Environmental Impact Assessment Report

Proposed Clonberne Wind Farm Development, Co. Galway

Chapter 10 – Air Quality

DOCUMENT DETAILS

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Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

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10. AIR QUALITY

10.1 Introduction

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality arising from the construction, operation and decommissioning of the Proposed Project. The full description of the Proposed Project is detailed in Chapter 4.

The assessment has been carried out according to best practice and guidelines relating to air quality.

10.1.1 Background

The Proposed Wind Farm Site is located c.14km to the north-east of Tuam, and c.6.5km to the south-east of Dunmore in Co. Galway. The approximate location of the centre of the site is X554464, Y756549 in Irish Transverse Mercator (ITM). It is proposed to access the Proposed Wind Farm Site via a new access roadway off the R328 Regional Road to the north of the Proposed Wind Farm Site. The Proposed Wind Farm Site is served by a number of existing agricultural roads and tracks.

The Proposed Grid Connection for the Proposed Project comprises of connecting the Proposed Wind Farm Site to the National Grid. Underground electrical cables will transmit the power from each wind turbine to the proposed on-site substation which will be configured for a 220kV connection. The Proposed Grid Connection will connect the Proposed Project into the National Grid via connecting into the existing 220kV Cashla – Flagford Overhead Line at Laughil, measuring approximately 2.8km in length. The underground cabling route will be located along the public road corridor and new access tracks. Once operational, the substation will be accessed via the new access track and public road to the east.

The townlands in which the Proposed Project is located are listed in Table 1-1 in Chapter 1 of this EIAR. Current land-use on the Proposed Wind Farm Site comprises a mix of small-scale agriculture with pockets of commercial forestry, low-density residential, public road corridors and cut peat. Current land-use along the Proposed Grid Connection comprises of public road corridor, cut peat, commercial forestry, and agriculture. Land-use in the wider landscape of the Site comprises a mix of agriculture, peat cutting, quarrying, low density residential and commercial forestry.

Due to the non-industrial nature of the Proposed Project and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR. It is considered that the air quality in the existing environment is reflective of the Environmental Protection Agency's (EPA) Air Quality Zone D, as described in Section 10.2.3.1 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 is expected from coal or oil-based power stations. Harnessing more energy by means of wind farms will reduce dependency on oil, gas and coal power stations, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment. Some minor indirect emissions associated with the construction of the Proposed Project include vehicular and dust emissions.

10.1.2 Relevant Guidance and Legislation

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

- Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document PE-ENV-01106 (Transport Infrastructure Ireland, December 2022)

- Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (Transport Infrastructure Ireland, December 2022).
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports – June 2022' (EPA, 2022).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report' (EC, 2017)
- Air Quality in Ireland Report 2022 (EPA, 2023)
- Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects (EPA, 2021)
- Guidance of the Assessment of Dust from Demolition and Construction (IAQM, 2024).
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII, 2011).
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes (TII, 2009).
- Clean Air Strategy for Ireland (Government of Ireland, 2023).
- UK Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG (16) (DEFRA 2018).
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality (UKHA, 2019).
- World Health Organization (WHO) Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide Global Update 2005 (WHO 2005)

10.1.3 Statement of Authority

This section of the EIAR has been prepared by Brodie Ní Thuathail and reviewed by Jonny Fearon and Owen Cahill, all of MKO. Brodie is a Graduate Environmental Scientist with MKO. Brodie holds a BCL in Corporate Law and an MSc in Environmental Leadership. Prior to taking up her position with MKO in September 2023, Brodie worked as a legal researcher for the School of Law in the University of Galway, where she assisted on various legal projects, including publication of a legal textbook on disability law in Ireland. Brodie's key strengths and areas of expertise are in environmental law and policy, drafting EIAR report chapters and QGIS mapping. Since joining MKO, Brodie has been involved as a Graduate Environmental Scientist in a range of wind farm projects, assisting with field work, client briefing notes, compiling planning policy rationale reports, constraints mapping and drafting EIAR chapters, with more projects in the pipeline.

