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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED LITTLETON WIND FARM, CO. TIPPERARY

Volume 1 - Non-Technical Summary

Prepared for:
Littleton Wind Farm DAC

BnM | sse

Date: **June 2026**

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VOLUME 1 | Non-Technical Summary

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Abstract: Fehily Timoney and Company (FT) has been retained by Littleton Wind Farm DAC to prepare an EIAR for the Proposed Development of Littleton Wind Farm, Co. Tipperary. This document is the Environmental Impact Assessment Report (EIAR) for the planning consent stage of the Proposed Development.

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1. INTRODUCTION

This Non-Technical Summary (NTS) has been prepared by Fehily Timoney and Company (FT) on behalf of Littleton Wind Farm DAC, a joint venture of SSE and Bord na Móna Powergen Ltd., a subsidiary of Bord na Móna plc. trading as BnM. The report summaries the findings contained in Volume II which is the Main Environmental Impact Assessment Report (EIAR).

Common terms and acronyms used throughout this EIAR can be found in Appendix 1.3 Glossary of Terms and Abbreviations, contained in Volume 3 of this EIAR.

The Proposed Development assessed in this EIAR comprises the following elements:

- The 'Proposed Wind Farm' (also referred to in this EIAR as the 'Site');
- The 'Proposed Grid Connection' (also referred to in this EIAR as the 'GC');
- The 'Turbine Delivery Route' (also referred to in this EIAR as the 'TDR');
- The 'Biodiversity Management and Enhancement Plan Lands' (also referred to in this EIAR as the 'BEMP Lands');

The location of the Proposed Development is shown in Figure 4.1, contained within Volume 4 of this EIAR. The general layouts (including BEMP lands) of the Proposed Wind Farm are shown in Figure 4.2(a), (b) and (c). The Grid Connection (GC) route and Turbine Delivery Route (TDR) are presented in Figures 4.3 to 4.4, Volume 4.

1.1 Development Description

Littleton Wind Farm DAC (hereafter referred to as the Applicant) intends to apply to An Coimisiún Pleanála (ACP) for planning permission to construct a wind energy development predominantly located in East County Tipperary and includes lands in the townlands of Longfordpass North, Longfordpass South, Leigh, Bawnreagh, Clonoura, Noard, Derryhogan, Derryvella, Ballybeg, Lanespark, Newhill and Killeen, County Tipperary.

The Proposed Development of Littleton Wind Farm will comprise of the following:

- Construction of 11 no. wind turbines with a blade tip height of 200 m, a hub height of 119 m and a rotor diameter of 162 m.
- Construction of permanent turbine foundations and crane pad hard standing and assembly areas including associated drainage infrastructure;
- Construction of 15.45 km of new internal access tracks and associated drainage infrastructure;
- Upgrading of 2.95 km existing tracks and associated drainage infrastructure;
- Creation of 3 no. new site accesses (2 no. on the Local Road L4114 and 1 no. on the Regional Road R639) to serve as construction and operation accesses to the Proposed Wind Farm Site
- Upgrading of 3 no. existing site entrances (1 no. on the L2201 and 2 no. on the Local Road L4153) to serve as construction and operation accesses to the Proposed Wind Farm Site;
- Installation of new pipe culverts within the Proposed Wind Farm Site where proposed infrastructure crosses existing drains;
- All associated drainage and sediment control including interceptor drains, cross drains, sediment ponds and swales;

- Development of 1 no. on-site construction borrow pit and associated ancillary drainage;
- 5 no. temporary construction site compounds and associated ancillary infrastructure including parking,
- 2 no. temporary security cabins;
- Erection of 1 no. permanent meteorological mast to a height of 120 m above ground level, with an approximately 1 m long lightning protection rod protruding above this;
- Construction of 1 no. permanent onsite 110 kV electrical substation to EirGrid specifications, including an associated compound and ancillary infrastructure comprising:
  - Control buildings, equipment storage and welfare facilities
  - Electrical infrastructure
  - 10no. Car Parking spaces (of which 4no. are EV Parking with chargers)
  - 2 no. Wastewater holding tanks
  - 2 no. Rainwater harvesting tanks
  - 2 no. Water supply bored wells
  - Telecommunications tower to a height of 36m (with an approximately 1 m long lightning protection rod protruding above this) and associated fencing, foundation and hard-standing area
  - Lightning masts and lighting poles
  - Security fencing and stock proof fencing
- Installation of medium voltage underground electrical and communication cabling connecting the wind turbines to the proposed on-site substation and associated ancillary works;
- All associated infrastructure, services and site works including excavation, earthworks, peat and spoil management;
- Creation of 6 no. dedicated peat and spoil deposition areas and berms for the management of peat and spoil within the Site;
- Vegetation clearance to facilitate construction and operation of the proposed development;
- Provision of onsite recreation and amenity facilities to include a 4km walking/cycling trail and associated car park;
- Biodiversity enhancements measures to include tree planting, drain blocking, wetland retention, ponds, eucalyptus removal, nest boxes, log piles, refugia / hibernacula, calcareous grassland and Marsh Fritillary habitat within the Wind Farm Site.

Permission is being sought for a period of 10 years for the Wind Farm and an operational life of 35 years from the date of full commissioning. Permission is sought in perpetuity for the operation of the Substation as this will become an asset of the national grid under the management of EirGrid and ESB Networks and will remain in place upon decommissioning of the Proposed Wind Farm.

The proposed wind turbine generator (WTG) parameters assessed in this EIAR comprises a conventional three-blade horizontal axis wind turbine. Detailed dimensions of the proposed WTG are shown on the 0300-Series planning application detail drawings.

Whilst consent is not being sought as part of this application for the proposed GC route to facilitate a connection to the national transmission grid network at Ballyragget, Co. Kilkenny, it is assessed as part of this EIAR. Consent for the Proposed Grid Connection will be sought through a separate planning application.

Figure 4.1, (Volume 4 of this EIAR), shows the general layouts (including BEMP lands) of the Proposed Wind Farm, which are shown in Figure 4.2(a), (b) and (c) of Volume 4. The Grid Connection (GC) route and Turbine Delivery Route (TDR) are presented in Figures 4.3 to 4.4, Volume 4.

1.1.1 Permission Period

The applicant requests a grant of permission on the basis of a 35-year operational period from the date of full operational commissioning of the wind farm. With permission for the onsite substation sought in perpetuity given that the substation will form part of the national electricity network. Therefore, the substation will be retained as a permanent structure and will not be removed.

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

1.2 Need for the Proposed Development

The Proposed Development will have an Export Capacity of 68.2 MW, and is necessary to produce renewable energy for the Irish national grid, in order to transition Ireland to a low carbon economy.

At a strategic level, the need for the Proposed Development is supported by International, European, National and Regional environmental and energy commitments and policies. Chapter 2: Background to the Proposed Development and Need for the Proposed Development, provides a detailed description of the relevant policies and renewable energy commitments regarding the Proposed Development. This is within the context of continuing failure by Ireland in meeting climate targets as outlined in the Environment Protection Agency's (EPA) report Ireland’s Greenhouse Gas Emissions Projections 2023-2050 (EPA, May 2024).

1.2.1 Community Benefit

The Proposed Development will have both long-term and short-term benefits for the local economy including additional income to local landowners, job creation, work opportunities for local businesses and service providers, local authority commercial rate payments and a Community Benefit Scheme

Commercial rate payments from the Proposed Development will be provided to Tipperary County Council each year which will be redirected for provision of public services including road upkeep, fire services, environmental protection, street lighting, footpath maintenance, etc. within Tipperary County Council.

The construction of the Littleton Wind Farm will also create approximately 80 - 100 jobs and 2-3 permanent jobs during operation. It is possible that there will be direct employment for people living in the Study Area who may be qualified for construction related roles. The employment of local construction workers and the use of locally sourced materials will be encouraged. This will assist in sustaining employment in the local construction trade. Furthermore, local businesses in the nearby towns and villages will likely receive an influx of workers to the area who will require services such as shops and food places.

As part of the Proposed Development, a recreational amenity in the form of walking and cycling trails is proposed within the Wind Farm Site to enhance public access and promote the recreational use of the area. A network of trails forming loops and links is proposed utilising a combination of the internal access tracks proposed for the windfarm and approximately 4.0 km of new floating dedicated amenity tracks, with all new amenity trails designed to a width of 3 m to accommodate both pedestrians and cyclists. To support public access, an additional car parking area is proposed adjacent to the site entrance to the R639 in proximity to the amenity trail. As part of this dog proof fencing is included, which will help to protect adjacent sensitive areas.

Furthermore, a Community Benefit Fund will be developed during the first year of operation of the wind farm. The value of the Community Benefit Fund will be linked to the productivity of the wind farm, and is calculated based on €2/MWh for the overall total generated by the Proposed Development. It is estimated that the proposed Fund could be in the region of c. €5.5 million over the first 15 years of the Fund, on the basis that the Proposed Development will generate 185,204 MWh of electricity per year.

1.3 Site Background

1.3.1 Former Use of Site

Industrial scale peat extraction ceased at the Site in 2017. BnM formally announced in January 2021 that all industrial scale peat extraction on lands within its management would permanently cease in line with its on-going climate action programme and its transition to becoming a climate solutions company.

BnM have applied for substitute consent to regularise, without prejudice, the planning status of peat extraction and ancillary activities within the Littleton, Longfordpass, Lanespark and Derryvella Bogs (with Derryvella Bog located outside the area of the Proposed Development of Littleton Wind Farm).

BnM was granted its Integrated Pollution Control Licence (IPC) Licence (Ref. P0499-01) from the EPA in August 2001 for the Littleton Bog Group, in addition to a number of other bogs located in Co. Tipperary.

The Littleton Wind Farm will facilitate the transition of these lands away from peat related activity to a sustainable renewable energy use (which can be considered a sustainable after use). A series of other items including, amongst other things, Biodiversity Enhancement Measures and recreational trails and amenities are also proposed in this Application. This emphasises the Applications compliance with Policy Objective 3-I of the Tipperary County Development Plan 2022 -2028 which seeks to support projects which facilitate the continued transition away from industrial cut-over peatlands, to sustainable after uses. Please refer to Sections 2.5 to 2.11 of Chapter 2 of this EIAR for a full assessment of the Littleton Wind Farm against relevant International, European, National, Regional and Local policies.

1.3.2 Peatland Rehabilitation (Phase 1)

Rehabilitation Phase 1 works were completed in Littleton, Longfordpass, Lanespark Bogs and the nearby Ballybeg and Derryvella Bogs between 2018-2021 with extensive drain-blocking and hydrological management. The key objective of peatland rehabilitation is environmental stabilisation. The rehabilitation works that have been completed in Phase 1 are described in the Cutaway Bog Decommissioning and Rehabilitation Plans (Appendix 2.1) and in Section 2.2 of Chapter 2.

1.3.2.1 Peatlands Climate Action Scheme (PCAS) (Phase 2)

In line with BnM's accelerated decarbonisation strategy, BnM has committed to ambitious enhanced peatland decommissioning, rehabilitation and restoration measures, targeting c. 33,000ha in over 80 no. BnM bogs.

This strategy has been developed to optimise ecosystem service benefits of peatland rehabilitation and restoration, particularly carbon storage and reducing carbon emissions. In addition, this will also benefit biodiversity and water (water quality and catchment management).

An updated Cutaway Bog Decommissioning and Rehabilitation Plan for the nearby Ballybeg and Derryvella Bogs was prepared in 2025 to include Phase 2 enhanced rehabilitation measures (as part of the Peatlands Climate Action Scheme) (see Appendix 2.1 of Volume 3).

1.3.3 Substitute Consent Application

A concurrent application has been submitted to An Coimisiún Pleanála for substitute consent for historic peat extraction and ancillary works on the Lanespark, Longford Pass, Littleton and Derryvella Bogs under Section 177E (Application for Substitute Consent) of the Planning and Development Act 2000, as amended.

1.4 EIAR Structure

The EIAR has been prepared using the "grouped format structure" as outlined in EPA guidance document (EPA, 2022). Using this structure there is a separate chapter for each topic, e.g. air quality and climate, biodiversity, hydrology. The description of the existing environment, the Proposed Development and the potential effects, mitigation measures and residual effects are grouped in the chapter. The grouped format makes it easy to investigate topics of interest and facilitates cross-reference to specialist studies.

The EIAR is structured as follows:

- Volume 1 – Non-Technical Summary (NTS)
- Volume 2 – Main EIAR
- Volume 3 – Appendices to the Main EIAR
- Volume 4 – Figures
- Volume 5 - Photomontages
- Volume 6 - Natura Impact Statement (NIS)

The EIAR consists of the following chapters:

- Chapter 1 - Introduction
- Chapter 2 - Background to the Proposed Development
- Chapter 3 - Consideration of Reasonable Alternatives
- Chapter 4 – Description of the Proposed Development
- Chapter 5 - Population and Human Health
- Chapter 6 – Biodiversity
- Chapter 7 - Ornithology

- Chapter 8 - Land, Soils and Geology
- Chapter 9 - Hydrology, Hydrogeology and Water Quality
- Chapter 10 - Air Quality and Climate
- Chapter 11 – Noise and Vibration
- Chapter 12 – Shadow Flicker
- Chapter 13 – Landscape and Visual Impact
- Chapter 14 – Archaeological, Architectural and Cultural Heritage
- Chapter 15 – Material Assets
- Chapter 16 - Interaction of Effects
- Chapter 17 – Schedule of Mitigation and Monitoring Measures

A separate Natura Impact Statement (NIS) and Planning Statement has also been submitted with the planning application.

Both the EIAR and NIS contain the information necessary for ACP to complete the Environmental Impact Assessment and Appropriate Assessment as required for this planning application.

The application is also supported by Planning Drawings.

1.5 Difficulties Encountered

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

2. BACKGROUND TO THE PROPOSED DEVELOPMENT

2.1 Historic Peat Extraction at Littleton and Lanespark Bogs

Industrial scale peat extraction ceased at the Application Site in 2017. BnM formally announced in January 2021 that all industrial scale peat extraction on lands within its management would permanently cease in line with its on-going climate action programme and its transition to becoming a climate solutions company.

During the Current Phase, the operations at the Application Site have reduced to the removal of stockpiled peat which was completed by mid-2019.

The Littleton Works (hereafter 'the Works'), which comprises the Littleton Briquette Factory, workshops, offices, canteen and staff parking is located adjacent to the Application Site boundary. The Littleton Works provided a central location for support and management services to the Application Site and includes workshops, offices and welfare facilities such as toilets, a canteen, staff parking and the Littleton Briquette Factory.

BnM have applied for substitute consent to regularise, without prejudice, the planning status of peat extraction and ancillary activities within the Littleton and Lanespark Bogs (as well as other Bogs part of this Bog group which are outside the area of Proposed Development).

2.1.1 IPC Licences

Bord na Móna is currently the only operator licenced by the Environmental Protection Agency (EPA), as per Part IV of the Environmental Protection Agency Act 1992, to carry out the extraction of peat in an area exceeding 50 hectares. Bord na Móna was granted its Integrated Pollution Control Licence (IPC) Licence (Ref. P0499-01) from the EPA for the Littleton Bog Group, within which the Application Site is located, in addition to a number of other bogs located in Co. Tipperary in 2001. The EPA issues licences that contain conditions on how an activity must operate so as to protect the environment from pollution that might otherwise arise. The EPA Act, 1992 specifically prohibits the EPA from granting a licence if emissions from an activity would cause pollution.

The EPA has undertaken a Technical Amendments of the IPC licence on 25th September 2012 for the purpose of aligning the operational conditions of the licence to the objectives of National and European environmental protection legislation enacted over the lifetime of the licence. The current IPC Licence contains 15 no. conditions relating to operation and monitoring, emissions to water and air, water protection, waste management and bog rehabilitation. The IPC Licence is managed by Bord na Móna's Environmental Management Department in Land and Habitats, with a designated Compliance Officer managing the day-to-day compliance requirements.

Please note that irrespective of the consenting of the Proposed Wind Farm the remaining measures outlined in the Rehabilitation Plans, i.e. monitoring of the Littleton, Longfordpass and Lanespark Phase 1 measures and enhanced Phase 2 measures at nearby Ballybeg and Derryvella bogs, will continue to be implemented by BnM in agreement with the EPA. Please see Appendix 2.1 (Volume 3 of the EIAR) and Section 2.2.1 of Chapter 2 of the EIAR for further detail.

2.1.2 Peatlands Climate Action Scheme (PCAS)

In addition to the standard remedial measures as detailed in the rehabilitation plans for the bogs comprising the Site, BnM are also committed to enhanced peatland rehabilitation and restoration measures, subject to government funding, targeting c. 33,000ha in over 80 no. BnM bogs in line with the Peatlands Climate Action Scheme (PCAS). The nearby Ballybeg and Derryvella Bogs are intended to be part of PCAS.

2.2 Scoping and Consultation

A scoping request letter and scoping report detailing a description of the proposed project, draft mapping, preliminary table of contents of the EIAR and outline of the methodology for the assessment was distributed to consultees on the 17th September 2021, with a follow up issued to Kilkenny County Council and Tipperary County Council in 2023.

A further scoping request was issued on the 8th May 2025. The recipients included, the Councils, Government Departments, non-governmental organisations (NGOs), interested parties and key stakeholders, with scoping requests issued to bodies such as Inland Fisheries Ireland (IFI), Heritage Council, Environmental Protection Agency (EPA) and Irish Aviation Authority (IAA).

All consultees were invited to contribute to the EIAR by suggesting baseline data, survey methodologies and potential impacts that should be considered as part of the impact assessment process and in preparation of the EIAR.

Further submissions were also made to AirNav on 11 December 2025 and Department of Defence on 16 December 2025, but no response was received.

Additional consultation was requested with the National Monuments Service (NMS) on 10 December 2025, with a response received 23 January 2026.

Additional consultation with the National Parks and Wildlife Service (NPWS) was requested on 15 December 2025 and a meeting conducted on 12 February 2026 (reference: G Pre00401/2025). Following the additional consultations with NPWS, observations were then addressed through the design process, within the EIAR assessment and by mitigation prescribed in the Biodiversity Chapter and Hydrology chapters of the EIAR.

A copy of the scoping request letters and scoping reports are included as Appendix 2.2, Volume 3 of this EIAR.

A summary of key issues raised during the consultation process is included in Chapter 2, along with the Applicant's response to these issues.

2.3 Planning Policy

2.3.1 International Global Policies

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

2.3.2 European Union Directives - Legislation and Policy

The various directives and policies of the EU set a clear mandate for each member state to transition to sustainable, renewable energy and reduce greenhouse gas emissions. The EU aims to reduce the EU's net greenhouse gas emission by at least 55% on 1990 levels by the end of this decade.

EU Legislation and Policies include:

- Renewable Energy Directives (REDII and REDIII);
- Clean Energy for all Europeans Package (2019);
- European Green Deal (December 2019);
- European Climate Law (July 2021);
- Clean Industrial Deal: A Plan for EU Competitiveness and Decarbonisation (July 2025)
- RePower EU Plan
- Commission Recommendation and Guidance to Member States (EU) 2024/1343 of 13 May 2024 on speeding up permit granting procedure for renewable energy and related infrastructure projects

2.3.3 National Policies and Legislation

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

These policies are supported by the latest Programme for Government (2025), titled 'Securing Ireland's Future' which presents strong climate governance in rapidly reducing climate change in order to protect and improve public health and quality of life, and had identified wind energy as having a crucial role to play in achieving this. The government are committed to the rapid decarbonisation of the energy sector with an aim of providing the necessary actions to deliver national renewable electricity targets. These government ambitions support the ongoing generation of renewable energy from onshore wind sources. The Climate Action Plan 2024 and Climate Action 2025, which must be read together, state the following commitments:

- To achieve 80% renewable electricity by 2030;
- Deliver 9 GW of onshore wind by 2030;
- Hold at least one RESS auction per year;
- Prioritizing and increase investment in the electricity grid;
- Develop a policy to address repowering and extend the life of existing onshore wind farms.

