Indirect, negative, slight, short term, likely impact to local groundwater quality.

Mitigation Measures

Oil used in transformers (within each turbine transformer) and any storage of oils or hydrocarbons within the Proposed Development site could potentially leak during the decommissioning phase and impact on groundwater or surface water quality. Turbine transformers are located within the turbine hardstands, with dedicated concrete foundations, so any leaks would be contained within the turbine transformer units and hydrocarbons would not be able to permeate to ground. In addition:

- All plant and machinery to be serviced before being mobilised to site;
- No plant maintenance completed on-site, any broken-down plant removed from site to be fixed;
- Refuelling completed in a controlled manner using drip trays at all times;
- Mobile bowsers, tanks and drums stored in secure, impermeable bunded storage areas away from open water;
- Only designated trained operators authorised to refuel plant on-site;
- Procedures and contingency plans set up to deal with emergency accidents or spills; and,
- Highest standards of site management maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during works.

These mitigation measures are considered sufficient to reduce risk to ground/peat/soils and subsoils, and to groundwater and surface water quality.

Residual Impacts

The implementation of the above mitigation measures will result in a residual **neutral, imperceptible, direct, short term, unlikely impact** to surface water and groundwater. There was no recorded or observed evidence of storage of significant quantities of hydrocarbons or other chemicals, nor any leakages or spillages of hydrocarbons during the site walkover.

Significance of Effects

No significant effects on the water environment are envisaged during the decommissioning stage of the Proposed Development.

9.4.6 Potential Hydrological Impacts on Designated Sites

Pathway:

- Indirect deterioration of surface water and ground water quality.

Receptor:

- Slaney River Valley SAC (000781)
- Wexford Slobs and Harbour SPA (004076)
- Slaney River Valley pNHA [000781]

Pre-Mitigation Potential Impact:

Short-term slight reversable impact on aquatic habitats and the aquatic fauna they support, of local, National, and International importance.

Impact Assessment and Implemented Mitigation Measures:

Whilst no significant effects on water quality are anticipated during the operational phase of the Proposed Development, any potential for effects on water quality associated with the operational phase drainage of the site has been fully mitigated through appropriate design and mitigation as fully described below:

- All plant and machinery to be serviced before being mobilised to site;
- No plant maintenance completed on-site, any broken-down plant removed from site to be fixed;
- Should it be required on site, refuelling will be completed in a controlled manner using drip trays at all times on impermeable surfaces;
- Mobile bowsers, tanks and drums stored in secure, impermeable bunded storage areas a minimum of 50m from open water;
- Only designated trained operators authorised to refuel plant on-site; and
- Procedures and contingency plans set up to deal with emergency accidents or spills.

Residual Impact

No potential for significant effect has been identified at any geographic scale as a result of the Proposed Development. The residual impact will be the same for any selected turbine that is within the range of dimensions for which planning permission is sought.

Significance of Effects

No significant effects on the designated sites are envisaged during the decommissioning stage of the Proposed Development.

9.5 Cumulative Impacts

The hydrological impact assessment undertaken in this chapter finds that significant effects are unlikely due to the limited nature of the works associated with the extension of life of the existing Castledockrell Wind Farm. Potential cumulative effects on local hydrology or hydrogeology between the Proposed Development and other developments in the vicinity, including those listed in Section 2.7.2 of this EIAR, were also considered as part of this assessment. The nearest wind energy development to the existing Castledockrell Wind Farm is the existing Turbine 12 of the Castledockrell Wind Farm, granted under a separate planning application (WCC Ref 2008/0335), approximately 330m from T11, its closest point, and Bola More Wind Farm, located approximately 2.6km west-northwest of the Proposed Development. The existing Bola More Wind Farm was also subject to an EIA that identified mitigation measures to ensure that no significant impact to surface waters, groundwaters or coastal waters would occur.

Beyond cumulative wind farm assessment in the study area, the existing 110kV underground grid connection cable was also assessed for potential effects upon hydrology and hydrogeology. The grid connection is composed of approximately 8.1km of buried 110kVkV transmission line from the onsite 110kV substation at the existing Castledockrell Wind Farm to the existing Lodgewood 220kV substation, to the southeast of the Proposed Development. The grid connection is an existing linear underground infrastructure and there are no associated potential impact pathways which could lead to significant effects in combination with the Proposed Development.

Due to the limited scale of other developments in the vicinity, there is little potential for significant impacts to surface waters, groundwaters or coastal waters resulting from those developments. Therefore, **no significant cumulative effects** on local hydrology or hydrogeology are anticipated during the continued operation of the Proposed Development.

10. AIR AND CLIMATE

10.1 Introduction

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality and climate arising from the continued operation and decommissioning of the Proposed Development. A full description of the Proposed Development is contained in Chapter 4 of this EIAR.

