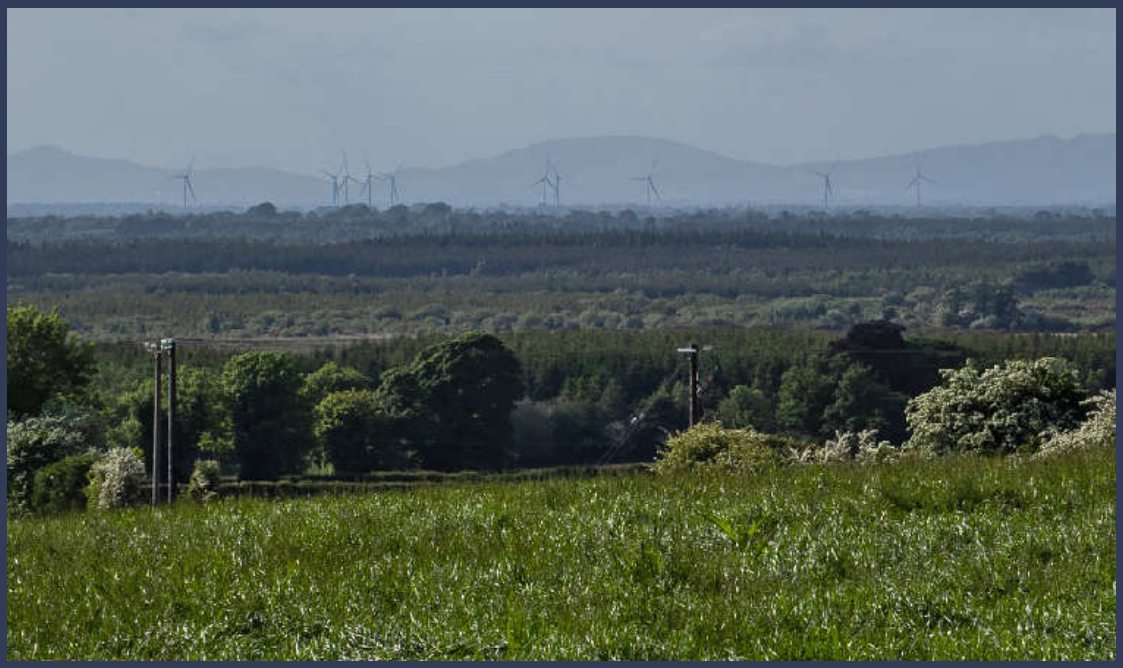
MWP



Environmental Impact Assessment

Volume I: Non-Technical Summary

Brittas Wind Farm, Co. Tipperary

Brittas Wind Farm Limited

November 2024

Contents

Figures

Tables

Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
12345	XX01-MWP-ZZ-ZZ-HS-Z-6001	P01	02/12/2024	MT	JD	MT	DRAFT
12345	XX01-MWP-ZZ-ZZ-HS-Z-6001	P01	02/12/2024	MT	JD	JD	ISSUE

MWP, Engineering and Environmental Consultants
Address: Park House, Bessboro Road, Blackrock, Cork, T12 X251, Ireland

www.mwp.ie

1. Introduction

Brittas Wind Farm Limited (the 'Applicant') is seeking 10-year planning consent from An Bord Pleanála (the competent Planning Authority) under Section 37E of the Planning and Development Act (as amended) for a proposed wind energy project in Co. Tipperary, named Brittas Wind Farm (Proposed Development). The location of the Proposed Development site is shown in **Figure 1**Error! Reference source not found.. 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 **Chapters 2** and **3** 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 the Environmental Impact Assessment Report are:

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

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

1.1 The Applicant

The Applicant is **Brittas Wind Farm Limited**, a subsidiary of **Ørsted Onshore Ireland Midco Limited**. Ørsted is a renewable energy company taking action to create a world that runs entirely on green energy. Ørsted develop, construct, own and operate onshore wind farms, solar farms and energy storage facilities across Ireland. The company has 21 operational wind farms on the Island of Ireland producing 378MW of renewable electricity. There are additional wind farms in the construction and planning stage. Ørsted is also recognised on the CPD Climate Change A List as a global leader for their work on climate action. They were the first energy company to have its science-based net-zero emissions target validated by the SBTi or Science Based Targets initiative. Their headquarters is in Denmark with their Irish operations based in Cork City. Over the next decade, Ørsted aims to develop 1,000MW of onshore wind, solar, and storage capacity across Ireland.

1.2 Overview of Proposed Project

The layout of the proposed project is illustrated in **Figure 2 (**and in **Appendix 1** of the **NTS)**. The proposed development will consist of the following elements that are described separately in Chapter 2 of the EIAR:

- The Wind Farm Site which includes ten (10) wind turbines;
- Associated tracks and infrastructure;
- An on-site 110kV electrical substation;
- A 7km Grid Connection Route (GCR) which consists of an underground electrical grid connection from the Wind Farm Site to the existing Thurles 110kV substation; and

- Temporary accommodation works along the turbine delivery route to allow for the delivery of large turbine components.

The development description as per the statutory newspaper notice and the application form for which consent from An Bórd Pleanála (ABP) is being sought is as follows:

- 10 No. Wind Turbines with a blade tip height of 180m, hub height range from 102.5 to 105.5m and a rotor diameter range from 149m to 155m;
- 10 No. Wind Turbine foundations and Hardstand areas and associated drainage infrastructure;
- 1 No. Permanent Lidar unit and associated foundation, hardstand area and compound for Meteorological Monitoring;
- 1 No. 110kV Electrical Substation including 2 No. control buildings, electrical plant and equipment, welfare facilities, carparking, water and wastewater holding tanks, security fencing, lightening protection and telecommunications masts, security cameras, external lighting and, all associated infrastructure;
- Installation of medium voltage underground electrical and communication cabling connecting the wind turbines to the proposed onsite substation and associated ancillary works;
- Installation of approximately 7km of underground electricity and communication cabling between the proposed onsite substation and the nearby existing Thurles 110kV substation in the townland of Ballygammane, Co. Tipperary. The cabling will be laid primarily within the public road and will connect the proposed wind farm to the national grid;
- 4 No. Site Entrances from the public road and associated fencing and signage;
- Construction of new permanent site access tracks, turning heads and associated drainage infrastructure;
- The upgrading of existing access tracks and associated drainage infrastructure;
- 2 No. Temporary construction site compounds and mobile welfare facilities;
- 1 No. Borrow pit and associated drainage infrastructure to be used as a source of stone material during construction;
- Spoil deposition areas;
- Associated surface water management systems;
- Tree felling and hedgerow removal to accommodate wind farm infrastructure;
- Temporary accommodation works at 2 no. locations adjacent to the public road to facilitate delivery of turbine components to site within the townlands of Brittas and Brittasroad, Co. Tipperary. The works primarily relate to trimming and clearing of vegetation, temporary removal of street furniture and fencing, and installation of temporary stone hard standing; and
- All related site works and ancillary development;

In accordance with Section 37CC of the Planning and Development Act 2000, as amended, and article 15J of the Planning and Development Regulations 2001, as amended, Brittas Wind Farm Ltd formally submitted a flexibility request application to An Bord Pleanála (ABP) for the proposed project. The flexibility request in this case was for alternative turbine models which includes different hub heights, rotor diameters, blade lengths, maximum power outputs and variations in the hardstanding areas at the base of each respective turbine model. The reasons for the flexibility application are related to the fact that the exact turbine model will be subject to a competitive procurement process that will only commence if the project receives planning consent. At this pre-application

stage it is not possible to be definitive about the exact turbine type, i.e. the exact dimensions, as different turbine manufacturers produce different sized machines. The three types of potential turbines to be used in the proposed project are described in Section 2.4.1 of Chapter 02 Project Description.

After consideration of this application and a consultative meeting, ABP granted permission for flexibility with respect to the turbine models. A copy of the letter from ABP granting this permission is provided in Appendix 1A.

The EIAR has assessed the potential effects of all three turbine options. Although flexibility was granted for alternative hardstanding areas at the base of each turbine, one single hardstand design was brought forward for the proposal and is assessed throughout the EIAR.

The applicant is seeking a ten-year permission and an operational period of no less than 35 years from the date of commissioning of the entire Wind Farm.

Other elements of the project which are assessed throughout the EIAR but are not the subject of this SID planning application are as follows:

- Battery Energy Storage Facility (BESS);
- Rerouting of an on-site ESB 38kV overhead powerline (OHL); and
- Accommodation works along the turbine delivery route (TDR)which includes temporary removal of traffic signs and lights, electricity poles, bollards and lamp posts, fences and hedge and tree removal/trimming.

Two separate planning applications for the BESS and re-routing of the ESB OHL will be prepared and lodged with Tipperary County Council (TCC) after planning permission has been obtained for the main wind farm project. Relevant consent will also obtained from ESB for the rerouting of the OHL. Application Area

The planning application area spans a total of 331.98 ha and includes the wind farm site, the grid route along the public road corridor between the proposed on-site substation and the existing Thurles 110kV substation, and an area in Thurles town required for accommodation works to allow for turbine delivery.

A full description of the site location is provided in Chapter 2 Description of the Proposed Development of this EIAR.

1.3 Site Location

The proposed Wind Farm Site is located 3km north of Thurles town (see Error! Reference source not found.) in the following townlands: Brittas, Rossestown, Clobanna, Brownstown, Kilkillahara and Killeenleigh, County Tipperary. The proposed Grid Connection Route (GCR) is located within the public road between the Wind Farm Site and the existing Thurles 110kV Substation. The Grid Connection Route is located in the following townlands: Killeenleigh, Coolgarrane, Clobanna, Athnid More, Rossestown, Cassestown, Laghtagalla, Farranreigh. Furze, Loughlahan and Ballygammane, County Tipperary. The Turbine Delivery Route (TDR) runs from the Port of Foynes in County Limerick to the Wind Farm Site via the national, regional and local road network. Proposed works associated with the Turbine Delivery Route are located in the Townlands of Brittas and Brittas Road, County Tipperary.

The lands of the Wind Farm Site are made up of agricultural fields bounded by hedgerows and treelines. An area of broadleaf forestry is located at the southwest corner of the project site. The River Suir transects the site from north to south. The N62 is located west of the site, running north to south, connecting Templemore to Thurles. The N62 provides a link to the M6, M7 and M8 motorways. The L8017 local road traverses the centre of site from east to west, crossing the River Suir at a bridge point. There are a small number of recorded monuments in the study area, including Brittas Castle, located in the southeast portion of the project site and is included in the National Inventory of Architectural Heritage.