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

The following National Legislation and Policies include:

- The White Paper: Ireland's Transition to a Low Carbon Energy Future 2015-2030;
- Climate Action and Low Carbon Development (Amendment) Act 2021;
- Ireland's integrated National Energy and Climate Plans 2021-2023 (NECP's);
- Project Ireland 2040: National Development Plan 2021 – 2030 (NDP) and the National Planning Framework (NPF)
- Climate Action Plan 2025 (CAP25);
- Eirgrid Assessment of Progress with Carbon Budget Compliance;
- Climate Change Advisory Council (CCAC) Assessment;
- National Onshore Wind Targets – State of play (Jan 2025);
- National Energy Security Framework.

2.3.4 Regional and Local Policies

Regional and Local plans have also been adhered to, including the Southern Regional Spatial & Economic Strategy 2020 - 2032 and the Tipperary County Development Plan 2022-2028 which sets out the wind energy strategy for the county. The Proposed Development at Littleton is located within an area zoned as being *'Open for Consideration'* for onshore wind development as per the current County Development Plan.

The Proposed Development contributes to the nation's target increase of renewable energy from 30% to 80% by 2030 and will contribute to achieving Ireland's energy targets as set out in the Climate Action Plan 2024, which has a target of 80% of electricity generated from renewable sources by 2030, with a target increase in onshore wind of 9GW by 2030, the Littleton Wind Farm has the potential to significantly contribute to this total.

2.3.5 Irish Energy and Environment Policies

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

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

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

2.3.6 Tipperary County Development Plan 2022 - 2028

The Tipperary County Development Plan 2022-2028 (TCDP) is a statutory document prepared by the Planning Authority in accordance with the requirements of the Planning & Development Act 2000 (as amended) and the Planning & Development Regulations 2001 (as amended). Adopted on 22nd August 2022, the current TCDP covers the period from 2022-2028, and recognises that it is essential for a pro-active approach in which the challenges posed by climate change are integrated into the development of policies, plans and programmes. The TCDP recognises the importance of investing in the green economy including employment creation in emerging sectors such as renewable energy.

The TCDP states that a sustainable approach to economic development complements the core strength of the economy in the use of natural resources. Key drivers of the growth of the Green Economy globally include emissions reduction targets, increasing fossil fuel prices, diminishing natural resources, the impact of climate change, environmental legislation and consumer preferences.

The Proposed Development will actively support the green economy by helping reduce emissions, reduce dependency on fossil fuels, produce energy from a renewable source and help fight against climate change, and is in line with environmental legislation.

The renewable energy policies for County Tipperary are set out in Volume 1 Chapter 10 'Renewable Energy and Bioeconomy' of the TCDP, where its stated aims are;

> *"to supports investment and development in renewable energy and the bioeconomy, as part of a national transition to a low-carbon, climate resilient and circular economy"*

The TCDP policy context is grounded in national and regional strategies which are in line with the provision of renewable energy, where the TCDP sets out policies which are considered supportive of solar energy development within county Tipperary. Therefore, and in accordance with national policy as outlined above, the TCDP sets out the long-term vision for the development of County Tipperary, while protecting and enhancing its environment through employing the principles of sustainable development in the policies and objectives such as outlined in TCDP Chapter 10 'Renewable Energy and Bioeconomy'.

2.3.7 Tipperary Renewable Energy Strategy 2022 - 2028 (RES)

The Tipperary Renewable Energy Strategy (RES) forms part of the Tipperary County Development Plan 2022 – 2028 as Appendix 2 of Volume 3. The Renewable Energy Strategy (RES) for County Tipperary was first implemented in 2016 and has been carried over to the current Development Plan. The RES is a county-wide strategy aimed to accelerate the transition to clean energy, reduce carbon emissions and align with Ireland's National Climate Goals outlined above. The overall vision of the RES is:

> *"To support and facilitate the development of the renewable energy sector in line with the strategic goals set out by the Department of Communications, Climate Action and the Environment whilst balancing the need for new development with the protection of the environmental, cultural and heritage assets of the county."*

The Proposed Development at Littleton directly supports the objectives of the Tipperary County RES 2022–2028 by providing approximately 68.2MW of new onshore wind capacity.

3. CONSIDERATION OF REASONABLE ALTERNATIVES

3.1 Alternative Assessment

The Consideration of Reasonable Alternatives (Chapter 3 of the EIAR) has particular regard to the environmental considerations which influenced the selection of alternatives and details the evolution of the Proposed Development through alternatives considered, indicating the main reasons for selecting the chosen option taking into account the effects on the receiving environment and considering the comparison of environmental effects of each alternative.

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

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

This Chapter also details non-environmental factors of the design process where they are relevant to the evolution of the Proposed Development.

Consequently, taking account of the legislation and guidance requirements, this chapter of the EIAR addresses alternatives under the following headings:

- 'Do Nothing' Alternative;
- Alternative Renewable Energy Technologies;
- Strategic Site Selection;
- Constraints-Led Design Approach;
- Alternative Turbine Numbers, Layout and Design;
- Alternative Transport Routes and Site Access;
- Alternative Grid Connection Routes;
- Alternative Substation Locations;
- Alternative Borrow Pit Locations;
- Alternative Mitigation Measures.

3.1.1 Do-Nothing Alternative

Under the "Do-Nothing" scenario, the Proposed Development would not proceed i.e. the development of a renewable energy project is not pursued, and the Site remains in its current form as bogland and agricultural land.

Please note that irrespective of the consenting of the Proposed Wind Farm the remaining measures outlined in the Rehabilitation Plans, i.e. monitoring of the Littleton, Longfordpass and Lanespark Phase 1 measures and enhanced Phase 2 measures at nearby Ballybeg and Derryvella bogs, will continue to be implemented by BnM in agreement with the EPA. Please see Appendix 2.1 (Volume 3 of the EIAR) and Section 2.2.1 of Chapter 2 of the EIAR for further detail.

Whether the Proposed Development proceeds or not, the peatlands within the site will continue to collect CO_2, as the Proposed Wind Farm will not interfere with the rehabilitation or compromise re-wetting and revegetation or regeneration at the site scale.

If the Proposed Development does not proceed, up to 9,585 tonnes of additional CO_2 could be accumulated by bog plants locally under the footprint of land lost due to the Wind Farm construction and the areas affected by drainage. This represents only 0.3% of the carbon emission saved (fossil fuel - mix electricity generation) over the 35-year lifetime (see Chapter 10 for further details).

While re-wetting peatlands is proven to be a viable solution to reducing land-use carbon emissions, this only becomes significant when considering re-wetting and land-use carbon emission reductions across large land areas and over long periods. The calculations provided indicate that wind energy is ultimately much more effective at reducing carbon emissions over the relatively short lifetime of the wind farm, when compared to re-wetting peatlands across equivalent areas and equivalent time periods on a like-by-like basis. Integrating this wind energy development, which will take up only a small footprint, within this much larger rehabilitated peatland site improves the overall carbon emissions reductions associated with the Site.

In the "Do-Nothing" scenario, the prospect of creating sustainable energy through Tipperary's wind energy resources would be lost at this location. The nation's ability to produce sustainable energy and reduce greenhouse gas emissions to meet EU targets and National Targets, as set out above, would be stifled.

This may contribute to Ireland incurring significant financial penalties from the EU if targets are not achieved and result in continued global warming. Additionally, it would affect Ireland's commitment to "pursue efforts" to limit warming as agreed to in the Paris Agreement (2015). This will result in continued likely significant negative effects to air quality and climate.

Under the "Do-Nothing" scenario, the socio-economic benefits associated with the Proposed Development will be lost. These benefits include approximately 80 - 100 no. jobs during the construction period and 2-3 no. jobs during operation and maintenance phases of the Proposed Development (and a similar number to construction during decommissioning). Please refer to Chapter 4 - Description of the Proposed Development which sets out in Section 4.8 the full extent of the Community Benefit to be provided, should the scheme go ahead. Additionally, as described in Section 4.4.1 of Chapter 4 - Development Description, as part of the Proposed Development, a recreational amenity in the form of walking and cycling trails is proposed within the Wind Farm Site to enhance public access and promote the recreational use of the area and tie in with the existing Littleton Labyrinth; an existing amenity route developed by Tipperary County Council which provides a shared walking and cycling route connecting the village of Horse and Jockey to Lough Derryvilla. Under the "Do-Nothing" scenario, the socio-economic benefits associated with the proposed recreational amenity will be lost.

Furthermore, under the "Do-Nothing" scenario the local community will not benefit economically from the community benefit fund associated with the Proposed Development which could be used to improve physical and social infrastructure in the locality.

In addition, under the "Do-Nothing" scenario, general council services will not benefit from rates and development contributions paid by the developer to the local authority which would include road upkeep, fire services, environmental protection, street lighting, footpath works etc., along with other local community initiatives and support.

3.1.2 Alternative Renewable Energy Technologies

Alternative sources of energy generation form part of the renewable energy development portfolio of the Applicant, and a number of options were considered at a high level prior to the Strategic Site Selection process.

Although the screening exercise was primarily based on identifying lands for onshore wind development; another alternative source of renewable electricity generation would be offshore wind energy.

The Applicant is committed to playing a key role in helping the State achieve its CAP25 objectives while building upon its proven record of generating clean renewable energy to the national grid. As such, the option of an offshore project is not considered to be a reasonable alternative at this time.

Another alternative renewable energy source considered was solar which can be defined as the harnessing and conversion of sunlight into electricity using photovoltaic arrays (panels).

In order to achieve the same energy output from solar energy, a site would require a significantly larger development footprint due to the significant difference in capacity factors between solar and wind technologies and the footprint of the technology infrastructure. The capacity factor of solar energy is significantly lower than that of wind energy, requiring approximately three times the installed capacity of the Proposed Development to produce the same amount of energy.

A commercial wind farm project was preferred due to the significantly lower land take required to deliver comparable energy output to a solar farm and was thus considered to align better with the project objectives.

3.1.3 Strategic Site Selection

Bord na Mona (BnM) owns circa 80,000 hectares of land, primarily in the midlands of Ireland. An assessment of potential future uses of this landbank was published by BnM in 2011 in a document entitled 'Strategic Framework for the Future Use of Peatlands'. This report clearly identified the potential for the development of renewable energy (in particular wind energy) and other developments on BnM lands.

In order to identify sites within its landbank which might be suitable for wind energy development, BnM conducted a two-stage assessment process.

The first stage comprised the identification of a number of candidate sites via desk studies and on-site surveys of the landbank. Known constraints, derived from various industry and regulatory guidelines, available Geographical Information Systems (GIS) datasets and on-site surveys (carried out as part of the peat extraction activity), were then applied to the dataset, including:

- Planning Policy Context;
- Proximity to Sensitive Receptors;
- Proximity to the national electricity grid;
- Proximity to National and European Designated sites and onsite Environmental Sensitivities;
- Peat depths, and;
- Suitable wind speeds.

The proposed Site was progressed for detailed assessment and planning consideration due to its relatively low potential for environmental effects and the close proximity to key transport routes which would provide environmental and project viability benefits.

The Proposed Development site was further examined under the following headings to confirm its suitability for wind energy development. The main policy, planning and environmental issues considered for the validation of this wind farm site included:

- Consistently high average annual wind speeds;
- Obtainable, and commercially viable grid connection;
- Compliance with Planning Legislation
- Located outside areas designated for protection of ecological species and habitats;
- Adjacency of residential properties;
- Site topography and access for turbine delivery and construction activities; and
- Level of Visual Impact.

The above exercises, based on several key environmental, technical and policy-related criteria, determined that the proposed development site represents an optimal location for the Proposed Development in Tipperary and has satisfied key criteria required for successful wind energy development.

3.1.4 Constraints-Led Design Approach

Following the selection of the Littleton Site from the Site Screening Process outlined in the Section above, a design process commenced. From the outset of this process, a constraints led design approach was adopted by the Applicant and the wider project design team. Constraints led design is a commonly used, best practice approach employed in wind farm design. In this approach, environmental sensitivities within the Proposed Development site are identified and avoided by the design team with a view to obtaining suitable areas in which wind turbines may be located. The resulting area is referred to as the 'developable area'. Lands outside of this developable area were not considered for the placement of wind turbines or related ancillary infrastructure as they have been deemed unsuitable.

The preliminary developable area was determined before progressing the detailed design of the Proposed Development. This area evolved throughout the design process as additional survey information was collected during the EIAR process. Additional constraints were added as they become known following the completion of more detailed environmental studies, field surveys and feedback received from consultation (please refer to EIAR, Chapter 2 - Background to Development). All proposed wind turbines and infrastructure associated with the Proposed Development were also sited as far as is possible to avoid the wetland areas and other key habitats which have developed following the implementation of the Phase 1 Rehabilitation Measures on site. The following sections discuss the evolution of the Design Iterations for the Proposed Development in Littleton, along with the key influences and constraints for turbine locations and the positioning of supporting infrastructure.

3.1.5 Alternative Site Layout and Design

As outlined within this EIAR, the overall site layout and design of the Proposed Development evolved through a number of design iterations informed by various environmental assessments, technical studies, consultation and feedback from specialists, stakeholders, landowners and local residents. The layout was refined to avoid significant environmental effects while delivering a technically feasible project and maximising the wind resource. This process included changes to turbine numbers, layout and associated infrastructure, with the project progressing from an initial 14-turbine layout to the current proposed design.

Alternative transport routes and site access options were also considered for turbine delivery and construction traffic. Foynes Port was selected as the preferred port of entry due to its proximity to the site, good motorway connectivity and reduced requirement for third-party lands. The preferred turbine delivery route was identified via the national road network to the proposed site entrance from the R639.

Alternative grid connection options were assessed as part of the design process. An underground grid connection was selected as the preferred option in accordance with national guidance and favourable ground conditions along the route. Following a review of available grid capacity, Ballyragget 110kV substation was identified as the most suitable connection point. Three potential underground grid routes between the proposed on-site substation and Ballyragget were considered.

A number of alternative on-site substation locations were also examined during the design process. Following further site investigations and refinement, a location within the northern part of Littleton Bog was identified as the most suitable and forms part of the Proposed Development.

Alternative borrow pit locations were assessed to reduce the need for imported construction materials and associated HGV traffic on the local road network. The borrow pit design was refined throughout the design process, including consideration of material requirements and potential construction noise impacts, to avoid significant adverse effects on nearby residents.

3.1.6 Alternative Mitigation Measures

Mitigation by avoidance has been central to the Proposed Development's evolution. By avoiding the ecologically sensitive areas of the Site, the potential for environmental effects is limited. As noted above, the site layout aims to avoid any environmentally sensitive areas through the application of site-specific constraints. Where loss of habitat occurs in the Site, this has been mitigated with the proposal of enhancement lands.

4. DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 Overview of the Proposed Development

The Proposed Development consists of an 11 no. turbine wind farm and associated infrastructure including internal access tracks, hard standings, additional amenity trails, an onsite borrow pit, peat deposition areas, a permanent meteorological mast, an onsite 110kV substation and associated grid connection infrastructure, internal electrical and communications cabling, temporary construction compounds, drainage infrastructure, biodiversity management and enhancement measures, temporary accommodation works along the Proposed Turbine Delivery Route and all associated works related to the construction of the Proposed Development.

An Coimisiún Pleanála (formerly An Bord Pleanála) issued a letter dated 24 March 2026 which confirmed that they deemed the Proposed Development to be Strategic Infrastructure Development (SID) by way of a notice served under section 37B(4)(a) of the Planning and Development Act 2000 (as amended) and the application is being made directly to the Commission (SID Pre-Planning Case Ref. 311587-21) in accordance with Section 37E of the Planning and Development Act 2000, (as amended). The Commission are the competent authority for the purposes of the Environmental Impact Assessment (EIA).

A 10-year planning permission and 35-year operational life from the date of commissioning of the Proposed Wind Farm (including the meteorological mast) is being sought. This reflects the lifespan of modern-day turbines, with Section 1.1 Development Description, above, outlining the elements of the Proposed Development for which development consent is being sought.

A permanent planning permission is being sought for the substation as this will become an asset of the national grid under the management of EirGrid and ESB Networks and will remain in place upon decommissioning of the Proposed Wind Farm.

Presented hereunder are the elements of the Proposed Development for which development consent is being sought and all other associated project components subject to EIA but for which planning consent is not being sought within the current application.

Whilst consent is not being sought as part of this application for the proposed GC route to facilitate a connection to the national transmission grid network at Ballyragget, Co. Kilkenny, it is assessed as part of this EIAR. Consent for the Proposed Grid Connection will be sought through a separate planning application.

Certain temporary accommodation works associated with the TDR are subject to this EIA but do not require planning consent. Details on the temporary works to facilitate the delivery of turbine components to the Site are contained in Appendix 4.2 and include hedge or tree cutting, relocation of powerlines/poles, lamp posts, signage and temporary local road widening. For these locations, works have been identified and assessed in the EIAR, however, permission for these works will be sought separately with the local Planning Authority through road opening licenses as necessary.

4.2 Proposed Development Location

The Wind Farm Site is located within the jurisdiction of Tipperary County Council. The majority of settlements closest to the site are situated to the west of the site. Ballinunty is the nearest, c.2 km southeast of the proposed turbine array. The village of Gortnahoe lies c. 2.5 km northeast of the site at its closest point, while New Birmingham is situated c. 2 km to the east.

The small centre of population of Ballysloe is also located to the east, at just over 3 km from the nearest turbine. Littleton and Twomileborris are the only settlements within the central study area situated to the west of the site, located c. 2.6 km and c. 2 km from the proposed turbine array, respectively. The village of Killenaule lies c. 4 km southeast of the site and Horse and Jockey is c. 4.7 km to the west.

Urlingford is located c. 6.8 km north of the site and Johnstown c. 10.5 km to the north

The most notable settlements within the area are Thurles and Cashel. Thurles is located c. 9 km west of the site, while Cashel is c. 17 km to the southwest.

The Wind Farm Site is located within a bog group and includes lands in the townlands of Longfordpass North Longfordpass South, Leigh, Bawnreagh, Clonoura, Noard, Derryhogan, Derryvella, Ballybeg, Lanespark, Newhill and Killeen, County Tipperary. Refer to Figure 4.1, contained within Volume 4 of the EIAR, for the location of the Proposed Development.

The Biodiversity Enhancement and Management Plan (BEMP) Lands are contained within the Wind Farm Site.

The TDR travels from the port of entry of Foynes in the following route:

- Loads will exit Foynes Port and join the N69 heading east;
- At Limerick, they will join the N18 heading northeast and merge onto the M7;
- Loads will exit at Junction 17 Portlaoise Interchange and perform a U-turn to re-join the M7 heading southwest;
- They will merge onto the M8 and continue southwest;
- At the M8 Junction 4 East Roundabout loads will turn left to join the R693;
- At the following roundabout loads will turn right onto the R639 then drive through Urlingford;
- To the southwest of Urlingford loads will turn left at the proposed site entrance.

The proposed GC route will exit north of the Proposed Wind Farm Site along the Local Road L4114 and traverse the following townlands within County Tipperary: Longfordpass East, Graiguepadeen, Longfordpass North, Fennor and Longfordpass South. The cable then enters County Kilkenny, and traverses the following townland within the public road, terminating at the Ballyragget 110kV Substation: Freshford Lots, Borrisnoe, Killawardy, Clomantagh Upper, Acragar, Moneenaun, Urlingford, Kilrush, Glenreagh, Kilduff, Borrisnafarney, Barnane, Sweethill, Ridge, Balief Lower, Bohernarude, Kilmacuddy, Killoskehan, Cloncannon, Grange, Moatpark, Barna, Ballybeg, Parksgrove, Baunaniska, Ballyconra, Stook, Graigueswood, Clone, Borrisbeg, Borrismore, Gortagarry, Clomantagh (Mt. Garret), Mountfinn, Barnagrotty, Balief Upper, Clomantagh Lower, Tobernapeastia, Darbyshill, Monabrika, Aghnameadle and Blakefield.

4.2.1 Proposed Wind Farm Site Boundary

The Wind Farm Site boundary area comprises a land area of 1,177 hectares (ha) and is shown in Figure 4.1, contained within Volume 4 of the EIAR.