The existing Castledockrell Wind Farm is located 8.1km west of Ferns and 6.5km south of Bunclody, Co. Wexford. The Proposed Development site covers approximately 97 hectares (ha) with a development footprint of circa. 3.04ha. The existing Castledockrell Wind Farm comprises lands in the townlands of Kilcullen, Ballynelahillan, Carranroe, Tomatee, Knockduff and Sroughmore. The existing wind farm consists of 12 no. turbines, however, the Proposed Development includes for the continuation of 11 no turbines, with a total rated capacity of c.25.3 Megawatts (MW), which became operational in 2011.

The existing Castledockrell Wind Farm is based within agricultural lands, which is split between pastural land and arable land. No additional changes to the current land-uses of agriculture are proposed for the site.

Due to the non-industrial nature of the wind farm and the fact that it is already operational and does not require a construction phase, and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR. It is expected that air quality in the existing environment is good, since there are no major sources of air pollution (e.g., heavy industry) in close proximity to the site.

The production of energy from wind turbines has no direct emissions as is expected from fossil fuel-based power stations. Harnessing more energy by means of wind farms will reduce dependency on fossil fuels, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment. Emissions from the operation and decommissioning phases of the Proposed Development are addressed in Section 10.2.3 and Section 10.2.4.

10.1.1.1 Statement of Authority

This chapter of the EIAR was completed by Keelin Bourke and Catherine Johnson and reviewed by Gráinne Griffin and Sean Creedon, all of MKO. Keelin is a graduate Environmental Scientist with MKO having joined the company in September 2023. Keelin holds a BSc (Hons) in Environmental Science from University College Cork and an MSc (Dist) in Environmental Engineering from Trinity College Dublin. Prior to taking up her position with MKO, Keelin worked as an Environmental Health and Safey Officer in an EPA licensed Waste Transfer Station in Cork City. Keelin's current key strengths and areas of expertise are in environmental surveying, report writing and environmental mapping. Since joining MKO, Keelin has become a member of the MKO Environmental Renewables Team which work on producing high quality Environmental Impact Assessment Reports for a variety of Renewable Energy clients. Catherine is an Environmental Scientist and Climate Practitioner with MKO with over one year of private consultancy experience and expertise in climate and sustainability matters. Catherine holds a BSc in Earth and Ocean Science and a LLM in Global Environment and Climate Change Law. Prior to taking up her position with MKO in October 2022, Catherine worked as an Environmental Social Governance (ESG) analyst for Acasta in Edinburgh. Catherine has expertise regarding international climate law and policy, earth processes, ocean science, and sustainability/ESG. Since joining MKO Catherine has been involved in a myriad of environmental service offerings at MKO including EIA Screenings and Reports, climate and sustainability related work and renewable energy infrastructure projects. Within MKO Catherine plays a large role in company sustainability and

a more focused climate service offering and holds a graduate membership for the Charted Institution of Water and Environmental Management.

Gráinne is an Environmental Scientist with MKO with over 4 years' experience in the environmental consultancy sector, which included ecological roles as a marine mammal observer and an aerial survey operator. Gráinne holds a BSc in Applied Freshwater & Marine Biology from ATU Galway and a MSc in Environmental Leadership from the University of Galway. Gráinne's key strengths and areas of expertise include managing and researching reports in areas of environmental conservation and policy, ecology, renewable energy, marine spatial planning, and climate action. Gráinne has experience in report writing, including Appropriate Assessments, Natura Impact Statements, feasibility studies and EIA screening reports. Gráinne also holds skills in environmental restoration project research and design. Since joining MKO Gráinne has been involved in coordinating environmental site work for a wide range of developments, assisting in stakeholder engagement, scoping exercises, organising and attending pre-application meetings with local authorities and An Bord Pleanála. Within MKO, Gráinne has been assisting managers in the coordination and production of EIARs for largescale SID wind energy developments. Gráinne also holds a membership with the Chartered Institute of Ecology and Environmental Management (CIEEM).

Sean is an Associate Director in the Environment Team at MKO. He oversees a team of highly skilled environmental professionals working on EIAR for large-and medium scale Renewable Energy infrastructure. Sean has directed and overseen multiple renewable energy projects across wind, solar, battery and hydrogen as well as a range of thermal and other energy related developments. He has worked on the planning and environmental impact elements within all stages of wind farm project delivery. He is a member of the MKO senior management team responsible for developing the business, mentoring team members, fostering a positive culture and promoting continuous employee professional development. Sean has over 22 years' experience in program and project development, holds an MSc from NUI Galway and a Diploma in Project Management from Institute of Project Management Ireland

10.2 Air Quality

10.2.1 Relevant Guidance

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

- Air Quality Assessment of 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)
- Environmental Protection Agency (2023) Air Quality in Ireland Report 2022.
- Environmental Protection Agency (2021) Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects.
- European Environment Agency (2022) Air Quality in Europe 2022
- Guidance on the Assessment of Dust from Demolition and Construction V2.2 (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 Road Schemes (TII, 2009)
- Rialtas na Éireann Clean Air Strategy for Ireland (April 2023)

- **UK Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management, (LAQM) (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 2005 (WHO 2005).**

10.2.2 Relevant Legislation

In order to reduce human health risk resulting from poor air quality, national and European statutory bodies set limit values in ambient air for a range of pollutants. The applicable legal standards in Ireland are described below.

