



Cush Wind Farm
Phase II

Environmental Impact Assessment Report

Chapter 8: Air Quality

Cush Wind Limited

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8.1 INTRODUCTION

This chapter comprises an assessment of the likely significant effects on air quality associated with the project.

The project site is located in rural Co. Offaly, approximately 4km north of the town of Birr and c. 28km south-west of Tullamore, Co. Offaly.

The project assessed within this EIAR comprises a 3 no. wind turbine extension to the permitted Cush Wind Farm Phase I, together with all associated and ancillary infrastructure and works. This includes turbine foundations, crane hardstanding areas, access tracks, internal wind farm underground cabling, site drainage and rehabilitation works, peat/spoil management, a proposed electrical switch room building, and c.5km of underground electricity line to connect the proposed wind farm to the national electricity network at the proposed Mullanafawnia 110kV substation.

The turbine component haul route and associated temporary and permanent upgrade works as described in **Chapter 3**, are located within Counties Galway, Roscommon, Westmeath and Offaly. Turbine components will be transported from the Port of Galway to the project site via the N6, M6, N52 and N62, before accessing the project site from the permitted construction phase site entrance from the N62 national road.

A full description of the project is presented in **Chapter 3**.

This chapter provides a baseline assessment of the setting of the project in terms of air quality and discusses the likely effects that the construction and operation of the project will have. Where required, appropriate mitigation measures to limit any identified likely significant adverse effects on air quality are recommended. The air quality assessment takes into consideration the construction and operation of the proposed project as summarised above and detailed in **Chapter 3**.

An overview of the methodology undertaken for the air quality assessment for the proposed project is outlined below:

- The existing ambient environment of the proposed project has been characterised by a review of available published ambient air quality monitoring data.
- A review of the most applicable best practice standards and guidelines has been undertaken in order to define the air quality significance criteria for the construction, operation and decommissioning phases of the proposed project.
- The direct, indirect and cumulative effects of construction dust resulting from construction activities, in terms of dust soiling, human health and ecology effects have been assessed.
- The potential for direct, indirect and cumulative air quality effects associated with changes in traffic volumes associated with the construction, operation and decommissioning phases of the proposed project has been considered.
- The indirect effects to air quality from savings in nitrogen oxides (NO_x) emissions arising from the production of electricity using renewable sources have been assessed.
- A schedule of mitigation measures has been incorporated, where required,

to reduce, where necessary, the identified potential air quality effects associated with the proposed project; and

- An assessment of the significance of any residual effects after mitigation has also been undertaken.

8.1.1 STATEMENT OF AUTHORITY

This chapter was prepared by Carl Ramskill. Carl Ramskill is a Principal Environmental Consultant in the Air Quality section of AWN Consulting with 9 years' experience in air quality consulting. He holds a BSc. in Chemistry and MSc. in Air Pollution Management and Control from the University of Birmingham. He is a Member of the Institution of Environmental Science (MIEnvSc), Member of the Institute of Air Quality Management (MIAQM) and specialises in the fields of air quality, EIA and air dispersion modelling and monitoring. Carl has prepared air quality assessments for EIARs, planning application support and permitting/licencing support. He has worked on a diverse range of projects including large scale infrastructure road and rail schemes, residential developments, commercial developments, wind farms, data centres and energy centres.

8.2 METHODOLOGY

8.2.1 SCOPE OF ASSESSMENT

8.2.1.1 Construction Phase Dust Assessment

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (IAQM, 2024) outlines an assessment method for predicting the effect of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust effects. The IAQM methodology has been applied to the construction phase of this project in order to predict the likely risk of dust effects in the absence of mitigation measures and to determine the level of site-specific mitigation required. The use of UK guidance is recommended by Transport Infrastructure Ireland in their guidance document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2025).

The IAQM states that an assessment of construction dust effects is normally required where there is a human or ecological receptor within 250m of the boundary of the construction works (this should consider offsite construction compounds), and/or within 50m of the route(s) used by construction vehicles on the public road network (on roads up to 250m from the construction site entrance). This constitutes the Zone of Influence for the construction dust assessment. As sensitive receptors are present within these distances, a construction dust assessment is scoped into the assessment.

8.2.1.2 Construction Phase Traffic Assessment

Construction phase traffic can also impact air quality. The TII guidance '*Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106*' (TII, 2025), states that

road links meeting one or more of the following criteria can be defined as being “affected” by a proposed project and should be included in the local air quality assessment. While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic and has been applied for this assessment.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10kph or more;
- Peak hour speed change by 20kph or more;
- A change in road alignment by 5m or greater.

As set out in **Chapter 14**, short-duration peaks in HGV movements will occur during turbine-foundation concrete pours. These peak-day movements do not represent annual average daily traffic. When averaged over the construction programme, the predicted change in traffic remains below the TII screening criteria of 1,000 vehicles AADT and 200 HDV AADT. No applicable speed-change or road-alignment screening criterion is exceeded. Accordingly, detailed dispersion modelling of construction traffic emissions is not required. Dust and trackout associated with construction traffic are assessed separately below.

8.2.1.3 Operation Phase Traffic Assessment

Operation phase traffic has the potential to impact air quality. The TII scoping criteria (TII, 2025) were used to determine if any road links required a detailed modelling assessment.

