpose of EIA Scoping

The purpose of the EIA scoping process is to identify the key points and issues which are likely to be important during the Environmental Impact Assessment (EIA) of the Project and to eliminate those that are not. The scoping process identifies sources or causes of potential environmental effects, the pathways by which the effects can happen, and the sensitive receptors which are likely to be affected. It defines the appropriate level of detail for the information to be provided in the EIAR. In essence, the primary focus of scoping is to define the most appropriate assessment of significant effects related to the Project. Scoping was carried out, in accordance with the European Commission's EIA Scoping Checklist (2017), under the EU's Environmental Impact Assessment (EIA) Directive (2011/92/EU as amended by 2014/52/EU).

The requirement to consider cumulative effects is outlined in EU and national legislation. The EIA Directive requires the consideration of:

> *'the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources'*

A desk study was undertaken to identify other existing and Proposed Developments with which significant cumulative effects could plausibly occur. This was further informed by consultation.

Consultation was carried out throughout the development of the EIAR and through various wind farm design iterations. The list of consultees is provided in Table 5-1 of Chapter 5 - Scoping and Consultation. Consultees were invited to contribute to the EIAR by suggesting baseline data, survey methodologies and potential impacts that should be considered as part of the impact assessment process and in preparation of the EIAR.

5.2 Conclusion of EIA Scoping

Consultation was carried out with stakeholders, including Galway County Council, Mayo County Council, Government Departments, Non-Governmental Organisations, telecommunications providers, aviation organisations and members of the public. Their comments and feedback were incorporated into the Proposed Development design iterations and to the assessments conducted in the EIAR. Copies of the consultation responses received are included in Appendix 5.1, Volume III of the EIAR.

5.2.1 Stakeholder Consultation

The list of scoping consultees that were contacted throughout the EIA process is provided in **Table 5-1**.

Table 5-1: List of Consultees

Regional and Local Authorities	
Mayo County Council	
Galway County Council	
Northern & Western Regional Assembly	
Government Departments	
Minister for Agriculture, Food and the Marine	
Minister for Communications, Climate Action and Environment	
Minister for Tourism, Culture, Arts, Gaeltacht, Sport and Media	
Minister for Defence	
Minster for Housing, Local Government and Heritage	
Minister for Transport	
NGOs & Stakeholders	
Inland Fisheries Ireland (IFI)	An Chomhairle Ealaíon (Arts Council)
Irish Environmental Network	An Garda Siochána - Tuam Branch
Irish Peatland Conservation Council	An Taisce
Irish Raptor Study Group	Teagasc
Irish Hen Harrier Winter Survey Group	The Heritage Council
Bat Conservation Ireland	Commission for Regulation of Utilities
Biodiversity Ireland	Environmental Sciences Association of Ireland
Birdwatch Ireland	Health and Safety Authority (HSA)
Butterfly Conservation Ireland	Health Service Executive (HSE)
Forestry Services	Office of Public Works (OPW)
Geographical Society of Ireland	Sustainable Energy Authority Ireland
Geological Survey Ireland (GSI)	National Transport Authority
Irish Wildlife Trust	Transport Infrastructure Ireland (TII)
National Monuments Service	EirGrid
National Parks and Wildlife Service (NPWS)	ESB Networks
Environmental Protection Agency (EPA)	Gas Networks Ireland
Fáilte Ireland	Irish Water (Uisce Eireann)
	Coimisiún na Meán Irish Wind Energy Association
	Met Eireann
Aviation	
Galway Airport	
Ireland West Knock Airport	
Irish Aviation Authority	
Air Navigation Ireland	
Telecommunications	

Imagine Networks Services Ltd	Broadcasting Authority of Ireland (BAI)
RTE Transmission Network Ltd	Commission for Communications Regulation
RTÉ/Saorview	An Garda Síochana Telecommunications
TG4	Eircom Ltd
Three Ireland (Hutchinson) Limited	Electricity Supply Board
Viatel Ireland Ltd	Enet Telecommunications Networks Limited
Virgin Media Ireland Ltd (PP)	Vodafone Ireland Ltd

Two pre-planning consultation meetings were held with Galway County Council, the first on 24th November 2022 and a second meeting on 28th November 2023 with Galway County Councils Roads Department. A further walkover was conducted with Galway County Council Roads Department staff on Wednesday 17th January 2024.

A pre-planning consultation meeting was held with Mayo County Council on 19th June 2024 to determine the key points and potential impacts of the Proposed Development.

An on-site meeting and walkover survey was carried out with Owen Hannon of the OPW on 11th October 2023 to discuss the Proposed Development relative to the baseline flood model prepared by IE Consulting and to discuss proposed watercourse crossings (culverts and bridge) and on-site drainage proposed as part of the Proposed Development.

An informal online meeting was held with NPWS on 10th October 2023 the aim of which was to present the findings of ecological field surveys that had been carried out and to focus in particular on the new access road that would be crossing along the periphery of the Cloonbar Bog.

Consultation was carried out with GNI in May and June 2024 in relation to the construction methodology required for the wind farm access road and 33kV cable crossing of the underground High Pressure Transmission Gas Pipe.

Communication in relation to 'Building-over or Near an Irish Water Asset' with Uisce Éireann's Diversions Team commenced in April 2024 and a Confirmation of Feasibility letter was received from Uisce Éireann in December 2024.

5.2.2 Pre-application Consultation

A pre-application consultation meeting was held with An Bord Pleanála on 12th March 2025. On 28th May 2025 An Bord Pleanála deemed the Proposed Development is eligible as Strategic Infrastructure Development (SID) (case ref. ABP-321507-24).

On 16th December the Applicant made a request to An Bord Pleanála for a design flex opinion (case ref. ABP-321495-24). The Board, on 13th June 2025, provided an opinion under section 37CD of the Planning and Development Act 2000 (as amended).

5.2.3 Public Consultation

The public consultation was facilitated over three years.

On 11th April 2023 RWE's Community Liaison Officer (CLO) commenced an initial eight-week consultation with residents in and around the Shancloon Wind Farm study area. Letters were issued to residents within 2km of the proposed wind farm and the CLO carried out door-to-door visits within that area to discuss any questions or concerns relating to the Proposed Development. Additionally, a dedicated phone number and email address were set up to allow residents make an appointment suitable to them for discussions with the development team at RWE.

Feedback from the CLO was passed on to the project design team and EIAR team on an ongoing basis in order to allow the consultation process to inform the design and impact assessment process.

A project website was also set up (https://ie.rwe.com/projects-and-locations/onshore-wind-farm-shancloon/) to inform the public of information relating to the Proposed Development. The website includes a twelve-page information brochure (Shancloon Proposed Wind Farm) along with facts about the Proposed Development. The website, along with letter drops was used to notify members of the public of project updates, project timelines, upcoming public consultation and any changes in the design and layout. It also provides an avenue for the public to contact the project development team directly.

Additionally, all Elected Member local representatives were emailed on 11th April 2023 with a copy of the letter of introduction to the CLO and a soft copy of the Shancloon Proposed Wind Farm brochure.

A detailed Community Consultation report is included in Appendix 5.2 and a summary of consultation is provided Table 5-2.

Table 5-2: Community Consultation

Timeline	Action
April 2023	Dedicated project website, email and phone line established First project information letter distributed 2km radius (231 houses) CLO went door to door on 12th, 13th and 14th of April 2023 and met with 89 householders April and May 2023: 37 emails were received and responded to by the development team
September 2023	Second project information letter distributed 2km radius (231 houses)
November 2023	Third project information letter distributed 2km radius (231 houses) CLO went door to door on 27th 28th and 29th November 2023 and met with 60 householders
June 2025	11th and 12th June 2025 - Public meetings held (morning and evening)

6. POPULATION AND HUMAN HEALTH

6.1 Population and Socioeconomic

One of the principal concerns in the development process is that individuals or communities, should experience no significant diminution in their quality of life from the direct, indirect or cumulative effects arising from the construction, operation and decommissioning of a development.

Relevant demographic data within proximity of the Proposed Development and TDR has been sourced from the Central Statistics Office (CSO) Census of Ireland (2006 to 2016, along with available data from 2022) records. Demographic information relating to the State, counties Galway and Mayo and the 'Study Area' has been assessed to establish the existing demographic trends. The demographic analysis of the study area as set out in this Chapter is defined in terms of Electoral Divisions (EDs), within which the wind farm site boundary and substation is contained.

In the six years between the 2016 Census and the 2022 Census has seen a national increase in population of + 8.1%. This is an upward continuation of the upward trend in national population observed since 2011, which is similarly reflected at County level especially in Galway City and County.

The rate of population growth has been lowering in Mayo compared to the State and Galway between 2016-2022 with a slight decrease between 2011-2016 which may be attributed to the more rural nature of Mayo which would not encompass any large urban centres that would contribute to State and Galway City & County figures. Locally, within the EDs associated with the Site, the growth in population is at a similar rate to state levels observed since the 2011 Census.

Of the EDs associated with the Site, Foxhall has the largest population in 2022 with a population of 675 persons which is higher than the population of Kilshanvy and Beaghmore with populations of 420 and 394 persons respectively. The population of the Donaghpatrick Substation ED in 2022 is a population of 584 persons.

Similarly in 2016, Foxhall had a larger population of 629 persons which was higher than the respective population of both Kilshanvy and Beaghmore. Likewise, 2011 shows that Foxhall has the highest population of all Site Eds. Overall, the reason behind the larger population of Foxhall is due to its location in closer proximity to Tuam, the location of the regional R332 road to Tuam and the village of Kilconly both located within the Foxhall Electoral Division.

There are 224 residential properties (or proposed residential developments which have received/hold active planning consent) within 2 km of the turbine array and 49 residential properties (or consented residential developments) within 1km of the turbine array. The closest property to a turbine (Eircode H54 KH73) is located c. 357 m distance from Turbine T01, however this property belongs to an involved landowner, and this receptor is no longer a residential residence. The next nearest property is a derelict building (currently uninhabitable property) located 720.4m south-east of T1 (no Eircode assigned). The closest inhabited residential property to the Project is located 728m east of T11 (Eircode H54 XC65). The Project will achieve a minimum separation distance in excess of 720 m (4 times tip height) between the closest dwellings and the proposed turbines.

It is expected that the operational phase of the Proposed Development could create 73.8 to 87.2 long term jobs (with an installed capacity of 61.6 MW to 72.6 MW). These jobs include operations and maintenance, back-office support and indirect jobs created by other activities related to installed turbines including IPP/utilities, consultancy firms, research institutions, universities and financial services.

It is intended that a Community Benefit fund will be established in accordance with the *Renewable Energy Support Scheme* (RESS). The provision of the Community Benefit Fund will have a significant long-term, positive effect on the socioeconomic profile of the study area and wider area, providing a regular payment to near neighbours of the project and providing for projects which will benefit the community as a whole, bringing long-term socio-economic benefits.

The existing land-uses in proximity to the proposed Shancloon Wind Farm will remain broadly unchanged during the construction phase of the project, however, some land use in close proximity to the site will be temporarily disrupted during the construction phase. There is no significant felling of forestry required for the Proposed Development, with the effect of this very minor felling being imperceptible. It is anticipated that there will be minimal impact on existing land uses arising from the operational phase.

