White Hill Wind Farm Electricity Substation & Electricity Line

Environmental Impact Assessment Report

Chapter 8: Air Quality & Climate

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8.1 Introduction

8.1.1 Background

This chapter comprises an assessment of the likely effect on air quality and climate associated with the project. This report provides a baseline assessment of the setting of the project in terms of air quality and climate and discusses the likely and significant effects that its construction, operation and decommissioning will have on these environmental factors. Where required, appropriate mitigation measures to limit any identified likely significant adverse effects to air quality and climate are recommended.

8.1.2 Description of the Project

The project site is located in rural County Kilkenny and County Carlow, approximately 11 kilometres (km) northeast of Kilkenny City, c. 15km southwest of Carlow Town, c. 3km west of Muine Bheag and c. 1km north of Paulstown. In summary, the project comprises the following main components as described in full at **Chapter 3**:-

- A 110kV 'loop-in/loop-out' electricity substation;
- Approximately 320 metres (m) of 110kV underground electricity line between the electricity substation and the Kellis-Kilkenny overhead transmission line and the provision of 2 no. interface masts;
- An electrical control unit at the permitted White Hill Wind Farm site;
- Approximately 8.8km of underground electricity line between the electricity substation and the electrical control unit; and,
- All associated and ancillary site development, access, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure.

The project site traverses the administrative boundary between counties Kilkenny and Carlow; with the electricity substation and c. 3.3km of the underground electricity line located in County Kilkenny and c. 5.5km of the underground electricity line and the electrical control unit located in County Carlow. Electrical equipment suppliers, construction material suppliers and candidate quarries which may supply aggregates are located nationwide.

8.1.3 Statement of Authority

This chapter was prepared by various members of the Galetech Energy Services (GES) Environment & Planning Team. GES has significant experience in preparing and managing EIARs, including Air Quality & Climate chapters, for numerous wind farm and other energy developments.

8.2 Relevant Legislation & Guidance

8.2.1 Air Quality

The following Environmental Protection Agency (EPA) guidelines were considered in this assessment: -

- *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (2022).

The statutory ambient air quality standards in Ireland are outlined in S.I. No. 739 of 2022 Air Quality Standards Regulations 2022 (hereafter referred to as the Air Quality Regulations), which incorporate the ambient air quality limits set out in Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient

air quality and cleaner air for Europe (hereafter referred to as the CAFE Directive), for a range of air pollutants. The statutory ambient air quality guidelines are discussed in greater detail in the sections below.

In addition to the specific statutory air quality standards, the assessment has made reference to national guidelines, where available, in addition to international standards and guidelines relating to the assessment of ambient air quality impact from road schemes. These are summarised below:-

- *Guidance on the Assessment of Dust from Demolition and Construction V1.1 (IAQM 2016);*
- *PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (Transport Infrastructure Ireland (TII), 2022a);*
- *Guidance on the Assessment of Dust from Demolition and Construction Version 1.1 (Institute of Air Quality Management (IAQM), 2014) (hereafter referred to as the IAQM Guidelines); and*
- *A Guide to The Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1) (IAQM, 2020).*

8.2.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. The applicable legal standards in Ireland are outlined in the Air Quality Regulations (S.I. 739 of 2022), which incorporate the CAFE Directive (EU 2008/50/EC). The Air Quality Regulations set limit values for the pollutants nitrogen dioxide (NO_2) and nitrogen oxides (NO_X), particulate matter (PM) with an aerodynamic diameter of less than 10 microns (PM_{10}) and PM with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$) (**Table 8.1**).

Pollutant	Regulation*	Limit Type	Value
NO_2	S.I. 739 of 2022	Hourly limit for protection of human health - not to be exceeded more than 18 times / year	200µg/m^3 NO_2
		Annual limit for protection of human health	40µg/m^3 NO_2
Nitrogen Oxides (NO + NO_2)		Critical limit for the protection of vegetation and natural ecosystems	30µg/m^3 NO + NO_2
PM (as PM_{10})	S.I. 739 of 2022	24-hour limit for protection of human health - not to be exceeded more than 35 times / year	50µg/m^3
		Annual limit for protection of human health	40µg/m^3
PM (as $PM_{2.5}$)	S.I. 739 of 2022	Annual limit for protection of human health	25µg/m^3
Dust Deposition	TA Luft (German VDI 2002)	Annual average limit for nuisance dust	350 mg/m^2/day

Table 8.1: Air Quality Regulations (based on the CAFE Directive)

**CAFE Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC*

In April 2023, the Government of Ireland published the *Clean Air Strategy for Ireland*, which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality

Guidelines Interim Target 3 (IT3) by 2026 (shown in **Table 8.2**), the IT4 targets by 2030 and the final targets by 2040 (shown in **Table 8.2**). The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5 µg/m^3. The strategy also acknowledges that "meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2". Ireland will revise its air quality legislation in line with the proposed EU revisions to the CAFE Directive, which will set interim 2030 air quality standards and align the EU more closely with the WHO targets.

