MWP

Chapter 13 Air and Climate

Ballinla Wind Farm

Ballinla Wind Farm Ltd.

July 2025

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Project No.	Doc. No.	Chapter Rev.	Date	Prepared By	Checked By	Approved By	Status
23882	6008	A	02/07/2025	CB	GT	GT	Final

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13. Air and Climate

13.1 Introduction

This chapter describes the likely significant effects the construction, operation and decommissioning of the Proposed Development will have on air quality and climate. For a full description of the Proposed Development, refer to Chapter 2 Description of the Proposed Development of this EIAR.

13.1.1 Competency of Assessor

This chapter was prepared by Claire Boylan BBS, BSc (Env Mgt), DipSci and Adv Dip Planning & Environmental Law. Claire is an experienced Environmental Scientist at Malachy Walsh and Partners (MWP), having worked for 6 years in the environmental sector. Claire has worked on a variety of infrastructure projects, environmental licensing applications, conducted environmental assessments and supported the delivery of a number of environmental deliverables including Environmental Impact Assessment (EIA) Screening Reports, Appropriate Assessment (AA), Natura Impact Statements (NIS) and Environmental Impact Assessment Reports (EIAR).

This assessment has been reviewed by Graeme Thornton. Graeme is a senior environmental scientist. He has 20 years' experience working on environmental projects ranging from emergency hazardous waste spills to the project management of environmental impact assessment reports. Environmental site assessment is a speciality on both greenfield and brownfield sites. He has managed the design, planning and preparation of EIA's on a number of large-scale projects.

13.1.2 Guidelines and Legislation

The assessment has been prepared in accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA 2022), as well as guidelines and legislation outlined in Section 13.1.2.1 to Section 13.1.2.3.

13.1.2.1 Air Quality

The statutory ambient air quality standards in Ireland are set out in the Ambient Air Quality Standards Regulations 2022, which incorporate the ambient air quality limits set out in Directive 2008/50/EC of the European Parliament and of the Council (21st May 2008) on ambient air quality and cleaner air for Europe (hereafter referred to as the CAFÉ Directive) (as amended by Directive EU 2015/1480), for a range of air pollutants. (Table 13-1).

In October 2024, the European Council formally adopted a directive setting updated air quality standards across the EU. The revised Ambient Air Quality Directive entered into force on the 10th December 2024, aligning 2030 EU air quality standards more closely with World health Organisation recommendations. Member states will have two years after the entry into force to transpose the directive into national law. The new directive air quality limits are shown in Table 13-2.

To reduce the risk of poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limits are set for the protection of human health and ecosystems. Air Quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values which incorporate European Commission Directive 2008/50/EC which has set limit values for pollutants SO_2, NO_2, PM_{10}, Lead, Benzene and

Carbon Monoxide. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions are also made for the inclusion of ambient limit values relating to $PM_{2.5}$.

Table 13-1: Air Quality Standards regulations 2011 – Limit Values (based on EU Council Directive 2008/50/EC)

Pollutant	Limit Value Objective	Averaging Period	Limit Value µg/m³	Limit Value ppb	Basis of Application of the Limit Value
SO_2	Protection of human health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year
SO_2	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year
SO_2	Protection of vegetation	Calendar	20	7.5	Annual Mean
SO_2	Protection of vegetation	1 Oct to 31 Mar	30	7.5	Annual Mean
NO_2	Protection of Human Health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year
NO_2	Protection of Human Health	Calendar Year	40	21	Annual Mean
NO & NO_2	Protection of ecosystems	Calendar Year	30	16	Annual Mean
PM_{10}	Protection of Human Health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year
PM_{10}	Protection of Human Health	Calendar Year	40	-	Annual Mean
$PM_{2.5}$ – Stage 1	Protection of Human Health	Calendar Year	25	-	Annual Mean
$PM_{2.5}$ – Stage 2	Protection of Human Health	Calendar Year	20	-	Annual Mean
Carbon Monoxide	Protection of Human Health	8 hours	10,000	8,620	Not to be exceeded
Lead	Protection of Human Health	Calendar Year	0.5	-	Annual Mean
Benzene	Protection of Human Health	Calendar Year	5	1.5	Annual Mean

Table 13-2: New Directive Proposed Limit Values for Air Quality to be Attained by 1 January 2030.

Pollutant	Limit Value Objective	Averaging Period	Limit Value µg/m³	Basis of Application of the Limit Value
SO_2	Protection of Human Health	1 hour	350	Not to be exceeded more than 3 times in a calendar year
SO_2	Protection of human health	24 hours	50	Not to be exceeded more than 18 times in a calendar year
SO_2	Protection of vegetation	Calendar year	20	Annual mean
SO_2	Protection of vegetation	Calendar Year and Winter (1st Oct to 31st Mar)	20	Winter mean
NO_2	Protection of human health	1 hour	200	Not to be exceeded more than 3 times in a calendar year
NO_2	Protection of human health	24 hours	50	Not to be exceeded more than 18 times in a calendar year
NO_2	Protection of human health	Calendar year	20	Annual mean
NO & NO_2	Protection of ecosystems	Calendar year	30	Annual mean
PM_{10}	Protection of human health	24 hours	45	Not to be exceeded more than 18 times in a calendar year
PM_{10}	Protection of human health	Calendar year	20	Annual mean
$PM_{2.5}$	Protection of human health	24 hours	25	Not to be exceeded more than 18 times in a calendar year
$PM_{2.5}$	Protection of human health	Calendar year	10	Annual mean
Lead (Pb)	Protection of human health	Calendar year	0.5	Annual mean
CO	Protection of human health	Maximum daily 8 hour mean	10	8 hour mean
CO	Protection of human health	24 hours	4	Not to be exceeded more than 18 times in a calendar year
Benzene (C_6H_6)	Protection of human health	Calendar Year	3.4	Annual mean

Table 13-3: Target Values for Ozone defined in Directive 2008/50/EC & Proposed Long Term objectives for Ozone[1]

Objective	Parameter	Target Value for 2010	Target Value for 2020	Long-term objective (1 Jan 2050)
Protection of human health	Maximum daily 8-hour mean	120 mg/m^3 not to be exceeded more than 25 days per calendar year averaged over 3 years	120 µg/m^3	100 µg/m^3
Protection of vegetation	AOT40 calculated from 1 hour values from May to July	18,000 mg/m^3.h averaged over 5 years	6,000 µg/m^3.h	6,000 µg/m^3.h
Information Threshold	1-hour average	180 mg/m^3	-	
Alert Threshold	1-hour average	240 mg/m^3	-	

In addition to the specific statutory air quality standards, the assessment has been prepared in accordance with national guidelines, where available, in addition to international standards and guidelines. These are summarised below:

- Clean Air Strategy (Government of Ireland 2023).
- Air quality assessment of proposed national roads – Standard' and 'Air quality assessment of specified infrastructure projects – overarching technical document' (TII, 2022).
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII 2011).
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes (TII 2009).
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality (UKHA 2024).
- World Health Organization (WHO) Global Air Quality Guidelines for Particulate Matter ($PM_{2.5}$ & PM_{10}), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide 2021 (WHO 2021).
- A guide to the assessment of air quality impacts on designated nature conservation sites – Version 1.1 May 2020 (Institute of Air Quality Management – IAQM).
- Assessment of dust from demolition and construction 2024, V2.2, (Institute of Air Quality Management – IAQM).

13.1.2.2 Climate

This assessment has been prepared in accordance with national guidelines, where available, in addition to international standards and guidelines relating to the assessment of Greenhouse Gas (GHG) emissions and associated climatic impact. References to legislation include in addition amendments to same. These are summarised below:

- DCCAE (2017) National Adaption Plan.
- DCEE (202) Climate Action Plan (CAP) 2025.
- Department of Transport, Tourism and Sport (DTTAS) (2019) Transport – Climate Change Sectoral Adaption Plan.
- Climate Action and Low Carbon Development (Amendment) Act 2021 (No.46 of 2015) (hereafter referred to as the 2021 Climate Act).
- OCC's Climate Action Plan 2024-2029.
- OCC's Climate Change Adaption Strategy 2019-2024.
- Offaly CDP 2021-2027.
- European Commission (EC) (2014) 2030 Climate and Energy Policy Framework.

[1] Source: EPA

- Transport Infrastructure Ireland (TII) (2022) Climate Assessment of Proposed National Roads – Standard (PE-ENV-01105).
- Transport Infrastructure Ireland (TII) (2022) Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (PE-ENV-01104).
- Transport Infrastructure Ireland (TII) (2022) Climate Adaption Strategy 2023.
- UKHA (2019) Design Manual for Roads and Bridges: A 114 – Climate.
- European Green Deal (EC, 2022).
- Kyoto Protocol (United Nations Framework Convention on Climate Change (UNFCC, 1997).
- Paris Agreement (UNFCC, 2015).
- The Climate Action and Low Carbon Development (Amendment) Act 2021.
- Glasgow Climate Pact (COP26).
- Summary of Global Climate Action at COP 27 (UNFCC, 2022).

13.1.2.3 Local Policy and Guidelines

The current OCC Climate Change Adaptation Strategy 2019-2024 outlines the Proposed Adaptation Strategy that OCC will implement to adapt to the effects of climate and to safeguard the biophysical infrastructure and well-being of the people and communities of County Offaly.

The key adaption goals and related actions in terms of renewable energy are as follows:

Local Adaption Governance and Business Operations Goal: Climate Change adaption considerations are mainstreamed and integrated successfully into all functions and activities of Offaly County Council ensuring operational protocols, procedures and policies implement an appropriate response in addressing the diversity of impacts associated with climate change.

Action No.1.5.3

'Quantifying Offaly's CO_2 emission and establish a target for first and subsequent cycles of the programme. Opportunity to link with tourism strategy and strategic projects in the County such as wind farms, loving bogs, constructed wetlands, public lighting LED retrofits. Promote carbon footprint savings within the County and potential future savings. Opportunity to promote Offaly as a Sustainable Energy County.

Infrastructure and Built Environment Goal: Increased capacity for climate resilient structural infrastructure is centred around the effective management of climate risk, informed investment decisions and positive contribution towards a low carbon society.

Action 2.3.5

'Promote and inform public on renewables and grants available to encourage the move away from coal and turf heating in homes to solar and more green methods.'

The current OCC CDP 2021-2027 recognises the potential economic benefit of a transition from fossil fuel based energy production through to investment in renewable energy, the promotion of the green enterprise sector and the creation of green collar jobs. all components of a local 'smart green economy'.

Offaly County Council adopted a Climate Change Adaptation and Energy Efficiency Strategy for the county in 2019, which takes on the role as the primary instrument at local level to: (i) ensure a proper comprehension of the key risks and vulnerabilities of climate change. (ii) bring forward the implementation of climate resilient actions in a planned and proactive manner. (iii) ensure that climate adaptation considerations are mainstreamed into all plans and policies and integrated into all operations and functions of OCC.