The operation phase of the project will involve only very occasional inspection and maintenance vehicles (see **Chapter 14**). The traffic consultant has confirmed that there are no road links with traffic changes as a result of the proposed project exceeding the TII scoping criteria. Therefore, a detailed air assessment of operation phase traffic emissions has been scoped out from any further assessment as there is no potential for significant effects to air quality as a result of vehicle emissions.

8.2.1.4 Operation Phase Energy Production

The operation phase of the proposed project will result in positive effects on air quality due to the displacement of fossil fuels as an energy source. The indirect effects to air quality from savings in NO_x emissions arising from the production of electricity using renewable sources is therefore scoped into the assessment to quantify these positive effects using EPA and SEAI reports (EPA, 2026; SEAI, 2025).

8.2.2 LEGISLATION, POLICY AND GUIDANCE

8.2.2.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European

statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or “Air Quality Standards” are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland are set out in Directive (EU) 2024/2881 of the European Parliament and of the Council of 23 October 2024 on ambient air quality and cleaner air for Europe (recast). This directive supersedes EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (CAFE Directive) and it sets out new air quality standards for pollutants to be reached by 2030 which are more closely aligned with the World Health Organisation (WHO) air quality guidelines.

The Air Quality Standards Regulations 2022 (S.I. 739 of 2022) transposed EU Directive 2008/50/EC. With the adoption of Directive (EU) 2024/2881, Ireland must transpose this directive into national law (i.e. update the Air Quality Standards Regulations) before December 2026.

The ambient air quality standards applicable for particulate matter (PM₁₀ and PM_{2.5}) are outlined in **Table 8.1**. The limit values set out in Directive (EU) 2024/2881 will need to be achieved by 2030¹, with the limit values set out in the Air Quality Standards Regulations 2022 (and future updated regulations) applicable until 2030.

Pollutant	2008/50/EC Limit Type	2008/50/EC Limit Value (applicable until 2030)	2024/2881/EC Limit Type	2024/2881/EC Limit Value
Particulate Matter (as PM ₁₀)	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50µg/m ³	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	45µg/m ³
	Annual limit for protection of human health	40µg/m ³	Annual limit for protection of human health	20µg/m ³
Particulate Matter (as PM _{2.5})	n/a	n/a	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	25µg/m ³
	Annual limit for protection of human health	25µg/m ³	Annual limit for protection of human health	10µg/m ³

Table 8.1: Ambient Air Quality Limit Values

¹ Directive 2024/2881/EC must be transposed into national law by 11 December 2026 and will apply from 12 December 2026. The revised limit values are required to be achieved by 2030.

In April 2023, the Government of Ireland published the Clean Air Strategy for Ireland (Government of Ireland 2023), which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target 3 (IT3) by 2026, the IT4 targets by 2030 and the final targets by 2040 (shown in **Table 8.2**). The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final PM_{2.5} target of 5µg/m³. The strategy also acknowledges that “meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both PM_{2.5} and NO₂”.

Annex II of Directive 2024/2881/EC gives assessment thresholds which align with the clean air strategy final 2040 WHO targets. Directive (EU) 2024/2881 states that “Member States shall endeavour to achieve and preserve the best ambient air quality and a high level of protection of human health and the environment, with the aim of achieving a zero-pollution objective as referred to in Article 1(1), in line with WHO recommendations, and below the assessment thresholds laid down in Annex II.”

These assessment thresholds relate to monitoring of ambient air quality by Member States, where “exceedances of the assessment thresholds specified in Annex II shall be determined on the basis of concentrations during the previous 5 years where sufficient data are available. An assessment threshold shall be deemed to have been exceeded if it has been exceeded during at least 3 separate years out of those previous 5 years.”

The applicable air quality limit values for the purposes of this assessment are those set out in **Table 8.1**. The limit values stipulated under Directive 2008/50/EC and the Air Quality Standards Regulations 2022 are applicable prior to 2030. The limit values stipulated by Directive (EU) 2024/2881 are applicable for assessments after 2030.

Pollutant	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
PM ₁₀	24-hour limit for protection of human health	75µg/m ³	50µg/m ³	45µg/m ³
	Annual limit for protection of human health	30µg/m ³	20µg/m ³	15µg/m ³
PM _{2.5}	24-hour limit for protection of human health	37.5µg/m ³	25µg/m ³	15µg/m ³
	Annual limit for protection of human health	15µg/m ³	10µg/m ³	5µg/m ³

Table 8.2: WHO Air Quality Guidelines

8.2.2.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust which are less than 10 microns and the EU ambient air quality standards have set ambient air quality

limit values for PM₁₀ and PM_{2.5}.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland.

However, best practice guidelines for dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350mg/m²/day averaged over a one-year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled *Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (EPA, 2006). The document recommends that the Bergerhoff limit of 350mg/m²/day be applied to the site boundary of quarries. This limit value can be implemented with regard to dust effects from construction of the proposed project.

8.2.2.3 National Air Emissions Targets

Regional air emissions associated with the proposed project can be assessed relative to the emission ceilings given in Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (hereafter referred to as the National Emissions Reduction Directive). This National Emissions Reduction Directive applied the limits set out in Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants until 2020 and established new national emission reduction commitments which are applicable from 2020 and 2030 for sulphur dioxide (SO₂), NO_x, non-methane volatile organic compounds (NMVOC), NH₃, and PM_{2.5}.