6.2 Tourism and Recreation

The nearest recreation activities/attractions in proximity to the Shancloon Wind Farm iare trail walking, Glamping, Camping, and Sports Grounds and the cultural amenity associated with a number of abbeys and castles. The proposed works, including the construction haul routes and TDR accommodation works do not interact with nearby recreation and tourism amenities as listed in EIAR Chapter 6 – Population and Human Health, and therefore there are no expected direct impacts on these features. The works associated with the Proposed Development will avoid negatively impacting on nearby community facilities, town centre services and amenities due to distance of the site from such receptors.

The TDR passes near the settlement of Tuam, County Galway. During turbine delivery, there is potential for indirect impact to town/settlement centre services due to the transportation of large and bulky loads on the road network serving the settlements. This will likely be as a result of traffic calming measures during the escorting of the turbine components. Temporary accommodation works will not be required in these settlements and therefore impact is likely to be temporary to brief, negative and not significant.

Overall, the Proposed Development will result in an intensification of wind energy development within the landscape, however, the proximate major tourist attractions to the Shancloon Wind farm: Quiet Man Museum (c. 15km North West), Lough Mask Distillery (c. 27.4km North West) and Ballintubber Abbey (c. 28.6km North West), are such a distance that visual intrusion on these attractions would not be significant.

6.3 Human Health & Safety

The Proposed Development will be obliged to be constructed in accordance with national legislation including Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013).

Construction and accommodating works taking place on the public road and the delivery of heavy/bulky goods (TDR) and machinery on narrow roads may lead to temporary limited access to farmlands, forestry lands and residential properties creating a potential hazard. This may cause a potential temporary moderate, negative impact to public safety along the TDR route during the construction phase. This will be managed through a Traffic Management Plan and any road closures will be in accordance with national legislation including the Road Traffic Act 1993 (S.I No.75 of 1993).

The engineering solutions and inclusion of proper construction and safety protocols potential will ensure that the impacts to human health and safety during the 24 month construction period managed and mitigated.

Under normal conditions, operational wind turbines do not pose a threat to public safety or the safety of animals.

The Proposed Development has been examined with respect to potential impact from major accidents and natural disasters. This relates to:

- Flooding;
- Fire;
- Major incidents involving dangerous substances;
- Catastrophic events; and
- Landslides.

There is limited potential for major accidents or natural disasters to occur at the Proposed Development site. Bulk storage of hydrocarbons, chemicals and wastes will not occur on the Proposed Development site to provide further potential risks in the unlikely event of flooding, fire or landslides. Emergency protocols will be in place should an accident occur at the Proposed Development.

There is currently no published credible scientific evidence to positively link wind turbines with adverse health effects.

7. AIR QUALITY AND CLIMATE

This section describes the existing air quality and climate environment of the Proposed Development.

If the Proposed Development does not proceed, local air quality and the microclimate will remain unchanged. On a national scale, there will be an increase in greenhouse gas emissions if increasing future electricity needs are not met by alternative renewable sources which have the potential to contribute to air pollution and climate change. The opportunity to contribute to Ireland's commitments under the Kyoto Protocol and to meet national targets as set out in the Climate Action Plan (2023) would also be lost.

European air quality legislation requires that each member state be defined in terms of Zones and Agglomerations for air quality, with Ireland divided into four zones. The EPA has designated four zones within Ireland:

- Zone A: Dublin City and its environs
- Zone B: Cork City and its environs
- Zone C: 24 cities and towns (such as Galway, Limerick and Waterford cities and towns such as Naas, Newbridge, Celbridge, Leixlip) with a population of greater than 15,000
- Zone D covers the remainder of the country.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Clean Air for Europe (CAFE) Directive (as amended) and the Fourth Daughter Directive. The site of the proposed development lies within Zone D, which represents rural areas located away from large population centres.

Due to the non-industrial nature of the Proposed Development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR.

The production of energy from wind turbines has no direct emissions as is expected from fossil fuel-based power stations. Harnessing more energy by means of wind farms will reduce dependency on fossil fuels, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment.

Some minor short term or temporary indirect emissions associated with the construction of the wind farm include vehicular and dust emissions. A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase and includes dust suppression measures. In addition, turbines and construction materials will be transported to the site on specified haul routes only. The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary.

Once the Proposed Development is constructed there will be no significant direct emissions to atmosphere.

Maintenance vehicles will access the Proposed Development during the operational period, however, due to the low traffic movements involved, the impact will be imperceptible. The operational phase of the wind farm will result in positive impacts on air quality due to the displacement of fossil fuels as an energy source.

During the decommissioning phase, there will be truck movements associated with removing the wind turbines from the wind farm resulting in vehicular emissions and also dust. However, the number of truck movements would be significantly less than the construction phase and would potentially result in a slight temporary impact.

Climate Change and Carbon Balance Calculations

Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases in the atmosphere. These greenhouse gases come primarily from the combustion of fossil fuels in energy use.

Published in June 2023, the EPA's publication entitled 'Ireland's Greenhouse Gas Emission Projections (2022-2040)' provides an assessment of Ireland's total projected greenhouse gas (GHG) emissions from 2022 to 2040, and indicates that Ireland will fall short its climate targets. The Proposed Development will have an export capacity in the range of 188MW to 222MW and therefore will help contribute towards this target.

In terms of carbon losses and savings, the online Scottish Windfarm Carbon Assessment Tool (https://informatics.sepa.org.uk/CarbonCalculator/index.jsp) was used to estimate carbon savings as a result of the proposed construction and operation of the wind farm. Appendix 7.1, Volume III details the inputs to the model.

Based on the Scottish Windfarm Carbon Assessment Tool, during the manufacturing and transportation of turbines, and construction and decommissioning of the turbines 52,413 - 62,691 tonnes of CO2 will be released to the atmosphere. This is based on the assessment of the turbine range presented in Chapter 3 – Development Description: the lower range of 5.6 MW and the upper range of 6.6 MW were both considered for the assessment and the results for each presented. This represents 2.14 - 2.17% of the total amount of CO2 emissions that will be offset by the Proposed Development.

In total, it is estimated that 2,447,700 – 2,884,800 tonnes of CO2 will be displaced over the proposed thirty-year lifetime of the wind farm i.e. 81,590 - 96,160 tonnes of CO2 per annum, which assists in realising the ambitious goals of the Climate Action Plan 2024/2025. From an operational perspective, the proposed development will displace the emission of CO2 from other less clean forms of energy generation and will assist Ireland in meeting its renewable energy targets and obligations. The burning of fossil fuels for energy creates greenhouse gases, which contributes significantly to climate change. These and other emissions also create acid rain and air pollution.

For the Proposed Development with 11 no. turbines assuming a turbine power rating of 5.6 – 6.6 MW, and operational period of 30 years, the payback time for the manufacture, construction and decommissioning phases (including carbon losses from soil, felling of forestry etc.) of the Proposed Development is estimated at approximately 1.8 – 1.9 years. Should further restoration measures be put in place, the total carbon emissions and carbon payback time would be reduced.

The calculator only takes into account the loss of forestry from felling (carbon release) and the loss of forestry growth (carbon sequestration) associated with the Proposed Development and does not take into account the replanting of forestry outside of the site (there is no option of including external replant lands). Therefore, it is possible that the carbon loss calculations for the Proposed Development are slightly overestimated in this regard. Permanent felling of approximately 0.54 ha of coniferous forestry is required for turbine delivery route accommodation works, no additional felling is required for any other part of the Proposed Development. It should be noted that the clear-felling of trees in the State requires a felling licence. A felling licence will include the provision of relevant replant lands (afforestation area) to be planted in lieu of the proposed tree felling on the site. A total of 0.54 hectares of new forestry will be replanted in accordance with the Forestry Act, 2014 at the alternative site to compensate the loss of forestry at the Site which will offset 309 tonnes of CO2 lost due to the felling of forestry. This replanting is not factored into the carbon assessment.

As the operation of the Proposed Development will not have any significant impacts on air quality, mitigation measures are considered unnecessary.

8. NOISE AND VIBRATION

Within the Proposed Development, noise will be generated by the proposed temporary works, comprising construction activities at the Site, grid connection works and along the turbine delivery route. Noise will be generated during the operational phase by the rotation of the wind turbine blades and the turbine generator operation, as they generate electricity. Noise will also be generated during the decommissioning phase of the Proposed Development. These Potential Impacts during decommissioning will be similar to those of the construction phase. Noise sensitive locations were identified in proximity to the Proposed Development.

Baseline noise monitoring was undertaken at receptor locations surrounding the Proposed Development to establish the existing background noise levels. The data was analysed in conjunction with on-site measured wind speed data.

8.1 Construction and Decommissioning Phase

Noise predictions were undertaken to determine the likely impact during the construction and decommissioning works. BS 5228-1:2009+A1:2014 sets out sound power levels and LAeq noise levels of plant items normally encountered on construction sites, which in turn enables the prediction of noise levels at selected locations.

The construction noise model assessed all tasks with the potential to generate high noise levels over a 24 month construction period. These tasks included:

- tree felling
- deliveries and/or removal of material to and from site
- preparation of access roads, preparation of hardstands and drainage
- Pressed-in steel sheet piling
- pouring of foundations
- installation of wind turbines and
- works associated with grid connection and substation.

The on-site construction and decommissioning noise levels will be below the daytime noise limit of 65 dB LAeq,1hr at the nearest residential receptors, and therefore construction noise impacts are not considered to be significant.

There will be periods of elevated noise for only short periods of time at a very limited number of dwellings where noise levels are predicted to exceed 65 dB LAeq,1hr associated with grid connection works. Given the nature of the grid connection works, construction activities will not occur over an extended period at any one location (i.e. typically less than 3 days) and a temporary barrier or screen will be used to reduce noise level below the noise limit and such these works will have a moderate temporary effect.

The noise impact for construction works traffic will be mitigated by generally restricting movements along access routes to the standard working hours and exclude Sundays, unless specifically agreed otherwise. For example, during turbine erection and foundation pours, an extension to the working day may be required, i.e. 05:00 to 21:00, but this would be necessary only on a relatively small number of occasions.

8.2 Operational Phase

Noise during the operational phase will be generated primarily by the rotation of turbine blades (aerodynamic noise) and to a lesser extent by internal turbine machinery (mechanical noise). The turbines will operate above the cut-in wind speed of approximately 3 m/s and will shut down at the cut-out wind speed of approximately 25 m/s.

A detailed operational noise assessment was undertaken in accordance with:

- ETSU-R-97, The Assessment and Rating of Noise from Wind Farms (1996),
- Institute of Acoustics (IoA) Good Practice Guide (2013), and
- The Wind Energy Development Guidelines (DoEHLG, 2006).

Operational noise levels were predicted using ISO 9613-2:1996, assuming worst-case downwind propagation conditions (10°C and 70% humidity) and incorporating a +2 dB turbine uncertainty. The assessment considered a layout of 11 turbines with the following hub heights:

  - minimum:102.5m
  - average 103.75m
  - maximum 105m.

Noise predictions were calculated at 93 noise-sensitive locations (NSLs) within the 35 dB LA90 study area. Background noise data were collected at 12 monitoring locations and were used to derive site-specific day and night-time noise limits in accordance with the guidance documents referenced above.

The derived operational noise limits applied to the assessment were:

- **Daytime (07:00–23:00):** 40 dB LA90 or +5 dB above background, whichever is greater,
- **Night-time (23:00–07:00):** 43 dB LA90 or +5 dB above background, whichever is greater.