Pollutant	Regulation	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO_2	WHO Air Quality Guidelines	24-hour limit for protection of human health	50µg/m^3 NO_2	50µg/m^3 NO_2	25µg/m^3 NO_2
		Annual limit for protection of human health	30µg/ m^3 NO_2	20µg/ m^3 NO_2	10µg/m^3 NO_2
PM (as PM_{10})		24-hour limit for protection of human health	75µg/ m^3 PM_{10}	50µg/m^3 PM_{10}	45µg/m^3 PM_{10}
		Annual limit for protection of human health	30µg/ m^3 PM_{10}	20µg/m^3 PM_{10}	15µg/m^3 PM_{10}
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5µg/m^3 $PM_{2.5}$	25µg/m^3 $PM_{2.5}$	15µg/m^3 $PM_{2.5}$
		Annual limit for protection of human health	15µg/m^3 $PM_{2.5}5$	10µg/m^3 $PM_{2.5}$	5µg/m^3 $PM_{2.5}$

Table 8.2: WHO Guidelines*

**Air Quality Guidelines - Global Update 2021 (WHO 2021)*

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Dublin City Council (DCC) has published a guidance document titled *Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition* however this guidance does not specify a guideline value. Applicable guidance from other local authorities within Ireland is not available.

The German TA-Luft standard for dust deposition (non-hazardous dust) sets a maximum permissible emission level for dust deposition of 350mg/(m_2*day) averaged over a 1-year period at any receptors outside a project's boundary. Recommendations from the Department of the Environment, Heritage and Local Government apply the Bergerhoff limit of 350mg/(m_2*day) to the site boundary of quarries. This guidance value can be implemented with regard to dust effects from the construction of the project.

The appropriate limits for the construction and operational phase assessment of air quality effects from the project are the Air Quality Regulations, which incorporate the CAFE Directive.

8.2.1.2 Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% below 2005 levels), 65 kt for NO_X (49% reduction), 43 kt for VOCs (25% reduction), 108 kt for NH_3 (1% reduction) and 10 kt for $PM_{2.5}$ (18% reduction).

European Commission Directive 2001/81/EC and the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. A national EPA Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005. The data available from the EPA in 2021 indicated that Ireland complied with the emissions ceiling for SO_2 in recent years but failed to comply with the ceilings for NH_3, NO_X and NMVOCs. Directive (EU) 2016/2284 *On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC* was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020-29 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 10.9 kt (85% below 2005 levels) for SO_2, 40.7 kt (69% reduction) for NO_X, 51.6 kt (32% reduction) for NMVOCs, 107.5 kt (5% reduction) for NH_3 and 11.2 kt (41% reduction) for $PM_{2.5}$.

8.2.2 Climate

The assessment has made reference to national guidelines, where available, in addition to international standards and guidelines relating to the assessment of GHG emissions and associated climatic effect from road schemes. These are summarised below:-

- *Climate Action and Low Carbon Development Act 2015 (Act. No. 46 of 2015) ('the 2015 Climate Act');*
- *Climate Action Plan 2024;*
- *Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) ('the 2021 Climate Act');*
- *Climate Action and Low Carbon Development (Amendment) Bill 2021 (No. 46 of 2015) (hereafter referred to as 'the 2021 Climate Bill');*
- *PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (offline & Greenways) – Overarching Technical Document (TII);*
- *PE-ENV-01105: Climate Assessment of Proposed National Roads – Standard (TII);*
- *GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII);*
- *Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA);*
- *Technical guidance on the climate proofing of infrastructure in the period 2021-2027 (European Commission);*
- *IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the 'IEMA 2020 EIA Guide') (IEMA);*
- *IEMA GHG Management Hierarchy (hereafter referred to as the 'IEMA 2020 GHG Management Hierarchy') (IEMA);*
- *IEMA Principles Series: Climate Change Mitigation & EIA (IEMA);*
- *Publicly Available Specification (PAS) 2080:2016 on Carbon Management in Infrastructure (BSI); and,*

- *Technical guidance on the Climate Proofing of Infrastructure in the Period 2021-2027* (European Commission).

