Environmental Impact Assessment Report (EIAR)

Killoshulan Wind Farm, Co. Kilkenny

Chapter 10 - Air Quality

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GLOSSARY OF TERMS

Term	Definition
CAFE Directive	The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive is a key European Union regulation designed to define, establish, and manage ambient air quality standards to protect human health and the environment. It sets legally binding limits for pollutants and dictates how Member States should monitor and improve air quality
IAQM 2024 Guidance	The IAQM 2024 guidance, "Guidance on the Assessment of Dust from Demolition and Construction," provides a standardized methodology for assessing construction dust impacts, covering demolition, earthworks, construction, and trackout.
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.

GLOSSARY OF ACRONYMS

Acronym	Definition
NH_3	Ammonia
C_6H_6	Benzene
CO_2	Carbon Dioxide
CO	Carbon Monoxide
CAFE	Clean Air for Europe
CEMP	Construction and Environmental Management Plan
DEFRA	Department of Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EC	European Commission
EEA	European Environment Agency
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EU	European Union
GHG	Greenhouse Gas
HGVs	Heavy Goods Vehicles
HDV	Heavy-duty vehicle
IAQM	Institute of Air Quality Management
km	Kilometres
Pb	Lead
LGVs	Light Goods Vehicles
LAQM	Local Air Quality Management
LAT	Lower Assessment Threshold
MRF	Materials Recovery Facility
m	Metres
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides

NMVOC	Non-Methane Volatile Organic Compounds
O_3	Ozone
PM	Particulate Matter
ppb	Parts per billion
PAHs	Polyaromatic Hydrocarbons
SAC	Special Area of Conservation
SO_2	Sulphur Dioxide
SO_x	Sulphur Oxide
TII	Transport Infrastructure Ireland
UAT	Upper Assessment Threshold
UKHA	UK Highways Agency
WHO	World Health Organisation

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 Killoshulan Wind Farm development. The full description of the Proposed Project is detailed in Chapter 4: Description of the Proposed Project. Alternative designs initially proposed for the Proposed Project and their potential for effects on air quality are considered in Chapter 3: Site Selection and Reasonable Alternatives.

For the purposes of this Environmental Impact Assessment Report (EIAR), the various project components are described and assessed using the following references: 'Proposed Project', 'Site', 'Proposed Grid Connection', and 'Proposed Wind Farm'. 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 assessment has been carried out according to best practice and guidelines relating to air quality.

10.1.1 Background

The Proposed Wind Farm is located approximately 2.4km east of the village of Johnstown, 3.7km northeast of the town of Urlingford and 4km west of the village of Freshford, Co. Kilkenny. The townlands within which the Proposed Wind Farm site and Proposed Grid Connection are located can be found in Table 1-1 of Chapter 1 of this EIAR.

Current land-use on the Proposed Wind Farm comprises commercial forestry, agricultural pastural land, mixed forest and transitional woodland-shrub. Current land-use along the Proposed Grid Connection comprises of public road corridor, public open space, agriculture, commercial forestry, land principally used by agriculture with significant areas of natural vegetation, mineral extraction sites, mixed forest and discontinuous urban fabric. Land-use in the wider landscape of the site comprises a mix of agriculture, quarrying, renewable energy, low density residential and commercial forestry. Land-use in the areas proposed for turbine delivery route accommodation comprises a mix of agriculture, transitional woodland-shrub, coniferous forest, public open space. Due to the nature of the Proposed Project and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR. Based on professional judgement it is considered that air quality in the existing environment is reflective of the Environmental Protection Agency's (EPA) Air Quality Zone D, as described in Section 10.1.6.1 below, 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 emissions as occurs 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 is damaging to human health and the environment. Some minor short term or temporary indirect emissions associated with the construction and decommissioning of the Proposed Project include vehicular and dust emissions.

10.1.2 Statement of Authority

This section of the EIAR has been prepared by Evan Connolly of MKO. This section of the EIAR has been reviewed by Jonny Fearon and Eoin McCarthy, who are Project Environmental Scientist and Project Director with MKO, respectfully.

Evan is an Environmental Scientist with MKO within the Environmental Renewables team with over 2 years of experience of private consultancy experience. Evan holds a B.Sc. (Hons) in Earth and Ocean

Science from the University of Galway and an interinstitutional M.Sc. in Sustainable Resource Management: Policy & Practice from University of Galway and University of Limerick. Evan's strengths and areas of expertise are in environmental sustainability, resource management, conservation, geology, hydrology and oceanography. Since joining MKO Evan has been involved as an Environmental Scientist on a range of wind energy infrastructure projects. Within these projects Evan has been responsible for the drafting and reviewing of EIAR chapters, constraints analysis, data analysis and GIS mapping. Outside of large scale EIAR projects Evan has also led wind farm feasibility studies and scoping exercises.

Jonny Fearon is a Project Environmental Scientist with MKO having joined the company in March 2022. Jonny holds a BSc (Hons) Environmental Science, a MSc (Hons) in Environmental Leadership and a Specialist Diploma in Corporate Environmental Planning. Jonny's key strengths are GIS, data analysis, fieldwork and report writing. Since joining MKO, Jonny has been involved in a range of wind farm projects. In his role as an Environmental Scientist, Jonny works with and co-ordinates large multidisciplinary teams including members from MKO's Environmental, Planning, Ecological and Ornithological departments as well as sub-contractors from various fields in the preparation and production of EIARs.

Eoin is a Project Director within the Environment Renewables team of MKO with over 15 years of environmental consultancy experience. Eoin holds a B.Sc. (Hons) in Environmental Science from NUI, Galway. Eoin took up his position with McCarthy Keville O'Sullivan in June 2011. Eoin's key strengths and areas of expertise are in project management, environmental impact assessment, wind energy site selection and feasibility assessment. Since joining MKO, Eoin has progressed from Graduate to Senior level and has been heavily involved on a significant range of energy infrastructure, tourism, waste permit, flood relief scheme and quarrying projects. He has overseen the design phase and applications of some of the largest wind energy projects in Ireland. In his role as project manager, Eoin works with and co-ordinates large multidisciplinary teams including members from MKO's Environmental, Planning, Ecological and Ornithological departments as well as sub-contractors from various fields in the preparation and production of EIARs. Eoin is also involved in the development of project strategy for the projects that he manages. He has held the role of project manager and EIAR co-ordinator on over 700MW worth of wind energy projects. Within MKO Eoin plays a large role in the management of and sharing of knowledge with junior members of staff and works as part of a large multi-disciplinary team to produce EIA Reports.