In relation to Ireland, the 2020 to 2029 and 2030 emission targets are shown in **Table 8.3** and are reproduced from the most recent EPA report *Ireland's Air Pollutant Emissions: Trends and Outlook* (EPA, 2026).

Pollutant	2020 – 2029 Reduction Commitments		2030 Reduction Commitments	
	kt	% Reduction Compared to 2005 Levels	kt	% Reduction Compared to 2005 Levels
SO ₂	25.90	-65%	11.10	-85%
NO _x	70.33	-49%	42.75	-69%
NMVOC	51.69	-25%	46.87	-32%
NH ₃	122.63	-1%	117.68	-5%
PM _{2.5}	15.47	-18%	11.13	-41%

Table 8.3: National Air Emission Targets (Ireland's Air Pollutant Emissions 2020 to 2030)

8.2.2.4 Construction Dust Assessment Guidance

The Institute of Air Quality Management in the UK (IAQM) guidance document

'Guidance on the Assessment of Dust from Demolition and Construction' (2024) outlines an assessment method for predicting the effect of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust effects. The IAQM methodology has been applied to the construction phase of this project in order to predict the likely risk of dust effects in the absence of mitigation measures and to determine the level of site-specific mitigation required. The use of UK guidance is recommended by Transport Infrastructure Ireland in their guidance document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2025).

The major dust generating activities are divided into four types within the IAQM guidance (2024) to reflect their different potential effects. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (transport of dust and dirt from the construction site entrance onto the public road network).

The magnitude of each of the four categories is divided into large, medium or small scale depending on the nature of the activities involved. The criteria for determining the category for the works involved are outlined in **Table 8.4**, these are based on the IAQM guidance (2024). The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust effects from site activities (see **Section 8.4.2.1**). This allows the level of site-specific mitigation to be determined.

The works required along the turbine haul route comprise the removal of a c.6m section of existing wall, the temporary removal and subsequent replacement of a section of existing fencing, temporary road widening at identified roundabouts and junctions, the temporary removal and reinstatement of street furniture, and the pruning of trees. These works have been considered in the assessment.

Small	Medium	Large
Demolition		
total building volume <12,000m ³ construction material with low potential for dust release (e.g. metal cladding or timber) demolition activities <6m above ground demolition during wetter months	total building volume 12,000 - 75,000m ³ potentially dusty construction material demolition activities 6 – 12m above ground level	total building volume >75,000m ³ potentially dusty construction material (e.g. concrete) on-site crushing and screening demolition activities >12m above ground level
Earthworks		
total site area <18,000m ² soil type with large grain size (e.g. sand) <5 heavy earth moving vehicles active at any one time formation of bunds <3m in height earthworks during wetter months	total site area 18,000 - 110,000m ² moderately dusty soil type (e.g. silt) 5 – 10 heavy earth moving vehicles active at any one time formation of bunds 3 – 6m in height	total site area >110,000m ² potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) >10 heavy earth moving vehicles active at any one time formation of bunds >6m in height
Construction		
total building volume <12,000m ³ construction material with low potential for dust release (e.g. metal cladding or timber)	total building volume 12,000 - 75,000m ³ potentially dusty construction material (e.g. concrete) on-site concrete batching	total building volume >75,000m ³ on-site concrete batching sandblasting
Trackout		
<20 HDV (>3.5 t) outward movements in any one day surface material with low potential for dust release unpaved road length <50m	20 – 50 HDV (>3.5 t) outward movements in any one day moderately dusty surface material (e.g. high clay content) unpaved road length 50 – 100m	>50 HDV (>3.5 t) outward movements in any one day potentially dusty surface material (e.g. high clay content) unpaved road length >100m

Table 8.4: IAQM Criteria to Determine Dust Emissions Magnitude

Once the dust emission magnitude has been determined the next step, according to the IAQM guidance (2024), is to establish the level of risk by combining the magnitude with the overall sensitivity of the area to dust soiling, human health and ecological effects. The level of risk associated with each activity is determined using the criteria in **Table 8.5**.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High risk	Medium risk	Medium risk
Medium	High risk	Medium risk	Low risk
Low	Medium risk	Low risk	Negligible
Earthworks			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Construction			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Trackout			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

Table 8.5: IAQM Criteria to Determine Risk of Dust Effects

8.2.2.5 Operation Energy Production

The operation of the turbines themselves will not give rise to any significant emissions to air.

The operation phase of the proposed project will result in positive effects on air quality due to the displacement of fossil fuels as an energy source. The indirect effects to air quality from savings in nitrogen oxides (NO_x) emissions arising from the production of electricity using renewable sources were calculated and compared against those produced using non-renewable sources. The calculations used SEAI electricity-generation data and EPA NO_x emissions data.

The most recent report by the SEAI entitled "Energy in Ireland 2025 Report" (SEAI, 2025, Table 4.3) estimates that a total of 31.22TWh of electricity was generated nationally in 2024. Renewable energy accounted for 46.5% of the electricity generated in 2024, with 11.65TWh from wind generation.

The EPA states that a total of 88.75kt NO_x was emitted in 2024 in their report entitled "Ireland's Air Pollutant Emissions" (EPA, 2026). These are the most recently published figures for NO_x emissions. Power generation accounted for 4.7% of the total emissions produced in 2024.