Noise predictions were performed for the 11-wind turbine layout using the highest noise levels at each wind speed, for the proposed turbine models have been selected for a range of standardised 10m height wind speeds from 3 m/s up to 14 m/s. The highest noise level is reached at 8m/s.

Two properties were determined to be marginally above the daytime limit at 6m/s (the limit is exceeded by 1.0 dB and by 0.3 dB) when adopting the noisiest turbine model (Nordex N149) in the noise model (noting that no exceedance is predicted when using the other less noisy models: Siemens Gamesa SG155 and Vestas V150). Mitigation is prescribed for these occupied properties in the form of quiet modes of operation at turbines T5, T8 and T9 at relevant wind speeds.

Substation operational noise was also assessed in line with BS 4142:2014+A1:2019. The predicted transformer noise levels were found to be below the background noise levels at the nearest NSLs. As such, no significant impact is predicted from the substation during the operational phase.

The potential for amplitude modulation (AM), sometimes referred to as “blade swish,” has been considered. While AM is a known and intermittent phenomenon, it is typically perceptible only at short distances and under certain atmospheric conditions. There is no method to reliably predict its occurrence at a particular location prior to turbine operation. If AM results in future disturbance, mitigation such as blade pitch regulation or operational adjustment will be implemented, and monitoring will be carried out in accordance with the IoA 2016 guidance.

Low-frequency noise (LFN) and infrasound generated by modern wind turbines, including the proposed models, have been found through numerous international studies to be well below levels of human perception. LFN is therefore not expected to give rise to significant effects. Operational vibration levels from the proposed wind turbines are not perceptible beyond a few metres from the turbine base. The nearest dwelling is located more than 720 m from the nearest turbine. As such, operational vibration is not expected to be noticeable and is considered to be negligible.

Overall, operational noise and vibration associated with the Proposed Development is predicted to result in a long-term, imperceptible to slight impact and does not give rise to any significant effects. Should complaints arise during operation, a noise monitoring programme will be implemented and, if necessary, turbine curtailment strategies will be employed.

9. BIODIVERSITY

9.1 Existing Environment

This chapter assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Development may have on Biodiversity, Flora and Fauna and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified.

A Biodiversity Enhancement and Management Plan has been prepared for the Proposed Development which includes measures for the enhancement of the local environment. The BEMP will provide a biodiversity net gain to the Proposed Development.

The EIAR also includes an appraisal of potential impacts of the Proposed European Sites and sites of national importance. The following sites were considered in the assessment:

- SACs: Lough Corrib SAC (000297)
- SPAs: Lough Corrib SPA (004042), Lough Carra SPA (004051), Lough Mask SPA (004062), Inner Galway Bay SPA (004031)
- pNHAs: Rostaff Turlough pNHA (000385), Lough Corrib pNHA (000297)

Multidisciplinary walkover surveys were undertaken for the Proposed Development as follows:

- Habitat and botanical surveys were undertaken on the 06th,07th and 08th October 2021, 19th and 20th January 2022, 26th September 2022, 22nd June 2023 and from 01st to 03rd May 2024.
- Marsh Fritillary surveys – potentially suitable habitats were identified during walkover surveys in August - September 2022 and targeted larval web surveys were undertaken within these areas on the 31st August 2022.
- Mammal surveys were undertaken on 26th September 2022 and revisited on 1st June 2024.
- Bat activity transect surveys were carried out in 2020 and 2021, with some surveys affected by non-compliant weather conditions and detector failures. Walkover surveys of potential roosting features were undertaken on 31st August 2020, 9th September 2021, and 7th June 2022. Static detector surveys were completed during 2020, 2021, and 2023, with a static detector survey at height in 2022. Despite some data loss due to weather, equipment issues, and livestock interference, sufficient survey coverage was achieved across all seasons, and the data is considered robust for assessment.
- Surveys to inform the aquatic ecology assessment were completed in 12 locations surrounding this site. The surveys included walkover surveys, catchment wide electro-fishing, White-clawed Crayfish Surveys (conventional methods and eDNA survey), Freshwater Pearl Mussel Survey, biological water quality survey.

9.1.1 Habitats

This habitat mapping and assessment was undertaken in accordance with *A Guide to Habitats in Ireland* (Fossitt, 2000). No invasive species listed on the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) were recorded within the Proposed Development boundary or at turbine delivery accommodation works. Several Third Schedule invasive species have been recorded in the wider 10 km grid squares (M25 and M35), but not within the works area. Japanese Knotweed was noted on a roadside in the vicinity by the local authority, but no evidence of it was confirmed during surveys.

No flora listed on the Flora (Protection) Order or as threatened, vulnerable or endangered on the Irish Red List were recorded within the Proposed Development boundary. One specimen of Pennyroyal (*Mentha pulegium*) was recorded during riparian surveys 390 m northwest of T10, but outside of the red line boundary.

The Third Schedule invasive species Water Fern (*Azolla filiculoides*) and Canadian Pondweed (*Elodea canadensis*) occur in the Togher River near the HDD crossing location. Of note also is the presence of Crayfish plague (*Aphanomyces astaci (Schikora)*) in the Corrib catchment. A notice along the L6483 local road identifying the presence of invasive species (confirmed through consultation with Galway County Council Roads Department as the location of Japanese Knotweed, *Reynoutria japonica*) was observed during field survey. However, no invasive species were identified along this road. There is a possibility of below-ground rhizomes at this location.

The Proposed Development is predominantly located within improved agricultural grassland habitat (GA1) (often in mosaic with wet grassland (GS4)) and within cutover bog (PB4), areas of willow scrub (WS1), conifer plantation (WD4), raised bog (PB1) and calcareous and neutral grassland (GS1) in mosaic with dry calcareous heath (HH2). There is also a large area of dry-humid acid grassland (GS3) associated with Cloonbar East Wetland. Waterbodies within the Site include a network of drainage ditches, small streams/watercourses classified as lowland depositing rivers, many of which are the subject of arterial drainage. The hedgerows and treelines within the Site are mainly associated with the agricultural lands and waterbody riparian areas.

- Turbine locations T01, T05, T07, T10 and T11 are located within cutover bog (PB4), which is assessed as locally important (higher value).
- The turbines in the central parcel of the Site (T6, T8 and T9) and their associated hardstandings and access tracks are located within intensively managed agricultural grassland and sparsely vegetated treelines and hedgerows. Similarly, the 110 kV infrastructure (substation and loop-in) are located within intensively managed grasslands. These lands are assessed as having locally important, lower ecological value.
- Dry neutral grassland occurs at T5 and at the proposed location of the access track to T6. The grasslands do not correlate to Annex I type habitat 'semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (*important orchid sites) (6210)', and the heath is not Dry Heath - Annex I habitat type code 4030, given the level of scrub encroachment. However, the grassland/heath offer value to pollinators and ground nesting bird species and as such is assessed to be of local importance, higher value.
- The turbines within the west of the Site (T2, T3 and T4), Construction Compound # 2, and the meteorological mast are located within improved grassland in mosaic with wet grassland. The wet grassland fields do not correspond with the Annex 1 habitat '*Molinia meadows [6410]*' as they are species poor and often rank where grazing is lighter. As such they are locally important, lower value.

- The Proposed Development includes the construction of a piled and floated road along the periphery of Cloonbar Bog. There are areas of intact degraded and active raised bog habitat within Cloonbar Bog, however these areas are located beyond the footprint of the Proposed Development. The habitat within the bog in which it is proposed to construct the floated road is heavily degraded and dry due to influence from the adjacent Black (Shrule) river/arterial drainage channel.

The Proposed Development is within the catchment of the Black (Shrule) and Togher Rivers. These rivers are assessed as being of County Importance, while drainage ditches and arterial drainage channels in the catchment are assessed and being of Local Importance – Higher Value.

9.1.2 Species

Generally, evidence of mammal activity in the study area was low and is attributed to the level of disturbance in the area and generally wet peatland habitats. A recently excavated badger sett was recorded within the Proposed Development red line boundary (location not disclosed due to NPWS data requirements for protected species).

No otter resting or breeding sites were recorded during field survey, however signs of otter (slides, spraints) were observed on the Togher River and the Black (Shrule) river, and there are prominent mammal paths parallelling the river near T7 which are likely attributable to otter.

A hare dropping was observed within the scrub / bog habitat within the red line boundary at Cloonbar Bog. However, no breeding or resting places for this species was observed during field survey.

Bat surveys recorded eight species across the site. Common and Soprano Pipistrelle and Leisler's Bat were the most frequently detected, with lower levels of Brown Long-eared, Daubenton's, Natterer's, Whiskered, and Lesser Horseshoe Bat also observed.

Common and soprano pipistrelles were recorded throughout the survey area, with most activity directly adjacent to linear habitat features such as treelines, hedgerows, river habitats and plantation forestry. Lesser horseshoe bat was recorded within the survey area, though only in the form of sporadic individual passes.

Three bat roosts were recorded within or close to the proposed development as follows:

- F1 (53.529249, -9.025090) - Derelict house and cattle shed - Brown long-eared bat, Common pipistrelle and Natterer's bat roost
- F2 (53.541603, -9.003607) - Abandoned cottage - Soprano pipistrelle roost
- F3 (53.536216, -9.004166) - Derelict house - Leisler's bat and Soprano pipistrelle roost

Common frog was recorded on several occasions throughout the Site. Common lizard (Zootoca vivipara) while not recorded during the site visits, is likely to occur within the Site.

Aquatic surveys indicate that the Togher and Black (Shrule) rivers support three-spined stickleback, brown trout, salmon, and potentially lamprey and European eel. No freshwater pearl mussels or white-clawed crayfish were observed, and habitat conditions were considered unsuitable for both species. Water quality throughout the system is rated as poor to moderate, and the habitat is heavily modified due to historic drainage.

9.2 Potential Impacts

A Natura Impact Statement has been prepared for the Proposed Development which examines the potential pathways for adverse effect on European Sites and prescribes mitigation to ensure the pathway by which such effects may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures. The measures ensure that the construction, operation and decommissioning of the Proposed Development does not adversely affect the integrity of any European sites. Therefore, it can be objectively concluded that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

9.2.1 Habitats

Potential Impacts on habitats include:

- Long-term direct loss of habitat within the Proposed Development footprint, noting that the consent application is seeking an operational period of 30 years,
- temporary to short-term deterioration in habitat adjacent to works areas due to disturbance from vehicle movements, runoff and precipitation of dust from works areas, drawdown of groundwater table due to dewatering of excavations,
- temporary to short-term deterioration of aquatic habitat quality due runoff from construction areas
- the operation of the Proposed Development will not result in any additional land take and as such there is no potential for any significant effects on habitats of ecological value within the Site

The most abundant habitat type within the Proposed Development boundary is improved agricultural grassland, followed by cutover bog, scrub, and dry grassland mosaics. The Proposed Development will result in the loss of an area of 265,263.64m2 of habitat including scrub bog woodland, cutover bog, uncut raised bog, neutral grassland (GS1), dry heath (HH2), and broadleaved woodland. Alos, 2,032m of linear treeline/hedgerow habitat will be removed. No Annex I habitats will be lost or damaged due to the Proposed Development.

There is potential for degradation or loss of aquatic habitat of ecological value during the works through indirect effects resulting from water pollution.

9.2.2 Species

There is potential damage to the badger sett within the Site during the construction works. No resting places for any other mammal were determined during extensive field survey. Therefore, the potential for impacts on same is assessed as negligible.