10.1.3 Relevant Guidance

The air quality section of this Environmental Impact Assessment Report (EIAR) has been completed 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)*[1].
- *Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document PE-ENV-01106 (Transport Infrastructure Ireland, December 2025)*[2]
- *Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (Transport Infrastructure Ireland, December 2025).*[3]
- *Guidelines on the Information to be contained in Environmental Impact Assessment Reports – June 2022 (EPA, 2022).*[4]

[1] *Transport Infrastructure Ireland (TII). (2022). Air Quality Assessment of Proposed National Roads – Standard (PE-ENV-01107). December 2022.* <https://cdn.tii.ie/publications/PE-ENV-01107-01.pdf.>
[2] https://cdn.tii.ie/publications/PE-ENV-01106-02.pdf
[3] https://cdn.tii.ie/publications/PE-ENV-01107-02.pdf
[4] https://www.epa.ie/publications/monitoring–assessment/assessment/EIAR_Guidelines_2022_Web.pdf

- *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (EC, 2017).*[5]
- *Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects (EPA, 2021).*[6]
- *Guidance of the Assessment of Dust from Demolition and Construction (IAQM, 2024).*[7]
- *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).*[8]
- *Clean Air Strategy for Ireland (Government of Ireland, 2023).*[9]
- *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 Sulphur Dioxide Global Update 2021 (WHO 2021).*[10]

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[11] (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 have been 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.

[5] https://albertslund.dk/media/4wyitnqv/eu_2017_environmental-impact-assessment-of-projects-guidance-on-the-preparation-of-the-environmental-impact-assessment-repo.pdf
[6] https://www.epa.ie/publications/circular-economy/resources/CDWasteGuidelines.pdf
[7] https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf
[8] https://www.tii.ie/media/kzldoawo/guidelines-for-assessment-of-ecological-impacts-of-national-road-schemes.pdf
[9] https://assets.gov.ie/static/documents/clean-air-strategy.pdf
[10] https://iris.who.int/server/api/core/bitstreams/551b515e-2a32-4e1a-a58c-cdaecd395b19/content
[11] IEEP Fourth Daughter Directive 2004. Available at: https://ieep.eu/publications/the-fourth-air-quality-daughter-directive-impacts-and-consequences-of-mandatory-limits/

- New air quality objectives for particulate matter less than 2.5 micrometers (µm) referred to as PM2.5 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 less than 10µm (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 (µg/m^3) and parts per billion (ppb). The notation PM_{10} is used to describe particulate matter or particles of 10µm or less (coarse particles) in aerodynamic diameter. $PM_{2.5}$ represents particles measuring less than 2.5µm (fine particles) 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 31st December 2022 and has been replaced by the Ambient Air Quality Standards Regulations 2022 (S.I. No. 739/2022).

On the 26th of October 2022 the EU Commission announced a proposed review of Air Quality Standards.[12] The proposed revision will set interim 2030 EU air quality standards, seeking to align more closely with WHO recommendations, while putting the EU on a trajectory to achieve zero pollution for air at the latest by 2050, in synergy with climate-neutrality efforts. The first review is proposed to take place by the end of 2028, with the objective of ensuring full alignment with WHO recommendations.

The Ambient Air Quality Standards Regulation (2022) made the provisions necessary for the implementation of Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe (as amended), establishes the limit values and alert thresholds for concentrations of certain pollutants in ambient air, provides for the assessment of concentrations of certain pollutants in ambient air, provides for the maintenance of ambient air quality, and ensures that adequate information on concentrations of pollutants are made available to the public.

On 10th December 2024, Directive (EU) 2024/2881 on ambient air quality and cleaner air for Europe came into force. This directive recasts Directive 2008/50/EC (the CAFE Directive) and the fourth Daughter Directive (Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air) and incorporates them into a single directive. This recast directive sets out limit values, target values, average exposure reduction obligations, average exposure concentration objectives, critical levels, alert thresholds, information thresholds and long-term objectives. It sets out air quality provisions with the aim of achieving the objectives of the European Commission's Zero Pollution Action Plan, so that air pollution within the EU is progressively reduced to levels no longer considered harmful to health and natural ecosystems at the latest by 2050. At the time of writing Directive (EU) 2024/2881 has not yet been transposed into Irish law.

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

[12] *European Commission, Revision of the Ambient Air Quality Directives.* <https://environment.ec.europa.eu/topics/air/air-quality/revision-ambient-air-quality-directives_en>

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 (µg/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	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 2.5 ($PM_{2.5}$)	Protection of human health	Calendar year	40	Annual mean	1st Jan 2005
Particulate matter 2.5	Protection of human health	Calendar year	25	Annual mean	1st Jan 2015

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Basis of Application of Limit Value	Attainment Date
($PM_{2.5}$) Stage 1					
Particulate matter 2.5 ($PM_{2.5}$) Stage 2	Protection of human health	Calendar year	20	Annual mean	1st Jan 2020
Lead (Pb)	Protection of human health	Calendar year	0.5	Annual mean	1st Jan 2005
Carbon Monoxide (CO)	Protection of human health	8 hours	10,000	Not to be exceeded	1st Jan 2005
Benzene (C_6H_6)	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 (µg/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
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

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu g/m^3$)	Basis of Application of Limit Value
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 $\mu g/m^3$ not to be exceeded more than 25 days per calendar year averaged over 3 years	120 $\mu g/m^3$
Protection of vegetation	AOT40* calculated from 1-hour values from May to July	18,000 $\mu g/m^3$.h averaged over 5 years	6,000 $\mu g/m^3$.h

* AOT_{40} is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 $\mu g/m^3$ and is expressed as $\mu g/m^3$ 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 $\mu g/m^3$
Alert Threshold	1-hour average	240 $\mu g/m^3$

10.1.5.1 Air Quality and Health

In September 2025, the EPA published '*Air Quality in Ireland 2024*'[13] which reports that although Ireland met the current EU legal air quality limits in 2024, monitoring results were higher than the more stringent health-based WHO air quality guidelines for a number of pollutants including: particulate matter (PM), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and ozone (O_3). The main sources of these pollutants are the burning of solid fuel in towns and villages and traffic in Irish cities. People's health and the health of the environment is impacted by these pollutants. Ireland's ambition in the 'Clean Air Strategy for Ireland' (discussed below) is to move towards alignment with the WHO Air Quality guidelines, this will be challenging but will have a significant positive impact on health. Despite comparing favourably with many other European countries, Ireland's 2024 monitoring results, if similar trends continue, would exceed the 2026 targets.

The EEA Report, *Air Quality in Europe 2023,* highlights the negative effects of air pollution on human health across the EU. The report concluded that in 2021, exposure to air pollution in the EU-27 member countries led to:

- 253,000 deaths were attributable to exposure to $PM_{2.5}$ concentrations above the World Health Organisation (WHO) guideline level of 5 µg/m^3.
- 52,000 deaths were attributable to exposure to NO_2 concentrations above the WHO's guideline level of 10 µg/m^3.22,000 deaths were attributable to short-term exposure to O_3 concentrations above 70 µg/m^3.

These figures are further informed by the EEA publication of '*Ireland – Air Pollution Country Fact Sheet 2024*' on the 10th December 2024[14]. This states that 530 Irish deaths were attributable to fine particulate matter ($PM_{2.5}$), 100 Irish deaths were attributable to nitrogen oxides (NO_2) and 240 Irish deaths were attributable to Ozone (O_3).

The European Environmental Agency (EEA) Report, '*Air Quality in Europe 2022*'[15] 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. 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). These figures are further informed by the EEA publication of 'Ireland – air pollution country fact sheet 2024' on the 10th December 2024[16]. This states that 530 Irish deaths were attributable to fine particulate matter ($PM_{2.5}$), 100 Irish deaths were attributable to nitrogen oxides (NO_2) and 240 Irish deaths were attributable to Ozone (O_3).