The above figures from the SEAI and EPA were used in the current assessment to quantify the NO_x emissions savings from the wind farm project both annually and over the lifespan of the proposed project and the results were compared against the 2030 national air emissions target of 42.75kt (see **Section 8.4.3**).

As set out in **Chapter 1**, the final turbine model has not yet been selected. The candidate turbine technologies within the assessed dimension range have a rated electrical output of approximately 6.1MW to 7.2MW per turbine, giving the project a total generating capacity of approximately 18.3MW to 21.6MW. Annual electricity generation has been calculated separately for each assessed turbine configuration using the corresponding capacity factor supplied for that configuration. On this basis, the project is expected to generate approximately 48.3GWh to 55.1GWh of electricity per annum.

8.2.3 LIMITATIONS

No material limitations which would affect the conclusions of the assessment were encountered.

8.3 DESCRIPTION OF THE EXISTING ENVIRONMENT

8.3.1 METEOROLOGICAL DATA

A key factor in assessing temporal and spatial variations in air quality are the prevailing meteorological conditions. Wind frequency is important as dust can only be dispersed by winds, and deposition of dust is a simple function of particle size, wind speed and distance. The closer the source of dust is to a receptor the higher the potential risk of effect of dust blow.

The nearest active weather station collating detailed weather records is Athenry meteorological station, which is located c. 62km west of the wind farm site. Athenry meteorological station data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (Met Éireann, 2026). The predominant wind direction is westerly to south-westerly (2021-2025), thereby predominantly dispersing any potential dust emissions to the east and north-east of the proposed wind farm site (see **Figure 8.1**). 30-year historical meteorological data for Athenry station are not available. However, the mean wind speed at Shannon Airport meteorological station, the closest station with available data (located c. 84km southwest of the site) over the long term 30-year averaging period 1991 - 2020 is 4.6m/s (Met Éireann, 2025).

Dust emissions are dramatically reduced where rainfall has occurred due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume no dust is generated under “wet day” conditions where rainfall greater than 0.2mm has fallen (*IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016*). Information collected from Shannon Airport meteorological station (the closest station with 30-year averages), identified that typically 223 days per annum are “wet” (Met Éireann, 2025). Thus, over 61% of the time no significant dust generation will be likely due to natural meteorological conditions.

