Planning and Environmental Consultants

Environmental Impact Assessment Report

Taurbeg Wind Farm Extension of Operational Life

Chapter 10 – Air Quality

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10. AIR QUALITY

10.1 Introduction

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality arising from the Proposed Lifetime Extension of the existing Taurbeg Wind Farm.

The existing Taurbeg Wind Farm is located 3.5km south of Rockchapel and 10.5km northwest of Newmarket, Co. Cork, in the townlands of Taurbeg, Glasheenanargid, Taurmore. The existing Taurbeg Wind Farm is based within private forestry and agricultural lands. Within the wider landscape of the existing Taurbeg Wind Farm, land use comprises wind energy production, agricultural pastures, transitional woodland scrub and peat bogs.

The Proposed Offsetting Lands are located approximately 8km east of Castleisland, Co. Kerry in the townlands of Coom and Knockatee. The Proposed Offsetting Lands are located c. 12km east of the Taurbeg Wind Farm Site in Co. Kerry. The Proposed Offsetting Measures comprise the permanent removal of c. 105.5 ha of coniferous plantation forestry and the restoration of c17.7 ha of farmland for the benefit of hen harrier. Further details on the Proposed Offsetting Measures can be found in Appendix 7-7.

Due to the non-industrial nature of the existing Taurbeg Wind Farm, the fact that it is already operational, no works are required within the Site, and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR. Based on professional judgement it is considered that air quality in the existing environment is reflective of the Environmental Protection Agency's (EPA) Air Quality Zone D, as described in Section 10.2.2.4 below, since there are no major sources of air pollution (e.g., heavy industry) in the vicinity of the Wind Farm Site and Proposed Offsetting Lands.

The production of energy from wind turbines has no direct emissions occurring from fossil fuel-based power stations. Harnessing more energy by means of renewable sources will reduce dependency on fossil fuels, thereby resulting in a reduction in harmful emissions that is damaging to human health and the environment. Some minor short term or temporary indirect emissions associated with the decommissioning of the existing Taurbeg Wind Farm include vehicular and dust emissions.

10.1.1 Relevant Guidance and Legislation

The air quality section of this Environmental Impact Assessment Report (EIAR) has been completed in accordance with the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU and having regard, where relevant, to guidance listed below.

- Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (Transport Infrastructure Ireland, December 2022).
- 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 (2024) Air Quality in Ireland Report 2023.
- Environmental Protection Agency (2021) Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects.
- Environmental Protection Agency
- Guidance on 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).

10.1.2 Statement of Authority

This section of the EIAR has been prepared by Gráinne Griffin and Natalia Stolarska and reviewed by Eoin McCarthy, of MKO. Gráinne is an Environmental Scientist with MKO with over 2 years' experience in the environmental consultancy sector. Gráinne has experience in report writing, including Appropriate Assessments, Natura Impact Statements, feasibility studies and EIA screening reports and EIAR chapters including Population and Human Health chapters for large-scale renewable energy developments. Natalia Stolarska is an Environmental Scientist with MKO. Natalia holds a BSc in Earth and Ocean Science and an MSc in Environmental Leadership. Natalia's key strengths and areas of expertise are in drafting EIAR report chapters, environmental impact assessment screening reports, wind farm feasibility studies and QGIS mapping. Since joining MKO in September 2023, Natalia has been involved in a range of wind farm projects, assisting with field work, client briefing notes, constraints mapping and drafting EIAR chapters, with more projects in the pipeline. Eoin is a Project Director with over 13 years of environmental consultancy experience. Eoin holds a B.Sc. (Hons) in Environmental Science from NUI, Galway. In his role as project manager, Eoin works with and co-ordinates large multidisciplinary teams including members from MKO's Environmental, Planning, Ecological and Ornithological departments as well as sub-contractors from various fields in the preparation and production of EIARs.

