



Volume I: Non-Technical Summary

Ballinlee Wind Farm

Ballinlee Green Energy Ltd.

September 2025

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1. Introduction

Ballinlee Green Energy Ltd. (the ‘Applicant’) is seeking 10-year planning permission from An Coimisiún Pleanála (competent Planning Authority) for a proposed wind energy project in Co. Limerick, named Ballinlee Wind Farm (Proposed Development). The location of the Proposed Development site is shown in **Figure 1-1**. Malachy Walsh and Partners (MWP) have been engaged by the Applicant to prepare an **Environmental Impact Assessment Report (EIAR)** to accompany the planning application. A full description of the Proposed Development and development lands of the project is provided in **Chapter 02** of **Volume II** of the **EIAR**.

This Non-Technical Summary (NTS) is the first volume of the EIAR for the proposed development. The other volumes which comprise this EIAR are:

- Volume II: Main Environmental Impact Assessment Report;
- Volume III: Appendices; and
- Volume IV: Photomontages.

The purpose of this NTS is to provide a concise overview in non-technical terms of the proposed development, environmental effects and mitigation measures highlighted by the Environmental Impact Assessment (EIA) and presented in detail in the main **EIAR, Volume II**.

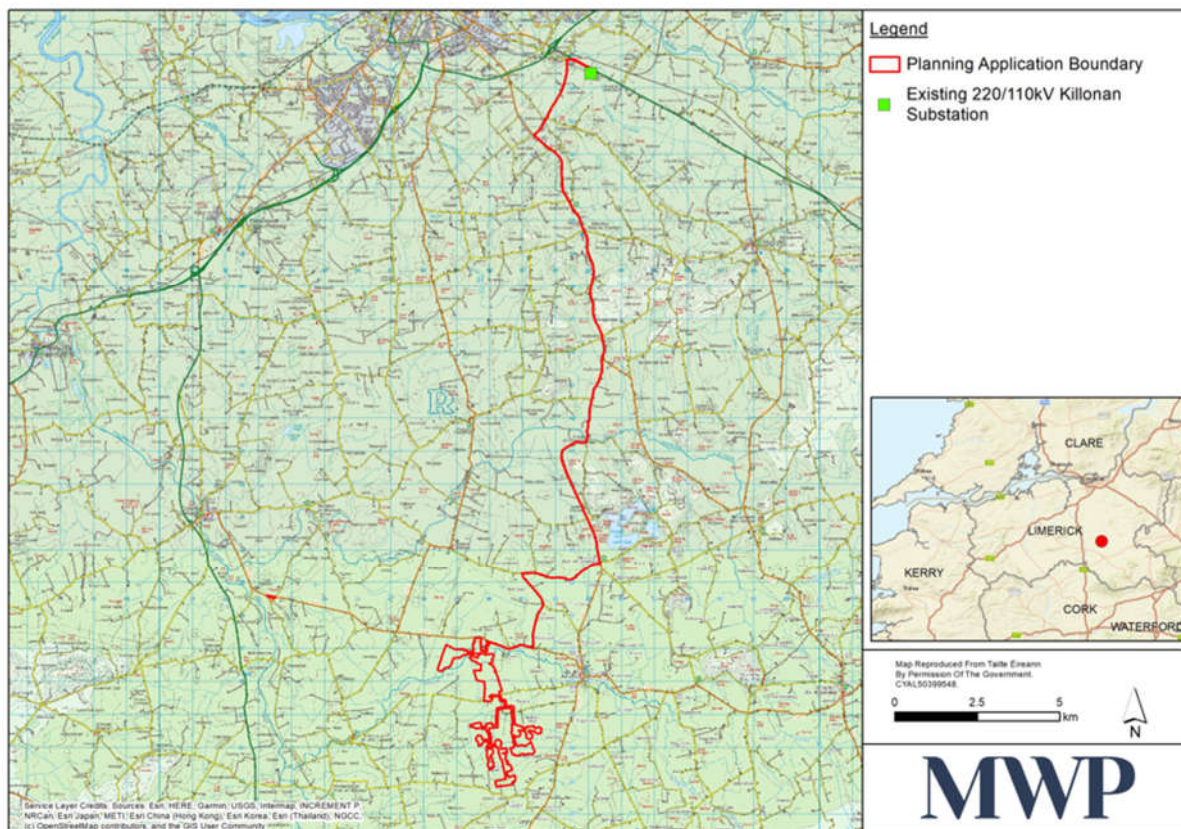


Figure 1-1 Location of Proposed Development

1.1 The Applicant

Ballinlee Green Energy Ltd. is a privately owned, innovative Irish renewable energy company based in Adare, Co. Limerick that specialises in the development of renewable energy projects, working with communities from pre-planning to operation, and creating long-lasting local partnerships. The company has over ten years development and operational experience. The company has a highly skilled and experienced team who are committed to developing projects with successful outcomes for all stakeholders.

1.2 Overview of Proposed Development

Ballinlee Green Energy Ltd propose to develop a wind farm comprising seventeen (17) No. wind turbines located on privately-owned predominantly agricultural lands in east County Limerick.

Table 1-1 sets out the characteristics of the Proposed Development elements for which development consent is being sought and all other associated Proposed Development components. The location of the Proposed Development is shown in **Figure 1-1** and the layout of the Proposed Development, including the location of the wind turbines is illustrated in **Figure 1-2**.

Table 1-1: Characteristics of the Proposed Development

Proposed Development for which consent is sought	Core Wind Farm Components - Seventeen (17) No. wind turbines (turbine tip height of 160m, and 150m (T6 only)) with associated foundations and crane hardstand areas. - One (1) No. Permanent Meteorological Mast (92m height) and associated foundation, hardstand area and ancillary main crane hardstand area. - One (1) No. Electrical Substation (110kV) including Eirgrid compound, IPP, maintenance compounds, ancillary building, security fencing and all associated works. - Nine (9) No. site entrances. - New and upgraded internal site service tracks (approximately 10.8km of new internal access tracks to be constructed). - New clear span bridge over the Morningstar River. - Underground electric collector cable systems between turbines within the wind farm site. - Underground electric cabling systems between the wind farm site and connection point at existing Killonan 220/110kV substation. Associated Components of the Proposed Development - New temporary access track via R516 to facilitate turbine delivery route located in the townland of Tullovin. - Three (3) No. temporary construction site compounds (one approximately 95m x 50m and two approximately 55m x 25m). - Two (2) No. borrow pits to be used as a source of stone material during construction and for storage of excess excavated materials. - Nine (9) No. permanent and two (2) temporary deposition areas. - Associated surface water management systems. - Tree felling required for wind farm infrastructure.
Other Associated Project Components	- Whooper Swan Management Area works. - Habitat Enhancement Areas works. - Landscaping, fencing and all associated works

A Turbine Delivery Route (TDR) between the Port of Foynes to the proposed development will include temporary works, such as trimming of hedges and relocation of powerlines/poles and signage, along the public road to allow for the delivery of wind turbine components. One section of the turbine delivery route at Tullovin Bridge (approximately 3.3km southeast of Croom, Co. Limerick) is included within the planning boundary as it will require the construction of a short temporary access track on privately-owned agricultural lands to avoid vehicle manoeuvre difficulties at the bridge and the bends either side.

Once operational, the proposed development will be capable of providing an expected Maximum Export Capacity (MEC) in excess 76 Megawatts (MW) of renewable electricity to the National Grid.

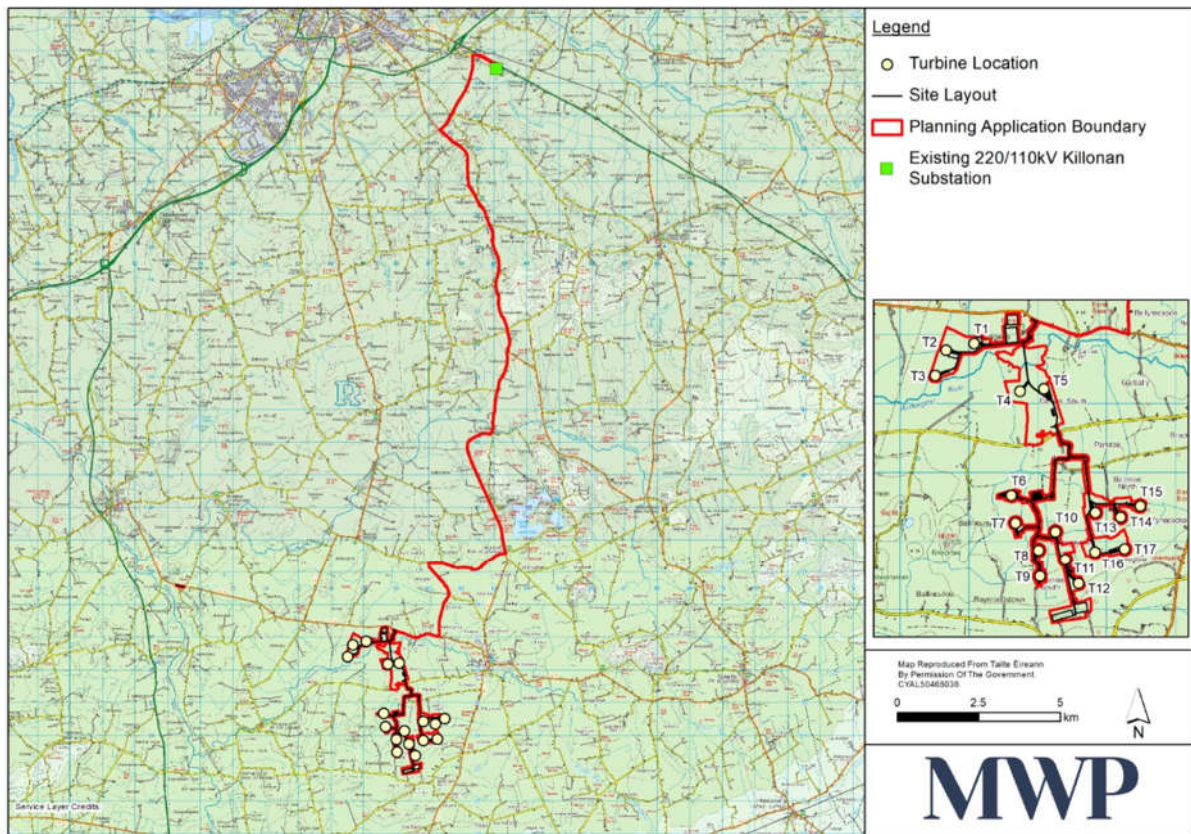


Figure 1-2: Proposed Development Layout

1.3 Site Location

The wind farm site is located in a rural area of east Limerick approximately 18km south of Limerick City and 3km southwest of Bruff. The wind farm site under consideration is located on privately-owned predominantly agricultural lands within the townlands of Ballincurra, Ballinlee South, Ballingayrou, Ballinrea, Knockuregare, Ballinlee North, Carrigeen and Camas South. The site is situated in a rural area characterised by agricultural holdings and one-off residential dwellings. Some patches of forestry plantation occur within the Proposed Development and some on neighbouring properties.