Jonny Fearon is an Environmental Scientist with MKO having joined the company in March 2022. Jonny holds a BSc (Hons) Environmental Science, and 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. The report was also reviewed by Owen Cahill (BSc. MSc.) who has over eight years' experience in the environmental consultancy sector. Owen completed an MSc. in Environmental Engineering at Queens University, Belfast in 2010. Owen is a full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

10.2 Air Quality

10.2.1 Relevant Legislation

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

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

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

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

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

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

10.2.2 Air Quality Standards

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

Table 10-1 Limit values of the CAFE Directive 2008/50.EC, Source: https://airquality.ie/information/air-quality-standards)

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu g/m^3$)		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 vegetation	Calendar year	30		Annual mean	19th Jul 2001-

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu g/m^3$)		Basis of Application of Limit Value	Attainment Date
Particulate matter 10 (PM_{10})	Protection of human health	24 hours	50		Not to be exceeded more than 35 times in a calendar year	1st Jan 2005
Particulate matter 10 (PM_{10})	Protection of human health	Calendar year	40		Annual mean	1st Jan 2005
Particulate matter 2.5 ($PM_{2.5}$) Stage 1	Protection of human health	Calendar year	25		Annual mean	1st Jan 2015
Particulate matter 2.5 ($PM_{2.5}$) Stage 2	Protection of human health	Calendar year	20		Annual mean	1st Jan 2020
Lead	Protection of human health	calendar year	0.5		Annual mean	1st Jan 2005
Carbon Monoxide	Protection of human health	8 hours	10,000		Not to be exceeded	1st Jan 2005
Benzene	Protection of human health	calendar year	5		Annual mean	1st Jan 2010

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

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

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

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

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

Objective	Parameter	Target Value for 2010	Long-term Objective
Protection of human health	Maximum daily 8-hour mean	120 $\mu g/m^3$ not to be exceeded more than 25 days per calendar year averaged over 3 years	120 $\mu g/m^3$

Objective	Parameter	Target Value for 2010	Long-term Objective
Protection of vegetation	AOT40* calculated from 1-hour values from May to July	18,000 µg/m^3.h averaged over 5 years	6,000 µg/m^3.h

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

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

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

10.2.2.1 Air Quality and Health

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

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

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

[1] *Air Quality in Europe 2022* <https://www.eea.europa.eu/publications/air-quality-in-europe-2022>
[2] https://www.eea.europa.eu/publications/air-quality-in-europe-2022/
[3] *Europe's air quality status 2023 briefing.* <https://www.eea.europa.eu/publications/europes-air-quality-status-2023>

The Office of Energy Efficiency and Renewable Energy in the United States published an article on August 24, 2023 entitled '*How Wind Can help Us Breathe Easier*.'[4] This article details the CO_2 emissions from different energy sources over the entire lifespan of the technology. It was found that wind energy produces around 11 grams of CO2 per kilowatt-hour (g CO_2/kWh) of electricity generated, compared with about 980 g CO_2/kWh for coal and roughly 465 g CO_2/kWh for natural gas. That makes coal's carbon footprint almost 90 times larger than that of wind energy, and the footprint of natural gas more than 40 times larger. During combustion of high-emitting energy sources, other air pollutants, i.e., nitrogen oxides (NOx) and sulphur dioxide (SO2), are also released into the atmosphere. This results in the emission of pollutants that can cause adverse health effects, including asthma, bronchitis, lower and upper respiratory symptoms, and heart attacks. Air pollution is responsible for a large number of premature deaths relating to these illnesses.

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

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

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

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

- 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.

[4] *Office of Energy Efficiency and Renewable Energy (2023) How Wind Can Help Us Breathe Easier*
[5] *Ireland's Environment – An Integrated Assessment (2020)* < https://www.epa.ie/our-services/monitoring--assessment/assessment/irelands-environment/state-of-environment-report-/>
[6] *Rialtas na hÉireann Clean Air Strategy April 2023. Available at: https://www.gov.ie/en/publication/927e0-clean-air-strategy/#:~:text=The%20Clean%20Air%20Strategy%20provides,delivering%20on%20wider%20national%20objectives.*