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[1] (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 particulate matter less than 2.5 micrometers (µm) referred to as $PM_{2.5}$ including the limit value and exposure concentration reduction target.
- The possibility to discount natural sources of pollution when assessing compliance against limit values.
- The possibility for time extensions of three years for particulate matter less than 10µm (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 (µg/m^3) and parts per billion (ppb). The notation PM_{10} is used to describe particulate matter or particles of 10µm or less (coarse particles) in aerodynamic diameter. $PM_{2.5}$ represents particles measuring less than 2.5µm (fine particles) in aerodynamic diameter.

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

[1] *IEEP Fourth Daughter Directive 2004. Available at: https://ieep.eu/publications/the-fourth-air-quality-daughter-directive-impacts-and-consequences-of-mandatory-limits/*

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Basis of Application of Limit Value	Attainment Date
Sulphur dioxide (SO_2)	Protection of Human Health	1 hour	350	Not to be exceeded more than 24 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of human health	24 hours	125	Not to be exceeded more than 3 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of vegetation	Calendar year	20	Annual mean	19th Jul 2001
Sulphur dioxide (SO_2)	Protection of vegetation	1st Oct to 31st Mar	20	Winter mean	19th Jul 2001
Nitrogen dioxide (NO_2)	Protection of human health	1 hour	200	Not to be exceeded more than 18 times in a calendar year	1st Jan 2010
Nitrogen dioxide (NO_2)	Protection of human health	Calendar year	40	Annual mean	1st Jan 2010
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2)	Protection of 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
Particulate matter 10(PM_{10})	Protection of human health	Calendar year	40	Annual mean	1st Jan 2005

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Basis of Application of Limit Value	Attainment Date
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 (Pb)	Protection of human health	Calendar year	0.5	Annual mean	1st Jan 2005
Carbon Monoxide (CO)	Protection of human health	8 hours	10,000	Not to be exceeded	1st Jan 2005
Benzene (C_6H_6)	Protection of human health	Calendar Year	5	Annual Mean	1st Jan 2010

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

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m^3)	Basis of Application of Limit Value
Sulphur dioxide (SO_2)	Upper assessment threshold for the protection of Human Health	24 hours	75	Not to be exceeded more than 3 times in a calendar year
Sulphur dioxide (SO_2)	Lower assessment threshold for the protection of human health	24 hours	50	Not to be exceeded more than 3 times in a calendar year
Nitrogen dioxide (NO_2)	Upper assessment threshold for the protection of human health	1 hour	140	Not to be exceeded more than 18 times in a calendar year
Nitrogen dioxide (NO_2)	Lower assessment threshold for the protection of human health	1 hour	100	Not to be exceeded more than 18 times in a calendar year
Particulate matter 10 (PM_{10})	Upper assessment threshold	24 hours	35	Not to be exceeded more

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m^3)	Basis of Application of Limit Value
				than 35 times in a calendar year
Particulate matter 10 (PM_{10})	Lower assessment threshold	24 hours	25	Not to be exceeded more than 35 times in a calendar year
Lead (Pb)	Upper assessment threshold	Calendar Year	0.35	-
Lead (Pb)	Lower assessment threshold	Calendar Year	0.25	-
Carbon Monoxide (CO)	Upper assessment threshold	8 hours	7000	-
Carbon Monoxide (CO)	Lower assessment threshold	8 hours	5000	-
Benzene (C_6H_6)	Upper assessment threshold	Calendar Year	3.5	-
Benzene (C_6H_6)	Lower assessment threshold	Calendar Year	2	-

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

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

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

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

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

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

Alert Threshold	1-hour average	240 µg/m^3

10.2.2.1 Air Quality and Health

In September 2024, the EPA published 'Air Quality in Ireland 2023'[2] which reports that although Ireland 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 (NO_2), sulphur dioxide (SO_2) and ozone (O_3). 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 WHO targets,