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) 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 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 $PM_{2.5}$ (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 PM_{10}) 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 ($\mu g/m^3$). 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).

10.2.3 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 CAFÉ Directive 2008/50.EC (Source: https://www.epa.ie/air/quality/standards/)

Pollutant	Limit Value Objective	Averaging Period	Limit Value (ug/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
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

Pollutant	Limit Value Objective	Averaging Period	Limit Value (ug/m³)	Basis of Application of Limit Value	Attainment Date
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 CAFÉ Directive 2008/50/EC

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	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
Particulate matter 10 (PM_{10})	Lower assessment threshold	24 hours	25	Not to be exceeded more than 35 times in a calendar year

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Basis of Application of Limit Value
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 CAFÉ 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 values 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 Target Value for 2020
Protection of human health	Maximum daily 8-hour mean	120 µg/m³ not to be exceeded more than 25 days per calendar year averaged over 3 years	120 µg/m³
Protection of vegetation	AOT40* calculated from 1-hour values from May to July	18,000 µg/m³.h averaged over 5 years	6,000 µg/m³.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 g/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/m³
Alert Threshold	1-hour average	240 µg/m³

On the 26th of October 2022 the EU Commission announced a proposed review of Air Quality Standards[1]. 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

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

air at the latest by 2050, in synergy with climate-neutrality efforts. To this end, regular reviews of the air quality standards are proposed to reassess them in line with latest scientific evidence as well as societal and technological developments. The first review is proposed to take place by the end of 2028, with the objective of ensuring full alignment with WHO recommendations[2].

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.

10.2.3.1 Air Quality and Health

In September 2024, the EPA published 'Air Quality in Ireland 2023'[3] which reports that although met the current EU legal air quality limits in 2023, monitoring results were higher than the more stringent health-based World Health Organization air quality guidelines for a number of pollutants including: particulate matter (PM), nitrogen dioxide (NO2), sulphur dioxide (SO2) and ozone (O3). The main sources of these pollutants are the burning of solid fuel in our towns and villages and traffic in our cities. . 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 alignment with the World Health Organisation (WHO) Air Quality guidelines, this will be challenging but will have a significantly positive impact on health. Despite comparing favourably with many of our European neighbours, Ireland's 2023 monitoring results would exceed the soon-approaching 2026 targets,

The European Environmental Agency (EEA) Report, 'Air Quality in Europe – 2022 Report'[4] highlights the negative effects of air pollution on human health across the EU. The report assessed that poor air quality accounted for premature deaths of approximately 238,000 people in the 27 EU Member States in 2021.[5] 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 Organization. Furthermore, in 2020, damaging levels of nitrogen deposition to ecosystems were exceeded in 75% of the total ecosystem area 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).

The EEA published a briefing on Europe's air quality status in April 2024[6]. This briefing presented the status of concentrations of pollution in ambient air in 2022 and 2023 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 operational and decommissioning phases of the Proposed Development, mitigation measures will be implemented at

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2 Revision of the Ambient Air Quality Directives <https://environment.ec.europa.eu/topics/air/air-quality/revision-ambient-air-quality-directives_en>

[3] Environmental Protection Agency: Air Quality in Ireland 2023. Available at: https://www.epa.ie/publications/monitoring-assessment/air/air-quality-in-ireland-2023.php#:~:text=Summary%3A%20Air%20quality%20in%20Ireland,based%20WHO%20guidelines%20in%202023.

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

[5] European Environmental Agency (2022) <https://www.eea.europa.eu/publications/air-quality-in-europe-2022/>

[6] Europe's air quality status 2024 briefing. https://www.eea.europa.eu//publications/europes-air-quality-status-2024

this site to reduce the impact from dust and vehicle emissions, which are discussed in Section 10.2.5 below. 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.'[7] This article details the CO2 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 CO2/kWh) of electricity generated, compared with about 980 g CO2/kWh for coal and roughly 465 g CO2/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. As stated above, air pollution is responsible for a large number of premature deaths relating to these illnesses.

These emissions, along with others including sulphur oxides (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.

A 2020 EPA report *'Ireland's Environment – An Integrated Assessment'*[8] states that the pollutants of most concern are NO_x, (the collective term for the gases nitric oxide and nitrogen dioxide, PM (particulate matter) and O_3 (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 Development therefore represents an opportunity to continue to 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 (CO2), oxides of nitrogen (NOx), and sulphur dioxide SO2, thereby resulting in cleaner air and associated positive health effects.

Whilst there is the potential of such emissions to be generated from the site operations, several mitigation measures will be implemented at the Proposed Development site to reduce the impact from dust and vehicle emissions, which are discussed in Section 10.2.6 below.

10.2.3.2 Clean Air Strategy for Ireland 2023

Irelands Clean Air Strategy 2023[9] 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.

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[7] *Office of Energy Efficiency and Renewable Energy (2023) How Wind Can Help Us Breathe Easier*
[8] *Ireland's Environment – An Integrated Assessment (2020)* <https://www.epa.ie/our-services/monitoring-assessment/assessment/irelands-environment/state-of-environment-report-/
[9] *Clean Air Strategy for Ireland (2023)* https://www.gov.ie/pdf/?file=https://assets.gov.ie/255392/efe212df-d9a7-4831-a887-bea2703e2c64.pdf#page=null

- 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.