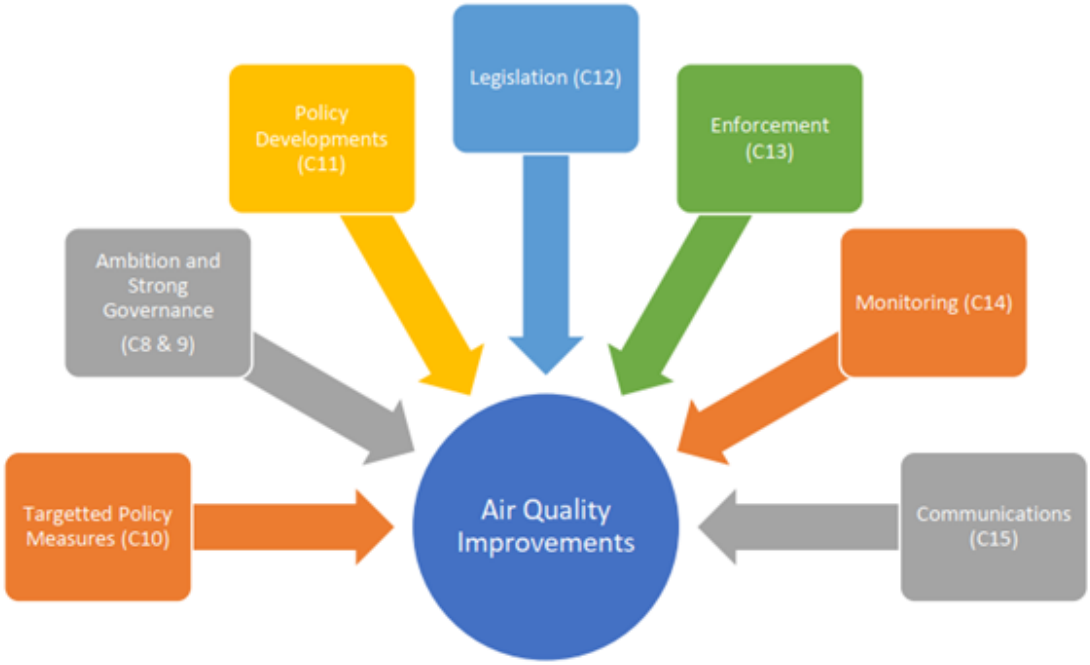


Figure 10-1 Seven Strategic Frameworks for Air Quality, with associated chapters in brackets. Reproduced as Figure 1 from Clean Air Strategy 2023

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

10.2.3 Methodology

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

10.2.3.1 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.

10.2.3.2 Air Quality Data Review

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

10.2.3.3 Dust

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2024) was considered in the dust impact assessment. The guidance document outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. This methodology has been used to predict the likely risk of dust as a result of the construction phase works, operational phase activities and decommissioning phase. The use of UK guidance is considered best practice in the absence of applicable Irish guidance. The major dust generating activities are divided into four types within the IAQM (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 - The transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when Heavy Goods Vehicles (HGVs) leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when HGVs transfer dust and dirt onto the road having travelled over muddy ground on site.

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 4-4 of this EIAR results in the classification of the Proposed Project as 'Large' for Earthworks and Construction activities. 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 Project as 'Large' 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.

Table 10-5: Description of magnitude for nature of activities

	Large	Medium	Small
Demolition	Total building volume >75,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12 m above ground level	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material, demolition activities 6-12m above ground level	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months

	Large	Medium	Small
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. ** A HDV is a heavy-duty vehicle with a gross weight greater than 3.5 tones.*		

10.2.3.3.1 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[7].

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 PM10
- Sensitivities of Receptors to Ecological Effects

Sensitivities of People to Dust Soiling Effects

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

[7] *Please see Section 7.3 (pg. 18) of the 2024 IAQM Guidance on the assessment of dust from demolition and construction (https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf) for full definitions of high, medium, and sensitive receptors for each of the three types of effects being considered*

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

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

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

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

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

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

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

Sensitivities of Receptors to Ecological Effects

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

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

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

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

10.2.3.3.2 *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 10-9 provides a method of assigning the level of risk for each activity.

Table 10-9 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

EPA classification terminology as presented in Table 1-2 of Chapter 1 of this EIAR (and in Table 10-10 below) have been correlated with the equivalent risk rating from Table 10-9 above.

Table 10-10 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

The risk of dust impacts for the Earthworks, Construction and Trackout activities from the Proposed Project is summarised in Section 10.2.4 below.

10.2.4 Baseline Air Quality

The air quality in the vicinity of the Proposed Project 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 2022'* was published by the EPA in September 2023. The EPA reports provide SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D.

10.2.4.1 Sulphur Dioxide (SO_2)

Sulphur dioxide data for Cork Harbour, Kilkitt, Shannon Estuary/Askeaton, Edenderry and Letterkenny in 2022 is presented in Table 10-11.