4.2.2 Existing Land Use and Site Context

The Proposed Wind Farm Site boundary extends for approximately 10km from north to south and ranges between 1km (at north end) and 2km2 (at south end) from east to west. The elevation of the Site ranges from approximately 120-130m altitude above sea level. A large proportion of the Site is regenerating cutaway (heath, scrub, woodland) but includes open areas with large bodies of open water. Areas of remnant high bog occur scattered along the boundaries.

The Site is located on 3 no. bogs, namely Littleton Bog Longford Pass (Popes Bog) and Ballybeg Lanespark Derryvella which covers an area of approximately 1,177ha.

The Wind Farm Site is located in a sparsely populated rural context. There are 101 no. properties (80 no. residential, 16 no. mixed use, and 5 no. commercial) within 2 km of the turbine array as shown in Figure 4.5, Volume 4 of the EIAR. The closest residential receptor is 851 m to T11. The closest residential receptor to the substation is approximately 475m away.

4.2.2.1 Existing and Planned Amenity in the Vicinity of the Proposed Development

The Littleton Labyrinth is an existing amenity route developed by Tipperary County Council which provides a shared walking and cycling route connecting the village of Horse and Jockey to Lough Derryvilla. From Horse and Jockey, it follows a mixture of public roads and the Derrynaflan greenway before joining 7.2km of newly constructed trail (opened in 2025) along the former Bord na Móna railway line between Derrynaflan and Derryvilla.

The route overlaps the proposed Wind Farm Site between the former Bord na Mona Factory trailhead and Lough Derryvilla. An amenity car park was built as part of the Labyrinth on the proposed Wind Farm Site also at the former Bord na Mona Factory trailhead.

Tipperary County Council have also identified in their Tourism Product Development Plan 2020 – 2030 potential for the further development of the Littleton Labyrinth network of walkways and cycleways which would link Twomileborris, Gortnahoo, Urlingford, Templetouhy and Littleton. If developed, these would cross the wider BnM land holdings and connect to the amenity tracks provided as part of the Proposed Wind Farm Project

4.3 Proposed Site Infrastructure

4.3.1 Wind Farm

The Proposed Development will comprise 11 no. wind turbines with a maximum tip height of 200m, with the Proposed Wind Farm has an export capacity of approximately 68.2 MW and will generate renewable electricity for the national grid.

The turbines will have a light grey non-reflective finish and will include aviation lighting in accordance with Irish Aviation Authority and Department of Defence requirements.

The Proposed Development also includes turbine foundations, crane hard standings, internal access tracks, drainage infrastructure, underground electrical cabling, a permanent meteorological mast, temporary construction compounds and peat management areas.

4.3.1.1 Site Access, Internal Access Tracks and Hard Standings

Access to the proposed Wind Farm Site will be provided will be provided via 6 no. access points from the public road network, comprising a combination of upgraded existing bog accesses and new entrances. These will facilitate construction traffic, turbine component delivery and operational access to the Site.

The access arrangements have been designed with regard to road safety and in accordance with Tipperary County Council and TII requirements. All HGV traffic will use approved transport routes identified within the Traffic Management Plan.

The Proposed Development includes approximately 15.45km of new internal access tracks and the upgrading of 2.95 km of existing bog tracks, together with associated drainage infrastructure. Turbine hard standings and laydown areas will be provided adjacent to each turbine location to facilitate construction and maintenance activities.

The Proposed Development also includes 1 no. permanent 120m meteorological mast and 1 no. construction borrow pit. Excavated rock and fill material generated onsite will be reused where possible in the construction of turbine foundations, hard standings and internal access tracks.

4.3.1.2 Biodiversity Enhancement and Management Plan Measures

A Biodiversity Enhancement and Management Plan (BEMP) has been prepared for lands within the Site boundary. The BEMP includes habitat management, peatland rehabilitation and biodiversity enhancement measures designed to support ecological restoration across the former cutaway bog lands, and is located in Appendix 6.1 of Volume 3 of this EIAR.

The BEMP includes measures to support the restoration and long-term management of peatland and wetland habitats through hydrological management, drain blocking, natural regeneration and targeted habitat enhancement measures. The plan also includes measures to protect and enhance existing habitats, support biodiversity and improve the ecological connectivity of the wider Site.

The BEMP lands are located within the Wind Farm Site and will be managed alongside the Proposed Development to support the long-term ecological restoration, biodiversity value and sustainable after-use of the former peat extraction lands. The location of the BEMP lands is shown on drawing numbers P20-211-0100-0004, P20-211-0100-0005 and P20-211-0100-0010 to P20-211-0100-0024 (inclusive).

4.3.1.3 Recreational Amenity Trails

As part of the Proposed Development, a recreational amenity in the form of walking and cycling trails is proposed within the Wind Farm Site to enhance public access and promote the recreational use of the area.

A network of trails forming loops and links is proposed utilising a combination of the internal access tracks proposed for the windfarm and approximately 4.0 km of new floating dedicated amenity tracks, with all new amenity trails designed to a width of 3 m to accommodate both pedestrians and cyclists. To support public access, an additional car parking area is proposed adjacent to the site entrance to the R639 in proximity to the amenity trail.

The proposed locations and layouts of the recreational trails and associated infrastructure are contained within the planning application drawings, Series No. 0100.

4.3.1.4 On-Site Electricity Substation

An onsite 110kV electricity substation will be constructed within the Proposed Wind Farm Site as shown in Figure 4.2, Volume 4. Electricity generated by the wind turbines will be collected through a network of underground electrical cabling connecting each turbine to the onsite substation. The substation will then transform the electricity to 110kV and facilitate transfer of the electricity to the national grid via the proposed underground grid connection to the existing Ballyragget 110kV Substation in County Kilkenny.

The substation will include electrical equipment, transformers, control buildings and associated ancillary infrastructure required for the operation and management of the Proposed Wind Farm and grid connection.

Details of the proposed substation compound and equipment can be found in planning application drawings, Series 0102.

4.3.2 Grid Connection

The proposed Grid Connection (GC) route will consist entirely of underground 110kV cable and will connect the on-site substation at Littleton Bog to the existing Ballyragget 110 kV substation within the townland of Ballyragget, Co. Kilkenny.

The proposed GC route will be 30.9 km in length, with 28.4 km to be constructed within the existing road corridor and the remainder in private lands. Refer to Figure 4.3, Volume 4 for the overall layout of the GC route.

4.3.3 Turbine Delivery Route

Turbine components will be delivered from Foynes Port to the Site via the national road network, including the N69, N18, M7, M8, R693 and R639. Temporary accommodation works may be required along sections of the route to facilitate delivery of oversized turbine components.

4.4 Construction

4.4.1 Construction Activities

Construction of the Proposed Development is expected to take approximately 24 months. Works will generally commence with the upgrading and construction of site access tracks and drainage infrastructure, followed by turbine foundations, hard standings and associated infrastructure.

A detailed Construction and Environmental Management Plan (CEMP), Appendix 4.1, Volume 3, has been prepared for the Proposed Development and includes environmental management and mitigation measures for the construction, operation and decommissioning phases.

The CEMP sets out the key environmental management measures associated with the construction, operation and decommissioning of the proposed project, to ensure that during these phases of the project, the environment is protected, and any potential impacts are minimised. The CEMP will be updated as required at the construction stage, on the appointment of the main contractor to the project to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned.

4.4.2 Traffic Management

A Traffic Management Plan (TMP) has been prepared as part of this EIAR and is contained within the CEMP at Volume 3, Appendix 4.1.

If permission is granted for the proposed project the TMP shall be updated as required following the appointment of the contractor for the main construction works to address the requirements of relevant planning conditions and mitigation measures identified in the EIAR.

The TMP will be agreed with Tipperary and Kilkenny County Councils to provide a safe environment for road users and construction workers and to prevent soiling and damage to the existing public road network as a result of the construction of the Project.

4.4.3 Surface Water Management and Site Drainage

A drainage system will be installed adjacent to the internal access tracks. A Sustainable Drainage Systems (SuDS) approach will be implemented across the Site. SuDS are drainage measures designed to manage rainfall and surface water runoff in a controlled and environmentally sensitive manner by slowing water flow, reducing erosion and sediment runoff and helping to protect surrounding watercourses and water quality. This is outlined in detail in the Surface Water Management Plan (SWMP), which is contained in Appendix 9.3, Volume 3 of the EIAR.

The proposed drainage design will maintain existing drainage patterns across the Site and manage surface water generated during the construction and operational phases of the Proposed Development. Further details of the surface water management and proposed drainage of the Site is contained in Chapter 9 - Hydrology, Hydrogeology and Water Quality and the SWMP in Appendix 9.2, Volume 3 of the EIAR.

4.4.4 Waste Management

A Waste Management Plan for the project has been included in the CEMP, Volume 3, Appendix 4.1. This outlines measures for the management, handling and disposal of waste generated during the construction phase, and is based on the principles of waste prevention, minimisation, reuse and recycling, with the objective of reducing the quantity of waste requiring disposal and ensuring that all waste materials are managed in accordance with relevant waste management legislation and best practice.

4.5 Operation

The Proposed Development has the potential to produce approximately 185,203 MWh (megawatt hours) of electricity per year and over 6,482 GWh (gigawatt hours) of electricity over the 35-year lifetime of the Proposed Development. The electricity produced by the proposed wind farm would be sufficient to supply 44,906 Irish households annually, based on the average Irish household using 4.2 MWh of electricity[1].

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

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

4.6 Decommissioning

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

It is proposed that all internal site access tracks and turbine hard standings will be left in place. Turbine hard standings will be covered using original stripped topsoil, which would have been placed adjacent to the works area and landscaped during the construction stage, and allowed to revegetate naturally.

Grid connection infrastructure including the on-site substation and ancillary electrical equipment shall form part of the national grid and will be left in situ.

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

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

4.7 Community benefit fund

In addition to employment during the construction and operational phases of the Proposed Development and annual rates that will be paid to the local authority by the developer, a Community Benefit Fund will be developed during the first year of operation of the wind farm.

The value of the Community Benefit Fund will be linked to the productivity of the wind farm and is calculated based on €2/MWh and the overall total generated by the wind farm. It is estimated that the proposed Fund could be in the region of circa €5.5 million over the first 15 years of the Fund, on the basis that the proposed project will generate 185,204 MWh of electricity produced per year.

5.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) examines the potential effects of the Proposed Development at Littleton Wind Farm on Population and Human Health. The chapter includes a description of the existing environment in respect of population and human health, and considers the likely effects arising from the Proposed Development during construction, operation and decommissioning under the following elements:

- Population and Settlement Patterns;
- Employment and Economic Activity;
- Land Use;
- Recreation, Amenity and Tourism;
- Human Health and Safety including the potential for the Proposed Development to cause accidents and/or natural disasters and the vulnerability of the Proposed Development to potential disaster/accidents.

The assessment presented in this chapter draws upon the findings of other EIAR chapters, such as Chapter 8 - Land, Soils and Geology, Chapter 9 – Hydrology, Hydrogeology and Water Quality, Chapter 10 – Air Quality and Climate, Chapter 11 – Noise and Vibration, Chapter 12 – Shadow Flicker, Chapter 13 - Landscape and Visual Impact, and Chapter 15 - Material Assets. In addition, other assessments are set out including those relating to potential effects on population statistics, socio-economics, changes to land use, facilities, human perception, and human safety.

5.2 Population

The Proposed Development is located within a predominantly rural area between settlements including Littleton, Twomileborris, Gortnahoe, Ballinunty and Urlingford. There are 396 no. residential properties within 2 km of the turbine array, with the closest dwelling located approximately 851 m from the nearest turbine, exceeding the setback distances outlined in national wind energy guidance.

The population of County Tipperary increased from 159,553 in 2016 to 167,895 in 2022. Population trends within the Electoral Divisions surrounding the Site show generally stable population levels.

Construction of the Proposed Development is expected to result in a temporary increase in workers within the area, with potential temporary traffic and access disruption during construction and turbine delivery activities. These effects will be managed through the Construction and Environmental Management Plan (CEMP) and Traffic Management Plan (TMP).

No significant effects on population are anticipated during the operational phase. The operational phase is expected to have a long-term positive and imperceptible effect on population through employment, renewable energy generation and associated economic activity.

Potential decommissioning effects will be temporary and similar in nature to the construction phase, but of a reduced scale.

5.3 Socioeconomics, Employment and Economic Activity

The construction of the Proposed Development is expected to create between 80 and 100 jobs during the construction phase, with opportunities for local contractors, suppliers and service providers. Local businesses within nearby towns and villages are also expected to benefit from increased economic activity during construction.

During operation, the Proposed Development is expected to support approximately 2–3 long-term jobs associated with operations and maintenance activities.

The Proposed Development will contribute to Ireland's renewable energy and climate targets by providing approximately 68.2 MW of renewable electricity generation capacity. The project will also contribute to local authority rates and wider economic activity within the area.

A Community Benefit Fund will be established during the first year of operation of the Proposed Wind Farm. The Fund is linked to electricity generation and is estimated to provide approximately €5.5 million over the first 15 years of operation.

The operational phase is expected to result in a significant positive effect on socioeconomics, employment and economic activity within the area. Decommissioning effects are expected to be temporary and similar to the construction phase, but of a reduced scale.

5.4 Land Use

The Site (i.e. the proposed wind farm) comprises c. 1,177 ha of former peat extraction lands including regenerating cutaway bog, forestry and agricultural lands. Existing land use surrounding the Site is predominantly rural in character, comprising agricultural land, forestry, scattered rural housing and road infrastructure.

Temporary disruption to land use may occur during construction, turbine delivery and grid connection works, including temporary traffic management measures and accommodation works along public roads. These effects are expected to be temporary and localised.

The operational phase will result in permanent land use change at turbine locations, access tracks, hard standings, the onsite substation and associated infrastructure. Existing agricultural and forestry activities surrounding the Site are expected to continue alongside the Proposed Development.

Biodiversity enhancement and peatland rehabilitation measures proposed within the Site will result in positive long-term effects through ecological restoration and habitat enhancement.

During decommissioning, turbines and associated above-ground infrastructure will be removed, while the onsite substation and grid connection infrastructure will remain in situ as part of the national grid. Access tracks may continue to support agricultural, forestry and recreational use.

5.5 Recreation, Amenity and Tourism

Tourism and recreation are important components of the local economy within County Tipperary and the wider Ireland's Ancient East tourism region.

The Site overlaps with sections of the existing Littleton Labyrinth walking and cycling route developed by Tipperary County Council. The Proposed Development also includes additional recreational walking and cycling trails which will connect with the wider existing and proposed amenity network in the area.

Temporary and localised disruption may occur during construction and turbine delivery activities, particularly along sections of the public road network used for turbine delivery. These effects are expected to be temporary and not significant.

National wind energy guidance recognises that wind energy developments and tourism can co-exist successfully where developments are appropriately designed and located. The landscape and visual assessment concludes that the Proposed Development will be viewed within an existing wind energy landscape context.

The operational phase is expected to result in long-term positive effects through the provision of additional recreational infrastructure and improved amenity access within the Site.

Potential decommissioning effects will be temporary and similar in nature to the construction phase.

5.6 Human Health & Safety

The conclusion of Chapter 5 found that the general health profile of the Study Area is broadly consistent with national averages. Construction activities, including turbine delivery and grid connection works, have the potential to temporarily affect traffic safety, access, noise and air quality within the local area. These effects will be managed through the implementation of the CEMP, TMP and other mitigation measures identified within the EIAR.

Potential construction noise effects associated with the borrow pit and construction activities will be temporary in nature. Traffic management and safety measures will also be implemented during turbine delivery activities.

During operation, potential effects on human health and safety are considered unlikely due to compliance with relevant safety standards, engineering design requirements and operational safety procedures.

Wind turbines include safety systems to detect issues such as blade icing, with turbines automatically shutting down where necessary. Operational staff will be appropriately trained and all maintenance activities will be undertaken in accordance with relevant health and safety procedures.

Decommissioning effects are expected to be temporary and similar to the construction phase. With the implementation of mitigation measures and best practice procedures, residual effects on human health and safety are not expected to be significant.

6. BIODIVERSITY

The Biodiversity chapter assessed the potential ecological impacts of the proposed development. The study included the wind farm site, grid connection route (GCR), turbine delivery route (TDR), and lands designated for biodiversity enhancement.

Consultation was initiated with the National Parks and Wildlife Service (NPWS) during the early stages of the project. A response was received following issue of the scoping report in 2021 (Pre00244/2021). This advised on best-practice assessment methods, key areas to cover relevant to ecology and site-specific observations.

A request for updated consultation were issued to the DAU on 22 September 2023. The response to this request referred back to their initial response (consultation reference Pre00244/2021). A further request consultation request was issued on 15 December 2025 at design freeze stage. NPWS responded, offering a meeting and summarising key ecological considerations (consultation reference: G Pre00401/2025).

Following from this, an online consultation meeting took place on 14 February 2026 focused on specific Site conditions.

The full list of consultees relevant to nature conservation is included in Chapter 2. No other consultees relevant to nature conservation responded to consultation requests. Inland Fisheries Ireland (IFI) were contacted during the initial consultation outreach in 2021, and again in 2023 (issued to South Eastern district office in Clonmel via email on 22 November 2023) but did not respond to either request.

Comprehensive ecological surveys were conducted between 2021 and 2025, including habitat mapping, mammal and bat surveys, aquatic ecology assessments, and invasive species monitoring.

Key ecological receptors (KERs) were identified within the ecological baseline and brought forward for further assessment.

The KERs identified included: European and Nationally Designated Sites; Habitats (including peatland, grassland, woodland and aquatic types); Aquatic Fauna (Freshwater pearl mussel, White-clawed crayfish, Atlantic salmon, Brown trout, European eel and Lamprey Spp.); Mammals (Badger, Otter, Pine Marten, Daubenton's Bat, Whiskered Bat, Natterer's Bat, Leisler's bat, Nathusius' Pipistrelle, Common Pipistrelle, Soprano Pipistrelle and Brown Long-eared Bat), and other species including Common lizard, Smooth Newt, Common Frog, Marsh Fritillary and Whirlygig Beetle.

Potential effects on KERs arising from construction, operation and decommissioning of the proposed wind farm are assessed in detail.

The impact assessment fully considers existing and emerging trends associated with the peatland rehabilitation plans being implemented at the site.

6.1 Peatland Rehabilitation

It is noted that the Phase 1 peatland rehabilitation measures completed at the Bord Na Móna bogs within the site are represented within the existing baseline, and as such form an inherent component of the baseline environment and are assessed in detail therein.

6.2 Mitigation

6.2.1 Construction Mitigation

Mitigation by avoidance and design has been employed, including the use of Horizontal Directional Drilling (HDD), which is a minimal impact trenchless method of installing underground cables, to avoid direct effects on riverine habitats and/or disturbance to bridges with potential to be used by roosting bats. The use of floating road construction and increased separation distance for roadside drainage in the northern section of the site will avoid indirect effects on (non-Annex I) raised bog. The layout was provides buffers around existing badger setts to avoid disturbance and potential damage to setts.

A Project Ecologist/Ecological Clerk of Works (ECoW) will be employed for the duration of construction to ensure that all the mitigation measures set out in the EIAR, NIS and any conditions of consent pertaining to biodiversity are implemented.

Dust suppression and speed limits will ensure protection of surrounding habitats during construction.

To mitigate the loss of calcareous grassland within the Site, it is proposed to re-use material excavated from under the existing rail line to landscape roadside areas such as nearby drain edges in order to retain this soil and the associated seedbank close to its current location.

Immature woodland within the proposed substation construction compound footprint will be re-planted after construction to accelerate habitat re-establishment and maintain connectivity for bats.

Where hedgerow removal is required for the Proposed Borrow Pit, reinstatement will use native species which indigenous to the local area including which elm, willows and downy birch and hazel.

Invasive species control measures will be undertaken as per the invasive species management plan (ISMP) in order to prevent the spread of non-native invasive plant species.