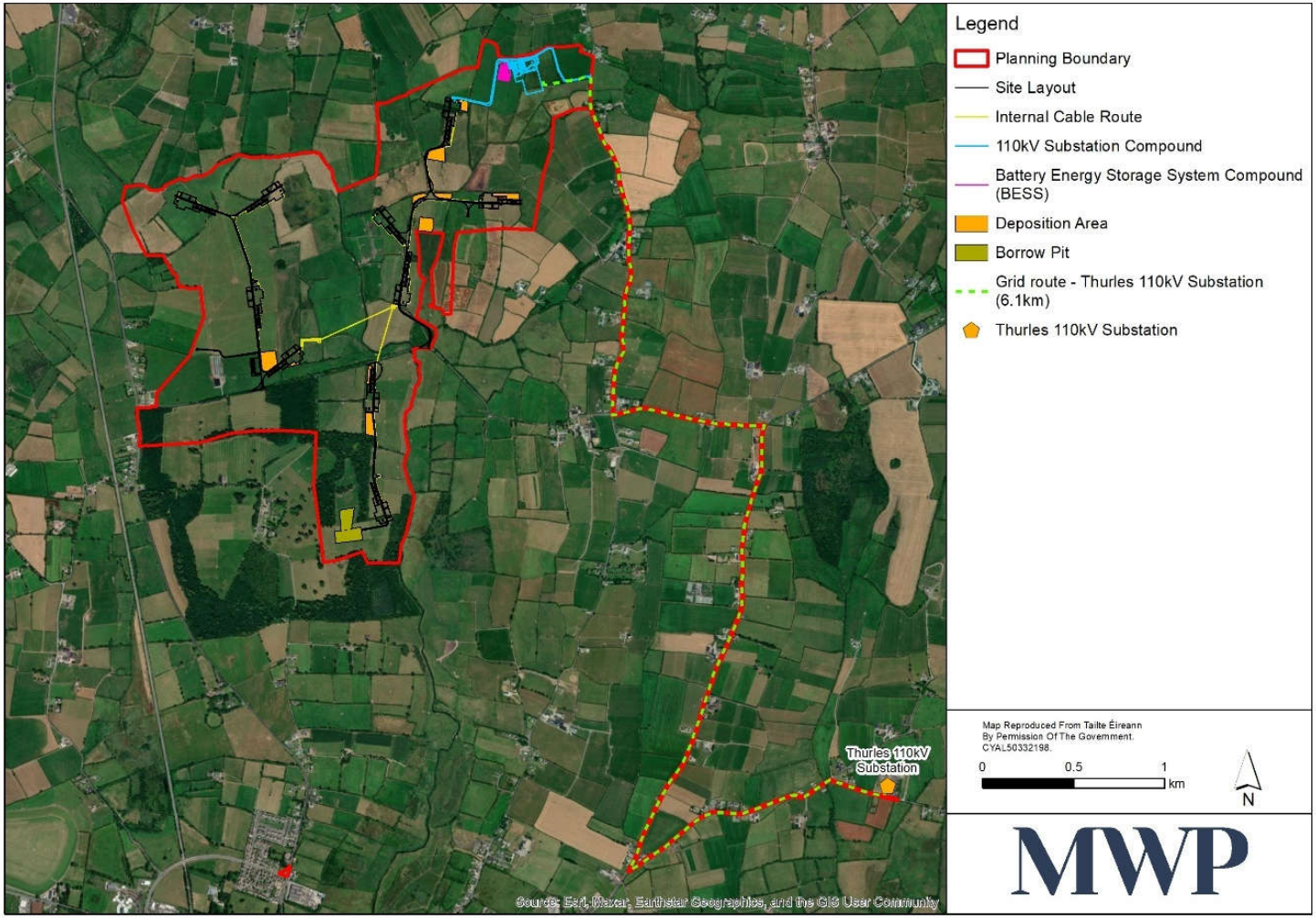


Figure 1: EIA Project Area and Red line Site Boundary for the Wind Farm Site, Grid Connection Route and TDR.

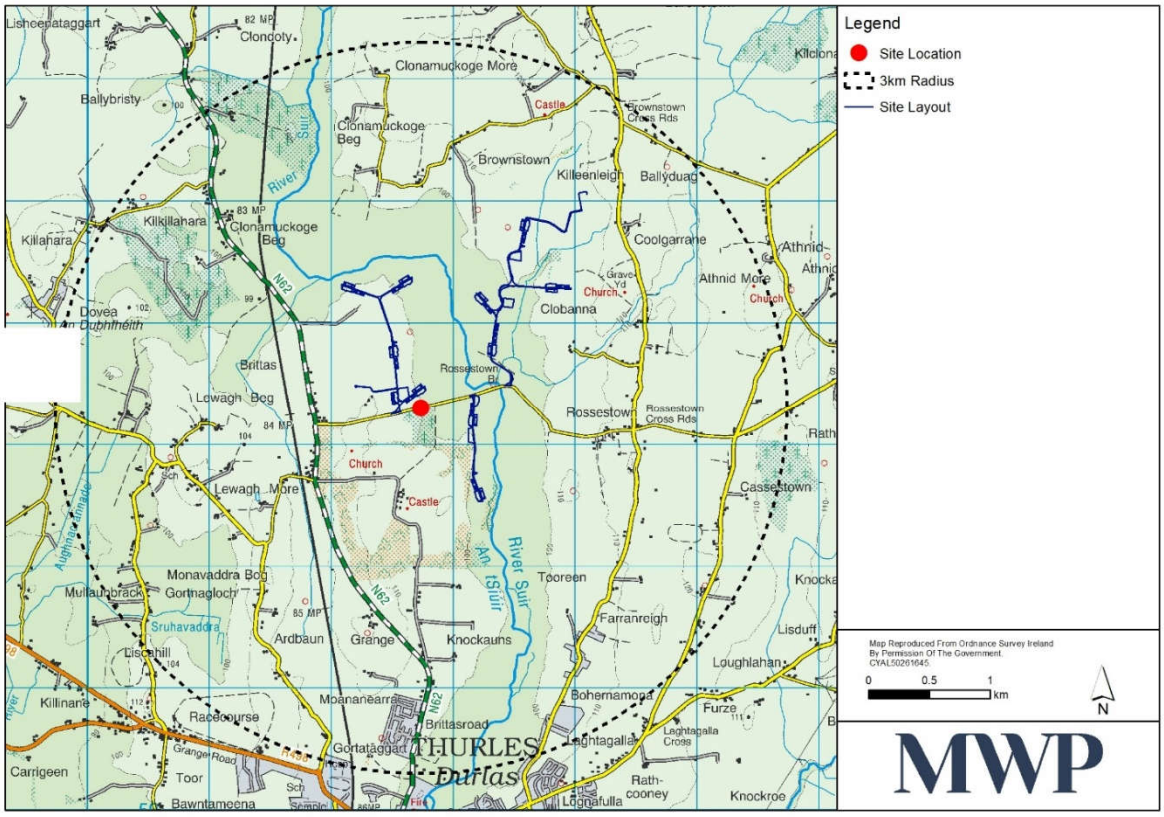


Figure 2: Proposed Development Site Location

The proposed wind farm is located within areas identified as 'Open to Consideration for New Wind Energy Development' in the Tipperary County Development Plan 2022-2028 Renewable Energy Strategy. See **Figure 2-6** in **Chapter 2** of the **EIAR Vol. 2**).

1.4 EIA Study Area

The planning application development site boundary includes a total land area of approximately 331.83 hectares. During the project EIA and design process, the Wind Farm Site has been substantially reduced in size eliminating areas that were considered unsuitable and concentrating on areas that were deemed appropriate for locating wind turbines and associated infrastructure. The project study area which is referred to throughout this EIAR incorporates a larger assessment area than presented in the planning application boundary (see **Figure 1**). It will vary from topic to topic depending on the zone of influence and sensitive receptors being assessed. This is reflected accordingly in each chapter. **Figure 2-3 in Chapter 2 of the EIAR Vol.2** illustrates the site planning application boundary and relevant townlands.

2. Description of the Proposed Development

2.1 Construction Phase

It is envisaged that the proposed project will commence in Quarter 4 of 2028 with a 18-month construction 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.

A proposed programme of work on the wind farm site (see Table 2-5 in Chapter 2 of the EIAR Vol. 2) will involve a number of phases that will run concurrently as follows.

- As the internal site access tracks are constructed up to each turbine, hardstanding areas for construction purposes, crane stands, turbine foundations and building foundations will be prepared.
- Once the tracks are completed, the trenching and laying of underground cables will begin.
- Construction of the site sub-station and control houses will commence so that they will be ready to export power as turbines are commissioned.

The proposed grid connection from the proposed on-site substation to the existing Thurles 110kV substation will be constructed in on-site tracks and within the public road. The active construction area is proposed to be only along a 100-200m stretch of any roadway at any one time. The works for the grid connection route are estimated to take approximately 4-5 months and will overlap with the wind farm works. During the first 2 months the cable trenches will be constructed. The second 2-3 months will involve sequentially opening up all joint bays (these are pre-cast concrete chambers that will be required along the grid connection route over its entire length) and pulling electrical cables, pulled through ducts and then joining each cable together.

Prior to turbine delivery movements, accommodation works will be required along the turbine delivery route (TDR) to allow for transport of oversized loads. The accommodation works are described in Appendix 2A in Vol. 3 of the EIAR. The accommodation works will require temporary hard standing areas at 2 no. locations. Other temporary works will be completed under road opening licence. Temporary accommodation works required to allow the movement of oversized loads include the temporary removal of traffic signs and lights, the temporary removal of electricity poles, bollards and lamp posts, hedges and tree removal or trimming, temporary land take, lowering of some roadside banks, temporary fence removal and road widening. The temporary accommodation works will be completed one month prior to delivery in agreement with the Local Authority.

Typically, construction will occur within the hours of 7.00am – 7.00pm, Monday to Saturday (if required). Due to the requirement for the concrete pours to be continuous, the working day may extend outside normal working hours in order to limit the traffic impact on other road users, particularly peak period school and work commuter traffic. Such activities are limited to the days of turbine foundation concrete pours, which are normally complete in a single day per turbine. Turbine and crane erections may also occasionally occur outside of these times in order to take advantage of low wind periods. Working hours will be confirmed at the outset of the project and any changes in hours will be agreed with Tipperary County Council.

Works along public roads will be from 7.00 a.m. to 7.00 p.m. Monday to Friday and 9.00 a.m. to 2.00 p.m. on Saturdays. A permit for moving abnormal loads will be sought from An Garda Síochána for the night time movement and delivery of oversized wind turbine components (i.e. blades, nacelles and towers).

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 project would generate employment for up to 60 persons during the construction phase to include site contractors, on-site vehicle and plant operators, engineers, materials delivery personnel, environmental personnel, health and safety personnel.

It is expected that the civil works for the grid connection route will require at least 10 personnel to complete the works. The electrical works will require less heavy machinery but more labour personnel, with an expected 25 personnel to complete the works.

Primary access to the proposed development site will be provided from the local public Rossestown road (L-8017). There will be four site entrances. Three of these are located along the Rossestown road (see Figure 3) and will provide site access during the construction, operational and decommissioning phases. The most westerly of these three site entrances provides access to turbines 1, 2, 6 and 8 as well as the Lidar and the main construction site compound to the north of the public road.

The middle entrance provides access to Turbines 9 and 10 and the borrow pit to the south of the L-8017. The third eastern entrance on the L-8017 provides access to turbines 3, 4, 5 and 7 as well as another construction compound and the substation. The fourth entrance is to the substation only and will only be used for maintenance access during the operational phase. This entrance is located along the section of the Rossestown road (L-4120) that goes northward on the eastern side of the River Suir (see Figure 2-12 in Chapter 2 of the EIAR Vol. 2).

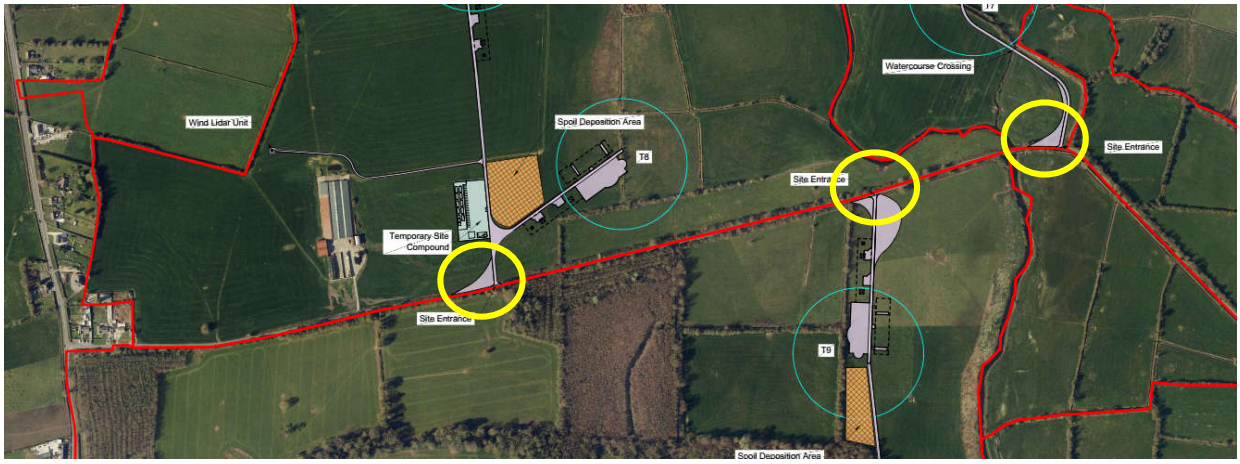


Figure 3: Three Construction Site Access Points (circled in yellow)Production of Waste

Approximately 78% of all soils and subsoils generated from excavation works will be retained on site and reused in bunding, landscaping and localised earthworks. Excess spoil material will be stored on site in designated deposition areas and used to infill the borrow pit. 21% of excavated material will need to be classified and removed from site. The removed wastes will be reused, recycled or disposed of in an authorised facility in accordance with best practise.