Table 10-11 Sulphur Dioxide Data for Zone D Sites in 2022

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

During the monitoring period there were no exceedances of the daily limit values for the protection of human health. As can be observed from Table 10-11 the average maximum hourly value recorded during the assessment period was 83.6 µg/m^3. In addition, there were no exceedances of the annual mean limit for the protection of ecosystems. It is expected based on professional judgement that SO_2 values at the Proposed Project is similar or lower than those recorded for the Zone D sites above.

10.2.4.2 Particulate Matter (PM_{10})

Sources of particulate matter include vehicle exhaust emissions, dust from soil and road surfaces, construction works and industrial emissions. The EPA report[8] provides annual mean PM_{10} concentration for sixteen Zone D towns, Tipperary Town, Carrick-on-Shannon/Askeaton, Enniscorthy, Birr, Macroom, Castlebar, Cobh Carrignafoy, Claremorris, Kilkitt, Cavan, Roscommon Town, Edenderry, Mallow, Longford and Cobh Cork Harbour and Killarney Particulate matter (PM_{10}) data for 2022 is presented in Table 10-12 Particulate Matter (PM_{10}) Data for Zone D Sites in 202212.

Table 10-12 Particulate Matter (PM_{10}) Data for Zone D Sites in 2022

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

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/m^3 for the protection of human health was exceeded on 40 days, which is greater than the PM_{10} daily limit for the protection of human health of a max 35 days >50 µg/m^3 applicable from 2005. The greatest number of exceedances occurred at Edenderry where the PM_{10} daily limit was exceeded on 10 no. occasions. In the EPA 2022 report, it notes that there were breaches in the levels of particulate matter (PM), which in Ireland, mainly comes from the burning of solid fuel,

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

such as coal, peat, and wood to heat our homes. In accordance with the Air Quality Zones data (Section 10.2.3.1) and Baseline Air Quality information detailed above, it is expected that PM_{10} values at the Wind Farm Site and Grid Connection is similar or lower than those recorded for the Zone D sites above.

10.2.4.3 Nitrogen Dioxide (NO_2)

Nitrogen dioxide data for Emo Court, Birr, Castlebar, Carrick-on-Shannon, Kilkitt and Edenderry in 2022 is presented in Table 10-13 Nitrogen Dioxide Data for Zone D Sites in 202213.

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

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

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

10.2.4.4 Carbon Monoxide (CO)

The EPA report[8] provides rolling 8-hour carbon monoxide concentrations for Birr, a Zone D site. Carbon Monoxide data for 2022 is presented in Table 10-14 Carbon Monoxide Data for Birr - Zone D Site in 202214.

Table 10-14 Carbon Monoxide Data for Birr - Zone D Site in 2022

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

The average concentration of carbon monoxide was 0.8 mg/m^3. The carbon monoxide limit value for the protection of human health is 10,000 µg/m^3 (or 10 mg/m^3). On no occasions were values in excess

of the 10 mg limit value set out in Directive 2008/50/EC. It is expected based on professional judgement that hat CO values at the Proposed Project site is similar or lower than those recorded for the Zone D site above.

10.2.4.5 Ozone (O_3)

The EPA report provides rolling 8-hour ozone concentrations for seven Zone D sites, Emo Court, Kilkitt, Carnsore Point, Mace Head, Castlebar, Valentia and Malin Head. Ozone (O_3) data for 2022 is presented in Table 10-15 Ozone Data for Zone D Sites in 202215. As can be observed from Table 10-14 there were 17. No. exceedances of the maximum daily eight-hour mean limit of 120 µg/m^3 The CAFE Directive stipulates that this limit should not be exceeded on more than 25 days per calendar year averaged over 3 years. It would be expected on professional judgement that O_3 values at the Proposed Project site would be similar or lower than those recorded for the Zone D sites below.

Table 10-15 Ozone Data for Zone D Sites in 2022

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

10.2.4.6 Dust

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

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

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

10.3 Likely Significant Effects and Associated Mitigation Measures

The assessment of effects in the sections that follow assess the Proposed Wind Farm and then the Proposed Grid Connection as the Proposed Project with a series of mitigation measures provided where required. A Residual Effect is then provided for the Proposed Project for each potential effect assessed.