Mitigation to control runoff from the Proposed Development is presented in Chapter 9, and will ensure protection of the aquatic environment during construction. Mitigation measures and emergency procedures to prevent and contain pollution incidents are detailed in Chapter 6 and the CEMP. Detailed mitigation is specified for HDD works, including a frac-out prevention and contingency plan.

Mitigation for non-volant mammals comprises pre-construction surveys, ecological supervision, toolbox talks and adherence to relevant guidance and legislation.

Vegetation buffers for bats will be implemented at construction stage to provide a 50m buffer between turbine blade tips and closest vegetation in accordance with NatureScot (2021) guidance.

An ecologist will supervise areas where vegetation removal will occur prior to and during construction as appropriate. This will ensure any Site-specific issues in relation to wildlife not currently present (e.g., bat roost locations) will be discovered prior to commencement of works to allow appropriate mitigation measures to be put in place. In the unlikely event that a bat roost is found, the NPWS will be informed, and the relevant guidelines will be implemented as appropriate (e.g. NRA guidelines).

Lighting restrictions and directional lighting where required will be used to avoid and contain light pollution to minimise potential lighting disturbance to bats during construction.

If three years lapse between EIAR/planning-stage surveys and installation of the wind turbines, it will be necessary to repeat one season of surveys during the bat activity period (EUROBATS, 2014). Future survey work will adhere to best practice guidelines available (Hundt, 2012; Collins, 2016; NatureScot, 2021; NIEA, 2021) and include static detector, activity and roost inspection surveys.

Pre-construction surveys for marsh fritillary will be undertaken to reconfirm the findings of the EIAR. Areas of suitable marsh fritillary habitat within the Proposed Wind Farm footprint will be translocated to suitable locations in adjacent areas. Measures to ensure any larvae and larval webs if present are not damaged and are translocated intact along with their habitat.

At vegetation clearance stage, areas will be methodically disturbed prior to clearance to disturb Herpetofauna (amphibians and lizards) so they leave prior to clearance works. In the event that construction is required to proceed during breeding, a pre-construction survey will be completed, followed by translocation under licence by a qualified ecologist where required. Measures to exclude newts from areas affected by scrub clearance and active construction zones will be implemented to prevent injury or mortality of adult newts.

6.2.2 Operational Mitigation

Monitoring of habitat-related mitigation and other translocation measures will be undertaken during operation, in addition to monitoring for invasive species.

In the event that a new badger sett is discovered during maintenance of bat felling buffers (vegetation trimming), NPWS will be informed and the relevant guidance (NRA, 2008c) and will be followed. The bat buffer pre-clearance badger survey shall extend 50m beyond the bat felling buffers.

Periodic inspections of sediment and erosion control measures will be undertaken until the risk of erosion or siltation has declined following the successful establishment of vegetation during the operational phase. Construction phase measures to protect water quality will continue as required.

A suite of operational mitigation is proposed for bats, including collision monitoring, 'feathering' of turbine blades, lighting restrictions and maintenance of turbine felling buffers. Curtailment is not proposed from the outset, but will be implemented during conditions likely to give rise to increased bat activity in the event that high numbers of bat fatalities are detected during monitoring.

The pre-clearance bat buffer ecological survey shall include a marsh fritillary habitat appraisal, followed if necessary by a larval web survey. Monitoring surveys and maintenance works for translocated marsh fritillary habitats will be implemented/supervised by a qualified ecologist.

The following mitigation for habitats supporting herpetofauna (herpetofauna are reptiles and amphibians) is proposed:

- conversion of settlement ponds in BEMP to amphibian ponds;
- retention/creation of vegetative cover around ponds;
- operational monitoring.

6.2.3 Decommissioning Mitigation

Mitigation for decommissioning will be similar to the construction phase.

6.3 Residual Effects

No significant residual effects are identified for the ecological receptors assessed in Chapter 6 Biodiversity. A Long-term Slight to Moderate Reversible Residual effect will occur for badger and otter due to the presence of mammal fencing to protect bird breeding areas during the operational phase.

6.4 Enhancement

A suite of enhancement measures are proposed within the BEMP (Appendix 6.1)

7. ORNITHOLOGY

7.1 Surveys and Analysis

A full suite of ornithological surveys were undertaken during suitable survey windows, in suitable conditions:

- Vantage Point (VP) Surveys (watches from a fixed point to record bird flight activity)
- Breeding Wader & Waterbird Surveys
- Hen Harrier Roost Surveys
- Breeding Bird Surveys
- Winter Bird Surveys
- Kingfisher Surveys
- Merlin Surveys
- Barn Owl Surveys
- Hinterland Survey (survey of wider area surrounding proposed development)
- Waders and Waterfowl Survey (Hinterland)
- Raptor Survey (Hinterland)

VP survey data collected over 4.5 years of surveys (winter 2020-21 to winter 2024-25) was utilised in the collision risk model (CRM), in accordance with Band/NatureScot (2024) guidance. The CRM uses the flight activity data recorded during VP surveys to estimate the number of birds likely to collide with turbines at a proposed wind farm. This allows pre-construction assessment of potential collision impacts on local and national populations. As birds may avoid a wind farm (for example some may be displaced from the area, while others may avoid turbines or take other evasive action to prevent a collision), the CRM accounts for this by applying an avoidance rate for each species.

7.2 Consultation

Detailed consultation was undertaken with NPWS throughout the design and assessment of the project.

The key items communicated by NPWS in advance of the meeting included: ensuring robustness of CRM through adequate visibility of the flight activity study area from VPs; importance of completing robust survey for breeding curlew; importance of contextualising potential effects on breeding curlew, noting conservation status/ distribution; ensuring hen harrier roost survey methodology is adequate and suitable.

An online meeting took place on 14 February 2026. Relevant to Chapter 7, these points were discussed:

- Importance of assessing effects on the local curlew population robustly.
- Ensure that seasonality and age-specific behaviour is accounted for when assessing potential collision effects on curlew noting juveniles may be more susceptible to collision risk, resulting in increased risk at certain times of the year;
- NPWS indicated they are receptive to inclusion of measures such as habitat and/or predator management to help offset any potential negative effects on breeding curlew;

- Assessment should consider local population-level effects in the event of one adult curlew collision fatality, and also assess potential for predator control/nest protection to offset this potential occurrence;
- Robust monitoring protocol to monitor potential effects of amenity use on curlew;
- Potential for future adoption of automated turbine curtailment systems should be noted;
- Include provisions to temporarily close amenity trail sections if required at key times to avoid disturbance to curlew/breeding waders. Monitoring of both bird and amenity user behaviour should be undertaken to inform any such decisions;
- Monitoring of operational amenity trails also required to check for other effects and to confirm effectiveness of any barriers, screening, fencing etc. installed;
- Identify 'desire lines' i.e. locations where amenity users may potentially stray or cut corners with potential effects on breeding wader/waterbird areas. To assess at planning stage, but also monitor behaviour of recreational users during operation to allow adaptive responses;
- If feasible, measures to protect breeding curlew could be considered as contributing to offsetting potential collision risk.

The above NPWS observations have been addressed through the design process, within the EIAR assessment, and by mitigation prescribed in this Ornithology Chapter. The full list of consultees relevant to nature conservation is included in Chapter 2. No other consultees relevant to nature conservation responded to consultation requests.

7.3 Assessment of Key Ecological Receptors

Key ecological receptors (KERs) were identified within the ecological baseline and brought forward for further assessment.

Potential effects on KER bird species arising from construction, operation and decommissioning of the proposed wind farm are assessed in detail.

The impact assessment fully considers existing and emerging trends associated with the peatland rehabilitation plans being implemented at the site (ongoing development of vegetation and establishment of wetlands on recolonising cutaway bog).

In the do-nothing scenario, habitats at the site are expected to develop further and be utilised by increasing numbers of birds while also providing increased opportunities for variability in habitat use and increased extent of displacement habitats (an increased resource of suitable habitats in the wider area).

The assessment grouped potential effects into primary categories including noise/visual disturbance, habitat loss, displacement, barrier effect and collision risk.

7.3.1 Construction Effects

Construction phase effects on National sites (i.e. proposed Natural Heritage Area -pNHA and Natural Heritage Area - NHA) are assessed as Short-term Imperceptible. Assessment of European sites (i.e. Special Protection Area - SPA and Special Area of Conservation - SAC) is detailed in the NIS.

No significant habitat loss effects were identified for any KER species, with most assessed as Imperceptible or Not significant. The highest magnitude effect identified was for Snipe (Long-term Slight to Moderate Effect).

Varying levels of construction disturbance/displacement effects were identified for KER species prior to mitigation:

- Hen Harrier (Long-term Very Significant Effect)
- Curlew, Lapwing and Snipe (Short-term Significant Effect)
- Barn Owl (Short-term Moderate to Significant Effect)
- Kingfisher and Woodcock (Short-term Moderate Effect)
- Whooper Swan (Short-term Slight to Moderate Effect)

Effects predicted for the remainder of KERs range from Imperceptible to Slight.

Potential for a Very Significant Effect on Hen Harrier prior to mitigation arises due to occasional presence of roosting birds on the margins of the site; if disturbed, the roost could be lost, displacing wintering Hen Harrier from the site. Short-term Significant Effects were identified for Curlew, Lapwing and Snipe due to potential for breeding birds to be disturbed during construction, prior to mitigation. A previously occupied barn owl roost occurs near the proposed borrow pit. If re-occupied prior to construction, a Short-term Moderate to Significant Effect could occur prior to mitigation.

7.3.2 Operational Effects

Operational phase effects on National sites are assessed as Long-term Imperceptible. Assessment of European sites is detailed in the NIS.

CRM results indicate a low predicted collision rate for Curlew (0.08 per year). However, due to the poor conservation status of Curlew and the local population comprising just one pair, potential for a Long-term, Very Significant effect was identified at local scale, and a Medium-term, Moderate effect was identified at national scale. The predicted collision rate for Kestrel is 2.94. This will result in a Long-term Imperceptible effect on national/county populations and a Long-term Moderate effect for the local population. Predicted collision effects for the remainder of KERs range from Imperceptible to Slight.

Regarding operational barrier effect, a Long-term Slight to Moderate effect was identified for Snipe; a Long-term, Not Significant to Slight effect was identified for Whooper swan; a Long-term, Slight effect was identified for Mute swan, and a Short-term Slight was identified for Hen Harrier. Predicted barrier effects for the remainder of KERs range from Imperceptible to Not significant.

The following displacement effects were noted: Curlew and Snipe (Long-term Significant); Kestrel (Long-term Moderate); Great Crested Grebe, Lapwing and Teal (Long-term Slight to Moderate). Potential operational displacement effects for Hen Harrier were limited to Short-term Slight. Potential disturbance/displacement effects on Curlew, Great Crested Grebe, Lapwing, Snipe and Teal relate to amenity use, while effects on Kestrel and Snipe arise primarily from disturbance/displacement associated with operational turbines.

7.3.3 Decommissioning Effects

Decommissioning phase effects will be similar to those identified for construction.

7.3.4 Cumulative Effects

7.3.4.1 Other Developments

The cumulative assessment identified potential for cumulative effects on KER bird species which use aquatic habitats (e.g. lakes, rivers) such as kingfisher, little egret, grey heron and duck species in the event that cumulative effects on water quality in the receiving catchment occurred during construction.

Potential cumulative effects in conjunction with other wind farms during operation (collision, displacement and barrier effect) range from Long-term Imperceptible to Long-term Not significant for the majority of KERs. There is one exception to this: potential for a Long-term Slight to Moderate Reversible displacement effect on Snipe.

7.3.4.2 Peatland Rehabilitation

There is potential for increased areas of surface water at Ballybeg and Derryvella Bogs to arise from rehabilitation measures proposed for these bogs (located adjacent to the proposed development), potentially increasing bird activity at these bogs and altering activity patterns at landscape scale. However, emerging trends and predicted variability in habitat use are unlikely to be significantly different from the existing baseline in which variable use of existing habitats at the site and across surrounding bogs by birds already occurs. As such, a Long-term Not significant effect is predicted in this regard.

7.4 Mitigation

7.4.1 Construction Mitigation

The design and turbine layout were informed by multiple collision risk models. The findings of these CRMs were utilised to ensure areas of high bird activity were avoided to minimise collision risk and avoid habitat loss or disturbance of primary areas used by waders and waterbirds. The layout of roads and other associated infrastructure purposely avoided habitats of high ecological value.

A Project Ecologist/Ecological Clerk of Works (ECoW) will be employed for the duration of construction to ensure that all mitigation measures are implemented.

The turbines will be constructed in a phased approach to limit areas of disturbance.

Removal of vegetation and scrub at the Site as well as trimming of trees along the TDR will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive).

Construction operations will take place primarily during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. Suitable measures and supervision will be implemented in cases where night work is required.

If construction disturbance to breeding wader and waterbird areas cannot be avoided during breeding season, mobile visual screens will be put in place between the works and breeding wader/waterbird habitats in locations where existing vegetation is absent to minimise disturbance to birds within 500m.

Toolbox talks will be undertaken with construction staff on disturbance to key species during construction. This will help minimise disturbance.

Where removed or altered at TDR Nodes, re-instated hedgerows will be planted with locally sourced native species.

A re-confirmatory pre-construction survey (March/April) will be conducted to assess any evidence of target species activity or occupation of new breeding territories (e.g. in the case of breeding snipe and barn owl). Should any nesting locations be recorded, works at these locations will be restricted to outside the breeding season (March 1st to August 31st inclusive) or until chicks are deemed to have fledged (following monitoring). If barn owl are present at a nest, all construction works will be halted within 250m of the nest until breeding is complete.

White lights will not be used on the turbines as these can attract night flying birds such as migratory species.

Construction works within 500m of Derryhogan Lakes will occur outside the breeding season (March 1st to August 31st) due to potential disturbance caused by construction noise and visual disturbance for curlew and other species breeding in this area. Works in this area will be limited to daylight hours as these lakes are also roosting habitats for wintering birds. A permanent 2m high berm will be installed along the alignment shown in Figure 7-7 during the non-breeding season to prevent noise and visual disturbance to curlew and other bird species breeding at Derryhogan Lakes. Site traffic will be permitted to travel on access tracks within 500m of Derryhogan lakes once the 2m berm is in place.

The 2m berm will extend around the western boundaries of the construction compound east of Derryhogan Lakes to reduce noise and visual disturbance to the key habitat area of Derryhogan Lakes.

Where construction is required within 500m of Longfordpass Lakes and Bawnreagh Lakes where existing vegetation screening is absent, mobile visual screening will be positioned to prevent visual disturbance to breeding and non-breeding birds utilising these areas.

Turbine T08 and the section of internal access track between T06 and T08 will not be constructed during non-breeding season (September 1st - February 28th) to avoid effects on roosting hen harrier.

A bird hide constructed to RSPB specifications will be incorporated within the embankment protecting Derryhogan Lakes (see Figure 7-7).

Mammal fencing will be installed along all amenity trail and access track sections where barriers are required to prevent dogs and walkers from accessing key habitat areas for breeding birds (see Figure 7-7).

2m high willow fence screening will be installed where access tracks and amenity trails are adjacent to key bird habitats to prevent visual disturbance arising from recreational use (see Figure 7-7).

Temporary screening will be installed along the northern access track west of the proposed substation in the areas indicated in Figure 7-7. Tree planting will also be provided outside the temporary screening.

Signage will be installed to ensure recreational users understand the requirement to remain on the trails and maintain control over dogs near bird habitats, and are aware of the location of these habitats.

The placement of barriers and hides has taken ‘desire lines’ into account, and the fencing and barriers have been designed to discourage recreational users from deviating from the trails in key areas.

Chapter 9- Water Quality and Hydrology prescribes best practice mitigation measures for the protection of the aquatic receiving environment during the construction phase. These measures will prevent indirect effects on bird species associated with the aquatic receiving environment.

7.5 Operational Mitigation

A post-construction monitoring programme will be implemented to confirm the effectiveness of mitigation measures; the results of this will be submitted annually to the competent authority and NPWS. The programme will include Fatality Monitoring, Flight Activity Surveys, Monthly Wildfowl Counts, Breeding Bird Surveys and Breeding Wader Surveys.

In addition, monitoring of potential recreational effects on breeding and wintering waders and waterbirds will be undertaken to identify any emerging patterns of disturbance and recreational user behaviour which would trigger mitigation such as temporary/seasonal closure of trails. It will also include identification of areas and points where recreational users habitually stray towards breeding or wintering wader/waterbird habitats, triggering measures such as additional fencing and signage.

In parallel with the monitoring detailed above, annual breeding season surveys of breeding curlew using the site will be undertaken in all years during the operational phase, and will similarly feed back into the adaptive mitigation regime as required.

Installation of permanent predator fencing around Derryhogan Lakes is proposed. The fencing will be incorporated into the barrier to prevent recreational user and dog access along proposed tracks and trails, and will also extend around the northern and western margins, fully encircling Derryhogan Lakes (See Figure 7-7). In addition, mink and crow trapping will be regularly undertaken in this area.

7.6 Decommissioning Mitigation

Mitigation for decommissioning will be similar to the construction phase.

7.7 Residual Effects

A Short-term Slight residual effect will remain at construction stage due to noise disturbance.

Regarding the operational phase, the following residual effects have been identified:

For Curlew, Long-term Moderate residual effects at the scale of the local breeding population, and Long-term Slight effects at the scale of the transient post-breeding and national populations.

For snipe, operational disturbance arising from recreational use will be reduced to a Long-term Moderate effect through the implementation of mitigation. Disturbance/displacement caused by operational turbines (Long-term Significant) is more difficult to mitigate; however, the realised effect is likely to be lower (i.e. Moderate) due to the abundance of suitable habitat for breeding snipe present further from the proposed development within the surrounding cutaway bog complex.

A Short-term Moderate to Significant effect arising from operational displacement of whooper swan was identified; however, this will reduce to Long-term Not Significant as whooper swan become accustomed to the development.

It is noted that habituation over the lifetime of the Proposed Wind Farm is likely to reduce the magnitude of all of the above residual operational effects identified. A comprehensive operational monitoring regime is proposed to ensure that any changes to the baseline environment during operation can be identified, allowing for the implementation of mitigation measures if required.

7.8 Enhancement

One barn owl nest box and one kestrel nest box will be installed on suitable trees in the north-eastern part of the BEMP area under ecological supervision. These can be installed on poles if suitable trees are not available (see Appendix 6.1).

8. LAND, SOILS AND GEOLOGY

8.1 Existing Environment

Based on the TII (previously NRA) methodology (2009), criteria for rating site importance of geological features, the importance of the peat and glacial till has been classified as 'High' importance receptor due to the Site being considered a County Geological Site (CGS) owing to the importance of the vegetation record held within the pollen of the peat. Furthermore, the bedrock has been defined as 'Medium' as it is not considered protected under the CGS classification.

The Geological Survey Ireland (GSI) Quaternary mapping indicates the Site is predominantly underlain by a mantle of cut over raised peat (peat), within the footprints of turbines and other infrastructure elements. The north-eastern part of the site, in the location under the Borrow Pit, comprises a Till derived from Limestone (TLs) and Bedrock outcrop or subcrop (Rck).

The Quaternary geology of the proposed project and surrounding area is presented in Figure 8.2 of Volume 4 of the EIAR. Mapping shows the turbines and hardstands are underlain by the following Quaternary deposits a mantle of cut over raised peat (peat).

The GSI 1:100,000 scale bedrock mapping (Figure 8.3, Volume 4) shows that the Site is underlain by the following formations:

- Turbines T01, T02, T03, T04 & T05: Ballysteen Formation – Dark muddy limestone, shale (BA).
- Turbines T06, T07, T08, T09, & T10: Waulsortian Limestone - Unbedded lime-mudstone (WA).
- Turbine T11: Aghmacart Formation - Dark shaly limestone (AG).
- Borrow Pit: Lisduff Oolite Member (Ballysteen Formation) – Thick bedded, pale-bluegrey oolite (limestone) (BAld)

A peat probe survey was undertaken between August 2021 to July 2025. A combined total of 556 no. peat probes were carried out by FT and BnM to determine the depth of peat across the site. Findings from the peat probe survey indicates that peat occurs across the majority of the site, however it is relatively shallow at infrastructure locations. Peat thicknesses recorded during the site walkovers ranged from 0.1 to >6.0m with an average peat depth of 1.6m. Approximately 34% of the probes recorded peat depths of less than 1.0m, with 38% of peat depth probes recorded peat depths of 1.0m to 2.0m, and 18% of peat depth probes recorded peat depths of 2.0m to 3.0m. The remaining 10% of probes recorded peat depths of between 3.0 to 6.0m.