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.

2.1.1 Emissions and Nuisances

The anticipated residues and emissions likely to be generated during the project lifetime are summarised in Error! Reference source not found.. These environmental effects have been identified, assessed and proposals for management of the anticipated disturbances and/or emissions are presented throughout relevant chapters of this EIAR.

Table 1: Emissions and Disturbance

Phase	Aspect	Potential Emission/Disturbance	Assessment Provided
Construction /Decommissioning	Air	The main emissions to atmosphere during the construction stage of the project is from fugitive dust associated with the following activities: • Groundworks associated with the construction of the project 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 (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM_{10}).	**EIAR Volume 2 Chapter 14** Air and Climate
	Noise	Traffic flows, excavation/blasting mechanical machinery and electrical equipment typically used for construction projects would generate noise emissions.	**EIAR Volume 2 Chapter 10** Noise
	Water	Surface water runoff and discharges from construction working areas are likely during construction, although overall the quantity of surface runoff would not change overall as a result of the construction work. Occasional and low quantity discharges could arise from pumping in order to dewater foundation excavations. This would be discharged to the water management drainage system. 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 presented in EIAR Volume 3: Appendix 2A: CEMP.	**EIAR Volume 2 Chapter 8** Water
	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 Volume 2 Chapter 15 Material Assets** and **EIAR Vol 3 Appendix 15C**
Operational	Air	Due to the nature of the project no significant point source or diffuse air emissions will be produced during its operation.	**EIAR Volume 2 Chapter 14 Air and Climate**
	Noise	Potential noise disturbance from operational turbines and a proposed new 110kV on-site substation. Any perceived noise disturbance will be in compliance with limits.	**EIAR Volume 2 Chapter 10 Noise**
	Water	No water emissions or pollution sources have been identified for the operational phase.	**EIAR Volume 2 Chapter 8 Water**
	Shadow Flicker	In certain conditions, the movement of wind turbine blades could give rise to shadow flicker at nearby residential receptors. Any perceived shadow flicker at receptors will be eliminated through the installation of control modules.	**EIAR Volume 2 Chapter 11 Shadow Flicker**

2.2 Operational Phase

The proposed development is expected to have a lifespan of no less than 35 years. Each wind turbine will be computerised to control critical functions, monitor wind conditions and report data back to a Supervisory Control and Data Acquisition (SCADA) system.

During the operation of the wind farm, the turbine manufacturer, the Developer or a service company will carry out regular maintenance of the turbines. During the life of the project, it is envisaged that at least two permanent jobs will be created locally in the form of operator or maintenance personnel. In addition, operation and monitoring activities may be carried out remotely with the aid of computers connected via a telephone broadband link. However, routine inspection and preventive maintenance visits will be necessary to ensure the smooth and efficient running of the wind farm and require a minimal presence.

It is unlikely that the underground cable will require much maintenance during its operation but in the event a fault does occur, inspection of the fault can be carried out to determine what works to the ducting may be required.

All potential effects to land and land use will occur during the proposed development construction phase. No additional effects to land and land use will occur during the operational phase, as no further works are proposed.

Once the wind farm is operational, existing agricultural and forestry activities will recommence following construction and continue to take place at the site independent of the wind farm development. Only a relatively small area of forestry, approximately 1.8ha of the proposed development site, will be permanently displaced in the footprint of the wind farm infrastructure. This loss of land use will not be significant.

2.3 Decommissioning

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 10 No. wind turbines and towers removed. Removal of infrastructure will be undertaken in line with landowner and regulatory requirements and best practice applicable at the time. It is envisaged that access tracks will remain in place. Hardstanding and foundation areas will be reinstated to match the surrounding landscape. The turbine bases will be rehabilitated by covering with local topsoil in order to regenerate vegetation.

The grid cable and substation will remain a permanent part of the national grid and therefore decommissioning is not foreseen. In the event of decommissioning, it will involve removing the cable from the ducting but leaving the ducting and associated supporting structure in place. It is also likely the substation will remain in place and will previously have been taken in charge by the system operator, after the wind farm is connected to the national electricity grid.

2.4 Cumulative Assessment

The proposed development was considered in combination with other relevant plans and projects that could result in cumulative effects. The potential cumulative impact of the Project has been assessed in accordance with Annex IV of the EIA Directive as amended which provides that the EIAR must contain a description of the likely significant effects of the project on the environment resulting from 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. The potential for cumulative effects are considered in the relevant chapters of this EIAR. No significant cumulative adverse effects were identified.

Although the BESS element and rerouting of the existing on-site 38kVoverhead line do not form part of the planning application, they do form part of the wind farm project and are assessed as part of the environmental impact assessment.

Section 1.6.4.6 of Chapter 1 of the EIAR identifies and profiles the existing and planned projects and plans that could potentially have cumulative effects that were assessed in the EIAR.

Significant cumulative impacts are not predicted with the Tipperary County Council Development Plan (2022-2028) and the associated Renewable Energy Strategy in its Appendix 2. as each plan has a range of environmental and natural heritage policy safeguards in place. Furthermore, this project has been developed with a view of

achieving the objectives of these plans. The proposed wind farm site is located within an area identified as 'open for consideration to wind energy' development. There is no other contradictory zoning for other project types or infrastructure in this area.

The information on other developments gathered for the cumulative assessment involved a search of relevant County Councils' Online Planning Registers, the An Bord Pleanála website and the EIA Portal, over the period of the last 10 years. This search was carried out during the EIA process with a final search in October 2024.

The search within 20km of the development site within the last 10 years identified 68 sizable developments (Error! Reference source not found. of Chapter 1 of the EIAR Vol. 2). This included eight multiple housing developments, three sports facilities, six quarry developments or extensions, two overhead power lines, two waste recovery/processing facilities, one mixed-use development, two mining developments, two wastewater treatment plants, one substation, one agricultural development, one retail park, one nursing home and one medical care centre. The nearest of these were located in Thurles town 3km south of the proposed development site.

The only potential development where direct cumulative effects that could reasonably be foreseen is the incomplete powerline which transects the proposed Brittas WF development site (see Figure 2-22 in Chapter 02 Project Description in EIAR Vol. 2). This c.6.94 km of incomplete powerline requires either new poles to be erected or that existing poles be strung. The structures to be erected comprise either twin or predominately single timber pole structures strung or to be strung with a twin line. This development was permitted in mid-2023 and is likely to be constructed prior to construction phase of the proposed Brittas wind farm project. The wind farm developer will submit a separate planning application for the rerouting of this line through the wind farm site to Tipperary County Council, in consultation with ESB. The possible options for this re-routing are outlined in Chapter 04 Alternatives of the EIAR Vol. 2. As the construction of this powerline will be completed prior to construction of the Brittas windfarm project, it is not expected to have any additional cumulative effects in combination with the proposed wind farm. This EIAR has assessed the potential effects of rerouting this powerline during the construction of the wind farm – as part of the project. Therefore, an assessment of additional cumulative effects is not relevant.

Other small planning applications within a 3km radius around the development site (refer to Appendix 1G in EIAR Vol. 3) relate to agricultural sheds and shed extensions, livestock facilities, dwelling houses, and extensions to dwelling houses, attic conversions, domestic wastewater treatment systems, property entrances and roads, sports facilities, garages, demolitions, and retention permission applications etc. Twenty-Eight of these are in areas around Thurles town or in villages north and further east of the site that would not be affected by construction works at the proposed project site. Seven are in the Rossestown and Clobanna areas where there is some potential for cumulative construction related effects along the grid route. Seven of these were permitted in 2023, two in 2022, six in 2021, seven in 2020 and four in 2019. The construction of these development will likely be completed, and their planning permissions expired by the time construction of the proposed project would potentially begin (at the end of 2028). Consequently, such dispersed small scale domestic and agricultural developments are not expected to have significant cumulative effects with the proposed project. These minor projects are either under the threshold for EIA or excluded from the list of projects requiring EIA and due to the nature and scale of these applications would not introduce complex or significant issues and are therefore not considered in the cumulative assessment.

The search within 20km of the development site within the last 10 years identified 68 sizable developments (Error! Reference source not found. in section 1.5.4.6.1 of Chapter 1 of the EIAR Vol.2). This included eight multiple housing developments, three sports facilities, six quarry developments or extensions, two overhead power lines, two waste recovery/processing facilities, one mixed-use development, two mining developments, two

wastewater treatment plants, one substation, one agricultural development, one retail park, one nursing home and one medical care centre. The closest of these were in Thurles town 3km south of the proposed wind farm site. These large projects will be put through a rigorous design process for obtaining planning permission. Where relevant, these projects/plans have incorporated CEMPs and Appropriate Assessments to ensure that there will be no adverse effects on land and soils.

The only potential development where direct cumulative effects that could reasonably be foreseen is the incomplete powerline which transects the proposed Brittas WF development site (see **Figure 2-22** in **Chapter 02 Project Description of the EIAR Vol. 2**). This c.6.94 km of incomplete powerline requires either new poles to be erected or that existing poles be strung. The structures to be erected comprise either twin or predominately single timber pole structures strung or to be strung with a twin line. This development was permitted in mid-2023 and is likely to be constructed prior to construction phase of the proposed project. The wind farm developer will submit a separate planning application for the rerouting of this line through the wind farm site to Tipperary County Council, in consultation with ESB. The possible options for this re-routing are outlined in **Chapter 04 Alternatives** of the **EIAR Vol. 2**. The construction of this powerline will be completed prior to construction of the Brittas windfarm project and will therefore not have any additional cumulative effects in combination with the proposed wind farm. This **EIAR** has assessed the potential effects of rerouting this powerline during the construction of the wind farm – as part of the project. Therefore, an assessment of cumulative effects is not relevant.

Land management practices in the wider area which are considered in combination with the effects of the project are agriculture and forestry. It is proposed that all agricultural activities within the planning boundary will cease for the duration of the construction and commissioning phase. Agricultural activities within the wider study area will continue and will be separated from construction activities by appropriate stock proof fencing. Forestry operations within the planning boundary will also cease and will resume again post commissioning of the wind farm.

The proposed development would positively cumulate with other wind farm developments in the region to advance in delivering local, regional, and national Green Energy targets. The 17 wind farms identified within 20km of the proposed Brittas development are listed in **Table 1-5** in **Chapter 1 of EIAR Vol. 2.** The nearest wind farms are the Kiloran and Lisheen wind farms which are 9.2 and 9.8km from the proposed project. **Figure 4** identifies the location of these wind farms in relation to the proposed Brittas Wind Farm.

There are six solar farms within 20km of the proposed project (see list in Error! Reference source not found. in **Chapter 1 of EIAR Vol. 2**). The nearest proposed solar farms to the proposed project are the ENGIE solar farm located 4km south of Brittas WF in Thurles town and Engie solar farm approximately 5km south-west of the proposed Brittas WF in the townlands of Rahelty and Shanballyduff, Co. Tipperary (planning ref 19601012). These projects were granted planning permission in 2020 and 2021. Two other solar farms further afield are currently seeking planning permission. These include:

- The proposed Renewable Energy Systems Ltd 88.5 ha solar farm outside Nenagh and +/- 30km northwest of the proposed Brittas WF. (Planning application 2460074 submitted in May 2023); and
- EEPV6 Ltd solar farm just outside Tipperary town and 39km south-west of the proposed Brittas WF. (This was permitted.) (Planning application 2360765 submitted in Sept 2023).