The proposed grid connection route is approximately 27.6km in length from the existing Killonan 220/110kV Substation which is located on the Tipperary Road (N24) East of Limerick City to the proposed wind farm substation.

Access to the wind farm site will be via the Local Road network. The R512 is located to the east of the wind farm site running from Bruff to Kilmallock. The closest National primary road is the N20 located to the west of the proposed development. The main site entrance is via the R516 Regional Road between Croom and Bruff on the north side of the wind farm site. This will be a new entrance close to an existing farm/dwelling entrance along the R516. To facilitate the turbine delivery a new temporary access track is proposed on privately-owned agricultural lands within the townland of Tullovin approximately 3.3km southeast of Croom, Co. Limerick. In total there will be 9 site entrances utilised during the construction phase to facilitate delivery of materials to the site.

1.4 EIA Study Area

The total Proposed Development area (planning application area) is approximately 255 hectares (ha). The EIA study area for the development includes the Proposed Development site, in addition to a wider area over which the various assessments and studies were carried out. Therefore, the study area which is referred to in the figures throughout this EIA incorporates a larger assessment area than presented in the planning application drawings. It will also vary from topic to topic depending on the zone of influence and sensitive receptors being assessed, which is reflected accordingly in each chapter.

2. Description of the Proposed Development

2.1 Overview

It is being proposed by the Applicant to develop a wind farm comprising of seventeen (17) No. wind turbines, sixteen with a tip height of 160m and one (T6) with a tip height of 150m, using the same rotor size of 136m, with associated foundations and crane hardstand areas, located on privately-owned predominantly agricultural lands in east County Limerick.

The Proposed Development includes a 110kV electrical substation onsite for exporting power from the windfarm to the national electricity grid. The proposed substation will include an Eirgrid compound, IPP, maintenance compounds, ancillary building, security fencing and all associated works.

A network of underground cabling serving each turbine with electrical power and signal transmission will be installed between the turbines and the wind farm site and the connection point at the existing Kilonan 220/110kV substation.

A permanent meteorological mast will be erected within the site to monitor the local wind regime while the wind farm is in operation. It will be 92m high (in line with the hub height of the proposed turbines) and located in the southern part of the Proposed development.

2.2 Construction Phase

The Proposed Development duration would be of the order of 18 months followed by a 6-month commissioning period. The start date is dependent on planning being granted, receipt of a grid connection offer from EirGrid, funding and all permits being in place.

Normal construction activities will be undertaken within the hours 07.00am – 07.00pm, Monday to Saturday inclusive. The working day may extend occasionally at times when critical elements of work need to be advanced. Longer working days will occur for concrete pours for turbine bases and for turbine erection works which may spill over into weekends depending on how low wind windows fall. Such activities are limited to the day of turbine foundation concrete pours, which are normally complete in a single day per turbine. Working hours will be confirmed at the outset of the Proposed Development and any changes in hours will be agreed with the Local Authority.

Works along public roads would be from 07.00am to 07.00pm Monday to Friday and 09.00am to 02.00pm on Saturdays.

A permit for moving abnormal loads will be sought from An Garda Síochána for the delivery of oversized wind turbine components (i.e. blades, nacelles and towers).

No work will take place on Sundays or bank holidays unless agreed in advance with the Local Authority.

During the construction phase, the number of on-site construction personnel will vary for each phase of the development. Overall, it is envisaged that the Proposed Development would generate employment for up to 80 personnel including site contractors, engineers, materials delivery personnel, health and safety personnel and the civil works for the cable route will require at least 15 personnel. The electrical works will require less heavy machinery but more labour personnel, with an expected 25 personnel to complete the works. It is likely that both the onsite civil and grid connection works will take place simultaneously.

Primary access to the Proposed Development site will be via the R516 Regional Road between Croom and Bruff on the north side of the site. This will be a new entrance to an existing farm/dwelling along the R516. In total there will be nine (9) site entrances. Entrances One (1 No.) to Seven (7 No.) provide access to the main wind farm site, entrances Eight (8 No.) and Nine (9 No.) are part of the turbine delivery route, avoiding the Tullovin bridge, and both are off the R-516.

During construction works, there will be three (3) No. temporary construction compounds set up. The compound will be used as a secure storage area for construction material and will also contain temporary site cabins to provide welfare facilities for site personnel. The Proposed Development will include an enclosed wastewater management system at the temporary compound capable of handling the demand during the construction phase. A holding tank is proposed at the compound for wastewater management. Upon completion of the Proposed Development the compounds will be decommissioned by backfilling the area with the material arising during excavation and landscaping with topsoil.

There will be three temporary construction compounds:

1. One close to the entrance of the site and the junction for the access track to T1
2. One to the South of T5 (60+m from the west bank of the river)
3. One to the East of the substation site.

There will be two (2) No. proposed on-site borrow pits which have been identified to provide fill material for internal tracks, passing bays, hardstands, foundations, and temporary compounds. It is estimated that these will provide 99,852 m³ (61%) of aggregate material required for the development.

Two (2) No. trial pits were excavated by Northwest Geotech to assess the suitability of the underlying strata at each of the two (2) No. borrow pit locations. Four (4) No. additional trial pits were performed by MWP to refine the location of the Southern Borrow Pit.

A site drainage system will be constructed along all work areas, including all internal site access tracks, storage areas, crane hardstand areas, deposition areas, borrow pit areas and temporary site construction compounds, to attenuate run-off, guard against soil erosion and safeguard downstream water quality.

2.2.1 Production of Waste

It has been calculated that there will be approximately 321,758m³ of material excavated during the construction of the proposed development. Approximately 296,918m³ of soils and subsoils will be generated from excavation works on the windfarm site. This material will be retained on site and reused in bunding, landscaping and localised earthworks. Excess material will be stored on site in designated deposition areas and used to infill the borrow pits. Approximately 24,840m³ will be excavated along the grid connection route. This material will be sent for disposal in a licensed waste facility.

Wastewater from welfare facilities on site will drain to integrated wastewater holding tanks associated with the toilet units. The stored effluent will then be collected on a regular basis from site by a permitted waste contractor

and removed to a licenced waste facility for treatment and disposal. There are licensed, operational wastewater treatment plants in Limerick.

Construction phase waste is anticipated to consist of hardcore, concrete, spare steel reinforcement, shuttering timber and unused oil, diesel and building materials. This waste will be segregated and stored in the construction compound and collected regularly during the construction phases and taken off site to be reused, recycled and disposed of in accordance with best practice procedures at an approved facility. Plastic waste will be taken for recycling by an approved contractor and disposed of or recycled at an approved facility. Domestic type waste generated by contractors will be collected on site, stored in an enclosed skip at the construction compounds and disposed of at an appropriately authorised facility. A list of licenced waste facilities and service providers is provided in the Resource Waste Management Plan (RWMP) (**Volume III, Appendix 2B**).

2.2.2 Emissions and Disturbances

The anticipated residues and emissions likely to be generated during the Proposed Development lifetime are summarised in **Table 2-1**. These environmental effects have been identified and assessed and proposals for management of the anticipated disturbances and/or emissions are presented throughout relevant chapters of this **EIAR**.

Table 2-1: Emissions and Disturbances

Aspect	Potential Emission/Disturbance	Assessment Provided
Air	The main emissions to atmosphere during the construction stage of the Proposed Development is from fugitive dust associated with the following activities: • Groundworks associated with the construction of the Proposed Development infrastructure; • Transportation and unloading of crushed stone around the site; • Vehicular movement over potentially hard dusty surfaces such as freshly excavated and constructed access tracks and crane hardstanding areas; • Vehicular movement over material potentially carried off site and deposited on public roads. The movement of machinery, construction vehicles and the use of generators during the construction phase will also generate exhaust fumes containing predominantly carbon dioxide (CO₂), sulphur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM₁₀).	EIAR Vol II Chapter 10 Air Quality & Chapter 11 Climate
Noise	Traffic flows, excavation, mechanical machinery and electrical equipment proposed to be used for construction projects will generate noise emissions.	EIAR Vol II Chapter 13 Noise and Vibration
Water	There will be no unauthorised discharge of water (groundwater or surface water runoff) to ground, drains or water courses during the construction phase ensuring only clean/uncontaminated water will be released. Pollution sources could arise as a result of soil erosion or from oil/fuel or chemical storage and use. Proposals for management of water quality and quantity from the Proposed Development are	EIAR Vol II Chapter 09 Water & Vol III Appendix 2A CEMP and Appendix 2E SWMP

Aspect	Potential Emission/Disturbance	Assessment Provided
	presented in EIAR Volume III: Appendix 2A: CEMP and Appendix 2E SWMP	
Traffic	The additional traffic, especially heavy goods vehicles associated with the construction phase, has the potential to cause disturbance to those using the local road networks.	EIAR Vol II Chapter 16 Material Assets – Traffic and Transport

2.3 Operational Phase

During the operation of the wind farm, the turbine manufacturer, the Developer or a service company will carry out regular monitoring and maintenance of the turbines and the substation. In addition, operation and monitoring activities will be carried out remotely using a Supervisory Control and Data Acquisition system (SCADA). Routine inspection and preventive maintenance visits will be necessary to ensure the smooth and efficient running of the wind farm. The wind farm has been designed to have an operational life of 35 years and any further proposals for wind farm development at the site after this time will be subject to a new planning permission application.