The European Environmental Agency (EEA) Briefing, '*Europe's Air Quality Status 2024*[3] highlights the negative effects that air pollution has on human health. The briefing notes that air pollution is Europe's largest environmental health risk, causing cardiovascular and respiratory diseases that impact health, reduce quality of life and cause preventable deaths. In 2022, despite ongoing reductions in emissions, most of the EU's urban population continued to be exposed to levels of key air pollutants that are damaging to health. In 2022 in the European Union, 96% of the urban population was exposed to levels of fine particulate matter ($PM_{2.5}$) above the health-based guideline level set by the World Health Organisation (WHO). Furthermore, in 2022 in the EU, 88% of the urban population were exposed to levels of nitrogen dioxide above the health-based guideline level set by the WHO. Whilst there is the potential of such emissions to be generated from the Proposed Lifetime Extension and decommissioning phases of the existing Taurbeg Wind Farm, mitigation measures will be implemented at the Site to reduce the impact from dust and vehicle emissions, which are discussed in Section 10.2.5 below.

The United States Department of Energy published an article on August 21, 2024 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 CO_2 per kilowatt-hour (g CO_2/kWh) of electricity generated, compared with about 980 g CO_2/kWh for coal and roughly 465 g CO_2/kWh for natural gas. That makes coal's carbon footprint almost 90 times larger than that of wind energy, and the footprint of natural gas more than 40 times larger. During combustion of high-emitting energy sources, other air pollutants, i.e., nitrogen oxides (NOx) and sulphur dioxide (SO_2), are also released into the atmosphere. This results in the emission of pollutants that can cause adverse health effects, including asthma, bronchitis, lower and upper respiratory symptoms, and heart attacks. Air pollution is responsible for a large number of premature deaths relating to these illnesses.

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

[2] *Environmental Protection Agency: Air Quality in Ireland 2023. Available at: https://www.epa.ie/publications/monitoring–assessment/air/air-quality-in-ireland-2023.php*
[3] *European Environment Agency Europe's air quality status 2024. Available at: https://www.eea.europa.eu/publications/europes-air-quality-status-2024*
[4] *US Department of Energy 'How Wind Can Help Us Breathe Easier' August 2024. Available at: https://www.energy.gov/eere/wind/articles/how-wind-can-help-us-breathe-easier*
[5] *EPA Ireland's Environment An Integrated Assessment 2020. Available at: https://www.epa.ie/publications/monitoring–assessment/assessment/state-of-the-environment/EPA_Irelands_Environment_2020.pdf*

"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 Lifetime Extension 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. 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, 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 us to continue to evolve our 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.