8.2.2.1 International and National Guidelines, Policy and Legislation

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted. The purpose of the 2015 Climate Act was to enable Ireland "*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*". This is referred to in the 2015 Climate Act as the 'national transition objective'. The 2015 Climate Act made provision for a national mitigation plan, and a national adaptation framework. In addition, the 2015 Climate Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019. The Climate Action Plan 2019 outlined the current status across key sectors including electricity, transport, built environment, industry and agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second Climate Action Plan in November 2021 and a third update in December 2023.

Following on from Ireland declaring a climate and biodiversity emergency in May 2019, and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme in December 2019, followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 in March 2021. The 2021 Climate Act was signed into Law on 23 July 2021, giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act is to provide for the approval of plans "*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050*". The 2021 Climate Act will also "provide for carbon budgets and a decarbonisation target range for certain sectors of the economy". The 2021 Climate Act defines the carbon budget as "*the total amount of greenhouse gas emissions that are permitted during the budget period*".

In relation to carbon budgets, the 2021 Climate Action and Low Carbon Development (Amendment) Act states that "*a carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')*". The carbon budget is to be produced for 3 no. sequential budget periods, as shown in **Table 8.3**. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications shall prepare and submit to government the maximum amount of Greenhouse Gas (GHG) emissions that are permitted in different sectors of the economy during a budget period and different

ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published in July 2022 and are shown in **Table 8.4**. Electricity has a 75% reduction requirement and a 2030 emission ceiling of 3 $MtCO_2eq$[1].

Sector	Reduction Required	2018 Emissions ($MtCO_2eq$)
2021-2025	295 Mt CO_2eq	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2eq	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2eq	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 8.3: 5-Year Carbon Budgets: 2021-2025, 2026-2030 and 2031-2025

Sector	Baseline ($MtCO_2eq$)	Carbon Budgets ($MtCO_2eq$)		2030 Emissions ($MtCO_2eq$)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compare to 2018)
	2018	2021-2025	2026-2030		
Transport	12	54	37	6	50
Electricity	10	40	20	3	75
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Agriculture	23	106	96	17.25	25
LULUCF[Note 1]	5	-	-	-	-
Industry	7	30	24	4	35
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Unallocated Savings	-	7	5	-5.25	-
Total	68	-	-	-	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	-	295	200	-	51

Table 8.4: Sectoral Emission Ceilings 2030

[Note 1] No targets for Land Use, Land-use Change and Forestry (LULUCF) published.

In December 2022, CAP 2023 was published. This is the first CAP since the publication of the carbon budgets and sectoral emissions ceilings, and it aims to implement the required changes to achieve a 51% reduction in carbon emissions by 2030. The CAP has six vital high impact sectors where the biggest savings can be made: renewable energy, energy efficiency of buildings, transport, sustainable farming, sustainable business and change of land-use. CAP 2023 states that the decarbonisation of Ireland's manufacturing industry is key for Ireland's economy and future competitiveness. There is a target to reduce the embodied carbon in construction materials by 10% for materials produced and used in Ireland by 2025 and by at least 30% for materials produced and used in Ireland by 2030. CAP 2023 states that these reductions can be brought about by product substitution for construction materials

[1] Mt CO_2eq denotes million tonnes carbon dioxide equivalent.

and reduction of clinker content in cement. Cement and other high embodied carbon construction elements can be reduced by the adoption of the methods set out in the Construction Industry Federation 2021 report *Modern Methods of Construction*. In order to ensure economic growth can continue alongside a reduction in emissions, the IDA Ireland will also seek to attract businesses to invest in decarbonisation technologies.

CAP 2023 aims to bring 9GW of onshore wind, 8GW of solar, at least 7GW of offshore wind and 2GW of green hydrogen into Irish energy production by 2030. In addition, the CAP aims to increase micro-generation and small-scale generation of renewables. CAP 2023 aims to phase out and end the use of coal and peat in electricity generation by 2030.

CAP 2024 was published in December 2024 and builds on the commitments made and measures implemented in previous Plans. CAP 2024 seeks to provide a framework which will lead Ireland to meeting its national climate objective of pursuing and achieving, by no later than 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy.

8.3 Methodology

The methodology employed as part of this assessment comprised a desktop appraisal and evaluation of existing environmental conditions; the likely effects which may arise during the construction, operational and decommissioning phases; and identification of measures to off-set or reduce any likely significant adverse effects. The following sections set out the methodology utilised to assess air quality and climate in respect of the construction and operational phases.

8.3.1 Construction & Decommissioning Phases

8.3.1.1 Air Quality – Construction Dust

The assessment of air quality has been carried out using a phased approach as recommended by the UK DEFRA. The phased approach recommends that the complexity of an air quality assessment be consistent with the risk of failing to achieve the air quality standards.