Collision risk and barotrauma to bats during operation of the wind turbines were considered during design, with turbines located away from key linear features and foraging corridors. Despite this, the potential for long-term localised impacts on bats is identified in the absence of mitigation, particularly for Pipistrelle species.

The watercourses associated with the Proposed Development are generally low order streams and drains of limited fishery value. However, in the absence of mitigation, construction has the potential to result in significant impacts on water quality and aquatic habitats in downstream habitats.

9.3 Mitigation Measures

As part of the design evolution for the Proposed Development the Design Team and the Planning and Environmental Teams worked closely together to ensure that constraints were considered from the outset, in order to formulate a development which would avoid, by design and at source, potential for significant effects.

A Project Ecologist / Ecological Clerk of Works (ECoW) will be appointed for the duration of the construction phase to oversee implementation of all mitigation measures outlined in the EIAR and NIS. An Invasive Species Management Plan and Biodiversity Enhancement and Management Plan (BEMP) have been prepared for the Proposed Development.

Mitigation for water quality and hydrology will follow the measures detailed in the EIAR, including best-practice sediment and erosion control, buffers, and SuDS. No works will be undertaken in water without appropriate screening and controls.

To minimise impacts on bats, turbine areas will be maintained as tree-free within a 90 m radius (100 m at T4) around turbines, and a curtailment regime will be implemented during the bat activity season. Post-construction monitoring will inform the long-term curtailment approach. Hedgerow and treeline reinstatement to offset for hedge/tree removal within the site is prescribed.

Provided the Proposed Development is constructed and operated in accordance with the project design, environmental best practice and committed mitigation, significant effects on biodiversity are not anticipated.

10. ORNITHOLOGY

10.1 Existing Environment

This chapter assesses the likely significant effects that the proposed development may have on bird species.

Surveys were carried out over a multi-year period between 2019 and 2021, covering both breeding and non-breeding seasons. Vantage point surveys, breeding bird surveys, breeding wader surveys, hinterland surveys, and winter wildfowl surveys were all conducted following best practice guidance including Bibby et al. (2000) and SNH (2017). Target species were recorded within and outside the Proposed Development boundary and a comprehensive baseline was established.

Bird species recorded within the study area include a number of species of conservation concern. These include:

Raptors

- Hen harrier – BoCCI Amber-listed
- Merlin – BoCCI Amber-listed
- Peregrine – BoCCI Green-listed
- Kestrel – BoCCI Red-listed
- Buzzard – BoCCI Green-listed
- Sparrowhawk – BoCCI Green-listed

Waders/Gulls

- Golden plover – BoCCI Red-listed
- Curlew – BoCCI Red-listed
- Lapwing – BoCCI Red-listed
- Snipe – BoCCI Red-listed
- Lesser black-backed gull – BoCCI Amber-listed
- Herring gull – BoCCI Red-listed
- Great black-backed gull – BoCCI Amber-listed

Wildfowl

- Whooper swan – BoCCI Amber-listed
- Mute swan – BoCCI Green-listed
- Mallard – BoCCI Green-listed
- Teal – BoCCI Amber-listed
- Kingfisher - BoCCI Amber-listed

Passerines

- Meadow pipit – BoCCI Red-listed
- Goldcrest, greenfinch, house sparrow, linnet, skylark, willow warbler, spotted flycatcher, sand martin and swallow – BoCCI Amber-listed

A Collision Risk Model (CRM) was completed using data from 2019 to 2021 and in accordance with Band et al. (2007; 2012, 2024).

10.2 Potential Impacts

The potential likely significant impacts of wind turbines on birds may include:

- Direct Effects: Habitat loss or alteration
- Disturbance or displacement
- Collision risk with turbine blades

Habitat loss due to land take for infrastructure such as turbine bases, access roads, and compounds has been kept to a minimum. Turbines have been located within areas of improved agricultural land and cutover bog to avoid higher value avian habitats. Effects on birds due to habitat loss and disturbance/displacement are predicted to be minimal due to the low habitat value of the development footprint with the impact of disturbance assessed as short-term and not significant.

In terms of collision risk, the assessment of effects has determined that the proposed Shancloon Wind Farm will not have a significant effect on the local, County or National populations of bird species with effects determined as ranging from Long-term Slight Negative to Long-term Imperceptible. The CRM results show that the predicted collision rates for the various bird species using the Site would equate to less than 1% of their individual national population, with a negligible impact in terms of the loss to bird populations at a national level due to collision risk from the proposed Shancloon Wind farm either on its own or when acting cumulatively with other wind farms within 20km. Similarly, at a County level, impact on bird populations is assessed as Negligible (<1%) for most species and Low (1-5% of population lost) for Lesser Black-Backed Gull and Snipe equating to a Long-term, Slight Negative effect.

Displacement or barrier effects are expected to be minor due to the generally low activity levels of high-sensitivity species within the footprint of the Proposed Development.

10.3 Mitigation Measures

The design and turbine layout were informed by multiple collision risk models. The findings of these CRMs were utilised to advise the layout and design such that impacts on birds are minimised.

Mitigation includes site clearance to occur outside the bird breeding season (March 1st to August 31st). Phased construction to limit areas of disturbance within the site. Construction operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species.A re-confirmatory pre-construction bird survey will be undertaken in March/April to identify any new activity by key target species. If new nesting sites are found, works will be postponed in those areas until breeding is complete.

Operational stage monitoring is proposed in years 1, 2, 3, 5, 10, and 15. This includes:

- Breeding bird surveys (April–July)
- Breeding wader surveys (April–June)
- Monthly wildfowl censuses during winter
- Flight activity surveys during summer and winter

These monitoring programs will assess any barrier effect, displacement, and changes in bird population or activity levels. Any additional mitigation measures will be informed by the results and agreed with NPWS.

Based on the results of the CRM and the proposed mitigation and monitoring, residual effects associated with collision risk, habitat loss, and displacement are predicted to be Long-term, Slight to Imperceptible and Not Significant.

11. SOILS, GEOLOGY AND HYDROGEOLOGY

The existing environment underlying the Proposed Development consists primarily of glacial till, with areas of cutover raised bog and peat deposits occurring across the site, particularly in lower-lying areas. The Site is characterised by gently undulating topography with north–south aligned glacial drumlins and inter-drumlin hollows. Elevations range from approximately 28 m AOD to 40 m AOD. Peat is most commonly encountered in low-lying areas, typically associated with historical drainage and land use modification.

There are no known areas of soil contamination within the Proposed Development site boundary.

The Site is underlain by a Regionally Important Karstified (Conduit) Bedrock Aquifer. The underlying subsoil comprises a mix of glacial tills and peat. Surface karst features, such as actively forming collapse dolines, occur throughout the site, attributed to the washout of fine-grained materials in the overburden into voids along faulted bedrock zones. However, the bedrock itself is not considered to be highly karstified. Groundwater vulnerability is classed as “extreme” across the majority of the Site due to shallow subsoil depths.

There are no public water supplies or source protection areas located within the Proposed Development boundary. Several private wells are located within 500 m of the Site, but no impact is anticipated based on baseline groundwater flow paths and design controls.

No historic or active quarries are identified within the Site based on GSI mapping. Materials such as crushed rock and granular fill will be imported from licenced local sources. One such supplier identified is Mortimer Quarries Ltd. in Belclare.

Peat probing across the Site returned depths ranging from 0.0 m to 8.0 m. The mean peat depth was 2.29 m, with 34% of probes recording depths less than 0.5 m. A peat stability assessment was conducted in accordance with Scottish Executive (2017) guidance. All infrastructure locations returned factors of safety greater than 1.3, indicating that peat failure risk is negligible.

Slopes across the Site are generally shallow to moderate, with gradients at turbine locations ranging from 2° to 5°. The Site is considered to be of low landslide susceptibility based on geological mapping, peat condition, slope angles, and field observations. No visual evidence of historical landslides or instability was recorded during site walkovers.

11.1 Potential Impacts

11.1.1 Construction phase

During the construction phase, activities which may have an impact on soils, geology and hydrogeology prior to mitigation include:

- **Site Clearance**: This activity may expose underlying overburden, leading to increased erosion on localised peat deposits, organic soils, Glacial Till deposits, and bedrock. Given site design and local environment, Potential Impacts are determined as ‘Imperceptible’ significance
- **Tree felling**: Tree felling machinery, used during this phase, may cause compaction of soft deposits, increasing surface water runoff and increased erosion of exposed soils such as localised peat deposits, organic soils, Glacial Till deposits, and bedrock. Given site design and local environment, Potential Impacts are determined as ‘Imperceptible’ significance.

- **Earthworks Associated with Construction**: This involves the removal of overburden material, open excavations and subsequent exposure of underlying overburden and bedrock as well as the importation of engineering fill and concrete which may lead to increased erosion, soil compaction and an increase in surface water runoff, resulting in increased erosion of exposed soils. The rating of these potential impacts, prior to mitigation, is considered to be of 'Slight' significance.
- **Slope Failure**: A peat stability analysis was undertaken as part of the Peat Stability and Geotechnical Assessment Report. Results from this assessment show no signs of instability within peat deposits across the Site. Potential for slipe failure is classified as low and unlikely. Notwithstanding, the rating of the potential impact due to slope failure, prior to mitigation, is considered to be of 'Moderate/Slight' significance.
- **Construction of Turbine and Substation Foundations**: This activity involves open excavations and increased runoff which may create erosion of underlying overburden and bedrock. Construction traffic exacerbates the situation, resulting in soil compaction and increased surface water runoff, leading to more erosion of exposed soils. Importation of engineering fill and concrete products further contributes to the adverse effects on localised peat deposits, organic soils, Glacial Till deposits, bedrock, and local quarries which will create a slight significance prior to mitigation. The rating of these potential impacts, prior to mitigation, is considered to be of 'Slight' to 'Moderate/Slight' significance.
- **Construction of Internal Site Access Roads, Hardstands, and Temporary Compound:** Open excavations during these activities can lead to increased runoff, causing erosion of underlying overburden and bedrock. Construction traffic compacts the soil, increases surface water runoff, and contributes to erosion of exposed soils. Importation of engineering fill adds to the challenges. The receptors impacted are localised peat deposits, organic soils, Glacial Till deposits, bedrock, and local quarries. This activity is also considered of medium importance which will create a slight significance prior to mitigation. The rating of these potential impacts, prior to mitigation, is considered to be of 'Slight' to 'Moderate/Slight' significance.
- **Construction of the Grid Connection and Internal Cabling**: This activity involves the removal of overburden material and the exposure of underlying clay and bedrock to erosion. Construction traffic, importation of engineering fill and concrete products, as well as the disposal of surplus excavated material to licensed facilities, contribute to the adverse effects on localised peat deposits, organic soils, Glacial Till deposits, bedrock, local quarries, and licensed waste facilities, which has a slight significance prior to mitigation. The rating of these potential impacts, prior to mitigation, is considered to be of 'Moderate/Slight' significance.
- **Horizontal Directional Drilling (HDD) at a Water Crossing Point**: During HDD operations, there's potential for overburden collapse, affecting localised peat deposits, organic soils, Glacial Till deposits, and bedrock which has a slight significance before mitigation. The rating of these potential impacts, prior to mitigation, is considered to be of 'Slight' to 'Moderate/Slight' significance.
- **Accommodation Works Along TDR:** Accommodation works also expose overburden material and underlying superficial deposits and bedrock to erosion. Construction traffic further compacts the soil, increases surface water runoff, and contributes to the erosion of exposed soils. Importation of engineering fill and the disposal of surplus excavated material to licensed facilities are additional risks. This impacts peat deposits, organic soils, Glacial Till deposits, bedrock, local quarries, and licensed waste facilities and has a slight significance on the project before mitigation. The rating of these potential impacts, prior to mitigation, is considered to be of 'Imperceptible' significance.