[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.*

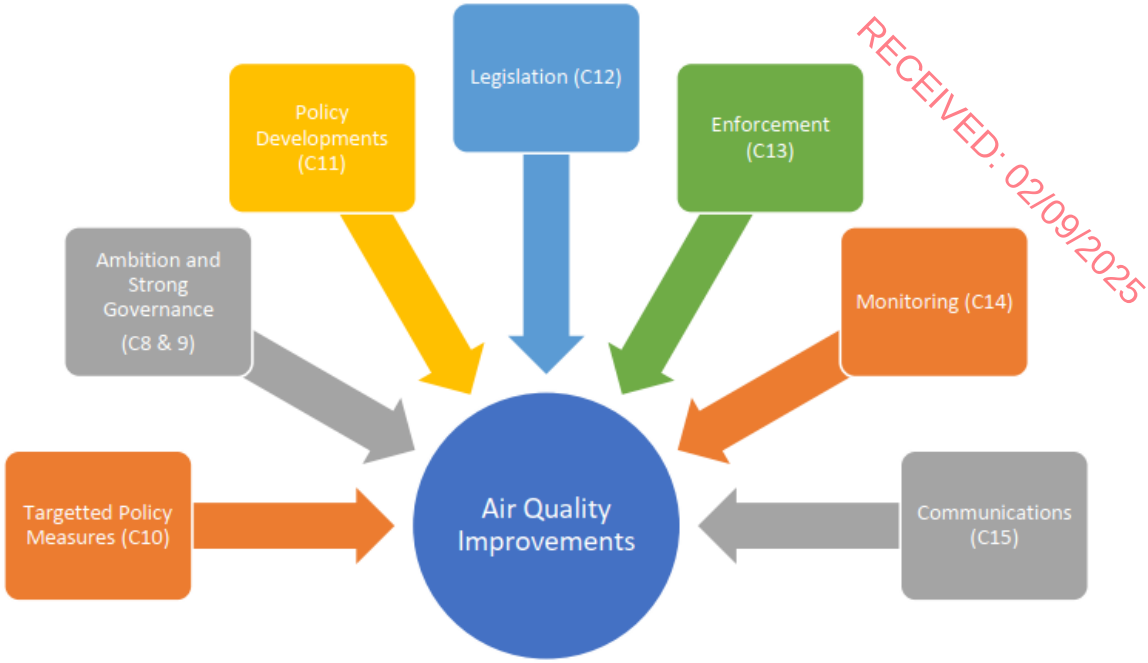

Figure 10-1 Seven Strategic Frameworks for Air Quality, with associated chapters in brackets. Reproduced as Figure 1 from Clean Air Strategy 2023

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

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 and environs
- Zone B: Cork 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 existing Taurbeg Wind Farm site and Proposed Offsetting Lands lie 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 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. These are detailed in the Baseline Air Quality section below.

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 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 the Proposed Offsetting Lands. There are demolition works required for the Decommissioning Phase of the Proposed Lifetime Extension.)
- Earthworks (There are small scale earthworks required for the Proposed Lifetime Extension through maintenance works. There are earthworks required for the Decommissioning Phase.)
- Construction (There are no construction works required for any phase of the Proposed Lifetime Extension or Proposed Offsetting Lands.)
- Trackout - The transport of dust and dirt from the 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 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. IAQM (2024) guidance provides example definitions for the scale of the activities, and these are applied for this development as outlined in Table 10-5.

Table 10-5 Description of magnitude for nature of activities

	Large	Medium	Small
Demolition	Total building volume >75,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12 m above ground level	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material, demolition activities 6-12m above ground level	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months
Earthworks	Large: Total site area >110,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >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

	Large	Medium	Small
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		

Proposed Lifetime Extension

There will be no Construction associated with the Proposed Lifetime Extension. Small scale Earthworks are associated with the Proposed Lifetime Extension for maintenance purposes. The number of vehicle movements per day, as outlined in Section 15.2.4.3 in Chapter 15 Material Assets of this EIAR, results in the classification of the existing Taurbeg Wind Farm Site as 'Small' for trackout activities.

There will be Small to Medium Earthworks, Demolition and Trackout associated with the decommissioning phase of the existing Taurbeg Wind Farm.

Proposed Offsetting Measures

There will be no Demolition or Construction associated with the Proposed Offsetting Measures. There will be small scale earthworks and trackout associated with the Proposed Offsetting Measures. There will be no excavation of peat or subsoil as part of the Proposed Offsetting Measures. For the purposes of this assessment, deforestation for the purposes of Proposed Offsetting Measures is defined as earthworks.

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

10.2.3.3.1 *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.

There are no high, medium, or low sensitivity receptors in this project for either the Proposed Lifetime Extension or Proposed Offsetting Measures.

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

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

Sensitivities of People to Dust Soiling Effects

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

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

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

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

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

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

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

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

Sensitivities of Receptors to Ecological Effects

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

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

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

There are ecological sensitive receptors, as described by the IAQM (2024) guidance within the existing Taurbeg Wind Farm, due to it being located within the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle Special Protection Area (SPA). There are small scale earthworks associated for the Proposed Lifetime Extension during the decommissioning phase. There will be no construction associated with the Proposed Lifetime Extension. There are no demolition or construction works associated with the Proposed Offsetting Measures, with small scale earthworks and trackout being proposed, this being temporary in nature.

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

The risk of dust impacts for the earthworks, demolition, and trackout activities from the Proposed Lifetime Extension is summarised in Section 10.2.5 below.