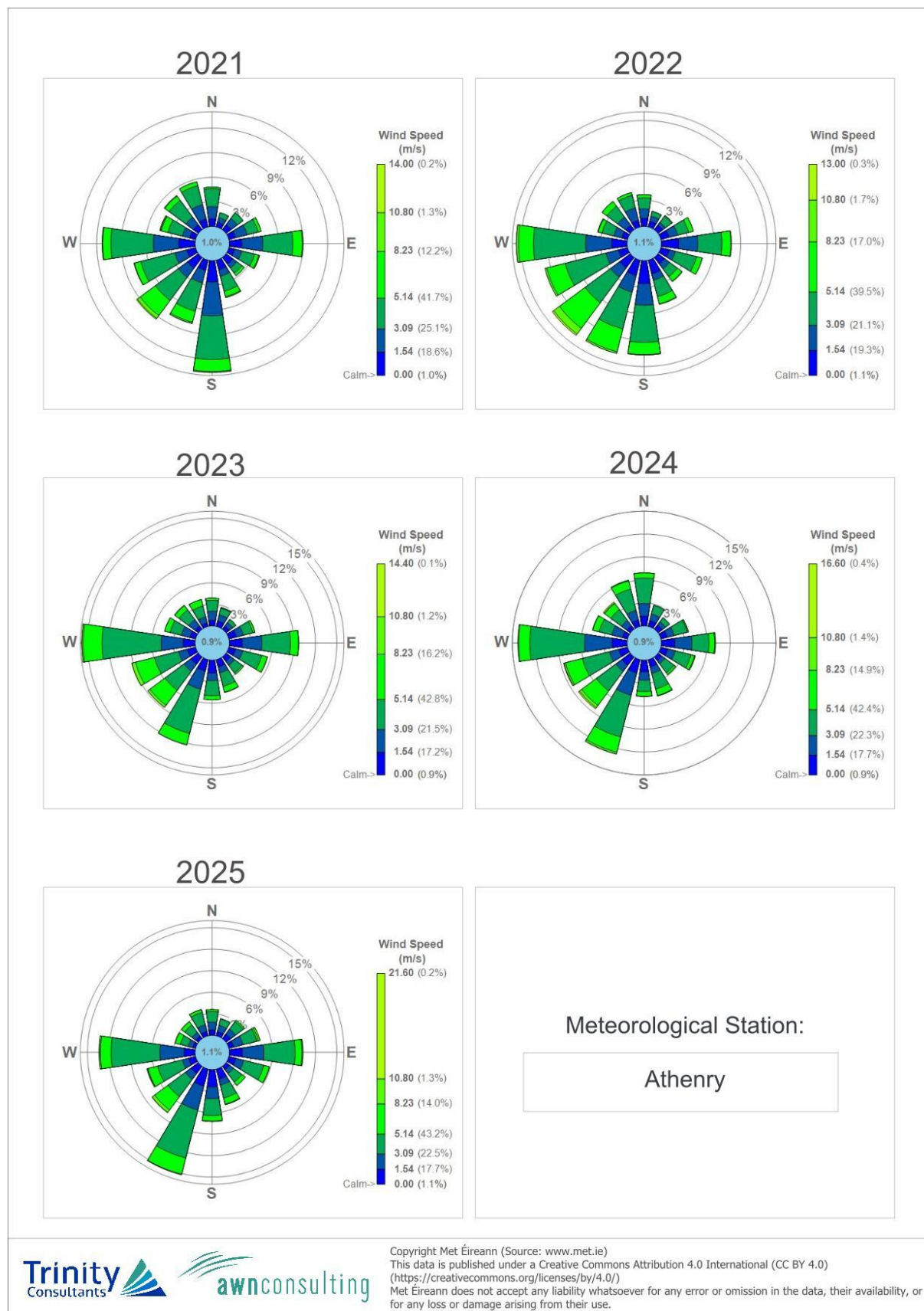


Figure 8.1: Wind Roses for Athenry Meteorological Station

8.3.2 BASELINE AIR QUALITY

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes as outlined within the EPA document titled Air Quality in Ireland 2024 (EPA, 2025). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D. In terms of air monitoring, the area of the proposed project is categorised as Zone D.

Continuous monitoring by the EPA is carried out at a number of monitoring stations within Zone D (EPA, 2025); these include rural background sites, roadside (traffic) sites and suburban background sites.

It is necessary to select monitoring stations that are representative of the proposed project location. Not all monitoring stations are considered suitable for determining background pollutant concentrations and must be reviewed on a case-by-case basis to determine the most appropriate EPA monitoring sites for the assessment. The selected monitoring sites (Kilkitt, Claremorris and Askeaton) are rural background monitoring locations which are not heavily influenced by traffic or other major air emission sources (similarly to the location of the project) and can provide an indicative estimate of the background concentrations in the vicinity of the proposed project.

8.3.2.1 Particulate Matter (PM₁₀)

Continuous PM₁₀ monitoring was carried out at three representative Zone D rural background locations from 2020 – 2024; Kilkitt, Claremorris and Askeaton (EPA, 2025). Annual average PM₁₀ concentrations across the sites ranged from 7 – 10µg/m³ over the 2020 – 2024 period (see **Table 8.6**).

There were no exceedances of the daily limit of 50µg/m³ (35 exceedances are permitted per year) (EPA, 2025). The overall average PM₁₀ concentration at the rural background Zone D sites over the 2020 – 2024 period is 8µg/m³. Based on the EPA data, a representative estimate of the current background PM₁₀ concentration in the region of the project is 8µg/m³.

Station	Averaging Period	Year				
		2020	2021	2022	2023	2024
Kilkitt	Annual Mean PM ₁₀ (µg/m ³)	8	8	9	7	7
	24-hr Mean > 50µg/m ³ (days)	0	0	0	0	0
Claremorris	Annual Mean PM ₁₀ (µg/m ³)	10	10	8	8	8
	24-hr Mean > 50µg/m ³ (days)	0	0	0	0	0
Askeaton	Annual Mean PM ₁₀ (µg/m ³)	7	9	9	-	8
	24-hr Mean > 50µg/m ³ (days)	0	0	0	-	0

Table 8.6: Baseline Zone D Air Quality – PM₁₀

8.3.2.2 Particulate Matter (PM_{2.5})

The results of PM_{2.5} monitoring at Claremorris and Shannon Estuary/Askeaton over the period 2020 – 2024 ranged from 4 – 8 µg/m³ (EPA, 2025) (see **Table 8.7**).

Long-term average PM_{2.5} concentrations measured at this location were significantly lower than the annual average limit value of 25 µg/m³. Based on this information, a conservative background PM_{2.5} concentration of 6 µg/m³ can be assumed.

Station	Averaging Period	Year				
		2020	2021	2022	2023	2024
Claremorris	Annual Mean PM _{2.5} (µg/m ³)	5	8	6	5	5
Shannon Estuary/Askeaton	Annual Mean PM _{2.5} (µg/m ³)	4	6	5	5	5

Table 8.7: Baseline Zone D Air Quality – PM_{2.5}

8.3.3 DUST DEPOSITION

Dust is present naturally in the air from a number of sources including weathering of minerals, pick-up across open land and dust generated from fires. Monitoring of dust deposition is not undertaken in the area and therefore background levels for the immediate vicinity of the proposed wind farm site are not available.

However, a study by the UK Office of Deputy Prime Minister (UK ODPM, 2002) gives estimates of likely dust deposition levels in specific types of environments. In open country a level of 39mg/m²/day is typical, rising to 59mg/m²/day on the outskirts of towns, and peaking at 127mg/m²/day for a purely industrial area. A level of 39mg/m²/day can be estimated as the background dust deposition level for the region of the proposed project due to its rural location.

8.3.4 SENSITIVITY OF THE RECEIVING ENVIRONMENT

In line with the UK Institute of Air Quality Management (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2024) prior to assessing the effect of dust from a proposed project, the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed construction works areas are taken into consideration.

For the purposes of this assessment, in line with the IAQM guidance, high sensitivity receptors are regarded as residential properties (where people are likely to spend the majority of their time), schools or hospitals. 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.

Table 8.8 outlines the criteria for determining the sensitivity of the area to dust soiling and dust-related human health effects as per the IAQM guidelines.

