Environmental Impact Assessment Report

Briskalagh Renewable Energy Development, Co. Kilkenny

Chapter 10 Air Quality

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10. AIR QUALITY

10.1 Introduction

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality arising from the construction, operation and decommissioning of the Proposed Project. The full description of the Proposed Project is detailed in Chapter 4. Alternative designs initially proposed for the Proposed Project and their potential for effects on air quality are considered in Chapter 3 Consideration of Alternatives.

10.1.1 Background

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Wind Farm', 'Proposed Grid Connection' and the 'Site'. Please see Section 1.1.1 of this EIAR for further details. A detailed description of the Proposed Project is provided in Chapter 4 of this EIAR.

The Proposed Project is located approximately 8.5km west of Kilkenny City. The settlement of Kilmanagh is located approximately 1.2km south of the nearest proposed turbine, and the settlement of Tullaroan is located approximately 2.7km north of the nearest proposed turbine. The R695 regional road runs in an east-west orientation entering the settlement of Kilmanagh and then heading south from Kilmanagh towards Callan, passing within approximately 1.3km of the nearest proposed turbine. Existing access is via farm entrances off the L5024 local road to the north, L5023 local road to the west and L1009 to the south. It is proposed to provide construction access the Proposed Wind Farm site via new access off the L5024. It is also proposed to construct a temporary access road to facilitate the delivery of abnormal loads and concrete to the south, off the L1009. The operational access is proposed at the new entrance proposed off the L5024.

The townlands in which the Proposed Project is located are listed in Table 1-1 in Chapter 1 of this EIAR. Current land-use on the Site comprises agricultural lands and small-scale commercial forestry.

Due to the non-industrial nature of the Proposed Project, and the general character of the surrounding environment, baseline air quality sampling was deemed to be unnecessary for this EIAR. It is expected that the air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the vicinity of the Site.

The production of energy from wind turbines has no direct air emissions as is expected from fossil fuel-based power stations. Harnessing more energy by means of renewable sources will reduce dependency on fossil fuels, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment. Some temporary or short-term indirect emissions associated with the construction of the Proposed Project will include vehicular and dust emissions.

10.1.2 Statement of Authority

This section of the EIAR, has been prepared by Jack Smith and reviewed by Eoin McCarthy of MKO. Jack is a Project Environmental Scientist with MKO with over 3 years' experience in the consultancy sector. Jack holds a MSc. in Environmental Leadership from NUIG and is a Practitioner member of the Institute for Environmental Management and Assessment. Jack's key strengths and areas of expertise are in project management, environmental impact assessment, GIS mapping and modelling, and feasibility assessment. Since joining MKO, Jack has experience in report writing including feasibility studies and EIA screening reports and EIAR chapters including Air Quality chapters for large-scale renewable energy developments. Eoin McCarthy holds a BSc. (Env.) in Environmental Science and is a Senior Environmental Scientist with over 13 years' experience in the consultancy sector. Eoin has

completed numerous Air Quality sections of EIARs for wind farm developments. Michael Watson is a Director at MKO. Michael has over 21 years' experience in the environmental sector.

10.1.3 Relevant Guidance

The air quality section of this EIAR is carried out in accordance with the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU and having regard, where relevant, to guidance listed below:

- Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (Transport Infrastructure Ireland, December 2022).
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports – June 2022 (EPA, 2022).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (EC, 2017).
- Air Quality in Ireland Report 2022 (EPA, 2023).
- Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects (EPA, 2021).
- Guidance of the Assessment of Dust from Demolition and Construction (IAQM, 2024).
- 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).
- Clean Air Strategy for Ireland (Government of Ireland, 2023).
- UK Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG (16) (DEFRA 2018).
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality (UKHA, 2019).
- World Health Organization (WHO) Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide Global Update 2005 (WHO 2005).

10.1.4 Relevant Legislation

In 1996, the Air Quality Framework Directive (on ambient air quality assessment and management) (96/62/EC) was published. This Directive was transposed into Irish law by the Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The Directive was followed by four Daughter Directives, which set out limit values for specific pollutants:

- The first Daughter Directive (1999/30/EC) addresses sulphur dioxide, oxides of nitrogen, particulate matter and lead.
- The second Daughter Directive (2000/69/EC) addresses carbon monoxide and benzene. The first two Daughter Directives were transposed into Irish law by the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).
- The third Daughter Directive, Council Directive (2002/3/EC) relating to ozone was published in 2002 and was transposed into Irish law by the Ozone in Ambient Air Regulations 2004 (SI No. 53 of 2004).
- The fourth Daughter Directive (2004/107/EC), published in 2004, relates to polyaromatic hydrocarbons (PAHs), arsenic, nickel, cadmium and mercury in ambient air and was transposed into Irish law by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2009 (S.I. No. 58 of 2009) (amended by SI 659/2016 - Air Quality Standards (Amendment) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air (Amendment) Regulations 2016.)

The Air Quality Framework Directive and the first three Daughter Directives were replaced by the Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC on ambient air quality and cleaner air for Europe) (as amended by Directive EU 2015/1480) which encompasses the following elements:

- The merging of most of the existing legislation into a single Directive (except for the Fourth Daughter Directive) with no change to existing air quality objectives.
- New air quality objectives for PM2.5 (fine particles) including the limit value and exposure concentration reduction target.
- The possibility to discount natural sources of pollution when assessing compliance against limit values.
- The possibility for time extensions of three years (for particulate matter PM10) or up to five years (nitrogen dioxide, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

Table 10-1 below sets out the limit values of the CAFE Directive, as derived from the Air Quality Framework Daughter Directives. Limit values are presented in micrograms per cubic metre ($\mu g/m^3$) and parts per billion (ppb). The notation PM_{10} is used to describe particulate matter or particles of ten micrometres or less in aerodynamic diameter. $PM_{2.5}$ represents particles measuring less than 2.5 micrometres in aerodynamic diameter.

The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) as amended by the Air Quality Standards (Amendments) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2016 (S.I. 659 2016). The 2011 Regulations superseded the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the Ambient Air Quality Assessment and Management Regulations 1999 (S.I. No. 33 of 1999). The Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) was revoked on 31 December 2022 and has been replaced by the Ambient Air Quality Standards Regulations 2022 (S.I. No. 739/2022).

10.1.5 Air Quality Standards

The recently implemented Ambient Air Quality Standards Regulations 2022 (S.I. No. 739/2022) remains aligned to the CAFÉ Directive and diverts to the CAFÉ Directive for the Limit values outlined in Table 10-1, the Assessment Thresholds in Table 10-2, the Ozone limits and Assessment Thresholds in Table 10-3 and Table 10-4 respectively.