From a review of the GSI Landslide Susceptibility database, the Project and proposed infrastructure locations are almost exclusively within an area mapped as having a 'Low' landslide susceptibility.

There are no known areas of soil contamination on the Site.

8.2 Characteristics of the Proposed Project

The proposed project will involve the removal of topsoil, peat and overburden for the construction of turbine foundations, hardstands, substation, temporary construction compounds, cable route and access roads.

Aggregate for construction of these access roads and hardstands will primarily be sourced from the on-site borrow pit and imported to the Site where required.

8.3 Potential Impacts

The environment will change, even without the construction of the proposed project. However, any such changes in the natural environment will be small in nature and will alter the current classification of the site as a passive geological environmental, nor will it impact on the current importance rating of the site in terms of geology (low).

The following on-Site activities have been identified as the sources of potential impacts on the existing geological conditions during the construction phase of the Project:

Site Clearance

- Topsoil and vegetation clearance

Earthworks

- Excavation of Topsoil
- Excavation of Peat deposits
- Excavation of Glacial Till
- Excavation of bedrock at the Borrow Pit location.
- Construction traffic

Filling and Material Deposition Operations

- Deposition of surplus topsoil, peat and glacial till deposits in berms for reinstatement purposes around turbine bases hardstands, along access tracks and in designated peat repository areas. Material placed alongside access tracks will not exceed 1m in height and will be shaped and sealed to prevent the ingress of water.
- Deposition of surplus topsoil and spoil in proposed borrow pits after site won material is excavated.
- Importation and Filling of site won and imported General Fill and Engineering Aggregates.

Slope Stability

- Excavation of Peat Deposits
- Excavation of the Borrow Pit
- Deposition of surplus topsoil, peat and glacial till deposits in berms for reinstatement purposes around turbine bases hardstands, along access tracks and in designated peat repository areas. Material placed alongside access tracks will not exceed 1m in height and will be shaped and sealed to prevent the ingress of water.

Internal Access Tracks and Hardstands

- Deposition of surplus topsoil, peat and glacial till deposits in berms for reinstatement purposes around, hardstands, temporary construction compound and substation compound.
- Use of site won and imported General Fill and Engineering Aggregates.

Internal Cabling and Grid Connection

- The GC, associated excavations and ducting may present a preferential pathway for the movement of groundwater and/or contamination in the subsurface. However, the subsoil at the Proposed Development is predominantly Glacial Till which has a low permeability throughout the majority of the GC.
- The excavations for the GC trenches and joint bays can have a direct impact on the exposed soils (to include excavation and reinstatement of peat deposits) and rock in the form of increased erosion from surface water ingress.
- Where the material excavated from the GC excavations are not suitable for reuse as backfill or deposition on site this material will be disposed of at a facility licenced (subject to environmental testing and classification) to accept this waste type.

Very few potential direct impacts are envisaged during the operational phase of the Project. These are:

- Some construction traffic may be necessary for maintenance of turbines, hardstands and access tracks which could result in minor accidental leaks or spills of fuel/oil.
- The grid transformer in the Proposed Substation and transformers in each proposed wind turbine will be oil cooled. There is potential for spills / leaks of oils/battery fluids from this equipment resulting in contamination of soils and groundwater.

The potential impacts associated with decommissioning will be similar to those associated with construction but of reduced magnitude.

During decommissioning, it may be possible to reverse or at least reduce some of the impacts caused during construction by rehabilitating construction areas such as turbine bases and hardstanding areas. This will be done by covering with topsoil to encourage vegetation growth and reduce run-off and sedimentation.

8.4 Mitigation Measures

The following section outlines appropriate mitigation measures by design and best practice to avoid or reduce the potential impact of the Project. Further details are given in the CEMP which is contained in Appendix 4.1 of Volume 3 of the EIAR.

One of the primary mitigation measures employed at the preliminary design stage is the minimisation of volumes of soil excavation and lengths of track and trench construction.

The proposed turbine locations have been carefully selected in areas of the site which are relatively close to the existing access tracks to minimise the length of new access tracks required. Drainage will be towards the existing drainage network.

To mitigate against erosion of the exposed soil or rock, all excavations will be constructed and backfilled as quickly as possible. Excavations will stop during or immediately after heavy rainfall (>10mm/hour).

Excavation will be undertaken before the turbine, cable trench and access track construction, whereby topsoil and soft soils will be excavated and replaced with granular fill where required. Excavation will be carried out from access tracks where possible in order to reduce the compaction of topsoil.

No spoil stockpiles will be left on site after construction.

Any contaminated soils will be handled, removed and disposed of in accordance with the requirements of the local authority and/or EPA and waste management legislation.

Prior to removal of material from site for disposal WAC (Waste Acceptance Criteria) testing will also be undertaken in accordance with recommended standards and in-line with the acceptance criteria at a suitably licenced landfill or treatment facility.

All temporary cuts/excavations will be carried out such that they are stable or adequately supported. Gravel fill will be used to provide additional support to drains where appropriate. Where appropriate and necessary, temporary cuts and excavations will be protected against the ingress of water or erosion by covering during adverse weather. Where necessary sheet piling or other measures will be used to provide integrity for unstable excavations, particularly within peat, gravel or for excavations below the water table.

8.5 Residual Impacts

Following the implementation of the mitigation measures to be applied, the wind farm is expected to have a low impact on the receiving environment. As such, The Project is not expected to contribute to any significant, negative cumulative impacts of other existing or known developments in the vicinity. Slight residual cumulative impacts from the excavation of fill material from local quarries and disposal of material deemed unsuitable for reuse are considered to result from the Project by placing demand on existing quarries and available void space at licensed facilities during the construction phase of the development.

8.6 Conclusion

A study has been undertaken which has identified the principal impacts of the construction of the proposed project in relation to the Land, Soils, and Geology.

The assessment of Land, Soils, and Geology has established a baseline for the receiving environment for the impact assessment. Potential impacts were considered for the construction, operational and decommissioning phases of the Project as well as potential residual and cumulative impacts. Mitigation measures have been proposed where relevant. The importance of the soil receptors (subsoil) is considered to be ‘High’ throughout the Site due to the Site being located within Littleton Bog, Ballybeg Bog, Lanespark Bog and Derryvella Bog which is considered a County Geological Site (CGS) owing to the importance of the vegetation record held within the pollen of the peat. The bedrock has been defined as 'Medium' importance receptor as it is not considered protected under the CGS classification.

The site topography is predominantly flat, with no existing gradients of sufficient magnitude to pose inherent slope stability concerns. The gentle natural slopes across the area, typically ranging from approximately 2° to 4°, are not anticipated to generate significant global stability issues and any potential instability would be limited to localised zones. Findings from the site walkover surveys indicates no visual evidence of historic or contemporary landslides or ground instability at or adjacent to the proposed infrastructure locations.

A number of potential impacts have been identified associated with the excavation of soil and rock on the site. The significance of these potential impacts is assessed as being 'slight' to 'significant/moderate' significance prior to mitigation. With mitigation measures, outlined in Chapter 8 Section 8.7, put in place during construction, operational and decommissioning stage the Proposed Development will have 'imperceptible' to 'moderate/slight' significance on the land, soils and geology.

The Project is not expected to result in any significant, negative cumulative impacts with other existing, permitted or Proposed Developments in the vicinity

9. HYDROLOGY, HYDROGEOLOGY AND WATER QUALITY

9.1 Introduction

This chapter assesses the likely significant effects that the Proposed Development (Proposed Wind Farm and Proposed Grid Connection) may have on hydrology and hydrogeology and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified.

9.2 Proposed Wind Farm

The surface of the Proposed Wind Farm site (the 'Site') is drained by a network of drains that are typically spaced every 15 to 20m. Larger arterial drains connect the smaller field drains and gently slope towards perimeter silt ponds and surface water outfalls. Drainage at the Site was historically assisted by pumping stations. These are no longer active and all discharge is currently via gravity outfalls. Surface water outflows from the Site discharge to small streams and drains located in the lands surrounding the cutover bog.

Regionally, the Site is located in the River Suir Catchment and the Drish River sub-catchment. All surface waters draining the Site are directed to the Drish River via the Breagagh, Clover, Black (Two Mile Borris) rivers and other smaller streams which drain the local area. The Drish River discharged into the River Suir to the south of Thurles.

The bedrock geology underlying the Site is classified as a Locally Important Aquifer in the north. Meanwhile, the south of the Site is mapped to be underlain by a Regionally Important Karst Aquifer associated with the Waulsortian Limestone Formation. There are no mapped karst features within the Site. The Site is overlain by cutover raised peat with an extensive network of surface water drainage features. The hydrogeological regime at the Proposed Project site is characterised by high rates of surface water runoff and very low rates of groundwater recharge due to the presence of soils and subsoils of low permeability.

Due to the nature of wind farm developments, being near surface construction activities, effects on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments. The primary risk to groundwater would be from oil spillage and leakages at turbine foundations or during construction plant refuelling. These are common potential impacts to all construction sites (such as road works and industrial sites). These potential contamination sources are to be carefully managed at the Site during the construction and operational phases of the development and measures are proposed within the EIAR to deal with these potential minor local impacts.

During each phase of the Proposed Development (construction, operation, and decommissioning) a number of activities will take place at the Site, some of which will have the potential to significantly affect the hydrological regime or water quality at or downstream of the Site. These significant potential effects generally arise from sediment input from runoff and other pollutants such as hydrocarbons and cement-based compounds.

Surface water drainage measures, pollution control and other preventative measures have been incorporated into the project design to minimise significant impacts on water quality and downstream designated sites. A self-imposed 50m watercourses buffer was used during the design of the Proposed Wind Farm, thereby avoiding sensitive hydrological features. The surface water drainage plan will be the principal means of significantly reducing sediment runoff arising from construction activities and to control runoff rates. The key surface water control measure is that there will be no direct discharge of wind farm runoff into local watercourses or into the existing bog drainage network. This will be achieved by avoidance methods (i.e. stream and drain buffers) and design methods (i.e. surface water drainage plan). Preventative measures also include fuel and concrete management and a waste management plan which will be incorporated into the Construction and Environmental Management Plan.

No significant impacts to surface water (quality and flows) and groundwater (quality and quantity, and any local groundwater wells) will occur as a result of the Proposed Wind Farm provided the proposed mitigation measures are implemented. This EIAR presents proven and effective mitigation measures to mitigate the release of sediment which will reduce the concentration of suspended solids to acceptable levels. The storage and handling of hydrocarbons/chemicals will be carried out using best practice methods which will ensure the protection of surface and groundwater quality.

A Site Specific Flood Risk Assessment has been completed for the Proposed Development and concludes that the Proposed Wind Farm has no potential to increase the downstream flood risk. All highly vulnerable infrastructure are located in the Flood Zone C and are considered to be acceptable from a flood risk perspective. The Proposed Wind Farm is designed and laid out in a manner that reduces flood risk. The Proposed Wind Farm drainage system will be designed to slow surface water runoff from the Site by providing greater attenuation. This will ensure that the Proposed Wind Farm does not alter downstream surface water flows and will not contribute to downstream flooding.

A hydrological assessment of potential impacts on local designated sites was undertaken. The Lower River Suir and the Cabragh Wetlands pNHA are considered to be hydrologically connected to the Site. The potential for effects on these downstream designated sites is limited due to their distant location from the Site (hydrological flowpath length of ~17km).Furthermore, following implementation of the appropriate mitigation measures as outlined in the EIAR no significant impacts on these designated sites will occur as a result of the Proposed Development.

There are no surface water abstractions for drinking water located downstream, and in close proximity to the Site on the Drish River or its tributaries.

There are no group or public groundwater abstractions, or any associated delineated source protection areas, mapped within the Site. Several groundwater supplies are located in the local area including the Leigh, Newhill, Longford Pass, Moyne, and Fenor Inch Group Water Schemes, and the Two-Mile Borris Public Water Supply (PWS). In addition, private well supplies are located in the lands surrounding the Site. A comprehensive impact assessment was completed with respect to local groundwater supplies, with particular attention paid to the potential affects which may arise from the excavation of the proposed borrow pit, which is located outside of the main cutover bog area. However, due to the nature of the local bedrock, which was described as strong and competent limestone during the site investigations with no significant groundwater strikes, and the restricted depth of the borrow pit, there will be no potential for significant effects on local groundwater levels Furthermore, tried and tested best practice mitigation measures for the protection of groundwater quality will ensure that there are no qualitative effects on local groundwater supplies. The assessment concluded that there will be no significant effects on any public, group or private groundwater supply.

A Water Framework Directive (WFD) Compliance Assessment has been completed for all waterbodies (surface water and groundwater bodies) with the potential to be impacted by the Proposed Wind Farm. With the implementation of the mitigation measures detailed in this EIAR there will be no change in the WFD status of the underlying groundwater body or downstream surface waterbodies as a result of the Proposed Wind Farm. The Proposed Wind Farm has been found to be fully compliant with the WFD and will not prevent any waterbody from achieving its WFD objectives.

An assessment of potential cumulative effects associated with the Proposed Wind Farm and other developments on the hydrological and hydrogeological environment has been completed. With the implementation of the mitigation measures detailed in this EIAR, the cumulative assessment found that there will be no significant effects on the hydrological and hydrogeological environments. The assessment found that the cumulative effect with the Cutaway Bog Decommissioning and Rehabilitation Plans will result in an overall positive effect as the rehabilitation plans will improve surface water quality and attenuation within the Site.

No significant effects on the water environment will occur during the construction, operation or decommissioning of the Proposed Wind Farm.

9.3 Proposed Grid Connection

The Proposed Grid Connection underground cabling route from the proposed onsite 110kV substation to the existing Ballyragget 110/220kV substation is ~30.9km and is located within the largely within the carriageway of the existing road network.

On a regional scale, the Proposed Grid Connection is located in the River Suir catchment in the vicinity of the Site, with the majority of the Proposed Grid Connection in the River Nore catchment. There is 1 no. watercourse crossing located in the River Suir catchment with an additional 10 no. crossings within the catchment of the River Nore.

Designated sites located downstream of the Proposed Grid Connection include the Lower River Suir Special Area of Conservation (SAC) in the catchment of the River Suir, and the River Barrow and River Nore SAC, the River Nore Special Protection Area (SPA), Inchbeg proposed Natural Heritage Area (pNHA), River Nore Abbeyleix Woods Complex pNHA in the catchment of the River Nore. In addition, The Loughans SAC/pNHA is located adjacent to a section of the Proposed Grid Connection. Due to the minor and transient nature of the proposed works, coupled with the prescribed mitigation measures, there will be no significant effects on downstream designated sites.

Approximately 19.46km of the Proposed Grid Connection is underlain by a Regionally Important Karst Aquifer. However, due to the minor, shallow and transient nature of the works, and the prescribed mitigation measures, there will be no significant effect on karst features or the underlying karst aquifer.

A crossing is proposed under the Nore_120 Drinking Water Protected Area via Horizontal Directional Drilling. The Nore_120 waterbody is associated with the Ballyragget water supply with the source of the raw water being an infiltration gallery adjacent to the river. Furthermore downstream the Kilkenny Troyswood Supply is sourced from the River Nore. However, due to the minor, shallow and transient nature of the works, and the prescribed mitigation measures, there will be no significant effect on downstream surface water abstractions.

Several groundwater abstractions are also located in the vicinity of the Grid Connection including the Fennor Inchorourke GWS, Urlingford Johnstown PWS, Balief GWS, Barna Kilrush GWS and the Ballyconra PWS. However, due to the minor, shallow and transient nature of the works, and the prescribed mitigation measures, there will be no significant effects on any groundwater abstraction.

An assessment of the construction, operational and decommissioning phases has been completed, along with a cumulative assessment for each phase. Based on the above, and with implementation of the outlined mitigation measures, no significant effects on the surface water and groundwater environments will occur. The Proposed Grid Connection has been found to be fully compliant with the WFD and will not prevent any waterbody from achieving its WFD objectives.

10. AIR QUALITY AND CLIMATE

This chapter identifies, describes and assesses the likely significant direct and indirect effects on air quality and climate arising from the construction, operation and decommissioning of the Proposed Development, as well as the effects of climate change on the Proposed Development and the ability of the Proposed Development to adapt to possible climate changes over the course of its lifetime.

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

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

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Framework Directive and Daughter Directives. The site of the Proposed Development, including the grid connection (GC) are in Zone D.

10.1 Existing Environment

The study area is located in Zone D and the Air Quality Index for Health map on the EPA website, shows that the current air quality within the Site, GC and Turbine Delivery Route (TDR) is classed as *Good*. In terms of climate, the dominant influence on Ireland's climate is the Gulf Stream. Consequently, Ireland does not suffer from the extremes of temperature experience by other countries at the same latitude. Climatic data from Met Eireann's Oak Park weather station is presented in the chapter.

10.2 Impact Assessment

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

The principal sources of potential air emissions during the construction of the Proposed Development will be from the Site, GC, TDR, and the haulage routes; from dust arising from earthworks, trench excavation along cable routes, construction of the new access tracks, the temporary storage of excavated materials, the construction of the proposed substation, the movement of construction vehicles, loading and unloading of aggregates/materials and the movement of material around the Site.

Due to the small number of human receptors (refer to Figure 5.2 within EIAR Volume 4 which shows the Residential Receptors within 1km vicinity of the Wind Farm Site), and distance from the source of the dust emissions, with the closest residential dwelling being approximately 90 m from the source of dust, the "sensitivity" of the area is "low", as per the criteria set out in the guidance (IAQM, 2014). For further information on human receptors, please refer to Chapter 5 – Population and Human Health, within EIAR Volume 2.

Combining the large magnitude of the earthworks with the low sensitivity, the IAQM guidance indicates that the Risk of Dust Impacts are "Low Risk" for the Proposed Development. The likelihood of a significant adverse environmental effect is low. The effect is considered to be adverse in nature, temporary in duration and not significant.

Calculations of HGV movements associated with the construction of the Proposed Development indicate an average daily increase of 22 HGV trips per day. This increases to a peak of 64 HGV trips per day during the peak month which occurs in month 7 of the programme for HGV traffic (see Chapter 15, Volume 2 of the EIAR).

During construction, an average workforce of 40 no. site staff is anticipated, increasing to 60 during peak periods. This is estimated to give rise to an average increase in LGV traffic of 60 no. trips per working day and rising to 77 no. during peak construction periods which occurs in months 7 - 10 inclusive of the programme for LGV traffic. The combined HGV and LGV average daily increase are 83 vehicles per day and rising to 140 vehicles per day during peak construction periods occurring in month 7 of the construction programme.

For context, these average daily increases in traffic are significantly below the threshold of 1,000 annual average daily traffic (AADT) referenced in standard traffic and air quality assessment criteria, below which construction traffic impacts are generally considered to be not significant. The relatively low volume of additional traffic is not expected to result in a significant effect on air quality.

The Proposed Development does not meet or exceed any of the criteria set out in the UK DMRB. Therefore, the air quality assessment model is not required in this instance. Given the relatively small increase in traffic at the Site, and the conclusion of no significant impacts from Chapter 15, no effects on air quality are expected.

Some receptors have the potential for dust soiling due to trucks travelling along local routes. This is a temporary, slight adverse effect, which is not considered to be significant.

Once the Proposed Development is constructed there will be no likely significant direct emissions to atmosphere. A diesel generator will be located at the proposed wind farm substation; however, this will only be operated as a back-up/emergency power supply.

Emissions from the diesel generator will therefore be infrequent. During use, a diesel generator will emit carbon dioxide, nitrogen oxide and particulate matter, however, due to the low usage, the effect will likely be imperceptible (therefore non-significant).