Sensitivity of the Area to Dust Soiling Effects on People and Property					
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
Sensitivity of the Area to Human Health Effects (<24µg/m³ Annual Mean PM ₁₀ Concentration)					
Receptor Sensitivity	Number of Receptors	Distance From Source (m)			
		<20	<50	<100	<250
High	>100	Medium	Low	Low	Low
	10 - 100	Low	Low	Low	Low
	1 - 10	Low	Low	Low	Low
Medium	>10	Low	Low	Low	Low
Low	1 - 10	Low	Low	Low	Low
Sensitivity of the Area to Dust Related Ecology Effects					
Receptor Sensitivity		Distance From Source			
		<20	<50		
High		High		Medium	
Medium		Medium		Low	
Low		Low		Low	

Table 8.8: Criteria for Determining the Sensitivity of the Area to Construction Dust

In terms of receptor sensitivity to dust soiling, the area surrounding the wind farm site is predominantly rural in nature. The dwelling location mapping provided in **Annex 13.1** identifies the residential receptors within 2km of the proposed turbines and provides context for the distribution of residential receptors surrounding the wind farm site. There are no residential properties within 250m of the wind farm construction works.

A review of the switch room and underground electricity line confirms that there are no highly sensitive residential receptors within 20m of the construction works. The number of highly sensitive residential receptors within 50m falls within the 1–10 receptor band identified in the IAQM guidance.

At the c.6m wall-removal location along the turbine haul route, the closest residential property is approximately 34m from the works and is located on the opposite side of the main road junction. The remaining nearby buildings are in commercial/industrial use.

On the basis of the receptor distribution described above and the criteria set out in **Table 8.8**, the sensitivity of the area to dust-soiling effects is classified as low.

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health effects. The criteria

take into consideration the current annual mean PM₁₀ concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity) and the number of receptors affected within various distance bands from the construction works. Based on the EPA data, a conservative estimate of the current background PM₁₀ concentration in the region of the project is 8µg/m³.

Based on the receptor distribution described above, the annual mean PM₁₀ concentration of 8µg/m³ and the IAQM criteria set out in **Table 8.8**, the sensitivity of the area to dust-related human-health effects is classified as low.

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to dust-related ecological effects. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant, as well as other effects. The guidance states that dust effects to vegetation can occur up to 50m from the site, and 50m from the proposed wind farm site access tracks, up to 250m from the proposed wind farm site entrance. The sensitivity of the area is determined based on the distance to the source, the designation of the site, (European, National or local designation) and the potential dust sensitivity of the ecologically important species present.

There are no designated ecology sites within 250m of the project. Therefore, ecological effects from construction dust are not considered further in this assessment.

8.4 DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

8.4.1 'DO-NOTHING' SCENARIO

Under the 'Do-Nothing' Scenario no construction works will take place and the previously identified effects of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. The ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from new developments in the surrounding area, changes in road traffic, etc.).

In the 'Do-Nothing' scenario the clean renewable power associated with wind farms, which replaces power generated from fossil fuels, would be delayed or prevented (i.e. renewable energy production capacity reduced).

8.4.2 CONSTRUCTION PHASE

8.4.2.1 Construction Dust Assessment

The greatest potential effect on air quality during the construction phase of the proposed project is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 250m of a construction site, the majority of the deposition occurs within the first 50m (IAQM, 2024). The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust

dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. A review of Athenry meteorological data and Shannon Airport meteorological data indicates that the prevailing wind direction is westerly to south-westerly and wind speeds are generally moderate in nature (see **Section 8.3.1**). In addition, dust generation is considered negligible on days where rainfall is greater than 0.2mm. A review of historical 30-year average data for Shannon Airport meteorological station (the nearest station with 30-year data) indicates that on average 223 days per year have rainfall over 0.2mm (Met Eireann, 2025) and therefore it can be determined that 61% of the time dust generation will be reduced due to natural meteorological conditions.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see **Section 8.3.4**). The major dust generating activities are divided into four types within the IAQM (2024) guidance to reflect their different potential effects. These are: demolition, earthworks, construction and trackout (movement of heavy vehicles).

Determining the Potential Dust Emission Magnitude

The magnitude of the works under each category can be classified as either small, medium or large depending on the scale of the works involved. The potential for dust-generating activities has been considered for the wind farm site, the grid connection and the works along the turbine haul route. The removal of the c.6m section of existing wall has been assessed as a small demolition activity below. The remaining turbine haul route works are considered to have negligible dust-generating potential and are not considered further.

The magnitude of each activity has been determined and summarised below for the proposed project using the criteria in **Table 8.4**.

- Demolition: The dust emission magnitude for demolition can be classified as small as only one small section of wall will be demolished and replaced with a fence as part of the haul route.
- Earthworks: The dust emission magnitude is classified as large because the c.87.12ha wind farm site alone exceeds the IAQM indicative site-area threshold of 110,000m². This is conservative as per the IAQM guidance, as earthworks will be localised and sequential rather than undertaken across the whole site simultaneously.
- Construction: The dust emission magnitude for the proposed construction activities can be classified as small as the total volume of structures with dust generating potential during their construction will be less than 12,000m³ and there will be no on-site concrete batching.
- Trackout: The dust emission magnitude for the proposed trackout can be classified as large, as there will be more than 50 outward HGV movements during the peak day of the construction phase of the proposed project.