2.4 Decommissioning

At the end of the estimated 35-year lifespan, the Developer will make the decision whether to apply for permission to repower the wind farm, or to decommission the turbines. Any further proposals for development at the site during or after this time will be subject to a new planning application and will be subject to environmental assessment. If planning permission is not sought after the end of life of the turbines, the site will be decommissioned and partially reinstated with all turbines and towers removed. Removal of infrastructure will be undertaken in line with landowner(s) and regulatory requirements and best practice applicable at the time. The information below outlines the likely decommissioning tasks based on current requirements and best practice.

Prior to the decommissioning work, the following will be provided to LCCC for approval:

- A plan outlining measures to ensure the safety of the public workforce and the use of best available techniques at the time; and
- A comprehensive reinstatement proposal, including the implementation of a programme that details the removal of all structures and landscaping.

If the site is to be decommissioned, cranes of similar size to those used for construction will disassemble each turbine. The towers, blades and all components will then be removed and recycled as appropriate.

At present it is anticipated that underground cables connecting the turbines to the substation will be cut back and left underground. The cables will not be removed if an environmental assessment of the decommissioning operation demonstrates that this would do more harm than leaving them *in situ*. The assessment will be carried out closer to the time to take into account environmental changes over the duration of the proposed development.

The underground electric cabling systems between the wind farm site and connection point at existing Killonan 220/110kV substation will remain in place as it will be under the ownership of ESB/EirGrid and will operate as an asset to the National Grid going forward.

Hardstand and turbine foundation areas will be left in situ and covered with soil to match the existing landscape. Access tracks will be left for use by the landowners.

Wastes generated during the decommissioning phase will be taken off site and disposed of at an authorised waste facility. Any materials suitable for recycling will be disposed of in an appropriate manner.

2.5 Cumulative Assessment

The Proposed Development was considered in combination with other relevant plans and projects that could result in cumulative effects.

A desk study was undertaken to identify other existing and proposed projects with which significant cumulative effects could plausibly occur with the proposed Ballinlee Wind Farm, substation and grid connection development. Publicly available information on existing developments and land uses, and/or approved developments (collated from planning applications and relevant development plans) were considered for each of the environmental topics included in this EIAR, to identify whether there was any potential for cumulative/in combination effects with the proposed development. The key criteria for this scoping exercise included consideration of the types of potential effects associated with the proposed development, common resources affected, receptors impacted, project timeframes (where available) and scale of development. For more information see EIAR, **Volume II, Chapter 01 Table 1-4 , 1-5 and 1-6** which sets out the types of projects identified and considered as part of the cumulative appraisal for each of the specific environmental assessment included in this EIAR.

2.6 Risk of Major Accidents and Disasters

Given the temporary nature of the construction stage and the scale of the proposed development, as well as the environmental protection measures that will be implemented from the outset, the risk of disasters (typically considered to be natural catastrophes e.g., very severe weather event) or accidents (e.g., fuel spill, traffic accident or peat slide) is considered low.

A high-pressure GNI pipeline crosses both the northern and southern sections of the wind farm site boundary. GNI have been consulted, and all works in proximity to pipelines will be undertaken in strict compliance with GNI requirements. Setback distances will be maintained, and any crossing works will be supervised and agreed with GNI. This will ensure that the risk of accidental strike or leakage is minimised.

The northern area of the site is at risk from fluvial flooding from the Morningstar River and its tributaries however a flood risk assessment has been completed and the site designed so that both the risks to the development are minimised and the proposed development will not have an adverse impact on flooding elsewhere.

In the case of the occurrence of a severe weather event such as flooding during construction, construction work will temporarily cease.

2.7 Impact of Climate Change

There is potential for the Proposed Development to be impacted by severe weather including increased wind and storms due to climate change. However, wind turbines are designed to withstand extreme weather conditions with brake mechanisms installed within the turbines so that they only operate under specific wind speeds and will shut-down during high wind speed events. Therefore, there is very low risk to the Proposed Development from high wind speeds.

Flood risk is considered in **Volume III, Appendix 9B** and summarised in **Chapter 09** of this EIAR. Whilst there is potential for fluvial flooding from the Morningstar River and its tributaries, particularly in the northern part of the

project area, the Proposed Development has been designed to ensure that there is no unacceptable flood risk and no adverse impact on flooding elsewhere. Measures include;

- Raising access tracks and hardstands sufficiently to prevent flooding for relatively frequent events while also allowing flow to overtop the track for more extreme events.
- Installing opening/culverts within the internal access tracks to ensure water can still flow across the floodplain
- Raising the turbines and substations above likely flood levels.

2.8 Alternatives Considered

The consideration of Alternatives is a mandatory part of the EIA process. The legal requirements of the 2014 EIA Directive, relating to the assessment of Alternatives, are set out in Article 5(1)(d) and Annex IV point 2 of the Directive.

During the Proposed Development design process alternative wind farm layouts and scales were fully considered in order to find the optimum design solution for the site with the least level of environmental impact. The Consideration of Alternatives chapter (**Chapter 03** of this **EIAR**) therefore outlines the site selection process, the process of design evolution for the proposed development, the reasonable alternatives considered during the Proposed Development inception and design process including a comparison of the environmental effects and the principal reasons for proceeding with the current planning application. The following elements are considered further in the chapter:

- Site Selection;
- Proposed Development Design Process; and
- Alternatives Considered.

The Proposed Development has been designed to minimise potential environmental impacts and to maximise wind potential on site.

The wind farm has been designed following a step-by-step EIA process which informed and identified the buildable areas suited to turbines, tracks and infrastructure based on avoidance of unsuitable areas and following the good practice of mitigation by design. More details on the Proposed Development design and evolution can be read in **EIAR Volume II Chapter 02** Description of the Proposed Development and **Chapter 03** Consideration of Alternatives.

The final site layout or final alternative was determined based on multi-discipline inputs and consideration of topography, biodiversity, land and soils, hydrology, landscape, and engineering constraints and assessments. The development as proposed is the preferred option as it results in the least effects on resources and receptors while meeting the Proposed Development objectives of a large-scale renewable wind energy development.

3. Environmental Assessment

This **EIAR** has been carried out in accordance with the relevant legislative requirements and guidelines, including the Environmental Protection Agency (EPA) - 'Guidelines on Information to be Contained in an Environmental Impact Assessment Reports, 2022'. Specialist guidance as required for each of the environmental topics has also been used where appropriate.

A summary of each prescribed environmental factor considered in this **EIAR** is outlined in the following sections.

3.1 Population and Human Health

The scope of the Population and Human Health assessment considers the effects of the construction and operation of the Proposed Development in terms of how the proposal could affect economic activity, employment, land use, amenities and tourism, and health.

The Proposed Development is located in a rural area of east Limerick, approximately 18km south of Limerick City, on privately-owned predominantly agricultural lands within the townlands of Ballincurra, Ballinlee South, Ballingayrou, Ballinrea, Knockuregare, Ballinlee North, Carrigeen and Camas South.

The Proposed Development is located approximately 18km south of Limerick City, the largest urban area in the vicinity. Other towns and villages surrounding the Proposed Development include:

- Bruff – c. 3km to the east
- Athlaca – c. 3.6km to the west
- Killmallock - c. 5.2km to the south
- Bruree - c. 5.5 km to the southwest
- Fedamore - c. 6.6km to the north
- Croom - c. 8.3km to the northwest
- Knockainey - c. 8.6km to the east
- Herbertstown - c. 9.2km to the northeast
- Hospital - c. 10.2km to the east
- Knocklong - c. 11.4km to the southeast
- Charleville - c. 12km to the southwest
- Kilfinane - c. 12.4km to the south
- Limerick City – c. 18km to the north

The settlement pattern in the vicinity of the Proposed Development (within 1.5km of each proposed turbine position) is characterised by dwellings and farm buildings located mainly along the public roads, with some dwellings (older and newer) located down long private lanes. The land on which the Proposed Development is located consists predominantly of agricultural land within a rural setting.

Settlement patterns in the greater region range from small to medium community settlements and relatively isolated farmsteads. Charleville, approximately 12km to the southwest, is the largest town within the vicinity of the proposed development, with a population of 3,970 recorded in 2022. The town is a provider of major services and employment in the area and provides high quality transport connections via access to the N20, and Charleville train station. Other services include large retail shops, education for primary and secondary, access to a Further Education and Training facility, medical and childcare facilities, and sport and community clubs, such as Charleville GAA.

Smaller population centres in the general locality are the towns of Bruff, Croom and Killmallock. These towns provide a range of local community facilities, including primary schools, sporting clubs, churches, general shops, and post offices to those residents in the vicinity. Smaller villages in the area include Hospital, Knocklong, Knockainey, Kilfinane, and Herbertstown, and provide some small-scale services such as local shops.

There are no recreational amenities located within the boundary of the Proposed Development and therefore impacts are not expected during the construction phase of the Proposed Development however there are number of recreational amenities in the wider area. Lough Gur is a horseshoe lake near Bruff, located approximately 5km

northwest of the Proposed Development and is part of the Wild Atlantic Gateway and Ireland's Hidden Heartlands tourism experiences. The Kilfinane Outdoor Education Centre is approximately 12km southeast of the proposed development. Knockfierna Famine House and Trail is approximately 15km west of the Proposed Development and Ballyhoura is 15km to the south.

Given that there are currently no tourist attractions specifically pertaining to the Proposed Development site there are no direct impacts associated with the construction phase of the Proposed Development.

During the construction phase of the Proposed Development, approximately 80 people will be employed over a 24-month construction phase which will have a direct, positive, short-term to temporary and moderate impact on employment in the local area.