Table 10-1 Limit Values of the CAFÉ Directive 2008/50/EC (Source: https://airquality.ie/information/air-quality-standards)

Pollutant	Limit Value Objective	Averaging Period	Limit Value (ug/m3)	Basis of Application of Limit Value	Attainment Date
Sulphur dioxide (SO_2)	Protection of human health	1 hour	350	Not to be exceeded more than 24 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of human health	24 hours	125	Not to be exceeded more than 3 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of vegetation	Calendar year	20	Annual mean	19th Jul 2001
Sulphur dioxide (SO_2)	Protection of vegetation	1st Oct to 31st Mar	20	Winter mean	19th Jul 2001

Nitrogen dioxide (NO_2)	Protection of human health	Calendar year	40	Annual mean	1st Jan 2010
Nitrogen dioxide (NO_2)	Protection of human health	1 hour	200	Not to be exceeded more than 18 times in a calendar year	1st Jan 2010
Nitrogen dioxide (NO_2)	Protection of human health	Calendar year	40	Annual mean	1st Jan 2010
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2)	Protection of ecosystems	Calendar year	30	Annual mean	19th Jul 2001
Particulate matter 10 (PM_{10})	Protection of human health	24 hours	50	Not to be exceeded more than 35 times in a calendar year	1st Jan 2005
Particulate matter 10 (PM_{10})	Protection of human health	Calendar year	40	Annual mean	1st Jan 2005
Particulate matter 2.5 ($PM_{2.5}$) Stage 1	Protection of human health	Calendar year	25	Annual mean	1st Jan 2015
Particulate matter 2.5 ($PM_{2.5}$) Stage 2	Protection of human health	Calendar year	20	Annual mean	1st Jan 2020
Lead	Protection of human health	calendar year	0.5	Annual mean	1st Jan 2005
Carbon Monoxide	Protection of human health	8 hours	10,000	Not to be exceeded	1st Jan 2005
Benzene	Protection of human health	calendar year	5	Annual mean	1st Jan 2010

Table 10-2 Assessment Thresholds from CAFE Directive 2008/50/EC

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu g/m^3$)	Basis of Application of Limit Value
Sulphur dioxide (SO_2)	Upper assessment threshold for the protection of Human Health	24 hours	75	Not to be exceeded more than 3 times in a calendar year

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu g/m^3$)	Basis of Application of Limit Value
Sulphur dioxide (SO_2)	Lower assessment threshold for the protection of human health	24 hours	50	Not to be exceeded more than 3 times in a calendar year
Nitrogen dioxide (NO_2)	Upper assessment threshold for the protection of human health	1 hour	140	Not to be exceeded more than 18 times in a calendar year
Nitrogen dioxide (NO_2)	Lower assessment threshold for the protection of human health	1 hour	100	Not to be exceeded more than 18 times in a calendar year
Particulate matter 10 (PM_{10})	Upper assessment threshold	24 hours	35	Not to be exceeded more than 35 times in a calendar year
Particulate matter 10 (PM_{10})	Lower assessment threshold	24 hours	25	Not to be exceeded more than 35 times in a calendar year
Lead (Pb)	Upper assessment threshold	Calendar Year	0.35	-
Lead (Pb)	Lower assessment threshold	Calendar Year	0.25	-
Carbon Monoxide (CO)	Upper assessment threshold	8 hours	7000	-
Carbon Monoxide (CO)	Lower assessment threshold	8 hours	5000	-
Benzene (C_6H_6)	Upper assessment threshold	Calendar Year	3.5	-
Benzene (C_6H_6)	Lower assessment threshold	Calendar Year	2	-

Ozone is set out differently in the CAFE Directive in that it sets target values and long-term objectives for ozone rather than limit values. Table 10-3 presents the target values and long-term target value for ozone and Table 10-4 details the threshold values for Ozone.

Table 10-3 Target values for Ozone defined in Directive 2008/50/EC

Objective	Parameter	Target Value for 2010	Long- term Objective
Protection of human health	Maximum daily 8-hour mean	120 µg/m^3 not to be exceeded more than 25 days per calendar year averaged over 3 years	120 µg/m^3
Protection of vegetation	AOT40* calculated from 1-hour values from May to July	18,000 µg/m^3.h averaged over 5 years	6,000 µg/m^3.h

* AOT40 is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 µg/m3 and is expressed as µg/m3 hours.

Table 10-4 Threshold for Ozone Defined in Directive 2008/50/EC (source: https://airquality.ie/information/air-quality-standards and Directive 2008/50/EC)

Pollutant	Averaging Period	Threshold
Information Threshold	1-hour average	180 µg/m^3
Alert Threshold	1-hour average	240 µg/m^3

10.1.5.1 Air Quality and Health

In September 2023, the EPA published 'Air Quality in Ireland 2022' which reports that although air quality in Ireland is generally good and on track to meet the majority of 2030 EU Commitments for national emission levels, there are concerning localised issues. Fine particulate matter ($PM_{2.5}$) from solid fuel combustion and nitrogen dioxide (NO_2) from vehicle emissions are the main pollutants. People's health and the health of our environment is impacted by these pollutants. Ireland's ambition in the 'Clean Air Strategy for Ireland' (discussed below) is to move towards the World Health Organisation (WHO) Air Quality guidelines, this will be challenging but will have a significantly positive impact on health.

The European Environmental Agency (EEA) Report, '*Air Quality in Europe 2022*'[1] report highlights the negative effects of air pollution on human health. The report assessed that poor air quality in Europe accounted for premature deaths of approximately 238,000 people in the 27 EU Member States in 2020[2]. In 2020 in the European Union, 96% of the urban population was exposed to levels of fine particulate matter above the health-based guideline level set by the World Health organisation. Furthermore, in 2020 damaging levels of nitrogen deposition to ecosystems were exceeding in 75% of the total ecosystems that are in the EU-27. This represents a fall of 12% since 2005. The estimated effects on the population in Europe of exposure to NO_2 and O_3 concentrations in 2020 were around 49,000 and 24,000 premature deaths, respectively. From this, 490 Irish deaths were attributable to fine particulate matter ($PM_{2.5}$), 50 Irish deaths were attributable to nitrogen oxides (NO_2) and 70 Irish deaths were attributable to Ozone (O_3) (Source: *'Air Quality in Europe – 2022 Report'*, EEA, 2022).

[1] *Air Quality in Europe 2022* <https://www.eea.europa.eu/publications/air-quality-in-europe-2022>
[2] https://www.eea.europa.eu/publications/air-quality-in-europe-2022/

The EEA published a briefing[3] on Europe's air quality status in April 2023. This briefing presented the status of concentrations of pollution in ambient air in 2021 and 2022 for regulated pollutants in relation to both EU air quality standards and the 2021 WHO guideline levels. The assessment shows that, in spite of constant improvements, exceedances of air quality standards are common across the EU, with concentrations well above the latest WHO recommendations. PM_{10}, NO_2 and O_3 emissions, along with others including sulphur oxides, carbon monoxide, benzene and lead are produced during fossil fuel-based electricity generation and traffic in various amounts, depending on the fuel and technology used. Whilst there is the potential of such emissions to be generated from the construction, operational and decommissioning phases of the Proposed Project mitigation measures will be implemented at this Site to reduce the impact from dust and vehicle emissions, which are discussed in Section 10.3 below.

The Office of Energy Efficiency and Renewable Energy in the United States published an article on August 24, 2023 entitles '*How Wind Can help Us Breathe Easier*.'[4] This article details the CO_2 emissions from different energy sources over the entire lifespan of the technology. It was found that wind energy produces around 11 grams of CO2 per kilowatt-hour (g CO_2/kWh) of electricity generated, compared with about 980 g CO_2/kWh for coal and roughly 465 g CO_2/kWh for natural gas. That makes coal's carbon footprint almost 90 times larger than that of wind energy, and the footprint of natural gas more than 40 times larger. During combustion of high-emitting energy sources, other air pollutants, i.e., nitrogen oxides (NOx) and sulphur dioxide (SO_2), are also released into the atmosphere. This results in the emission of pollutants that can cause adverse health effects, including asthma, bronchitis, lower and upper respiratory symptoms, and heart attacks. Air pollution is responsible for a large number of premature deaths relating to these illnesses.