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 States 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 (reaffirmed in the most recent Climate Action Plan 2024), 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, 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 European Green Deal are to deliver net-zero greenhouse gas emissions by 2050 and reduce GHG emissions to at least 55% by 2030, compared to 1990 levels. For further details on greenhouse gas emissions please refer to Section 10.3 below.

10.2.4 Methodology

10.2.4.1 Air Quality Zones

The air quality zone for the site was selected, followed by a review of EPA collated baseline air quality data namely Sulphur Dioxide (SO_2), Particulate Matter (PM_{10}), Nitrogen Dioxide (NO_2), Carbon

Monoxide (CO) and Ozone (O_3) for the selected air quality zone to determine the representative levels of such emissions for the Proposed Development.

The EPA has designated four Air Quality Zones for Ireland:

- Zone A: Dublin
- Zone B: Cork
- Zone C: Other cities and large towns including Limerick, Galway, Mullingar
- Zone D: Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C.

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 Development lies within Zone D, which represents rural areas located away from large population centres.

10.2.4.2 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 2023' was published by the EPA in 2024. The EPA reports provide SO2, PM10, NO2 and O3 concentrations for areas in Zone D. These are detailed in the Baseline Air Quality section below.

10.2.4.3 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 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,
- Earthworks.
- Construction.
- Trackout[10].

The magnitude of dust generating activities is divided into 'Large', 'Medium' or 'Small' scale depending on the nature of the activities involved. The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. IAQM (2024) guidance provides example definitions for the scale of the activities, and these are applied for the Proposed Development as outlined in Table 10-5 below.

[10] *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*

Table 10-5 Description of magnitude for nature of activities IAQM 2024 Guidance

	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 Proposed Development is currently operational and there are no proposed demolition, earthworks or construction activities onsite associated with a construction phase, which would produce the opportunity for trackout to occur. However, this EIAR includes for an assessment of the decommissioning of the Proposed Development. On this basis, the Proposed Development is considered 'Small' in magnitude and the following assessment looks to examine the potential for dust impacts to occur relative to the decommissioning phase.

10.2.4.3.1 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 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.

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/m³	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32 µg/m³	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<250
Medium	>32 $\mu g/m^3$	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32 $\mu g/m^3$	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28 $\mu g/m^3$	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 $\mu g/m^3$	>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 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 high ecological sensitive receptors, as described by the IAQM (2024) guidance within 50m of the Proposed Development. Therefore, dust impacts on ecological receptors have been scoped out from this assessment.

10.2.4.3.2 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 and Demolition (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 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 Demolition, Earthwork and Trackout activities from the Proposed Development is summarised in Section 10.2.5 below.

10.2.5 Baseline Air Quality

The air quality in the vicinity of the Proposed Development site is typical of that of rural areas in the southeast 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 2023' was published by the EPA in 2024. The EPA reports provide SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D. Values for each of these elements recorded within the Zone D monitoring stations listed in the report, have been averaged to give representative values for Zone D. Similar measurement values for all air quality parameters would be expected for the Proposed Development site as it lies in a rural location, within Zone D.

10.2.5.1 Sulphur Dioxide (SO_2)

Sulphur dioxide data for Cork Harbour, Kilkitt, Shannon Estuary/Askeaton, Edenderry and Letterkenny in 2023 is presented in Table 10-11.

Table 10-11 Average Sulphur Dioxide Data for Zone D in 2023.

Parameter	Measurement
Annual Mean	4.3 µg/m³
Average Hourly values > 350	0.0

Average Hourly max	80.9 ug/m³
Daily values > 125	0
Average Daily max	23.2 µg/m³

During the monitoring period there were no exceedances of the daily limit values for the protection of human health. As can be observed from Table 10-13 the average maximum hourly value recorded during the assessment period was 80.9 µg/m3. In addition, there were no exceedances of the annual mean limit for the protection of ecosystems. It would be expected, based on professional judgement that SO_2 values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites above.

10.2.5.2 Particulate Matter (PM_{10})

Sources of particulate matter include vehicle exhaust emissions, dust from soil and road surfaces, demolition works and industrial emissions. The EPA report provides annual mean PM_{10} concentration for sixteen Zone D towns, Tipperary Town, Carrick-on-Shannon, Enniscorthy, Birr, Macroom, Castlebar, Cobh Carrignafoy, Claremorris, Kilkitt, Cavan, Edenderry, Mallow, Longford, Cobh Cork Harbour, Roscommon Town and Killarney. Particulate matter (PM_{10}) data for 2023 is presented in Table 10-12.

Table 10-12 Average Particulate Matter (PM10) Data for Zone D Sites in 2022.