Construction activities can cause a nuisance to the local community and are likely to pose temporary minor disturbances locally. The most notable of these disturbances relates to the generation of additional traffic on the local networks. Here noise and safety implications are also a concern. However, disturbances associated with the additional volumes of traffic will principally be confined to the construction phase and will cease on completion of works. The construction phase will be managed to minimise the impact on the human environment and the local residents. Dust and noise impacts from construction works are not expected to cause a significant effect, with the implementation of mitigation measures. No significant adverse effects on the local human environment are expected.

The operation phase of the Proposed Development is not expected to present any adverse effect on the human environment. With the implementation of mitigation measures, shadow flicker effects associated with the operational phase will be eliminated at receptors. Given the set back distances from turbines to residences the noise effects from the turbines will not exceed the guideline limits and will not be significant.

The visual factor of the developments is perhaps the most intrusive aspect. Given the size of the turbine structures and their proposed position within a relatively flat landscape, a visual consequence is unavoidable. The extent of intrusion will vary in degree and significance according to viewing distance, the numbers and parts of turbines visible, the number of viewers affected and of course public perception.

The production of electricity by wind energy is environmentally friendly and thus prevents risk of air pollution and risk to human health.

In relation to the local community, with community Benefit Fund Guidelines, governed by the Sustainable Energy Authority of Ireland (SEAI), and based on the current Proposed Development scope, Ballinlee Green Energy Ltd. will generate a Community Benefit Fund of approximately €350,000 per annum for the local area within the first 15 years, which will result in a positive, moderate, long-term economic benefits on the local area.

3.2 Biodiversity

The biodiversity of the Proposed Development site and environs is described in terms of designated sites, habitats, flora, fauna and biological water quality. Mitigation measures are specified to ensure that significant effects on these features do not occur. Studies and reporting were in line with best practice and recently produced guidance. The information on the existing environment was obtained using publicly available information sources and by field surveys.

A Natura Impact Statement (NIS) report which considers the potential impacts on the integrity of the relevant Natura 2000 sites of the proposed development, either alone or in combination with other plans or projects, with respect to the Conservation Objectives of Natura 2000 sites in question, has been prepared as a standalone document in the planning application.

The main development site is mapped by the EPA (EPA, 2025) to be within the Shannon Estuary South Water Framework Directive (WFD) Catchment (Catchment I.D.:24) and the Mague_SC_030 WFD Sub-Catchment (Sub-Catchment I.D.:24_17). The Shannon Estuary South WFD Catchment includes the area drained by the River Deel and Mague River, and all streams entering tidal water in the Shannon Estuary between Kilconly Point and Thomond Bridge, Limerick, draining a total area of 2.033km².

The route of the proposed grid connection is mapped by the EPA (EPA, 2025) to be within the Shannon Estuary South WFD Catchment (Catchment I.D.: 24) but will also cross the Ballynaclogh_SC_010 and Shannon [Lower]_SC_090 WFD Sub-catchments. The route of the proposed grid connection is also mapped by the EPA as transecting the Ballycullane (Limerick)_010, the Camoge_020, the Ballynaclogh_010, the Whitehall_010, and the Groody_010 WFD River Sub Basins. The proposed grid connection route directly crosses the Camoge River and crosses the minor headwater streams/drainage channels contributing to the Groody River. The Camoge crossing will require horizontal directional drilling as the existing road bridge is a protected structure.

The Natura Impact Statement (NIS) concluded that with the full implementation of the mitigation measures, in view of best scientific knowledge and in view of the conservation objectives of these European sites, the Development will not have any adverse effects on the integrity of any European sites, the Development will not have any adverse effects on the integrity of any European sites, either alone or in-combination with other plans or projects (for more details see NIS).

Potential sources of direct effects during the construction phase include:

- Permanent habitat loss and clearance of vegetation;
- Removal of soil and rock for access tracks, hardstands and turbine bases;
- Permanent habitat loss and clearance of hedgerows and treelines around turbines to implement 50m bat feature buffers;
- Temporary habitat loss for the creation of temporary infrastructure such as construction compound, blade set-down areas and crane pads;
- Permanent loss of nesting/roosting/resting places due to habitat loss and vegetation clearance;
- Permanent habitat loss and vegetation removal along the TDR; and,
- Excavation of trenches for cable ducting and storage of materials along the GCR.

The operational phase of the Proposed Development will not involve any additional removal of habitat nor any point source discharges, and there will be no other material releases that would cause adverse effect on surface waters. Wind turbines, and their associated equipment, use lubricating and insulating oils in a closed system.

Overall, the impacts of decommissioning a wind farm are potentially similar to construction impacts and will comprise temporary disturbance such as noise associated with decommissioning of turbines and on-site machinery.

General best practice construction mitigation measures will be followed, including working according to a CEMP, a draft of which has been prepared. A Surface Water Management System forms an integral part of the project design as do a suite of avoidance measures including buffers and set back distances from watercourses, ecologically valuable habitats and designated sites. The works will be supervised by an Ecological Clerk of Works (EcoW) who will review all method statements and monitor the construction phase to ensure that all environmental controls and mitigation are implemented in full. The project ecologist will be awarded a level of authority and will be allowed to stop construction activity if there is potential for adverse environmental effects.

It is considered that the effects on important Ecological Features from potential construction, operation and decommissioning impacts will be avoided, reduced and mitigated sufficiently to ensure that no likely significant effects remain, with the full implementation of the ecological mitigation measures including:

- Replacement of hedgerows (including those with trees), scattered trees and scrub, removed to facilitate the Development. A total of c. 3970.1 m of hedgerow is proposed to be replanted within the Planning Application Boundary, resulting in a net gain of 2390.6 m.
- Planting of approximately 1.74 ha of native woodland in an area south of Turbine 5 which will increase the amount of woodland habitat within the site
- Creation of ponds and wetland meadow habitat will be for the purposes of providing breeding habitat for amphibians, including common frog and smooth newt.

3.3 Ornithology

Baseline ornithological surveys were conducted over a three-year period from October 2021 to September 2024, in accordance with NatureScot (2017) guidance. Survey areas were determined by the 'viable area' at the time of surveys, and a suitable buffer in line with NatureScot (2017) guidance. The viable area was defined as any land where turbines could potentially be located, and an additional 500m buffer. Survey Areas were therefore as follows:

- Vantage Point Watch Survey Area – The viable area;
- Breeding Bird Survey Area – The viable area;
- Crepuscular/Dusk Survey Area - The viable area;
- Breeding Raptor Survey Area – The viable area and a 2 km buffer;
- Barn Owl Survey Area - The viable area and a 1 km buffer;
- Winter Walkover Survey Area - The viable area;
- Wintering Waterbird Survey Area - The viable area and a 5 km buffer;
- Hen Harrier Roost Survey Area - The viable area and a 2 km buffer;
- Whooper Swan Survey Area - The viable area;
- Whooper Swan Roost Survey Area – Covering Lough Gur and known foraging locations.

During the construction phase, potential effects on avian assemblages will arise from vegetation removal, habitat loss and disturbance to facilitate construction of site access tracks, turbine bases, hardstand areas, temporary construction compounds and the proposed Ballinlee Substation. The potential for significant effects on Important Ornithological Feature's (IOF's), including those that may be seasonally sensitive, through habitat loss has been assessed as part of the development. Construction phase effects associated include tree and hedge trimming or removal, the construction of internal site access tracks and other temporary infrastructure, as well as the potential for water quality deterioration through sedimentation and pollution of local watercourses.

Operational adverse effects are considered as those resulting from the operation of the proposed development, including operational turbines, and turning blades, maintenance of built infrastructure, and operation of the proposed Ballinlee substation. The proposed operational lifespan of the wind farm is 35 years.

Potential effects on ornithological features during the decommissioning phase are anticipated to be broadly similar in nature to those experienced during the construction phase, albeit generally of reduced magnitude and duration.

This assessment considers the potential cumulative effect on IOFs recorded at the Development. The analysis follows a 20 km radius study area in accordance with the Wind Energy Development Guidelines (2006) and the

Draft Wind Energy Guidelines (2019), focusing on developments either in planning, construction, or operation phases. Emphasis is placed on potential cumulative effects that may arise from habitat loss and fragmentation, disturbance/displacement from construction and operation water quality degradation from hydrological connectivity

Key management mitigation measures during the construction phase include:

- **Hedgerow protection:** Existing hedgerows will be retained wherever feasible and buffered by a minimum of 5 m to prevent encroachment. No cutting or disturbance will occur between 1 March and 31 August unless required for safety and only following ecological inspection.
- **Ecological supervision:** All works near hedgerows will be monitored by a qualified ecologist to safeguard nesting birds, roosting bats, and other protected species.
- **Surface Water Management:** Maintenance of Sustainable Drainage Systems (SuDS), including attenuation ponds, vegetated swales, and silt traps, will be implemented to prevent sediment and pollutants from entering the Morningstar River system and connected Special Protection Areas (SPAs).
- **Pollution Control:** Spill kits will be available on-site along with trained personnel following established pollution response protocols. Regular water quality monitoring will be undertaken to protect bird habitats designated as Sites of Community Importance (SCI).
- **Water quality protection:** Measures such as silt fencing, buffer zones, and restrictions on in-stream works during sensitive periods will be implemented alongside the pollution prevention plans.
- **Disturbance Minimisation:** Routine maintenance activities will be scheduled to avoid sensitive periods for wintering species such as lapwing and golden plover. All activities will be confined to designated tracks to avoid prolonged disturbance near sensitive habitats.
- **Nest Protection:** Vegetation management during the bird breeding season will only proceed following thorough surveys confirming the absence of nesting birds. This approach is in compliance with the Wildlife Acts 1976 to 2012 (as amended) and relevant provisions of the EU Birds Directive transposed into Irish law.
- **Decommissioning safeguards:** The decommissioning phase will incorporate adapted versions of all relevant construction-phase mitigation measures. A detailed decommissioning plan, to be submitted to Limerick City and County Council, will include site-specific ornithological safeguards and adhere to best environmental practice.