Maintenance vehicles will access the Site during the operational period, however, due to the low traffic movements involved (see Chapter 15), the potential adverse effects from their operation will be imperceptible and not significant. Additionally, the operational phase of the wind farm will result in positive effects on air quality due to the displacement of fossil fuels as an energy source. This would have a significant positive effect on Tipperary County Council meeting their CDP and CAP targets: and a slight, positive effect on Ireland meeting its various climate targets set out in Section 10.1.3 of this Chapter and in Chapter 2, Volume 2 of the EIAR. The likely effect on Climate Change on a global scale would be imperceptible and as such non-significant.

In terms of decommissioning, there will be truck movements required for removing the wind turbines, earthmoving to cover foundations, and landscaping resulting in vehicular emissions and dust. However, the number of truck movements will be significantly less than the construction phase and the likely potential adverse effects on air quality will be temporary, imperceptible and not significant. There will also be emissions from machinery on site including for the movement of soil to cover the foundations, however, the related effects on air quality will be not significant.

During the decommissioning phase, the substation, grid connection and ancillary electrical equipment will form part of the national grid and shall be left in situ. The internal ducts for cabling, and all the internal access roads, and turbine hard standings will be left in situ, resulting in no additional truck movements and hence no adverse effects from emissions from machinery.

As turbine foundations will be left in-situ following decommission, the Risk of Dust effects on air quality during the decommissioning stage will be imperceptible, temporary and not significant.

In terms of carbon losses and savings, in the absence of any Irish tools, the online Scottish Windfarm Carbon Assessment Tool (https://informatics.sepa.org.uk/CarbonCalculator/index.jsp) was used in December 2025 to estimate carbon savings as a result of the proposed construction and operation of the wind farm. Appendix 10.1, Volume 3 contains a summary of the variables / inputs used to generate a model for the Proposed Development.

Based on the Scottish Windfarm Carbon Assessment Tool, embodied carbon emissions associated with the manufacturing and transportation of turbines (11 no.), together with emissions from construction and decommissioning activities, will release 60,212 tonnes of CO_2 to the atmosphere. This is based on the assessment of a wind turbine generator with a power output rating of 6.2MW. This represents 38% of total wind farm CO_2 losses that are attributable to turbine life losses. Losses during the construction and decommissioning phases will be due to reduced carbon fixing potential and losses from soil organic matter.

Irrespective of whether the Proposed Development proceeds or not, the peatlands within the site will continue to gather CO_2, as the Proposed Wind Farm will not interfere with the rehabilitation or compromise re-wetting and revegetation or regeneration of the site.

If the Proposed Development does not proceed, up to 9,585 tonnes of additional CO_2 could be gathered by bog plants under the footprint of land lost due to the construction of the proposed development and the areas affected by drainage. This represents only 0.3% of the carbon emission saved over the 35-year lifetime of the development.

While re-wetting peatlands is proven to be a viable solution to reducing land-use carbon emissions, this only becomes significant when considering re-wetting and land-use carbon emission reductions across large land areas and over long periods of time. The calculations provided indicate that wind energy is much more effective at reducing carbon emissions over the relatively short lifetime of the wind farm, when compared to re-wetting peatlands across equivalent areas and equivalent time periods on a like-by-like basis. Integrating this wind energy development, which will take up only a small footprint, within this much larger rehabilitated peatland site improves the overall carbon emissions reductions associated with the Site.

10.3 Mitigation Measures

The impact assessment has not identified any likely significant adverse effects on Air or Climate from the Proposed Development. However, while mitigation measures are not required, they are provided here as best practice.

Mitigation measures in relation to air quality include the use of a water bowser to spray works areas and haul routes; loads to be covered; revegetation of exposed soils; good maintenance of machinery; implementation of a dust control plan as part of the Construction and Environmental Management Plan; no idling of vehicles. As the operation of the wind farm will have positive impacts on air quality, mitigation measures are not required.

It is considered that the Proposed Development will have an overall likely positive non-significant effect in terms of carbon reduction and climate change. It will assist Ireland in meeting the EU's latest renewable energy targets set out in the Renewable Energy Directive (2023) which contains a binding target for 2030 of at least 42.5% but aiming for 45%. Also, it will aid in increasing the onshore wind capacity, as per the Climate Action Plan 2024. In terms of renewable energy, the target increase set in the Climate Action Plan 2024 in electricity generated from renewable sources is to increase to 80% by 2030, with 9GW of onshore wind capacity.

For the Proposed Development with 11 no. turbines assuming a turbine power rating of 6.2 MW, and operational period of 35 years, the payback time for the manufacture, construction and decommissioning phases (including carbon losses from soil, etc.) is estimated at approximately 2.1 years for fossil fuel mix of electricity generation and 4.4 years for the 2024 grid - mix electricity generation.

10.4 Residual Impacts

Following the implementation of the above mitigation measures, the Site, GC and TDR work areas will result in slight to moderate residual effects arising from fugitive dust emissions during construction activities involving excavations, felling or earthmoving. These will be localised in nature and as they will be associated with elements of the construction phase, they will be temporary in nature and will not result in any likely significant residual effects.

As no likely significant effects on air quality were identified for the construction phase in the pre-mitigation assessment, no likely significant residual effects will arise for the construction phase. While the proposed mitigation measures may reduce the magnitude and duration of the residual effects as compared to the pre-mitigation effects, such mitigation measures are not required to reach a conclusion of no likely significant residual effects.

10.5 Conclusion

There are no likely significant effects expected on Air Quality or Climate as a result of the construction, operation and decommissioning of the Proposed Development.

There are no likely significant cumulative effects expected on Air Quality and Climate as a result of other existing or proposed projects.

There will be a likely long term positive residual effect on Air Quality and Climate as a result of the Proposed Development due to the displacement of fossil fuels.

The mitigation measures identified in this Chapter will be adopted and implemented by the Contractor and have been incorporated into the construction stage CEMP included in Appendix 4.1, Volume 3 of the EIAR.

Should the Proposed Development not be developed, fossil fuel electricity generation will likely be the primary alternative to provide the required quantities of electricity. This will further contribute to greenhouse gas and other air pollutant emissions, as well as hindering Ireland in its commitment to meet its international commitments in relation to increasing renewable electricity production and reduction in GHG emissions.

11. NOISE AND VIBRATION

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

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

11.1 Construction and Decommissioning Phase

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

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

- On-site Borrow pit
- Preparation of access roads, preparation of hardstands and drainage
- Preparation of wind turbine foundations and installation of turbines
- Construction of Substation
- Grid connection works
- Accommodation works for Turbine Delivery Route

Noise from the proposed borrow pit is predicted to be below the daytime construction noise limit at the nearest residential receptors, provided noise mitigation measures with bunding and a barrier between the borrow pit and noise sensitive locations, are employed. Also plant operations will be phased when operating close to the eastern and southern boundaries near the residential locations. With mitigation noise from the borrow pit will be below the daytime construction noise limit and the impact is not considered to be significant. It is proposed that noise monitoring is undertaken at the closest properties to the south and east of the borrow pit, to confirm that the noise criteria are met at the closest properties.

Construction and decommissioning noise from the other on-site works are predicted to be below the daytime construction noise limit at the nearest residential receptors, and therefore construction noise impacts are not considered to be significant.

Grid connection works extend for 31km and are proposed to take place along 28km of public road. Noise from grid connection works, with mitigation, have the potential to exceed the daytime noise limit at 5 properties within 10m of the works along the grid connection route. With mitigation, all properties within 50m of the grid connection works meet the daytime construction noise limit. Above 50m from grid connection works, the daytime construction noise limit is met at noise sensitive locations. Given the nature of the grid connection works, construction activities will not occur over an extended period at any one location (i.e. typically less than 3 days).

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

The on-site construction and decommissioning noise levels will be below the daytime construction noise limit at the nearest residential receptors, and therefore construction noise impacts are not considered to be significant. Note that construction hours have been reduced to avoid unsociable hours, recommended within the Code of practice for noise and vibration control on construction and open sites (British Standard 5228: Part 1: 2009+A12014) to minimise the potential impact of construction noise. Construction operations will generally be restricted to between 07:00-19:00 Monday to Friday and 07:00-13:00 on Saturdays.

Given the minor nature of proposed temporary accommodation works and the distance of the proposed works to the closest noise sensitive locations, the noise impact is predicted to be below the daytime construction noise limit.

11.2 Operational Phase

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

A detailed operational noise assessment was undertaken in accordance with:

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

Operational noise levels were predicted in line with current best practice, at the time of writing the chapter, as detailed in the Chapter. The assessment considered a layout of 11 turbines with a hub height of 119m:

The derived operational noise limits applied to the assessment were:

- Daytime (07:00–23:00), a limit of 40 dB LA90 for low noise environments in accordance with the Wind Energy Development Guidelines 2006. For other areas the daytime limit of 45 dB LA90 was applied
- Night-time (23:00–07:00): 43 dB LA90.

Noise predictions were performed for the 11-wind turbine layout using manufacturers data at each wind speed, for the proposed turbine model. The highest noise level is reached at 7m/s.

The noise limits outlined above were met at identified noise sensitive locations. As the proposed turbine meets the noise limits, no noise mitigation is required.

Substation operational noise was also assessed in line with British Standard 4142: Methods for rating and assessing industrial and commercial sound (BS 4142:2014+A1:2019). The predicted transformer noise levels were found to be below the level that would lead to an adverse effect at the nearest noise sensitive locations. . As such, no significant impact is predicted from the substation during the operational phase.

The potential for amplitude modulation (AM), sometimes referred to as “blade swish,” has been considered. While AM is a known and intermittent phenomenon, it is typically perceptible only at short distances and under certain atmospheric conditions. There is no method to reliably predict its occurrence at a particular location prior to turbine operation. The approach of Wind Energy Ireland is considered, which states that "No AM" conditions should be included in planning permissions, as it cannot be eliminated and such conditions are unsupported by scientific evidence or best practice. It recommends a complaints based monitoring system, in line with UK good practice.

It is proposed that during the operational phase, should any complaints occur following commissioning, the wind farm operator will undertake noise monitoring at the windfarm. The methodology will be agreed with the Local Authority and based on best practice. If the complaints relate to amplitude modulation and/or tonal noise, mitigation measures will be implemented, depending on the source of AM or Tonal noise and magnitude.

Based on the Institute of Acoustics (IOA) advice on infrasound and low frequency noise, the absolute levels from wind turbines are well below those reported to trigger physiological health effects, based on peer reviewed research to date.

Based on the IOA Acoustics Statement in Respect of Wind Farm Noise Assessment December 2024, Vibration from operational wind turbines are well below perception thresholds even on the actual wind turbine sites. Therefore, there is no need to assess vibration affecting people for operational and wind turbine developments.

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

The Chapter addressed both potential construction and operational cumulative noise. No additional effects were identified from potential cumulative construction noise. The Chapter considered cumulative operational noise from the proposed development and adjacent Lisheen, Graigaman and Ballincurry Wind Farms. There is a slight increase in predicted windfarm operational noise at some locations, but predicted noise levels are below the Littleton Windfarm Operational Noise Limits, in addition to the planning conditions for the adjacent Wind Farms.

12. SHADOW FLICKER

Under certain combinations of geographical position, wind direction, weather conditions and times of day and year, the sun may pass behind the rotors of a wind turbine and cast a shadow over the windows of nearby buildings. When the blades rotate and the shadow passes a window, to a person within that room the shadow appears to 'flick' on and off; this effect is known as 'shadow flicker'. The phenomenon occurs only within occupied buildings where shadows are cast across a window aperture, and the effects are typically considered up to a maximum distance of 10 times the rotor diameter from each wind turbine.

Potential levels of shadow flicker were predicted using specialist computer software for all buildings within 10 rotor diameters of the turbines. A two-stage approach was used, which initially identified areas in which shadow flicker has the potential to occur, and for all properties within this area, detailed predictions were undertaken based on the dimensions of each building. Predictions were undertaken using several worst-case assumptions, including a bare-earth model and optimal weather conditions for shadow flicker to occur, and that the full external façade of each building was sensitive to shadow flicker (rather than specific window locations).

Predicted levels of shadow flicker at each property were assessed against applicable threshold levels as set out in national guidance. This assessment considered both worst-case predictions, and predictions that had been corrected to reflect typical monthly hours of sunshine based on meteorological data.

Properties where predicted levels exceed daily and yearly thresholds were identified as requiring mitigation. Mitigation is available in the form of a wind turbine control system which ceases operation of specific wind turbines during periods and conditions where shadow flicker is anticipated to occur.

Beyond the requirements of national guidance, mitigation (in the form of targeted turbine shut-downs during shadow flicker events) will be implemented at all sensitive properties within 10 rotor diameters of the turbines to ensure there is minimal shadow flicker occurrence at any receptor, subject to the response time of the system.

13. LANDSCAPE AND VISUAL IMPACT (LVIA)

13.1 Introduction

This chapter describes the landscape context of the proposed project and assesses the likely landscape and visual impacts of the scheme on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately.

In accordance with relevant guidelines, the study area used for the LVIA is 20km. Production of the Landscape and Visual Impact Assessment involved baseline work in the form of desktop studies and fieldwork followed by professional evaluation by qualified and experienced Landscape Architects.

13.2 Receiving Environment

The site and its immediate surroundings are extensively flat, highlighted by the linear array of peat bogs that contain the site and some of the surrounding central study area. Beyond the site's immediate context, the terrain is also characterised by relatively flat to gently rolling land. The landform changes swiftly in the eastern and south-eastern parts of the study area, where the terrain rises along a steep but low escarpment to an area of more rolling ground around the Slieveardagh Hills. The nearest watercourse to the site is the Back River, which flows a short distance to the north. A small lake, known locally as Lough Doire Bhile, is also located north of the three most southern turbines in the proposed array. The site is located within a linear array of flat, open peat bogs oriented in a generally north–south direction. The periphery of these peat bogs comprises notable areas of conifer woodland and sections of transitional woodland. Beyond the site's immediate context, the principal land use is pastoral farmland, bounded by networks of mixed hedgerow vegetation and mature trees. Several small existing wind turbines are also located along the rolling hills and ridges in the eastern extent of the central study area, whilst the wider study area includes a higher predominance of wind turbines.

With regard to settlements, the central study area encompasses several small settlements, the majority of which are situated to the west of the site. Ballinunty is the nearest, located just over 2 km southeast of the proposed turbine array. The village of Gortnahoe lies approximately 2.5 km northeast of the site at its closest point, while New Birmingham is situated just under 2 km to the east. The small centre of population of Ballysloe is also located to the east, at just over 3 km from the nearest turbine. Littleton and Twomileborris are the only settlements within the central study area situated to the west of the site, located 2.6 km and 2 km from the proposed turbine array, respectively. The wider study area comprises numerous settlements of varying sizes the most notable of which include the large centres of population of Thurles and Cashel. The principal transport route in relation to the Proposed Development is the M8 motorway, which traverses the study area in a general northeast–southwest direction. The N75 and N62 national secondary routes are also located along the periphery of the central study area, extending west from the M8 motorway, whilst a collection of local and regional roads also occur within the central study area.

The central and wider study area encompasses numerous heritage, recreation and tourism receptors that possess a variety of values and sensitivities. The nearest of these to the Proposed Development is the Lough Doire Bhile Loop Walk which is contained around a small Lough located immediately adjacent to the southern turbine array. Some of the more prominent heritage and amenity features within the study area and wider landscape include the Rock of Cashel, Kilcooley Abbey and Holy Cross Abbey.

13.3 Landscape Policy Context

The Wind Energy Development Guidelines (2006) provide guidance on wind farm siting and design criteria for a number of different landscape types. The site of the Proposed Development is located within a broad area of flat peatland and is surrounding by areas of flat to low-rolling pastoral farmland.

With regard to the current Tipperary County Development Plan, the site is contained within the landscape character type 'A1 – Lowland pasture & Arable' and 'A2 – Peatlands & Wet Mixed Farmland' with the proposed wind farm situated in the landscape character type A2. The proposed site itself is contained across both Landscape Character Area (LCA) '9 - Littleton Farmland Mosaic and Marginal Peatland' and LCA '8 - Littleton Raised Bog' (Figure 13.4 refers). Chapter 5 of the landscape character assessment relates to landscape sensitivity and designates LCA 8 - 'Littleton Raised Bog' with a 'normal/transitional/sensitive' sensitivity designation with the 'sensitive' designation being the dominant one. The dominant 'sensitive' designation for this landscape character area has a 'limited' capacity for development. LCA '9 – Littleton Farmland Mosaic and Marginal Peatland' is designated as having a 'normal/transitional/sensitive' sensitivity designation with the 'normal' designation being the dominant one. The dominant 'normal' sensitivity designation for this landscape character area has a 'high' capacity to accommodate development.

Section 6.2 of the Tipperary Landscape Character Assessment identifies land-use compatibility between LCAs and land-use types, which are categorised in 5 layers of compatibility from 'Most' compatible to 'Least' compatible. Both LCA 8 and LCA 9 have been classified with a 'Medium' compatibility rating in respect of wind farm developments. Chapter 11 of the current Tipperary CDP 2022-2028 relates to the landscape and identifies primary and secondary amenity areas within County. It is important to note that the Site is neither situated within a primary or secondary special amenity area. Nonetheless, a broad 'secondary special amenity area' is located to the south of the site and is associated with the Slieveardagh Hills and its surrounding rolling landscape.

In terms of designated scenic amenity, the Tipperary CDP, Kilkenny CDP and Laois CDP identify an array of scenic designations throughout the study area. Those that have been deemed relevant to the proposed project have been included as a representative view for assessment in the visual impact appraisal.

13.4 Mitigation Measures

Landscape and visual considerations were central to the design of the Proposed Development from the outset. The layout and positioning of the turbines were carefully refined to minimise impacts on nearby residents and the surrounding landscape, in line with national Wind Energy Development Guidelines. The site was selected within a robust, working landscape that is considered capable of accommodating wind energy development and is not subject to sensitive landscape or visual designations. Existing wind farms in the area also demonstrate the landscape's capacity to absorb such development.

A series of design iterations were analysed using wireframe modelling to understand potential effects. Early proposals included larger and taller turbines. However, these were found to create an excessive visual presence for nearby receptors. As a result, the design was revised, reducing both turbine height and number. The final design comprises 11 turbines with a maximum height of 200 m, representing a balanced approach that minimises visual impact while maintaining the viability of the project.

With regard to offsets from surrounding dwelling receptors, for the Proposed Development, the minimum distance of any turbine from the nearest residential receptor is >800 m, which is in excess of the draft revised Wind Energy Development Guidelines (2019) minimum set back of 500m and greater than the setback distance of 4 times the tip height of the proposed turbines. In this instance and based on the Draft revised WEGS 2019, the setback distance for visual amenity purposes is 200m from residential receptors on the basis of the 200m high turbines (this represents the greatest potential setback distance with regard to all potential turbines ranges).

13.5 Residual Effects - Landscape Effects

13.5.1 Construction Phase Effects

Construction of the wind farm will result in some temporary disturbance to the site, including the creation of access tracks, turbine bases, a substation, a meteorological mast and a borrow pit. However, these features have relatively small footprints, and the overall landform and character of the site will remain largely unchanged. Works have been carefully designed to minimise impacts, including using existing tracks where possible and following natural ground contours. There will be increased activity during construction, including the movement of machinery and materials, as well as some temporary works along local roads to facilitate turbine delivery. These effects will be short-term and localised.

The on-site substation and underground cabling will result in some localised ground disturbance, but these impacts are limited in scale and comparable to typical rural or agricultural construction. Most site works, including excavations and vegetation clearance, will be reinstated following construction. While construction activity will temporarily increase the intensity of development at the site, these effects are reversible and will reduce significantly once the wind farm becomes operational. Effects will be most noticeable close to the site and will diminish with distance.