Parameter	Measurement
Annual Mean	11.0 µg/m³
% Data Capture	90.8%
Values > 50 ug/m3	Max 6 (Edenderry)
Daily Max	45.4 µg/m³

Notes: 1- PM10 daily limit for the protection of human health: No more than 35 days >50 µg/m3

The daily limit of 50 µg/m3 for the protection of human health was exceeded on 13 days which is less 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 Edenderry where the PM_{10} daily limit was exceeded on 6 occasions. In the EPA 2023 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 Development site would be similar or lower than those recorded for the Zone D sites above.

10.2.5.3 Nitrogen Dioxide (NO_2)

Nitrogen dioxide data for Birr, Briarhill, Castlebar, Carrick-on-Shannon, Edenderry, Emo Court and Kilkitt in 2023 is presented in Table 10-13.

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

Parameter	Measurement
Annual Mean	8.1 µg/m³
NO_2 Values >200	0
Values > 140 (UAT)	0
Values >100 (LAT)	4
Hourly Max	67.6 µg/m³

The annual NO_2 value was below the annual mean limit value for the protection of human health of 40 µg/m³. The lower assessment threshold of 100 µg/m³ was exceeded 4 no. times during the monitoring

period in Briarhill and the upper assessment threshold of 140 µg/m3 was not exceeded during the monitoring period. The 18 days limit during the monitoring period was not exceeded. In 2023, 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 67.6 µg/m^3 measured during the monitoring period was below the hourly max threshold of 200 µg/m^3. It would be expected that NO_2 values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites above.

10.2.5.4 Carbon Monoxide (CO)

The EPA report provide rolling 8-hour carbon monoxide concentrations for Birr a Zone D site. Carbon Monoxide data for 2023 is presented in Table 10-14.

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

Parameter	Measurement
Annual Mean	0.6 mg/m^3
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 10mg/m^3). On no occasions were values in excess of the 10 mg limit value set out in Directive 2008/69/EC. It would be expected that CO values at the Proposed Development site would be similar or lower than those recorded for the Zone D site above.

10.2.5.5 Ozone (O_3)

The EPA report provide 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 2023 is presented in Table 10-15. As can be observed from Table 10-15, there were 10 no. exceedances of the maximum daily eight-hour limit of 120 µg/m^3. The CAFÉ 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 that O_3 values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites below.

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

Parameter	Measurement
Annual Mean	61.5µg/m^3
Median	72.8 µg/m^3
% Data Capture	95.5%
No. of days > 120	10 days

10.2.5.6 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/m²/day. The EPA recommends a maximum daily deposition level of 350 mg/m²/day when measured according to the TA Luft Standard 2002[11],[12].

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, peat, 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.

The Proposed Development is currently operational and there are no construction activities or works envisaged which would produce perceptible levels of dust during its continued operation.

10.2.6 Likely Significant Effects and Associated Mitigation Measures

10.2.6.1 'Do-Nothing' Effect

If the Proposed Development for the extension of the operational period of the existing Castledockrell Wind Farm were not to proceed, the wind farm would be decommissioned in 2025 under the requirements of its current permission. In doing so, the environmental effects in terms of emissions are likely to be neutral. 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 the renewable energy sources such as the extended operational life of this wind farm. This will result in an indirect negative impact on air quality nationally, regionally and locally.

Under the Do-Nothing scenario, the Proposed Development would be decommissioned in accordance with the conditions of the current planning permission (WCC Pl. Ref. 2004/4702, ABP Ref PL26.211725), once this permission expires in 2025. Should the Decommissioning Plan as set out in the current conditions be implemented it may lead to environmental effects on air quality due to the potential increase in emissions from construction plant and vehicles required to remove the existing turbines and other infrastructure.

There would be exhaust emissions from construction plant and vehicles, and potential dust emissions due to the movement of the same associated with the decommissioning of the wind farm. A Decommissioning Plan will be agreed with the local authority at least 3 months prior to the start of decommissioning works which would include mitigation measures to reduce any potential negative impacts on the environment. However, a preliminary decommissioning plan has been prepared and is included in Appendix 4-4 of this EIAR.

The effect of decommissioning is considered **neutral** in the context of the EIAR.

10.2.6.2 Construction Phase

The Castledockrell Wind Farm is currently operational, and it is proposed to extend the duration of operation of the wind farm by 20 years, until 2045. No construction activities will occur as part of the Proposed Development, therefore there are **no construction phase effects** on air quality.

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[11] *Environmental Protection Agency Office of Environmental Enforcement (OEE) Air Emissions Monitoring Guidance Note (AG2), Revision 4 (May 2018). EPA: Wexford, Ireland Available at:* <<http://www.epa.ie/pubs/advice/air/emissions/Emission_Monitoring_Guidance_AG2_May2018.pdf>>

[12] *Technical Instructions on Air Quality Control TA Luft (2002) English Translation. Available at:* <http://www.cement.or.kr/mater_down/UMEG_TA-Luft2002_Englisch.pdf>>

10.2.6.3 Operational Phase

10.2.6.3.1 *Exhaust Emissions*

Exhaust emissions associated with the operational phase of the Proposed Development will arise from machinery and Light Goods Vehicles (LGV) that are intermittently required onsite for maintenance. This will give rise to a **Long-term Imperceptible Negative Effect**.