Operational mitigation measures are generally less severe than during construction and include habitat restoration and maintenance, Whooper Swan-Specific Mitigation (**Volume III, Appendix 7D**) such as targeted curtailment of turbines during high-risk periods, continued annual ornithological surveys and Whooper Swan monitoring.

The likely effects identified during the construction phase that are also relevant to the decommissioning phase will be addressed through the implementation of similar mitigation measures, updated as necessary to reflect best practice at the time of decommissioning.

3.4 Land and Soils

An impact assessment was carried out to determine whether the Proposed Development is likely to have a significant adverse effect on land and soils and to propose mitigation measures to reduce any potential adverse impact.

The proposed wind farm location is rural in nature, with landcover comprising mainly agricultural land, farm holdings and residential dwellings. The topography of the area is relatively flat with elevations ranging between

49 to 79m AoD (Above Ordnance Datum). Current land use at the proposed wind farm is predominately improved grassland area (see Figure 3-1).

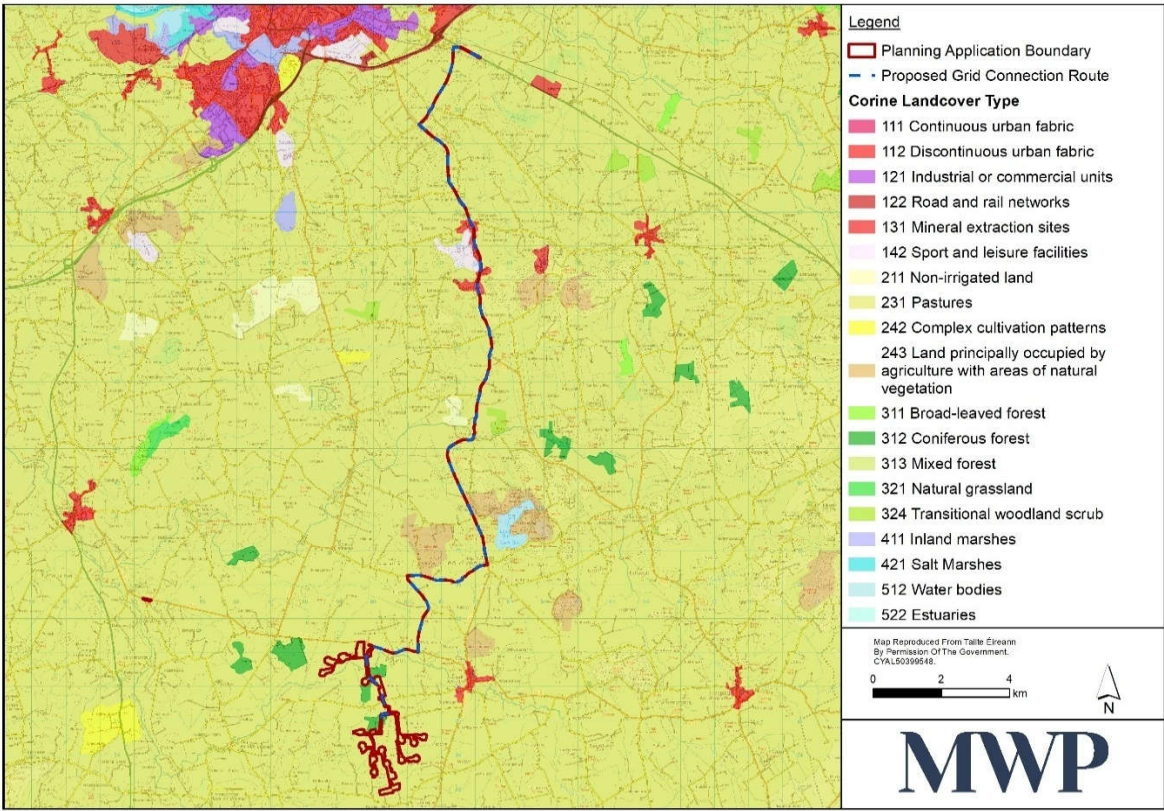


Figure 3-1: Corine 2018 Land Cover Mapping

The lithology of the rock within the subject site is comprised primarily of limestone known as the Ballysteen Formation, with a typical thickness of 100-200m. Waulsortian limestone is also present within the site. The Waulsortian Limestones rest on the Ballysteen Formation with a thickness of the rock in the region of 300-500m.

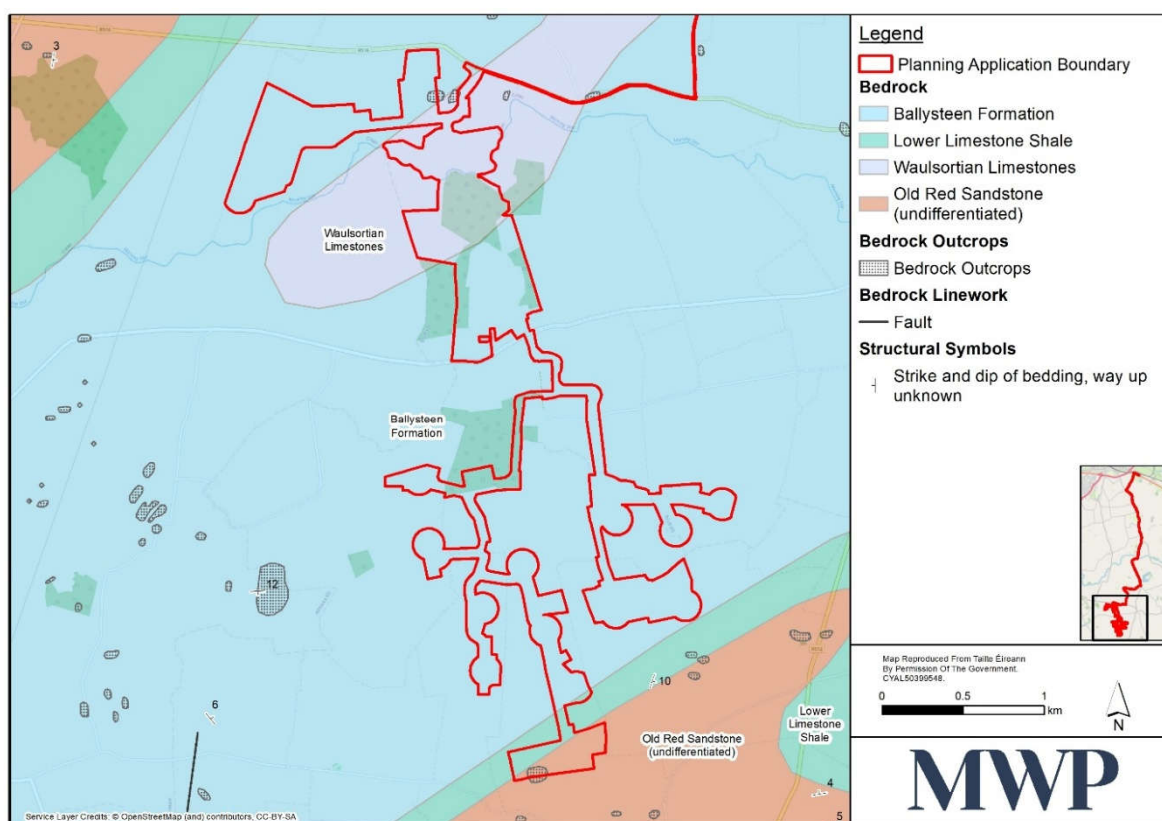


Figure 3-2: Bedrock Geology of subject site (Source GSI)

The construction of the Proposed Development will involve the removal of soil, subsoil, bedrock, and some forestry and hedgerows. Where possible, these materials will be reused on site for landscaping and reinstatement. Additional materials, such as rock, sand, gravel, and concrete needed for roads, hardstands, and substations, will be sourced from authorised local suppliers.

Excavation will also take place along the grid connection route. These works will cause temporary disruption to some sections of public road, but the majority of the soil removed will be reinstated afterward.

To prevent any significant environmental effects from soil disturbance, erosion, or pollution, a number of specific mitigation measures will be put in place. These include:

- Installing drainage systems and sediment control measures (e.g. silt traps, swales and settlement ponds). These systems will manage water runoff safely, especially after heavy rainfall, and will be monitored regularly.
- Storing any excess soil in designated, engineered areas on-site
- Using bunded storage areas for fuel and other hazardous materials to avoid contamination

A Traffic Management Plan (TMP) has been prepared to minimise the number of heavy vehicles on-site at any one time, reducing the risk of soil erosion and compaction.

In areas where forestry is removed, surface water runoff will be managed in the same way as other disturbed areas. On softer ground, brash mats (layers of tree material) will be used to support vehicles and prevent rutting and erosion.

Once the wind farm is operational all maintenance traffic will use existing or newly built access roads, and activity will be much lower than during construction. As vegetation re-establishes on the site, the risk of erosion, runoff, and sedimentation will be significantly reduced.

The same safety measures for handling oils and fuels will remain in place during operation, but the overall risk will be much lower due to reduced activity.

At the end of the wind farm's life, the land will be reinstated so it can return to agricultural (pastoral) use.

With all proposed mitigation measures in place, the assessment concludes that there will be no significant long-term effects on land, soils, or geology during construction, operation, or decommissioning.

The assessment also looked at the potential for cumulative effects from other nearby developments and found no additional significant effects when all projects and mitigation are taken into account.

3.5 Water

An impact assessment was carried out to determine whether the Proposed Development is likely to have a significant adverse effect on the hydrological and hydrogeological aspects of the environment and to propose mitigation measures to reduce any potential adverse impact of the proposed wind farm. The assessment was based on information obtained from the Geological Survey of Ireland, the EPA; the Water Action Plan 2024, site inspections, assessment of surface water quality and a detailed flood risk assessment.