The current assessment thus focused firstly on identifying the existing baseline levels of NO_2 and PM_{10} in the region of the project by an assessment of EPA monitoring data. Thereafter, the effect of the project on air quality at the neighbouring sensitive receptors during the construction and decommissioning phases was determined by an assessment of the dust generating construction activities associated with the project based on the guidance issued by the IAQM. The effects of dust from the construction phase will be short-term in nature; while decommissioning works are not proposed to be undertaken. Effects on air quality are assessed at **Section 8.5.1.1** and **Section 8.5.3.1** respectively.

8.3.1.2 Air Quality - Construction Traffic

Construction phase traffic also has the potential to affect air quality. The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* states that road links meeting one or more of the following criteria can be defined as being "*affected*" by a project and should be included in the local air quality assessment. While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;

- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10kph or more;
- Peak hour speed change by 20kph or more;
- A change in road alignment by 5m or greater.

GES have reviewed traffic data for the project and on the basis of **Chapter 12** of this EIAR, it has been determined that the construction phase will not increase traffic volumes by more than 1,000 no. AADT or 200 no. HDV AADT nor will the project result in speed changes or changes in public road alignment. **Chapter 12** estimates that the project will generate a daily average of 7 no. HGV trips[2] during peak construction. As a result, a detailed air quality assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for likely significant effects on air quality. Effects are considered temporary and imperceptible and do not require further assessment.

8.3.1.3 Climate – Forestry and Peat Removal

Trees are a natural carbon sink and absorb CO_2 from the atmosphere helping in the reduction of climate change; any felling of forestry results in a loss of this carbon sink thus, increasing the levels of CO_2 in the atmosphere. However, increased planting of trees on suitable lands will, over time, help to increase the carbon sink capacity of the land and benefit climate. The *Best Practice Guidelines for the Irish Wind Energy Industry* is used for calculating the GHG sinks due to the loss of forestry.

The GHG emissions associated with peat excavation has been assessed using the 2006 Intergovernmental Panel on Climate Change (IPCC) *Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use, Chapter 7 Wetlands* (IPCC, 2006).

8.3.2 Operational Phase

8.3.2.1 Air Quality

An assessment of baseline air quality in the region has been conducted to determine whether current levels of key pollutants are significantly lower than their limit values.

As per the construction phase scoping criteria detailed in **Section 8.3.1** and *PE-ENV-01106* (TII), traffic effects have been scoped out of the operational phase as they are considered insignificant.

8.3.2.2 Climate

There will be no greenhouse gas emissions from the operation of the project. However, as the project will accommodate the export of renewably generated electricity to the national electricity network, its operation will provide for the displacement of electricity which otherwise would have been produced from fossil fuels and, accordingly, there will be a net benefit in terms of GHG emissions. The savings have been calculated and compared to Ireland's 2030 commitment target for gross electricity consumption from renewable energy sources[3].

Vehicular traffic is often a dominant source of GHG emissions as a result of projects. However, as the traffic volumes associated with the operational phase will be very low, no further assessment is required.

[2] A 'trip' is assessed as comprising an 'inbound' movement and an 'outbound' movement.

[3] The GHG emission savings have been taken from the White Hill Wind Farm Environmental Impact Assessment Report.

8.4 Description of the Existing Environment

8.4.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality are the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$–PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Oak Park Meteorological Station, County Carlow, which is located approximately 19km north-east of the site. Data from the Oak Park Meteorological Station has been examined to identify the prevailing wind direction and average wind speeds over the period 2017-2021. Wind frequency is important as dust can only be dispersed by winds, and deposition of dust is a simple function of particle size, wind speed and distance. The closer the source of dust is to a receptor the higher the potential risk of effect from dust being blown to that receptor. The prevailing winds in the area are southerly in direction, thereby predominantly dispersing any potential dust emissions to the north of the site.

Dust emissions are dramatically reduced where rainfall has occurred due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume that no dust is generated under 'wet day' conditions where rainfall greater than 0.2mm has fallen. Long-term information collected from Kilkenny Meteorological Station (the closest representative station with long-term historical data) identified that typically 193-days per annum are 'wet' (Met Eireann 2022, 30-year averages). Thus, in excess of 50% of the time no significant dust generation will be likely due to meteorological conditions.

8.4.2 Available Background Data

Dust is present naturally in the air from a number of sources including weathering of minerals, pick-up across open land, and dust generated from fires. Monitoring of dust deposition is not undertaken in the vicinity of the project and therefore background levels for the immediate vicinity of the project site are not available.