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.*'[17] This article details the carbon

[13] Environmental Protection Agency: Air Quality in Ireland 2024. Available at: https://www.epa.ie/publications/monitoring--assessment/air/air-quality-in-ireland-2024.php.
[14] *European Environment Agency (EEA), Air Quality Report 2023, Available at:* https://www.eionet.europa.eu/etcs/etc-he/products/etc-he-products/etc-he-reports/etc-he-report-2024-5-status-report-of-air-quality-in-europe-for-year-2023-using-validated-and-up-to-date-data/@@download/file/2024-5_report_status_eionet_mix_2023_final%20for%20publication%2030-05-2024.pdf
[15] *European Environment Agency (EEA) (2022). Air Quality in Europe 2022 Report* <https://www.eea.europa.eu/publications/air-quality-in-europe-2022>
[16] *European Environment Agency (EEA). (2024). Ireland – Air Pollution Country Fact Sheet 2024.* <https://www.eea.europa.eu/en/topics/in-depth/air-pollution/air-pollution-country-fact-sheets-2024/ireland-air-pollution-country-fact-sheet-2024>
[17] *Office of Energy Efficiency and Renewable Energy (2023) How Wind Can Help Us Breathe Easier*

dioxide (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 980g CO_2/kWh for coal and roughly 465g 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 EEA published a briefing on '*Europe's Air Quality Status*' in April 2026[18]. This briefing presented the status of concentrations of pollution in ambient air in 2024 and 2025 for regulated pollutants in relation to both EU air quality standards and the 2021 WHO guideline levels. The assessment shows that, despite continuous improvements, exceedances of air quality standards are common across the EU, with concentrations well above the latest WHO recommendations. These emissions, along with others including SO_x are produced during fossil fuel-based electricity generation in various amounts, depending on the fuel and technology used, emissions from industry and power plants, vehicles emissions and transport fuels.

Key messages outlined in the '*Air Quality Status in Europe 2026'* are detailed below:

- Air quality continues to improve, but in up to 20% of monitoring stations in Europe air pollution is still above the current EU air quality standards, especially for PM_{10}, ground-level O_3 and benzo(a)pyrene (BaP).
- While some regions are already meeting the 2030 EU standards, further reductions are still needed across Europe to protect health.
- For most pollutants, concentrations remain well above the levels established by the WHO air quality guideline levels, with more than 9 out of 10 Europeans exposed to air pollution concentrations above those levels.
- Reducing air pollution reduces impacts on health and associated economic costs such as healthcare and absenteeism caused by pollution-related illnesses.
- EU air quality standards are still not fully met across Europe, despite ongoing overall improvements.
- Since 2011, all countries have reduced exposure of their urban population to fine $PM_{2.5}$ particles, the most harmful pollutant from a health perspective. Nevertheless, the vast majority (94%) of the EU urban population remains exposed to $PM_{2.5}$ concentrations above the World Health Organization guideline level, highlighting the need for additional measures to reduce the associated health risks.
- Many locations already have air quality concentrations below the new EU 2030 standards. But in order to meet these new standards everywhere, and based on current progress, additional measures to improve air quality, especially in cities, are likely to be needed.

A 2024 EPA report *'Ireland's State of the Environment Report'* [19] states that the pollutants of most concern are Fine Particulate matter ($PM_{2.5}$.), Nitrogen Dioxide (NO_2) and Ammonia (NH_3). The EPA 2024 report goes on to state that:

> *"The planned transition to more renewable energy sources, and away from combustion-sourced heating systems to electrification, is a shift that could see greenhouse gas emissions from industry significantly decrease.*

[18] *EEA (2026) Air Quality Status in Europe* <https://www.eea.europa.eu/en/analysis/publications/air-quality-status-report-2026>
[19] *Environmental Protection Agency (2024). Irelands State of the Environment Report 2024)* <https://www.epa.ie/our-services/monitoring--assessment/assessment/irelands-environment/state-of-environment-report-/

As a consequence of meeting these growing demands primarily with oil, natural gas, coal and peat, our energy system is highly dependent on fossil fuels. Ireland has made some progress in transforming the electricity system through the deployment of wind farms, with renewable energy currently providing more than 40% of electricity used. However, electricity represents only one-fifth of Ireland's energy use, and our transport and heating systems remain heavily reliant on fossil fuel systems, with lock-ins that need to be addressed.

While Ireland's renewable energy share has increased from 10.7% in 2018 (reported in the last State of the Environment Report) to 13.1% in 2022, this is the lowest level in the EU (well below the EU average of 23.0%), and Ireland is not on track to meet the EU-wide binding target of 42.5% renewable energy share by 2030. Reaching the target of 80% renewable electricity by 2030, while ensuring a stable energy supply, will require new capacity, a more flexible grid and increased interconnectivity (EC, 2024)

Established technologies, such as wind energy, solar photovoltaics and bioenergy, will be key in meeting short-term emission reduction targets (i.e. 2030), whereas significant growth in offshore wind infrastructure is expected to be the key essential element of future energy systems."

The EPA published a report, entitled '*Ireland's Air Pollutant Emissions Trends and Outlook 2026*'[20] providing details of emissions of air pollutants in Ireland in the period 1990 to 2024, and projected emissions of these pollutants from 2025 to 2030. The key findings of the report with respect to assessment of targets are:

- Ireland is compliant with current and future emission reduction commitments for four out of five key air pollutants: SO_2, NO_x, NH_3, and PM2.5, which are projected to meet the 2030 commitments under all scenarios. However, emissions of non-methane volatile organic compounds (NMVOCs) remain above the applicable reduction commitment and are projected to continue exceeding the 2030 target under certain scenarios. Consistent implementation of existing and planned national policies and measures will be required to achieve and maintain compliance with emission reduction commitments.
- Since 1990, key pollutants associated with acid rain have reduced dramatically, with SO_2 levels down 96%, and NO_x down by 67%. Pollutants that negatively impact human health such as particulate matter and non-methane volatile organic compounds, are also down by 67% and 32%, respectively.
- For the third year in succession (2022-2024) emissions of NH_3 remain in compliance with the 2020-2029 emission reduction commitments, being 5% below the 2005 baseline compared to the 1% reduction target

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 the 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.

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.

[20] *EPA (2026) Ireland's Air Pollutant Emissions Trends and Outlook 2026* <https://www.epa.ie/publications/monitoring-assessment/climate-change/air-emissions/irelands-air-pollutant-emissions-trends-and-outlook-2026.php>

10.1.5.1.1 Clean Air Strategy Ireland 2023

Ireland's Clean Air Strategy 2023[21] 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:

- 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 it's 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.