11.1.2 Operational Phase

During the operational phase, activities which may have an impact on soils, geology and hydrogeology, include:

- **Construction Traffic for Maintenance Purposes**: During the operational phase, there is a potential for minor accidental leaks or spills of fuel/oil, which is predicted to have a slight effect on hydrogeology, soils and geology before taking into account any mitigation. The rating of these potential impacts, prior to mitigation, is considered to be of 'Imperceptible' significance.
- **Operation of Substation**: The operation of the substation can lead to spills and leaks of oils/battery fluids, which has potential for a slight significance on the project without mitigation. The rating of these potential impacts, prior to mitigation, is considered to be of '**Imperceptible**' significance.
- **Maintenance of Access Tracks**: Importation of engineering fill from local quarries during maintenance activities can impact local quarries, which has potential for slight significance on the project without mitigation. The rating of these potential impacts, prior to mitigation, is considered to be of 'Slight' significance.

11.1.3 Decommissioning Phase

During the decommissioning phase, activities related to the removal of turbines and associated infrastructure may result in construction traffic causing soil compaction and increased surface water runoff, leading to erosion of exposed soils. These impacts affect peat deposits, glacial till, and bedrock.

However, it is proposed that turbine foundations, hardstand areas, and internal access tracks will be left in situ and covered with overburden material already present on site. This approach allows for re-vegetation and avoids the need for excavation and removal, thereby reducing the scale of works and potential environmental disturbance. As a result, the magnitude of impact on soils and geological receptors is considered 'small adverse', with the importance of the receptor 'low', giving an overall unmitigated significance of 'imperceptible'. For groundwater receptors, the magnitude is 'small adverse', the importance 'high', and the overall unmitigated significance is 'moderate/slight'

Should removal of infrastructure be required by the Planning Authority, appropriate mitigation measures similar to the construction phase will be implemented to minimise potential impacts on the receiving environment

11.1.4 Cumulative Effects

Cumulative effects have been assessed in the context of large-scale developments within 20km of the Proposed Development site, including other wind farms and industrial projects.

If the construction of the Proposed Development occurs concurrently with developments such as Clonberne Wind Farm (ABP ref. 320089) and Laurclavagh Wind Farm (ABP ref. 319307), cumulative effects could include:

- Increased demand on local aggregate quarries (e.g., Mortimer Quarry Ltd, McGraths Limestone Cong), and
- Potential strain on licensed waste facilities due to increased spoil disposal.

The magnitude of impact on soils and geology is considered 'small adverse' with 'medium' importance, resulting in an unmitigated cumulative impact significance of 'slight'. For groundwater receptors (Regionally Important Karstified Conduit Aquifer), the magnitude is 'small adverse', importance 'high', and the impact significance is 'imperceptible'.

11.2 Mitigation Measures

The primary mitigation measure employed has been the design of the wind farm with detailed design and best practice implemented as shown below.

In order to reduce the impacts on soils, geology, hydrogeology and slope stability, infrastructure has been primarily located within areas of thinner peat/soft ground and lower slope gradients. Extensive work has already been undertaken at the preliminary design stage to apply risk avoidance by design which included:

- Peat probing, walkover surveys, and both intrusive and non-intrusive ground investigations to identify geotechnical constraints, such as peat deposits, surface karst features, and historical landslides.
- Micro-siting and relocation of turbines, access roads, and other infrastructure in response to site assessments and karst risk analysis.
- All engineering designs have been reviewed and approved by geotechnical and civil engineers with appropriate qualifications and experience in excavation and earthworks design.

Additional Measures to be Implemented:

- The Project adheres to recognised best practice including guidance by the EPA, IGI, and the Scottish Executive.
- All excavation and construction works will undergo a design risk assessment at the detailed design stage to evaluate risks during construction, operation, and decommissioning. Impacts will be minimised using the principles of avoidance, prevention, and protection.
- Experienced geotechnical personnel will supervise excavation and earthworks.
- Detailed method statements for each phase of work will be prepared by the Contractor and reviewed by a qualified geotechnical engineer.
- Programming will avoid earthworks during severe weather conditions. Where severe weather is forecast, stabilisation and protective measures will be implemented to secure works.
- A Peat and spoil Management Plan – Appendix 11.4, Volume III, has been prepared for the Proposed Development which will be implemented in full.

Construction Environmental Management Plan (CEMP):

A CEMP has been prepared and is included in Volume III, Appendix 2.1. This document outlines work practices, environmental procedures, and responsibilities during the construction phase. The contractor will be required to implement the CEMP in full.

The CEMP sets out the environmental management measures across all phases of the Proposed Development. It will be updated at construction stage following appointment of the main Contractor and will reflect any planning conditions and required additional mitigation.

11.2.1 Conclusion

The Proposed Development is not located within a geologically sensitive area and poses a negligible risk of landslide or peat failure.

A number of potential impacts were identified in relation to excavation of peat, till, and bedrock across the Site. Prior to mitigation, the significance of these impacts ranges from imperceptible to moderate, depending on receptor sensitivity and activity type.

Site walkover surveys and peat probing confirmed no visual evidence of existing landslides or ground instability within or adjacent to proposed infrastructure locations. Although deep peat is present in parts of the Site, peat stability assessment results indicated acceptable safety factors (>1.3), and shallow gradients further reduce landslide risk.

The project is not anticipated to contribute to any significant negative cumulative effects when considered in combination with other existing, permitted, or proposed developments in the wider area.

With the proposed mitigation measures in place during construction, operation, and decommissioning, the residual impact of the development on soils, geology and hydrogeology is considered to be imperceptible.

12. HYDROLOGY AND WATER QUALITY

12.1 Existing Environment

The Site is located within the Black[SHRULE]_010 sub-basin. The Site drains to the Togher River and its tributaries, which generally drain in a westerly direction. The Togher River drains into the Black River at the western extent of the Site. The Black River in turn drains in a south-westerly direction, until its terminus at Lough Corrib, approximately 10 km southwest of the Site boundary. There are no naturally occurring lakes or reservoirs within the Site boundary.

All of the wind turbines (turbine foundation and hardstanding) are located a minimum of 50 m away from all watercourses. There are three temporary construction compounds proposed for the Proposed Development. The main temporary construction compound is to be located in the northeast of the Site, at the Site access and will be located approximately 100 m east of an unnamed stream, which is a tributary of the Togher River. The second temporary construction compound is located towards the southwest of the site between turbines T1, T3 and T4; approximately 380 m west of the Togher River. The temporary compound for the substation is to be located approximately 370 m south of the Togher River.

The Grid Connection Route (GCR) includes a Horizontal Directional Drilling (HDD) crossing of the Black (Shrule) River which has been designed to avoid direct in-stream works.

One existing bridge crossing of the BLACK (SHRULE)_010 river will be incorporated into the internal site access. This bridge was constructed as part of the Corrib Headford arterial drainage scheme in the 1960's (structure ref. 9664 B2 on channel C4/13). In addition to the existing bridge crossing, there will be a new single-span bridge (WC01) and 14 nr. piped culvert crossings (required for watercourse / drain crossing) constructed as part of the Proposed Development.

All watercourse crossings required for the Proposed Development will be subject to the requirements of Regulation 50. Prior to the commencement of any works on watercourse crossings, the developer will apply to the OPW for a consent under Regulation 50 for the watercourse crossing works.

The Proposed Development includes the construction of a piled and floated road along the periphery of Cloonbar Bog. The floated road within Cloonbar Bog will be supported by a double row of sheet piles in order to ensure suitable ground stability and bearing capacity given that the road will be constructed parallel to the Black (Shrule) River (OPW arterial drainage channel reference CH4/13/7).

12.1.1 Flood Risk

A site-specific flood risk assessment (FRA) including justification test has been prepared for the Propose Development in accordance with the 'Planning System and Flood Risk Management Guidelines' (DOEHLG, 2009) and Departmental Circular PL2/2014 and is provided in Appendix 12.3, Volume III of this EIAR.

The primary flood risk to the proposed site can be attributed to a fluvial flooding, i.e. flooding from the river (the site is not at risk of pluvial or groundwater flooding).

The assessment and analysis undertaken has determined that the location of the proposed substation and the grid connection route and loop-in do not fall within a delineated predictive fluvial Flood Vulnerable Zones Flood Zone 'A' or Flood Zone 'B'. The location of the proposed sub-station and grid connection route therefore fall within Flood Zone 'C'.

The location of proposed turbines T01, T02, T03, T04, T05, T06, T08, T09, T10 and T11 do not fall within a delineated predictive fluvial Flood Zone 'A' or Flood Zone 'B'. The location of these proposed turbines therefore fall within Flood Zone 'C'.

The location of proposed turbine T07 falls within a delineated predictive fluvial Flood Zone 'A' and Flood Zone 'B'.

As such, the following measures have been built in to the Design of the wind farm in order to manage against flood risk and to ensure a robust and sustainable development:

- The base of proposed turbine T07 will be sealed to prevent water ingress.
- No vulnerable components of any turbines will be located at ground level and will be constructed to above the 1 in 1000 Year fluvial flood levels
- The finished floor level of the proposed substation will be constructed above the predictive peak flood level at that location.

12.2 Potential Impacts

During the construction phase, excavation and removal of vegetation cover and soil will be necessary and replaced with lower permeability surfaces, which may contribute to increased runoff, with potential to negatively impact the physico-chemical conditions for surface waters.

Extensive ground investigation for the Proposed Development has been carried out and a peat slippage risk assessment prepared for the Site, which has determined that peat slippage at the Site is unlikely.

Horizontal Directional Drilling (HDD) will be employed at one location to cross the Togher River to facilitate the cable crossing. If not properly managed, there is potential for frac-out to occur during the HDD drilling process. A frac out occurs when the pressure of the drilling fluid in a borehole exceeds the strength of the surrounding soil, causing the soil to fracture and the fluid to escape to the surface.

To facilitate the Proposed Development, the incorporation of concrete structures is necessary at turbine foundations, substation foundation, loop in tower foundations, and meteorological mast foundation. Additionally, concrete will be required as blinding for culvert and joint bay installations and also as part of the bridge crossing structure (WC01). The use of cementitious materials like concrete, cement, or lean mix can lead to changes in soil and water pH, as well as increased concentrations of sulphates and other constituents found in concrete, which can further impact water quality.

The Proposed Development will require the excavation and removal of vegetation cover and soil, and replacement with less permeable surfaces with a resulting potential to contribute to the increase in rate and volume of rainfall runoff from the Site. An assessment has been made of the resultant increase of impermeable area within the catchment due to the Proposed Development, which has determined only a 0.044% increase in impermeable area. This is minimal in comparison with the area of the sub-basin and will not impact hydrology / hydromorphology (including flood risk).

A flood risk assessment was prepared for the catchment which determined that the Proposed Development will not increase flood risk elsewhere within the catchment, and will not result in any adverse impact on the existing fluvial flood extents, depths, or flow paths when compared to the existing undeveloped baseline scenario.