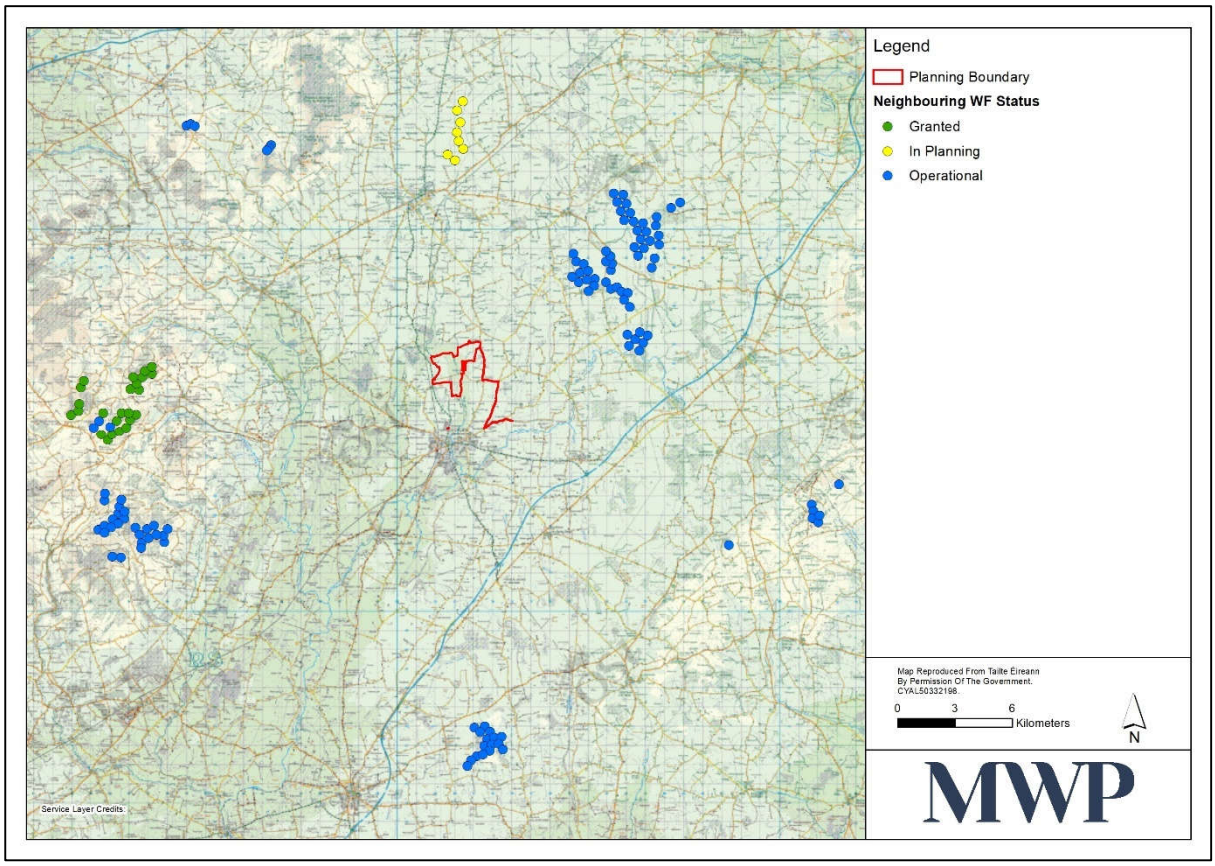


Figure 4: Wind Farm developments within 20km of proposed project

2.5 Risk of Major Accidents and Disasters

Incidents such as landslides or technological disasters can result in liabilities such as contaminated soil, loss of infrastructure and loss of life. Proactive risk management reduces the potential for an incident to occur, and therefore the CEMP (see Appendix 2 in EIAR Vol 3) for the proposed project sets out the Emergency Response Procedure to be adopted in the event of an emergency including contamination, health and safety and environmental protection.

The proposed project has been designed and will be built in accordance with the best practice measures set out in this EIAR and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design. Each EIAR chapter has also assessed the potential for major accidents and disasters.

A flood risk assessment was undertaken for the proposed project due to its location along the banks of the River Suir and the results of this assessment informed the design and layout of the proposed facilities and infrastructure (see Appendix 9A in EIAR Vol. 3) and the assessment of water and hydrological effects associated with the increase in impermeable hard standing areas across the proposed project site was assessed in Chapter 9 of EIAR Vol. 2. The reports concluded that the proposed project is not at risk of flooding, nor will the proposal have an adverse effect on flooding elsewhere and the residual risks are considered acceptable. In the case of the occurrence of a severe weather event such as flooding during construction, it is proposed that construction work will cease. On-site drainage and water storage facilities have also been included in the design to avoid pollution and slow down

any drainage flow from the works areas and proposed facilities. Consequently, it is considered that there is no potential for the proposed project to cause a major accident or disaster related to flooding.

A scoping exercise was carried out to determine whether a detailed Peat Landslide Hazard and Risk Assessment is required for this site. This scoping exercise reviewed whether peat was present onsite. No peat is mapped on the GSI maps for the site. During a site walkover a small area of peaty type soil was noted in the north-eastern corner of the site. Site investigations found small patched of peat less than 0.5m deep. As no infrastructure is proposed within this area of the site, it was not deemed necessary to carry out a Peat Stability Risk Assessment for this site. Overall, there is no risk of instability of the site, access roads, turbine bases, or grid connection from peat.

2.6 Impact of Climate Change

There is potential for the Proposed project 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 project from high wind speeds.

Flood risk is considered in EIAR Chapter 8 to determine whether the site is at risk from extreme fluvial flooding events. The turbines have been located to avoid areas prone to flooding. This assessment concluded that the site is not at risk from extreme flooding. The assessment also considered the increased risk of downstream flooding as a result of the forest felling, new site access tracks, turbine hard-standing areas and other new hard surfaces and determined that the risk of an increase in downstream flooding is low due to the small percentage increase in run-off contributing to the catchments as a result of the wind farm development.

2.7 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 project 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 Alternatives chapter therefore outlines the site selection process, the process of design evolution for the proposed development, the reasonable alternatives considered during the project 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 this chapter:

- Site Selection;
- Wind Farm Design Process; and
- Alternatives Considered included:
    - Alternative Turbine Options
    - Turbine layout alternatives
    - Substation and BESS sites
    - Grid Connection Routes
    - Turbine Delivery Routes
    - Wind monitoring facilities and locations
    - Alternative construction methodologies
    - Re-routing options for the ESB 38kV overhead powerline through the wind farm site
    - Alternative Telecommunications infrastructure.

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 project design and evolution can be read in Chapter 4 of Volume II of the EIAR.

The final site layout or final alternative (10 turbine layout) 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 project objectives of a large scale renewable wind energy development.

3. Environmental Assessment

The 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 this assessment considers the effects of the construction, operation and decommissioning of the proposed project in terms of how the proposal could affect population and settlement, economic activity, employment, land use, amenities and tourism, and health and safety.

The closest urban settlement to the proposed wind farm site is the town of Thurles approximately 3km to the south. The immediate vicinity is predominantly rural, with agricultural land surrounding the proposed site to the east, west, and north. In the study area, settlement patterns are dispersed, with some isolated houses. In the broader region, settlements range from medium-sized to small community settlements, including relatively isolated farmsteads. The area is rural yet moderately populated, characterised by scattered one-off housing and ribbon developments along the local and regional road networks serving the vicinity. The closest residential property is approximately 350m east of the proposed 110kV substation. The closest dwellings to the proposed wind turbines are 560m from T5 and 650m from T10 and belong to involved landowners. All the rest of the neighbouring dwellings are located at least 720m from any of the proposed turbines. (see Figure 5-5 in Chapter 5 of EIAR Vol. 2). Within 1km radius of the proposed wind turbines, there are 57 dwellings. A further 337 dwellings are located between 1km and 2km from the site. The 3km radius around the proposed turbines encroaches on the northern part of Thurles town and includes many more dwellings and some other sports and other social facilities.

The proposed development is not within any tourist attraction site. The closest tourist attraction is Loughagalla Park, located to the east of the proposed development. Retail and commercial facilities in the vicinity of the proposed development are located in Thurles and Templemore.

The development project will have a positive impact on employment at the local and regional level in the short term. It is the intention of the developer to encourage the main contractor to use local sub-contractors, drivers, suppliers and materials as much as possible. During the construction phase aggregates and concrete supply will be obtained from local quarries and suppliers, supporting the local economy. As with any development, the

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.

The highest risk of dust effects will be during the construction, when and if the weather is dry. Compliance with the proposed mitigation measures incorporated into the Construction Environmental Management Plan will minimise and effectively avoid this potential effect. Any potential negative visual effect in the locality due to construction activities is considered to be not significant and short term. While the construction works will be visible at a distance, the isolated location of the site will ensure that much of the rest of the activity at ground level will be less visible to traffic and will be screened. With the proposed mitigation measures in place, no significant negative effects on the local population and human health are expected during the construction phase.

During operation, the proposed development would bring added benefit to the local community through the provision of a community benefit fund. It is not likely that the proposed development would directly or indirectly result in any negative effect or reduction in existing economic activity of the area during any phase of the development. Serious risks to human health and safety are not envisioned. The rigorous safety checks imposed on the turbines during design, construction, commissioning and operation ensures the risks to humans are negligible. There are no predicted adverse operational impacts associated with the proposed development which would result in significant negative effects on local society. The project will produce electricity in an environmentally-friendly manner thereby avoiding the risk of air pollution and thus benefit human health.

In terms of impacts to neighbouring lands and land-uses it is considered that the proposed development does not pose a significant risk to either existing or future land-uses. All existing land use practices can co-exist with the proposed development. There will be no severance, loss of rights of way or amenities as a result of the proposed development. Noise effects are not considered to be significant. The noise assessment shows that that predicted noise levels will comply with the noise limits set out in the EPA guidelines and thus will not adversely impact on the quality of life of local residents and the existing relatively tranquil environment in which they live. Traffic related noise, congestion and safety issues during the operational phase are considered low. Dust effects are not expected during the operational phase. The shadow flicker assessment shows that while there is potential for a number of dwellings to experience shadow flicker effects, the operational mitigation measures proposed ensures that zero shadow flicker will occur at all residential receptors.

The visual factor of the development is an intrusive aspect. Given the size of the turbine structures and their proposed position, a visual effect 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 public perception. The landscape assessment demonstrates that the proposed development would not have a significant negative landscape effects. The visual effects during the construction phase for the wind farm site are expected to be localised to the proposed development site and immediate vicinity and expected to be short-term moderate adverse visual effects. The visual effects associate with the grid route construction are not considered significant. The visual effects from the turbines during the operational phase were rated for 25 viewpoints (see section 3.11 below). Some significant visual effects are likely to be generated as a result of the proposed development.

3.2 Biodiversity

This Biodiversity Chapter (6) presents an assessment of likely significant effects from the proposed project in relation to habitats, invertebrates, freshwater ecology, amphibians, reptiles, non-volant mammals and bats during the construction, operational and decommissioning phases. The existing baseline conditions and results of surveys undertaken to inform the assessment are detailed, in addition the proposed mitigation measures and monitoring required to reduce or eliminate any residual effects.

Biodiversity and ecological impacts of the proposed project have been assessed in accordance with Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal, and Marine published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018, updated 2022).

Key Findings

The site encompasses a variety of habitats, including improved grassland, wet grassland, marsh, hedgerows, rivers, and woodlands. Notably, some areas possess high ecological value, such as Molinia meadows and poor fen habitats within the substation fields. The assessment identified several protected species within the site, including bats, otters, badgers, pine martens, and marsh fritillary butterflies.

Potential Impacts

During the construction phase, the project will lead to temporary and permanent habitat loss, disturbance to wildlife, potential water pollution, and the potential spread of invasive species. Specifically, the construction activities will result in the removal of vegetation, soil, and rock for access roads, hardstands, and turbine bases, leading to the loss of habitats. Additionally, the clearance of hedgerows and treelines to facilitate infrastructure, noise disturbance, and light pollution could further impact the local biodiversity.

During the operational phase, the primary concerns include the risk of collision for bats, ongoing habitat disturbance, and potential water quality issues. The operation of the wind turbines poses a significant risk to bats due to the potential for collision and barotrauma. Furthermore, the presence of the turbines and associated vegetation buffers may lead to ongoing habitat disturbance and changes in water quality.

During the decommissioning phase, impacts are likely to be broadly similar to construction phase impacts, in terms of disturbance through increased noise levels, ground clearance works and water quality. However, activities occurring during the construction phase are anticipated to occur at reduced levels or not at all during decommissioning. Turbine foundations, access tracks and the substation (including ancillary infrastructure) that will be left in situ. In addition, the use of building materials, including concrete and aggregates will not be required.

Mitigation Measures:

To address the potential impacts, several mitigation measures are proposed.