However, a study by the UK Office of the Deputy Prime Minister gives estimates of likely dust deposition levels in specific types of environments. In open country, a level of 39mg/m^2/day is typical, rising to 59mg/m^2/day on the outskirts of towns, and peaking at 127mg/m^2/day for a purely industrial area. A level of 39mg/m^2/day can be estimated as the background dust deposition level for the project due to its rural location.

Air quality monitoring programmes have been undertaken in recent years by the EPA. The most recent annual report on air quality in Ireland is *Air Quality In Ireland 2023*. The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments.

As part of the implementation of the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011), as amended, 4 no. air quality zones have been defined in Ireland for air quality management and assessment purposes. Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 no. towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the project is within Zone D. Long-term monitoring data has been used to determine background concentrations for the key pollutants at the project site. It should be noted that background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

In 2020, the EPA reported that Ireland was compliant with EU legal air quality limits at all locations; however this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA *Air Quality in Ireland 2020* report details the effect that the Covid-19 restrictions had on air monitoring stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, they have been included in the baseline section for representative purposes only and previous long-term data has been used to determine baseline levels of pollutants in the vicinity of the project.

NO_2 monitoring was carried out at two rural Zone D locations over the period 2017-2021, Emo and Kilkitt, and the urban site of Castlebar. Over the 2017-2021 period, annual mean concentrations ranged from 2–5µg/m^3 for the rural sites and 6–8µg/m^3 for the urban site (**Table 8.5**). Hence, long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40µg/m^3. There is a new monitoring station in Birr since 2019; however, while in relative proximity to the project, it is not representative as it is an urban traffic location rather than urban background location. The hourly limit value of 200µg/m^3 was not exceeded in any year, albeit 18 no. exceedances are permitted per year. The average results in recent years at the rural Zone D locations suggest an upper average of no more than 3 µg/m^3 as a background concentration. Based on the above information, a conservative estimate of the background NO_2 concentration in the region of the project is 5µg/m^3.

Station	Averaging Period Notes 1, 2	Year				
		2017	2018	2019	2020	2021
Castlebar	Annual Mean NO_2 ($\mu g/m^3$)	7	8	8	6	6
	99.8th %ile 1-hr NO_2 ($\mu g/m^3$)	60	60	59	76	73
Kilkitt	Annual Mean NO_2 ($\mu g/m^3$)	2	3	5	2	2
	99.8th %ile 1-hr NO_2 ($\mu g/m^3$)	17	22	42	18	15
Emo	Annual Mean NO_2 ($\mu g/m^3$)	3	3	4	3	4
	99.8th %ile 1-hr NO_2 ($\mu g/m^3$)	28	42	28	38	47

Table 8.5: Trends in Zone D Air Quality – Nitrogen Dioxide (NO_2)

Note 1 *Annual average limit value – 40 $\mu g/m^3$ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).*

Note 2 *Hourly limit value – 200 $\mu g/m^3$ measured as a 99.8th percentile (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).*

Long-term PM_{10} monitoring was carried out at the Zone D locations of Castlebar, Kilkitt and Claremorris over the period 2017–2021. Annual mean concentrations range from 7–12µg/m³ for the urban site (Castlebar) and 11–16µg/m³ for the rural site at Kilkitt (**Table 8.6**). Hence, long-term average PM_{10} concentrations measured at these locations were significantly lower than the annual average limit value of 40µg/m³. There is a new monitoring station in Birr since 2019 however, while relative proximity to the project site, it is not representative as it is an urban traffic location rather than urban background location. The 90.4th percentile of 24-hour values was well below the limit value of 50µg/m³ at the Zone D monitoring locations. Data for the rural site at Kilkitt suggests an upper average annual mean of no more than 10µg/m³ as a background value. Based on the above data, a conservative estimate of the current background PM_{10} concentration in the region of the project is 12µg/m³.

Station	Averaging Period Notes 1, 2	Year				
		2017	2018	2019	2020	2021
Castlebar	Annual Mean PM_{10} ($\mu g/m^3$)	11	11	16	14	14
	90th %ile 24-hr PM_{10} ($\mu g/m^3$)	19	20	24	22	22
Kilkitt	Annual Mean PM_{10} ($\mu g/m^3$)	8	9	7	-	-
	90th %ile 24-hr PM_{10} ($\mu g/m^3$)	14	15	13	-	-
Claremorris	Annual Mean PM_{10} ($\mu g/m^3$)	11	12	11	10	8
	90th %ile 24-hr PM_{10} ($\mu g/m^3$)	17	20	20	16	13

Table 8.6: Trends in Zone D Air Quality – PM_{10}

Note 1 *Annual average limit value - 40 $\mu g/m^3$ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).*

Note 2 *Daily limit value - 50 $\mu g/m^3$ measured as a 90.4th percentile (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).*

The results of $PM_{2.5}$ monitoring at Claremorris over the period 2017–2021 ranged from 4-8µg/m³ with an average $PM_{2.5}/PM_{10}$ ratio between 0.4–1, with an average of 0.6. Long-term average $PM_{2.5}$ concentrations measured at this location were significantly lower than the annual average limit value of 25µg/m³. Based on this information, a conservative ratio of 0.7 was used to generate a rural background $PM_{2.5}$ concentration of 8.4µg/m³.