Since the publication of the Clean Air Strategy 2023, the Clean Air Strategy for Ireland *'First Progress Report 2024'* was released'. This report detailed the significant progress that has been made on the actions in the strategy since its publication in April 2023. The key takeaways that have been implemented since the publication of the strategy include the operational use of the Air Pollution Act 1987 (Solid Fuels), please note, while it is too early to say the exact impact that these regulations have had on air quality, initial indications from the EPA are that there have been significant air quality improvements made in areas prone to burning solid fuels. The Clean Air Strategy saw a push for the submission of Ireland's second National Air Pollution Control Programme, which was completed in May 2024, and the development of new public awareness campaigns. The Clean Air Strategy has furthermore increased the frequency and financial supports given to local authorities to conduct sulphur testing[22].

[21] *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.*
[22] *Clean Air Strategy For Ireland First Progress Report 2024*

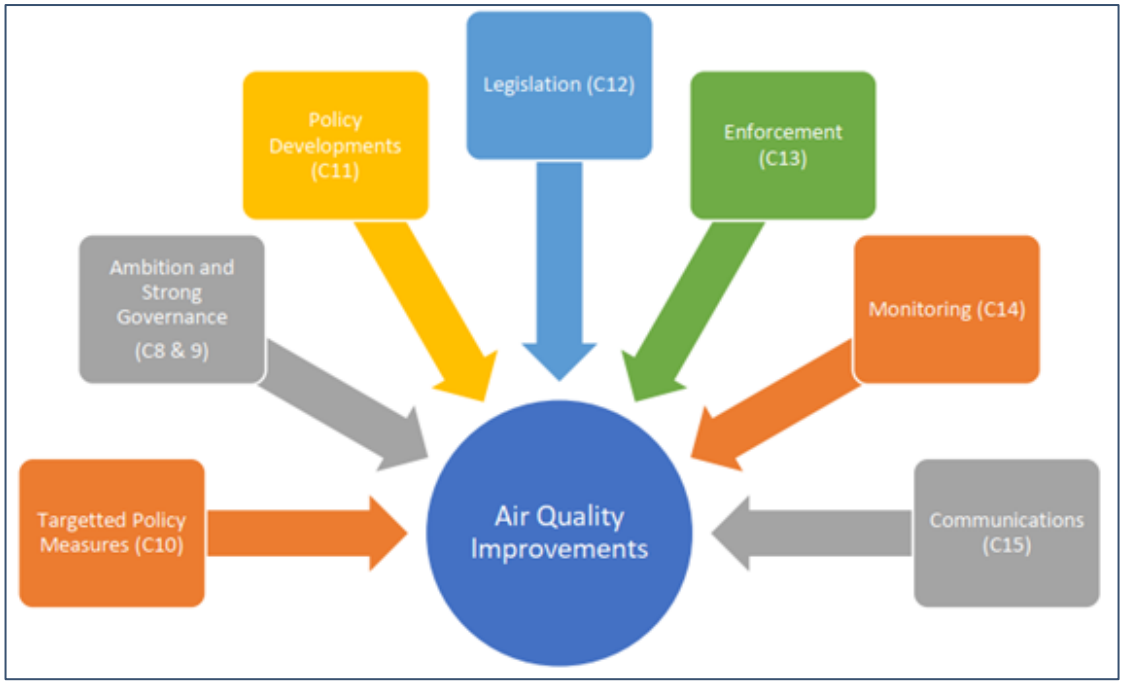


Figure 10-1 Seven Strategic Frameworks for Air Quality, with associated chapters in brackets. Reproduced as Figure 1 from Clean Air Strategy 2023

In July 2025 a second Clean Air Strategy for Ireland Progress Report[23] was published providing a high-level overview of progress to date. The report built on the Clean Air Strategy and 2024 update reports. Key highlights indicated significant progress had been made improving air quality. Section 5.1 outlines progress made in reduction of annual emissions. Substantial progress has been made to date in relation to our annual SO_2, NO_x, ammonia, NMVOCs and $PM_{2.5}$ emissions as shown in Table 10-5 below.

Table 10-5 Percentage Change in Emission of Pollutants 2022-2023

Pollutant	2022 Emission (kt)	2023 Emission (kt)	% Change 2022-2023
Sulphur Dioxide (SO_2)	9.35	7.36	-21.32%
NO_2	91.2	84.42	-7.43%
NMVOC	110.25	105.69	-4.13%
Ammonia	121.32	116.36	-4.08%
$PM_{2.5}$	10.51	9.31	-11.41%

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 2025, 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 2025 is currently the latest revision. The targets of the Climate Action Plan 2025 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.

[23] *Clean Air Strategy For Ireland First Progress Report 2025*

The Proposed Project supports Ireland's Clean Air Strategy generating clean wind energy and facilitating the connection of this clean energy to the national grid, thus helping to cut air pollution, improve public health, and meet national air and climate goals.

10.1.6 Methodology

10.1.6.1 Air Quality Zones

The air quality zone for the Proposed Project was selected, followed by a review of EPA collated baseline air quality data namely Sulphur Dioxide (SO2), Particulate Matter (PM_{10}), Nitrogen Dioxide (NO2), Carbon Monoxide (CO) and Ozone (O3) 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 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 CAFE Directive. The site of the Proposed Project 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 2024'* was published by the EPA in 2025. The EPA reports provide SO_2 PM_{10}, NO_2 and O_3 concentrations for areas in Zone D. The *'Air Quality in Ireland 2023'* report published by the EPA in 2024 provides concentrations for Zone D CO concentrations. 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) (hereafter referred to the IAQM 2024 Guidance) 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 2024 Guidance 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[24]

[24] *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) and/or Heavy-Duty Vehicles (HDVs) leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when HGVs/HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.*

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 10-6 below.

Table 10-6 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 >6 m 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 magnitude of dust generating activities is divided into 'Large', 'Medium' or 'Small' scale depending on the nature of the activities involved. . The earthwork requirements as outlined in Appendix 4-3 of this EIAR results in the classification of the Proposed Wind Farm as 'Large' for Earthworks and Construction activities. The Proposed Grid Connection falls under the classification of 'Medium' for Earthworks and 'Small' for 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 Proposed 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 as per the IAQM 2024 Guidance. Table 10-7 below identifies the sensitivity of an area to dust soiling effects on people and their properties, relative to different receptor sensitivities.

Table 10-7 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 10-8 below identifies the sensitivity of an area to human health effects of PM_{10}, relative to different receptor sensitivities. As indicated in Section 10.1.6.1 above, the Proposed Project is situated in Zone D. According to the 2024 EPA baseline air quality data[25]; the average PM_{10} for Zone D is 11.5µg/m^3. Therefore, the only annual PM_{10} concentration categorised in the IAQM 2024 Guidance relevant to the Proposed Project is the minimum concentration of <24µg/m^3.

Table 10-8 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

[25] https://www.epa.ie/resources/charts–data/air/air-quality–pm10.php

Receptor Sensitivity	Annual Mean PM_{10} concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<250
		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 earthworks, construction and trackout has the potential to physically and chemically affect sensitive habitats and plant communities. Table 10-9 below identifies the sensitivity of an area to ecological impacts.

Table 10-9 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 infrastructure. Exposed Limestone *(ER2 habitat)* is located approx. 72m southwest of T4 and associated hardstand infrastructure. However, no species associated with calcareous grassland were observed in the ER2 habitat. Therefore, dust impacts on ecological receptors in relation to the Proposed Wind Farm are considered not significant.