The main hydrological feature is the Morningstar River which flows west to northeast across the site. Minor streams generally flow perpendicular to the Morningstar River. Listed from east to west these are the Killorath Stream, the Rathcannon Stream, the Ballinlee South Stream, the Ballinrea Stream, the Ballingayroun Stream, and the North Ballinlee Stream. The Morningstar River ultimately confluences with the Mague River approximately 5.8km west of the site at its closest point. The Proposed Development will require new crossings of all watercourses within the main development site with the only exceptions being the Killorath and Ballinlee South streams.

The bedrock beneath the site comprises dark, muddy limestone and shale, and is classified as a Locally Important Aquifer that is productive only in local zones.

During the construction period, the Proposed Development has the potential to lead to effects on hydrology and water quality unless appropriate mitigation is applied. New internal road construction will be required to provide access to all 17 turbine locations, meteorological mast and the substation location. The surface water run-off drainage system will be implemented along all internal access routes, to separate and collect 'dirty water' run-off from the roadway and to intercept clean over land surface water flows from crossing internal roadways.

During the operational phase, the main potential hydrological impact of the development is a slight increase in run-off from a storm event to the streams within the site due to a minor decrease in ground permeability at the turbine hardstands and substation. The potential effects associated with decommissioning of the Proposed Development will be similar to those associated with construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works.

On implementing identified mitigation measures, the Proposed Development will have an adverse, not significant temporary and residual impact on hydrology, surface and groundwater during the construction stage. It will have an adverse, not significant, long term residual impact on hydrology during the operational stage and will have a neutral, imperceptible, long term and indeterminable impact on surface and groundwater quality during the operational stage.

3.6 Air Quality

The potential effects of the Proposed Development on local air quality have been assessed as part of this EIAR and the effects of construction, operation and decommissioning have been considered.

Representative Environmental Protection Agency ambient air quality data has been used to characterise the existing air quality in the area. The nearest available data from air quality stations to the Proposed Development is at People's Park, Limerick city centre, which is located approximately 20km to the northwest of the Proposed Development site. This station monitors Particulate Matter (PM10 and PM2.5) and Nitrogen Dioxide (NO₂) and is located in an Urban Area. The average concentrations, recorded on 25th June 2025, for a 24 hour period are as follows: NO₂ – 6.69 µg/m³, PM10 12.77 µg/m³ and PM2.5 – 7.31 µg/m³. The People's Park station updates daily with the calculated Air Quality Index for Health (AQIH). On 25th June 2025, the air quality index characterised by this station was classified as '1-Good'.

In terms of air quality, the greatest likelihood of effects during the construction stage will be from dust emissions associated with the construction works. The key works likely to be associated with dust emissions include earthworks and excavation activities, construction of hardstanding areas and movement of vehicles on and off site. Dust emissions during the decommissioning phase will be lower than the construction phase given that there is no need for excavations. Earthworks will primarily involve excavation, haulage, tipping, landscaping and stockpiling.

For the Main Wind Farm construction works, the total area of site construction works is over 10,000m² therefore the dust magnitude for earthwork activities associated with the Main Wind Farm area can be classified as large. With respect to dust soiling, human health and ecological effects from the main wind farm earthworks, the risk of dust effects prior to mitigation is low.

For the grid connection works, total area of site works is over 10,000m², therefore the dust mitigation for earthwork activities associated within grid connection works can be classified as large. With respect to dust soiling and human health effects the risk of dust effects from earthworks, prior to mitigation is considered medium. With respect to ecological effects from grid connection works the risk of dust effects from earthworks prior to mitigation is low.

It is not expected that any adverse effects to air quality will occur during the operational phase and therefore no mitigation measures are required.

3.7 Climate

The potential effects of the Proposed Development on climate have been assessed as part of the EIAR and the effects of construction and operation have been considered. Decarbonisation is critical to reducing rising global temperatures and the resultant adverse effects to the Planet and its occupants.

The Proposed Development wind farm will facilitate decarbonisation objectives at local and national levels as set out in the 2023 National Climate Action Plan and the 2022-2028 Limerick Development Plan which states that Limerick City and County Council will facilitate the development of energy sources which will achieve low carbon outputs.

It is not expected that any adverse effects to climate will occur during the operational phase and therefore no mitigation measures are required.

There will be some CO₂ losses associated with the turbine life (manufacture, construction and decommissioning), and the disruption of the natural on-site natural CO₂ sink resources. However, this will be quickly repaid once the wind farm is operational. The calculated payback CO₂ period is 0.8 years.

Once operational, there will be no direct emissions to the atmosphere from the Proposed Development. The electricity generated will displace electricity that would otherwise have been generated by burning fossil fuels. The Proposed Development wind farm will assist Ireland's CO₂ reduction commitments under the Paris Agreement as well as facilitate decarbonisation objectives, at local and national levels as set out in the National Climate Action Plan 2023 and the 2022-2028 Limerick Development Plan. The Limerick Development Plan (Renewable Energy Designation) has designated the site as a strategic and acceptable in principle area for wind energy generation.

Overall, Ballinlee Wind Farm is fully aligned with current energy and climate policy, aims and objectives, which primarily seek to increase the production of electricity from renewable sources.

3.8 Landscape and Visual

The proposed wind farm which includes up to 17 turbines (Turbine tip height of 160m and 150m (T6 only)) and associated infrastructure lie within the townlands of Ballincurra, Ballinlee South, Ballingayrou, Ballinrea, Knockregare, Ballinlee North, Carrigeen and Camas South, approximately 18km southeast of Limerick City and 3km southwest of Bruff, Co. Limerick.

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right, and on people's views and visual amenity. The significance of the effect is a judgement based on the sensitivity of the receptor, combined with the magnitude or degree of change. This process is the same for landscape and visual effects. The assessment of landscape and visual effects included a desktop study, review of the Proposed Development drawings and visualisations, and a number of site visits.

The landscape effects of the Proposed Development were considered in the context of the site and immediate vicinity, and the effects on the wider landscape. It is considered that the Proposed Development will have a modest physical effect on the landscape within the site, with land disturbance being localised and relatively limited. Disturbance to existing vegetation to accommodate the TDR (Turbine Delivery Route), and the required access tracks and turbine hardstand areas will largely relate to vegetation that is not readily discernible from locations beyond the immediate locality. Whilst there will be some long-term/permanent construction phase effects on the physical landscape, these are localised in extent. Excepting some residually useful access tracks, all other development features will be removed from the site, and the land reinstated/restored. The below-ground concrete associated with turbine bases will not be removed as this would generate potentially greater environmental effects than leaving it in-situ under the prevailing land cover. As such, the construction phase landscape effects of the development are substantially reversible at decommissioning.

3.9 Noise and Vibration

The assessment of environmental noise effects requires that noise emissions of any Proposed Development are compared with the existing 'background' noise levels. Existing conditions are typically measured by means of a noise survey and the expected noise emission levels are predicted by calculations.

Noise emissions from wind turbines require more comprehensive analysis due to the fact that their noise emission levels vary with wind speed and wind direction. The assessment is further complicated as the background noise levels also changes as wind speed increases (due to factors like wind-induced noise in foliage).

Wind Energy Development Guidelines (2006) issued by the Irish Department of Housing, Local Government, and Heritage provide a framework for wind energy development in Ireland. The guidance addresses aspects such as shadow flicker, community engagement and grid connections and sets noise limits with the aim of balancing wind energy development with the well-being of communities and the environment.

A summary of the operational noise limits from this guidance is as follows:

- During the **Daytime**, the noise limit is 45dB or 5dB above the background (whichever is higher); and
- During the **Night-time**, the noise limit is 43dB or 5dB above the background (whichever is higher).

In relation to schools, the Department of Education and Skills (DoES) guidance document *SDG 02-05-03 Acoustic Performance in New Primary & Post Primary School Buildings* recommends a limit for Indoor Ambient Noise Levels (IANLs) of 35dB for classrooms. It states that this can be achieved without additional treatments if the external noise level is no more than 51dB. Evidently the criteria for residential locations is considerably more stringent.

The noise assessment of the proposed Ballinlee Wind Farm has been comprehensively evaluated following best practice, national and international guidance and methodologies for the construction, operational and decommissioning stages.

A thorough background noise survey was conducted to quantify the current conditions at representative locations over the operational wind speeds of the turbines. The construction/demolition programme has been assessed at all stages and the operational noise levels carefully predicted, including the cumulative effects of other developments. A conservative, worst-case approach was adopted throughout the assessment, and suitable uncertainty factors considered.

It was demonstrated that the construction/demolition phases will result in short-term elevated noise levels at the closest dwellings. Nevertheless, a comprehensive range of mitigation measures will be deployed to minimise any adverse impact.

The design of the site layout, the type of turbines and the intervening topography is such that the predicted operational noise levels of the wind farm are not expected to exceed the *Wind Energy Development Guidelines'* daytime or night-time noise limits.

In addition, suitable monitoring and mitigation measures are available to assess the actual noise impact were the scheme to proceed and thus ensure compliance.

3.10 Archaeology and Cultural Heritage

The assessment was completed using a combination of: (1) desk-based assessment of available archaeological, historical, cultural and cartographic sources; (2) field inspections of the limits of the Proposed Development site in January 2022, July 2022 and April 2025; (3) inspection of the proposed substation site in May 2024 and (4) inspection of the proposed grid cable route in March 2025.

There are no National Monuments in State Ownership / Guardianship situated within EIAR study area. There are thirty-four National Monuments situated within the 10km of the proposed Ballinlee Wind Farm, the assessment of these National Monuments was undertaken within a 10km study zone to establish potential cultural visual impacts (CVI's). The assessment outside of 10km radius zone was not considered as possible CVI's would be classified as *not-significant*, even if the turbines were visible from these locations.

Indirect effects, in terms of archaeology, architectural and cultural heritage are considered to be those effects which happen away from development site. This includes effects on visual setting of any cultural heritage asset in the wider landscape. Since these visual effects are only possible once turbines are constructed, they are considered operation effects. No indirect effects were identified which would occur at the construction phase.