During the construction phase, efforts will be made to avoid sensitive areas, implement buffer zones, manage water quality, and remove & monitor invasive species.

Specific measures include:

- Placing turbine locations and associated infrastructure at a minimum set-back distance of 50 meters from EPA-mapped watercourses.
- Utilizing Horizontal Directional Drilling (HDD) to avoid in-stream works at watercourse crossings.

- Implementing flood attenuation measures to limit flow rates into settlement ponds during high-intensity storm events.
- Appointing an Environmental Manager (EM) and an Ecological Clerk of Works (ECoW) to oversee the implementation of environmental protective measures and mitigation strategies.

During the operational phase, habitat buffers will be maintained, and smart curtailment for turbines will be implemented to protect bats. The smart curtailment plan involves reducing turbine operations during periods of high bat activity and favourable weather conditions. Additionally, ongoing ecological monitoring will be conducted to ensure the effectiveness of the mitigation measures.

During the decommissioning phase, mitigation measures as detailed for the construction phase will be implemented. These include limitations on the working corridor, minimised impact on vegetation, protection of water quality and protection of roosting bats.

Post-mitigation, the residual impacts on habitats, species, and water quality are expected to be minimal and not significant. The implementation of the proposed mitigation measures is anticipated to effectively reduce the potential adverse effects of the project on local biodiversity. The monitoring and maintenance of habitat buffers, along with the smart curtailment plan, will help ensure the long-term protection of bats and other wildlife species.

In conclusion, the proposed project aims to balance the development of renewable energy infrastructure with the preservation of local biodiversity. Through careful planning, implementation of mitigation measures, and ongoing monitoring, the project seeks to minimize its environmental impact and contribute to a sustainable future.

3.3 Ornithology

Chapter 7 provides an assessment of the likely significant effects on birds as a result of the proposed project. This assessment considers the ornithological impact of the entire proposal through the construction, operational and decommissioning phases for the proposed project in Co. Tipperary.

As detailed in Appendix 7A (in EIAR Vol. 3), a comprehensive desk study was undertaken to inform this ornithological impact assessment, involving a thorough review of available information that is relevant to the ornithology of the proposed project. The ornithological baseline for the impact assessment is informed by a comprehensive suite of ornithological surveys undertaken by appropriately qualified and experienced ornithologists from APEM Group: Woodrow Sustainable Solutions Ltd., between October 2021 and February 2024, and a team from Feehily Timoney between October 2020 to September 2021. These surveys applied best practice guidelines, compliant with SNH (2017) *Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms*). Wider area winter hen harrier roost searches out to 2 km as recommended by SNH (2017). The information contained in this chapter includes robust baseline data which has been used to assess the likely significant effects of the proposed project ornithology. No substantial limitations were identified in terms of scale, scope or context in the preparation of this assessment.

As outline in Section 7.2.4, the ornithological impact assessment was undertaken following specific guidelines for birds (Percival, 2003) found to be occur within the respective zones of influence for the for the proposed project and is consistent with the CIEEM (2018, updated 2019) Guidelines. In the absence of mitigation, likely significant effects were identified due to following impacts:

Impact: Deterioration in water quality, during both construction and operation

- Riverine birds, with specific effects of medium significance (Percival, 2003) on kingfisher, low significance on little egret, and cormorant and of very low significance on grey heron and imperceptible effects on grey wagtail.

Impact: Construction related direct/indirect disturbance

- Breeding assemblage of birds, with specific effects of low significance (Percival, 2003) on local breeding populations of lapwing, snipe, peregrine, kestrel, barn owl and of very low significance for green listed birds of prey, including sparrowhawk, buzzard and long-eared owl, other non-passerines including stock dove and imperceptible (EPA,2022) effects for a range of red/amber listed breeding passerine, especially for those nesting in woodland/scrub.
- Wintering waterbirds with specific effects of low significance(Percival, 2003) on lapwing, golden plover, snipe and very low significance (Percival, 2003) for jack snipe.

Impact: Operational collision risk

- Breeding waders including effects of low significance (Percival, 2003) for lapwing and snipe.
- Wintering waterbirds including effects of low significance (Percival, 2003) on for lapwing, golden plover, snipe and lesser black-backed gull.
- Birds of prey including effects of low significance (Percival, 2003) for kestrel and peregrine and very low significance (Percival, 2003) for buzzard.

Impact: Operational disturbance/displacement

- Breeding waders including effects of low significance (Percival, 2003) for lapwing and snipe.
- Winter waterbirds including effects of low significance (Percival, 2003) for lapwing and golden plover.
- Birds of prey including effect of very low significance (Percival, 2003) for long-eared owl.

Mitigation measures are set out in Section 7.5 to provide robust and effective protection to important ornithological features likely to be affected by the proposed development in the absence of mitigation.

As part of the iterative design process (embedded mitigation), areas of wetland habitats important to wintering waterbirds and breeding waders have been avoided and will be retained. Likewise, impacts on older growth woodland have been minimised and this habitat will be retained.

To avoid widespread disturbance to habitats and associated birdlife during construction, access within the proposed development site will be restricted to the footprint of the proposed works corridor and no access between different parts of the site will be permitted except via the proposed works corridor. An Ecological Clerk of Works (ECoW) will be employed throughout the construction phase to ensure that construction activities are compliant with the mitigation measures. This will include preconstruction site walkovers to implement the specified construction exclusion zones around any sensitive ornithological features identified during baseline; as well as identifying any changes in the distribution of sensitive species that may have occurred over the intervening time between the baseline and pre-construction surveys.

To avoid direct and indirect disturbance to breeding birds during construction, site clearance works (vegetation removal) will be undertaken outside the bird breeding season. Should the clearance of vegetation suitable for nesting birds be required during the bird breeding season, the relevant vegetation will be surveyed in advance clearance works and appropriate (species specific) exclusion zones will be implemented if nests/territories are identified. For areas identified as supporting breeding lapwing, monitoring will commence in February/ early March. The peregrine nest will be monitored throughout the breeding season while construction works are occurring in the southern part of the Proposed Project Site.

Species specific mitigation strategies are set out in Section 7.5 that will offset the effects of predict collision risk and displacement effects. This includes a range of offsetting enhancement measures such as the provision of nest boxes to increase productivity and maintenance/management of wetland habitats for breeding waters and wintering waterbirds and monitoring during sensitive periods, such as at fledging time for peregrine.

As presented is Section 7.6; Table 7-18 in Chapter 7 of EIAR Vol.2, any residual effects are outlined after taking account of the mitigation proposed. For the likely significant effects assessed, application of the proposed mitigation measures in full will limit residual effects to negligible/not significant (Percival, 2003). The exceptions being a disturbance/displacement effects to wintering waterbirds over construction ONLY and specifically to wintering lapwing, wintering golden plover and wintering snipe, where residual effects of low significance (Percival, 2003) remain. Any residual displacement effects on wintering waterbirds during construction are short-term, limited to the period of construction (unlikely to extend beyond one winter) and are reversible (EPA, 2022), and birds will return to the area post-construction.

3.4 Water

An impact assessment was carried out to determine whether the proposed development is likely to have a significant adverse effect on the hydrology and geohydrological aspects of the environment and to propose mitigation measures to reduce any potential negative impact of the proposed wind farm.

The proposed project site and grid connection area located within Hydrometric Area No. 16, also known as the Suir catchment, within the sub catchments 16_22 (Suir_SC_010) and 16_21 (Suir_SC_040).

There are five EPA mapped watercourses that flow from north to south within proposed project site and grid connection route. There are listed below and shown in shown in Error! Reference source not found.:

- River Suir (IE_SE_16S020500 and IE_SE_16S020600);
- Rossestown Bridge Stream (IE_SE_16S020500);
- Athnid More Stream (IE_SE_16S020500);
- Rossestown Stream (IE_SE_16R010300); and
- Farranreigh 16 Stream (IE_SE_16D020400).

The River Suir (IE_SE_16S020500 and IE_SE_16S020600) flows in an easterly direction north of Turbine 1 and 2. The river then bends and flows in a southerly direction between Turbines 3, 6, 7 and 8. It continues in a southerly direction and flows to the east of Turbine 9 and 10.

The Rossestown Bridge Stream (IE_SE_16S020500) flows to the east of Turbine 4. The Athnid More Stream (IE_SE_16S020500) then confluences this stream to the north of Turbine 5 which flows in a southerly direction to the East of Turbine 3 and 7 before the confluence with the River Suir passing Turbine 9 and 10. The grid connection route crosses this stream over a single span arch stone bridge.

The Rossestown Stream (IE_SE_16R010300) flows to the east of the proposed project site and confluences with the Rossestown Bridge Stream.

The Farranreigh 16 Stream (IE_SE_16D020400) is located to the east of Thurles and is crossed by the grid connection over a single span arch bridge before connecting into the Thurles substation.

The latest biological water quality data for the nearest EPA monitoring stations is show that the Suir River (although 'Not at Risk' where it flows through the proposed project site) is 'At Risk' of not achieving the WFD objectives.

A stage 3 flood risk assessment was undertaken and concluded that with the implementation of appropriate mitigation. The proposed project would not have an adverse effect on flooding elsewhere.

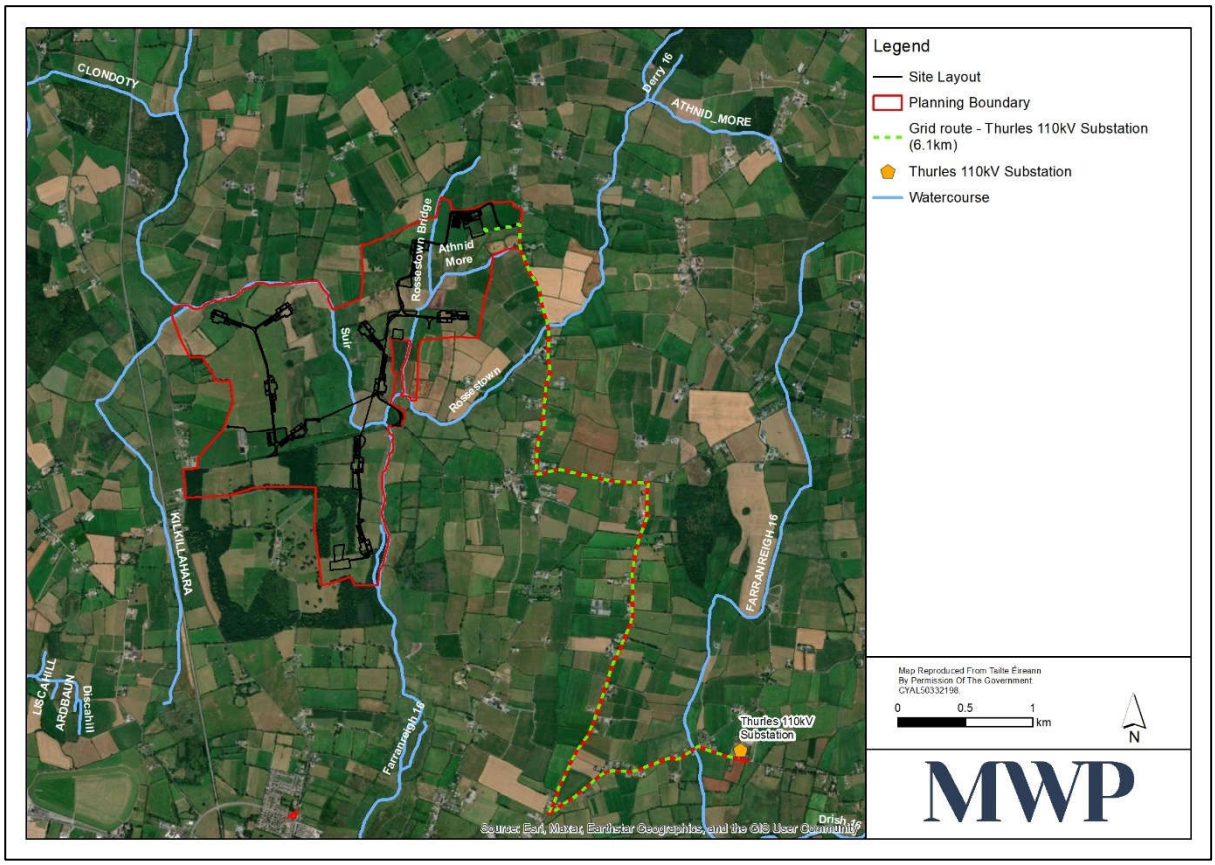


Figure 5: Surface Water Features

The proposed project site and grid connection route are situated within the Templemore and Thurles groundwater bodies (GWB) respectively. The majority of the proposed project site and grid connection are situated within an aquifer that is described by Geological Survey Ireland (GSI) as a Locally Important Bedrock Aquifer, which is Moderately Productive only in Local Zones (Category LI) (Error! Reference source not found.). Parts of the grid connection route to Thurles is situated within an aquifer which is described as a Regionally Important Aquifer, which comprises of bedrock which is Karstified (diffuse) (Category Rkd) and a locally important aquifer with bedrock that is generally moderately productive (Category Lm).