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

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

10.2.4 Baseline Air Quality

The air quality in the vicinity of the Site and Proposed Offsetting Lands 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 2023'* was published by the EPA in September 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 Site and Proposed Offsetting Lands as both lie in a rural location, within Zone D.

10.2.4.1 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 Sulphur Dioxide Data for Zone D Sites in 2023

Parameter	Measurement
Annual Mean	4.3 µg/m^3
Hourly values > 350	0
Hourly max (Average)	80.9 µg/m^3
Daily values > 125	0
Daily max (Average)	23.2

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 80.9 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 existing Taurbeg Wind Farm site and Proposed Offsetting Lands are 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 *'Air Quality in Ireland 2023'* report provides annual mean PM_{10} concentration for seventeen Zone D towns, Tipperary Town, Carrick-on-Shannon/Askeaton, Enniscorthy, Birr, Macroom, Castlebar, Cobh Carrignafoy, Claremorris, Kilkitt, Cavan, Roscommon Town, Edenderry, Mallow, Longford, Killarney and Malin Head. Particulate matter (PM_{10}) data for 2023 is presented in Table 10-12.

Table 10-12 Particulate Matter (PM10) Data for Zone D Sites in 2023

Parameter	Measurement
Annual Mean	10.8 µg/m^3
% Data Capture (Average)	966%
Values > 50 ug/m^3	Max 6 (Edenderry)
Daily Max (Average)	45.4 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 6 no. occasions. In the '*Air Quality in Ireland 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 existing Taurbeg Wind Farm site and Proposed Offsetting Lands are 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, Edenderry and Briarhill in 2023 is presented in Table 10-13.

Table 10-13 Nitrogen Dioxide Data for Zone D Sites in 2023

Parameter	Measurement
Annual Mean (Average)	8.1 µg/m^3
NO_2 Values >200	0
Values > 140 (UAT)	0
Values >100 (LAT)	4
Hourly Max. (Average)	67.6 µg/m^3

The annual NO_2 value was below the annual mean limit value for the protection of human health of 40 µg/m^3. The lower assessment threshold of 100 µg/m3 was exceeded 4 no. times during the monitoring period in Briarhill while the upper assessment threshold of 140 µg/m3 was not exceeded during the monitoring period. The lower assessment threshold did not exceed the 18 days limit during the monitoring period. In 2023, no other monitoring locations in Zone D had exceedances in the lower and upper assessment thresholds of 100 and 140 µg/m3. The average hourly max. NO_2 value of 67.6 µg/m^3 measured during the monitoring period was below the hourly max threshold of 200 µg/m^3. It is expected based on professional judgement that NO_2 values at the existing Taurbeg Wind Farm site and Proposed Offsetting Lands are similar or lower than those recorded for the Zone D sites above.

10.2.4.4 Carbon Monoxide (CO)

The '*Air Quality in Ireland 2023*' report provides 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 2023

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 10 mg/m^3). On no occasions were values in excess of the 10 mg limit value set out in Directive 2008/50/EC. It is expected based on professional judgement that CO values at the existing Taurbeg Wind Farm site and Proposed Offsetting Lands are 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, Ennis 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 mean limit of 120 µg/m3. The CAFE Directive stipulates that this limit should not be exceeded on more than 25 days per calendar year averaged over 3 years. It would be expected on professional judgement that O_3 values at the existing Taurbeg Wind Farm site and Proposed Offsetting Lands would be similar or lower than those recorded for the Zone D sites below.

Table 10-15 Ozone Data for Zone D Sites in 2023

Parameter	Measurement
Annual Mean	61.5µg/m3
Median	72.8 µg/m3
% Data Capture	95.5%
No. of days > 120 µg/m^3	10 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 activities associated with the Proposed Lifetime Extension and Proposed Offsetting Measures.

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.

The potential dust-related effects on local air quality and the relevant associated mitigation measures are presented in Sections 10.2.5 below.