During the operational phase, accidental pollution from spills and leaks of fuel, oil and chemicals from vehicles and maintenance works may occur. Additionally, transformer oil will be used in cooling the transformers associated with the sub-station which creates potential for oil spills during any oil replacement activity or leaks during the operational phase, although the likelihood of this is low. Additionally, permanent drains and settlement ponds will be installed and maintained across the Site as per 100 and 500 series planning drawings. These will act to attenuate any accidental spills such that they can be controlled and managed in a timely manner.

In the decommissioning phase, turbines will be removed by dismantling above-ground infrastructure. Hardstandings and foundations will be covered with stripped soil and allowed to re-vegetate. This approach avoids deeper excavation and reduces hydrological disruption. Infrastructure to remain in place includes internal access tracks, the on-site substation and electrical infrastructure.

In relation to cumulative effects, the OPW will continue to maintain the Corrib Headford Arterial Drainage Scheme on a 4-6 year rolling basis. In-stream works associated with the Proposed Development has potential to act cumulatively with arterial drainage works through sedimentation and risk of accidental pollution. Similarly, there is potential for accidental runoff from the Site to act cumulatively with forestry and turbary activities if not properly mitigated.

12.3 Mitigation Measures

A process of 'mitigation by avoidance', as informed by constraints assessment and consultation, was undertaken by the EIA team during the design of the wind farm layout and selection of the grid connection route (refer to Chapter 3 – Site Selection and Alternatives). The objective was to minimise the potential for significant effects on water quality and hydrology. The Site layout and drainage infrastructure have been designed to follow existing topography and preserve the natural hydrological regime. The design has been informed by a detailed flood risk assessment for the Site.

The infrastructure has been located such that it is set back as far as reasonably practicable from hydrological features, with an ethos of ensuring a minimum setback of 50 m between mapped surface waters and wind farm infrastructure, and a minimum setback of 10 m from non-mapped streams and drainage features with the exception of HDD locations and watercourse crossings. Objective FL18 of the Galway County Development Plan 2022-2028 requires that a riparian buffer zone of at least 10 m is maintained between the development works and the top of the riverbank. The design of the Proposed Development meets the objective of the Development Plan, noting that there are a number of watercourse crossings included in the Proposed Development.

HDD techniques for the 33kV cable crossing of the Togher River are used to avoid instream works and protect riparian habitat.

All watercourse crossings are designed in compliance with Regulation 50 of the European Communities (Assessment and Management of Flood Risks) Regulations 2010 (S.I. No. 122/2010).

A Surface Water Management Plan will be implemented during construction, operation, and decommissioning, which includes:

- Interceptor drains to collect clean surface water upgradient of infrastructure and redirect flow downgradient via cross-drains and diffuse outfalls.
- Dirty water management with collection into swales and discharge to settlement ponds to remove sediment and attenuate flow.

- Drainage design that maintains the pre-development hydrological regime.

Best practice construction methods will be used to avoid potential for effects on water quality and hydrology following the documents and guidelines listed below:

- Water Run-Off from Construction Sites - SEPA - (WAT-SG-75)
- The SUDS Manual - CIRIA C753.
- Site Handbook for the Construction of SUDS - CIRIA C698 ISBN 0 86017 698 3.
- Works and maintenance in or near water - PPG5 - (October 2007)
- Environmental good practice on site guide (fourth edition) (C741)
- Guidance for Pollution Prevention, dealing with spills: GPP 22-(October 2018)
- Temporary Construction Methods - SEPA -(WAT-SG-29)
- Guidelines on protection of Fisheries During Construction Works in and Adjacent to Waters - Inland Fisheries Ireland - (IFI 2016)
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes - TII Publications (2008)

An Environmental / Ecological Clerk of Works (EnCoW / ECoW) will be appointed by the Developer with responsibility for monitoring at the Site during the construction phase of the Development. The Clerk of Works will have the authority to temporarily stop works to prevent negative effects on hydrology or to ensure corrective action is taken to mitigate adverse effects.

12.3.1 Attenuation and Flood Risk

The Proposed Development will increase the impermeable area within the Site, however this is noted to be negligible in terms of potential to cause a significant change in runoff rates. Notwithstanding, mitigation measures to address surface water runoff and drainage are proposed for this project as set out in the Surface Water Management Plan, in order to maintain the baseline hydrological regime and to provide attenuation at greenfield run-off rates. Mitigation measures include:

- In-line attenuation features such as check dams, stilling ponds, and diffuse outfalls to attenuate flows and mimic greenfield runoff conditions.
- Access tracks constructed from permeable aggregate, allowing infiltration and reducing runoff generation.
- Swales to intercept and retain runoff, with check dams installed on sloping ground to slow flow and promote infiltration.

Swales and channels will route runoff to settlement ponds. These ponds will be designed to accommodate flows from storm events up to and including the 1 in 100-year return period. Settlement ponds will not discharge directly to watercourses. Instead, treated flows will be released via diffuse overland flow to vegetated areas within the catchment.

Watercourse crossings (including culverts and one 18.5 m clear span bridge) will be sized to maintain existing channel width, allow for passage of sediment and woody debris, and meet OPW freeboard and flood risk requirements.

Cable trenching will be undertaken in dry conditions where possible, and disturbed areas will be reinstated and re-vegetated to prevent erosion and sediment release.

The surface water management system has been designed to ensure there will be no increase in the risk of fluvial or pluvial flooding downstream as a result of the Proposed Development.

13. SHADOW FLICKER

13.1 Potential Impacts

Under certain combinations of geographical position, wind direction, weather conditions and times of day and year, the sun may pass behind the rotors of a wind turbine and cast a shadow over the windows of nearby buildings. When the blades rotate and the shadow passes a window, to a person within that room the shadow appears to 'flick' on and off; this effect is known as 'shadow flicker'. The phenomenon occurs only within buildings where shadows are cast across a window aperture, and best practice is to assess potential shadow flicker effects within an area up to a maximum distance of 10 times the rotor diameter from each wind turbine. A study area of 1,550 m from each of the 11 wind turbines was selected for this assessment. This is based upon ten times the maximum rotor diameter (155 m), which the shadow flicker assessment considers the rotor range of 149.1m to 155m.

The Applicant is committed to minimising the potential for shadow flicker to occur at any dwelling within the study area and the shadow flicker assessment will be used to inform the Shadow Flicker Control Measures that will be designed for each turbine.

There is no standard for the assessment of shadow flicker in Ireland, although a maximum of 30 hours per year and 30 mins per day within 500 m of a wind turbine is recommended, as detailed in Wind Energy Development Guidelines (2006).

The predicted maximum theoretical hours per day of shadow flicker exceeds 30 minutes at 80 receptors when considering a 155 m rotor diameter, at 77 receptors when considering a 150 m rotor diameter, and at 76 receptors when considering a 149.1 m rotor diameter.

No cumulative effects with other proposed or operational wind farms in the area are predicted to occur on any receptors in the study area.

Shadow flicker can only occur as a by-product of wind turbine operation; as such, there will be no shadow flicker effects during the construction or decommissioning phase.

13.2 Mitigation Measures

The Developer will install a shadow flicker impact control system at turbines which have the potential to cause shadow flicker on nearby properties. This system will be installed prior to operation of turbines.

This shadow flicker control system, consisting of light sensors and specialised software, will be installed on the turbines to ensure that mitigation is implemented when shadow flicker exceeds the thresholds as set out in the assessment criteria. The calculated shadow flicker periods can be input into the turbine control software and when the correct conditions are met (i.e. the light intensity is sufficient) during a potential period of shadow flicker, individual turbines will cease operation as required until the conditions for shadow flicker are no longer present. This method of mitigation will be used to ensure that mitigation will be implemented for all instances where shadow flicker effects may occur at a residential dwelling within 10 rotor diameters of the turbines.

It should be noted that under certain circumstances, there may be brief periods between the conditions for shadow flicker becoming present (i.e. cloud cover disappearing, resulting in bright sunshine) and mitigation being fully implemented, due to the time required for the turbine blades to slow to a stop.

It is noted that, as might be required by potential adoption of the 2019 draft wind energy guidelines, shadow flicker control modules can be used to ensure that a near zero level of shadow flicker is achieved, allowing for the reaction time of the shadow flicker control modules and also allowing for a short period of time for the turbine blades to slow down to a stop.

During operation of the Proposed Development, any complaints relating to shadow flicker will be fully investigated by the Developer and the shadow flicker control system updated accordingly.

14. TRAFFIC AND TRANSPORT

14.1 Existing Environment

The nearest motorway to the site is the **M17** which connects Tuam to the M18 between Galway City and Athenry. The Turbine Delivery Route (TDR) will utilise the M6 and M17 motorway network.

The nearest national primary road is the **N17**, which is located approximately 6.8km to the southeast (straight line distance) of the site. The N17 will connect the M17 to the R332 along the proposed TDR.

The closest national secondary route to the site is the **N84**, located approximately 5km southwest of the Site. The N84 forms part of the northern construction haul route. The TDR does not utilise the N84 national road.

The nearest regional road is the **R332** which is located approximately 2.45km northeast (straight line distance) of the Site. The R332 forms up to 6.7km of the southern haul route as well as TDR, it also makes up 14km of the northern construction haul route.

There are several local roads in the vicinity of the Site. The proposed development will have one main site entrance which will be used for both construction and operation as an access point from the **L2234** public road. The main site entrance requires construction of a new access on the L2234 local road.

The **L6483** is a local secondary road to the east of the Site which connects the L2234 at the crossroads located north of the proposed site entrance to the R332. The substation entrance is located on the **L6100** local secondary road. TDR proposes the use of the L2234, L6483, L22202, L2220 and the L22204. The GCR proposes the use of the L6100, L6225, L22204, L2220, and the L22202.

The cable route parallelling the L-22204 local road will require an overcrossing of the Gas Networks Ireland Mayo - Galway natural high pressure gas distribution main which is connected to the nearby Beaghmore Transmission Above Ground Installation (AGI). At this location the crossing will comprise two cable circuits and will require a flattened crossing with a trench width of 2390 mm (see Planning Drawing 051021-DR-113). GNI has instructed that the cables need to have at least 600mm separation from the red indicator tape for all transmission pipelines (whether high pressure or low pressure) and that open cut trenching is preferred with all works supervised.

The cable route crossing of the L-2220local road will cross an existing 250 mm diameter uPVC potable water trunk main (which is under gravity flow). At this location the crossing will comprise two cable circuits and will require a flattened crossing with a trench width of 2390 mm. In this regard, Uisce Éireann Diversions Team has provided a Confirmation of Feasibility to building over or near Uisce Éireann assets (Diversion Enquiry Reference DIV24312).

The proposed grid connection export cable will exit the site through the new substation entrance located on the L6100 local road. This access point will also be used for construction and operation and will be used by both HGV's and LGV's for substation construction.

Temporary accommodation works and temporary access roads will be constructed for turbine delivery to site and for the HDD crossing.

14.2 Potential Impacts

The likely traffic that will be generated by each phase of the project (construction, operation and decommissioning) is estimated to identify potential disruptions to existing road users and is based on a 24-month construction programme and a 30-year operational life.

Site access points are assessed for suitability in the context of both TII and Local Authority requirements for both geometric design and visibility. Potential disruption as a result of road or lane closures as a result of works along public roads are also assessed.