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.

Residual Effects

The implementation of the above mitigation measures will result in a residual **Long-term, Imperceptible, Negative Effect** upon air quality.

Significance of Effects

Based on the assessment above there will be **No Significant Direct or Indirect Effects**.

10.2.6.3.2 *Air Quality*

By providing an alternative to electricity derived from coal, oil or gas-fired power stations, the Proposed Development has resulted, and will continue to result in emission savings of carbon dioxide (CO_2), oxides of nitrogen (NO_2), and sulphur dioxide (SO_2) during its operational phase. The production of renewable energy from the Proposed Development will have a **Long-Term Moderate Positive Effect** on air quality. Further details on the carbon dioxide savings associated with the Proposed Development are presented in Section 10.3.3 below.

Residual Effect

Based on the assessment above there will be a **Long-Term Moderate Positive Effect** on air quality due to the continued operation of the Proposed Development.

Significance of Effects

Based on the assessment above there will be a **Moderate Positive Direct and Indirect Effect** on-air quality due to the continued operation of the Proposed Development.

10.2.6.3.3 *Human Health*

Long-term exposure to chemicals such as SO_2 and NOx are harmful to human health. The production of clean, renewable energy from the Proposed Development has offset, and will continue to 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 Development on Human Health is contained in Chapter 5: Population and Human Health.

Residual Effect

Based on the assessment above there will be a **Long-term Slight Positive Effect** on human health due to the continued operation of the Proposed Development.

Significance of Effects

Based on the assessment above there will be a **Long-term Slight Positive Effect** on human health due to the operation of the Proposed Development.

10.2.6.4 Decommissioning Phase

The potential impacts associated with decommissioning of the Proposed Development (2045 should planning permission be granted for the Proposed Development) will be similar to those associated with a typical wind farm construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works, as outlined in Chapter 4, Section 4.6 of this EIAR.

A preliminary Decommissioning Plan for the Proposed Development, see Appendix 4-4, contains details which will be agreed with the local authority prior to any decommissioning. The potential for effects during the decommissioning phase of the Proposed Development has been fully assessed in the EIAR.

10.2.6.4.1 *Exhaust Emissions*

The dismantling of turbines and removal offsite, electrical cabling removal (ducting remaining), and turbine foundation backfilling (as outlined in Appendix 4-4 Decommissioning Plan) 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 decommissioning phase and localised to works areas. Therefore, this is considered a **Short-term, Slight, Negative Effect.**

The transport of turbine components, construction materials, waste and workers to and from the site, (see Section 14.1 of this EIAR), will also give rise to exhaust emissions associated with the transport vehicles. This constitutes a **Short-term, Slight, Negative Effect** in terms of air quality.

Mitigation

Mitigation measures in relation to exhaust emissions are presented below:

- All construction vehicles and plant used onsite during the decommissioning 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 from the Site on specified routes only, as agreed with the Planning Authority prior to decommissioning.
- 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 Materials Recovery Facility (MRF) facility will be as close as possible to the Proposed Development site to reduce the amount of emissions associated with vehicle movements.

Residual Effect

The implementation of the above mitigation measures will result in a residual **Short-term, Imperceptible, Negative Effect upon air quality.**

Significance of Effects

Based on the assessment above there will be **No Significant Direct or Indirect Effects**.

10.2.6.4.2 *Dust Emissions*

The decommissioning of turbines and associated foundations and hard-standing areas, access tracks and underground cabling will give rise to dust emissions.

The IAQM (2024) methodology for ***the Assessment of Dust from Demolition and Construction*** as discussed in Section 10.2.4.2 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 no High Sensitive Receptors located within 20m of the Proposed Development site boundary;
- There are no High Sensitive Receptor within 50m of the Proposed Development site boundary
- There are 2 no. High Sensitive Receptors within 100m of the Proposed Development site boundary
- There are 18 no. High Sensitive Receptors within 250m of the Proposed Development site boundary

Table 10-16 below identifies the sensitivity of the Area to Dust Soiling Effects on People and Property surrounding the Proposed Development to dust soiling effects, as described in Section 10.2.4.3 above. The overall sensitivity of the area to dust soiling effects is considered to be Low.

Table 10-16 Sensitivity of the Area to Dust Soiling Effects on People and property from the Proposed Development decommissioning 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 Proposed Development to the health effects of PM_{10}, as described in Section 10.2.4.3 above. The overall sensitivity of the area to human health effects of PM_{10} is considered to be Low.

As indicated in Section 10.2.5.2 above, the Proposed Development is situated in Zone D. According to the 2022 EPA baseline air quality data; the average PM_{10} for Zone D is 11.10µg/m^3. Therefore, the only

annual PM_{10} concentration categorised in the IAQM (2024) guidance relevant to the Proposed Development is the minimum concentration of <24µg/m³ (<14 µg/m³ in Scotland).