Direct effects refer to a physical effect on archaeological and cultural heritage monuments, features or sites during the construction phase. Construction phase of the Proposed Development will consist of ground disturbance including topsoil removal and excavation of cable trenches. No National Monuments in State

Ownership/Guardianship are located within or adjacent to the proposed planning boundary, proposed Grid Connection route or directly along the proposed Turbine Delivery Route. A number of archaeological sites associated with the Lough Gur national monument complex are situated in close vicinity of the grid route and therefore there is potential for physical effects to previously unrecorded features or sites.

There are over 30 recorded monuments situated within the primary EIAR study area of which 10 are located within the planning boundary. None of these monuments are directly situated on the footprint of the Proposed Development and consequently there will be no direct physical effect to any of these recorded monuments during the construction phase. There are six recorded monuments within the 120m wide assessment corridor of the proposed Grid Connection Route. Five of the six monuments are situated in the vicinity of the grid connection route and one (Bridge LI023-063002) is located directly on the footprint of the proposed cable route. The potential physical impact to the Bridge is classified as high and, in that context, it is recommended that horizontal directional drilling (HDD) be undertaken to mitigate effects.

There are no Recorded Monuments situated directly on the proposed TDR. There are however two sections of the route (pinch point 10 & 11) where turbine delivery crosses the ZON of Croom Historic town LI030-025001. Analysis of these enabling works show that there will be no physical impact to any recorded monuments within Croom town and consequently potential physical impact is classified as 'not significant'.

During the operational phase, no direct effects will occur. Any likely direct effects will occur at the construction phase of the Proposed Development. Indirect visual impacts of the proposed turbines on all national monuments within 10km distance of the proposed turbines is classified from 'slight' to 'moderate'. The proposed turbines may not be visible from all monuments due to surrounding vegetation/buildings. For recorded monuments over 30 are within the EIAR study zone of which five are upstanding and visible from the ground level. The other monuments are levelled, not noticeable or fully excavated. Field inspection revealed that there is no public access to any of the recorded sites within the EIAR study zone and in that context potential visual impact is classified from 'slight' (to the upstanding monuments) to 'not significant' (to monuments not visible on the ground)

There are no archaeological effects anticipated in the course of the de-commissioning of the proposed turbines. Potential subsurface archaeological issues will have been adequately resolved by the mitigation measures in advance of constructions phase of the proposed development, i.e. pre-development testing and archaeological monitoring of ground works associated with the construction phase of the wind farm development.

An assessment of cumulative effects taking into consideration proposed developments within 25km of the Proposed Development including all permitted and existing turbines has been undertaken. When considered cumulative effects on the wider setting of cultural heritage assets is 'not significant'. The proposed mitigation of licensed archaeological monitoring and testing, no cultural heritage residual effects are anticipated.

3.11 Shadow Flicker

In terms of the overall Proposed Development, shadow flicker relates solely to the operational wind turbines. Shadow flicker is defined as the alternating light intensity produced by a wind turbine as the rotating blade casts shadows on the ground and stationary objects, such as the window of a residence. Shadow flicker can only occur if there is an unobstructed direct line of sight from within a dwelling to a turbine.

No flicker will occur when the turbines are stationary or when the sun is obscured by clouds or fog, or if blinds or curtains are drawn at the receptor location.

Shadow flicker was calculated for the proposed wind turbines using industry-standard simulation software Wind Farm, a tool which has been successfully applied to a number of similar studies around the world. In general, the shadow flicker assessment methodology involves the identification of houses within a defined study area, which

have the potential to be adversely impacted by shadow flicker. In line with best practice guidance, the study area is usually limited to a distance (between a house and wind turbine) equivalent in length to 10 of the proposed wind turbine rotor diameters. In line with best practice, the scope of this assessment extends to a distance of 10 times the maximum rotor diameter (or 1.36 km). There are 227 properties within the 10x rotor diameter study area. Of the 227 properties assessed, 100 houses are expected to exceed the 30-hour threshold limit per year and 117 are expected to exceed the 30-minute threshold per day.

The developer for the Proposed Development is committed to installing mitigation measures that will eliminate shadow flicker at a receptor.

Turbines will be programmed to shut down during periods when shadow flicker is predicted to occur, and where conditions are present for it to occur. This strategy has been successfully employed at other wind farms.

As shadow flicker will be eliminated at receptors there will be no significant residual effect.

3.12 Material Assets – Traffic

The proposed wind farm development and substation site is located on the south side of the R516 Regional Road, between Croom and Bruff, approximately 11kms east of the N20 National Primary Road at Croom. The R516 rural road between Croom and Bruff has typical road carriageway widths of 4.9 metres to 5.3 metres, with local reduced widths of 4.6 metres. The R516 rural road includes centreline and hard strip road markings. Construction access for the proposed windfarm and substation site, its temporary compounds, windfarm collector cable, and associated internal site access tracks, is via a proposed access on the south side of the R516, at the north of the site. Public road crossings, with associated accesses, are proposed during construction at two locations on the L1414 and two locations on the L51217.

It is envisaged that the delivery of construction materials would be typically circa 50% via the R516 east of the proposed windfarm and substation site access, and circa 50% via the R516 west of the proposed windfarm and substation access but could be up to 100% via either direction during specific periods of construction.

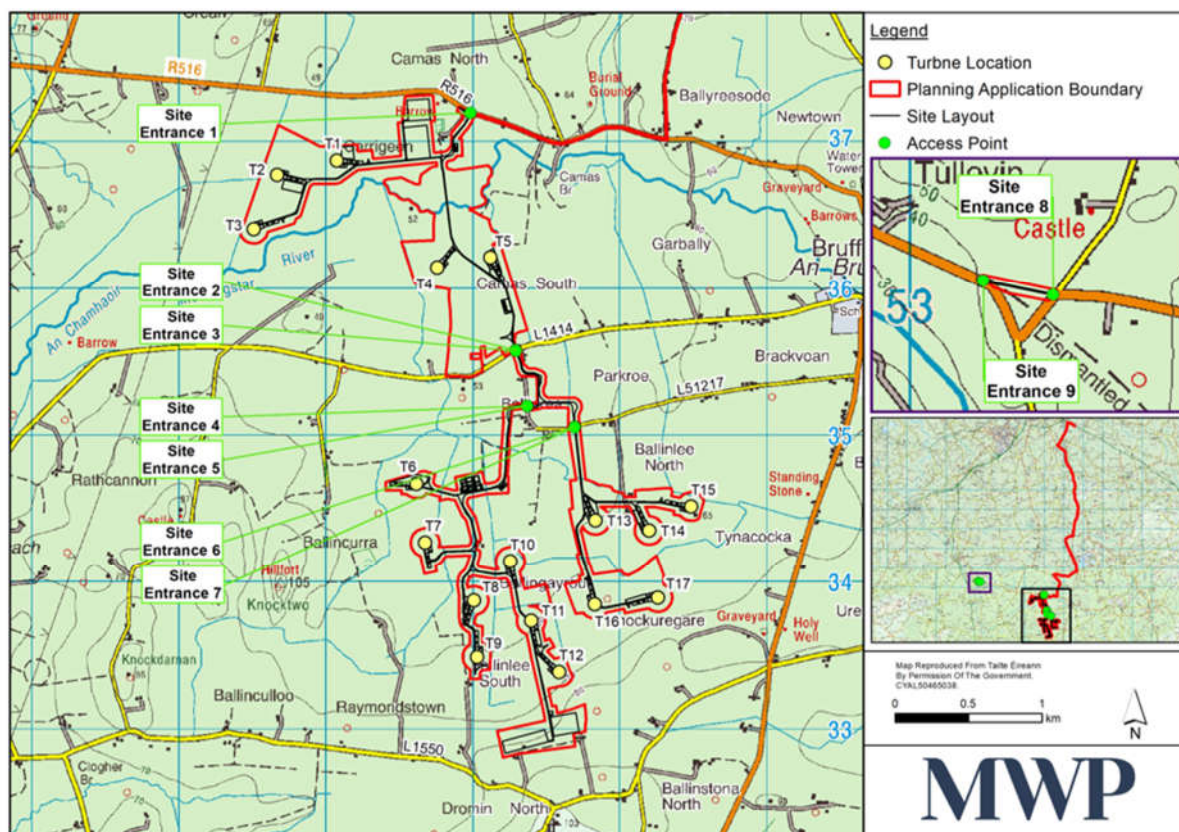


Figure 3-3: Proposed Site Access Points Location Map

The construction phase of the Proposed Development will generate traffic due to site personnel trips and material deliveries. This traffic will be short-term in nature and will travel along regional and local access roads. The operation and maintenance phase of this development will attract negligible traffic.

The wind turbine abnormal loads would be delivered in consultation with Limerick City and County Council and An Garda Síochána, during off-peak traffic periods. A total of 170 delivery vehicles would be required for the seventeen turbines in delivery convoys during nights. This could result in temporary delays for other local traffic during the off-peak traffic delivery process.

A traffic management plan will be implemented to ensure significant effects do not result.

3.13 Material Assets – Built Services

3.13.1 Aviation

Whilst the proposed development will not impede aircraft, IAA Electronic Air Navigation Obstacle Data set identified obstacles as objects whose height above ground level is 90m or higher, affecting air navigation. Irish Wind Energy Association (IWEA) Guidelines have set out the following measures to ensure that pilots of aircraft are fully aware of the presence of wind turbines.

- All turbines and meteorological masts having a height of 90m, or more are promulgated in the Irish Air Navigation Obstacle database;

- Wind turbines or any structure exceeding 90m in height may require appropriate aviation warning lighting as agreed with IAA;
- The IAA should be informed 30 days in advance of the erection of any structure exceeding 45m in height.

The only potential effect on aviation associated with the proposed development during the construction phase is during the erection of wind turbines on site. Ballinlee Green Energy will agree an acceptable aviation obstacle warning lighting scheme with the Department of Defence and IAA/AirNav Ireland ahead of turbine construction and will supply the coordinates and elevations for built turbines, as is standard for wind farm developments.

In the absence of mitigation, the effects of cranes and turbines during construction phase, on aviation, can be described as adverse, slight, localised, temporary and direct.