Overall, construction stage landscape effects are considered to be temporary, localised and Not significant

13.5.2 Operational Phase Effects

The main landscape impact of the wind farm will arise from the introduction of tall turbines, which will become a new feature in the local area. However, the surrounding landscape already contains a number of wind turbines, and as a result the Proposed Development will continue an established pattern of energy generation in this part of County Tipperary. The site is located within a broad, open peatland landscape, which is well suited to accommodating wind turbines without creating significant conflicts of scale. The area also has a long history of energy production through peat extraction, and the proposed wind farm represents a more sustainable continuation of this tradition.

In addition to energy generation, the project includes measures to enhance biodiversity and provide recreational trails, which will deliver some positive landscape benefits. Although the wind farm will operate for up to 35 years, it is not permanent. Most infrastructure will be removed at the end of its life, and the land will be restored, leaving limited long-term evidence of the development. Overall, while the wind farm will increase the level of development within the immediate area, it is considered to fit well within the existing landscape. Landscape effects will be most noticeable close to the site, reducing with distance, and are not considered significant at a wider scale.

Landscape effects associated with the grid connection and turbine delivery route will be minimal, temporary, and largely confined to the construction phase. Any impacts will be localised and Not Significant.

13.6 Residual Effects - Visual Effects

13.6.1 Construction Stage Visual Effects

During construction, visual impacts will mainly arise from increased traffic, site activity and the use of large machinery, including cranes used to erect the turbines. Temporary features such as soil stockpiles and construction materials will also be visible. However, much of this activity will be screened by existing hedgerows and forestry, and all construction effects will be short-term, ending once the wind farm becomes operational.

Visual effects will be most noticeable for nearby residents but will reduce quickly with distance. Overall, construction stage visual effects are temporary, localised and Not Significant.

13.6.2 Operational Stage Visual Effects

During operation, the proposed wind farm will introduce a new and noticeable feature into the surrounding landscape, particularly within the immediate study area (approximately 5 km from the site). The turbines will be visible from a range of locations, including local roads, nearby dwellings, settlements, and some amenity and heritage features. Due to their height and moving blades, the proposed turbines will draw the eye in certain views, especially from closer viewing distances. The most noticeable visual effects will occur at locations closest to the site, generally within 1–2 km, where the turbines will appear as prominent features in the landscape. In these views, the Proposed Development will represent a clear increase in the intensity and scale of built infrastructure. However, the proposed turbines are not considered to be noticeably overbearing and are typically well spaced and clearly legible, allowing for a degree of visual permeability through the proposed array. The broad, open nature of the peatland landscape aids in visually accommodating the proposed turbines structures without creating significant conflicts of scale.

At distances between approximately 2–5 km, the proposed turbines will remain visible but will appear less dominant. In many cases, views will be partially filtered or intermittently screened by existing vegetation, landform, or built features. This reduces their overall visual influence and results in a more moderate level of visual change. From these locations, the proposed turbines are generally perceived as part of the wider working landscape, which already includes a range of human influenced land uses, including existing wind energy development. Beyond the central study area, visual effects reduce further with distance. The turbines become smaller elements within broader views and are often difficult to discern clearly, particularly where screening is present. In these more distant views, visual effects are typically slight or imperceptible.

With regard to specific receptor types, local community views will experience the greatest degree of change due to proximity, although effects are generally moderate or less for most locations. A small number of viewpoints close to the site will experience more noticeable effects, where the proposed turbines will present in a dominant manner and will be one of the most prominent built features within the local surrounding landscape context.

Tourism, heritage, and amenity features within the study area will, in some cases, have views of the proposed turbines. The most notable effects occur at locations closest to the site, where the proposed turbines will become a prominent feature in the view. Of most note is the Lough Dhoire Bhile walk, which afforded views of turbines at a near distance where they present in a dominant manner. However, other key heritage assets and more sensitive sites are either screened by vegetation and landform or are located at sufficient distances to heavily diminish the perceived visual presence and intensity of the Proposed Development. As such, the overall setting and appreciation of these features will not be significantly affected.

Scenic routes and designated views will experience some visual change, particularly where open views towards the site are available. However, in many instances, these routes are influenced by existing infrastructure or limited by screening, reducing the overall sensitivity of the view. While the proposed turbines will be visible and draw the eye, they do not block or dominate views and are generally perceived as part of the wider robust rural landscape context.

Centres of population, including nearby villages and settlements, will also experience varying degrees of visibility. In elevated locations, more open views of the proposed turbines will be available, while in other areas, vegetation and buildings will provide a notable degree of screening. Users of major roads, including national and regional routes, will experience intermittent views of the proposed turbines. These views are typically transient in nature and often partially screened. While the turbines have the potential to draw they eye, particularly where visible above vegetation, they are not considered to significantly affect the visual experience of road users.

Overall, the Proposed Development is well accommodated within this broad landscape context and does not appear incongruous in terms of scale or function, particularly given the extensive areas of underlying peat bog. The development also aligns and complies with the guidance set out for 'Flat Peatland' landscapes in the current Wind Energy Development Guidelines (WEDGs), particularly with respect to its broad linear spatial extent and larger turbines, which are considered "most appropriate" for this landscape type.

On the basis of the above, it is assessed the visual effects at receptors within the central and wider study area are Not Significant.

13.7 Cumulative Effects

The study area already encompasses a number of wind farms within the wider 20 km study area, with over 100 turbines either operational or permitted. However, most of these are located at considerable distances from the Proposed Development, with the nearest turbines over 4 km away and the majority more than 7–10 km distant. As a result, the proposed wind farm will not significantly add to existing clusters but will instead be perceived as a separate grouping within the wider landscape. While visibility mapping shows that there is theoretical potential for combined visibility of multiple wind farms across parts of the study area, actual visibility on the ground is much more limited due to screening by vegetation and landform. In many locations, views of turbines are partial, intermittent or not available. Where multiple wind farms are visible together, this typically occurs from elevated or open viewpoints, and the proposed turbines will appear as part of an established pattern of wind energy development rather than a dominant new feature.

For road users, including along the M8 motorway, views of wind farms are generally brief and sequential, with turbines appearing intermittently along the route. The Proposed Development will contribute slightly to this experience but will not significantly change it. Overall, the proposed wind farm will result in a modest increase in the number of turbines within the study area (approximately 8.5%) and will be seen as part of the existing wind energy landscape. Cumulative effects are considered to be moderate in scale but not significant.

In the potential future cumulative scenario, which takes account of wind farm developments at pre-planning stage, one additional wind farm is currently in planning at distances of over 15 km from the site. This would have limited additional influence on cumulative effects due to its separation from the Proposed Development and would appear as a distinct cluster of turbines within the wider landscape. A further wind farm is at an early planning stage closer to the site. While details are not yet confirmed, its proximity means it could increase cumulative effects locally and may appear as an extension of the Proposed Development. This potential will be assessed further as more information becomes available.

In summary, cumulative landscape and visual effects are considered to be limited and Not Significant.

14. ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

14.1 Introduction

This chapter assesses the potential significant effects of the Proposed Development, on the cultural heritage resource. The assessment was informed by a combination of desktop research and field inspections. The primary study area reviewed for the Wind Farm ('the Site') comprised the area within its boundary and lands extending for 2km in all directions. A 100m wide study area centred on the localised grid connection and turbine delivery work areas was reviewed. A study area extending for 10km in all directions from the Site was reviewed for National Monuments in State Care and monuments with potential ritual alignments. In addition, the Landscape and Visual Impact Assessment (Chapter 13) provides the results of an assessment of potential visual impacts on a range of publicly accessible heritage receptors within the wider landscape extending for 20km from the Site.

14.2 Receiving Environment

14.2.1 Wind Farm Site

There are 31 no. recorded archaeological sites located within the Site and mainly comprise prehistoric peatland toghers (trackways) and platforms identified during archaeological surveys and excavations commissioned by Bord na Móna as archaeological mitigation works in the 1990s and 2000s. The majority of the sites were concentrated in a narrow section of bog in the northern end of the Site. The National Museum of Ireland Topographical Files also records the discovery of a wide range of archaeological objects within townlands extending into Littleton Bog, the majority of which were found during 20th century peat extraction works.

The reports on the surveys and excavations conducted in the 1990s and 2000s were reviewed and record that some of the identified sites had been disturbed or removed by peat extraction works while other examples remained extant at that time. Peat extraction works continued within the Site for approximately a decade following the completion of the archaeological investigations and this likely resulted in further disturbance or removal of archaeological materials. An average depth of 0.1m of peat per year was extracted and the main concentration of archaeological sites was subject to peat extraction works until 2017. This likely resulted in c.1m reduction of ground levels at the location of the identified sites following the completion of the last phase of archaeological investigations in 2008.

There are 92 no. recorded archaeological sites within 2km of the Site, the majority of which are located in private properties. A review of Archaeological Survey of Ireland (ASI) descriptions of these sites revealed that 36 no. comprise peatland sites in adjoining bogs. Of the archaeological sites in dryland areas, the ASI record that 21 no. have been levelled, 18 no. only retain low surface traces, 13 no. are wholly or partially extant while there are no published descriptions of the remaining sites. There are no recorded dryland archaeological sites that can be definitively assigned a prehistoric date located within the 2km study area. The area contains 5 no. recorded early medieval ringforts and, of these, only two are recorded as containing extant enclosure banks. There are also 16 no. enclosures located within the area, and all of these are either completely levelled or retain low surface remains. The study area also contains a number of medieval archaeological sites including a motte, tower houses, moated sites, churches and a deserted medieval settlement.

There are two National Monuments in State Care within 2km of the Site and these comprise an ecclesiastical enclosure in Derryvella townland (National Monument 533) and a church site in Leigh townland (National Monument 266). There are four other National Monuments in State Care and one Preservation Order site within 10km of the Site. These comprise Derrynaflan Church (National Monument 355) 3.6km to southwest, Grallagh Castle (National Monument 127) 6km to southwest, Kilcooly Abbey (National Monument 218) 5km to west, Farranrory Warhouse (National Monument 659) 9.4km to southeast and Rathmooley Ringfort (Preservation Order 1/1992) 6.2km to south. The lands within 10km of the Site also contain a number of prehistoric monument types with potential ritual alignments across the wider landscape. A review of the ASI descriptions of these monuments revealed that none of the extant examples have recorded alignments towards the Site.

There are no protected structures or structures/landscapes listed in the National Inventory of Architectural Heritage (NIAH) within the Site. There are two protected structures within 2km of the Site, and these comprise a presbytery house (ref. TRPS1855) and a two-storey 19th century house (ref. TRPS1389), both of which are c. 2.4km from the nearest turbine.

The existing ground conditions within the Site are the result of large-scale industrial peat extraction works which continued in areas until 2017. Rehabilitation works were completed in Littleton bog between 2018-2021 and included the blocking of drains, which were generally waterfilled during site inspections. The inspection of the Site also revealed that extensive natural revegetation has occurred, including large areas of birch woodland, and the areas of bare surface peat have been largely reduced. The inspection revealed that the turbines, and associated hardstands and access tracks, are generally located within overgrown areas. No surface traces of any potential archaeological sites were noted during inspections of remnant areas of exposed bare peat at these Proposed Development locations. It is noted that all areas within the Site were subject to detailed inspections during archaeological surveys conducted in the 1990s and 2000s, prior to the development of extensive overgrowth, and no archaeological sites were identified at these development locations. A proposed substation is within the environs of the recorded location of a togher site (TN042-039004-). This site was recorded as being in poor to moderate preservation in 2006 due to machine damage. Its location was subject to continuing peat extraction during the following decade which may have disturbed or removed further remains. The inspection of this area did not reveal any surface traces of this site, but the potential exists for surviving subsurface remains. The recorded locations of two togher sites (TN042-039008- and TN042-039009-) are situated c.20m to the north of a proposed peat deposition area. No surface traces of these sites were observed during an inspection of this area, but the potential exists that subsurface traces may survive

A proposed borrow pit is located within an area of pasture fields to the east of the bogland. No surface traces of any potential unrecorded archaeological sites or structures of architectural heritage interest were noted during desktop research and field-walking surveys of this area.

14.2.2 Grid Connection

There are 10 no. recorded archaeological sites located within the 100m wide study area centred on the roadways that the grid connection follows, and the majority are within private properties outside the road corridor. The roads extend through the recorded locations of two archaeological sites (Ringfort KK013-005---- and Enclosure KK013-007----) and an inspection of these sites indicates that the construction of the roads has reduced the ground surface at their locations. The study area also contains a number of protected structures and buildings listed in the NIAH and the majority of these comprise buildings located outside the road corridor.

14.2.3 Turbine Delivery Route

Three areas of minor road widening works will be required to facilitate the delivery of turbines. A review of these areas revealed that there are no recorded cultural heritage constraints at their locations or within lands extending for 100m in all directions.

14.3 Potential Effects

14.3.1 Construction Phase

14.3.1.1 Wind Farm Site

14.3.1.1.1 Direct Impacts

The main concentration of recorded archaeological sites within the Site is in a narrow section of bog in the northern area and the Proposed Development was designed to avoid this location. The nearest proposed turbine (T1) is c.2km to the south and a substation area is c.225m to the southwest. No direct effects on any potential surviving subsurface elements of this concentration of archaeological sites will occur.

A proposed substation is within the environs of the recorded location of a togher site (TN042-039004-), recorded as being in a poor to moderate state of preservation in 2006 due to machine damage and its location was subject to further extraction works during the following decade. The inspection did not reveal any surface traces of this site, but the potential exists for surviving subsurface remains that would be subject to direct, slight-moderate negative effects during construction phase ground works. The recorded locations of two togher sites (TN042-039008- and TN042-039009-) are c.20m to the north of a proposed peat deposition area. No surface traces of these sites were observed during an inspection of their recorded location, but the potential exists that subsurface traces may survive and would be subject to direct slight-moderate negative effects resulting from site traffic. The potential also exists for the presence of previously unrecorded, sub-surface archaeological sites and objects within the Site. While the existence as well as location, nature and extent of such potential unrecorded, sub-surface archaeological remains are indeterminable, the potential does exist for direct, negative effects on any examples that may exist within Proposed Development areas.

No direct effects on cultural heritage constraints within lands outside the Site boundary will occur during the construction phase.

14.3.1.1.2 Indirect Impacts

The potential exists for the presence of surviving sub-surface archaeological sites and objects within the Site. Given the buried nature of such potential archaeological remains, no likely indirect visual effects on their wider settings are predicted during the construction phase.

14.3.1.2 Grid Connection

The public road that the route follows extends through the recorded extent of two archaeological sites, ringfort (KK013-005----) and enclosure (KK013-007----), and also extends within the environs of other archaeological sites in adjoining private lands. The construction of the existing roads has likely disturbed archaeological features within those two sites, but the potential exists that subsurface archaeological remains may exist beneath road fill material. The excavation of the cable trench, therefore, has the potential to result in slight-moderate direct effects on any such surviving archaeological remains. The majority of the architectural heritage constraints within the grid connection study area are located within private properties outside the road corridor and no direct or indirect effects on these structures will occur. The proposed crossing methodology at two listed bridges (Graiguepadeen Bridge (TS042-027----) and Grange Bridge (NIAH 12400902)) will entail horizontal directional drilling (HDD) and this will not result in any direct or indirect effects. In addition, the proposed crossing methodology for other watercourse crossings will also entail HDD which will not result in any likely direct effects on any potential unrecorded underwater archaeological sites that may exist within these watercourses.

14.3.1.3 Turbine Delivery Route

There are no recorded cultural heritage constraints at the locations of minor road widening works or within lands extending for 100m in all directions of these areas. No construction phase direct or indirect effects on the cultural heritage resource are, therefore, predicted.

14.3.2 Operation Phase

14.3.2.1 Wind Farm Site

14.3.2.1.1 Direct Impacts

The operation phase will not require any excavation works within the Site and will, therefore, not result in any direct effects on any recorded or potential unrecorded cultural heritage constraints.

14.3.2.1.2 Indirect Impacts

There are 6 no. extant National Monuments in State Care located within 10km of the Site. The Landscape and Visual chapter (Chapter 13) presents an assessment of visual effects on three examples within locations accessible to the public, and these comprise Killcooley Abbey, Derrynaflan Church and Farranrory Warhouse. That chapter also presents an assessment of visual effects of two National Monuments located within the wider landscape and these comprise Holy Cross Abbey located c. 12km to the west and the Rock of Cashel located c.17.2km to the southwest. The assessment of visual effects on these National Monuments is presented in the Landscape and Visual chapter and, in summary no significant effects were identified.

There are three additional National Monuments in State Care, and one Preservation Order site, located within 10km of the Site. These include two examples located within 2km of the Site: Liathmore Churches (National Monument no 266) and Derryvella ecclesiastical site (National Monument ref. 533). The other National Monument comprises Grallagh Castle (National Monument no. 127) located 6km to the southwest. A ringfort in Rathmooley townland located 6.2km to the south is also subject to a Preservation Order (ref. 1/1992). The assessment of long-term (reversible), indirect effects on the setting of these monuments was informed reviews of Zone of Theoretical Visibility (ZTV) map sets prepared by the Landscape and Visual specialists. This revealed that these National Monuments are in areas where the potential exists that 9-11 turbines will be visible. The potential indirect effects on Liathmore Churches and Derryvella ecclesiastical site are deemed to be significant due to their proximity to the Site. Grallagh Castle and Rathmooley Ringfort are located c.6km from the Site and the potential indirect effects on their setting are deemed to be moderate due to their distances from the Site.

No indirect effects on the setting of levelled or partially levelled archaeological sites within the 2km study area are predicted during the operation phase. The area contains 13 no. recorded archaeological sites and 2 no. protected structures that remain either wholly or partially extant. Based on reviews of ZTV mapping they are located in areas where 9-11 turbines will be theoretically visible. None of these constraints are located within 1km of any turbines and the indirect negative effect on their wider settings will be of low-medium magnitude and slight to moderate in significance.

14.3.2.2 Grid Connection

As the grid connection will comprise a buried cable within public roads during the operation phase it will result in no predicted direct or indirect effects on the cultural heritage resource.

14.3.2.3 Turbine Delivery Route

In the event that any turbines are required to be replaced during the operational phase using the same route as utilised during the construction phase, no likely effects on the cultural heritage resource are predicted.

14.3.3 Decommissioning

No effects on known elements of the cultural heritage resource are predicted during the decommissioning phase as there are no recorded cultural heritage constraint located within the footprint of the various elements of the Proposed Development that will be subject to decommissioning. The decommissioning phase will reverse the indirect visual effects on cultural heritage constraints within surrounding lands.

14.4 Mitigation Measures

14.4.1.1 Wind Farm Site

The layout of the Proposed Development was informed by the archaeological desktop research and fieldwork undertaken in order to assist in mitigation by design.

The proposed location of the substation area within the Site is within the proximity of the recorded location of a togher site (TN042-039004-). No surface traces of this site were noted during the site inspection. A programme of pre-construction archaeological test trenching will be carried out within the footprint of the substation to ascertain if any subsurface archaeological remains are present.

The recorded locations of two togher sites (TN042-039008- and TN042-039009-) are situated c.20m to the north of a proposed peat deposition area. Their recorded locations will be cordoned off during the construction phase and traffic to the peat deposit area to the south will be excluded from their recorded location.

The potential exists for the presence of subsurface archaeological remains within the proposed borrow pit area in a green field area adjoining the bogland. The ground conditions within this grassland area do not form a constraint for advance archaeological investigations and, therefore, a programme of geophysical survey followed by targeted test trenching investigations of any identified features of archaeological potential will be carried out in advance of the construction phase.

A suitably qualified archaeologist will be employed to monitor construction phase ground works within the overgrown areas of the Site under licence by the National Monuments Service (NMS). This will include archaeological supervision of vegetation clearance works and inspections of cleared areas in advance of ground excavation works.

In the event that any archaeological remains are identified during these archaeological investigations, work will halt at the relevant location, and the archaeological remains will be securely cordoned off and recorded. The NMS will then be notified and consulted to determine further appropriate mitigation measures, which may include preservation in situ by avoidance or preservation by record through a systematic, licensed archaeological excavation.

14.4.1.2 Grid Connection

A programme of licensed archaeological monitoring of ground works during the construction phase will be carried out within sections of road within the environs of the recorded archaeological sites. The majority of the architectural heritage constraints within the grid connection study area within private properties adjacent to the public road and no mitigation measures for these structures will be required. The proposed crossing methodology at watercourses will entail horizontal directional drilling and this will not require any mitigation.