In summary, existing baseline levels of NO_2, PM_{10} and $PM_{2.5}$ based on extensive long-term data from the EPA are well below ambient air quality limit values in the vicinity of the project.

8.4.2.1 Sensitivity of the Air Quality Receiving Environment

In accordance with the IAQM guidance document *Guidance on the Assessment of Dust from Demolition and Construction* (2014), prior to assessing the effect of dust from a project, the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to construction works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity, while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there are no dwellings within 50m of the electricity substation compound and less than 10 no. high sensitivity residential dwellings within 20m of the underground electricity line. The worst-case sensitivity of the area to dust soiling is considered medium as per **Table 8.7.**

Receptor Sensitivity	Number Of Receptors	Distance from source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	**Medium**	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 8.7: Sensitivity of the Area to Dust Soiling Effects on People and Property

Source: Guidance on the Assessment of Dust from Demolition and Construction (IAQM)

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health effects. The criteria takes into consideration the current annual mean PM_{10} concentration, receptor sensitivity and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the project is 12µg/m^3. The worst-case sensitivity of the area to human health effects is considered low as per **Table 8.8**.

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<200
High	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	**Low**	Low	Low	Low
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low

Low	< 24 µg/m^3	>1	Low	Low	Low	Low

Table 8.8: Sensitivity of the Area to Human Health Effects

Source: Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to ecological effects from dust. The criteria takes into consideration whether the receiving environment is classified as a Special Area of Conservation (SAC), a Special Protected Area (SPA), a Natural Heritage Area (NHA) or a proposed Natural Heritage Area (pNHA) or whether the site is a local nature reserve or home to a sensitive plant or animal species. While there are a number of designated ecological sites within the wider landscape, it is assessed that none are sufficiently proximate to the project site to result in any significant adverse effects from dust soiling. Ecological sensitivity is therefore assessed to be Low.

8.4.3 Climate

Climate is defined as the average weather over a period of time, whilst climate change is a significant change to the average weather. Climate change is a natural phenomenon but in recent years human activities, through the release of GHGs, have impacted on the climate. The release of anthropogenic GHGs is altering the Earth's atmosphere resulting in a 'Greenhouse Effect'. This effect is causing an increase in the atmosphere's heat trapping abilities resulting in increased average global temperatures over the past number of decades. The release of CO_2 as a result of burning fossil fuels, has been one of the leading factors in the creation of this 'Greenhouse Effect'. The most significant GHGs are CO_2, methane (CH_4) and nitrous oxide (N_2O).

CO_2 accounted for 60.5% of total GHG emissions in Ireland in 2020; with CH_4 and N_2O contributing 28.4% and 9.9%, respectively. The main source of CH_4 and N_2O is from the agriculture sector (~93%) (EPA).

Ireland declared a climate and biodiversity emergency in May 2019 and, in November 2019, the European Parliament approved a resolution declaring a climate and environment emergency in Europe. This, in addition to Ireland's current failure to meet its EU binding targets under Regulation 2018/842 results in changes in GHG emissions either beneficial or adverse being of more significance than previously considered prior to these declarations.

Data published by the EPA in 2022 predicts that Ireland exceeded (without the use of flexibilities) its 2021 annual limit set under EU's Effort Sharing Decision (ESD) (EU 2018/842) by 3.29Mt CO_2eq. The sector with the highest emissions in 2021 was agriculture at 38% of the total, followed by transport at 17.7%. For 2021, total national emissions were estimated to be 62.11Mt CO_2eq.

8.5 Description of Likely Effects

8.5.1 Construction Phase

8.5.1.1 Air Quality

In terms of air quality, the greatest likelihood of effects during the construction stage will be from dust emissions associated with the construction works. The key works likely to be associated with dust emissions include earthworks and excavation activities, construction of the electricity substation and movement of vehicles on and off site.