The GSI database lists sixteen boreholes and one dug well in proximity to the proposed project site. The current use of most (10) of these boreholes is unknown with the remainder for agricultural and domestic use. The Yield Class ranges between poor and moderate for these boreholes with some of them having an unknown yield class. The current turbine locations are not located within any Groundwater Group Schemes or Public Supply Source Protection Area. The closest turbine to a Group Scheme is approximately 500m.

During the construction period, the proposed development has the potential to lead to effects on hydrology and hydrogeology unless appropriate mitigation is applied. Majority of the potential effects will be mitigated through the design of the proposed project. New internal track construction will be required to provide access to all 10 turbine locations and the substation and BESS. The construction of new access tracks will require some additional drains and the removal of soil and diverting near-surface groundwater flow into the drains and channels. Seven watercourse crossings will be required for the internal access road, internal cables and two watercourse crossings required for the grid connection route. Where an open drain or watercourse is encountered during the installation of the internal site cable trenches; the cable trenches will cross the open drain or watercourse within the road carriageway via new or existing road crossing points to minimise the requirement for in-stream works.

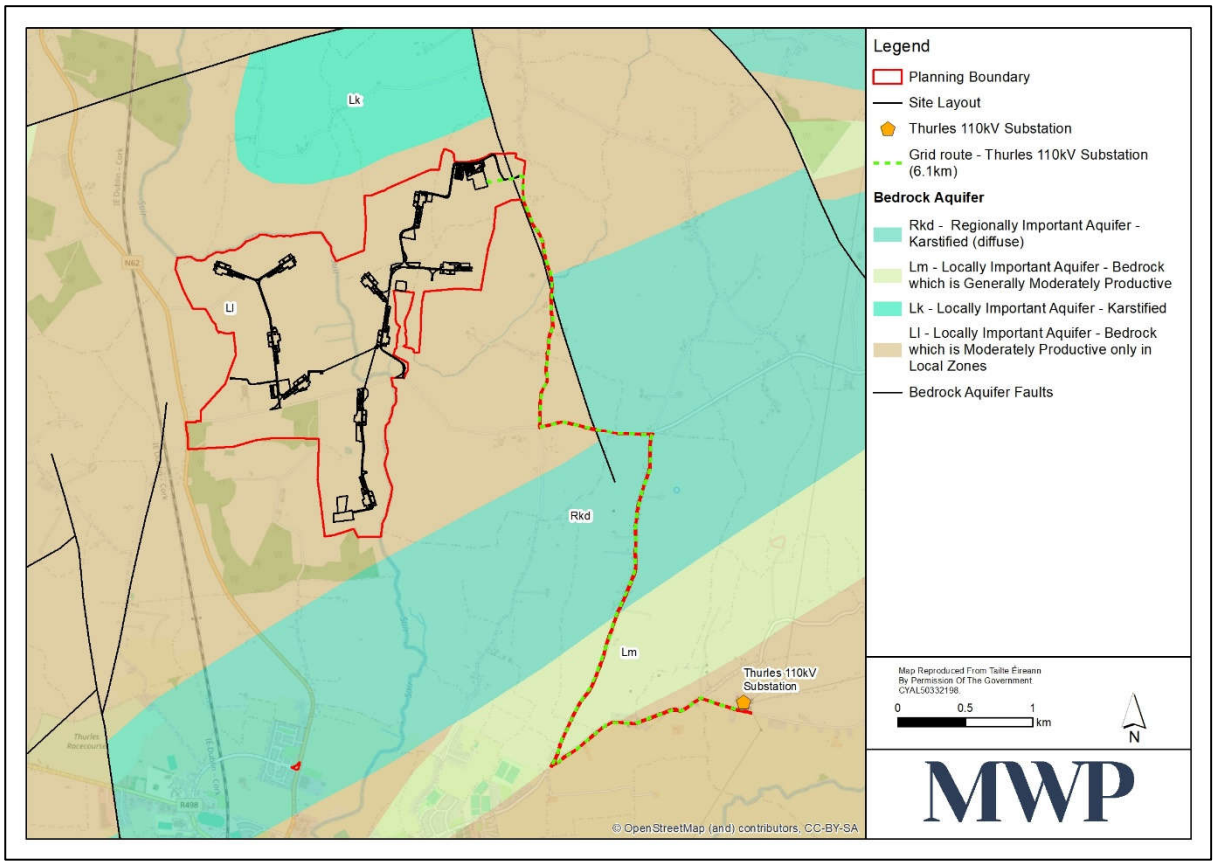


Figure 6: Groundwater Resources

During the operational phase, the main potential hydrological effect 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 impacts 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 in addition to the avoidance by design, the significance of the residual effect on the water environment during the construction and operational phase of the development is assessed as being imperceptible. Mitigation by design has been implemented initially to prevent adverse impacts. Other mitigation measures will be implemented and monitored throughout the construction and operation phases as outlined in the CEMP. It is considered that the proposed project design including control measures together with mitigation measures will ensure that there will be no significant negative effect on surface water quality, surface water flows or groundwater resources.

No significant cumulative impacts on any of the regional surface water catchment or groundwater bodies will occur as a result of the construction and operation of the proposed development.

3.5 Land and Soils

The Land and soils chapter describes any prospective effects on land and soils due to the construction and operation of the proposed development.

The study area for the proposed wind farm is primarily in agricultural fields which are bounded by hedgerows and treelines. There is an area of broad-leafed forestry in the southwest of the site. There is also the River Suir transecting the site from north to south. See **Figure 7** for CORINE Land Cover of the surrounding area.

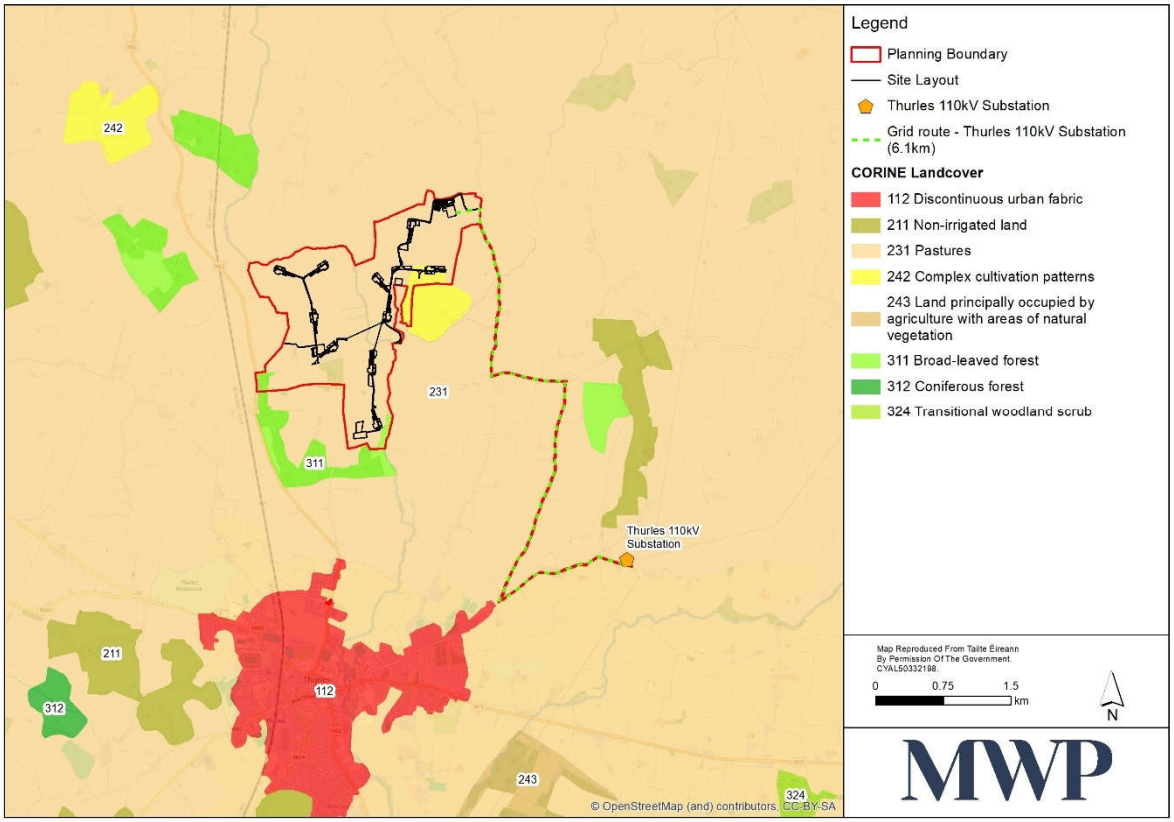


Figure 7: CORINE Land Cover

The site is described as being located on a largely flat area, with elevations of 100m to 120m AoD. The centre and southern areas of the site are low lying incised with the River Suir. The ground level drops by 5-10m AoD along the river and slopes towards the embankment.

The proposed site is underlain by Carboniferous Limestones, namely the Ballysteen Formation and Waulsortian Limestone. The sites overall structural setting is due to the Caledonian strikes which extend across the midlands from the Shannon estuary to the Irish Sea. The predominant soil type within the majority of the study area is *''BminDW- Deep well drained mineral with calcareous composition (mainly basic)''* followed by *''BminPD – Poorly drained mineral with calcareous composition (mainly basic)''* according to Teagasc / EPA Soil Map available on the Geological Survey of Ireland online mapping system. (See for Teagasc Soils in **Chapter 8** of **EIAR Vol.2**).

The proposed development will involve the removal of soil, subsoil, and bedrock for facilitating the construction of elements of the proposed development such as access tracks and hardstands emplacements. Aggregates (rock, stone, gravel, sand) used during construction of the tracks, hardstands, substation and BESS will be extracted from

the proposed on-site borrow pit. Large amounts of aggregates, concrete and steel will be used during construction. Concrete and additional aggregate materials will be sourced from authorised facilities.

Approximately 78% of all soils and subsoils generated from excavation works will be retained on site and reused in bunding, landscaping and localised earthworks. Approximately 22% of excavated material will need to be classified and removed from the site.

Any potential waste soil will be notified under Article 27 (European Communities (Waste Directive) Regulations 2011) or treated to comply with Article 28 (European Communities (Waste Directive) Regulations 2011) if practicable. Any materials containing invasive species will be appropriately managed and sent to authorised facilities.

During the construction phase, sources of contaminants (such as oil based substances or other hazardous chemicals) will not be stored at the site except where this is done within safely bunded areas that safely contain all spillages and prevent the migration of contaminants into soil and bedrock. Refuelling will be completed using a double skinned fuel bowser (twin walled, in case the outer wall (skin) of the bowser was ruptured accidentally) with spill kits on the ready in case of accidental spillages, and will not be undertaken within 50m of any watercourse. The risk is considered to be low once mitigation measures are implemented.

With the implementation of specific mitigation measures, no significant effects on the land, soil and geology of the site of the proposed development or along the grid route will occur during construction, operation, or during decommissioning due to correct procedures and outlined mitigations being in place.

The assessment also confirms there will be no cumulative effects on land soil and geology environment as a result of the proposed development.

3.6 Noise and Vibration

The assessment of environmental noise impacts 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. In essence, the effect can be objectively quantified by comparing the difference between the two.

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 address 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 residents and the environment.

A summary of the typical 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).
- During the night-time, the noise limit is 43dB or 5dB above the background (whichever is higher).