The Ai Bridges Aviation Review Statement has noted that in the event of a grant of planning, the proposed development will be required to register in the IAA Air Navigation Obstacle Data set. A copy of the Ai Bridges Aviation Review Statement is attached as **EIAR Volume 3 III, Appendix 17A**. By incorporating aviation warning lighting within the design of the proposed wind turbines, effects are assessed to be neutral, imperceptible, localised, direct and long term for the duration of the operational phase.

Due to the sub-surface nature of the proposed Grid Connection infrastructure, there will be no effects on aviation for this element of the project. It is concluded that the operation of the proposed wind turbines will not result in any likely significant effect on Aviation.

At the end of the estimated 35-year lifespan of the proposed development, the Developer will make the decision whether to repower or decommission the turbines. Any further proposals for development at the site during or after this time will be subject to a new planning permission application. If planning permission is not sought after the end of life of the turbines, the site will be decommissioned and reinstated with all 17 No. wind turbines and towers removed. Effects associated with the decommissioning phase will be similar to those of the construction phase. Removal of infrastructure will be undertaken in line with landowner and regulatory requirements and best practice applicable at the time of decommissioning. During decommissioning, the effects are described as positive, imperceptible, local, permanent, and direct.

3.13.2 Forest Resources

There is a portion of the Proposed Development site which has cover of coniferous forest. The surrounding land includes some pastures and lands principally occupied by agriculture.

Felling of some existing tree plantations is required within and around wind farm infrastructure to accommodate the construction of the turbine foundations and associated hardstands, access tracks, turbine assembly and spoil deposition areas. Trees in a radius of between 73.9m to 97.1m around each turbine will be felled as part of the Proposed Development. There will be an overall forestry felling of approximately 14.4ha. The wind farm developments operational phase will not impede or deter either existing or future use of the local forest resources for recreational activities. During the decommissioning phase, there may be tree removal required to access turbines which are to be removed. Transport of turbines off site may also require the felling of some trees.

The effect of the wind farm on forest operations and the potential effect of forestry felling on the environment will be controlled as it currently is, by strict environmental controls, practices and guidelines as described by the relevant Forest Service Guidelines. Any tree felling required to facilitate the construction, operation, or decommissioning of the wind farm will be kept to a minimum and under the terms of felling licences. Obligations to replant clear-fell areas will be fulfilled.

The Proposed Development will not result in any significant adverse effects on forest resources requiring additional mitigation.

3.13.3 Television and Telecommunications

Where existing telecommunications are located in the public road, the grid cable will avoid these services by providing ducting above, below or on the other side of the road corridor. Prior to construction being undertaken, a survey of underground services along the grid route will be undertaken to identify their location and design the layout of the grid route cables to avoid any interference with or risk to the existing services and networks under the road. The relevant authorities will also be consulted during this phase and will approve the proposed approach and methods prior to the initiation of construction. This will avoid any effects on telecommunication lines along the grid route.

The temporary accommodation works for the Turbine Delivery Route (TDR) may result in some brief disruption to existing telecommunication lines due to the temporary movement of existing overhead lines, refer Appendix **EIAR Volume III, Appendix 2C**. The relevant service providers and local authorities will be consulted on these proposed temporary changes and will need to approve them and facilitate the disconnection and reconnection of the affected lines and poles.

Pre-mitigation construction effects on telecommunications are described as neutral, not significant, direct, likely and temporary.

3.13.4 Water and Wastewater Infrastructure

There is an existing watermain located along the R516 to the north of the Proposed Development as well as a watermain which runs along the L1414 which is located between the north and south sections of the Proposed Development. There are also watermains installed underground on sections of the R512 along the grid connection route. There is currently no wastewater infrastructure within the proposed windfarm development or along the public road which the grid connection crosses. The nearest Wastewater Treatment Plant (WWTP) is located in Bruff and there is a network of wastewater pipes within the town which collects foul water and directs it to the WWTP. Along the grid connection route, dwellings are served by individual septic tanks for wastewater treatment. During construction works, there will be a temporary compound on the wind farm site set up upon commencement of the construction phase. Sanitary wastewater will be collected in portable toilets. Disposal of sanitary wates will be managed through a contract with a licensed waste contractor. The existing environment, both the local water supply and wastewater treatment plant have good capacity, therefore the supply of water and treatment of waste is unlikely to burden the existing infrastructure.

Water needs for construction activities will be limited to concrete truck chute washing, wheel wash, dust suppression and sanitary facilities. It is estimated that up to approximately 3,000 litres per day of potable water will be required during peak construction for construction employees. It is proposed that this water requirement will be imported in bulk water tanks.

During the construction phase a 110kV underground cable will be installed in the public road. Where the cable meets existing water infrastructure, the ducting will be placed over, under or on the opposite side of the road from existing watermains. Prior to construction being undertaken, a survey of underground services along the grid route will be undertaken to identify their location. The design of the layout of the grid route cables will aim to avoid any interference with or risk to the existing services and networks under the road. The relevant authorities will also be consulted during this phase and will approve the proposed approach and methods prior to the initiation of construction. This will avoid any effects on existing water infrastructure along the grid route.

The TDR accommodation works are limited to ground level and above ground works. Consequently, there are expected to be no effects on underground water supply or wastewater networks along the TDR. Pre-mitigation construction effects on water infrastructure are predicted to be adverse, not significant, local, direct and temporary.

Preconstruction surveys will be completed to avoid disturbances to existing watermain. The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with Uisce Eireann or other relevant authorities. All works affecting the water and wastewater infrastructure will be carried out in ongoing consultation with the local authorities and service providers and will be in compliance with any requirements or guidelines they may have. All construction phase and operational phase wastewater will be taken off-site by an authorised waste contractor and brought to an authorised waste facility.

3.13.5 Gas

Desktop study revealed that a high-pressure Gas Networks Ireland (GNI) pipeline will cross both the northern section of the main wind farm site boundary and also the southern section. The location of the existing gas pipeline within the proposed wind farm site and along the grid connection route will be confirmed prior to the commencement of on-site works by carrying out trial boring. In addition, safe codes of practice will be applied by the appointed contractor during the construction phase to avoid the existing gas pipeline which traverses the site. No turbines will encroach upon the main gas pipeline wayleave and the gas pipeline will be outside the electrical safety exclusion zone. Therefore, the construction phase will cause no significant adverse effects on gas infrastructure. The Proposed Development will result in no effects on gas infrastructure; therefore, no specific measures are proposed.

3.13.6 Waste Management

During the course of the Proposed Development, a certain amount of waste will be produced, this will be mainly during the construction phase. Waste generation is principally avoided through planning and management of activities and good housekeeping. Material inputs are generally in bulk. By bulk procurement, the generation of small-sized containers and packaging is largely avoided and thus minimises the generation of unnecessary waste recycling or disposal. In line with the waste hierarchy, wherever possible, packaging will be returned to originator for reuse ahead of recycling or disposal. Otherwise, waste packaging will be segregated and stored on site in appropriate skips within the construction compound and disposed of in accordance with waste management regulations. Skips will be clearly labelled for plastics, timber, steel and other waste materials to ensure segregation. Materials will be placed in these and can be reused as required during construction. Hazardous materials, such as gear and hydraulic oils used in the operation of the wind turbines and mineral oils used in transformers, will be disposed of in accordance with all applicable laws and regulations. Construction phase waste may consist of soil, hardcore, concrete, spare steel reinforcement, cable wires, shuttering timber and building materials. The waste from all components of the Proposed Development will be stored in demarcated areas in the construction compounds and collected during and at the end of the construction phase and taken off site to be reused, recycled and disposed of in accordance with best practice procedures at an approved facility. Waste management procedures have been included in the **CEMP** in **EIAR Volume III Appendix 2A** and **RWMP EIAR Volume III Appendix 2B**. All personnel working on site will be trained in pollution incident control response, and an emergency response will be prepared as part of the **CEMP**.

During the operational phase, minimal amounts of solid waste will be generated, which will be collected onsite and transported to a licenced disposal facility, or recycling facility by a waste hauling contractor.

During the decommissioning phase, waste will be kept to a minimum. The majority of the materials on site will be recycled. At present, between 85% and 95% of turbine components can be recycled. Ballinlee Green Energy have committed to reuse, recycle or otherwise recover all wind turbine blades from decommissioned wind farms, and avoid blades going to landfill.

3.14 Interaction of the Foregoing

There is potential for interactions between one aspect of the environment and another which can result in direct or indirect effects, and which may be positive or adverse.

A matrix has been generated to summarise the relevant interactions and interdependencies between specific environmental aspects (Refer to **Table 3-1**). It contains each of the environmental topics, which were considered as part of this environmental impact assessment, on both axes.

Table 3-1: Matrix of Interactions

	Population and Human Health	Biodiversity	Ornithology	Land and Soils	Water	Air	Climate	Landscape & Visual	Noise & Vibration	Cultural Heritage	Shadow Flicker	Material Assets - Traffic and Transport	Material Assets – Built Services
Population and Human Health				C	C	C/O	C/O	C/O/D	C/O/D		O	C/D	C
Biodiversity				C	C	C/O/D	C/O		C/O			C/D	
Ornithology				C	C	C/O/D	C/O		C/O		O	C/D	
Land and Soils	C	C/O	C/O		C/O	C		C/D	C			C	C
Water	C	C	C	C									
Air	C/O	C/O	C/O	C			C/O					C/O	
Climate	C/O	C/O	C/O	C		C/O						C/O	
Landscape & Visual	C/O/D			C						C/O	O		
Noise & Vibration	C/O/D	C/O	C/O									C/D	
Cultural Heritage	C			C									
Shadow Flicker	O							O					
Material Assets – Traffic & Transport	C/D	C/D	C/D			C/O	C/O	C/D	C/D				C/D
Material Assets – Built Services	C/O					C/D	C/D					C	

	Interaction Occurs
	No Interaction

C	Construction Phase Effect
O	Operation phase Effect
D	Decommissioning Phase Effect