During construction, the primary source of dust emissions likely to affect sensitive receptors will be the movement of vehicles on and off site. Materials with the highest likelihood of dust emissions will be concrete and aggregates for the construction of the electricity substation compound, access track, and reinstatement of the underground electricity line trench. The demolition of the existing agricultural structure is not assessed as likely to give rise to notable levels of dust.

Earthworks will result in some dust emissions, particularly during excavations. However, the majority of sensitive properties are located a significant distance from the most extensive excavations (i.e. electricity substation compound); while works to be undertaken at closer proximity to properties are of a reduced scale and/or of a transitory nature (i.e. installation of electricity line or construction of access tracks).

The magnitude of dust emissions from earthworks, according to IAQM guidance, is Large; and when combined with the previously established sensitivity of the area (Medium sensitivity to dust soiling and Low sensitivity in terms of human health effects), there is a likelihood of adverse dust effects. The likelihood of a significant nuisance arising from dust effects as a result of earthworks, prior to mitigation, is assessed to be Medium. With respect to human health effects, the likely effect is assessed to be Low (see **Table 8.9**).

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 8.9: Likelihood of Dust Effects - Earthworks

Construction works taking place within the project site will result in some dust emissions. However, the majority of properties are a significant distance from the actual works areas of the electricity substation site. Work areas that are in closer proximity to sensitive receptors along the electricity line route will have more limited activities and short construction periods.

The magnitude of dust emissions from construction works, according to IAQM guidance, is Small; and when combined with the previously established sensitivity of the area (Medium sensitivity to dust soiling and Low sensitivity in terms of human health), there is a likelihood of adverse dust effects. The likelihood of significant dust soiling effects as a result of construction, prior to mitigation, is Low. With respect to human health effects, the likely effect is assessed as Negligible (**Table 8.10**).

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 8.10: Likelihood of Dust Effects – Construction

The likelihood of trackout for vehicles leaving the site has also been assessed. According to the IAQM guidance, the number of one-way vehicle movements per day is classified as Medium in terms of potential dust emission magnitude. There will, on average, be up to 22 no. trips per day during peak construction (HGV and construction personnel traffic).

When combined with the previously established sensitivity of the area (Medium sensitivity to dust soiling and Low sensitivity in terms of human health effects) the likelihood of significant nuisance dust effects, prior to mitigation, is Medium with the overall likelihood of human health effects also predicted to be Low (see **Table 8.11**).

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 8.11: Likelihood of Dust Effects - Trackout

8.5.1.2 Climate

Construction Traffic & Materials

Due to the low volumes of traffic associated with the construction phase of the project, the effects on climate change as a consequence of associated traffic emissions has been scoped out.

The construction phase of the project will result in a number of GHG emissions from various sources. Embodied carbon is carbon dioxide emitted during the manufacture, transport and construction of building materials, together with end-of-life emissions. In terms of this project, construction stage embodied GHG emissions are categorised under the following headings:-

- Manufacture of materials;
- Materials transport to site; and
- Construction works (including personnel travel and project size).

Given the comparatively low volume of construction materials required for the construction of the project; and the fact that rock/stone, as the most substantial construction material, would otherwise be used in other construction projects; it is assessed that embodied carbon emissions are not likely to be significant.

8.5.2 Operational Phase

8.5.2.1 Air Quality

The assessment of baseline air quality in the region of the project has shown that current levels of key pollutants are significantly lower than their limit values. Due to the size, nature and remote location of the project, the minor associated increase in road traffic emissions is assessed as having an imperceptible effect on air quality during the operational phase.

The generation of electricity from the permitted White Hill Wind Farm and exported to the national electricity grid via the subject project will lead to a net savings in terms of GHG emissions. The wind farm is anticipated to generate approximately 150GWh of renewable electricity per annum which will displace electricity which, otherwise, would have been produced from fossil fuels. Thus, the subject project, in combination with the permitted wind farm, will result in a net benefit in terms of greenhouse gas emissions by off-setting c. 55,000 tonnes of CO_2 equivalent per annum.

8.5.2.2 Climate

During the operational phase, there will be no GHG emissions from the operation of the project. However, due to the displacement of c. 150GWh of electricity per annum

which would otherwise have been produced from fossil fuels, there will be a net benefit in terms of GHG emissions.

The reduction in GHG emissions, as a result of this project, will be imperceptible in terms of Ireland's obligations under the European Union's Effort Sharing Regulation (Regulation 2018/842); however, as stated above, the generation of c. 150GWh of renewable electricity to the national grid will result in a net saving in terms of GHG emissions.

8.5.3 Decommissioning Phase

During the decommissioning phase, there will be localised dust emissions from excavations and GHG emissions from plant and machinery. However, having regard to the reduced scope of the decommissioning phase, compared to the construction phase, effects are not assessed as likely to be significant.