The Proposed 110kV Underground Cabling crosses the River Barrow SAC and River Nore SAC northwest of Dundrum. These receptors are assessed below in Section 10.3.2.

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 matrix in Table 10-10 provides a method of assigning the level of risk for each activity.

Table 10-10 Risk of Dust Impacts for Earthworks, Construction, Trackout (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

The risk of dust impacts for the Earthworks, Construction and Trackout activities from the Proposed Project is summarised in Section 10.3.2 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 10-11 below.

Table 10-11 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 Site is typical of that of rural areas in the southwest 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 2024'* was published by the EPA in September 2025. The EPA reports provide SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D.

10.2.1.1 Sulphur Dioxide (SO_2)

Sulphur dioxide data for Cork Harbour, Kilkitt, Shannon Estuary/Askeaton and Edenderry in 2024 is presented in Table 10-12.

Table 10-12 Sulphur Dioxide Data for Zone D Sites in 2024

Parameter	Measurement
Annual Mean	2.8µg/m^3
Hourly values > 350	0.0
Hourly max (Average)	36.2 µg/m^3
Daily values > 125	0
Daily max (Average)	14.7

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 10-12 the average maximum hourly value recorded during the assessment period was 36.2 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 Proposed Project and 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 *'Air Quality in Ireland 2024'* report provides annual mean PM_{10} concentration for nineteen Zone D towns, Tipperary Town, Carrick-on-Shannon, Askeaton, Enniscorthy, Birr, Macroom, Castlebar, Cobh Carrignafoy, Claremorris, Ballinasloe, Kilkitt, Cavan, Carnsore, Roscommon Town, Edenderry, Mallow, Longford, Killarney and Malin Head. Particulate matter (PM_{10}) data for 2024 is presented in Table 10-13.

Table 10-13 Average Particulate Matter (PM10) Data for Zone D Sites in 2024

Parameter	Measurement (ug/m^3)
Annual Mean	11.5 µg/m^3
% Data Capture (Average)	94%
Values > 50 ug/m^3	Max 7
Daily Max (Average)	49.5µg/m^3

Notes: [1-] PM_{10} daily limit for the protection of human health: No more than 35 days >50 µg/m^3

The daily limit of 50 µg/m3 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/m3 applicable from 2005. The greatest number of exceedances occurred at Longford where the PM_{10} daily limit was exceeded on 7 no. occasions. In the EPA *'Air Quality in Ireland 2024'* 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 Project are similar or lower than those recorded for the Zone D sites above.

10.2.1.3 Nitrogen Dioxide (NO_2)

Nitrogen dioxide data for Emo Court, Cork Mallow, Birr, Castlebar, Carrick-on-Shannon, Kilkitt and Edenderry in 2024 is presented in Table 10-14.

Table 10-14 Average Nitrogen Dioxide Data for Zone D Sites in 2024

Parameter	Measurement
Annual Mean (Average)	8.3 µg/m^3
NO_2 Values >200	0
Values > 140 (UAT)	0
Values >100 (LAT)	1
Hourly Max. (Average)	68.6 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 once during the monitoring period in Edenderry while the upper assessment threshold of 140 µg/m3 was not exceeded during the monitoring period. Edenderry did not exceed the 18 days limit during the monitoring period. In 2024, no other monitoring locations in Zone D had exceedances in the lower and upper assessment thresholds of 100 and 140 µg/m3. The average hourly max. NO_2 value of 68.6 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 are similar or lower than those recorded for the Zone D sites above.

10.2.1.4 Carbon Monoxide (CO)

Due to operational issues at the Birr station, there is no 2024 data. The baseline air quality will use the 2023 data. The '*Air Quality in Ireland 2023*'[26] data provides rolling 8-hour carbon monoxide concentrations for Birr, a Zone D site. Carbon Monoxide data for 2023 is presented in Table 10-15.

Table 10-15 Carbon Monoxide Data for Birr – Zone D Site in 2023.

Parameter	Measurement
Annual Mean	0.6 mg/m^3

[26] *Air Quality in Ireland Report 2023. Available at:* https://www.epa.ie/publications/monitoring--assessment/air/air-quality-in-ireland-2023.php

Parameter	Measurement
Median	0.6 mg/m^3
% Data Capture	99.8%
Values > 10	0
Max	2.2 mg/m^3

The average concentration of carbon monoxide was 0.6 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 CO values at the Site are 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 eight Zone D sites, Emo Court, Kilkitt, Carnsore Point, Mace Head, Castlebar, Valentia, Cork Mallow and Malin Head. Ozone (O_3) data for 2024 is presented in Table 10-16. As can be observed from Table 10-16 there were no exceedances of the maximum daily eight-hour mean limit of 120 µg/m3. 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 10-16 Average Ozone Data for Zone D Sites in 2024

Parameter	Measurement
Annual Mean	58.9 µg/m^3
Median	59.9 µg/m^3
% Data Capture	84.1%
No. of days > 120 µg/m^3	0 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 10.3.2 below.

10.2.1.7 Other Industries

Tirlán Limited located on the N77 approx. 1.6km northwest of Ballyragget, Co. Kilkenny. Tirlán is a food manufacturing facility which is licenced with the EPA under Licence Number P0359-03 and are fully compliant with applicable air quality and emission requirements related to operations. Approx. 600m of the Proposed 110kV Underground Cabling passes Tirlán, an EPA licensed facility within the adjacent public road corridor on the N77 and L5833.

10.3 Likely Significant Effects and Associated Mitigation Measures

10.3.1 'Do-Nothing' Scenario

If the Proposed Project were not to proceed, the Site would continue to function as it does at present, with no changes to the current land-use and air quality. This impact is considered to be neutral in the context of the EIAR. If the Proposed Project were not to proceed, the opportunity to reduce emissions of carbon dioxide, oxides of nitrogen (NOx), and sulphur dioxide (SO2) to the atmosphere would be lost due to the continued dependence on electricity derived from coal, oil and gas-fired power stations, rather than renewable energy sources, such as the Proposed Project. This will result in an indirect negative impact on air quality nationally, regionally and locally.

Furthermore, 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.

Furthermore, as this application includes a Biodiversity Management and Enhancement Plan (Appendix 6-4) to be implemented during the development's operation, the opportunity to enhance the site for biodiversity, at a local scale, would also be lost.

10.3.2 Construction Phase

10.3.2.1 Exhaust Emissions: Construction of Proposed Project Infrastructure

Pre-Mitigation Impact

Proposed Wind Farm

The construction of turbines, the meteorological mast, site roads, and other Proposed Wind Farm site infrastructure (as outlined in Chapter 4 of this EIAR) and extraction of material from the proposed borrow pit will require the operation of construction vehicles and plant on site and the transport of workers to and from the Site. Exhaust emissions associated with vehicles and plant such as NO_2, Benzene and PM_{10} will arise as a result of construction activities. This potential effect 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.

Proposed Grid Connection

The construction of the Proposed 110kV Substation, and the Proposed 110kV Underground Cabling to the existing Ballyragget 110kV substation will require the use of construction machinery, thereby giving

rise to exhaust emissions. This represents a short-term, slight, negative effect which will be reduced through use of the best practice mitigation measures as presented below.