10.3.1 'Do-Nothing' Effect

If the Proposed Project were not to proceed, the current mix of agricultural, peat cutting, quarrying, low density residential and commercial forestry practices would likely to continue, and the air quality would

likely remain similar to current status recorded for Zone D areas. However, the opportunity to reduce emissions of carbon dioxide, oxides of nitrogen (NO_x), and sulphur dioxide (SO_2) 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.

If the Proposed Project were not to proceed, the opportunity to capture part of Galway's valuable renewable energy resource would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions.

10.3.2 Construction Phase

10.3.2.1 Exhaust Emissions

Proposed Project

The construction of turbines and associated foundations and hard-standing areas, borrow pit, access roads, temporary construction compound, turbine delivery accommodation works, peatland enhancement area, underground cabling, peat, spoil and overburden management, site drainage, tree felling and all ancillary works and apparatus (as outlined in Chapter 4 of this EIAR) will require the operation of construction vehicles and plant on and off-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. Mitigation measures to reduce this impact are presented below.

Works such as road widening are sometimes required along proposed turbine transport routes to accommodate the large vehicles used to transport turbine components to Proposed Wind Farms. The proposed transport route for the Proposed Project has been the subject of a route assessment to determine what accommodation works are required along its length. Accommodation works will be required in three locations: Ballagh West, Carrowntryla and Lissybroder. Full details of the assessment are included as part of the traffic impact assessment set out in Section 15.1 of this EIAR and summarised in detail in Section 4.4.3.1 of Chapter 4.

The accommodation works necessary for the Proposed Project will require the use of construction machinery, thereby giving rise to exhaust emissions. This is a short-term, slight, negative effect, which will be reduced through use of the best practice mitigation measures as presented below.

It is proposed to construct a 220kV electricity substation on-site. This 220kV substation will be connected to the national grid via a loop-in of 220kV Cashla – Flagford overhead line in the townland of Laughil. The construction of the Grid Connection cabling route will require the use of construction machinery, thereby giving rise to exhaust emissions. This is a temporary, slight, negative effect, which will be reduced through use of the best practice mitigation measures as presented below.

Transport to Proposed Wind Farm Site

The transport of turbines and construction materials, waste and workers to and from the Site, (see Section 15.1 of this EIAR) will also give rise to exhaust emissions associated with the transport vehicles. This constitutes a temporary moderate negative effect in terms of air quality. Mitigation measures in relation to exhaust emissions are presented below.

Mitigation:

- All construction vehicles and plant used during construction will be maintained in good operational order while onsite. If any vehicle requires repairs, this work will be carried 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.
- 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 pits on site. This will significantly reduce the number of delivery vehicles accessing the site, thereby reducing the amount of emissions associated with vehicle movements.
- The Materials Recovery Facility (MRF) will be local to the Proposed Project site to reduce the amount of emissions associated with vehicle movements. The nearest licensed waste facility to the Wind Farm Site is located approximately 44km to the southeast of the Site of the Proposed Project.
- Waste associated with the construction of the underground grid connection cabling route will be disposed of at the closest MRF to where waste is generated along the underground electrical cabling route. The closest licensed waste facilities in the vicinity of the underground electrical cabling route, is located approximately 38km to the south.

Residual Effect

Following implementation of the mitigation measures above, residual impacts of exhaust emissions for the construction phase of the Proposed Project will have a temporary to short-term, slight, negative effect.

Significance of Effects

Based on the evaluation above there will be no significant direct or indirect effects on air quality due to the construction of the Proposed Project.

10.3.2.2 Dust Emissions

Proposed Project

The construction of turbines and associated foundations and hard-standing areas, grid connection, borrow pit, access roads, temporary construction compound, turbine delivery accommodation works, peatland enhancement area, underground cabling, peat, spoil and overburden management, site drainage, tree felling and all ancillary works and apparatus. (as outlined in Chapter 4 of this EIAR) will give rise to dust emissions during the construction phase.