Determining the Risk of Dust Effects

Once the dust emission magnitude has been determined the next step, according to the IAQM guidance (2024), is to establish the level of risk by combining the magnitude with the overall sensitivity of the area to dust soiling, dust-related human health and ecological effects (see **Section 8.3.4**). The level of risk associated with each activity is determined using the criteria in **Table 8.5**. The overall risk of dust effects from the construction works is shown in **Table 8.9**.

There is at most a low risk of dust soiling effects and a low risk of dust-related human health effects associated with the proposed works. As a result, best practice dust mitigation measures associated with low risk works will be implemented to ensure there are no significant effects at nearby sensitive receptors. In the absence of mitigation, dust effects are predicted to be **direct, localised, short-term, moderate** and **negative**.

Receptor	Receptor Sensitivity	Dust Emission Magnitude	Risk of Dust-Related Effects
Demolition			
Dust Soiling	Low	Small	Negligible Risk
Human Health	Low		Negligible Risk
Ecology	n/a		n/a
Earthworks			
Dust Soiling	Low	Large	Low Risk
Human Health	Low		Low Risk
Ecology	n/a		n/a
Construction			
Dust Soiling	Low	Small	Negligible Risk
Human Health	Low		Negligible Risk
Ecology	n/a		n/a
Trackout			
Dust Soiling	Low	Large	Low Risk
Human Health	Low		Low Risk
Ecology	n/a		n/a

Table 8.9: Risk of Construction Dust Effects Used to Define Site-Specific Mitigation

8.4.3 OPERATION PHASE

8.4.3.1 Operation Phase Indirect Air Quality Effects from Renewable Electricity Production

The generation of electricity from the project will lead to indirect net savings in NO_x emissions. The assessed turbine configurations have a total generating capacity of between 18.3MW and 21.6MW. Applying the corresponding capacity factor for each assessed turbine configuration, the project is expected to generate approximately 48.3GWh to 55.1GWh of electricity per annum.

The supply of 48.3 – 55.1GWh of renewable electricity to the national grid will lead to

a net saving in terms of NO_x emissions which may have been emitted from fossil fuels to produce electricity. Results, outlined in **Table 8.10**, indicate that the effect of the wind farm on Ireland's obligations under the National Emissions Reduction Directive is positive.

The annual effect of the project is annual NO_x emission savings of 0.03% of the 2030 ceiling of 42.75kt and savings of 0.29 – 0.33% relative to the NO_x emissions associated with power generation in Ireland in 2024 (EPA, 2026). This is an **indirect, long-term, slight and positive** effect on air quality.

NO _x Emissions Saved Due to Wind farm (tonnes/annum)	Comparison Scenario	NO _x (tonnes/annum)	Annual NO _x Saving (%)
12.1 – 13.8	National Emission Ceiling 2030 ^{Note 1}	42,750	0.03%
	NO _x Emissions from Power Generation in 2024 ^{Note 2}	4,171	0.29 – 0.33%
^{Note 1} National Emission Ceiling (EU Directive 2016/2284) ^{Note 2} Estimated as 4.7% of total national NO _x emissions of 88.75kt in 2024 (EPA, 2026).			

Table 8.10: Predicted Effect of the Proposed Project on Ireland's National Emissions Ceiling Obligations

8.4.4 DECOMMISSIONING PHASE

Decommissioning of the project will involve the dismantling and removal of the wind turbines and other above ground infrastructure, as described in **Chapter 3**. Decommissioning activities will involve the operation of plant and machinery, vehicle movements and the handling and removal of materials. These activities will have the potential to generate temporary dust, particulate matter, trackout and exhaust emissions.

The nature of the potential air quality effects will be comparable to those arising during the construction phase. However, the scale and duration of decommissioning activities and the associated traffic volumes will be lower than during construction, and the established access track network will be available for use. Decommissioning traffic will remain below the TII screening criteria for detailed traffic emissions modelling.

In the absence of mitigation, potential decommissioning effects on air quality will be direct, localised, short-term and negative, which are potentially significant. The construction-phase dust and trackout mitigation measures set out in **Section 8.5.1** will be applied, as relevant, during decommissioning. Subject to the implementation of these measures, no significant air quality effects are predicted.

8.4.5 CUMULATIVE EFFECTS

Potential cumulative effects on air quality could arise where dust-generating construction activities associated with separate developments occur concurrently and in proximity to one another, or where construction traffic from more than one development uses the same public road network. The developments of greatest

relevance to the project are the permitted Cush Wind Farm Phase I² and the proposed Mullanafawnia 110kV substation, together with other permitted and proposed developments in the surrounding area.

For the purposes of the cumulative assessment, the anticipated concurrent construction of the permitted Cush Wind Farm Phase I and the project has been assessed. The combined construction traffic associated with both developments has been assessed in **Chapter 14**. The combined average construction traffic remains below the TII screening criteria of an increase of 1,000 vehicles AADT or 200 HDV AADT. While short-duration peaks in HGV movements will occur during activities such as turbine foundation concrete pours, these peak-day movements do not represent annual average daily traffic. Consequently, detailed modelling of cumulative construction traffic emissions is not required.