13.2 Methodology

The methodology accords with guidance and best practice outlined in Sections 13.2.3.1 to Section 13.2.3.3.

The existing air quality was characterised at a local level to establish a baseline. The nature, scale and duration of the construction works was examined and its potential to significantly impact local air quality assessed. Mitigation measures are described to minimise the potential effects.

As part of this assessment, the local climate was characterised based on 30 year averages measured at a representative weather observatory. The compatibility of the proposed project with the 2024 national CAP was examined. Climate is a global rather than a national consideration, therefore current reports on the state of the climate have been summarised.

13.2.1 Scope of Assessment

The aim of this assessment is to consider whether the Proposed Development including the Proposed Wind Farm, Proposed TDR and Proposed Gird Connection (refer to Chapter 2) and all associated site infrastructure would be likely to result in significant air quality and climate effects. The cumulative effect of the Proposed Development in combination with neighbouring existing and permitted developments is then assessed to determine any likely cumulative significant air quality and climate effects.

The potential effects of the decommissioning phase will be of similar magnitude, if not slightly less, than the construction phase. Therefore, the outcome of the construction phase assessment should be taken as representative of the decommissioning phase effects.

There will be approximately 18.07ha of trees felled to facilitate wind farm infrastructure (See Chapter 2 for full details).

The felled trees will be replanted elsewhere. this will ensure no net loss of carbon sequestering trees. However, the potential effect of the early felling of the trees on carbon sequestration has been assessed. Once constructed, there will be no air emissions from the Proposed Development.

13.2.2 Assessment Criteria

13.2.2.1 Air Quality

In the EU, Directives set down Air Quality Standards to protect health, vegetation, and ecosystems. The Ambient Air Quality and Cleaner Air for Europe (CAFÉ) Directive (2008/50/EC) (as amended by Directive EU 2015/1480) was published in May 2008 and was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) and has since been revoked and replaced by S. I. No. 739/2022 Ambient Air Quality Standards Regulations 2022.

There will be some pollutants named in the CAFÉ directive arising from plant and machinery exhaust emissions associated with the construction of the Proposed Development. These include carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), and particulate matter (PM_{10}). However, these emissions will not exceed the limit values set out in the CAFÉ Directive 2008/50/EC (as amended by Directive EU 2015/1480). Any adverse effects from these emissions are therefore likely to be insignificant.

Dust

There is potential for temporary disturbance to nearby receptors to occur as a result of fugitive dust from the excavation and transport of soil and materials during construction.

Transport Infrastructure Ireland (TII) published new guidance in 2022 for assessing dust effects at a local level from road construction 'Air quality assessment of proposed national roads – Standard' (TII, 2022A) and 'Air quality assessment of specified infrastructure projects – overarching technical document' (TII,2022B). The assessment of dust has been carried out in accordance with same. The TII Guidance in relation to dust is in accordance with the latest 2024 IAQM Guidelines on construction dust assessments, Guidance on the assessment of dust from demolition and construction.

This assessment of dust effects therefore focuses on identifying the existing baseline levels of PM_{10} and $PM_{2.5}$ in the region of the Proposed Development by an assessment of EPA monitoring data. Thereafter, the effect of the construction phase of the Proposed Development on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities with the Proposed Development based on the guidance issued by the IAQM (2024).

Traffic

TII guidance documents (TII, 2022A/2022B) state that the following scoping criteria shall be used to determine whether the air quality impacts of a project can be scoped out or require an assessment based on changes between 'Do-Something' traffic scenario (with the Proposed Development) compared to the 'Do-Minimum' traffic scenario (without the Proposed Development):

- Road alignment will change by 5m or more.
- Annual average daily traffic (AADT) flows will change by 1,000 or more. or
- Heavy goods vehicle (HGV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more. or
- Daily average speed change by 10 kph or more.
- Peak hour speed will change by 20kph or more.

If the above criteria are not met, then a quantitative assessment of construction traffic can be scoped out and the effects are considered to be not significant. The construction stage traffic, as described in Chapter 15 Material Assets Traffic and Transport, is below the above criteria and therefore no further detailed impact assessment is required.

13.2.2.2 Climate

In order to demonstrate that the carbon savings associated with the proposed renewable energy development will significantly out-weigh any potential carbon losses, a methodology made available by the Scottish Government (2019) in tabular spreadsheet format titled '*Calculating carbon savings from wind farms on Scottish peatlands'* was applied to this development.

This 'carbon calculator' is the Scottish Government's tool developed to support the process of determining the carbon effect of wind farm developments in Scotland. The purpose of the tool is to assess, in a comprehensive and consistent way, the carbon effect of wind farm developments. This is done by comparing the carbon costs of wind farm developments with the carbon savings attributable to the wind farm.

As there is no comparable Irish version, it is considered appropriate to adopt the Scottish methodology which has been tried and tested and subject to audit by the Scottish Environmental Protection Agency. This is accepted as best practice in Ireland and therefore this method has been adopted for this assessment to determine the potential carbon savings and losses from the Proposed Development, refer to Section 13.4.3.4.

It is important to note that there are limited amounts of peat identified within the site and these areas are not being developed, therefore, no peat will be removed or disturbed as part of the development. Only elements of the carbon calculator tool relating to the manufacture (lifecycle) of the wind turbines and the felling of forestry have been used to estimate the carbon savings associated with the wind farm.

13.2.3 Statement on Limitations and Difficulties Encountered

It is not possible to quantify exactly what effect the Proposed Development will have on Climate Change and Air Quality beyond the site boundary. However, it has been possible to determine the potential significance of the effects. It is universally accepted that replacing fossil fuel generated electricity with wind generation and other forms of renewable electricity has a positive rather than adverse effect nationally and globally on air quality and climate. The information provided in this chapter is considered appropriate to enable an informed decision to be made on the potential effects of the Proposed Development on air quality and climate.

13.3 Existing Environment

The Proposed Development is located in a rural area of east Co. Offaly. The site is approximately 4km west of the Edenderry town boundary and 24km east of Tullamore. Figure 13-1 outlines the location of the Proposed Development.

The Proposed Development is within the townland of Leitrim in the municipal district of Edenderry, Co. Offaly. The turbine delivery route will include development in the townlands of Leitrim, Ballyfore Big, Ballyleakin, and Ballina (Geashill By) Co. Offaly. The Proposed Grid Connection will be a linear development within the townlands of Leitrim, Lumville, Ballinla, Clarkeville, Ballyfore Big, Ballyfore Little, Ballyeakin and Ballykilleen, Co. Offaly. The grid connection route is 8km along the public roads from the proposed wind farm southeast to the existing Philipstown 110kV substation adjacent to the Edenderry Power Station.

Existing land cover at the site consists of agricultural land in the northern section and coniferous forest in the southern section. The northern and southern sections of the Proposed Development are split by the L5010 going east west through the Proposed Development site. The Grand Canal is approximately 500m to the north of the nearest turbine. The surrounding land includes agricultural fields, forestry and cutover peatlands.

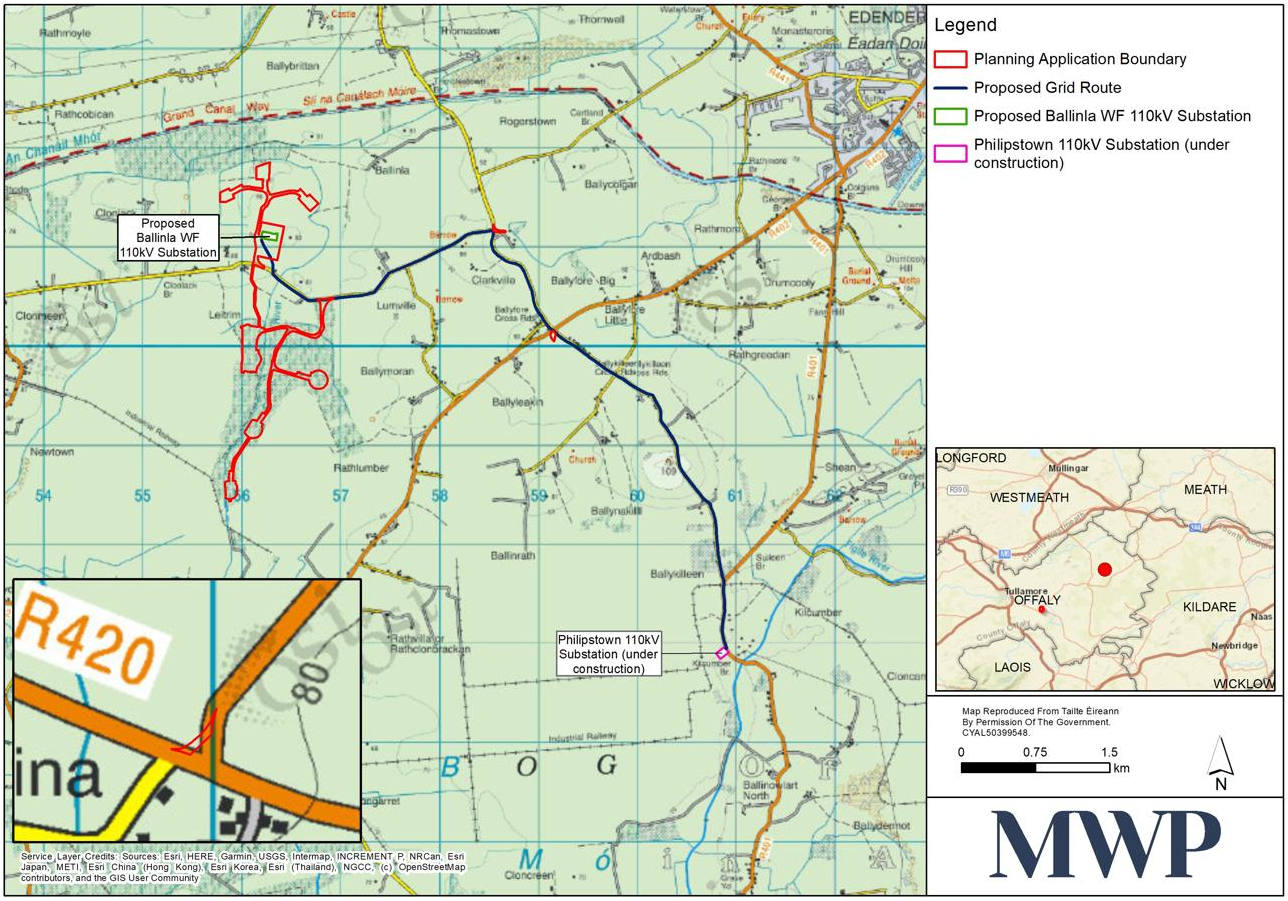

Figure 13-1: Site Location and red line boundary

Tullamore has the highest population in Offaly with 15,598 persons (Source: Census 2022) followed by a population of 9,288 in Portarlington on the Offaly/ Laois boundary and the last census of Edenderry recorded a population of 7,888. Along with local traffic (CO_2, NOx), agricultural practices on nearby farmland (CH_4), Edenderry Power Station (SO_2, NO_2 and Particulate Matte and forestry operations (CO_2, Nox) i.e. machinery used for tree felling, these urban centres are the largest nearby potential sources of pollution.