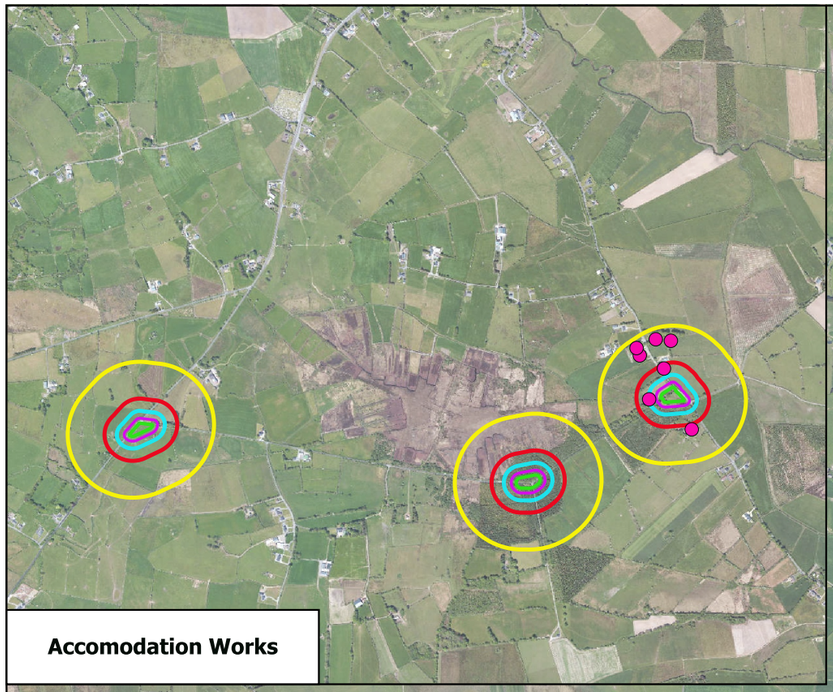
The majority of the construction materials for the Proposed Project will be won onsite from the temporary borrow pit, where an estimated 106,770m^3 of materials will be extracted. The removal of the overburden followed by its management and transportation off site during the construction phase will give rise to dust emissions. . It is proposed to provide construction grade materials for the Proposed Grid Connection infrastructure from local licenced quarries.

Excavation works associated with the accommodation works will give rise to localised dust emissions.

The IAQM (2024) methodology for *the Assessment of Dust from Demolition and Construction* as discussed in Section 10.2.3.3 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.

- There are 1 no. High Sensitive Properties within 20m of the Proposed Project footprint (H001 is an involved landowner);
- There are 1 no. High Sensitive Properties within 50m of the Proposed Project footprint;
- There are 2 no. High Sensitive Properties within 100m of the Proposed Project footprint;
- There are 18 no. High Sensitive Properties within 250m of the Proposed Project footprint (2 of which are involved landowners, H021 and H025; where construction activities with the potential to generate dust can occur.

Figure 10-2 below displays the above IAQM Dust Deposition Bands and the Relevant Sensitive Receptors within each band.



Map Legend

- EIAR Site Boundary
- Sensitive Properties
- 250m IAQM Dust Deposistion Band
- 100m IAQM Dust Deposistion Band
- 50m IAQM Dust Deposistion Band
- 20m IAQM Dust Deposistion Band

Drawing Title
IAQM Dust Deposistion Bands and Relevant Sesnsitive Properties for Assessment

Project Title
Clonberne Wind Farm, Co. Galway

Drawn By	Checked By
BNT	OC
Project No.	Drawing No.
180740	Figure 10-2
Scale 1:20,000	Date 2024-06-25

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

As per the criteria in Table 10-16 below, the overall sensitivity of the area to dust soiling impacts is **Low.** For the construction phase, the impacts from dust emissions is considered to be a short term, slight negative effect.

Table 10-16 Sensitivity of the Area to Dust Soiling Effects on People and property from Wind Farm Site 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 10-17 below identifies the sensitivity of people in the area surrounding the development footprint of the Proposed Project to the health effects of PM_{10}, as described in Section 10.2.4.2 above. The overall sensitivity of the area to human health effects of PM_{10} is considered to be **Low.**

As indicated in section 10.2.3.1 above, the Proposed Project is situated in Zone D. According to the 2021 EPA baseline air quality data[9]; the average PM_{10} for Zone D is 14µg/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 (<14 µg/m^3 in Scotland).

Table 10-17 Sensitivity of the Area to Human Health Impacts from the Proposed Wind Farm Site 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

As identified in Section 10.2.3.3 above, the Proposed Project is classified as 'Large' for Earthworks, Construction and Trackout activities. Therefore, when combined with the sensitivity of the area, using Tables 10-16 and 10-17 above as guidance, the pre-mitigation risk of impacts from the Proposed Project is summarised in Table 10-18 below.