The construction activities associated with the project will lead to additional construction related traffic on the existing public road network over the duration of the construction works. Without appropriate mitigation measures, the proposed works have the potential to lead to a negative impact on the existing road network.

The traffic impact associated with the grid connection cable works will fall into two main categories, the construction traffic related impacts and the road/lane closure related impacts. The use of heavy goods vehicles, light goods vehicles and the transport of materials will be involved with the grid connection. The grid connection construction works will require a combination of temporary road closures with traffic diversions and temporary lane closures along the proposed route.

All road works will be subject to a road opening licence, but it is anticipated that the cable installation along local roads will be advanced using a combination of rolling lane closures and temporary road closures where the existing road width is insufficient to accommodate an open lane for traffic to pass the works area.

The delivery of turbine components including blades, tower sections and nacelles is a specialist transport operation owing to the oversized loads involved. The blades are the longest component and have been considered for the purpose of this assessment.

Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company. Turbine deliveries will also be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimized.

As further described in Section 14.4 of Chapter 14: *Traffic and Transportation*, accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and temporary local road widening through the laying of compacted aggregate to verges. Prior to mitigation measures, this could include a negative impact on the existing road network such as delay and disruption to road users, road safety issues, inappropriate parking of construction vehicle, soiling of the public road and existing public road infrastructure damage.

A small number of full-time wind farm personnel are expected to be present during the operational phase of the project.

Unforeseen or unplanned events such as emergency turbine repair works could potentially require the mobilisation of construction plant and personnel to site or grid route. The replacement of a large turbine component such as a blade will require a crane and the re-installation of some Turbine Delivery Route temporary accommodation works. In such an event, it is considered that negative or adverse effects on the receiving environment will be temporary in duration and not significant to slight following appropriate mitigation measures.

The potential impacts associated with the decommissioning phase will be significantly less than the construction phase due to the considerably lower number of vehicle movements.

14.3 Mitigation Measures

A number of mitigation measures will be employed during construction to reduce, minimise or eliminate the potential impacts created by the project and outlined above. These measures include a detailed Traffic Management Plan (TMP) which will be agreed with the road's authority and An Garda Siochána prior to commencing construction, with mitigation measures proposed for the grid connection works to include:

- Road Opening : The road works associated with the grid connection cabling will be completed in line with the requirements of a road opening license as agreed with the local authority.
- Route Proofing: In advance of the main grid connection works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. This will include slit trenching with the aim of minimising the construction impacts and avoiding existing services in the road.
- Road Cleanliness: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used when necessary, to ensure that the public road network remains clean.
- Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the road's authority.
- Surface Overlay after Trench Reinstatement: following temporary reinstatement of trenches on public roads, sections of the public roads will receive a full surface overlay. Details to be agreed with the roads authority At a minimum they will be reinstated to their pre-works condition or better and to the satisfaction of the road's authority.

The turbine delivery route has been assessed using a detailed appraisal of potential routes and the identification of the most appropriate route including the accommodation requirements along the route to mitigate the impact of the turbine delivery. The impact of the deliveries on traffic is mitigated by delivering components during off-peak or night-time deliveries. Mitigation measures proposed for the turbine delivery route also include:

- Programme of Deliveries: a programme of deliveries will be submitted to the road's authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company.
- Garda Escort: Turbine deliveries will be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.
- Reinstatement: Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition.
- Consultation: Consultation with the local residents and Waterford County Council will be carried out in advance to manage turbine component deliveries.

During the operational phase of the Proposed Development, site entrances to the site to be maintained continually to ensure visibility conditions at these entrances has not deteriorated. Hedgerow maintenance will be required periodically to ensure continued visibility at site entrances.

Once the decommissioning phase commences, traffic impact associated with the decommissioning phase will be significantly less than the construction phase. Infrastructure associated with the grid connection will form part of the national transmission network and will be left in-situ. Therefore, no impacts are envisaged upon decommissioning of the wind farm project and no mitigation is required. All decommissioning works are to be carried out in accordance with a decommissioning plan to be agreed with the planning authority in advance of the decommissioning works. Traffic management measures identified will be included in the decommissioning plan for the wind farm.

15. ARCHAEOLOGY, ARCHITECTURAL AND CULTURAL HERITAGE

15.1 Existing Environment

Chapter 15 assesses the Potential Impacts of the Proposed Development on the known and potential cultural heritage resource which encompasses assets relevant to both the tangible resources, such as archaeology and architecture heritage; and non-tangible resources including history, folklore, tradition, language and placenames).

There are fifty-four recorded archaeological sites, one of which is classified as a 'redundant record', located within 2km of the Site. The 2km study area contains one example in County Mayo (Enclosure MA122-035----) and the remainder of the recorded archaeological sites are located in County Galway. There is only one recorded archaeological site located within the Site boundary, and this comprises an extant ringfort (GA028-040---) in Shancloon townland. None of the recorded archaeological sites within the study area are National Monuments in State Care or are subject to Preservation Orders, but all are protected under the National Monuments Act 1930 (as amended).

The study area contains one recorded ecclesiastical enclosure of potential early medieval date (located 700m north of turbine T2) which contains the foundation remains of an associated ecclesiastical building (GA028-012001-) and children's burial ground (GA028-012003-).

The study area also contains four recorded holy wells, none of which are within the Site.

A cashel site (GA028-046----), which contains the potential site of a children's burial ground GA028-046001-), located c.40m to the south of the 110kV loop -in connection tower.

A detached three-bay single-storey gate lodge, built in c.1850, is located 45m to the north of accommodation works in Beagh townland (TDR ref. PoI 16)

A review of monuments with potential visual alignment attributes, such as megalithic tombs, stone circles, stone rows and standing stones, within lands extending for 10km from the Site revealed that there are three examples located within the area, none of which are aligned towards the Site.

15.2 Potential Impacts

There are no recorded archaeological sites located on the footprint of, or directly adjacent to, any of the proposed construction areas within the Site and no potential unrecorded archaeological sites were identified within these areas during the desktop study and field inspections carried out as part of this assessment. Given these factors, no direct impacts on the known archaeological resource are predicted during the construction phase. There is one archaeological site located within the Site boundary, and this comprises an extant ringfort (GA028-040----) in Shancloon townland. This is located 75m to the east of a site access road and 100m to the south of T3. No direct effects on this archaeological site are predicted as a result of the construction of the Proposed Development.

The loop-in connection mast is within the environs of a levelled cashel site (GA028-046----), which contains the potential site of a children's burial ground GA028-046001-) in Tonacooleen townland. No surface traces of these sites were noted during an inspection of the location and a section of the route located c.40m to the north of their location extends through a concrete surfaced farmyard. However the potential for subsurface remains cannot be discounted.

The accommodation works at this junction are located 45m to the south of a property containing a detached three-bay single-storey gate lodge, built in c.1850, which is listed as a protected structure (RPS 3902) and is also included in the NIAH (30402915). The proposed accommodation works will not result in any direct impacts on this architectural heritage constraint.

The operational phase of the Proposed Development will result in no predicted direct impacts on the known archaeological, architectural and cultural heritage resources.

There are no monument types that have potential visual attributes associated with ritual practices such as alignments across the landscape towards astronomical events, e.g., stone circles, stone rows or megalithic tombs, that could be potentially impinged upon by wind turbines.

15.3 Mitigation Measures

The Proposed Development lands have the potential to contain unrecorded, sub-surface archaeological remains and should the presence of such remains be revealed during the construction phase, they would be likely to suffer a high magnitude of impact. As such, the mitigation for Potential Impacts on unknown archaeological remains will entail archaeological monitoring of ground works during the construction phase under licence by the National Monuments Service and this will be carried out by a suitably qualified archaeologist. In the event that any sub-surface archaeological remains are identified during monitoring they will be recorded in situ and securely cordoned off while the National Monuments Service are consulted to determine further appropriate mitigation measures, which may include preservation in situ (by avoidance) or preservation by record (archaeological excavation). Additionally, the locations of turbines, hardstands and associated new access roads will be subject to a pre-construction geophysical survey, carried out by a suitably qualified consultancy, followed by a programme of targeted archaeological test trenching. In the event that any sub-surface archaeological features are identified during these site investigations they will be recorded and then securely cordoned off while the National Monuments Service are consulted to determine further appropriate mitigation measures, which may include preservation *in situ* (by avoidance) or preservation by record (archaeological excavation).

16. LANDSCAPE AND VISUAL IMPACT

16.1 Existing Environment

The Site and its immediate surroundings are flat, highlighted by the array of peat bogs. Beyond the Site's immediate context, the terrain is also characterised by relatively flat to low-rolling lands. Lough Hacket is situated 3.8 km southwest of the Site. The nearest watercourse is the Back River, which flows a short distance to the north and west of the Site. The smaller Togher River meanders through the Site. Otherwise, the Site comprises small streams and drainage ditches. The wider environment is slightly more varied and contains the broader extents of Lough Corrib in the southwest portion. Other notable watercourses within the wider area include the Robe River, which flows through the Ballinrobe in the northern portion. Turloughs are dotted throughout the wider environment and are characteristic of the landscape. The principal land uses in the area are medium to large-sized pastoral fields bound by networks of hedgerow vegetation and blocks of peat bogs.

The Proposed Development is entirely contained within the 'North Galway Complex Landscape' Landscape Character Areas (LCA) which is rated as being of 'low' landscape sensitivity.

The proposed turbines are located within an area categorised as 'Open to consideration' under the Local Authority Renewable Energy Strategy.

There are three protected views within 20km of the Proposed Development, but none are orientated towards the Site:

- Ard na Goaithe
- Kilbeg Peir
- Friary of Ross

In addition to the protected views identified in the Galway CDP, the following key amenity and heritage features are located within 20km of the Site:

- Kilmaine - Killernan Loop recreational trail 4.5 km northwest of the Site;
- Knockma Wood c.6 km south of the Site;
- Friary of Ross (Ross Errilly Friary) ruin is a heritage feature c.10 km southwest of the Site (subject of the nearby protected view no. 33);
- Cong village, c.16.5 km west of the Site;
- Ard na Gaoithe – Ardnageeha loop recreational trail c.16.5 km west of the Site; and
- Land of the Giants recreational trail c.17 km north of the Site.

16.2 Potential Impacts

The wind farm is to be located within a landscape that is consistent with both the '*Flat Peatland*' and the '*Hilly and Flat Farmland*' landscape type. In general, the Proposed Development is largely consistent with the 2006 Wind Energy Development Guidelines (and the draft 2019 guidelines) in terms of the guidance on wind farm siting and design criteria for different landscape types.

Due to the location of the Site within the plains of north Galway and south Mayo, there is theoretical potential for comprehensive views of the proposed turbines across the majority of the Study Area as a result of the gently rolling topography. (However, this gently rolling landscape is also the reason why, in reality, there will be limited locations with sufficient elevation to have visibility of the turbines above the hedgerows and treelines.)

There will be some long-term/permanent construction stage effects on the physical landscape in the form of turbine foundations and hardstands, access tracks and a substation, but only the substation is proposed to remain in perpetuity as part of the national grid network.

There will be physical impacts on the land cover of the Site as a result of the Proposed Development during the operational phase, but these will be relatively minor in the context of this productive rural landscape that comprises existing wind energy developments and extensive areas of commercial conifer forest. Whilst the Proposed Development represents a notable intensification of development in the local landscape context, the scale of the Proposed Development will be well assimilated within its landscape context without undue conflicts of scale with underlying landform and land use patterns.