10.2.5 Likely and Significant Effect and Associated Mitigation Measures

10.2.5.1 'Do-Nothing' Effect

If the Proposed Project were not to proceed, the existing Taurbeg Wind Farm would be decommissioned in accordance with the conditions of the current planning permission.

If the Proposed Project were not to proceed, the opportunity to further significantly reduce emissions of greenhouse gas emissions, including CO_2, NO_x and SO_2 to the atmosphere would be lost. The opportunity to contribute to Ireland's commitments under the Kyoto Protocol and EU law would also be lost. This would be a medium-term, slight negative effect.

If the Proposed Lifetime Extension were not to proceed, the existing Taurbeg Wind Farm would be decommissioned and the use of machinery during the decommissioning of the existing wind farm

would result in the emission of greenhouse gases. Operations such as the transport of equipment and materials as well as construction personnel are typical examples of machinery use. This impact is considered to be imperceptible, given the insignificant quantity of greenhouse gases that would be emitted. This would likely result in a short-term, imperceptible, negative effect.

If the Proposed Offsetting Measures were not to proceed, existing land use of plantation forestry and agricultural practises within the Proposed Offsetting Lands would continue and the Proposed Offsetting Measures would not take place. As such, this would have a long term, imperceptible positive effect on air quality.

10.2.5.2 Construction Phase

Taurbeg Wind Farm is currently operational, and it is proposed to extend the operational phase of the wind farm by a further 10 years. No construction activities will occur as part of the Proposed Lifetime Extension, therefore there are no construction phase impacts on air quality.

10.2.5.3 Extended Operational Phase

10.2.5.3.1 *Exhaust Emissions*

Proposed Lifetime Extension

Exhaust emissions associated with the Proposed Lifetime Extension arise from machinery and vehicles that are intermittently required onsite for maintenance. This will give rise to a medium-term, imperceptible, negative effect due to the localised and intermittent nature of the maintenance.

Mitigation

- Any vehicles or plant brought onsite during the extended 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 Effect

Medium-term, imperceptible, negative effect.

Proposed Offsetting Measures

Exhaust emissions associated with the Proposed Offsetting Measures will arise from machinery and vehicles that are required onsite for deforestation works. This will give rise to a localised and temporary, not significant, negative effects due to the nature and expected duration of the deforestation works.

Mitigation

- Any vehicles or plant brought onsite during the extended 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 Effect

Temporary, imperceptible, negative effect.

Significance of Effects- Proposed Project

Based on the assessment above, there will be no significant direct or indirect effects on air quality associated with the Proposed Project.

10.2.5.3.2 *Air Quality*

Proposed Lifetime Extension

The Proposed Lifetime Extension, 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). The continued production of renewable energy from the existing Taurbeg Wind Farm has a medium-term, significant, positive effect on air quality, and thus not requiring mitigation. Further details on the carbon dioxide savings associated with the Proposed Lifetime Extension are presented in Chapter 11, Section 11.4.

Mitigation

None proposed.

Residual Effect

The residual effect is a medium-term, moderate, positive effect. An output of 2.3 MW per turbine has been chosen to calculate the power output of the 11-turbine wind energy development, which results in an estimated installed capacity of 25.3 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.

Proposed Offsetting Measures

As part of the Proposed Offsetting Measures, it is proposed to permanently remove 105.5 ha of forestry to create suitable habitat for hen harrier. This will give rise to a permanent, imperceptible, negative effect on air quality due to the loss of carbon storage associated with the deforestation of trees.

Mitigation

None proposed.

Residual Effect

Permanent, imperceptible, negative effect.

Significance of Effects- Proposed Project

Based on the assessment above, there will be no significant direct or indirect effects on air quality associated with the Proposed Project.