This applies at dwellings and if a resident is financially involved in the project, the limits can be increased by 5dB.

The assessment of the proposed Brittas Wind Farm (including the Battery Energy Storage System and Substation) has been comprehensively assessed 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 existing wind farm developments. A conservative, worst-case approach was adopted, and suitable uncertainty factors considered.

It was demonstrated that the construction/demolition phases will result in short-term elevated noise levels but will be within appropriate noise limits. Nevertheless, a comprehensive range of mitigation measured 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 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.

3.7 Cultural Heritage

An assessment of the archaeological and cultural heritage value of the site and the direct and indirect likely significant effects on archaeological features and heritage assets resulting from the construction, operation and decommissioning of the Proposed Project was undertaken.

Potential direct physical impact during the construction phase to National Monuments, Recorded Monuments, Protected Structures and Cultural Heritage Sites was assessed.

There are no National Monuments in State Ownership/Guardianship located on or adjacent to the Proposed Project, therefore there will be no direct impacts to these aspects of the archaeological resource and no mitigation is required.

There are no recorded archaeological sites located on the footprint of any elements of the Proposed Project. There are four recorded monuments (two ringforts: TN035-075, TN035-076; and two enclosures: TN041-008 and TN041-087) within the Red Line Boundary of Proposed Wind Farm Site and one recorded monument (ringfort TN041-026) situated within 120m assessed corridor of proposed GCR. The Proposed Project has been designed to avoid direct effect on all those monuments where possible and consequently there will be no direct physical effect to any. There is possibility that unrecorded archaeological features associated with the ringfort TN041-026 may be discovered during the excavation of GCR within the ZON of the monument. In that regards proposed mitigation measures are to undertake targeted archaeological monitoring within the ZON of the ringfort TN041-026 during the construction phase.

There are no Protected Structures or structures/items listed in the NIAH (National Inventory of Architectural Heritage) located within the Proposed Project. The nearest located Protected Structures is a vernacular house (RPS no: TRPS834) abutting the L-4119 road and consequently the proposed GCR to the west. Possible unlikely direct physical effect to this structure is classified as slight and no mitigation measures are required.

Potential direct physical effect on previously unknown, sub-surface archaeological features during construction phase was assessed and classified as: (1) - 'moderate' within the Red Line Boundary of Proposed Wind Farm; (2) – 'slight' during the construction works associated with GCR; and (3) – 'silght' during temporary works associated with TDR. Proposed mitigation measures will be to undertake archaeological testing followed by archaeological monitoring of all groundwork's associated with the construction the proposed turbines hardstands, temporary compounds, Met Lidar, borrow pit, spoil deposition areas and internal access track. Targeted archaeological monitoring is proposed within ZON of recorded ringfort TN041-026 during the construction of GCR and on the sections (pinch points) of TDR where ground will be disturbed.

Direct physical effects during the construction phase to cultural importance heritage sites were assessed and classified from 'not significant' to 'moderate'. Moderate direct physical effect was assessed to: (1) - Loughmoe East/Shyane Parish boundary; (2) - Rossestown and Clobanna townland boundary; (3) - Brownstown and Killeenleigh townland boundaries; (4) - vernacular structure 3; (5) - vernacular structure 6. 'Slight' effect was assessed to: (1) - vernacular structure 1; (2) - vernacular structure 4; (3) – vernacular structure 7. The effect on the other structures was assessed as 'not significant'. All groundworks associated with cutting through the townland / parish/ barony boundaries should be kept to a minimum and cutting locations should be archaeologically monitored and recorded. Archaeological monitoring is also proposed at the locations of vernacular structures.

Indirect impact describes the presence of the development during the operation phase when they may cause change to the surroundings of the archaeological or architectural heritage resource was assessed, however, there is no mitigation proposed for the operational phase of the project.

Potential cultural visual effects was assessed to National Monuments within 10km radius zone from proposed development and 3km radius study zone was undertaken to assess effects on Recorded Monuments and NIAH structures (including Recorded Protected Structures). This assessment was supported with the results of the ZTV analysis and photomontage undertaken from selected locations.

Cultural visual effects on National Monuments was classified from: 'slight' - (Rock of Cashel (National Monument No. 128)) to 'not significant' (Church (National (Monument No. 266) and Holycross Abbey (National Monument No. 121)).

Potential cultural visual effects to Recorded Monuments within 3km zone (including monuments within Red Line Wind Farms Boundary and two located outside of the zone but assessed in the chapter) was classified from 'not significant' (62 monuments), trough 'slight' (21 monuments) and 'moderate' (1 recorded monument) to 'significant' (2 monuments) .

Potential cultural visual effect on NIAH structures including Recorded Protected Structures was assessed and classified from 'not significant' to 'slight' effect. There are over a hundred structures located within 3km assessment zone of which vast majority of the likely effects was classified as 'not significant'. Likely slight effect was classified to the four structures situated within Brittas Demesne, to the House (Reg. No. 22404102) and the Ballyduag Creamery (TRPS769). No 'moderate' or 'significant cultural' visual effect was assessed to any of NIAH structures.

In the addition to heritage sites there will be 'slight' cultural visual impact on Rossestown Bridge and to the remains of lime kiln located within Brittas demesne.

There will be no significant potential impacts on the archaeological, architectural and cultural heritage environment during the decommissioning of the Proposed Development. Potential subsurface archaeological issues will have been adequately resolved by the mitigation measures in advance of the construction phase of the project. All townland / parish / barony boundaries impacted by the construction of the Proposed Development will revert to their pre-construction phase. Indirect effect during the operation phase which may cause change to the surroundings of the archaeological or architectural heritage resource will be reversed following the decommissioning phase

Cumulative impact consisted of evaluation of other existing and permitted wind farm projects within a 20km radius of the proposed BWF development was considered in order to assess potential construction phase cumulative impacts and assessed as 'slight'. This assessment was supported with results of ZTV's and analysis of several photomontage images. There is no mitigation proposed for the cumulative impacts of the project.

3.8 Air and Climate

The Air and Climate Chapter assesses the potential effects of the proposed wind farm on air quality and climate during its construction, operation, and decommissioning phases.

3.8.1 Methodology

The assessment followed best practices and current guidelines. It evaluated the baseline air quality, the potential impact of construction activities such as dust and vehicle emissions, and the carbon savings associated with the operation of the wind farm. The cumulative effects of nearby developments and future climate change impacts were also considered.

3.8.2 Air Quality

During the construction phase there will be emissions from vehicle exhausts. The movement of machinery, construction vehicles and the use of generators during the construction phase will generate exhaust fumes containing predominantly carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), and particulate matter (PM10).

Traffic levels for the construction period of the proposed development are below TII criteria which warrant a quantitative assessment of construction traffic and therefore are unlikely to cause an adverse effect on local air quality and will not have a significant effect on local, regional or national Air Quality Standards given the scale of the high levels of dispersion, and the limited duration of works.

In terms of air quality, the greatest likelihood of effects during the construction stage will be from dust emissions associated with the construction works.

In terms of air quality, the greatest likelihood of effects during the construction stage will be from dust emissions associated with the construction works.

Using Institute of Air Quality Management (IAQM) methodology, the dust emission magnitude is considered low risk across all construction and decommissioning activities. There is a minimum separation of 294m between the nearest dwelling and major construction element (substation), so therefore dust is unlikely to be a significant impact at the nearest dwellings. Approximately 60 receptors are located within a 50m buffer zone of the grid connection. Works along the grid connection are transient and will only pass roadside receptors for 1 to 2 days at a time. Therefore, effects from dust will be temporary and not significant, with mitigation measures applied.

Overall, dust and emissions from the construction works will likely result in a negative, not significant, temporary to short-term effect on sensitive receptors for the duration of the construction phase. Standard best practice will be adhered to during the construction phase in order to minimise fugitive dust emissions in particular.

During the decommissioning phase, to a less extent than the construction phase, there will be some dust generation and vehicle emissions, but these will be temporary and not significant.

Once operational, the wind farm will not emit significant pollutants. Emissions from maintenance vehicles will be negligible.

3.8.3 Climate

The operational wind farm will contribute significantly to reducing greenhouse gas emissions by displacing fossil fuel-based electricity generation. It is estimated that the wind farm will save 56174 tonnes CO_2 (based on a 5.7MW

turbine wind farm providing 149,796MWh of annual renewable electricity) to 65,043 tonnes CO_2 (based on a 6.6MW turbine wind farm providing 173,448MWh of annual renewable electricity) per year.

There will be some carbon dioxide (CO_2) losses associated with the turbine life (manufacture, construction and decommissioning), and the temporary disruption of the natural on-site natural CO_2 sink resources. However, this will be quickly re-paid once the wind farm is operational. The calculated payback CO_2 period is 0.9 years.

3.8.4 Conclusion

The proposed wind farm, in combination with other nearby developments, will have a negligible effect on air quality and climate, especially once operational. The renewable energy produced will reduce greenhouse gas emissions, contributing positively to Ireland's decarbonisation efforts.

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 wind farm project will assist Irelands CO_2 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 2024 and the 2022 - 2028 Clare County Development Plan.

Overall, Brittas 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.

The operational phase of the proposed development will have a positive, moderate and long-term effect on climate.

3.9 Material Assets

This assessment identifies Material Assets within the vicinity of proposed Brittas Wind Farm, a ten (10) turbine wind energy development, 3km north of Thurles in Co. Tipperary. Material asset assessed include grid capacity and electrical infrastructure, gas, aviation, telecommunications, waste and wastewater infrastructure and waste management.

3.9.1 Electrical Infrastructure

The main components of the development are ten (10) wind turbines with a height of 180m, an on-site 110kV electrical substation, a Battery Energy Storage System (BESS) and an underground electrical connection to an existing 110kV substation at Thurles which is connected to the National Grid. This is the preferred technical grid connection approach. The final selected grid route and connection strategy will be confirmed by way of a future grid connection offer process and as determined by EirGrid. All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB networks and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines.

Where new services are required, the Contractor will apply to ESB Networks for a connection permit where appropriate and will adhere to their requirements. It is proposed to construct a 110kV cable in the public road between the proposed onsite substation and existing Thurles 110kV substation. The underground cabling will be constructed in a trench within the public road corridor.

The accommodation works for the Turbine Delivery Route (TDR) will require some brief disruption to electrical supplies due to movement of existing overhead lines and poles at 2 pinch points along this route. The ESB will be consulted on these proposed temporary changes and will need to approve them and facilitate the dis-connection and reconnections of the affected lines and poles.

The electricity generated by the proposed project will assist to displace electricity from coal, oil and gas fired power plants, thus reducing emission from these power plants. The proposed project includes a 110kV substation and Battery Energy Storage System (BESS) to accommodate the additional renewable energy to be generated.

In the event of decommissioning of the wind farm, this will result in the removal of between 57MW and 66MW of renewable electricity from the national grid.

3.9.2 Gas

Natural gas is supplied via underground interconnecting pipelines throughout the Country. The natural gas network in Ireland is run by Gas Networks Ireland.

Following consultation with Gas Networks Ireland Dial Before You Dig (DBYD), there are no identified gas network utilities within the proposed project site boundary or surrounding areas. Therefore the project will have no effects on gas infrastructure.

3.9.3 Telecommunications

Results from Ai Bridges impact analysis indicate that there are four radio links that cross over the proposed project and may potentially temporarily be impacted dependent on the turbine layout. The radio links that cross over the wind farm site are ENET (two microwave radio links) - Three Ireland and Vodafone Ireland (one microwave radio link each). There will be limited interference to exiting radio links during the construction phase as cranes will temporarily be in place and turbines will be erected gradually over the 18-month construction period

During operation, there is potential interfere with telecommunications signal on some networks, from the turbine structures. It is anticipated that any potential interference with links can be suitably overcome through mitigation measures (see section 10.6.4)). A copy of Ai Bridges Telecommunications Report is attached as **EIAR Volume 3 Appendix 10B**.

Decommissioning will likely have no effects as turbines will be removed from the site, removing any potential obstruction to telecommunications links.