Table 10-17 Sensitivity of the Area to Human Health Impacts from the Proposed Development Decommissioning 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/m³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	<24 µg/m³	>10	Low	Low	Low	Low
		1-10				
Low	-	≥1	Low	Low	Low	Low

As described in Section 10.2.4.3 above, the Proposed Development is classified as 'Small' for Earthworks, Demolition and Trackout activities. Therefore, when combined with the sensitivity of the area, using Table 10-9 above as guidance, the pre-mitigation risk of impacts from the Proposed Development is summarised in Table 10-18 below.

Table 10-18 Summary Dust Risk Table for the Proposed Development Decommissioning Activities

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Low Risk	N/A	Low Risk
Human Health	Low Risk	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 decommissioning phase of the Proposed Development is Low. Therefore, the potential effects of dust from the construction phase of the Proposed Development are considered to be equivalent to **Short-term, Slight Negative** effects.

Mitigation

Mitigation & monitoring measures for the Proposed Development are outlined below:

- Sporadic wetting of loose stone surface will be carried out during the decommissioning 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 Wind Farm Site.
- Turbines will be transported away from site on specified haul routes only, which will be agreed prior to decommissioning with Wexford County Council.
- The roads adjacent to the site entrances will be checked weekly for damage/potholes and repaired as necessary.
- Waste material will be transferred to a licensed/permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be

local to the Proposed Development to reduce the amount of emissions associated with vehicle movements

- **An Operational and Environmental Management Plan (OEMP) will be in place throughout the decommissioning phase (see Appendix 4-3). The OEMP includes dust suppression measures.**

Residual Effect

With the implementation of the above, the Proposed Development is considered to have a **Short-term, Not Significant, Negative Effect** on air quality brought about by dust emissions generated during the decommissioning activities.

Significance of Effects

Based on the assessment above there will be **No Significant Direct or Indirect Effects**.

10.3 Climate

All relevant legislation and policy in relation to climate is outlined in detail in Chapter 2 of this EIAR. A summary of the same is provided in the following sections.

10.3.1 Relevant Guidance

The climate section of this EIAR is carried out in accordance with the 'EIA Directive' as amended by Directive 2014/52/EU and has been prepared in accordance with guidance listed in Section 1.7.2 of Chapter 1: Introduction. Due to the nature of the Proposed Development, a wind farm project, the following methodology and guidance was utilised for the climate section of this EIAR:

- ***Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*** (2013) European Commission
- ***Calculating Carbon Savings from Wind Farms on Scottish Peat Lands*** (University of Aberdeen and the Macauley Institute 2008)
- ***Wind Farms and Carbon Savings*** (Scottish Natural Heritage, 2003)
- Macauley Institute Carbon Calculator for Wind Farms on Scottish Peatlands (Version 1.7.0) (2022)
- Transport Infrastructure Ireland (TII) Carbon Assessment Tool (Version 0.6.19) (TII, 2020)

Consideration has also been given to the ***'Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107'*** (Transport Infrastructure Ireland, December 2022 (2022a)), ***Climate Assessment of Proposed National Roads – Standard and Overarching technical Documentation*** (Transport Infrastructure Ireland December 2022b/c) and Transport Infrastructure Ireland Carbon Tool for Road and Light Rail Projects: User Guidance Document, GE-ENV-01106 (TII 2022d).

10.3.2 Climate Change and Greenhouse Gases

Although variation in climate is thought to be a natural process, the rate at which the climate is changing has been accelerated rapidly by human activities. Climate change is one of the most challenging global issues facing the world today and is primarily the result of increased levels of greenhouse gases in the atmosphere. Increasing human emissions of carbon dioxide and other greenhouse gases cause a positive radiative imbalance at the top of the atmosphere, meaning energy is being trapped within the climate system. The imbalance leads to an accumulation of energy in the Earth system in the form of heat that is driving global warming[13],[14]. Greenhouse gases come primarily from the combustion of fossil fuels in energy use.

In March 2023 the European Environment Agency (EEA) published the European Climate Risk Assessment[15]. This assessment states that Europe is the fastest warming continent on the planet and is warming at about the twice the global rate. The average global temperature in the 12-month period between February 2023 and January 2024 exceeding pre-industrial levels by 1.5°C. 2023 was the warmest year on record over more than 100,000 years globally, at 1.48°C above pre-industrial levels, with the world's ocean temperature also reaching new heights.

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[13] Hansen, J.; Sato, M.; Kharecha, P. et al. Earth's Energy Imbalance and Implications. Atmospheric Chemistry and Physics 2011, 11 (24), 13421–13449. https://doi.org/10.5194/acp-11-13421-2011

[14] von Schuckmann, K.; Palmer, M. D.; Trenberth, K. E. et al.-An Imperative to Monitor Earth's Energy Imbalance. Nature Clim Change 2016, 6 (2), 138–144. https://doi.org/10.1038/nclimate2876.

[15] European Environment Agency (2023) European Climate Risk Assessment <https://climate-adapt.eea.europa.eu/en/eu-adaptation-policy/key-eu-actions/climate_risk_assessment/index_html/>

The Intergovernmental Panel on Climate Change (IPCC), in their AR6 Synthesis Report: Climate Change 2023[16], state that widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. This has led to widespread adverse impacts and related losses and damages to people and nature due to the pressures of climate change and the inability to adapt to a rapidly changing environment. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

10.3.2.1 International Greenhouse Gas Emission and Climate Targets

Globally, governance relating to climate change has changed significantly since 1994 when the United Nations Framework Convention on Climate Change (UNFCCC) entered into force. Greenhouse Gas emissions have been a primary focus of climate related international agreements for almost two decades.