The EPA 2020 report '*Ireland's Environment – An Integrated Assessment*'[5] states that across Europe, the most problematic pollutants have consistently been particulate matter, nitrogen oxides and ozone. The EPA 2020 report goes on to state that:

> *"Ireland has excellent indigenous renewable energy resources, and renewable energy is playing an increasing role in the domestic energy supply. Ireland has more onshore (land-based) and offshore energy potential than most other European countries.*
>
> *The use of renewable energy reduces or eliminates generation losses, which are significant for combustion related generation. Reducing these losses also contributes to meeting energy targets and decarbonisation. Overall, reducing the loss and waste of energy has multiple* ***benefits for the climate and human health and wellbeing****."*

The Proposed Project therefore represents an opportunity to further harness Ireland's significant renewable energy resources, with valuable benefits to air quality and in turn to human health. The consumption of fossil fuels for energy results in the release of particulates, sulphur dioxide and nitrogen dioxide to our air. The use of wind energy, by providing an alternative to electricity derived from coal, oil or gas-fired power stations, results in emission savings of carbon dioxide (CO_2), oxides of nitrogen (NO_x), and sulphur dioxide SO_2, thereby resulting in cleaner air and associated positive health effects.

Ireland's Clean Air Strategy 2023[6] sets out the detail of seven strategic frameworks that will be used to ensure that air quality continues to improve (Figure 10-1). The aims of these key strategic frameworks are:

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[3] *Europe's air quality status 2023 briefing.* <https://www.eea.europa.eu/publications/europes-air-quality-status-2023>

[4] *Office of Energy Efficiency and Renewable Energy (2023) How Wind Can Help Us Breathe Easier*

[5] *Ireland's Environment – An Integrated Assessment (2020)* < https://www.epa.ie/our-services/monitoring--assessment/assessment/irelands-environment/state-of-environment-report-/>

[6] *Rialtas na hÉireann Clean Air Strategy April 2023. Available at: https://www.gov.ie/en/publication/927e0-clean-air-strategy/#:~:text=The%20Clean%20Air%20Strategy%20provides,delivering%20on%20wider%20national%20objectives.*

- To set the appropriate targets and limits to ensure continuous improvements in air quality across the country and to deliver health benefits for all.
- To ensure the integration of clean air considerations into policy development across Government.
- To increase the evidence base that will help Ireland to continue to evolve its understanding of the sources of pollution and their impacts on health, in order to address them more effectively.
- To enhance regulation required to deliver improvements across all pollutants.
- To improve the effectiveness of our enforcement systems.
- To promote and increase awareness of the importance of clean air, and the links between cleaner air and better health.
- To develop the additional targeted/specific policy measures as required to deal with national or local air quality issues.

Figure 10-1 Seven Strategic Frameworks for Air Quality, with associated chapters in brackets. Reproduced as Figure 1 from Clean Air Strategy 2023

Chapter 11 of the Clean Air Strategy discusses Air Quality Policy Development. The chapter discusses energy policy and acknowledges how the State's accelerated transition to renewable electricity will be critical to successfully meeting the ambitious renewable energy and greenhouse gas emission reduction targets outlined in the European Green Deal and Ireland's Climate Action Plan 2023, as well as to protecting against security of supply risks and removal of fossil fuels from power generation. Wind (offshore and onshore) and solar energy will be the leading cost-effective technologies to achieve our energy and emissions targets, as well as displacing emissions in other sectors, including household heating and vehicle transport. In the Clean Air Strategy the Climate Action Plan 2023 is referenced, while Climate Action Plan 2024 is currently the latest revision. The targets of the Climate Action Plan 2024 and the Green Deal are to deliver net-zero GHG emissions by 2050 and reduce GHG emissions to at least 55% by 2030, compared to 1990 levels.

10.1.6 Methodology

10.1.6.1 Air Quality Zones

The air quality zone for the Site was selected, followed by a review of EPA collated baseline air quality data namely Sulphur Dioxide (SO_2), Particulate Matter (PM_{10}), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO) and Ozone (O_3) for the selected air quality zone to determine the representative levels of such emissions for the Proposed Project.

The EPA has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and Environs
- Zone B: Cork City and Environs
- Zone C: 16 urban areas within 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 as described in the CAFE Directive. The Site lies within Zone D, which represents rural areas located away from large population centres.

10.1.6.2 Air Quality Data Review

The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent report on air quality in Ireland, 'Air Quality in Ireland 2022' was published by the EPA in 2023[7]. The EPA reports provide SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D. These are detailed in the Baseline Air Quality section.

10.1.6.3 Dust

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2024) was considered in the dust impact assessment. The guidance document outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. This methodology has been used to predict the likely risk of dust as a result of the construction phase works, operational phase activities and decommissioning phase. The use of UK guidance is considered best practice in the absence of applicable Irish guidance. The major dust generating activities are divided into four types within the IAQM guidance (2024) to reflect their different potential impacts. These are:

- Demolition (There are no demolition works required for any phase of the Proposed Project);
- Earthworks;
- Construction;
- Trackout - The transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when Heavy Goods Vehicles (HGVs) leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when HGVs transfer dust and dirt onto the road having travelled over muddy ground on site.

[7] *Environmental Protection Agency: Air Quality in Ireland 2022. Available at : https://www.epa.ie/publications/monitoring-assessment/air/air-quality-in-ireland 2022.php#:~:text=In%202022%20air%20monitoring%20results,threats%20to%20good%20air%20quality.*

The magnitude of dust generating activities is divided into 'Large', 'Medium' or 'Small' scale depending on the nature of the activities involved. IAQM (2024) guidance provides example definitions for the scale of the activities, and these are applied for this development as outlined in Table 10-5

Table 10-5 Description of magnitude for nature of activities

	Large	Medium	Small
Demolition	Total building volume >75,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12 m above ground level	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material, demolition activities 6-12m above ground level	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months
Earthworks	Large: Total site area >110,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6m in height	Total site area 18,000 m^2 – 110,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3m - 6m in height	Total site area <18,000 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3 m in height
Construction	Total building volume >75,000 m^3, on site concrete batching, sandblasting	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m	20-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m	<20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m
	Note: A vehicle movement is a one way journey. i.e. from A to B and excludes the return journey. HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average		

The earthwork requirements as outlined in Appendix 4-2 of this EIAR results in the classification of the Proposed Wind Farm site as 'Large' for Earthworks and Construction activities. The Grid Connection falls under the classification of 'Medium' for Earthworks and Construction due to the lower volumes of construction material required. The number of heavy-duty vehicle movements per day, as outlined in

Section 15.1 in Chapter 15 Material Assets of this EIAR, results in the classification of the Proposed Wind Farm site as 'Large' and Grid Connection as 'Medium' for Trackout activities.

The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities.

10.1.6.3.1 *Defining the Sensitivity of the Area*

For the purposes of this assessment, high sensitivity receptors are residential properties and dust sensitive ecological habitats. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

The IAQM (2024) guidance has outlined three types of effects to be considered:

- Sensitivities of People to Dust Soiling Effects
- Sensitivities of People to the Health Effects of PM_{10}
- Sensitivities of Receptors to Ecological Effects

Sensitivities of People to Dust Soiling Effects

Dust soiling effects can occur for a distance of 250m from works areas, but the majority of deposition occurs within the first 50m (IAQM, 2024). Table 10-6 below identifies the sensitivity of an area to dust soiling effects on people and their properties, relative to different receptor sensitivities.

Table 10-6 Sensitivity of the Area to Dust Soiling Effects on People and Property. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

Receptor Sensitivity	Number Of Receptors	Distance from source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Sensitivities of People to the Health Effects of PM_{10}

When assessing sensitivity of people to the health effects of PM_{10}, the IAQM (2024) guidance recommends the use of sensitivities bands based on whether or not the receptor is likely to be exposed to elevated concentrations of PM_{10} over a 24-hour period. Table 10-7 below identifies the sensitivity of an area to human health effects of PM_{10}, relative to different receptor sensitivities.

Table 10-7 Sensitivity of the Area to Human Health Impacts. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

Receptor Sensitivity	Annual Mean PM_{10} concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<250
High	>32 µg/m^3	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low

Sensitivities of Receptors to Ecological Effects

Dust deposition due to demolition, earthworks, construction and trackout has the potential to physically and chemically affect sensitive habitats and plant communities. Table 10-8 below identifies the sensitivity of an area to ecological impacts.

Table 10-8 Sensitivity of the Area to Ecological Impacts. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

Receptor Sensitivity	Distance from source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

There are no sensitive habitats, as described by the IAQM (2024) guidance within 50m of the Proposed Wind Farm. Therefore, dust impacts on ecological receptors in relation to the Proposed Wind Farm have been scoped out from this assessment.

The Proposed Grid Connection cable route crosses the River Barrow and River Nore SAC and River Nore SPA northwest of Ballyragget. These receptors are assessed below in Section 10.3.2.3.

10.1.6.3.2 Defining the Risk of Impacts

The dust emission magnitude is combined with the sensitivity of the area to determine the risk of impacts with no mitigation applied. The matrices in Table 10-9, Table 10-10 and Table 10-11 provide a method of assigning the level of risk for each activity.

Table 10-9 Risk of Dust Impacts - Earthworks (IAQM, 2024)

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

Table 10-10 Risk of Dust Impacts - Construction

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

Table 10-11 Risk of Dust Impacts - Trackout

	Dust Emission Magnitude

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

The risk of dust impacts for the Earthworks, Construction and Trackout activities from the Proposed Project is set out in Section 10.3 below.

EPA classification terminology as presented in Table 1-2 of Chapter 1 of this EIAR have been correlated with the equivalent risk rating from Table 10-12 below.

Table 10-12 Correlation of Impact Classification Terminology (EPA, 2022) to Risk Rating

EPA Term	EPA Description	Risk Rating
Imperceptible	An effect capable of measurement but without significant consequences	Negligible
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities	Low
Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends	Medium
Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment	High

10.2 Baseline Air Quality

The air quality in the vicinity of the Proposed Project is typical of that of rural areas of Ireland, i.e., Zone D. Prevailing south-westerly winds carry clean, unpolluted air from the Atlantic Ocean onto the Irish mainland. The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent report on air quality in Ireland, 'Air Quality in Ireland 2022' was published by the EPA in 2023. The EPA reports provide SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D. These are detailed in the following tables.

10.2.1.1 Sulphur Dioxide

The Sulphur dioxide data from Cork Harbour, Kilkitt, Askeaton, Edenderry and Letterkenny in 2022 is presented in Table 10-13.

Table 10-13 Sulphur Dioxide Data for Zone D Sites in 2022

Parameter	Measurement (ug/m³)
Annual Mean	5.0 µg/m^3
Hourly values > 350	0
Hourly max (Average)	83.6 µg/m^3
Daily values > 125	0
Daily max (Average)	22.8

During the monitoring period there were no exceedances of the daily limit values for the protection of human health. As can be observed from Table 10-13 the average maximum hourly value recorded during the assessment period was 83.6 µg/m^3. In addition, there were no exceedances of the annual mean limit for the protection of ecosystems. It is expected, based on professional judgement that SO_2 values at the Site are similar or lower than those recorded for the Zone D sites above.

10.2.1.2 Particulate Matter (PM_{10})

Sources of particulate matter include vehicle exhaust emissions, dust from soil and road surfaces, construction works and industrial emissions. The EPA report[8] provides annual mean PM_{10} concentration for sixteen Zone D towns, Tipperary Town, Carrick-on-Shannon/Askeaton, Enniscorthy, Birr, Macroom, Castlebar, Cobh Carrignafoy, Claremorris, Kilkitt, Cavan, Roscommon Town, Edenderry, Mallow, Longford and Cobh Cork Harbour and Killarney Particulate matter (PM_{10}) data for 2022 is presented in Table 10-14.

Table 10-14 Average Particulate Matter (PM_{10}) Data for Zone D Sites in 2022

Parameter	Measurement (ug/m3)
Annual Mean	12.7 µg/m^3
% Data Capture (Average)	93.2%
Values > 50 ug/m^3	Max 10
Daily Max (Average)	56.5 µg/m^3

The daily limit of 50 µg/m^3 for the protection of human health was exceeded on 40 days, which is greater than the PM_{10} daily limit for the protection of human health of a max 35 days >50 µg/m^3 applicable from 2005. The greatest number of exceedances occurred at Edenderry where the PM_{10} daily limit was exceeded on 10 no. occasions. In the EPA 2022 report, it notes that there were breaches in the levels of particulate matter (PM), which in Ireland, mainly comes from the burning of solid fuel, such as coal, peat, and wood to heat our homes. It is expected based on professional judgement that PM_{10} values at the Proposed Wind Farm and Proposed Grid Connection is similar or lower than those recorded for the Zone D sites above.

[8] *EPA (2023). Air Quality in Ireland 2022.*

10.2.1.3 Nitrogen Dioxide (NO_2)

Nitrogen dioxide data for Birr, Castlebar, Carrick-on-Shannon, Edenderry, Emo Court and Kilkitt in 2022 is presented in Table 10-16.

Table 10-15 Average Nitrogen Dioxide Data for Zone D Sites in 2022

Parameter	Measurement
Annual Mean (Average)	7.4 µg/m^3
NO_2 Values >200	0
Values > 140 (UAT)	1
Values >100 (LAT)	4
Hourly Max. (Average)	87.3 µg/m^3

The annual NO_2 value was below the annual mean limit value for the protection of human health of 40 µg/m^3. The lower assessment threshold of 100 µg/m3 was exceeded 4 no. times during the monitoring period in Emo Court, Co. Laois and the upper assessment threshold of 140 µg/m^3 was exceeded once during the monitoring period, also in Emo Court, Co. Laois. Both did not exceed the 18days limit during the monitoring period. In 2022, no other monitoring locations in Zone D had exceedances in the lower and upper assessment thresholds of 100 and 140 µg/m^3/ The average hourly max. NO_2 value of 87.3 µg/m^3 measured during the monitoring period was below the hourly max threshold of 200 µg/m^3. It is expected based on professional judgement that NO_2 values at the Site is similar or lower than those recorded for the Zone D sites above.

10.2.1.4 Carbon Monoxide (CO)

The EPA Report provides rolling 8-hour carbon monoxide concentrations for Birr, a Zone D site. Carbon Monoxide data for 2022 is presented in Table 10-16.

Table 10-16 Carbon Monoxide Data for Birr – Zone D Site in 2022.

Parameter	Measurement
Annual Mean	0.8 mg/m^3
Median	0.7 mg/m^3
% Data Capture	95.9%
Values > 10	0
Max	3.4 mg/m^3

The average concentration of carbon monoxide was 0.8 mg/m^3. The carbon monoxide limit value for the protection of human health is 10,000 µg/m^3 (or 10 mg/m^3). On no occasions were values in excess of the 10 mg limit value set out in Directive 2008/50/EC. It is expected based on professional judgement that the CO value at the Site is similar or lower than those recorded for the Zone D site above.

10.2.1.5 Ozone (O_3)

The EPA report provides rolling 8-hour ozone concentrations for seven Zone D sites, Ennis Court, Kilkitt, Carnsore Point, Mace Head, Castlebar, Valentia and Malin Head. Ozone (O_3) data for 2022 is presented in Table 10-17. As can be observed from Table 10-17 there were 17 no. exceedances of the maximum daily eight-hour mean limit of 120 µg/m^3. The CAFE Directive stipulates that this limit should not be exceeded on more than 25 days per calendar year averaged over 3 years. It would be expected on professional judgement that O_3 values at the Site would be similar or lower than those recorded for the Zone D sites below.

Table 10-17 Average Ozone Data for Zone D Sites in 2022.

Parameter	Measurement
Annual Mean	61.7µg/m^3
Median	62.2 µg/m3
% Data Capture	89.5%
No. of days > 120 µg/m^3	17 days

10.2.1.6 Dust

There are no statutory limits for dust deposition in Ireland. However, EPA guidance suggests that a deposition of 10 mg/m^2/hour can generally be considered as posing a soiling nuisance. This equates to 240 mg/m^2/day. The EPA recommends a maximum daily deposition level of 350 mg/m^2/day when measured according to the TA Luft Standard 2002. This limit value can also be implemented with regard to dust impacts from construction activities associated with the Proposed Project.

The extent of dust generation at any site depends on the type of activity undertaken, the location, the nature of the dust, i.e., soil, sand, etc., and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction dust has the potential to be generated from on-site activities such as excavation and backfilling. Construction traffic movements also have the potential to generate dust as they travel along the haul route.

The potential dust-related effects on local air quality and the relevant associated mitigation measures are presented in Sections 10.3 below.

10.3 Likely and Significant Impacts and Associated Mitigation Measures

10.3.1 'Do-Nothing' Effect

If the Proposed Project were not to proceed, the Site will continue to function as it does at present, with no changes to the current land-use and air quality. The impact of this is considered neutral in the context of the EIAR. If the Proposed Project were not to proceed, there would be no potential for negative effects on human health during the construction phase of the Proposed Project related to potential emissions to air of dust. However, the opportunity to capture an even greater part of County Kilkenny's valuable renewable energy resource would be lost, as would the opportunity to further contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions.

10.3.2 Construction Phase

10.3.2.1 Exhaust Emissions: Construction of Proposed Project Infrastructure

Identification of Effect

Proposed Wind Farm

Exhaust emissions associated with vehicles and plant such as NO_2, Benzene and PM_{10} will arise as a result of construction activities.

The construction of turbines and associated foundations and hardstanding areas, meteorological mast, access roads, temporary construction compound, underground cabling, site drainage, hedgerow felling, and all ancillary works and apparatus, will require the operation of construction vehicles. This constitutes a short-term, slight, negative effect in terms of air quality. Mitigation measures in relation to exhaust emissions are presented below.

The proposed borrow pit located in the townland of Oldtownhill will require the use of construction machinery and plant, thereby giving rise to exhaust emissions. The borrow pit location is approx. 340m from the nearest non-involved landowners. The potential effect from exhaust emissions will not be significant and will be restricted to the duration of the construction phase and localised to works areas. Therefore, this is considered a short-term, slight, negative effect. Mitigation measures to reduce this effect are presented below.

The construction of the spoil management areas will require the use of construction machinery and plant, thereby giving rise to exhaust emissions. Therefore, this is considered a short-term, slight, negative effect. Mitigation measures to reduce this effect are presented below.

Proposed Grid Connection

The construction of the proposed onsite 38kV substation and temporary construction compound, and the underground cabling route connecting the onsite 38kV substation to the existing Ballyragget 110kV substation in the townland of Moatpark, Co. Kilkenny, will require the use of construction machinery, thereby giving rise to exhaust emissions such as NO_2, Benzene and PM_{10}, as already outlined for the Proposed Wind Farm activities. This is a short-term, slight, negative effect, which will be reduced through use of the best practice mitigation measures as presented below.

Mitigation & Monitoring Measures for the Proposed Project

- Proposed Project Construction staff will be trained how to inspect and maintain construction vehicles and plant to ensure good operational order while onsite, thereby minimising any emissions that arise. The Site Supervisor/Construction Manager produce and follow a site inspection and machinery checklist which will be followed and updated if/when required.
- All plant and materials vehicles shall be stored in dedicated areas (onsite). Machinery will be switched off when not in use.
- Turbines and construction materials will be transported to the site on specified routes only, unless otherwise agreed with the Planning Authority. Please see Chapter 15 Material Assets for details.
- All plant and materials vehicles shall be stored in dedicated areas (onsite).
- Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction.

- The expected waste volumes generated onsite are unlikely to be large enough to warrant source segregation at the Site. Therefore, all wastes streams generated onsite will be deposited into a single waste skip which will be covered. This waste material will be transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be local to the Site to reduce the emissions associated with vehicle movements.
- Aggregate materials for the construction of the Proposed Wind Farm infrastructure will be predominantly sourced onsite.
- A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-2).

Residual Effect

With the implementation of the above measures for this phase construction phase, residual effects on air quality from exhaust emissions associated with construction activities and machinery are considered to be a short-term imperceptible negative effect.

Significance of Effects

The effects on air quality from exhaust emissions during the construction phase of the Proposed Project are considered to be imperceptible.

10.3.2.2 Exhaust Emissions: Transportation to and from the Site

Identification of Effect

Proposed Wind Farm

The transport of turbine components, supporting infrastructure materials, construction and staff vehicles, small volume of aggregate material, and waste removal vehicles to/from the Proposed Wind Farm site (which will occur on specified routes only, see in Chapter 4 Description of this EIAR), the departure of empty vehicles and/or minor waste volumes (please see accompanying CEMP Appendix 4-2) from the site and daily staff movements, will give rise to exhaust emissions associated with the transport vehicles.

Proposed Grid Connection

The transport of substation infrastructure, construction vehicles, aggregate material, waste removal vehicles and construction staff to/from the Site for the construction of the Proposed Grid Connection (which will occur on specified routes only, see in Chapter 4 Description of this EIAR), the departure of empty vehicles and/or minor waste volumes (please see accompanying CEMP Appendix 4-2) from the Site and daily staff movements, will give rise to exhaust emissions associated with the transport vehicles.

Mitigation & Monitoring Measures for the Proposed Project

- Measures listed in section 10.3.2.1 above pertaining to exhaust emissions will be implemented for the transportation of vehicles to and from the Site.
- Aggregate materials for the construction of Site access tracks and all associated infrastructure will all be sourced from the proposed onsite borrow pit where possible, or else locally sourced, where possible, which will further reduce potential emissions.
- Turbines and construction materials will be transported to the Site on specified haul routes only.

- Waste material will be transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be local to the Site to reduce the emissions associated with vehicle movements.
- A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-2).

Residual Effect

This constitutes a short-term slight negative effect on air quality brought about by the exhaust emissions associated with the traffic movements to and from the Site.

Significance of Effects

Based on this assessment there will be a slight significant effect on air quality from exhaust emissions due to traffic movements to and from the Site.