Under the concurrent construction scenario assessed, cumulative dust and trackout could arise where activities occur in proximity or construction vehicles use the same sections of the public road network. The dust and trackout mitigation measures set out in **Section 8.5.1** will be implemented throughout the construction phase and incorporated into the Construction Environmental Management Plan (**Annex 3.4**). The project's dust-generating activities and construction traffic will be managed in accordance with the measures in **Section 8.5.1**, while the permitted Phase I development will remain subject to the mitigation and environmental-management requirements of its own consent. Subject to the implementation of these measures, cumulative construction effects on air quality will be short-term, localised, negative and not significant.

The proposed Mullanafawnia 110kV substation does not form part of the project or the planning application and will be subject to a separate consenting process. If construction of the substation occurs concurrently with construction of the underground electricity line, cumulative dust, plant emissions and construction traffic could arise in the vicinity of the interface between the two developments. The project's contribution to such effects will be controlled through the mitigation measures set out in **Section 8.5.1**, while the substation development will be subject to its own applicable mitigation requirements. No significant cumulative air quality effects are predicted.

During the operation phase, the project, Cush Wind Farm Phase I and the Mullanafawnia 110kV substation will generate no material direct emissions to air. Traffic will principally comprise infrequent inspection and maintenance vehicles. Accordingly, no significant adverse cumulative air quality effects are predicted during the operation phase. The combined generation and transmission of renewable electricity will contribute to an indirect, long-term, positive cumulative effect through the displacement of electricity generated from fossil fuels.

Should decommissioning of the project occur concurrently with decommissioning or other works associated with nearby developments, the construction-phase dust and traffic mitigation measures will be applied, as relevant. No significant cumulative air

² Including the Section 146B alteration request identified in **Chapter 1**.

quality effects are predicted during decommissioning.

8.5 MITIGATION MEASURES

8.5.1 CONSTRUCTION PHASE

Based on the assessment results in **Section 8.4.2**, mitigation associated with a low risk of construction dust effects is required. The relevant mitigation measures for low-risk sites as recommended by IAQM construction dust guidance (2024) are outlined below. These measures shall be incorporated into the Construction Environmental Management Plan (CEMP) prepared for the site.

8.5.1.1 Communications

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

8.5.1.2 Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.

8.5.1.3 Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Use localised screening or enclosure around specific dust-generating activities where necessary and practicable.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

8.5.1.4 Operating vehicle/machinery and sustainable travel

- Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 25kph on surfaced and 15kph on unsurfaced haul roads and work areas (if long haul routes are required)

these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).

8.5.1.5 Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

8.5.1.6 Waste management

- Bonfires and burning of waste materials are legally prohibited.

8.5.1.7 Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as is practicable.
- Only remove the cover in small areas during work and not all at once.

8.5.1.8 Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.

8.5.1.9 Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the

- sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Access gates to be located at least 10m from receptors where possible.

8.5.2 OPERATION PHASE

Operation phase traffic will have a long-term, imperceptible and not significant effect on air quality. Accordingly, no site-specific mitigation measures are required.

8.5.3 DECOMMISSIONING PHASE

The construction phase dust and trackout mitigation measures set out in **Section 8.5.1** will be applied, as relevant, during decommissioning. The applicable measures will be incorporated into the Decommissioning Plan to be prepared in advance of the decommissioning works, as described in **Chapter 3**.

8.6 MONITORING MEASURES

8.6.1 CONSTRUCTION PHASE

The following monitoring measures are proposed to ensure the dust mitigation measures are working satisfactorily:

- Undertake daily on-site and off-site visual inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of construction works, with cleaning to be provided if necessary.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

8.6.2 OPERATION PHASE

There is no monitoring recommended for the operation phase of the project as effects to air quality are predicted to be not significant.

8.6.3 DECOMMISSIONING PHASE

The construction phase monitoring measures set out in **Section 8.6.1** will be implemented, as relevant, during decommissioning and for the duration of dust

generating activities.

8.7 RESIDUAL EFFECTS

8.7.1 CONSTRUCTION PHASE

Once the dust mitigation measures outlined in **Section 8.5.1** are implemented, the air quality effect of the project in terms of dust soiling will be short-term, direct, localised, negative and not significant at nearby receptors.

Best practice mitigation measures are proposed for the construction phase of the project which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. With these measures in place, construction of the project is not predicted to result in exceedance of the applicable ambient air quality limit values or significant effects on human health. Therefore, the air quality effect of construction of the project will be **short-term, direct, localised, negative** and **not significant** with respect to human health.

8.7.2 OPERATION PHASE

The only direct air quality effects during the operation phase will arise from infrequent maintenance vehicles. These effects are assessed as long-term, direct, localised, negative and imperceptible.

There will be indirect beneficial effects to air quality from the generation of renewable electricity from the project. There will be NO_x emission savings which may otherwise have been generated from fossil fuels. The generation of 48.3 – 55.1 GWh of renewable electricity will result in a decrease in annual NO_x emission levels by 0.03% of the 2030 National Air Emissions Target of 42.75kt. This is an **indirect, long-term, slight, positive** effect on air quality. Accordingly, the operation phase residual effect will be **not significant**.

8.7.3 DECOMMISSIONING PHASE

Following implementation of the mitigation and monitoring measures identified above, residual air quality effects during decommissioning will be **direct, localised, short-term, negative** and **not significant**.

8.8 SUMMARY

To conclude, no significant adverse air quality effects are predicted during the construction, operation or decommissioning phases of the project. The generation of renewable electricity during the operation phase will result in an indirect, long-term, slight and positive effect on air quality.

8.9 REFERENCES

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