The central Study Area contains several settlements, the largest of which is Shrule, located approximately 3.8 km west of the Site. The centre of Headford is located approximately 8.2 km southwest of the Site. The largest and most notable population centre in relation to the Proposed Development is Tuam, which is approximately 8.8 km southeast of the Site. Ballinrobe is located approximately 15 km northwest of the Site. It is not considered that any significant visual impact will occur with respect to centres of population on the basis of photomontage assessments carried out. A portion of the Study Area to the south of the Site has limited potential for turbine visibility due to the intervening hills (167 m Above Ordnance Datum) at Knockma Wood, located approximately 6 km south of the Site.

The area near the Site has a moderately populated but dispersed rural population. The Draft Revised Wind Energy Development Guidelines (December 2019) refers to appropriate setback distances for visual amenity purposes. The guidelines outline a mandatory minimum setback distance of *"500 meters"* or the distance of *"4 times the tip height"* of the proposed *turbines "between the nearest point of the curtilage of any residential property".* In this instance, the setback for visual amenity purposes would be 720m from residential receptors on the basis of the 180 m high turbines, and has been achieved for the Proposed Development. Local Community views are considered to be those experienced primarily by those people who live, work and move around the area within approximately 5km of the Site. These are generally the people who are most likely to have their visual amenity affected by a wind energy proposal due to proximity to the turbines, a greater potential to view turbines in various directions, or having turbines as a familiar feature of their daily views. The Proposed Development will present in a dominant manner at some of the nearest residential receptors to the Site. Some of these local receptors will experience borderline significant impacts.

The most notable visual impacts will occur within the immediate surroundings of the turbines at local residential receptors. Whilst the turbines will be dominant features in this local landscape context, impacts beyond this tend to reduce quickly, with many locations having no visibility of the proposed turbines.

There are instances where the Proposed Development has the potential to be viewed in combination with the existing, permitted or in-planning turbines. However, it is well offset from any other wind farm developments and, thus, will present with no notable negative cumulative aesthetic effects.

16.3 Mitigation

Given the highly visible nature of commercial wind energy developments, it is not generally feasible to screen them from view using on-site measures, as would be the primary form of mitigation for many other types of development. Instead, landscape and visual mitigation for wind farms must be incorporated into the early-stage site selection and design phases.

In this instance, the two main forms of landscape and visual mitigation employed were:

- Avoidance in design - the siting of the proposed turbines was selected due to the robustness of the receiving landscape and to minimise the impacts of key receptors.

- Buffering of Residential Receptors - The minimum distance of any turbine from the nearest residential receptor is 720.4m (noting closest property to a turbine (Eircode H54 KH73) is located 357 m distance from Turbine T01, however this property is under the control of the Developer and will be taken out of use as a residential property and will not be occupied for the operational period of the development)

17. MATERIAL ASSETS, TELECOMMUNICATIONS AND AVIATION

The Proposed Development has been examined for the potential impact on material assets, telecommunications and aviation.

An examination of material assets was carried out which includes renewable and non-renewable resources and utility infrastructure. As part of the scoping and consultation process for the Proposed Development, searches of existing utility services were carried out using a network analysis tool, stakeholder consultation and fieldwork, to identify areas where major assets exist such as high voltage electricity cables or gas mains. Private / State utility companies such as Uisce Éireann (formerly Irish Water) and Gas Networks Ireland (GNI) were also consulted during this period. Consultations were also carried out with telecommunication stakeholders including authorities with associated telecommunication infrastructure, wireless broadcasters, cellular network providers, broadband suppliers and wireless internet service providers (WISP). Material responses received are detailed in Chapter 5: Scoping and Consultation of this EIAR

Similarly, the airport and aviation authorities were asked to identify potential impact from the proposed turbines on infrastructure and airfields.

17.1 Existing Environment

A section of the internal access track and 33 kV electrical cable to be constructed as part of the Proposed Development will cross an existing High Pressure Gas Transmission Main near the L-22204 local road. These works will be constructed in accordance with Gas Networks Ireland requirements.

The delivery of turbine components to the Site will require temporary accommodation works along the which will include the requirement to remove utility poles. Such works will be agreed and carried out by the service provider in advance of turbine delivery and will result in localised disruption to service.

The 110kV grid connection from the Proposed Development will consist of new standard EirGrid loop in substation connected to the existing Cashla - Dalton 110kV overhead line via two new loop-in masts.

The cable route crossing of the L-2220-21 local road will cross an existing 250 mm diameter uPVC potable water trunk main (which is under gravity flow). Uisce Éireann Diversions Team has issued a Confirmation of Feasibility to building over or near Uisce Éireann assets (ref. DIV24312for these works.

The nearest sewerage infrastructure to the Proposed Development is the Shrule wastewater treatment plant and associated network (operated by Uisce Éireann under EPA licence D0359-01), located 1.6 km to the west, with a population equivalent of 600. The properties surrounding (and within) the Proposed Development boundary are not connected to this network/treatment plant, rather they are served by individual treatment systems (septic tanks). There will be no interaction between the Proposed Development and the Shrule sewerage scheme.

There are no microwave transmission links or Point to Point Radio networks which might be affected by the Proposed Development.

The Proposed Development is remote from all IAA licensed aerodromes and radar installations, and from Irish Air Corps (IAC) Aviation Exclusion Zones and Garda Air Support Unit and Emergency Aeromedical Services.

There are 2 no. private unlicensed airfields: Kilconly Airfield and Castlehacket Airfield (both within 5 km of the wind farm), which are not licensed by the IAA.

17.2 Potential Impacts

In relation tot eh crossing of the gas main, GNI confirmed that the alignment of the wind farm infrastructure coincides with a section of gas main comprising heavy wall pipe and as such no specialist load bearing reinforcement is required here. The standard requirements for 600mm separation from the red high pressure transmission pipeline, open cut cable trenching, and supervision of the works by GNI will be implemented. As such there will be no requirement to interact with the gas mains.

The crossing of the potable water main will be below pipe and as such will negate the need for direct interaction with the water main. Notwithstanding, the cable construction method, there is a likely need to briefly interrupt the potable water supply to accommodate the cable crossing. Effects will be brief.

In order to accommodate the loop-in connection from the Proposed Development, the existing Cashla - Dalton 110kV overhead line will be de-energised by ESB and as such will result in disruption to service for between 1 to 5 days. Similarly, there will be a requirement for interruption of service during decommissioning and potentially for maintenance activities at the wind farm.

Network analysis carried out as part of the EMI Impact Assessment indicates that no radio network would be impacted by the proposed turbine layout.

Shancloon Wind farm will be located 41.5 km southwest of the Ireland West Airport and as such is outside of the Obstacles Limitation Surfaces (OLS) and Building Restricted Area (BRA) of the airport (i.e. the airspace around the airport which must be maintained free from obstacles). Additionally, the wind turbines are below the Minimum Sector Altitudes (MSA) (i.e. obstacle clearance requirements) associated with Ireland West Airport and will not interfere with any Instrument and Visual Flight Procedures of the airport.

Decommissioning works will include removal of above ground structures including the turbines and met masts. Turbine foundations and access tracks will be left in situ. The proposed on-site substation building will be taken in charge by ESB which will have a long-term slight positive impact on electricity infrastructure provision in the area. There will be no significant negative impacts on renewable and non-renewable resources during the decommissioning phase.

During the decommissioning phase, the turbines will be dismantled and removed from the site, thereby removing all potential obstacles to aviation interests. There will be no likely effects on aviation during the decommissioning phase.

17.3 Mitigation Measures

In line with standard practice for wind farm developments, the coordinates and elevations for turbines will be supplied to the IAA at the end of the construction phase. An aeronautical obstacle lighting scheme will be agreed with IAA in line with IAA's consultation response and applied to the proposed turbines. Additionally, the developer will notify the Authority of intention to commence crane operations with at least 30 days prior notification of their erection.

As both the Kilconly and Castlehacket airfields are in *Class G airspace,* any pilots flying to/from these airfields are obliged to fly by *Visual Flight Rules* (VFR), and in accordance with the IAA *Rules of The Air*. As the *Rules of the Air* state, it is the pilot's legal responsibility to be aware of and avoid any obstacles in his/her flight path, and therefore, he/she would be required to be aware of wind turbines if flying to/from the airfield in question, which is achieved by prudent flight planning by the VFR pilot prior to flight.

Should the Proposed Development at Shancloon be permitted, in advance of their construction, the turbine locations, met mast and loop-in towers would be added to aviation flight charts and clearly marked as en-route obstacles. This would enable VFR pilots to plan their flight routes accordingly to avoid cranes and wind farm infrastructure during construction.

Residents and business that will be affected by any interruption to utility services will be informed by the service providers through the existing notification system.

18. INTERACTIONS OF THE FOREGOING

This Chapter considers the potential for interactions and inter-relationships between one aspect of the environment and another which can result in an impact being either positive or negative, as well as having varying significance. The chapter considers potential significant environmental effects that may occur in terms of the interaction and inter-relationships of Air Quality & Climate, Noise & Vibration, Biodiversity, Ornithology, Soils, Geology and Hydrogeology, Hydrology and Water Quality & FRA, Population and Human Health, Shadow Flicker, Traffic & Transportation, Archaeological, Architectural & Cultural Heritage and Landscape & Visual Impact, as a result of the Proposed Development as described in Chapter 2: Development Description of this EIAR.

Table 18-1, below, provides a matrix detailing the key interactions and inter-relationships between the key environmental aspects of the Proposed Development, including the wind farm, grid connection route and turbine delivery route.

Each individual chapter of the EIAR has had regard to interactions between different potential impacts. For example, *Hydrology and Water Quality & FRA has had regard to potential impacts on Biodiversity; and Land, Soils and Geology* has had regard to potential impacts on both *Biodiversity, Hydrology and Water Quality & FRA and Traffic & Transportation*.

Table 18-1: Matrix of Interaction Between key Environmental Aspects

	Air Quality & Climate	Noise & Vibration	Biodiversity	Ornithology	Soils, Geology and Hydrogeology	Hydrology and Water Quality & FRA	Population and Human Health	Shadow Flicker	Traffic & Transportation	Archaeological, Architectural & Cultural Heritage	Landscape & Visual Impact	Material Assets, Telecommunications and Aviation
Air Quality & Climate		■	■	■	■		■		■			
Noise & Vibration	■		■	■			■		■		■	■
Biodiversity	■	■		■	■	■	■		■			
Ornithology	■	■	■		■	■	■	■	■			
Soils, Geology and Hydrogeology	■	■	■	■		■	■		■	■		■
Hydrology and Water Quality & FRA			■	■	■				■	■		
Population and Human Health	■	■	■	■	■			■	■	■	■	■
Shadow Flicker				■			■				■	■
Traffic & Transportation	■	■	■	■	■	■	■					

	Air Quality & Climate	Noise & Vibration	Biodiversity	Ornithology	Soils, Geology and Hydrogeology	Hydrology and Water Quality & FRA	Population and Human Health	Shadow Flicker	Traffic & Transportation	Archaeological, Architectural & Cultural Heritage	Landscape & Visual Impact	Material Assets, Telecommunications and Aviation
Archaeological, Architectural & Cultural Heritage				■	■	■	■				■	■
Landscape & Visual Impact		■					■	■		■		
Material Assets, Telecommunications and Aviation								■		■	■	

■ = interaction or inter-relationship □ = no interaction or inter-relationship

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