10.3.2.3 Dust Emissions: Construction of Proposed Project Infrastructure

Identification of Effect

Proposed Wind Farm

The construction of turbines and associated foundations and hard-standing areas, meteorological mast, access roads, temporary construction compound, underground cabling, site drainage, tree felling, hedgerow felling, and all ancillary works and apparatus will give rise to dust emissions.

The majority of the construction materials for the Proposed Wind Farm will be won onsite from the borrow pit where an estimated 70,000m^3 of material will be extracted.

The removal of the topsoil followed by its transportation and deposition at the spoil management areas during the construction phase will give rise to dust emissions.

The IAQM (2024) methodology for *the Assessment of Dust from Demolition and Construction* as discussed in Section 10.1.6.3 above is used to assess the potential risk to high sensitivity receptors from dust deposition. Dust deposition impacts can occur for a distance of 250m from works areas, but the majority of deposition occurs within the first 50m (IAQM, 2024). The high sensitivity receptors were identified using a constraints mapping process, and detailed and updated planning searches which informed the project sensitive receptor dataset.

- There is 1 no. high sensitivity receptor located within 20m of the Proposed Wind Farm footprint;
- There are 5 no. high sensitivity receptors within 50m of the Proposed Wind Farm footprint;
- There are 9 no. high sensitivity receptors within 100m of the Proposed Wind Farm footprint;
- There are 49 no. high sensitivity receptors within 250m of the Proposed Wind Farm footprint.

Table 10-18 below identifies the sensitivity of the area surrounding the development footprint of the Proposed Wind Farm to dust soiling effects, as described in Section 10.1.6.3 above.

As per the criteria in Table 10-18 below, there is 1 no. sensitive receptor within 20m of the Proposed Wind Farm footprint, although it is noted that this receptor is an involved landowner. The overall sensitivity of the area to dust soiling impacts is considered to be Low.

Table 10-18 Sensitivity of the Area to Dust Soiling Effects on People and Property. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

Receptor Sensitivity	Number Of Receptors	Distance from source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 10-19 below identifies the high sensitivity receptors in the area surrounding the development footprint of the Proposed Wind Farm to the health effects of PM_{10}, as described in Section 10.1.6.3.1 above. The overall sensitivity of the area to human health effects of PM_{10} is considered to be Low.

Table 10-19 Sensitivity of the Area to Human Health Impacts from the Proposed Wind Farm construction works. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<250
High	<24 µg/m^3 (<14 µg/m^3 in Scotland)	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	<24 µg/m^3 (<14 µg/m^3 in Scotland)	>10	Low	Low	Low	Low
		1-10				
Low	-	≥1	Low	Low	Low	Low

As identified in Section 10.1.6.3 above, the Proposed Wind Farm is classified as 'Large' for Earthworks, Construction and Trackout activities. Therefore, when combined with the sensitivity of the area, using Tables 10-6 to 10-8 above as guidance, the pre-mitigation risk of impacts from the Proposed Wind Farm is summarised in Table 10-20 below.

Table 10-20 Summary Dust Risk Table for Proposed Wind Farm Activities

Potential Impact	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout

Dust Soiling	N/A	Low Risk	Low Risk	Low Risk
Human Health	N/A	Low Risk	Low Risk	Low Risk
Ecological	N/A	N/A	N/A	N/A

The overall risk of dust emissions impacts with no mitigation applied for the major dust generating activities during the construction phase of the Proposed Wind Farm is Low. Therefore, the potential effects of dust from the construction phase of the Proposed Wind Farm are considered to be equivalent to short-term, slight negative effects.

Proposed Grid Connection

The construction of the Proposed Grid Connection (permanent 38kV substation, temporary construction compound, underground grid connection cabling, end masts) will give rise to dust emissions. Aggregate materials for the construction of the proposed onsite substation and temporary construction compound will be sourced from the proposed onsite borrow pit, where possible. It is also proposed to provide construction grade materials (approx. 20,000m^3) for the Proposed Grid Connection infrastructure from local licenced quarries. Please see Figure 4-28 for locations.

The number of high sensitive receptors within 250m from Grid Connection works areas and their likely risk of dust impacts during the construction works, as highlighted in the IAQM (2024) methodology discussed above are as follows:

- There are 141 no. high sensitivity receptors located within 20m from the Proposed Grid Connection footprint;
- There are 193 no. high sensitivity receptors located within 50m of the Proposed Grid Connection footprint; one of which is also located within 50m of the Proposed Wind Farm footprint.
- There are 259 no. high sensitivity receptors located within 100m of the Proposed Grid Connection footprint; three of which are also located within 100m of the Proposed Wind Farm footprint.
- There are 367 no. high sensitivity receptors located within 250m of the Proposed Grid Connection footprint, eight of which are also located within 250m of the Proposed Wind Farm footprint.

Table 10-21 below identifies the sensitivity of the area surrounding the development footprint of the Grid Connection to dust soiling effects, as described in Section 10.1.6.3 above. The overall sensitivity of the area to dust soiling effects is High due to the number of high sensitivity receptors within 20m and within 50m of the Proposed Grid Connection.

Table 10-21 Sensitivity of the Area to Dust Soiling Effects from Grid Connection construction works on People and Property. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

Receptor Sensitivity	Number Of Receptors	Distance from source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low

Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 10-22 below identifies the high sensitivity receptors in the area surrounding the development footprint of the Proposed Grid Connection to the health effects of PM_{10}, as described in Section 10.1.6.3 above. The overall sensitivity of the area to human health effects of PM_{10} is Medium due to the number of high sensitivity receptors within 20m of the Proposed Grid Connection.

Table 10-22 Sensitivity of the Area to Human Health Impacts from Proposed Grid Connection construction works. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024).

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<250
High	<24 µg/m^3 (<14 µg/m^3 in Scotland)	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	<24 µg/m^3 (<14 µg/m^3 in Scotland)	>10	Low	Low	Low	Low
		1-10				
Low	-	≥1	Low	Low	Low	Low

Table 10-23 below identifies the sensitivity of the receptors to ecological effects in the area surrounding the development footprint of the Proposed Grid Connection. As noted above in Section 10.1.6.3, the Proposed Grid Connection underground cable route crosses the River Barrow and River Nore SAC and River Nore SPA northwest of Ballyragget. The overall sensitivity of the areas surrounding the development footprint of the Proposed Grid Connection is High due to the fact that a drilling pit is located within the SAC, albeit within an agricultural field, and a drilling pit being located 30m from the SPA.

Table 10-23 Sensitivity of the Area to Ecological Impacts. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

Receptor Sensitivity	Distance from source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

As identified in Section 10.1.6.3 above, the Proposed Grid Connection is classified as 'Medium' for Earthworks, 'Medium' for Construction, and 'Medium' for Trackout activities. Therefore, when combined with the sensitivity of the area, using Tables 10-9 to 10-11 above as guidance, the pre-mitigation risk of impacts from the Proposed Grid Connection is summarised in Table 10-24.

Table 10-24 Summary Dust Risk Table for Proposed Grid Connection Activities

Potential Impact	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Medium Risk	Medium Risk	Medium Risk
Human Health	N/A	Low Risk	Low Risk	Negligible
Ecological	N/A	Medium Risk	Medium Risk	Medium Risk

The overall risk of dust emissions impacts with no mitigation applied for the major dust generating activities during the construction phase of the Proposed Grid Connection is Medium. Therefore, the potential effects of dust from the construction phase of the Grid Connection are considered to be equivalent to temporary, moderate negative effects.