Representative EPA ambient air quality data has been used to characterise the existing air quality in the area.

13.3.1 EPA Monitoring Data

Under the Clean Air for Europe Directive, EU member states must designate ''Zones'' for the purpose of managing air quality. For Ireland, four zones were defined in the Air Quality Standards Regulations (2011). The four Air Quality Zones for Ireland are defined as:

- Zone A: Dublin City and environs.
- Zone B: Cork City and environs.
- Zone C: 16 urban areas with population greater than 15,000.
- Zone D: 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 Proposed Development lies within Zone D, which represents rural areas located away from large population centres.

Long term trends in $PM_{2.5}$ and NO_2 are reported in the EPA Air Quality report 2023 for small towns.

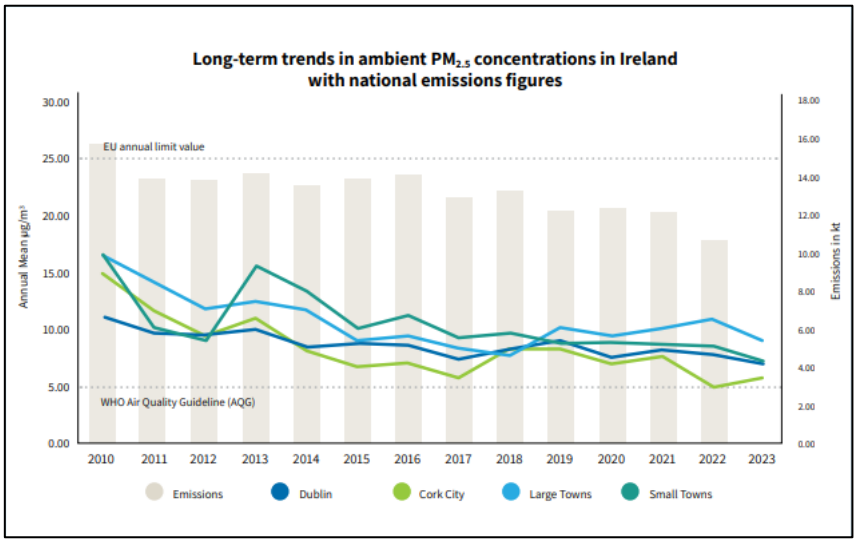

Figure 13-2: Long Term trends in ambient PM2.5 in Ireland

Since 2014, the EPA have being producing annual reports to provide an overview of air quality in Ireland based on the data obtained from monitoring stations that form the National Ambient Air Quality Network. The extensive network now consists of 115 monitoring stations, reporting hourly. Data taken throughout the year is validated and a summary report produced the following year. The most recent report available, produced in 2024 for data collected during 2023, also includes summary tables for all stations throughout Ireland. A summary of the key messages from the 2023 EPA report include:

- Ireland's latest monitoring shows we are in compliance with current EU standards.
- Ireland is not on track to achieve its ambition, set out in the National Clean Air Strategy, to meet the health-based WHO air quality guideline limits in 2026. Achieving future targets will be very challenging.
- Main pollutants of concern are fine particulate matter (PM2.5) from solid fuel combustion and nitrogen dioxide (NO2) from vehicle emissions/traffic.
- Air pollution can be a major environmental risk to people's health, with approximately 1,600 premature deaths annually in Ireland due to poor air quality.

According to the EPA, the two most significant pollutants in Ireland are particulate matter and nitrogen dioxide. These are mainly from burning solid fuel and from road traffic. High levels of these pollutants are often associated with cold weather from late autumn through to early spring, which generally incidents of poor air quality of one or two days duration. TII produced an updated standard in December 2022 titles 'Air Quality Assessment of Proposed National Roads – Standard' the purpose of which was to assess the potential air quality impacts of national road schemes. The guidance states that the main concern in relation to emissions from road traffic are nitrogen dioxide (NO_2) and particulate matter in the fractions of equal to or less than 10µm (PM_{10}) and equal to or less than 2.5µm ($PM_{2.5}$). During the construction phase, potential air quality effects can occur due to dust emissions and from construction traffic movements.

Construction traffic movements include additional vehicle trips associated with the construction of the scheme, as well as traffic management measures. Construction phase impacts will be temporary or short-term in nature.

EPA validated air monitoring data for 2023 was collated to reflect ambient air quality data at the Proposed Development. There is an EPA station within 7km (east) of the Proposed Development. The station is situated at Edenderry Library, Co. Offaly (Station 102 – Zone D). It records parameters NO_2, SO_2, PM_{10} and $PM_{2.5}$. The Edenderry station was commissioned in August 2021.

The average $PM_{2.5}$ concentration for all stations located in Zone D was 7.1µg.m^3 in 2023 and in Edenderry was 12.4 µg.m^3 Both average levels recorded are well below the 20µg.m^3 air quality standard limit in the Ambient Air Quality Standards Regulations 2022 which incorporate limits (EU Directive 2008/50/EC) and would be within the revised directive limits to be enacted. The Edenderry average value would be above the future 10 µg.m^3 air quality limit which is required to be enacted by December 2026.

PM_{10} data results from Zone D for 2023 was an average of 10.9µg.m^3 and for Edenderry was 16.3µg.m^3. Both average levels recorded are well below the 40µg.m^3 air quality standard limit. The current applicable standards in Ireland are the Ambient Air Quality Standards Regulations 2022. The results are within the proposed 20 µg.m^3 air quality limits to be enacted by December 2026.

NO_2 data results from Zone D for 2023 was an average of 8.1 µg.m^3 and for Edenderry was 8.6 µg.m^3. Both average levels recorded are well below the 40µg.m^3 air quality standard limit. The current applicable standards in Ireland are the Ambient Air Quality Standards Regulations 2022. The results are within the proposed 20 µg.m^3 air quality limits to be enacted by December 2026.

13.3.2 Dust Sensitivity of the Receiving Environment

A receptor is a location that may be affected by dust emissions during demolition and construction. Human receptors include locations where people spend time and where property may be impacted by dust. Ecological receptors are habitats that might be sensitive to dust. The Institute of Air Quality Management (IAQM) have recently updated guidance for the assessment of dust from demolition and construction. TII has published guidance for 'Air Quality Assessment of Proposed National Roads' (PE-ENV-01107). This standard refers to the IAQM procedures.

The objectives of the AQA process are to:

- Determine baseline air quality within the study area.
- Identify human receptors where a potential significant change in NO_2, PM_{10} or $PM_{2.5}$ concentrations, due to the proposed national road scheme, may occur.
- Identify sensitive designated habitats where a potential significant change in NOx or ammonia concentrations, due to the proposed national road scheme, may occur.
- Identify human and sensitive designated habitats where there is risk of dust and traffic movement effects occurring during the construction phase.
- Determine suitable mitigation measures to reduce significant air quality effects to an acceptable level.

A key principle of the air quality assessment process is to be proportional to the nature and scale of the project as it relates to the potential for significant air quality effects.

Step 1: Screen the need for a detailed assessment: An assessment will be required where there are sensitive receptors located within 250m of the boundary of the site or route used by construction vehicles on the public highway. Sensitive receptors can be classed as human and ecological.

Each receptor and/or environmental resource which may be impacted by the Proposed Development is identified and assigned a value on the basis of its importance or sensitivity to the potential impacts. The terminology used to describe the sensitivity of the receptor is High, Medium or Low. The following table indicates how sensitive receptors would be defined for the purposes of this report:

Table 13-4: Receptor Sensitivity Classification

Classification	Human	Ecological
High Sensitivity Receptor	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM10 (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	Locations with an international or national designation and the designated features may be affected by dust soiling or locations where there is a community of a particularly dust sensitive species. Indicative examples include a Special Area of Conservation (SAC) that is dust sensitive.
Medium Sensitivity Receptor	Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objectives, a relevant locations would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM10, as protection is covered by Health and Safety at Work Legislation.	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. or locations with a national designation where the features may be affected by dust deposition. Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features
Low Sensitivity Receptor	Locations where human exposure is transient. Indicative examples include public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition. Indicative example is a local Nature Reserve with dust sensitive features

Proximity of receptors are identified in relation to:

a) The Proposed Wind Farm and associated works included substation and access tracks.
b) The Proposed Grid Connection to the Philipstown 110kV substation.
c) The Proposed TDR.

There are less than 20 residential developments within 250m of the Proposed Wind Farm. There are no sensitive receptors within 250m of any of the turbines, substation or the spoil deposition area. The Grand Canal, which is a pNHA is 500m to the north of the nearest turbine. The nearest SAC, SPA or Natural Heritage Area is approximately 8km from the Proposed Wind Farm site (The Long Derries, Edenderry SAC).

There are approximately 90 residential receptors along the grid route to the Philipstown substation. Other receptors in the area include commercial enterprises such as hire and transport services, animal feed supplies and a power station. The nearest SAC, SPA or NHA is 5km from the grid route (The Long Derries, Edenderry SAC).

There will be some dust potential from turbine delivery route accommodation works however, most of these works are small in scale, temporary and sections of accommodation work areas will be spread out and therefore no significant dust

impacts. Three TDR node locations will require temporary development whereby rock will be laid down and/or soil reinstated during the construction works. The works at the three TDR nodes are of a similar size, the works are assessed using the Ballyleakin townland TDR node which has approximately 30 receptors within 250m as an example.

Due to the proximity of some highly sensitive receptors (residential) to elements of the project, a more detailed assessment will be undertaken for potential impacts on air quality during construction.

Step 2: Assess the Risk of Dust Impacts

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based on two factors:

- The scale and nature of the works (Step 2A), which determines the potential dust emission magnitude as small, medium or large and.
- The sensitivity of the area to dust impacts (Step 2B) which is defined as low, medium or high sensitivity.

These two factors are combined to determine the risk of dust impacts with no mitigation applied.

Step 2A: The scheme being assessed includes the Proposed Wind Farm site, the grid connection to the Philipstown 110kV substation and the Ballyleakin TDR node. The phases of development will include earthworks, construction and trackout. There is no demolition phase during the construction of this project, however it is considered there may be demolition if the development is decommissioned.

Step 2B: Define the Sensitivity of the Area

The sensitivity of the area takes account of a number of factors:

- The specific sensitivities of receptors in the area.
- The proximity and number of those receptors.
- In the case of PM_{10}, the local background concentration and.
- Site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Table 13-5: Sensitivity of the Area to Dust Soil Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<200
High	>100	High	High	Low	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

*The Proposed Wind Farm site has less than 10 high sensitive receptors within 250m of the site entrances. There are no sensitive receptors within 250m of any of the key infrastructural elements including the turbines, hardstands, substation and deposition area. The overall sensitivity of the Proposed Wind Farm site would be classed as low. The grid route has up to 100 residential receptors within 50m, therefore the sensitivity would be classed as medium.