14.4.1.3 Turbine Delivery Route

There are no cultural heritage constraints located within the environs of the localised areas of minor works required to facilitate delivery of turbines to the site and, therefore, no mitigation measures are required.

14.4.2 Operation Phase

14.4.2.1 Wind Farm Site

The operation phase of the Proposed Development will not require ground works that would result in any predicted direct impacts on cultural heritage constraints and, therefore, no mitigation measures for direct operational phase impacts will be required.

The turbines within the Site will result in a range of long term, indirect negative, visual effects on the wider setting of cultural heritage constraints within surrounding lands which will range from imperceptible to significant in significance. Given the nature of the wind farm turbines there are no mitigation measures that can address these indirect setting effects, but it is noted that they will be reversed following the decommissioning phase.

14.4.2.2 Grid Connection

The grid connection will comprise a buried cable during the operation phase and will not result in any predicted effects on the cultural heritage resource which require mitigation.

14.4.2.3 Turbine Delivery Route

The turbine delivery route will not result in any predicted effects on the cultural heritage resource during the operation phase which will require mitigation.

14.4.3 Decommissioning

14.4.3.1 Wind Farm Site

No likely significant direct or indirect effects on known elements of the cultural heritage resource are predicted during the decommissioning phase and, therefore, no cultural heritage mitigation measures are required for this phase.

14.4.3.2 Grid Connection

Grid connection infrastructure including the on-site substation and ancillary electrical will be left in situ as part of the decommissioning phase and, therefore, no mitigation is required.

14.4.3.3 Turbine Delivery Route

The temporary accommodation works along the TDR will not be required for the decommissioning phase as turbine components can be dismantled on site and removed using standard HGVs and, therefore no mitigation is required.

14.5 Residual Effects

14.5.1 Construction Phase

The mitigation measures detailed above will provide for either the avoidance of the potential unrecorded, sub-surface archaeological resource or the proper and adequate recording of this resource by full archaeological excavation. Preservation in situ shall allow for a negligible magnitude of impact resulting in a potential not significant/imperceptible significance of residual effect in the context of unrecorded archaeological remains. Preservation by record shall allow for a high magnitude of impact, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which shall be publicly disseminated. This shall result in a potential slight to moderate range of significance of residual effect in the context of unrecorded archaeological remains.

14.5.2 Operation Phase

The operational phase will result in a range of long term, indirect, negative residual effects of a visual nature on the wider setting of cultural heritage constraints within the surrounding landscape which will range from imperceptible to significant in significance. While are no mitigation measures that can address these residual indirect effects, it is noted that they will be reversed following the decommissioning phase.

14.5.3 Decommissioning

14.5.3.1 Wind Farm Site

No direct effects on known elements of the cultural heritage resource are predicted during the Decommissioning phase as there are no recorded cultural heritage constraints located within the footprint of the various elements of the Proposed Development that will be subject to decommissioning. Any previously unrecorded archaeological remains identified during archaeological investigations will either be preserved by avoidance or preserved by record (excavation) and no decommissioning effects on such potential features are predicted. Decommissioning will reverse indirect, negative effects on cultural heritage constraints in the wider landscape.

14.5.3.2 Grid Connection

Grid connection infrastructure including the on-site substation and ancillary electrical will be left in situ as part of the decommissioning phase and this will result in no residual effects on known elements of the cultural heritage resource.

14.5.3.3 Turbine Delivery Route

The temporary accommodation works along the route will not be required for the decommissioning phase as turbine components can be dismantled on site and removed using standard HGVs. This element of the Proposed Development will, therefore, not result in any residual effects on the cultural heritage resource during the decommissioning phase.

14.6 Cumulative Impacts

The assessment of potential cumulative impacts was based on reviews of operational, consented and proposed wind farm developments within the surrounding landscape, including all available cultural heritage assessments of those developments. In addition, a review of other development types located within the 2km study area around the Site was also conducted. No likely significant cumulative effects were identified.

15. MATERIAL ASSETS

15.1 Material Assets

This Chapter considers the likely effects of the Proposed Development on material assets. Material assets are physical resources and infrastructure that are of value to society and support human activity. These include:

- Non-renewable resources (e.g. minerals, aggregates, oil, coal, and gas)
- Renewable resources (wind, water and solar energy)
- Utilities infrastructure (water, sewage, electricity and natural gas)
- Waste management.

The assessment examines the potential effects of the development during the construction, operational and decommissioning phases.

15.1.1.1 Consultation

Organisations consulted included EirGrid, Uisce Éireann, ESB Networks, Gas Networks Ireland, Transport Infrastructure Ireland and Geological Survey Ireland. Input from the wider community through public consultation was also considered. Further details on consultation are provided in Chapter 2 of Volume 2.

15.1.1.2 Main Wind Farm Site

Available geological information indicates that there are no metallic mineral resources within the proposed Site. The closest active quarry is Castletown Quarry, located approximately 1.5 km to the north-west, with Gleeson Quarries approximately 4.3 km to the south. These quarries primarily supply aggregates used in construction activities.

Geological Survey Ireland data shows that the western part of the Site has a moderate to high potential for crushed rock aggregates, while the eastern part has a low potential due to thicker overburden. Granular aggregate potential across the site is very low. The higher potential in the west is associated with rock outcrops and underlying sandstone formations that may be suitable for aggregate use, subject to testing.

Utility searches identified a 38 kV overhead electricity line in the southern part of the site, associated with historic activities, which will be decommissioned. Existing watermains are located along the L-4114 and L-2201 roads adjacent to the site. All identified services through desktop assessment are indicative and will be verified prior to construction using appropriate detection techniques. No other major utility infrastructure was identified within the site.

15.1.1.3 Grid Connection

Utility searches along the grid connection route identified several existing services. A high-pressure gas transmission pipeline is located along part of the R694 road. An existing 38 kV underground electricity cable is crossed near Longfordpass Bridge. Water and wastewater infrastructure is present at various points along the route.

15.1.2 Potential Effects

15.1.2.1 Construction Phase effects

15.1.2.1.1 Non-renewable Resources

Construction will require aggregates and other materials, sourced locally where possible. Existing tracks will be used where possible, and the layout has been designed to minimise new track construction, reducing material demand.

15.1.2.1.2 Renewable Resources

The construction phase does not adversely affect renewable resources. The project enables the use of wind as a renewable energy source and represents a net positive contribution to renewable electricity generation.

15.1.2.1.3 Utilities Infrastructure

Temporary removal of overhead infrastructure may be required along the turbine delivery route. These works may cause brief and localised disruption but are not expected to result in significant impacts. Cable trenching along roads may result in short-term disturbance, with reinstatement carried out following construction.

15.1.2.1.4 Waste

Construction will generate waste materials, which will be managed in line with circular economy principles. Materials will be reused where possible, treated as by-products where appropriate, recycled where feasible and disposed of at licensed facilities when required.

15.1.2.2 Operation Phase effects

15.1.2.2.1 Non-renewable Resources

Once operational, only small quantities of material will be required for maintenance. Any effects on non-renewable resources will be slight to imperceptible.

15.1.2.2.2 Renewable Resources

The wind farm will provide a long-term positive contribution by reducing reliance on fossil fuels and supporting national renewable energy targets.

15.1.2.2.3 Utilities Infrastructure

No significant effects on utilities infrastructure are expected during operation. Any potential disruption associated with turbine component replacement would be brief and uncommon.

15.1.2.2.4 Waste

Very small quantities of waste may arise during maintenance activities and will be managed under established procedures, with no perceptible effect on the receiving environment.

Decommissioning impacts will be similar to construction but of reduced scale. Turbines and other above-ground structures will be removed, while access tracks, foundations, the substation and underground cabling will remain in place.

No significant effects on non-renewable or renewable resources are expected. Temporary disruption to utilities could occur if large components are removed, but such impacts would be brief. Waste generated during decommissioning will be reused, recycled or disposed of at licensed facilities. While future waste facility availability cannot be confirmed, impacts are expected to remain minimal.

15.1.3 Mitigation Measures

Mitigation measures include confirming service locations prior to construction, minimising material transport by using local sources, communicating in advance with affected residents and service providers, implementing detailed turbine delivery procedures, and managing waste through a Construction Waste Management Plan prepared in line with best practice.

15.1.4 Residual Effects

Following mitigation, construction material use will result in a permanent but imperceptible negative impact on non-renewable resources. The generation of renewable electricity will result in a long-term positive effect by offsetting fossil fuel use. The substation and underground grid connection will provide a lasting benefit to electricity infrastructure. Waste disposal will result in a slight permanent reduction in licensed waste capacity.

15.1.5 Cumulative Impacts

When considered alongside other existing and Proposed Developments within 20 km of the site, cumulative impacts on material assets are generally imperceptible. Small-scale developments do not interact significantly with the wind farm.

The combined output of this project and other renewable energy developments will have a significant positive cumulative impact on renewable energy generation and electricity infrastructure, reducing reliance on fossil fuels. There may be increased demand for aggregates from local quarries during construction, resulting in a moderate cumulative impact on stone resources, which can be accommodated by existing licensed facilities.

15.2 Traffic and Transportation

15.2.1 Introduction

This section of the EIAR evaluates the Proposed Development in the context of the traffic and transportation within the study area. The assessment examines potential effects and identifies mitigations for construction, operation and decommissioning of the Proposed Development.

15.2.2 Existing Environment

The nearest motorway to the Site is the M8 which connects Cork City to the M7 between Urlingford and Portlaoise. The M8 Motorway forms a large part of the Turbine Delivery Route (TDR) and departs at Junction 4 to join the R693 regional road. The M7, located approximately 23km north of the proposed site, is utilised for the TDR which departs at Junction 19 of the M7 Motorway to join the M8.

The N24 is the nearest national primary route located approximately 27km to the south of the proposed Wind Farm Site. The N69 national secondary road forms part of the TDR which connects Foynes to the N18 Limerick Southern Ring Road at Junction 2. The N69 is approximately 85km to the west of the Site. The TDR travels along the N18 Limerick Southern Ring Road for approximately 3.8km before merging with the M7 Motorway. The N77 national secondary road forms a short section of the GC route (approximately 930m).

The R639, which forms part of the GC route and the TDR (approximately 4.6km), serves as a vital regional road linking the N8 near Glanmire, Co. Cork, to the N77 at Durrow, Co. Laois. Running in the southwest direction, it passes approximately 1km west of the site and crosses the northern section of the development. The R693 regional road forms a large part of the GC route before joining the R694 and a short section of the TDR (approximately 680m). The proposed GC route travels along a large part of the R694 regional road which is approximately 18km to the northeast of the Site.

The L2201 local secondary road is a single lane local road which travels along the southern boundary of the site. This road links Ballymoreen to Ballinunty. Vehicles will utilise this road to gain access to the southern section of the site during the construction stage. The L4153 local road at Derryhogan is a single carriageway secondary local road. It is proposed to have an existing bog operations vehicular access road crossing point on this road. The L4114 Longford Pass local road traverses the northern section of the site. It branches off the R689 and runs for approximately 4.1km before joining the R689 again. This is a single carriageway secondary local road and forms part of the proposed grid connection and TDR. The TDR also traverses a short section of the L6188 (approximately 760m connecting Foynes Port to the N69) and L2101 (approximately 88m connecting the R639 to the L4114).

The Littleton Labyrinth is an existing amenity route developed by Tipperary County Council which provides a shared walking and cycling route connecting the village of Horse and Jockey to Lough Derryvilla. From Horse and Jockey, it follows a mixture of public roads and the Derrynaflan greenway before joining 7.2km of newly constructed trail along the former Bord na Móna railway line between Derrynaflan and Derryvella. The route overlaps the proposed Wind Farm Site between the Former Bord na Mona Factory trailhead and Lough Derryvilla.

The Midlands Trail Network amenity routes are proposed by Fáillte Ireland and BnM with Decision to Grant received 20th August 2025. The proposed trails link the Littleton Labyrinth and creates two new stretches of shared walking and cycling routes through the BnM peatlands, namely, between the Former Bord na Mona Factory, Lanespark and the L2111 road towards Littleton and between Lough Derryvilla and the L2111 towards New Birmingham.

The Suir Blueway, located in Co. Tipperary approximately 30km to the southwest of the Site, runs for 53km in an east-west direction from Carrick-on-Suir to Cahir via Clonmel. The route consists of a walking/ cycling trail for 21km which runs from Carrick-on-Suir to Clonmel.

The Site is situated approximately 11km to the east of the Dublin - Cork InterCity railway line with several stations located nearby including Thurles, Templemore, and Ballybrophy station.

15.2.3 Potential Effects

The likely traffic that will be generated by each phase of the project (construction, operation and decommissioning) is estimated to identify potential disruptions to existing road users and is based on a 24-month construction programme and a 35-year operational life.

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

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

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

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

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

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

As further described in Section 15.5.4.4 of Chapter 15 - Material Assets (to include Traffic and Transportation, Aviation, Telecommunications and Electromagnetic Interference), accommodation works are required along the turbine delivery route such as hedge or tree cutting, removal of street furniture, removal of vegetation, relocation of lampposts, signage and temporary local road widening through the laying of compacted load bearing aggregate to verges and roundabouts. Prior to mitigation measures, this could include a negative effect on the existing road network such as delay and disruption to road users, road safety issues, inappropriate parking of construction vehicle, soiling of the public road and existing public road infrastructure damage.

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

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

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

15.2.4 Mitigation Measures

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

- Road Opening: The road works associated with cable trenching works will be completed in line with the requirements of a road opening license as agreed with the local authority.
- Route Proofing: In advance of the cabling works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. This will include slit trenching with the aim of minimising the construction impacts and avoiding existing services in the road.
- Road Cleanliness: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used, when necessary, to ensure that the public road network remains clean.
- Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the Local Authority.
- Trench Reinstatement: Trench reinstatement will be carried out in accordance with the Guidelines for Managing Openings in Public Roads, Department of Transport, April 2017 and in agreement with the local authority roads department.

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

- Programme of Deliveries: A programme of deliveries will be submitted to the Local Authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company.
- Unloaded Trial Run: Vehicles with similar dimensions of the abnormal load vehicles will complete an unloaded run of the route to ensure all temporary accommodation works are suitable for the loaded convoy.
- Garda Escort: Turbine deliveries will be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.
- Reinstatement: Any area affected by the works on the public road to facilitate turbine delivery will be fully reinstated to its original condition.
- Consultation: Consultation with the local residents and Tipperary County Council will be carried out in advance to manage turbine component deliveries.

For each site access location, hedgerow trimming shall be carried out to the right and left of the proposed entrance in compliance with the Wildlife Act 1976 as amended, to achieve required minimum visibility in both directions. Hedgerows shall be maintained by the Proposed Development owner to ensure required visibility throughout the operational phase of the Proposed Development as part of the scheme's operation and maintenance arrangements.

No road safety issues were identified as part of the traffic and transport assessment, and the proposed access arrangements comply with the relevant TII standards. Other than the standard mitigation measures required for the construction and operation of the access points, no additional safety concerns arise. Therefore, the Proposed Development does not require a Road Safety Audit under TII guidance.

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

15.3 Aviation

This section of the chapter examines the potential impacts of the proposed development on aviation systems in the vicinity of the Proposed Development.

15.3.1 Methodology

To assess the potential effects of the Proposed Development on aviation, Ai Bridges prepared an aviation review of both civil and defence aviation, contained within Appendices 15.2 and 15.3 of Volume 3 respectively.

15.3.2 Existing Environment

A due-diligence survey was carried out on the private airfields / helipads in the vicinity of Littleton. It was found that there are two private unlicensed air fields within 10 km of the proposed wind farm site, Lickfinn and Moyne. The proposed wind farm is sufficiently far from each aviation installation that there would be no impact due to the proposed wind turbines. Pilots flying to/from these aviation installations would also be required by law to fly by Visual Flight Rules (VFR) and in accordance with the IAA Rules of The Air. The Rules of the Air state, it is the pilot's legal responsibility to be aware of and avoid any obstacles in his/her flight path and therefore he/she would be required to be aware of wind turbines if flying to/from the airfield in question. This can be achieved by prudent flight planning by the VFR pilot prior to flight.

15.3.3 Mitigation Measures

In line with standard practice for wind farm developments, the coordinates and elevations for turbines will be supplied to the IAA at the end of the construction phase. An aeronautical obstacle lighting scheme will be agreed with IAA in line with IAA's consultation response and applied to the proposed turbines. Should the Proposed Development get Planning consent, the turbine locations would be added to aviation flight charts and clearly marked as en-route obstacles.

15.3.4 Residual Effects

While further technical assessments and consultations may be required on certain aspects of the Proposed Development in relation to aviation, many of the effects identified are outlined within the Littleton Wind Farm Civil Aviation Review and Department of Defence – Irish Air Corps Aviation Review Statements (Appendices 15-2 and 15-3), with the effects identified within the Statements showing no residual effects on aviation as a result of the Proposed Development.

15.4 Telecommunications and Broadcasting

This section assesses the potential effects of the proposed development on telecommunications and broadcasting services in the surrounding area. Telecommunications infrastructure includes radio and microwave links used by mobile network operators, utility providers and public bodies for communications and data transmission. The assessment considers potential effects during construction, operation and decommissioning of the wind farm.

15.4.1 Assessment Methodology – Telecommunications

There are three primary stages in preparing and compiling a Telecommunications Study are:

- Telecom Operator Consultations
- Field Surveys
- Desktop Survey Network Modelling and Analysis

15.4.2 Existing Environment

The assessment identified fifteen radio links in the vicinity of the proposed wind farm site. These links are used by a range of operators, including mobile network providers, utility companies and broadband service providers. The radio links consist mainly of point-to-point microwave and UHF connections between fixed locations. Further detail on these links is provided in Appendix 15.1 of the EIAR.

15.4.3 Potential Effects

15.4.3.1 Construction Phase

During the construction phase, crane operations could temporarily pass through the line of sight of some radio links. This could cause brief reductions in signal strength. However, any such interference would be short-term, infrequent and highly unlikely to result in noticeable disruption.

15.4.3.2 Operational Phase

Consultation with operators and detailed desktop modelling show that all fifteen identified radio links have sufficient clearance from the proposed wind turbines. Each link was modelled in 3D using radio planning software to ensure that turbine blades would not obstruct the required signal pathways.

The detailed network analysis can be found in Appendix 15.1.

15.4.3.3 Decommissioning Phase

During the decommissioning phase, any effects on telecommunications networks are expected to be negligible.

15.4.4 Mitigation Measures

The assessment concludes that telecommunications networks will not be affected by the Proposed Development. No specific mitigation measures are required.

15.4.5 Residual Effects

Based on the detailed technical assessment, no residual effects on telecommunications or broadcasting services are expected as a result of the Proposed Development.

15.4.6 Cumulative Effects

The proposed wind farm is expected to produce negligible cumulative effects on telecommunications networks.

16. INTERACTION OF EFFECTS

This Chapter considers the potential for interactions and inter-relationships between each aspect of the environment assessed throughout this EIAR which can result in an impact being either positive or negative, as well as having varying significance. The chapter considers potential significant environmental effects that may occur in terms of the interaction and inter-relationships of Air Quality & Climate, Noise & Vibration, Biodiversity, Ornithology, Land, Soils, & Geology, Hydrology, Hydrogeology & Water Quality, Population & Human Health, Material Assets, Shadow Flicker, Archaeological, Architectural & Cultural heritage, and Landscape & Visual Impact, as a result of the Proposed Development as described in Chapter 4 of this EIAR.

Table 16-1, below provides a matrix detailing the key interactions and inter-relationships between the key environmental aspects of the Proposed Development, including the wind farm, grid connection route (GC), turbine delivery route (TDR) and biodiversity enhancement management plan lands (BEMP lands) during the construction, operation and decommissioning phases of the Proposed Development. The green squares represent an interaction between environmental aspects.

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

Table 16-1: Summary of the Interactions between Key Environmental Aspects

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

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