8.5.4 Cumulative Effects

During the construction phase, it is possible that cumulative effects may arise in relation to dust. This effect is only likely to arise should the construction phase of the project runs concurrently with the construction of another project. Given the relationship between the project and the permitted White Hill Wind Farm, it is highly likely that the developments will be constructed concurrently as a single project.

The White Hill Wind Farm EIAR concluded that significant air quality and climate effects were not assessed as likely to occur. Similarly, this EIAR has determined that there is no likelihood of significant effects to arise as a result of the project even in the absence of mitigation. Following the implementation of the measures set out at **Section 8.6**, significant dust emissions from the project are unlikely and are similarly unlikely, in combination with construction activities of other developments, to adversely affect sensitive receptors.

During the operational phase, it is assessed that there is no likelihood of significant adverse cumulative effects. The project will, in combination with the White Hill Wind Farm, result in a long-term beneficial effect on both air quality and climate.

Other existing, permitted and proposed developments, including those described at **Chapter 1**, are not assessed as likely to result in significant cumulative adverse effects on air quality or climate.

8.5 Mitigation & Monitoring Measures

The preceding sections have determined that the project is not assessed as likely to result in any significant adverse effects on air quality and climate. Notwithstanding this, and in order to sufficiently ameliorate the effects which are likely to arise, a schedule of air quality control measures has been formulated for both the construction and operational phases of the project.

Specific mitigation measures, additional to best practice methods, are not proposed in relation to climate as the project will result in a net benefit in the abatement of GHG emissions.

8.6.1 Construction Phase

The greatest likelihood of effects on air quality during the construction phase is from dust emissions. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a Planning-Stage Dust Minimisation Plan (see **Annex 8.1**).

A detailed Dust Minimisation Plan will be formulated prior to the construction phase of the project, and will include the following: -

- The on-site access tracks and public roads (being used for both the installation of the underground electricity line and for the delivery of construction materials) shall be regularly cleaned to remove mud, aggregates and debris and maintained as appropriate. All road sweepers shall be water assisted;
- If the access tracks have the potential to give rise to fugitive dust, they shall be regularly watered, as appropriate, during dry and/or windy conditions;
- In the event of dust nuisance occurring outside the site boundary, movement of materials will be immediately terminated, and satisfactory procedures implemented to rectify the problem before the resumption of operations;
- If issues persist and the above measures are not satisfactorily controlling dust emissions, a wheel washing system with rumble grids to dislodge accumulated dust and mud prior to leaving the site should be installed;
- During movement of materials off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions;
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods; and,
- The Dust Minimisation Plan shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

8.6.2 Operational Phase

The project will not result in any significant adverse air quality effects during the operational phase and no mitigation measures are proposed.

8.6.3 Decommissioning Phase

The measures set out at **Section 8.6.1** above will be implemented, as appropriate, during the decommissioning phase.

8.7 Residual Effects

8.7.1 Construction Phase

8.7.1.1 Air Quality

With the effective implementation of the Dust Minimisation Plan, outlined in **Section**

8.6.1 and **Annex 8.1**, the project is assessed as likely to have an imperceptible, short-term effect on air quality during the construction phase.

8.7.1.2 Climate

No significant residual effects from the project are assessed as likely for the construction phase.

8.7.2 Operational Phase

8.7.2.1 Air Quality

No significant residual effects from the project are assessed as likely for the operational phase.

8.7.2.2 Climate

No significant adverse residual effects from the project are assessed as likely for the operational phase.

8.7.3 Decommissioning Phase

8.7.3.1 Air Quality

With the effective implementation of the measures outlined at **Section 8.6.3**, the project is assessed as likely to have an imperceptible, short-term effect on air quality during the decommissioning phase.

8.7.3.2 Climate

No significant residual effects from the project are assessed as likely for the decommissioning phase.

8.7.4 Cumulative Effects

No significant residual cumulative effects from the project are assessed as likely. The project will also positively contribute to cumulative efforts in seeking the achievement of Ireland's GHG reduction targets.

8.6 Summary

An assessment of the likely air quality and climate effect associated with the project has been undertaken. This assessment has concluded that any likely adverse construction phase effects on air quality and climate are assessed as negligible and, thus, no significant adverse effect on the environment is likely to occur. During the operational phase, the development will result in a long term positive effect on both air quality and climate by facilitating the transmission of renewably generated electricity from the permitted White Hill Wind Farm to the national electricity network in turn displacing energy which would otherwise have been generated, at least in part, from fossil fuels.