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

Table 10-18 Summary Dust Risk Table for Wind Farm Site 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 Project is **Low.** Therefore, the potential effects of dust from the construction phase of the Proposed Project are considered to be equivalent to Short-term, Slight, Negative effects.

Transport to Proposed Wind Farm Site

The transport of construction materials and waste to and from the Proposed Wind Farm Site will give rise to some localised dust emissions during periods of dry weather. This is a short-term slight negative impact. Mitigation measures to reduce the significance of this effect are presented below.

Mitigation

- A wheel wash facility will be installed on the Proposed Wind Farm Site and will be used by vehicles before leaving the Site.
- In periods of extended dry weather, dust suppression may be necessary along haul roads, site roads, grid route, road widening sections, substation, and construction compounds and around the borrow pit area to ensure dust does not cause a nuisance. If necessary, such as during periods of dry weather, de-silted water will be taken from stilling ponds in the Site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads, turbine bases, borrow pit and site compounds to prevent the generation of dust where required. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff as outlined in the Construction and Environmental Management Plan (CEMP).
- Areas of excavation will be kept to a minimum and stockpiling of excavated material will be minimised by coordinating excavation, placement of material in peat management areas. Areas of excavation will be kept to a minimum and stockpiling of excavated material will be minimised by coordinating excavation and placement of material in peat management areas.
- Turbines components, construction materials and grid connection infrastructure will be transported to the Site on specified haul routes only, as agreed with the local authority.
- The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as deemed necessary by the construction Site Supervisor/Site Manager.
- The transport of construction materials may have the potential to generate dust in dry weather conditions. Roads will be watered down to suppress dust particles in the air as deemed necessary by the Site Supervisor/Manager.
- The transport of dry excavated material from the on-site borrow pits, which may have potential to generate dust will be minimised. If necessary, such as in periods of dry weather, excavated material will be dampened prior to transport from the borrow pits.
- A CEMP will be in place throughout the construction phase (see Appendix 4-4). The CEMP includes dust suppression measures.

Residual Effect

With the implementation of the above, the Proposed Project is considered to have a short-term, imperceptible, negative effect on air quality brought about by dust emissions generated during the construction activities.

Significance of Effects

Based on the assessment above there will be no significant direct or indirect effects on air quality due to dust emissions during the construction phase of the Proposed Project.

10.3.3 Operational Phase

10.3.3.1 Exhaust Emissions

The operational phase of the Proposed Project will generate additional traffic to the area in the form of light goods vehicles (LGVs) visiting the Site 1-2 times per day for inspections but on occasion, daily visits by Light Goods Vehicles (LGVs) and Heavy Goods Vehicle (HGVs) may be required over short periods during maintenance/component replacement activities.

The permanent 220kV substation will be operated and maintained by ESB. It is anticipated that substation operators will visit the Site 1-2 times per day in LGVs but on occasion, HGVs may be required to visit the Site for maintenance/substation component replacement. On occasion, the removal of hydrocarbons (transformer oil) and waste from substation welfare facilities will be removed from the Site by a licenced waste disposal company.

The addition of a LGV to the area 1-2 times per day type during the operational phase will give rise to a long-term imperceptible negative impact on air quality. The addition of several HGVs on occasion over the thirty-five-year lifetime of the Proposed Project will give rise to a long-term imperceptible negative effect on air quality.

In addition to the above, as a number of sections of the Site are located within commercial forestry, which will require machinery for tree felling, in order to utilise the Site as required.

Mitigation

- 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.

Residual Effects

Following implementation of the mitigation measures above, residual impacts of exhaust emissions for the operational phase of the Proposed Project will have a long-term imperceptible negative effect.

Significance of Effects

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

10.3.3.2 Dust Emissions

As discussed above in section 10.2.3.1, the operational phase of the Proposed Project will generate additional traffic to the area in the form of LGVs 1-2 visits per day and on occasion, daily LGVs and HGVs for short periods if maintenance or component replacement is required. This additional traffic may give rise to dust emissions. This will be a long-term imperceptible negative impact on air quality due to dust emissions.

Mitigation Measures

- Maintenance vehicles brought onsite during the operational phase will be maintained in good operational order, thereby minimising any dust emissions that arise.
- Waste material will be transferred to a licensed /permitted Materials Recovery Facility
- (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be local to the Site to reduce the emissions associated with vehicle movements.