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 impacts. The criteria take 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. The baseline average annual mean PM_{10} concentration for Edenderry was 16.3 µg/m^3.

Table 13-6: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
High	>32µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	<32 µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

*The risk assessment based on the IAQM guidance, taking into consideration baseline concentration, number of receptors and distance from source, classes the overall sensitivity of the area to human health impacts from the Proposed Wind Farm and grid connection as Low.

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to ecological impacts from dust. The criteria take into consideration whether the receiving environment is classified as a SAC, SPA, NHA or pNHA as dictated by the EU Habitats Directive or whether the site is a local natura reserve or home to a sensitive plant or animal species. The Proposed Wind Farm site is located south of the Grand Canal pNHA, however the nearest turbine is approximately 500m from the canal. There are no SAC's, SPA's or NHA's within approximately 5km of the Proposed Development. Due to intervening separation distances, the sensitivity of the area to ecological impacts can be considered low as per Table 13-7.

Table 13-7: Sensitivity of the Area to Ecological Impacts

Sensitivity of Area	Distance from the Source (m)	
	<20	<50
High	Medium	Medium
Medium	Medium	Low
Low	Low	Low

13.3.3 Global Climate

Every year, the World Meteorological Organisation (WMO) issues a 'Statement on the State of the Global Climate'. It is based on data provided by National Meteorological and Hydrological Servies and other national and international organisations. Some of the key messages in the WMO 'Statement of the State of the Climate 2023'[2] are as follows:

- 2023 was the warmest year on record at 1.45 ± 0.12°C above the pre-industrial average.
- Ocean heat content reached its highest level in the 65-year observational record.
- Record monthly global temperatures have been observed for the ocean – from April through to September – and, starting slightly later, the land – from July through to September.
- Observed concentrations of the three main greenhouse gases – carbon dioxide, methane and nitrous oxide – reached record high levels in 2022, the latest year for which consolidated global values are available (1984-2022). Real time data from specific locations show that levels of the three greenhouse gases continued to increase in 2023.
- are on track to be the eight warmest on record, fuelled by ever-rising greenhouse gas concentrations and accumulated heat. Extreme heatwaves, drought and devasting flooding have affected millions and cost billions this year, according to the WMO Provisional State of the Global Climate in 2022 report.
- In 2023, global mean sea level reached a record high in the satellite record (1993 to present), reflecting continued ocean warming as well as the melting of glaciers and ice sheets. The rate of global mean sea level in rise in the past ten years (2013-2022) is more than twice the rate of sea level rise I the first decade of the satellite record (1993-2002).
- Extreme weather continues to lead to severe socio-economic impacts. Extreme heat affected many parts of the world. Wildfires in Hawaii, Canada and Europe led to the loss of life, the destruction of homes and large scale air pollution. Flooding associated with extreme rainfall from Mediterranean Cyclone Daniel affected Greece, Bulgaria, Turkey and Libya with particularly heavy loss of life in Libya.
- Food security, population displacements and impacts on vulnerable populations continue to be of concern in 2023, with weather and climate hazards exacerbating the situation in many parts of the world.
- Extreme weather and climate conditions continued to trigger new, prolonged and secondary displacement in 2023 and increased vulnerability of many who were already uprooted by complex multi-casual situations of conflict and violence.

13.3.3.1 EPA: Ireland's Climate Change Assessment Synthesis Report-2023

This report is the first Ireland's Climate Change Assessment (ICCA) and the development was modelled on the work of the Intergovernmental Panel on Climate Change and the Sixth Assessment Cycle, completed in 2023, with the use of and localisation of its information for Ireland. The full report was developed through a co-creation process between leading

[2] https://library.wmo.int/viewer/68835/download?file=1347_Global-statement-2023_en.pdf&type=pdf&navigator=1

academics in Ireland and officials from across state agencies and government departments. Key findings in the report for policy makers include:

A) Human activity has resulted in widespread and rapid changes in climate which are already impacting us all today.
B) The future climate is in our collective hands. To halt warming globally and in Ireland requires rapidly reaching at least net-zero carbon dioxide emissions and substantially cutting other greenhouse gas emissions. Every action matters. with every additional increment of warming, impacts for Ireland will increase substantially.
C) Having peaked in 2001, Ireland's greenhouse gas emissions have reduced in all sectors except agriculture. However, Ireland currently emits more greenhouse gases per person than the EU average. A legal basis for deep, rapid and sustained national emissions cuts now exists, although current policy and action remain insufficient to meet those aims. The pathway forwards is clearer for energy, transport and the built environment than for agriculture and land use. For all sectors there are many challenges to overcome.
D) Ireland needs to be resilient to ongoing and future climate change impacts. This requires increased in focus upon and investment in adaptation that can protect us from future climatic impacts. Current implementation of adaptation is too slow and fragmented. Doing better requires financing, working with people and nature, monitoring and evaluating outcomes, and increasing public and private sector involvement.
E) Effective and just transformative actions will have mitigation and adaption benefits and bring broader benefits for health, wellbeing, nature and sustainable economic development. The state has a central role to play in enabling the necessary transformations, supported through action across society. Decisions taken this decade will reverberate for generations to come.

The Synthesis report is an integrated overview of four assessments including:

1. Climate Science: Ireland in a Changing World.
2. Achieving Climate Neutrality by 2050.
3. Being prepared for Ireland's Future Climate.
4. Realising the Benefits of Transition and Transformation.

The following paragraphs are key items taken from the synthesis report to provide information on the current climate situation.

It is unequivocal that human activity has warmed the climate system. Globally, widespread and rapid changes in the atmosphere, ocean, land, cryosphere and biosphere have occurred. The scale of the recent changes across the climate system as a whole – and the present state of many aspects of the climate system – are unprecedented over many centuries to many thousands of years. Human-induced climate change is already modifying extreme weather events across the globe. Increases in both the frequency and intensity of heatwaves and extreme precipitation have been consistently linked to human activities. Similarly, cold events have been made less likely and severe. Many notable recent Irish events have not yet been formally studied in the context of this rapidly emerging science of event attribution using state-of-the-art approaches. However, there is high confidence that recent changes in heat extremes and heavy precipitation events in Ireland can be linked, albeit indirectly, to human-induced climate change.

To stabilise the global climate requires global carbon dioxide emissions reduction to reach at least net-zero. Furthermore, emissions of other greenhouse gases would need to be substantially reduced on a sustained basis. Many components of the global climate system, such as temperature and precipitation, respond within years to decades to changes in radiative forcing. If we can reach net zero global carbon dioxide emissions around 2050, these components would globally stabilise within the lifetime of many of today's younger citizens. Some other components of the climate system, most notably sea level rise, will take thousands of years to stabilise even once greenhouse gas emissions reach net zero.

Future changes in climate will have impacts for all aspects of Irish society, the environment and the economy. Without significant mitigation and adaption efforts, climate change will result in significant impacts for many marine, terrestrial

and freshwater species and habitats, potentially undermanaging capacity to adapt to climate change in other sectors. Climate change will impact as aspects of Irish agriculture. While increased in productivity can be expected in some crops. Decreases can be expected for others. Pests and pathogens and likely to have an increased impact on arable and livestock farming, while increases in precipitation amounts and intensity would increase nutrient washout from land with consequent impacts on water quality.

The transition to a climate-neutral society is both an urgent challenge and an opportunity to build a resilient future for all. All parts of society will play a role – from the power sector to industry, mobility, buildings, agriculture and forestry. This will require leadership from government (policymakers, policy enforcers, etc.), business, communities and individuals.

Achieving net zero carbon dioxide emissions by 2050 requires significant and unprecedented changes to Ireland's energy system. There will be difficult choices ahead. Infrastructure such as the electricity grid must be built, large investment must be sought, renewable fuels found, and homes and businesses transformed. Without these changes and societal and political support, a net zero energy system cannot be achieved.

Policies tailored to suit different stages of technology development are critical for achieving a net zero energy system. Established technologies, such as wind energy, solar photovoltaics and bioenergy, will be key in meeting short-term emission reduction targets (i.e. 2030), whereas offshore wind infrastructure is expected to be the backbone of future energy systems.

Ireland has set the national objective of transitioning to a climate-resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy by 2050 at the latest. Resilience refers to the ability to absorb and respond to climate change by implementing effective adaptation actions and sustainable development to reduce negative climate impacts while also taking advantage of any opportunities. Adaptation aims to increase resilience by helping us navigate extreme events and maintain flexibility and a diversity of responses in delivering actions that reduce social, ecological and economic vulnerability and exposure.

We are not starting from an ideal position for adaptation because of ageing infrastructures, declining quality of the built environment, and significant and ongoing environmental deterioration, including declines in water quality, biodiversity and ecosystem quality. Together with a growing population and a lack of investment in critical infrastructure, this has meant that many natural and human systems upon which wellbeing depend have become less resilient. Looking to the future, aside from climate change, social, environmental and economic challenges in energy, health, housing, and an increasing and ageing population, together with biodiversity loss, will all increase vulnerability to climate change impacts.

Transformative change is a fundamental, system-wide reorganisation across technological, economic and social factors, including paradigms and goals, that values the climate, the environment, equity and wellbeing in decision making. It can entail mobilising society to fundamentally reorganise the systems driving greenhouse gas emissions, biodiversity loss and vulnerability to the impacts of climate change.

The decisions made and actions taken this decade will have long-term consequences affecting many generations into the future. Tackling climate change and biodiversity loss together enhances the many synergies that exist between actions to address these crises while minimising and managing any remaining trade-offs. Pursuing transformative change can also deliver social, economic and environmental benefits and opportunities from climate action that would otherwise be missed, including those for the wellbeing of people and nature and for greater equity across society.

13.3.3.2 Greenhouse Gas Emissions

In July 2024, the EPA updated the 1990-2023 greenhouse gas emissions inventory data. In 2023, Ireland's GHG emissions are estimated to be 55.01 million tonnes carbon dioxide equivalent (Mt CO_2eq) which is 6.8% lower than emissions in

2022, driven by the reductions in the Electricity generation, Residential sector, Agriculture and Industry. Greenhouse gas emissions decreased in 2023 due to the reduction in coal, oil and peat use and an increase in renewable energy for electricity generation. Decreases in coal were 44.2%, oil 78.2% and natural gas 7.2% used in electricity generation in 2023. The data indicate that from 2021- 2023 Ireland has used 64% (188.4 Mt CO2eq) of the 295 Mt CO2eq Carbon Budget for the five-year period 2021-2025. This leaves 36% of the budget available for the next two years, requiring a substantial 8% annual emissions reduction for 2024 and 2025 to stay within budget.