3.9.4 Aviation

Due to the proposed project lack of proximity to the above aerodromes, during construction, cranes and turbines effects are described as **neutral, slight, localised, temporary, likely,** and **direct**. In the event of a grant of planning, the proposed project will be required to register in the IAA Air Navigation Obstacle Data set. 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 project, 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 10 No. wind turbines and

towers removed. Removal of infrastructure will be undertaken in line with landowner and regulatory requirements and best practice applicable at the time. As the infrastructure will be removed, there will be no effect on aviation.

3.9.5 Water and Wastewater Infrastructure

Water needs for construction activities will be limited to concrete truck chute washing, wheel wash, dust suppression and sanitary facilities. It is proposed that this water requirement will be imported in bulk water tanks, therefore not impacting the local water supply. The volumes of water required are minimal and will have a negligible impact on the water supply utilities.

During construction works, there will be a temporary compound, it will be used as a secure storage area for construction materials, waste materials and also contain temporary site accommodation units to provide welfare facilities and enclosed wastewater management system. Sanitary wastewater will be collected in portable toilets. Disposal of sanitary wastes will be managed through a contract with a licensed waste contractor. 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 water mains.

During the operational phase, maintenance personnel will visit the substation building on a semi-regular basis. The daily average wastewater production during the operational phase is estimated from the average number of workers on site, which is expected to be 2 workers, resulting in a typical wastewater production rate of 100 litres per day, on days where workers are present on site. Welfare facilities during the operational phase will utilise rainwater harvesting at the substation

During decommissioning works, temporary compounds will be set up and used as a secure storage area for materials, waste materials and contain temporary site accommodation units to provide welfare facilities and enclosed wastewater management system. Sanitary wastewater will be collected in portable toilets and potable water will be brought to site by tanker. Disposal of sanitary wastes will be managed through a contract with a licensed waste contractor to a wastewater treatment plant. During decommissioning, there will be no impact on in-road water infrastructure as the cables would be left in-situ.

3.9.6 Waste Management

waste management will be undertaken in order of priority, as follows, prevention; re-use; recycling; other recovery (including energy recovery); and disposal. Construction phase waste will be stored in the construction compound and collected 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. All waste to be removed from site will be undertaken by authorised waste contractors and transported to an authorised facility in accordance with best practice. During the decommissioning phase, waste will be kept to a minimum. The majority of materials on site will be recycled.

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

During the decommissioning phase, waste will be kept to a minimum. The majority of materials on site will be recycled. Domestic type waste generated by contractors will be collected on site, stored in an enclosed skip at the temporary compounds and disposed of at an appropriately authorised facility. Tracks, hardstanding areas and foundations will be left in situ with hardstands and foundations covered over and revegetated. All non-recyclable or reusable materials will be disposed of in a licenced waste facility.

3.10 Shadow Flicker

Shadow flicker is defined as the alternating light intensity produced by a wind turbine as the rotating blade casts shadows across the window of a residence.

In line with best practice, the scope of this assessment extends to a distance of 10 times the maximum rotor diameter (1.55km for the 155m rotor diameter, 1.50km for the 150m rotor diameter and 1.49km for the 149m rotor diameter).

There are approximately 148 No. residential dwellings within 155 RD turbine type, and 139 No. residential dwellings within the study area for the 150 RD and 149 RD turbine types. The output from the Shadow Flicker model determines that out of the 148 properties within the 10 RD study area, Shadow flicker could theoretically occur at up to 107 properties, under theoretical conservative conditions, while 41 properties would remain unaffected, within all three 1.55km, 1.50km and 1.49km 10 rotor diameter study areas.

The likelihood and duration of this effect occurring however depends upon certain combinations of factors namely sunshine, turbine and window locations, turbine orientation, weather conditions and intervening structures or vegetation. When average annual sunshine data is taken into account, the potential annual shadow flicker at most dwellings falls well below the best practice threshold of 30 hours per day. 12 dwellings will potentially experience shadow cast from turbines with a RD of 155, 6 dwellings from turbines with a RD of 150, and 5 dwellings from turbines with a RD 149.

While when average daily sunshine data was taken into account, all dwellings fell below the 30-minute per day threshold for all three turbine types (RD 155, RD 150 and RD 149).

The shadow flicker assessment described in Chapter 13 of the main EIAR will inform the Shadow Flicker Control Measures (SFCM) that will be designed for relevant turbine to ensure that shadow flicker does not occur. Shadow Flicker Control Measures (SFCM) are a standard element of commercial wind turbine packages which require the identified dates and times of day of potential occurrence at dwellings within the shadow flicker study area to be inserted into the SFCM computer program. The installation of a programmable shadow flicker module will allow the control of turbines in order to eliminate shadow flicker. The correct operation of the installed shadow flicker control measures will ensure that there will be no impact from shadow flicker. The operation and performance of the shadow flicker control measures will be monitored on an ongoing basis.

3.11 Landscape and Visual

This chapter describes the Landscape and Visual Impact Assessment of the proposed Brittas Wind Farm. Landscape and Visual Impact Assessment is a tool used to identify and assess the significance of effects resulting from development on both the landscape as an environmental resource in its own right, as well as on people's views and visual amenity.

3.11.1 Study Area

In accordance with Landscape and Visual Impact Assessment best practice, a 20km study area was applied for this chapter. The vast majority of the study area, including all areas within approx. 9km of the site, is within Co. Tipperary. In addition, eastern sections of the study area are within Co. Kilkenny; the northeast section is within Co. Laois, while a small north-western section is within Co. Offaly.

3.11.2 Baseline

Set within the fertile plain of central Tipperary, the site's terrain is low-lying and gently undulating, with the River Suir flowing through the site. The wider landscape reflects that of the site, although towards the eastern, western and north-western extents of the study area, there are numerous tall hills/low mountains. Throughout the study area, the Suir remains the main watercourse present, while there are also 12 No. operational Wind Farms located within the study area. Similar to that of the wider study area, the site's landcover is that of intensively managed pasture, with field sizes tending to be medium-large. Adjacent to the southwest section of the site is the former demesne landscape of Brittas Castle.

There are numerous towns and villages within the study area, with the nearest being Thurles, located approx. 3km south of site. In terms of recreation and amenity, there is only one known (publicly accessible) trail within 10km of the site. The N62 aligns a small section of the western extent of the site, while approx. 200m west of the site boundary, is the Dublin-Cork railway line. Overall, the landscape is highly settled (in the context of rural Ireland), with numerous dwellings outside of settlements, and is not considered especially remote or tranquil.

3.11.3 Landscape Effects

Landscape Sensitivity relates to landscape value and landscape susceptibility, but the sensitivity of the landscape receptor is also related to the type of development proposed. The landscape sensitivity of the site and its immediate surrounds, as well as the wider study area, is considered to be Low-Medium.

In terms of the significance of the likely landscape effects during the construction phase, this will result in a Moderate significance of landscape effect for the on-site elements of the proposed development. While the quality of effect will be Adverse, the construction phase will also be short-term in nature (i.e. expected to last for up to 18 months). The proposed grid connection route, as well as some other elements of the project to be assessed, will result in a Slight significance of landscape effect, and will be Neutral-Adverse in nature. For the wider landscape of the study area, this will result in an Imperceptible landscape effect during the construction phase, with a quality of effect that will be Neutral in nature and Short-term in duration.

In terms of the significance of likely landscape effects during the operational phase (i.e. post-construction), this will result in a Moderate significance of landscape effect for the on-stie elements of the proposed development. The quality of effect will be Adverse in nature and long-term in duration. In terms of the wider landscape, the likely landscape effects during the operational phase will result in a Slight significance of landscape effect. The quality of effect will be Adverse in nature and long-term in duration.

Thus, no significant landscape effects are likely to be generated by the proposed development.

3.11.4 Visual Effects

Potential visual receptors (i.e. people in the study area) include a variety of viewers, both in close proximity to the site and those at some distance, as turbines are likely to be seen over a wider spatial area than most other types of development.

Higher sensitive visual receptors include residences in close proximity to the site, recreational trails/amenity areas, scenic routes/ protected views and, finally, designated landscapes. Less sensitive visual receptors include national roads and motorways, or those at work, as well as those working/living in urban areas.

A set of 29 no. verified photomontages were produced from carefully selected viewpoints - from a range of different distances, angles and contexts throughout the study area – and used to assist in assessing the likely visual effects. However, as four of these viewpoints are not in the 'public sphere,' these were not assessed in this chapter (i.e. they were created for the benefit of other chapters in this EIAR, and/ or from the private property of a local landowner). Consequently, the visual sensitivity of the 25 No. viewpoints that were visually assessed in this chapter, ranged from 'Low' to 'Very High.'

In terms of the significance of the likely visual effects during the construction phase, these are likely to be localised and affect only the site and immediate vicinity, with some patrial views from public roads. However, all likely construction-stage visual effects will be short-term in duration. In summary, the visual effects are likely to be Moderate and adverse in the immediate vicinity of the site, while the grid connection is likely to result in Not Significant adverse visual effects. With regards to the other elements of the project that are to be assessed within this EIAR, these are likely to result in Imperceptible and neutral visual effects. Meanwhile, the significance of visual effect on the wider landscape is considered to be Imperceptible and neutral.

In terms of the significance of the likely visual effects during the operational phase, of the 25 No. viewpoint locations assessed: three viewpoints were judged to be Significant and adverse; one viewpoint was considered Moderate-Significant and adverse; three viewpoints were considered Moderate and adverse; three viewpoints were considered Slight-Moderate and adverse; seven viewpoints were considered Slight (five of which were adverse, with two being neutral); three viewpoints were considered Not Significant and neutral, and, finally, five viewpoints were considered Imperceptible and neutral. Thus, some significant visual effects are likely to be generated as a result of the proposed development.

3.11.5 Cumulative Visual and Landscape Effects

Cumulative effects can be defined as the additional changes caused by a proposed development in conjunction with other similar developments, or as the combined effect of a set of developments, taken together. On review of the 25 No. photomontages, it is evident that where other wind energy developments are visible in the photomontage, they appear as discrete elements that are at some distance from each other. It is worth noting that no other wind energy developments are within 9km of the site, and only one such development is within 13km of the site.

In terms of cumulative landscape effects, these are likely to be Slight to Moderate and adverse. In terms of cumulative visual effects, receptors at the majority of viewpoints will not view the proposed development in combination with any existing/ permitted/ proposed turbines. In most viewpoints where other turbines are visible (in combination), these appear as distant and distinct turbines from other wind farms more than 9km from the proposed development. Thus, it is worth noting that 'Imperceptible' cumulative visual effects pertain to 17 of the 25 No. viewpoints assessed.

In summary, cumulative visibility is considered to vary throughout the study area, ranging from 'Imperceptible', in the majority of viewpoints, to 'Slight-Moderate,' in one viewpoint. Thus, significant cumulative impacts are not considered to occur.

3.12 Interaction of the Foregoing

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

A matrix has been generated to summarise the relevant interactions and interdependencies between specific environmental aspects (Refer to Table 2). It contains each of the environmental topics, which were considered as part of this environmental impact assessment, on both axes. No major adverse interactions were identified.

Table 2: Matrix of Effects

	Population and Human Health	Biodiversity and Ornithology	Water	Land and Soils	Noise and Vibration	Shadow Flicker	Landscape & Visual	Cultural Heritage	Air Quality and Climate	Material Assets	Traffic and Transport
Population and Human Health			C	C	C/O/D	O	C/O/D	C	C/O	C	C/D
Biodiversity and Ornithology			C	C	C/O/D				C/O		C/D
Water	C	C		C							
Land and Soils	C	C	C		C		C	C	C		C
Noise and Vibration	C/O/D	C/O/D		C					C		C/D
Shadow Flicker	O						0				
Landscape & Visual	C/O/D			C		O		C/O			C/D
Cultural Heritage	C			C			C/O				
Air Quality and Climate	C/O	C/O		C	C					C/O	C/D
Material Assets	C/O								C/O		C/D
Traffic and Transport	C/D	C/D		C	C/D		C/D		C/D	C/D	

	Interaction Occurs
	No Interaction

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

3.13 Schedule of Mitigation Measures

Chapter 18 of EIAR Vol. 2 summarises all the environmental mitigation and monitoring measures recommended in the Environmental Impact Assessment Report (EIAR) and the Natural Impact Statement for the Proposed Project for each phase of the proposed project.