Mitigation Measures

- 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 will produce and follow a site inspection and machinery checklist which will be followed and updated as required.
- All construction vehicles and plant used onsite during the construction phase will be maintained in good operational order. If a vehicle requires repairs this work will be caried out, thereby minimising any emissions that arise.
- Turbines components 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 machinery will be switched off when not in use.
- Users of the Site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants are kept to a minimum.
- The majority of aggregate materials for the construction of the Proposed Project will be obtained from the borrow pit on site. This will significantly reduce the number of delivery vehicles accessing the site, thereby reducing the amount of emissions associated with vehicle movements.
- Aggregate materials for the construction of the Proposed Project will be sourced from local quarries.
- The Materials Recovery Facility (MRF) facility will be local to the Proposed Wind Farm site to reduce the amount of emissions associated with vehicle movements. The nearest licensed waste facility to the Proposed Wind Farm site is Dunmore Recycling and Waste Disposal located approximately 14km to the southeast of the site of the Proposed Project.
- A Construction and Environmental Management Plan (CEMP Appendix 4-3) will be in place throughout the construction phase

Residual Effect

The residual effect from the construction phase and the implementation of the above mitigation measures will result in a temporary to short-term, imperceptible, negative effect.

Significance of Effects

The effects on air quality from exhaust emissions arising from the construction of Proposed Project infrastructure during the construction phase of the Proposed Project are considered to be Not Significant.

10.3.2.2 Exhaust Emissions: Transportation to and from the Site

Pre-Mitigation Impact

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 Project which will occur on specified routes only, (refer to Section 4.4 of Chapter 4 of this EIAR). The departure of empty vehicles and/or minor waste volumes (please see accompanying CEMP Appendix 4-3) from the Site and daily staff movements, will give rise to exhaust emissions associated with the transport vehicles. This constitutes a short-term, slight, negative effect in terms of air quality, which is not significant. Mitigation measures in relation to exhaust emissions are presented below.

Mitigation Measures

- 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 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.
- 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. Waste material will be transferred to a licensed /permitted 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. The nearest licensed waste facility to the Proposed Wind Farm site is Dunmore Recycling and Waste Disposal located approximately 14km to the southeast of the Site.
- A CEMP will be in place throughout the construction phase (see Appendix 4-3).

Residual Effect

Following implementation of the above mitigation measures, residual effects from exhaust emissions arising from transportation activities will be short-term, imperceptible, and negative on air quality.

Significance of Effects

The effects on air quality from exhaust emissions arising from transportation activities during the construction phase of the Proposed Project are considered to be Not Significant.

10.3.2.3 Dust Emissions

Pre-Mitigation Impact

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, and all ancillary works and apparatus will give rise to dust emissions. In order to accommodate the delivery of turbine components, temporary accommodation works will be required. The list of townlands where temporary accommodation works will be required is provided in Table 10-17 below.

Table 10-17 Townlands within which Temporary Accommodation Works are required

Development Works	Townlands
Accommodation works to facilitate the delivery of large turbine components and other abnormally sized loads.	Urlingford, Mountfinn, Balief Lower, Balief Upper, Barna

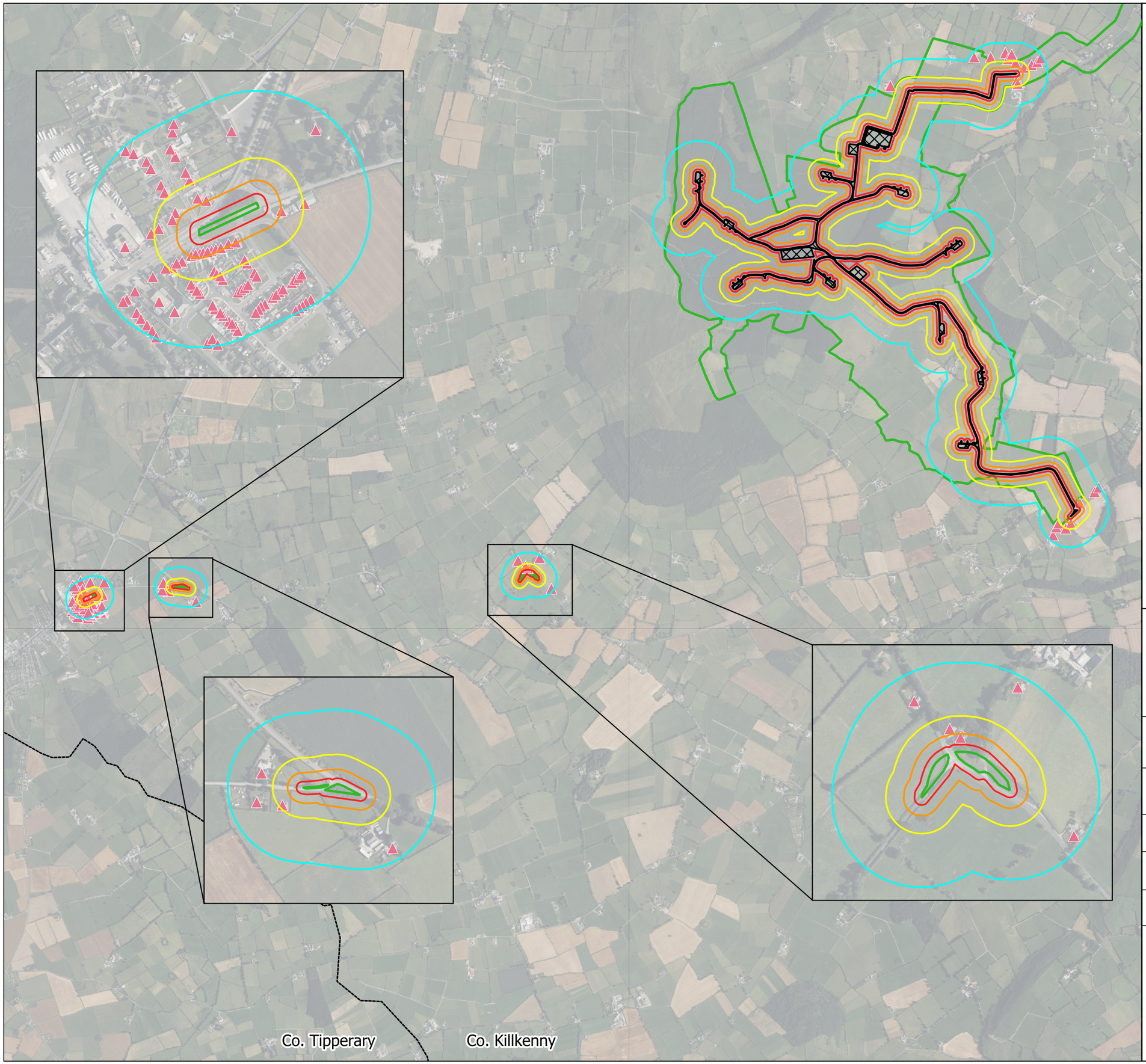
Works associated with the accommodation works will give rise to localised, temporary dust emissions. A full description of the Temporary Accommodation Works can be found in Section 4.4.3.1 of this EIAR. It is proposed to use crushed stone for the Temporary Accommodation Works or Heavy duty, ground protection mats, such as Tufftrak mats where required. In relation to the construction of these accommodation areas, it is considered that the extent and duration of works are such that there will be no potential for significant effects from dust emissions.