10.2.5.3.3 Human Health

Proposed Lifetime Extension

Exposure to chemicals such as SO_2 and NO_x are known to be harmful to human health. The production of clean renewable energy from Taurbeg Wind Farm has and will continue to offset the emission of these harmful chemicals by fossil fuel-powered sources of electricity and, therefore the Proposed Lifetime Extension will have a medium-term Slight Positive effect on human health. Further information on the impact of the Proposed Lifetime Extension on Human Health is contained in Chapter 5: Population and Human Health.

Mitigation

None proposed.

Residual Effect

Medium-term Slight Positive effect.

Proposed Offsetting Measures

As part of the Proposed Offsetting Measures, it is proposed to permanently remove 105.5 ha of forestry which will create suitable habitat for hen harrier. Whilst the deforestation works 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 are considered negligible as the potential for both exhaust and dust emissions will be limited and controlled through mitigation measures.

Mitigation

None proposed.

Residual Effect

Short-term slight negative effect.

Significance of Effects- Proposed Project

Based on the assessment above, there will be no significant direct or indirect effects on air quality associated with the Proposed Project.

10.2.6 Decommissioning Phase

The Proposed Project is seeking permission for an extension of operational life of 10 years. Following the extension of operational life, Taurbeg Wind Farm would be decommissioned unless a further planning permission is received.

The works required during the decommissioning phase are described in Section 4.7 in Chapter 4: Description of the Proposed Project.

A Decommissioning Plan is included in Appendix 4-3 of this EIAR for the decommission of the Taurbeg Wind Farm, further detail of which will be agreed, if required, with the local authority prior to any decommissioning.

Pre-Mitigation Impact

Upon decommissioning of the existing Taurbeg Wind Farm, the wind turbines will be disassembled in reverse order to how they were erected. All above-ground turbine components will be separated and removed off-site for reuse or recycling.

It is proposed to leave the existing turbine foundations in place underground and to cover them with earth and reseed as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration.

It is proposed that site roadways will be left in situ, as appropriate, as these are in use by the participating landowners to access their lands and as existing walking trails. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed where required, however, this is not envisaged at this time. It is proposed to leave underground cables in place where they are below a level likely to be impacted by typical agricultural works.

During decommissioning, it may be possible to reverse or at least reduce some of the potential impacts caused during the initial construction of the wind farm by rehabilitating construction areas such as turbine bases and hard standing areas. This will be done by covering with local topsoil and reseeding with a local native mix to encourage vegetation growth and reduce run-off and sedimentation.

It is expected that the pre-mitigation impact associated with decommissioning of the Taurbeg Wind Farm will have a short-term, slight and negative effect on air quality.

Mitigation Measures

- A decommissioning plan (Appendix 4-3) has been prepared as part of the EIAR, which includes mitigation measures for the decommissioning phase of Taurbeg Wind Farm. These include:
- Prior to the end of the operational period the Decommissioning Plan will be updated in line with decommissioning methodologies that may exist at the time and will agree with the competent authority at that time.
- Upon decommissioning of the wind farm, turbine foundations will remain in place underground and will be covered with earth and reseeded with an appropriate seed mix to accelerate the resumption of natural drainage management.
- The underground cable ducting within the wind farm site will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance.
- Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;
- The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary;
- All site related traffic will have speed restrictions on un-surfaced roads to 15 kph;
- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions.

Please refer to Section 7 of Appendix 4-3 for further details.

Residual Effect

The residual effect on Air Quality is a short-term, imperceptible and negative effect.

Significance of Effects

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

10.2.7 Cumulative Assessment

Potential cumulative effects on air quality between the Proposed Project (Proposed Lifetime Extension and Proposed Offsetting Measures) and other developments, including the existing grid connection, in the vicinity were also considered as part of this assessment. Please see Section 2.11 of Chapter 2 for cumulative assessment methodology.

The developments considered as part of this cumulative effect assessment are presented in Appendix 2-3 of this EIAR, with relevant developments within 1km of the EIAR site boundary being considered.

There were no potential cumulative effects identified as part of this assessment for either the Proposed Lifetime Extension, nor the Proposed Offsetting Measures.