13.3.3.3 Local Climate

Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers. There are a total of 20 automatic weather stations (AWS) and 5 manned weather stations (MWS) in Ireland. All weather observations record day-to-day changes of the atmosphere and are quality controlled in Met Eireann's database to formulate long-term climate records. The nearest station to the Proposed Development site is Mullingar AWS. The following parameters are recorded at the station: Air temperature, rainfall and wind speed.

Mullingar, Co. Westmeath, is the nearest weather and climate monitoring station to the Proposed Development. Meteorological data recorded for the 13-year period from 2011 – 2023 is detailed in Table 13-8. The monitoring station is located approximately 40km north of the site.

The wettest months are October and December and May is usually the driest. July is the warmest month with a mean daily temperature of 15.3° Celsius.

The Annual Climate Statement for 2024 released by Met Éireann[3] states that overall, the average annual air temperature for Ireland in 2024 *(using the Island of Ireland dataset*)* was 10.72 °C, which is 1.17°C above the 1961-1990 long-term average (LTA) or 0.55°C above the most recent 1991-2020 LTA. This makes 2024 the fourth warmest year on record, 0.49 °C cooler than 2023, the warmest year on record. Provisionally, 2024 rainfall was the 41st driest or 44th wettest since 1941.

Table 13-8: Met Data Mullingar AWS 2011 – 2023.

Mullingar AWS													
Rain (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average Annual
2011	47.1	119	36.1	35	67.3	65.1	60.3	65.1	122.1	133	106.2	87.8	78.7
2012	97.4	42.4	15.4	75.4	55.1	175.1	122.1	128.9	62	90.9	68.3	91.2	85.4
2013	117.8	54.8	40.1	78.1	72.2	62.6	62.8	52.8	53.8	179.3	46.6	142.5	80.3
2014	147.1	154.9	72.3	55.4	128.6	63.4	31.6	153.8	16.1	125.2	154.4	100.7	100.3
2015	92.9	53.7	92.8	64.2	135.3	37.1	76.5	97.1	39.2	57.6	184.4	274.3	100.4

[3]https://www.met.ie/annual-climate-statement-for-2024#:~:text=The%20average%20annual%20air%20temperature,the%20warmest%20year%20on%20record.

Mullingar AWS													
2016	121.9	111.8	58.2	91.2	61.6	130.3	70.1	98.6	90.5	33.9	50.7	69.5	82.4
2017	41.4	75.2	83.7	14.1	70.7	98.1	90.5	77.4	113.1	104.4	78.2	106.1	79.4
2018	148.1	52.4	73.6	58.9	33.9	27.1	33.5	60.2	45.8	41.7	105.8	100.6	65.1
2019	41.3	48.8	157.1	58.6	43.2	79.6	78.1	151.9	131.7	90.8	126.7	82.8	90.9
2020	54.4	197.5	61	41.9	10.1	96.6	126.3	114	68.3	131.8	87.7	89.3	89.9
2021	126.9	80.3	80.9	25.5	107.4	17.4	74.9	142.1	58.1	97.7	41.6	128	81.7
2022	47.6	131.8	46.2	48.7	53.4	100.6	31.6	35.2	104.1	208.8	109.3	84.5	83.5
2023	81.1	29.8	141.4	82.8	36.4	53.3	178.8	114.3	132.9	104.5	71.2	132	96.5
Average Monthly	89.6	88.6	73.8	56.1	67.3	77.4	79.8	99.3	79.8	107.7	94.7	114.6	

Mean Air temp (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average Annual
2011	2.9	6.3	6	10.5	10.6	11.6	14.1	13.1	13.3	11	8.9	5.1	9.5
2012	5.8	6.6	7.9	6.7	10.5	13	14	15.4	11.8	8	5.5	4.7	9.2
2013	4.5	4.1	3.1	6.6	9.9	13.3	17.3	15.1	13.1	11.3	5.8	6.1	9.2
2014	4.6	5.1	6.5	9.4	11.3	14.1	15.8	13.4	13.6	10.2	6.9	4.8	9.6
2015	4.1	4.1	5.4	7.7	9.5	12.7	13.4	13.4	11.6	9.8	7.9	7.4	8.9
2016	4.9	4.1	5.7	6.6	11.6	14.4	15.1	14.9	13.5	10.1	5.1	5.7	9.3
2017	5.4	5.5	7.5	8.2	11.7	13.9	14.7	13.8	12	10.7	6	4.9	9.5
2018	4.7	3.1	4.1	8.2	11.8	15.6	16.2	14.7	11.6	9	7.2	7.3	9.5
2019	5.1	7	6.7	8.7	10.6	12.5	16.1	15	12.6	8.9	5.9	5.4	9.5
2020	5.5	5.2	6.1	9.5	11.7	13.6	14.1	14.9	12.7	9.4	7.6	4.5	9.6
2021	3.3	5.6	7.4	7	9.3	13.8	17.1	14.9	14.5	11.4	7.8	6.3	9.9
2022	5.1	6.2	6.6	8.1	12	13.5	16.2	15.5	12.9	11.3	8.2	3.4	9.9
2023	5.3	6.8	6.9	8.7	12.3	15.9	14.5	15.3	14.3	10.8	6.8	6.5	10.3
Average Monthly	4.7	5.4	6.1	8.1	11.0	13.7	15.3	14.6	12.9	10.1	6.9	5.5	

Mean Wind Speed (knots)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average Annual
2011	4.7	6.8	4.6	5.8	8.8	5.3	4.7	4.6	7.8	7.6	7.9	8.1	6.4
2012	7.7	6.4	5.9	6.3	5.7	5.7	5.1	6.4	5.8	5.1	6.1	6.4	6.1
2013	6.6	6	7.2	7.7	6.9	5.4	4.6	5.3	5.4	5.9	5	8.9	6.2

Mullingar AWS													
2014	7.3	9.3	6.6	6.3	5.6	4.6	4.9	5.7	3.9	6.5	5.2	6.8	6.1
2015	8	6.1	7.1	5.5	7.2	6.1	6.1	5.4	5	5.2	7.5	9.3	6.5
2016	7.5	7.1	6.1	6.3	5.8	4.6	5.2	5.8	6.4	5.2	4.8	5.8	5.9
2017	6	7.8	7	5.4	6.1	6.1	5.2	5.2	5.8	6.7	5.2	6	6.0
2018	7.7	6.5	7	7	5.7	4.8	4.6	5.1	5.5	5.8	7.4	6.9	6.2
2019	5.2	8.2	7	6.8	4.9	5.7	5.3	6.1	5.4	5.6	5.3	7.1	6.1
2020	7.2	9.3	7.2	6	6	5.9	5.7	5.5	5.7	6.8	6.8	6.6	6.6
2021	5.4	8.6	6.8	5.3	6	5.5	4.1	4.7	4.7	6.1	5.5	6.6	5.8
2022	5.6	8.7	6	6.4	6.3	5.9	4.9	4.6	4.8	7	7.5	5.5	6.1
2023	6.5	6.4	6.7	6.5	5	5.7	5.8	5.9	5.6	5.2	5.6	7.9	6.1
Average Monthly	6.6	7.5	6.6	6.3	6.2	5.5	5.1	5.4	5.5	6.1	6.1	7.1	

Wind direction at Mullingar, which would be representative of the Midlands, is largely from a south-westerly direction. Thirty years of data from 1988 – 2018 was compiled in order to evaluate wind direction and wind speed over a significant period of time. [4]

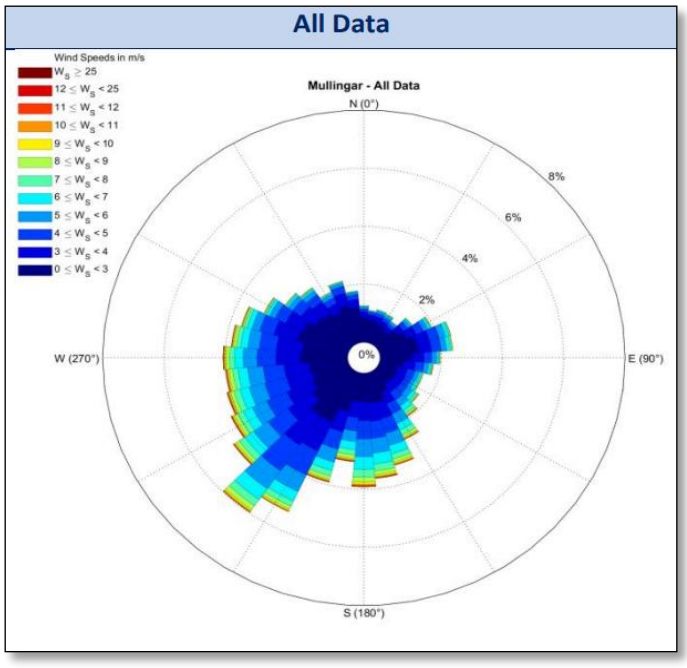

Figure 13-3: Mullingar Wind Speeds and Direction 1988-2018

[4] RPS, Draft Wind Energy Guidelines Wind Turbine Noise Analysis, Nov 2018

13.4 Potential Significant Effects of the Proposed Development

13.4.1 Do Nothing

If the Proposed Development were not to proceed, an opportunity to offset Greenhouse Gas Emissions (GHG) from fossil fuel-based energy sources would be lost. The potential for Ireland to reach its renewable energy targets set out in the National Climate Action Plan 2024 and to contribute to climate change mitigation would be reduced.

Emissions of CO_2, NO_x and SO_2 from coal, oil and gas fired power plants that would otherwise have been displaced will continue, resulting in a continued deterioration in air quality.

Poor air quality in our urban centres is a growing concern. As stated on the EPA's website: *The WHO estimates show that more than 400,000 premature deaths are attributable to poor air quality in Europe annually. In Ireland, the number of premature deaths attributable to poor air quality is estimated at 1,180 people and is mainly due to cardiovascular disease'*. The World Health Organisation (WHO) has described air pollution as the '*single biggest environmental health risk'*.

In a Do-Nothing scenario, there would be an **adverse**, **moderate, long-term** effect should the Proposed Development not proceed, as emissions associated with the burning of fossil fuels will continue.

Table 13-9: Do Nothing Assessment of Air Quality and Climate Effects

Effect: Dust, Particulates and GHG Emissions						
	Quality of Effect	Significance	Spatial Extent	Duration	Type	Likelihood
Proposed Development	Adverse	Moderate	Extensive	Long- term	Indirect	Likely

13.4.2 Construction Phase

13.4.2.1 Air Quality & Dust Emissions

The main air quality impacts that may arise during the construction phase will be:

- Dust deposition, resulting in the soiling of surfaces.
- Visible dust plumes, which are evidence of dust emissions.
- Elevated PM_{10} and $PM_{2.5}$ concentrations, because of dust generating activities onsite.
- To a lesser extent, increase in concentrations of airborne particles and nitrogen dioxide due to exhaust emissions from diesel powered vehicles and equipment used onsite.