The majority of the construction materials for the Proposed Project will be won onsite from the proposed borrow pit. The removal of the topsoil followed by its transportation and deposition at the spoil management area during the construction phase will give rise to dust emissions.

The IAQM 2024 Guidance 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 sensitive 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 Sensitive Receptors were identified using a constraints mapping process, and detailed and updated planning searches which informed the project sensitive receptor dataset. The sensitive properties located within the appropriate distance from potential dust emission sources, provided by the IAQM 2024 Guidance, are detailed below and presented in Figure 10-2 below.

- There are 0 no. High Sensitive Receptors within 20m of the Proposed Wind Farm footprint and Turbine Delivery Route Accommodation areas;
- There are 17 no. High Sensitive Receptor within 50m of the Proposed Wind Farm footprint and Turbine Delivery Route Accommodation areas;
- There are 36 no. High Sensitive Receptors within 100m of the Proposed Wind Farm footprint and Turbine Delivery Route Accommodation areas;
- There are 125 no. High Sensitive Receptors within 250m of the Proposed Wind Farm footprint and Turbine Delivery Route Accommodation areas.

Figure 10-2 below displays the above IAQM 2024 Guidance Dust Deposition Bands and the sensitive receptors within each band.



Map Legend

- EIAR Site Boundary
- County Boundary
- Proposed Construction Footprint
- IAQM Sensitive Receptors
- 20m IAQM Dust Deposition Band
- 50m IAQM Dust Deposition Band
- 100m IAQM Dust Deposition Band
- 250m IAQM Dust Deposition Band

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Drawing Title

IAQM Dust Deposition Bands and Relevant Sensitive Receptors for the Proposed Wind Farm Site

Project Title

Killoshulan Wind Farm

Drawn By	Checked By
EC	JF
Project No.	Drawing No.
260172	Figure 10-2
Scale	Date
1:30,000	2026-10-09

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Table 10-18 below identifies the sensitivity of the Area to Dust Soiling Effects on People and Property surrounding the Proposed Wind Farm footprint to dust soiling effects. Taking into consideration the proximity of High Sensitive Receptors to the Proposed Wind Farm footprint the overall sensitivity of the area to dust soiling effects is considered to be Low-to-Medium.

Table 10-18 Sensitivity of the Area to Dust Soiling Effects on People and property from Proposed Wind Farm construction works. 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 sensitivity of people in the area surrounding the Proposed Wind Farm footprint to the health effects of PM_{10}. 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 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 (Low), using Table 10-10 above as guidance, the pre-mitigation risk of impacts from the Proposed Wind Farm site is summarised in Table 10-20 below.

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

Potential Impact	Risk			
	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 site is Low. Therefore, the potential effects of dust from the construction phase of the Proposed Wind Farm site are considered to be equivalent to Short-term, Slight Negative effects.

Proposed Grid Connection

The construction of the Proposed Grid Connection will give rise to dust emissions. It is proposed to provide construction grade materials for the Proposed Grid Connection infrastructure from locally licenced quarries.

The number of High Sensitive Receptors within 250m from Proposed Grid Connection works areas and their likely risk of dust impacts during the construction works, as highlighted in the IAQM 2024 Guidance methodology discussed above are detailed below and presented in Figure 10-3 below are as follows:

- There are 32 no. High Sensitive Receptors located within 20m of the Proposed Grid Connection;
- There are 68 no. High Sensitive Receptors located within 50m of the Proposed Grid Connection;
- There are 89 no. High Sensitive Receptors located within 100m of the Proposed Grid Connection;
- There are 125 no. High Sensitive Receptors located within 250m of the Proposed Grid Connection.

There are a small number of Sensitive Receptors which overlap both the Proposed Wind Farm IAQM Dust Deposition Bands and the Proposed Grid Connection IAQM Dust Deposition Bands:

- There are 0 no. High Sensitive Receptors which overlap both the Proposed Wind Farm and Proposed Grid Connection 20m IAQM Bands
- There are 1 no. High Sensitive Receptors which overlap both the Proposed Wind Farm and Proposed Grid Connection 50m IAQM Bands
- There are 4 no. High Sensitive Receptors which overlap both the Proposed Wind Farm and Proposed Grid Connection 100m IAQM Bands
- There are 12 no. High Sensitive Receptors which overlap both the Proposed Wind Farm and Proposed Grid Connection 250m IAQM Bands



Map Legend

- EIAR Site Boundary
- County Boundary
- Proposed Construction Footprint
- IAQM Sensitive Receptors
- 20m IAQM Dust Deposition Band
- 50m IAQM Dust Deposition Band
- 100m IAQM Dust Deposition Band
- 250m IAQM Dust Deposition Band

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Drawing Title

IAQM Dust Deposition Bands and Relevant Sensitive Receptors for the Proposed Grid Connection

Project Title

Killoshulan Wind Farm

Drawn By	Checked By
EC	JF
Project No.	Drawing No.
260172	Figure 10-3
Scale	Date
1:35,000	2026-10-19

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Table 10-21 below identifies the sensitivity of the area surrounding the development footprint of the Proposed Grid Connection to dust soiling effects. The overall sensitivity of the area to dust soiling effects is High due to the number of sensitive receptors within 20m of the Proposed Grid Connection.

Table 10-21 Sensitivity of the Area to Dust Soiling Effects from Proposed 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 sensitivity of people in the area surrounding the development footprint of the Proposed Grid Connection to the health effects of PM_{10}. The overall sensitivity of the area to human health effects of PM_{10} is Low-.

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	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	<24 µg/m^3	>10	Low	Low	Low	Low
		1-10				
Low	-	≥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 in Chapter 4 Section 4.3.2.4, the Proposed 110kV Underground Cabling crosses the River Barrow and River Nore SAC northwest of Ballyragget.

Table 10-23 Sensitivity of the Area to Ecological Impacts. Guidance on the Assessment of Dust from 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, 'Small' for Construction, and 'Medium' for Trackout activities. Therefore, when combined with the sensitivity of the area, using Table 10-10 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	Risk			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	N/A	Medium Risk	Low Risk	Medium 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 Grid Connection is Medium. Therefore, the potential effects of dust from the construction phase of the Proposed Grid Connection are considered to be equivalent to temporary, slight negative effect.

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) 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.

Some houses may experience soiling and deposition of vegetation effects depending on how close to the road corridor they are located. However, due to the nature of construction along the Proposed 110kV Underground Cabling as described in Chapter 4 of this EIAR which is termed a "rolling" construction site, meaning that these works will not be concentrated in any one area of the route for any considerable length of time. Therefore, these effects are considered to be a temporary, slight negative impact. Mitigation measures to reduce this impact are presented below.