Please note that the assessment of the potential impact of dust on the ecological receptors included in this assessment (i.e. the River Barrow and River Nore SAC and River Nore SPA) follows the methodology set out in the IAQM 2024 guidance. However, a more detailed ecological impact assessment assessing impacts on these receptors during the construction phase (including effects from dust) is contained in Chapter 6 of this EIAR.

Mitigation & Monitoring Measures for the Proposed Project

- Sporadic wetting of loose stone surface will be carried out during the construction phase to minimise movement of dust particles to the air. In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff.
- All plant and materials vehicles shall be stored in dedicated areas within the Site.
- Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction.
- Turbines and construction traffic will be transported to the Site on specified haul routes only.
- The agreed haul route road adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary.
- The roads adjacent to the Site entrances will be checked weekly for damage/potholes and repaired as necessary.
- The transportation of materials from the borrow pit around the Site will be covered by tarpaulin or similar covered vehicles where necessary.
- The transportation of construction materials from locally sourced quarries for the Proposed Grid Connection infrastructure and a small volume for the Proposed Wind Farm to the Site will be covered by tarpaulin where necessary.
- If necessary, excavated material will be dampened prior to transport to the spoil management areas.
- Waste material will be transferred to a licensed/permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be local to the Proposed Project to reduce the amount of emissions associated with vehicle movement.
- A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-2). The CEMP includes dust suppression measures.

Residual Effect

With the implementation of the above, the Proposed Wind Farm is considered to have a short-term not significant negative effect on air quality brought about by dust emissions generated during the construction activities.

The Proposed Grid Connection is considered to have a temporary slight negative effect on air quality brought about by dust emissions generated during the construction activities.

Significance of Effects

The effects on air quality from dust emissions during the construction phase will be not significant and slight.

10.3.2.4 Dust Emissions: Transport to and from the Site

Identification of Effects

Proposed Wind Farm

The transport of turbine components, supporting infrastructure materials, construction and staff vehicles, small volume of aggregate material and waste removal vehicles to/from the Site, the departure of empty vehicles and/or minor waste volumes (please see accompanying CEMP Appendix 4-2) from the Site and daily staff movements will also give rise to some localised dust emissions during periods of dry weather.

Proposed Grid Connection

The transport of construction vehicles, aggregate material, waste removal vehicles and construction staff to/from the Site for the construction of the Proposed Grid Connection will also give rise to some localised dust emissions during periods of dry weather.

The Institute of Air Quality Management Construction Dust Guidance (IAQM, 2024) states that the likely routes the construction traffic will use should also be included in an assessment of dust arising from trackout, and that related construction dust impact increases with respect to the number of movements of HGVs per day, length of unpaved road, distance to receptors and the sensitivity of local receptors.

For the purposes of this assessment of the dust emissions arising from trackout related to the construction of the Proposed Project, the L5024 local road, along which the main construction site entrance is located was scoped in for assessment. Beyond either end of this road, construction traffic will disperse in different directions along different routes to a degree that there will be no potential for significant effects from trackout related dust emissions. In relation to the turbine delivery route and construction traffic related to the temporary site access along the L1009 to the south of the Proposed Wind Farm site, it is considered that the numbers of vehicle movements per day are so low that there will be no potential for significant effects from trackout related dust emissions. The L5024, scoped in for assessment, is a 2.2km stretch of local road that runs in an east-west orientation to the north of the Proposed Wind Farm site.

The IAQM methodology for *the Assessment of Dust from Demolition and Construction* as discussed in Section 10.1.6.3 above is used to assess the potential risk to high sensitivity receptors from dust deposition. Dust deposition impacts can occur for a distance of 250m from source (in this instance the L5024), but the majority of deposition occurs within the first 50m (IAQM, 2024). The high sensitivity receptors were identified using a constraints mapping process, and detailed and updated planning searches which informed the project sensitive receptor dataset.

- There are 4 no. high sensitivity receptors located within 20m of the L5024;
- There are 10 no. high sensitivity receptors within 50m of the L5024;
- There are 13 no. high sensitivity receptors within 100m of the L5024;
- There are 20 no. high sensitivity receptors within 250m of L5024.

Table 10-25 below identifies the sensitivity of the area surrounding the L5024 to dust soiling effects from trackout, as described in Section 10.1.6.3 above.

As per the criteria in Table 10-25 below, there are 4 no. high sensitivity receptors within 20m of the L5024, and 10 no. high sensitivity receptors within 50m of the L5024. The overall sensitivity of the area to dust soiling impacts is considered to be Low.

Table 10-25 Sensitivity of the Area to Dust Soiling Effects on People and Property. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

Receptor Sensitivity	Number Of Receptors	Distance from source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 10-26 below identifies the high sensitivity receptors in the area surrounding the L5024 to the health effects of PM_{10}, as described in Section 10.1.6.3 above. The overall sensitivity of the area to human health effects of PM_{10} is considered to be Low.

Table 10-26 Sensitivity of the Area to Human Health Impacts from the Proposed Wind Farm construction works. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<250
High	<24 µg/m^3 (<14 µg/m^3 in Scotland)	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	<24 µg/m^3 (<14 µg/m^3 in Scotland)	>10	Low	Low	Low	Low
		1-10				
Low	-	≥1	Low	Low	Low	Low

As identified in Section 10.1.6.3 above, the Proposed Wind Farm is classified as 'Large' for Trackout activities, and the Proposed Grid Connection is classified as 'Medium' for Trackout activities.

Therefore, when combined with the sensitivity of the area, using Table 10-11 above as guidance, the pre-mitigation risk of impacts from the Proposed Wind Farm and Proposed Grid Connection is summarised in Table 10-27 below.

Table 10-27 Summary Dust Risk Table for Proposed Wind Farm Activities

Potential Impact	Dust Emission Magnitude	
	Trackout (Proposed Wind Farm)	Trackout (Proposed Grid Connection)
Dust Soiling	Low Risk	Low Risk
Human Health	Low Risk	Low Risk
Ecological	N/A	N/A

The overall risk of dust emissions impacts with no mitigation applied for the major dust generating activities during the construction phase of the Proposed Wind Farm and Proposed Grid Connection is Low. Therefore, the potential effects of dust from the construction phase of the Proposed Wind Farm are considered to be equivalent to short-term, slight negative effects.

Mitigation & Monitoring Measures for the Proposed Project

- Sporadic wetting of loose stone surface will be carried out during the construction phase to minimise movement of dust particles to the air. In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff.
- All plant and materials vehicles shall be stored in dedicated areas within the Site.
- Turbines and construction vehicles will be transported to the Site on specified haul routes only.
- Proposed Grid Connection infrastructure will be transported to the Site on specified haul routes only.
- Construction materials for the Proposed Grid Connection and a small volume for the Proposed Wind Farm will be sourced locally from licenced quarries.
- The agreed haul route roads adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary.
- The roads adjacent to the Site entrances will be checked weekly for damage/potholes and repaired as necessary.
- The transport of construction materials around the Site from the nearby quarry facilities will be covered by tarpaulin where necessary.
- Waste material will be transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be local to the Site to reduce the amount of emissions associated with vehicle movements
- A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-2).

Residual Effect

Following implementation of mitigation measures as outlined above, residual effects on air quality from dust emissions from traffic movements to and from the Site during the construction phase will have a Short-Term Imperceptible Negative effect.

Significance of Effects

Based on the assessment above the effects on air quality from dust emissions generated by traffic movements to and from the Site during the construction phase will be imperceptible.