The most common impacts are dust soiling and increased ambient PM_{10} concentrations due to dust arising from activities on the site. Dust soiling will arise from the deposition of the Particulate Matter (PM) in all size fractions but would be associated mostly with particulate matter greater than 10 µm. The ambient PM relevant to health outcomes would be that measured as PM_{10}, although most of this will be in the $PM_{2.5}$ fraction, rather than the $PM_{2.5}$ portion.

In general, 85% to 90% by weight of the fugitive dust emissions of PM_{10} from construction sites are $PM_{2.5-10}$ and 10% to 15% are in the $PM_{2.5}$ fraction. For construction as a whole, it is recommended that the average $PM_{2.5}$ content of PM_{10} should be assumed to be 10%.[5]

[5] https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

The Proposed Development will consist of the installation of seven wind turbines and hardstand areas, access roads, a 110kV substation, as well as the Proposed TDR works and a Proposed Grid Connection.

Traffic movements during the construction phase are outlined in the Material Assets (Traffic and Transport) Chapter 15. Over the course of the construction of the Proposed Development, activities across the site will vary resulting in different staff numbers and different trip generation depending on the activities being undertaken at any given time. Given the phasing of construction across the site, the peak construction period will occur when different activities are being undertaken in different phases.

Based on this, it is possible to estimate the peak traffic movements to the site based on the stage of development where multiple phases are underway.

During the proposed 18 months construction duration, the proposed construction works would increase Annual Average Daily Traffic (AADT) volumes up to 70 vehicles, including 30 heavy vehicles, which equates to an AADT increase of up to 4.3% on regional roads. The proposed grid construction works along public roads would increase AADT volumes on those roads by 18 vehicles, including nine two-way heavy vehicles.

During peak construction traffic generation periods, the peak daily increase in daily traffic volumes would be up to 220 vehicles, including up to 180 HGVs. The construction highest peak hour increase in traffic volumes would be up to 18 heavy vehicles. The peak daily increase in traffic volumes generated by the proposed grid construction works along public roads would be up to 53 vehicles, including 26 two-way heavy vehicles.

The peak construction stage traffic has been reviewed and screened out based on the following assessment criteria:

- AADT changes by 1,000 or more during construction.
- HGV changes by 200 or more.
- A change in speed band.
- A change in carriageway alignment by 5m or greater.

The construction stage traffic has the potential for a not significant, negative and short-term impact on air quality.

There will be dust generated from moving and transporting soil, stone and materials in and around the construction site and on public roads. Weather conditions will play an important role in the quantity of dust generated. The potential for fugitive dust emissions is greatest during periods of prolonged dry weather.

The surrounding area has also been assessed for the presence of any ecological receptor, human receptor or sensitive habitat which would be affected by dust soiling. A human receptor refers to any location where a person may experience the annoyance effects of airborne dust or dust soiling, or exposure to PM_{10} over a time period relevant to the air quality objectives. In terms of annoyance effects, this will most commonly related to residential dwellings but may also refer to industrial and commercial premises that have a particular sensitivity to dust impacts. The impact of dust from construction is generally localized (within 50m to 200m from the works).

The risk of dust emissions from a demolition/construction site causing loss of amenity and/or health or ecological impacts is related to:

- The activities being undertaken include earth moving & excavation, transport & unloading, construction of access roads and hardstands, construction of substation and vehicle movements.
- The duration of these activities: 18 months.
- The size of the site.
- The meteorological conditions (wind speed, direction and rainfall).
- The proximity of receptors to the activities.
- The adequacy of the mitigation measures applied to reduce or eliminate dust.

- The sensitivity of the receptors to dust.

Screening the need for a more detailed assessment is in accordance with the updated January 2024 IAQM 'Guidance on the assessment of dust from demolition and construction'. An assessment will normally be required where there is:

- A human receptor within 250m of the boundary of the site and/or.
- A human receptor within 50m of the route(s) used by the construction vehicles on the public highway, up to 250m from the site entrance (S).
- An ecological receptor within 50m of the boundary of the site and/or.
- An ecological receptor within 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrances

The potential impact from dust becoming friable and a nuisance to workers and local road users, if unmitigated, is considered to be slight, negative, short-term, direct impact during the construction phase. Generally, the distance the particle travels is dependent on size, disturbance activities and weather conditions. Larger dust particles tend to travel shorter distances. There are c. 20 sensitive receptors within 200m of the proposed site boundary. There are no residential receptors within 250m of the main construction areas (turbines bases, hardstand, substation) There are c. 5 receptors within 200m of the site entrances. In addition, vegetation such as trees and hedgerows in the vicinity will help to mitigate any airborne dust migrating off the Site. Any effects of dust on vegetation will be confined to the construction and possibly the decommissioning phases and will be **short-term, slight** and **negative**. Based on the number, sensitivity and location of receptors, the requirement for a more detailed assessment will be screened in.

Where appropriate, the site can be divided into 'zones' for the dust risk assessment. This may result in different mitigation levels being applied to each zone. This could be where different parts of a large site are different distances from the nearest receptors, or where development activities move away from a receptor though time on a large scheme.

Earthworks

Earthworks will primarily involve excavation, haulage, tipping, landscaping and stockpiling. The dust emission magnitude from earthworks can be classified as small, medium or large and are described as follows:

The dust magnitude for the earthwork activities can be classified as medium due to the Proposed Development total excavation volumes proposed 84,714m^3. It is proposed for the excavated material to remain within the site within a deposition area and some material to be used for landscaping. This will minimize the likelihood of any dust impact outside the red line and also the impact of construction traffic. The excavated materials are not of a dusty soil type. Chapter 9 Land and Soils, defines the predominant soil type at the north of the site as poorly drained limestone derived till with peat the main soil type in the south of the site. Combining this classification with the previously established sensitivity of the area to dust soiling, ecological and human health effects (low sensitivity respectively), an overall Low risk of temporary dust soiling impacts, Low risk of ecological effects and Low risk of temporary human health effects is reached, as per Table 13-10.

Table 13-10: Risk of Dust Impacts – Earthworks

Distance to Nearest Receptor		Dust Emission Class		
Dust Soiling and PM_{10}	Ecological	Large	Medium	Small
<20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	-	High Risk Site	Medium Risk Site	Low Risk Site
50-100	<20	High Risk Site	Medium Risk Site	Low Risk Site
100 – 200	20 – 40	Medium Risk Site	Low Risk Site	Low Risk Site

Distance to Nearest Receptor		Dust Emission Class		
Dust Soiling and PM_{10}	Ecological	Large	Medium	Small
200-350	40-100	Medium Risk Site	Low Risk Site	Negligible
Assessment Criteria **Large:** Total building volume >110,000m^3, onsite concrete batching, sandblasting, >10 heavy earth moving vehicles **Medium:** Total building volume 18,000m^3-110,000m^3, moderately dusty soil type, 5-10 heavy earth moving vehicles active at any one time. **Small:** Total site area <18,0000m^3, soil type with large grain size (e.g. sand) <5 heavy earth moving vehicles active at any one time, formation of bunds <3m in height.				
Excavation for the Proposed Wind Farm site is estimated at 84,714m^3 with some reuse of material and the remainder to be stored within the deposition area. No material to be moved offsite. (soil type – not dusty). There are no large excavation areas in proximity (<250m) to sensitive receptors. A small volume of earthworks will take place at the site entrances in proximity to receptors. For the grid route, the material excavated from the trench will be reinstated after the ducting is laid. If there is some material encountered that is unsuitable, this will be removed to a licensed waste facility. Overall, these volumes are expected to be very low. The dust emission magnitude from the grid route would be considered small. Based on the distance to sensitive receptors and the dust emission magnitude from the scale of the earthworks, the development would be considered a low-risk site. There are no ecologically sensitive receptors <100m from the development.				
Classification: Low Risk Site Proposed Wind Farm, Proposed TDR and Proposed Grid Connection				

Construction

Dust emission magnitudes from the construction of buildings can be classified as small, medium and large and are described as follows:

The dust emission magnitude for the Proposed Wind Farm site during the construction phase can be classed as large as the estimated volumes of material to be imported are approximately 87,795m^3 and small for the TDR works and grid connection with low volumes of material required.

With respect to the IAQM guidance criteria table for rating of risk, refer to **Table 13-11**, the risk of dust impacts, as a result of the construction of the Proposed Wind Farm site works prior to mitigation is Medium with respect to dust soiling and health impacts and low with respect to ecological impacts.

With respect to the IAQM guidance criteria table for rating of risk, the risk of impacts from construction of the grid route prior to mitigation is Low with respect to dust soiling and health impacts and negligible with respect to ecological impacts.

Table 13-11: Risk of Dust Impacts – Construction

Distance to Nearest Receptor		Dust Emission Class		
Dust Soiling and PM_{10}	Ecological	Large	Medium	Small
<20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	-	High Risk Site	Medium Risk Site	Low Risk Site
50-100	<20	Medium Risk Site	Medium Risk Site	Low Risk Site
100 – 200	20 – 40	Medium Risk Site	Low Risk Site	Negligible
200-350	40-100	Low Risk Site	Low Risk Site	Negligible

Distance to Nearest Receptor		Dust Emission Class		
Dust Soiling and PM_{10}	Ecological	Large	Medium	Small
Assessment Criteria **Large:** Total building volume >75,000m^3, onsite concrete batching, sandblasting. **Medium:** Total building volume 12,000m^3-75,000m^3, potentially dusty construction material (e.g. concrete) on site concrete batching and. **Small:** Total building volume <12,0000m^3, construction material with low potential for dust release (e.g. metal cladding or timber)				
Construction phased over a period of 18 months with the importation of 87,795m^3 of material for Proposed Wind Farm site. Small volumes only required for the TDR works and grid route where excavated materials are considered unsuitable for reinstatement. Materials with low potential for dust release (stone)				
Classification: Medium (Proposed Wind Farm) to Low (Proposed Grid Connection and Proposed TDR) Risk Site				

Trackout

Trackout refers to the movement of dust and dirt from a construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. The factors which determine the magnitude of dust emissions are vehicle size, vehicle speed, vehicle numbers, geology and duration. Dust emission magnitudes from trackout can be classified as small, medium or large and have been described in **Table 13-12.**

During construction, the primary source of dust emissions with potential to impact sensitive receptors will be movement of vehicles on and off site. Materials with the highest potential for dust emissions will be concrete and aggregates for the construction of the hardstanding areas and access tracks, However, only ready-mix concrete will be used on site and all concrete will be delivered in enclosed trucks which will reduce the potential for dust emissions.

The maximum amount of daily HGV movements for the Proposed Wind Farm development will be 30 during the construction period with a peak of 180 HGV's, therefore trackout activities can be considered to be of large magnitude, refer to **Chapter 15** Traffic and Transport of this **EIAR**. For the grid connection there will be c. 26 outward HGV movements predicted and therefore trackout activities can be considered to be of medium magnitude.

It is expected the HGV movements for the Proposed TDR works will be similar to the grid connection with approximately 45 loads of rock required for the works over a two-day period equating to a maximum of 23 loads per day. Therefore, trackout activities can be considered to be of medium magnitude.

With respect to the IAQM guidance for rating of risk (Table 13-12), the risk of dust impacts as a result of the Proposed Wind Farm trackout activities prior to mitigation is Medium with respect to dust soiling and human health and ecological receptors.

The risk of impacts from the trackout phase of the Proposed Grid Connection, with consideration of the risk rating in **Table 13-12**, would be considered medium with respect to dust soiling and human health and negligible with respect to ecological receptors.

Table 13-12: Risk of Dust Impacts-Trackout

Distance to Nearest Receptor		Dust Emission Class		
Dust Soiling and PM_{10}	Ecological	Large	Medium	Small
<20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	-	Medium Risk Site	Medium Risk Site	Low Risk Site

Distance to Nearest Receptor		Dust Emission Class		
Dust Soiling and PM_{10}	Ecological	Large	Medium	Small
50-100	<20	Low Risk Site	Low Risk Site	Negligible
Assessment Criteria **Large**: >50 HGV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m. **Medium**: 20-50 HDV (>3/5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m. **Small**: <20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.				
Traffic movements (HGV) for the Proposed Wind Farm during construction would be 30 average, 180 peak HGV movements. Traffic movements for the TDR works and grid connection during construction would be less than 50 HGV in any one day. The material has low potential for dust release.				
Classification: Low (Proposed Wind Farm) to Medium (TDR and Grid Connection) Risk Site				

Summary of Dust Emission Risk

The magnitude of the risk determined is used to prescribe the level of site-specific mitigation required for each activity to prevent significant effects occurring.

The pre-mitigation Dust Risk Summary Table for the construction phase of the Proposed Wind Farm is shown in **Table 13-13**. The Dust Risk Summary Table for the Proposed TDR and Proposed Grid Connection are shown in **Table 13-14** and **Table 13-15** respectively.

Overall, to ensure that no dust nuisance occurs during the earthworks, construction and trackout activities, a range of dust mitigation measures associated with high risk of dust effects must be implemented. When the dust mitigation measures detailed in the mitigation section of this chapter are implemented, fugitive emissions of dust from the site will be insignificant and pose minimal nuisance at nearby receptors.

Table 13-13: Summary of Proposed Wind Farm Construction Phase Dust Effects Risk

Potential Effect	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Medium Risk	Low Risk
Human Health	Low Risk	Medium Risk	Low Risk
Ecological	Low Risk	Low Risk	Low Risk

Table 13-14: Summary of Proposed TDR Works Construction Phase Dust Effects Risk

Potential Effect	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Low Risk	Medium Risk
Human Health	Low Risk	Low Risk	Medium Risk
Ecological	Negligible	Negligible	Negligible

Table 13-15: Summary of Proposed Grid Connection Construction Phase Dust Effects Risk

Potential Effect	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Low Risk	Medium Risk
Human Health	Low Risk	Low Risk	Medium Risk
Ecological	Negligible	Negligible	Negligible

Table 13-16 shows the significance of Proposed Wind Farm construction phase dust effects in relation to dust soiling, human health and ecological receptors. Table 13-17 shows the significance of Proposed TDR works construction phase dust effects in relation to human health and ecological receptors. Table 13-18 shows the significance of Proposed Grid Connection construction phase dust effects in relation to human health and ecological receptors

Overall, in the absence of mitigation, dust effects from the Proposed Development construction phase works are predicted to be **negative**, **slight to not significant, temporary to short-term** and **direct** on air quality sensitive receptors.

Table 13-16: Construction Effects Proposed Wind Farm Dust Emissions on Sensitive Receptors

Construction Effect 1: Proposed Wind Farm Dust emissions on Sensitive Receptors						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Dust Soiling	Negative	Slight	Local	Temporary to Short-Term	Direct	Likely
Human Health	Negative	Not significant	Local	Temporary to Short-Term	Direct	Likely
Ecological	Negative	Not significant	Local	Temporary to Short-Term	Direct	Likely

Table 13-17: Construction Effects Proposed TDR Works Dust Emissions on Sensitive Receptors

Construction Effect 2: Grid Connection Dust emissions on Sensitive Receptors						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Dust Soiling	Negative	Slight	Local	Temporary	Direct	Likely
Human Health	Negative	Not significant	Local	Temporary	Direct	Likely
Ecological	Neutral	Not significant	Local	Temporary	Direct	Likely

Table 13-18: Construction Effects Proposed Grid Connection Dust Emissions on Sensitive Receptors

Construction Effect 2: Grid Connection Dust emissions on Sensitive Receptors						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Dust Soiling	Negative	Slight	Local	Temporary to Short-Term	Direct	Likely
Human Health	Negative	Not significant	Local	Temporary to Short-Term	Direct	Likely
Ecological	Neutral	Not significant	Local	Temporary to Short-Term	Direct	Likely

13.4.2.2 Vehicle Emissions

Traffic levels, summarised in Chapter 15 Material Assets of this EIAR, during the construction phase are below the TII criteria (refer to Section 13.2.2.1) and therefore a quantitative assessment of construction traffic was not required.

Exhaust emissions from construction and delivery vehicles during the construction period of 18 months, therefore are unlikely to have an adverse effect on local air quality and will not have a significant effect on local, regional or national Air Quality Standards given the scale of the high levels of dispersion, and the limited duration of works.

Overall, there will be no significant effect on air quality and climate at sensitive receptors for the short-term duration of the construction phase.

Construction stage traffic will have a **negative, imperceptible, local, short-term** and **direct** effect on air quality.

Table 13-19: Construction Effect of Traffic Emissions on Air Quality

Construction Effect 3: Traffic Emissions on Air Quality						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre-Mitigation	Negative	Imperceptible	Local	Short-Term	Direct	Likely

13.4.3 Operational Phase

13.4.3.1 Dust & Vehicle Emissions

Dust and vehicle emissions associated with the operational phase of the Proposed Development are considered to be much lower than the construction phase. Emissions will arise from maintenance and operator vehicles (light goods vehicles) estimated at 10 to 20 visits per month. The additional traffic generated during the operational phase will be negligible therefore the overall potential impact from dust and vehicle emissions during the operational phase will be long-term imperceptible negative impact on air quality.

13.4.3.2 Compatibility with Climate Policy and Targets

In terms of local policy, the 2021-2027 OCC Wind Energy Strategy has regard to:

- Project Ireland 2040.
- Climate Action Plan 2019 to Tackle Climate Breakdown.
- Eastern and Midland Regional Spatial and Economic Strategy 2019-2031.
- Specific Planning Policy Requirement from Interim Guidelines for Planning Authorities on Statutory Plans, Renewable Energy and Climate Change (2017).

The Climate Action Plan 2019 to Tackle Climate Breakdown, is committed to achieving a net zero carbon energy system for Irish society and create a resilient and sustainable country. The National Adaption Framework (NAF). Planning for a Climate resilient Ireland (2018) by Department of Communications, Climate Action and Environment (DCCAE) sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. It outlines a whole of government and society approach to climate adaption. It is council policy to:

(a) CAEP-10 to support local, regional, national and international initiatives for climate adaptation and mitigation and to limit emissions of greenhouse gases through energy efficiency and the development of renewable energy sources which make use of all natural resources, including publicly owned lands, in an environmentally acceptable manner.
(b) CAEP-11 to support the transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050, by way of reducing greenhouse gases, increasing renewable energy, and improving energy efficiency.
(c) CAEP-14 It is Council policy to cooperate with the Climate Action Regional Office (CARO) in respect of adaptation and mitigation of greenhouse gas emissions, and future climate change adaptation strategies.

Other beneficial effects arising from climate mitigation include contributions towards reductions in energy consumption, increases in alternative energy usage, maintenance/improvement of air quality and reductions /limits in noise emissions.

The Proposed Development is aligned with current energy and climate policy, aims and objectives, which primarily seek to increase the production of energy from renewable sources. The Proposed Development, along with other renewable electricity generating projects across the country will help contribute to the 80% reduction electricity target.

13.4.3.3 Climate Action Plan 2025

The current national CAP (2025) sets out a detailed sectorial roadmap designed to deliver a 51% reduction in GHG emissions by 2030. The GHG reduction target will require significant reductions from all sectors including the renewable energy sector. By its very nature, the Proposed Development will contribute to achieving this target and move Ireland one step closer towards decarbonization and ultimately a net zero GHG emissions society.

The Proposed Development is fully compatible with the provisions relating to renewable energy set out in the CAP, summarized as follows:

- The project will contribute to the CAPs objectives to achieve a 51% reduction in Ireland's overall GHG emissions from 2021 to 2030, and to achieving net-zero emissions no later than 2050..
- The project will contribute to the CAPs objectives to decarbonise the electricity sector by taking advantage of our significant renewable energy resources.
- The project will contribute to the CAPs objectives to increase the share of electricity demand generated from renewable sources to 80%.
- The project will contribute to the objectives of the CAP to expand and reinforce the grid through the addition of a substation and associated gridlines.

The Proposed Development will lead to a reduction in greenhouse gas emissions by using a least cost technology recognised in the CAP. Depending on the final turbine to be selected at the procurement stage, prior to construction, the Proposed Development is expected to have a capacity of approximately 50.4MW. This would provide enough power to, in the region of, 35,000 homes based on average electricity use per home of 4,200 kWh annually (According to data from the Commission for Regulation of Utilities).

13.4.3.4 Carbon Savings and Losses from the Wind Farm

Once operational, the electricity generated by the wind farm will displace electricity that would otherwise have been produced by burning fossil fuels. This will also displace the associated greenhouse gas emissions. However, there will be some carbon losses due to the manufacturing process of the wind turbines.

In order to demonstrate that the carbon savings will significantly outweigh any potential carbon losses, a methodology made available by the Scottish Government in an excel worksheet titled '*Calculating carbon savings from wind farms on Scottish peatlands'* was applied to this development.

As discussed earlier, this is an established methodology which has been approved by the Scottish government and Scottish EPA. Submissions made by developers using this tool are regularly audited by the Scottish EPA. In the absence of an Irish equivalent, it is considered appropriate to use this tool for the Proposed Development.

Clear felling of forestry is required to facilitate a number of turbine access tracks, substation and grid connection. These trees may be felled earlier than originally planned as a result of the Proposed Development. The carbon losses over the lifetime of the development are calculated from the area to be felled and the average carbon that would have been sequestered annually.

The theoretical worst case carbon losses due to the Proposed Development are presented in Table 13-16. The results are a theoretical worst case, the actual results are expected to be much lower than those calculated.

Table 13-16: CO2 Losses Due to the Proposed Development

Source	CO_2 Losses (tonnes CO_2 equivalent)
Losses due to turbine manufacture, construction & decommissioning	43,818
Losses due to felling forestry	8,349
Losses due to DOC & POC leaching	76
Losses from soil organic matter	34,641
Losses due to reduced carbon fixing potential	26
Total	**86,911**

The calculations show 86,911 tonnes of CO_2 equivalent losses over the 35-year life span. 43,818 CO_2 tonnes equivalent or 50.4% of the losses come from the turbine life cycle. The early felling of the forestry accounts for 8,349 tonnes CO_2 equivalent losses or 9.6% of the total.