Residual Effect

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

Significance of Effects

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

10.3.3.3 Air Quality

The Proposed Project, by providing an alternative to electricity derived from coal, oil or gas-fired power stations, 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, and thus not requiring mitigation. Further details on the carbon dioxide savings associated with the Proposed Project are presented in Section 11.5 of Chapter 11 – Climate.

Residual Effect

There will be a Long-term Significant Positive effect on air quality. For the purposes of this EIAR, a rated output of 7.2 MW has been chosen to calculate the power output of the proposed 11-turbine Proposed Project, which would result in an estimated installed capacity of 79.2 MW of electricity that doesn't directly emit carbon dioxide (CO_2), oxides of nitrogen (NO_x), or sulphur dioxide (SO_2). Whilst there are potentially higher rated turbines, the residual effect will not be altered.

Significance of Effects

Based on the assessment above there will be a significant positive effect on air quality due to the operation of the Proposed Project.

10.3.3.3.2 *Human Health*

Whilst the operational phases of the Proposed Project will give rise to minor increases 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 is 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, Pb, benzene and O_3 are thought 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 impact on human health. Further information on the impact of the Proposed Project on Human Health is contained in Chapter 5: Population and Human Health.

Residual Effect

Residual impact on human health during the operational phase of the Proposed Project will have a long-term, slight, positive effect.

Significance of Effects

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

10.3.4 Decommissioning Phase

The wind turbines proposed as part of the Proposed Project are expected to have a lifespan of approximately thirty-five-years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Project may be decommissioned fully.

The works required during the decommissioning phase are described in Section 4.9 of Chapter 4. Any impact and consequential effects that occur during the decommissioning phase are similar to that which occur during the construction phase, be it of less impact. The electrical cabling connecting the Proposed Project to the national grid in the townland of Laughil will be removed from the underground cable ducting at the end of the useful life of the Proposed Project. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible. Likewise, the substation will remain on site resulting in no additional truck movements or requirement for demolitions and removal works for this piece of infrastructure. The mitigation measures prescribed for the construction phase of the Proposed Project will be implemented during the decommissioning phase thereby minimising any potential impacts.

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 local authority prior to any decommissioning. Any impact and consequential effect that occurs during the decommissioning phase are similar to that which occur during the construction phase, be it of less 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 Project has been fully assessed in this EIAR.

10.3.5 Cumulative Assessment

Potential cumulative effects on air quality between the Proposed Project and other developments in the vicinity were also considered as part of this assessment. The developments considered as part of this

cumulative effect assessment are presented in Appendix 2-3 of this EIAR, with relevant developments within 1.63km of the red line planning application boundary presented below in Table 10-19 below.

Table 10-19: Developments with the potential to cause cumulative effects on air quality alongside the Proposed Project.

Planning Ref.	Description	Decision/ Planning Application Status
191827	For the construction of a new forest road bellmouth entrance, for trucks to access forestry plantations and associated site works	Conditional by Galway County Council 27/01/2020
2360604	To construct an extension to the existing playground/children's activity play area & all ancillary site works	Conditional by Galway County Council 24/07/2023
2460230	For the development consisting of a new 38kV overhead line from existing Glenamaddy 38kV station to existing cable ducts approximately 720 metres East of the existing Cloon 110kV station at Cloonascragh.	Further information requested by Galway County Council
2460013	The development of a quarry for the extraction of sand in a phased basis over an area of c. 6.2 ha by an average depth of 3m from existing ground levels in the townland of Lomaunaghbaun, Co. Galway.	Further Information is the current Application Status of this application.

The nature of the Proposed Project is such that, once operational, it will have a long-term, moderate, positive effect on the air quality. Emissions of carbon dioxide (CO2), oxides of nitrogen (NOx), sulphur dioxide (SO2) or dust emissions during the operational phases of the Proposed Project and other developments, listed in Appendix 2-3 of Chapter 2 and in Table 10-19 above, will be minimal, relating to the use of operation and maintenance vehicles onsite, and therefore there will be a long-term, imperceptible, negative cumulative effect on air quality. During the construction phase of the Proposed Project and considering the potential cumulative effect with other existing and proposed developments listed in Appendix 2-3 and within 1.63km of the red line planning application boundary, there will be exhaust emissions from construction plant and machinery and potential dust emissions associated with all construction activities. Should these developments be constructed simultaneously, there will be a short-term, slight negative cumulative effect on air quality due to vehicular and dust emissions.