10.3.3 Operational Phase

10.3.3.1 Exhaust Emissions: Proposed Project Infrastructure

Identification of Effect

Proposed Wind Farm

The operational phase of the Proposed Project will generate additional traffic to the area in the form of light goods vehicles (LGVs) visiting the Site 1-2 times per day for inspections but on occasion, daily visits by LGVs and HGVs may be required over short periods during maintenance/component replacement activities. The addition of a LGV to the area 1-2 times per day during the operational phase will give rise to a Long-term, Imperceptible, Negative effect on air quality. The addition of several HGVs on occasion over the 35-year lifetime of the Proposed Project will give rise to a Long-term, Imperceptible, Negative effect due to the localised and intermittent nature of the maintenance.

Identification of Effect

Proposed Grid Connection

The permanent 38kV substation will be operated and maintained by the Electricity Supply Board (ESB). It is anticipated that substation operators will visit the Site 1-2 times per day in LGVs but on occasion, HGVs may be required to visit the Site for maintenance/substation component replacement. On occasion, the removal of hydrocarbons (transformer oil) and waste from substation welfare facilities will be removed from the Site by a licenced waste disposal company. The addition of a LGV to the area 1-2 times per day type during the operational phase will give rise to a Long-term, Imperceptible, Negative effect on air quality. The addition of several HGVs on occasion over the 35-year lifetime of the Proposed Project will give rise to a Long-term, Imperceptible, Negative effect on air quality.

Mitigation & Monitoring Measures for the Proposed Project

- Any vehicles or plant brought onsite during the operational phase will be maintained in good operational order that comply with the Road Traffic Acts 1961 as amended, thereby minimising any emissions that arise.
- When stationary, delivery and onsite vehicles will be required to turn off engines.
- Waste material will be transferred to a licensed/permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be local to the Site to reduce the emissions associated with vehicle movements.

Residual Effect

Based on the above, the impact on air quality from exhaust emissions during the operational phase is a Long-term, Imperceptible, Negative effect.

Significance of Effects

Based on this assessment above the effects on air quality from exhaust emissions generated at the Site during the operational phase will be Imperceptible.

10.3.3.2 Overall Effect on Air Quality

10.3.3.2.1 *Operational Phase: Carbon Offsetting*

Although a Long-term, Imperceptible, Negative effect on air quality is expected during the operational phase due to exhaust and dust emissions from maintenance vehicles, there will be no net carbon dioxide (CO_2) emissions from operation of the Proposed Project. By providing an alternative to electricity derived from coal, oil or gas-fired power stations, the Proposed Project will result in emission savings of carbon dioxide (CO_2), oxides of nitrogen (NO_x), and sulphur dioxide (SO_2). The production of renewable energy from the Proposed Project will have a Long-Term Moderate Positive effect on air quality due to the offsetting of approximately 31,578 tonnes of Carbon Dioxide (CO_2) per annum. Please see Chapter 11 Climate for further details on carbon displacement calculations.

Residual Effect

The overall effect will be a Long-term Moderate Positive effect on air quality due to the offsetting of approximately 31,578 tonnes of Carbon Dioxide (CO2) per annum (see Chapter 11 for details), due to the provision of renewable energy in the range of approximately 32,703 Irish households with electricity per year.

Significance of Effects

Based on the assessment above there will be Long-term Moderate Positive effect on air quality.

10.3.4 Decommissioning Phase

The Proposed Wind Farm is seeking permission for an operational life of 35 years. Wind turbines are expected to have a lifespan of approximately 30-35 years. Following the end of their life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Wind Farm may be decommissioned fully. The Proposed Grid Connection onsite 38kV substation and underground electrical cabling will remain in place as it will be under the ownership of the ESB.

A Decommissioning Plan is included as Appendix 4-5 of this EIAR for the decommissioning of the Proposed Project, the detail of which will be agreed with the local authority prior to any decommissioning. Any impact and consequential effect that occurs during the decommissioning phase are similar to that which occur during the construction phase, be it of less effect. The mitigation measures prescribed for the construction phase of the Proposed Project will be implemented during the decommissioning phase thereby minimising any potential effects. The potential for effects during the decommissioning phase of the Proposed Project has been fully assessed within this EIAR.

10.3.5 Cumulative Effects

The potential for impact between the Proposed Project, and other relevant developments has been carried out with the purpose of identifying what influence the Proposed Project (Proposed Wind Farm and Proposed Grid Connection combined) will have on the surrounding environment when considered cumulatively and in combination with relevant existing permitted or proposed projects and plans in the vicinity of the Site, such as other wind energy developments, extractive industries, battery energy

storage systems, forestry etc... Please see Section 2.8 of Chapter 2 for the cumulative assessment methodology used.

During the construction phase of the Proposed Project and the construction of other permitted or proposed projects and plans in the area (please see Section 2.8 in Chapter 2 and Appendix 2-3 of this EIAR), there will be emissions from construction plant and machinery and potential dust emissions associated with the construction activities. However, once the mitigation proposals, as outlined in the above assessment are implemented during the construction phase of the Proposed Project, there will be no cumulative negative effect on air quality.

Exhaust and dust emissions during the operational phase of the Proposed Project will be minimal, relating to the use of maintenance vehicles onsite, and therefore there will be no measurable negative cumulative effect with other developments on air quality.

The nature of the Proposed Project is such that, once operational, it will have a long-term, moderate, positive impact on the air quality. There will be no measurable negative cumulative effect with other developments on air quality.

10.3.5.1 Construction Phase

Air Quality

As established in section 10.3.2, there are short-term, imperceptible to slight, negative effects on air quality during the construction phase from:

- Exhaust emissions arising from the construction of Proposed Project infrastructure;
- Exhaust emissions arising from transit of vehicles to, from and within the Site;
- Dust Emissions arising from the construction of Proposed Project infrastructure; and,
- Dust emissions arising from the transit of vehicles to, from and within the Site.

Therefore, it is considered here will be no cumulative effects on air quality, should other proposed or consented plans and projects within the surrounding landscape be constructed in parallel with the Proposed Project.

10.3.5.2 Operational Phase

There will be no net carbon dioxide (CO2) emissions from the operation of the Proposed Project.

Air Quality

As established above in section 10.3.3, there will be a long-term imperceptible negative effect on air quality due to:

- Exhaust and dust emissions from maintenance LGV vehicles visiting the site daily for site inspections; and,
- Increased exhaust and dust emissions on occasion due to more frequent LGV and HGV visits during component or substation infrastructure replacement.

It is similarly established in section 10.3.3 that there will be an overall long-term moderate positive effect on air quality given:

- There will be no net carbon dioxide (CO_2) emissions from operation of the Proposed Project. By providing an alternative to electricity derived from coal, oil or gas-fired power stations, the Proposed Project will result in emission savings of carbon dioxide (CO_2), oxides of nitrogen (NO_x), and sulphur dioxide (SO_2).

- The production of renewable energy from the Proposed Project will have a Long-Term Moderate Positive effect on air quality due to the offsetting of approximately 31,578 tonnes of Carbon Dioxide (CO_2) per annum, or 1,105,230 tonnes of carbon dioxide over the proposed 35 year lifecycle of the Proposed Project.

It is therefore considered there will be no measurable negative cumulative effects on air quality should other proposed or consented plans and within the surrounding landscape be operational in parallel with the Proposed Project. However, once the Proposed Project is operational, there will be a long-term, moderate, positive impact on the air quality.