The calculation spreadsheet uses counterfactual emission factors to calculate the payback period. There is no clear guidance on the appropriate emission factors to use in Ireland. A grid mix emission factor of 0.375 t CO_2 MWh-1 sourced from the SEAI document '*Energy Related CO2 emissions in Ireland 2005 to 2018*' (published in 2020) was used as the counterfactual emission factor. This resulted in a payback time of 1.7 years (Refer to Volume III, Appendix 13). Therefore, for the remaining 33.3 years of operation, the Proposed Development will be directly responsible for significant carbon savings.

Once operational, there will be no direct emissions to the atmosphere from the development. The carbon calculations demonstrate that significant CO_2 will be offset by the Proposed Development and will further assist Irelands CO_2 reduction commitments under the Paris Agreement and Ireland's CAP 2025. The electricity generated will assist to displace electricity otherwise generated from coal, oil and gas fired power plants, thus reducing emissions from these power plants.

In the context of the proposed project, there will be a long-term, moderate, positive effect.

Table 13-17: Operational Phase Carbon Savings

Effect: Carbon Savings						
	Quality of Effect	Significance	Spatial Extent	Duration	Type	Likelihood
Proposed Development	Positive	Moderate	National	Long- term	Indirect	Likely

14.4.4 Decommissioning Phase

The scale of works involved during the decommissioning phase will primarily involve the dismantling and removal of the wind farm infrastructure offsite and the dust generating activities will be greatly reduced when compared to the construction phase. Similarly, emissions from plant and machinery exhausts will be lower than anticipated for the construction phase. Where possible materials will be recovered and recycled, minimizing the energy required for disposal.

Demolition

The dismantling and removal of wind turbines is a specialist operation, which will be undertaken by the turbine supplier that completed the installation where possible. Turbine dismantling will be undertaken in reverse order to the methodology employed during their construction.

On the dismantling of turbines, it is not intended to remove the concrete foundation from the ground. It is considered that foundation removal would be the least preferred option in terms of potential effects on the environment. The turbine foundations will therefore be backfilled and covered with soil material. As there is no usable soil or overburden material on the site after construction, this material will be sourced locally and imported to site on heavy goods vehicles. The imported soil will be spread and graded over the foundation using a tracked excavator and revegetation enhanced by spreading of an appropriate seed mix to assist in revegetation.

The exact details of the decommissioning phase will be detailed as part of the Decommissioning Plan which will be finalized with the local authority prior to decommissioning. Taking a conservative approach, the demolition phase dust magnitude is taken as Medium for the purposes of the assessment.

With respect to the IAQM guidance criteria table for rating of risk, refer to **Table 13-18**, the risk of dust impacts as a result of the Proposed Wind Farm decommissioning works prior to mitigation is Low with respect to dust soiling, human health and ecological impacts.

Table 13-18: Risk of Dust Impacts – Demolition

Distance to Nearest Receptor		Dust Emission Class		
Dust Soiling and PM_{10}	Ecological	Large	Medium	Small
<20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	-	High Risk Site	Medium Risk Site	Low Risk Site
50-100	<20	Medium Risk Site	Medium Risk Site	Low Risk Site
100 – 200	20 – 40	Medium Risk Site	Low Risk Site	Negligible
200-350	40-100	Low Risk Site	Low Risk Site	Negligible
Assessment Criteria **Large**: Total building volume >75,000m^3, potentially dusty construction material (e.g. concrete), onsite crushing and screening, demolition activities >12m above ground level. **Medium**: Total building volume 12,000m^3 – 75,000m^3, potentially dusty construction material, demolition activities 6-12m above ground level. **Small**: Total building volume <12,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.				
In terms of demolition, it will be small scale relative to the area of the site (<12,000m3). There are no sensitive receptors identified are within 250m of the turbines and hardstands. The nature of the material is not likely to give rise to high levels of dust. There are no ecological sensitive receptors <100m from the development.				
Classification: Low Risk Site				

14.4.5 Cumulative Effects

Most planning applications in the region relate to small scale residential infrastructure plans and are listed in **Chapter 2** of this **EIAR.**

Wind farm projects within 20km of the Proposed Development include:

- Cushaling Wind Farm (9- turbine) (Permitted and under construction).
- Cloncreen Wind Farm (21-turbine) (existing).
- Mountlucas Wind Farm (28-turbine) (existing).
- Yellow River Wind Farm (29 – turbine) (Permitted and under construction).
- Moanvane Wind Farm (12 – turbine) (Permitted and under construction).
- Dernacart Wind Farm, Co. Laois (8 – turbine) (Permitted)
- Drehid Wind Farm, Co. Kildare (11 Turbine) (planned).

The nearest proposed solar farms are Kilcush Solar Farm (c.7km south) and Obton Limited Oldcourt Solar Farm (c.10km east).

In relation to dust emissions, the renewable projects are sufficient distance from the Proposed Development so that cumulative dust effects are not anticipated.

The plans and project outlined have been put through a rigorous design process for obtaining planning permission, where relevant mitigation measures have been incorporated into the EIAR to ensure that there will be no adverse effects on air/climate.

Should this wind farm and other renewable electricity generation projects become operational, the combined beneficial cumulative effects will be greater than those described in this chapter. The tonnes of CO_2 emissions avoided and the improvement to air quality, especially in our towns and cities, will be greatly enhanced. The potential cumulative effect with other renewable energy projects will be long term, significant and positive on air quality and climate as there is no emission to the atmosphere from the Proposed Development during the operational phase, there will be no cumulative effect on air quality with ongoing operations.

13.5 Mitigation Measures

Outlined below is a series of mitigation measures and good working practices to ensure that any potential effects during the construction phase are minimized and to ensure there will be no adverse effect on the receiving environment. The mitigation measures are recommended by National and International best practice guidance documents for the implementation of dust management plans such as.

- '*Control of Dust from Construction and Demolition Activities'*, UK British Research Establishment (BRE).
- '*Environmental Good Practice on Site'*, Construction Industry Research and Information Association (CIRA).
- '*Environmental Management Plans'*, Institute of Environmental Management and Assessment (IEMA).
- '*Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan'* National Roads Authority of Ireland (NRA).

Mitigation measures as outlined in the various other chapters of this EIAR and specifically the procedures contained within the CEMP (Volume III, Appendix 2-1) will minimise any potential effects, ensuring there is no significant adverse effect.

13.5.1 Construction Phase

13.5.1.1 Dust Generation

Construction phase generated dust will be minimised by the following measures, which are also incorporated into the site-specific CEMP (Volume III, Appendix 2-1):

- The use of water as a dust suppressant, e.g. a water bowser to spray access tracks and crane hardstanding areas during any extended dry periods when fugitive dust emissions could potentially arise.
- Public roads will be inspected regularly for cleanliness and cleaned as necessary.
- All loads entering and leaving the site will be covered during dry periods if dust results in a disturbance on site.
- Control of vehicle speeds passing over access tracks and crane hardstanding areas within the site.
- Wheel wash facilities will be implemented at the site entrance from the public road to facilitate removal of any material collected by vehicles entering or leaving the site and preventing its deposition on public roads.
- Site stockpiling of materials will be designed and laid out to minimise exposure to wind.
- Daily site inspections will take place to examine dust measures and their effectiveness.

13.5.1.2 Construction Traffic Emissions

Construction traffic emissions will be reduced using the following measures:

- Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently.
- Implementation of the TMP (Volume III, Appendix 15) to minimise congestion.
- All site vehicles and machinery will be switched off when not in use, and no idling of engines will be permitted.

13.5.2 Operational Phase

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

13.5.3 Decommissioning Phase

Effects resulting from the decommissioning phase are expected to be similar in nature, however smaller in scale in comparison to the construction phase. A decommissioning plan will be agreed with the planning authority prior to the commencement of decommissioning. This plan will include the following measures:

- Water will be used as a dust suppressant where required e.g. a water bowser to spray access tracks and crane hardstanding areas during any extended dry periods when fugitive dust emissions could potentially arise.
- Public roads will be inspected regularly for cleanliness and cleaned as necessary.
- All loads entering and leaving the site will be covered during dry periods, to protect from dust.
- Vehicle speeds will be controlled when passing over access tracks and crane hardstanding areas within the site.
- Daily site inspections will take place to examine dust measures and their effectiveness.

Decommissioning traffic emissions will be reduced using the following measures that will be implemented in full:

- Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently.
- All site vehicles and machinery will be switched off when not in use, and no idling of engines will be permitted.

13.6 Risk of Major Accidents and Disasters

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

A review of the national flood hazard mapping website (www.floodinfo.ie) indicates there is no history of flooding within the planning boundary. Notwithstanding this, in the case of the occurrence of a severe weather event such as flooding during construction, construction work will cease.

During the operational life of the wind farm, particularly in the context of climate change, potential exists for increased storm events and severe weather. Wind turbines are designed for specific wind parameters and will shut down during high wind speed events. Therefore, the potential effects of climate change on the operational development may involve curtailment where the turbines will be restricted from operation due to severe winds, however this does not present a likely risk of a major accident or disaster.

13.7 Residual Effects

There will be no significant adverse residual effects from the construction phase of the development on air quality and climate.

Once operational, there will be no significant adverse residual air quality effects or GHG emissions. The operation of the Proposed Development will displace air pollutants that would otherwise have been produced by fossil fuel generated electricity. By displacing fossil fuel generated electricity, the Proposed Development operational phase will help to reduce GHG emissions and contribute to national decarbonisation targets.

Overall, the operational phase of the development will have a positive, moderate and long-term effect on air quality and climate.

Table 13-19: Operational Phase Assessment of Air Quality and Climate Effects

Residual Effect: Improved Air Quality and Increased Carbon Savings						
	Quality of Effect	Significance	Spatial Extent	Duration	Type	Likelihood
Proposed Development	Positive	Moderate	Extensive	Long- term	Direct	Likely

13.8 Conclusions

Decarbonisation is critical to reducing rising global temperatures and the resultant adverse effects to the Planet and its occupants.

The proposed wind farm development will facilitate decarbonisation objectives at local and national levels as set out in the National Climate Action Plan (2025) and the Offaly CDP 2021-2027, which states that it is an objective of OCC to ensure the security of energy supply by supporting the potential of the wind energy (and other renewable) resources of the County in a manner that is consistent with proper planning and sustainable development of the area (CAEO-04).

The Proposed Development comprises the creation of a renewable energy source which aligns with the type of projects the above plans propose for decarbonisation. The site has been designated as an area open for consideration for wind energy development by OCC as part of the County Wind Energy Strategy. This is due to its regional and national importance and the favourable conditions for wind energy generation.

13.9 References

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