Mitigation Measures

- 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 Proposed Wind Farm 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.
- 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 site will be sourced locally from licenced quarries.
- The agreed haul route road adjacent to the Proposed Wind Farm 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 Proposed Wind Farm 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 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 movements.
- A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-3). The CEMP includes dust suppression measures.

Residual Effect

With the implementation of the above, the Proposed Wind Farm site is considered to have a short-term, slight, negative residual 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 residual 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 for the Proposed Wind Farm site and Slight for the Proposed Grid Connection.

10.3.2.4 Human Health

Pre-Mitigation Impact

Whilst the construction phase of the Proposed Project will give rise to an increase in dust and vehicle emissions, the implementation of the mitigation measures discussed above, and good management practices can prevent or minimise potential effects off-site. Good management practice consists of good site design and layout, adopting appropriate working methods, choosing the right equipment and ensuring that the workforce understands the company's responsibilities and is familiar with good working practice and dust suppression techniques. The potential for health effects are considered negligible as the potential for both exhaust and dust emissions will be limited and controlled through site layout design and mitigation measures.

Exposure to chemicals such as SO_2 and NO_x are known to be harmful to human health. The production of clean renewable energy from the Proposed Project will offset the emission of these harmful chemicals by fossil fuel-powered sources of electricity and, therefore, will have a long-term, slight, positive effect on human health. Further information on the impact of the Proposed Project on Human Health is contained in Chapter 5: Population and Human Health.

Mitigation Measures

All mitigation as outlined above in Sections 10.3.2.1, 10.3.2.2 and 10.3.2.3 will be implemented in order to reduce insofar as possible, impacts on human health as a result of air quality in the vicinity of Proposed Project construction works.

Residual Effect

No effects identified.

Significance of Effects

Based on the assessment above there will be no significant effects.

10.3.3 Operational Phase

10.3.3.1 Exhaust Emissions

Pre-Mitigation Impact

The Proposed Wind Farm site will continue to be used for agricultural and forestry practices and therefore farm and forestry machinery will utilise the Proposed Wind Farm site as required. Exhaust emissions associated with the operational phase of the Proposed Project will arise from machinery and vehicles that are intermittently required onsite for maintenance as well as the use of backup generators during maintenance shutdowns. As the Proposed Grid Connection route will be left in situ in the public roadway and private agricultural lands; and the substation will remain on site resulting in intermittent truck movements or requirement for maintenance and following implementation of the mitigation measures set out below. The operational phase of the Proposed Wind Farm will generate additional traffic to the area in the form of light goods vehicles (LGVs) visiting the Site up to 3 times per days. The addition of a LGV to the area 3 times per day during the operational phase will give rise to a long-term imperceptible negative impact on air quality.

Mitigation Measures

- 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 on-site 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 residual effect on air quality from exhaust emissions during the operational phase is long-term, imperceptible and negative.

Significance of Effects

The effects on air quality from exhaust emissions arising during the operational phase of the Proposed Project are considered to be Not Significant.

10.3.3.2 Dust Emissions

Pre-Mitigation Impact

The Proposed Wind Farm site will continue to be used as a working farm and commercial forestry and therefore machinery will utilise the Proposed Wind Farm site as required. Imperceptible levels of dust emissions associated with the operational phase of the Proposed Grid Connection will arise from maintenance vehicles on roads to the Proposed Wind Farm, Proposed 110kV Substation and along the Proposed 110kV Underground Cabling as well as the use of backup generators during maintenance shutdowns. The operational phase of the Proposed Project will generate additional traffic to the area in the form of LGVs visiting the Site 3 times daily. The addition of a LGV to the area 3 times daily during the operational phase will give rise to a long-term imperceptible negative impact on air quality.

Mitigation Measures

- 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 dust emissions that arise.

Residual Effect

Based on the above, the residual effect on air quality from dust emissions during the operational phase is long-term, imperceptible and negative.

Significance of Effects

The effects on air quality from dust emissions arising during the operational phase of the Proposed Project are considered to be Not Significant.

10.3.3.3 Air Quality

Pre-Mitigation Impact

Although a long term negative imperceptible impact on air quality is expected during the operational phase due to exhaust and dust emissions from maintenance vehicles, 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 significant positive effect on air quality due to the offsetting of approximately 28,277 tonnes of Carbon Dioxide (CO_2) will be displaced per annum (Against EU FFC). Please see Chapter 11 Climate for further details on carbon displacement calculations.

Mitigation Measures

No mitigation required.

Residual Effect

The residual effect will be long-term, significant and positive on air quality due to the offsetting of approximately 28,277 tonnes of CO_2 (Against EU FFC, see Chapter 11 for details), due to the provision of renewable energy in the range of approximately 49,560 Irish households with electricity per year.

Significance of Effects

Based on the assessment above there will be a Significant positive effect on air quality.

10.3.4 Decommissioning Phase

The wind turbines proposed as part of the Proposed Wind Farm site are expected to have a lifespan of approximately 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 site may be decommissioned fully. The Proposed Grid Connection will remain in place as it will be under the ownership of ESBN/EirGrid.

A Decommissioning Plan is included as in Appendix 4-6 of this EIAR for the decommission of the Proposed Project, the detail of which will be agreed with the competent 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 impact. The mitigation measures prescribed for the construction phase of the Proposed Project will be implemented during the decommissioning phase thereby minimising any potential impacts. The potential for effects during the decommissioning phase of the proposed renewable energy development has been fully assessed in the EIAR.

10.3.5 Cumulative Assessment

The potential cumulative effects on air quality and climate between the Proposed Project and other projects in the vicinity were also considered as part of this assessment. The projects considered as part of the cumulative effect assessment are described in Chapter 2 Background to the Proposed Project of this EIAR and considered below. The nature of the Proposed Project is such that, once operational, it will have a long-term, significant, positive effect on air quality.

During the construction phase of the Proposed Project and other permitted or proposed projects and plans in the area as set out in Section 2.9 in Chapter 2 of this EIAR, that are yet to be constructed, 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. Approx. 600m of the Proposed 110kV Underground Cabling passes Tirlán, an EPA licensed facility within the adjacent public road corridor on the N77 and L5833. There will be no significant interactions between Tirlán and the Proposed 110kV Underground Cabling.

Exhaust emissions of carbon dioxide (CO_2), oxides of nitrogen (NO_x), sulphur dioxide (SO_2) or 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.

10.3.5.1 Construction Phase

Air Quality

As established above in Section 10.3.2, there are no significant effects on air quality during the construction phase from:

- Exhaust emissions during the construction of the Proposed Project infrastructure
- Exhaust emissions through the transportation of materials to the Site.
- Dust emissions during the construction of the Proposed Project infrastructure
- Dust emissions through the transportation of materials to the Site.

- Carbon dioxide (CO_2), oxides of nitrogen (NO_x), and sulphur dioxide (SO_2) emissions through plant and vehicle emissions.

Therefore, it is considered there will be no negative 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 (CO_2) 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 Proposed Project infrastructure maintenance or replacement.

It is similarly established in Section 10.3.3.3 that there will be an overall long-term significant 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 989,687 tonnes of CO_2 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, positive cumulative effect on air quality.