International greenhouse gas emission and climate targets play an important role in stimulating and enabling action for developed and developing nations. The following sections provide an overview of the international agreements that have played key roles in establishing climate governance.

10.3.2.1.1 *Kyoto Protocol*

The Kyoto Protocol was adopted on 11 December 1997; this Protocol operationalised the UNFCCC and was the first international agreement that committed countries to reduce their greenhouse gas emissions (GHGs). It set limitations and reduction targets for greenhouse gases for developed countries. The Kyoto Protocol came into effect in 2005, as a result of which, emission reduction targets agreed by developed countries, including Ireland, became binding for the first time.

Under the Kyoto Protocol, the EU agreed to achieve a significant reduction in total greenhouse gas emissions in the period 2008 to 2012. These EU emission targets are legally binding in Ireland. Ireland's contribution to the EU commitment for the period 2008 – 2012 (the first commitment period) was to limit its greenhouse gas emissions to no more than 13% above 1990 levels. Ireland achieved its Kyoto Protocol targets under the EU burden-sharing agreement.

Doha Amendment to the Kyoto Protocol

- In Doha, Qatar, on 8th December 2012, the "Doha Amendment to the Kyoto Protocol" was adopted. The amendment includes:
- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from starting in 2013 and lasting until 2020.
    - The amendment entered into force on 31 December 2020
- A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

During the first commitment period, 37 industrialised countries and the European Community committed to reduce GHG emissions to an average of 5% below 1990 levels. During the second commitment period, Parties committed to reduce GHG emissions by at least 18% below 1990 levels in the eight-year period from 2013 to 2020. The composition of Parties in the second commitment period is different from the first; however, Ireland and the EU signed up to both the first and second commitment periods. Under the protocol, countries must meet their targets primarily through national

[16] *IPCC AR6 Synthesis Report: Climate Change 2023.* https://www.ipcc.ch/report/sixth-assessment-report-cycle/

measures, although market-based mechanisms (such as international emissions trading) can also be utilised.

Although the 1997 Kyoto Protocol and 2012 Doha Amendment were in force in 2020, the 2015 Paris Agreement superseded the Kyoto Protocol as the principle regulatory instrument governing the global response to climate change.

10.3.2.1.2 COP21 Paris Agreement

COP21 was the 21st session of the Conference of the Parties (COP) to the United Nations Convention. Every year since 1995, the COP has gathered the 196 Parties (195 countries and the European Union) that have ratified the Convention in a different country, to evaluate its implementation and negotiate new commitments. COP21 was organised by the United Nations in Paris and held from 30th November to 12th December 2015.

COP21 closed on 12th December 2015 with the adoption of the first international climate agreement (concluded by 195 countries and applicable to all). The twelve-page text, made up of a preamble and 29 articles, provides for a limitation of the temperature rise to below 2°C above pre-industrial levels and even to tend towards 1.5°C. It is flexible and takes into account the needs and capacities of each country. It is balanced as regards adaptation and mitigation, and durable, with a periodical ratcheting-up of ambitions.

10.3.2.1.3 COP25 Climate Change Conference

The 25th United Nations Climate Change conference COP25 was held in Madrid and ran from December 2nd to December 13th, 2019. While largely regarded as an unsuccessful conference, the European Union launched its most ambitious plan, 'The European Green New Deal' which aims to lower CO_2 emissions to zero by 2050. The deal includes proposals to reduce emissions from the transport, agriculture and energy sectors and will affect the technology chemicals, textiles, cement and steel industries. Measures such as fines and pay-outs by member states who rely on coal power will be in place to encourage the switch to renewable clean energies such as wind. On the 4th of March 2020, the European Commission put forward the proposal for a European climate law. This aims to establish the framework for achieving EU climate neutrality. It aims to provide a direction by setting a pathway to climate neutrality and to this end, aims to set in legislation the EU's 2050 climate-neutrality objective.

10.3.2.1.4 COP26 Climate Change Conference

The UN Climate Change Conference of the Parties (COP26) was held in Glasgow from the 31st of October to the 12th of November 2021. There were four key objectives that had been identified for COP 26 which included:

- Secure global net zero by 2050 and keep 1.5 degrees within reach.
- Adapt to protect communities and natural habitats to the already changing climate.
- Mobilise climate finance whereby developed countries must deliver on raising $100bn in climate finance per year.
- Finalise the Paris Rulebook (rules needed to implement the Paris Agreement) and turn ambitions into action.

Although COP26 was considered unsatisfactory in delivering the action and commitments needed to reach the Paris Agreement targets, it did raise the global ambition on climate action. Whilst COP26 failed to meet the 1.5 degree target and did not manage to secure the $100bn in climate finance there were a number key successes which included the following: