Chapter 8 – Air Quality

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8. AIR QUALITY

8.1 Introduction

Bord na Móna (BnM) are planning to convert the existing liquid fuel-powered peaking plant, at its Renewable Energy Complex, located just south of Edenderry, Co. Offaly, to natural gas turbines to reduce CO_2 emissions.

The Proposed Development comprises the construction, commissioning, and operation of a c. 23.65-kilometre (km) Gas Networks Ireland (GNI) 143 Ballykilleen Pipeline and all ancillary and associated temporary works. The proposed GNI 143 Ballykilleen Pipeline is designed to connect the existing BGE77 pipeline (also known as Pipeline to the West (PTTW)) to the Edenderry Renewable Energy Complex. The purpose of the Proposed Development is to provide the licenced site at the Edenderry Power Limited (P0482-04) with a natural gas supply which will facilitate the conversion of the existing Cushaling Peaker Plant on the site from their current single-fuel operation (liquid fuel) to dual-fuel operation, with natural gas as the primary fuel and HVO retained as backup. This chapter assesses the likely air quality impacts associated with the construction and operation of the Proposed Development.

A full description of the development is available in Chapter 2 – Description of the Proposed Development. The assessment of impacts has been undertaken in the context of current relevant standards and guidance, and identifies any requirements or possibilities for mitigation. The chapter covers the current baseline air quality in the region, assesses the air quality impacts associated with the construction and operation of the development, and sets out the mitigation measures that will be implemented to control and manage dust and emissions.

This chapter is supported by figures contained in Volume 4 of this EIAR. While selected figures may be reproduced within the chapter for ease of reference, the full size and quality of those figures are provided in Volume 4. Annotated mark ups, diagrams and photographic records are excluded, as these are provided for illustrative or contextual purposes only and are not replicated at full presentation quality.

The relevant Volume 4 figures to this chapter include:

- Figure 8.1 Air Quality - Sensitive Receptors
- Figure 8.2 Compound Air Quality- Sensitive Receptors

8.2 Methodology

The principal guidance and best practice documents used to inform the assessment of potential impacts on air quality are summarised below.

In addition to specific air quality guidance documents, the following guidelines were considered and consulted in the preparation of this chapter:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Environment, Community and Local Government, August 2018); and
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017).

The assessment has made reference to national air quality guidelines where available, in addition to international standards and guidelines relating to the assessment of air quality impacts. These are summarised below:

- PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (Transport Infrastructure Ireland (TII), 2025);
- Guidance on the Assessment of Dust from Demolition and Construction V2.2 (Institute of Air Quality Management (IAQM) IAQM 2024) (hereafter referred to as the IAQM Guidelines); and
- A Guide To The Assessment Of Air Quality Impacts On Designated Nature Conservation Sites (Version 1.1) (IAQM 2020).

8.2.1 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.

8.2.1.1.1 Air Quality Directive

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). Directive (EU) 2024/2881 sets out air quality standards for pollutants to be reached by 2026 and by 2030 which are more closely aligned with the World Health Organisation (WHO) air quality guidelines.

The ambient air quality limit values for pollutants are set out in Annex I of Directive (EU) 2024/2881. Table 1 of Annex I in Directive (EU) 2024/2881 sets out the updated air quality limit values for pollutants to be achieved by 1 January 2030, which are more closely aligned with the WHO air quality guidelines. Table 2 of Annex I in Directive (EU) 2024/2881 sets out the limit values for air pollutants which are to be achieved by 11 December 2026 and are also applicable up to 2030. The limit values in Table 2 of Annex I are the same as the limits set under Directive 2008/50/EC and the Air Quality Standards Regulations 2022.

The Ambient Air Quality Standards Regulations 2022 (S.I. 739 of 2022) (the Air Quality Standards Regulations 2022) further transposed the CAFE Directive and revoked the Air Quality Standards Regulations 2011, as amended. 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.

In relation to the Proposed Development, the applicable limit values are for nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$), as these are the pollutants that have the potential to be emitted during the construction and operational phases and cause significant air quality impacts. The limit values for these pollutants pre- and post-2030 are outlined in Table 8-1.

Table 8-1 CAFE Directive Ambient Air Quality Limit Values

Pollutant	Directive (EU) 2024/2881 Annex I Table 2		Directive (EU) 2024/2881 Annex I Table 1	
	Limit Type	Limit Value (to be attained by 2026 and applicable until 2030) a	Limit Type	Limit Value (to be attained by 2030) a
Nitrogen Dioxide (NO_2)	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3	Hourly limit for protection of human health - not to be exceeded more than 3 times/year	200 µg/m^3
	n/a	n/a	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	50 µg/m^3
	Annual limit for protection of human health	40 µg/m^3	Annual limit for protection of human health	20 µg/m^3
Particulate Matter (as PM_{10})	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	45 µg/m^3
	Annual limit for protection of human health	40 µg/m^3	Annual limit for protection of human health	20 µg/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	25 µg/m^3
	Annual limit for protection of human health	25 µg/m^3	Annual limit for protection of human health	10 µg/m^3

a. Note µg/m^3 (micrograms per cubic metre).

8.2.1.1.2 WHO Air Quality Guidelines & Clean Air Strategy

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 (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 5 µg/m^3. 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 NO_2*".

Annex II of Directive (EU) 2024/2881 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*."

Table 8-2 WHO Air Quality Guidelines 2021

Pollutant	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO_2	24-hour limit for protection of human health	-	-	25 µg/m^3
	Annual limit for protection of human health	20 µg/m^3	-	10 µg/m^3
PM (as PM_{10})	24-hour limit for protection of human health	75 µg/m^3	50 µg/m^3	45 µg/m^3
	Annual limit for protection of human health	30 µg/m^3	20 µg/m^3	15 µg/m^3
PM (as $PM_{2.5}$)	24-hour limit for protection of human health	37.5 µg/m^3	25 µg/m^3	15 µg/m^3
	Annual limit for protection of human health	15 µg/m^3	10 µg/m^3	5 µg/m^3

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 Table 2 of Annex I in Directive (EU) 2024/2881 and the Air Quality Standards Regulations 2022 are applicable for the Proposed Development as it will be constructed and operational prior to 2030.

8.2.1.1.3 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust that are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$). The EU ambient air quality standards outlined in Table 8-1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards 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. Furthermore, no criteria have been stipulated for nuisance dust for this specific type of Proposed Development.

With regard to 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 350 mg/m^2/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 TA-Luft limit of 350 mg/m^2/day be applied to the site boundary of quarries. This limit value can be implemented with regard

to dust impacts from construction of the Proposed Development, in terms of both sensitive human and ecological receptors.

8.2.2 Construction Phase

8.2.2.1 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 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. The IAQM methodology has been applied to the construction phase of this development to predict the likely risk of dust impacts 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 (IAQM, 2024) to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (transport of dust and dirt from the construction site 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 8-3, these are based on the IAQM guidance (IAQM, 2024). The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site-specific mitigation to be determined.

Table 8-3 IAQM Criteria to Determine Dust Emissions Magnitude

Dust Emission Magnitude		
Small	**Medium**	**Large**
Demolition		
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	Total building volume 12,000 - 75,000 m^3 Potentially dusty construction material Demolition activities 6 – 12 m above ground level	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
Earthworks		
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 Earthworks during wetter months	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 3 – 6 m in height	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
Construction		

Dust Emission Magnitude		
Small	**Medium**	**Large**
Total building volume <12,000 m^3 Construction material with low potential for dust release (e.g. metal cladding or timber)	Total building volume 12,000 - 75,000 m^3 Potentially dusty construction material (e.g. concrete) On-site concrete batching	Total building volume >75,000 m^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 <50 m	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 – 100 m	>50 HDV (>3.5 t) outward movements in any one day Potentially dusty surface material (e.g. high clay content) Unpaved road length >100 m

The sensitivity of the area must then be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. 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 8-4 outlines the criteria for determining the sensitivity of the area to dust soiling, dust-related human health effects and ecological effects as per the IAQM guidance (IAQM, 2024).

Table 8-4 Criteria for Determining the Sensitivity of the Area

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 Impacts						
Receptor Sensitivity	**Annual Mean PM_{10} Concentration**	**Number of Receptors**	**Distance from Source (m)**			
			<20	**<50**	**<100**	**<250**
High	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low

Sensitivity of the Area to Ecological Impacts		
Receptor Sensitivity	**Distance from Source (m)**	
	<20	**<50**
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Once the dust emission magnitude and sensitivity of the area have been determined the next step, according to the IAQM guidance (IAQM, 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.

Table 8-5 IAQM Criteria to Determine Risk of Dust Impacts

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

8.2.2.2 Traffic Assessment

Construction phase traffic also has the potential to 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 Development 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.

- 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 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5m or greater.

The transport consultant has confirmed that construction stage traffic is predicted to consist of a maximum of 180 Annual average daily traffic (AADT), including 60 Heavy duty vehicle (HDV). As construction traffic does not exceed any of the thresholds above for a detailed assessment, a detailed air quality assessment of construction stage traffic emissions has been scoped out as there is no potential for significant impacts to air quality.

8.2.3 Operational Phase

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the Proposed Development. The TII scoping criteria detailed in Section 8.2.2.2 were used to determine if any road links are affected by the Proposed Development and require inclusion in a detailed air dispersion modelling assessment.

Once constructed, the proposed GNI143 Ballykilleen Pipeline and AGPC will not require any on site staff to operate it. GNI maintenance staff, one van, will carry out checks every two weeks to a month along with routine inspection and maintenance, including pigging, of the asset every seven to ten years. Therefore, there is no potential for air quality impacts from operational traffic and no further assessment is required.

The Ballykilleen AGI will contain small boilers (<1MWth). Because of their size and low thermal output, the emissions of these boilers are highly unlikely to cause a significant air quality effect and so have been scoped out of this assessment.

A qualitative assessment will be undertaken separately to review the likely changes in emissions as a result of the change in fuel source to the Cushaling Peaker Plant and determine if there are likely to be any air quality effects that require mitigation. This report is included as Appendix 2.4 of Chapter 2 of this EIAR.

8.2.4 Forecasting Methods and Difficulties Encountered

There were no forecasting difficulties encountered.

8.3 Receiving Environment

8.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality are the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Casement Aerodrome meteorological station, which is located approximately 42.4 km east of the Proposed Development at the closest point. For data collated during five representative years (2020 – 2024), the predominant wind direction is westerly to south-westerly (Met Éireann, 2025).

8.3.2 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA. The most recent annual report on air quality in Ireland is "*Air Quality In Ireland 2024*" (EPA, 2025). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2025).

As part of the implementation of the Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022) four air quality zones have been defined in Ireland for air quality management and assessment purposes (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 and assessment, the Proposed Development site is within Zone D (EPA, 2025). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the Proposed Development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

Long-term NO_2 monitoring was carried out at the Zone D rural background locations of Emo Court and Kilkitt and the suburban background locations of Castlebar and Edenderry for the period 2020 – 2024 (EPA, 2025). Long term average concentrations are significantly below the annual average limit of 40 µg/m^3. Average results range from 2 – 10 µg/m^3 for the relevant background locations (Table 8-6). Edenderry is the most representative monitoring location. The maximum concentration recorded at

Edenderry was 10 µg/m^3 in 2024. Based on this data, a conservative estimate of the current background NO_2 concentration for the region of the Proposed Development is 10 µg/m^3.

Table 8-6 Trends In Zone D Air Quality - Nitrogen Dioxide (NO_2)

Station	Averaging Period	Year				
		2020	2021	2022	2023	2024
Emo Court	Annual Mean NO_2 (µg/m^3)	3	4	3	2	3
	1-hr Mean NO_2 Values >200 µg/m^3	0	0	0	0	0
Kilkitt	Annual Mean NO_2 (µg/m^3)	2	2	2	2	2
	1-hr Mean NO_2 Values >200 µg/m^3	0	0	0	0	0
Castlebar	Annual Mean NO_2 (µg/m^3)	6	6	8	7	7
	1-hr Mean NO_2 Values >200 µg/m^3	0	0	0	0	0
Edenderry	Annual Mean NO_2 (µg/m^3)	-	9	7	9	10
	1-hr Mean NO_2 Values >200 µg/m^3	0	0	0	0	0

Continuous PM_{10} monitoring was carried out at twelve representative Zone D locations from 2020 - 2024: Kilkitt, Claremorris, Askeaton, Killarney, Malin Head, Castlebar, Cobh Carrignafoy, Enniscorthy, Macroom, Roscommon Town, Tipperary Town, Cavan and Edenderry (Table 8-7). Levels range from 7 - 18 µg/m^3 over the five-year period with at most 10 exceedances (in Edenderry) of the 24-hour limit value of 50 µg/m^3 in 2022 (35 exceedances are permitted per year) (EPA, 2025). Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the Proposed Development is 18 µg/m^3.

Table 8-7 Trends in Zone D Quality - PM_{10}

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 > 50 µg/m^3 (days)	0	-	0	0	0
Claremorris	Annual Mean PM_{10} (µg/m^3)	10	10	8	8	8
	24-hr Mean > 50 µg/m^3 (days)	0	0	0	0	0
Askeaton	Annual Mean PM_{10} (µg/m^3)	7	9	9	-	8
	24-hr Mean > 50 µg/m^3 (days)	0	0	0	-	0
Killarney	Annual Mean PM_{10} (µg/m^3)	-	-	9	9	11
	24-hr Mean > 50 µg/m^3 (days)	-	-	0	0	0
Malin Head	Annual Mean PM_{10} (µg/m^3)	-	-	-	13	13
	24-hr Mean > 50 µg/m^3 (days)	-	-	-	0	0
Castlebar	Annual Mean PM_{10} (µg/m^3)	14	10	11	10	10
	24-hr Mean > 50 µg/m^3 (days)	2	1	0	-	0
Cobh Carrignafoy	Annual Mean PM_{10} (µg/m^3)	13	12	13	12	12
	24-hr Mean > 50 µg/m^3 (days)	0	1	0	-	0
Enniscorthy	Annual Mean PM_{10} (µg/m^3)	15	14	15	13	14
	24-hr Mean > 50 µg/m^3 (days)	5	1	5	-	3
Macroom	Annual Mean PM_{10} (µg/m^3)	15	15	16	11	12
	24-hr Mean > 50 µg/m^3 (days)	6	2	7	-	0
Roscommon Town	Annual Mean PM_{10} (µg/m^3)	10	10	11	10	10
	24-hr Mean > 50 µg/m^3 (days)	0	0	0	-	1
Tipperary Town	Annual Mean PM_{10} (µg/m^3)	12	13	14	11	11
	24-hr Mean > 50 µg/m^3 (days)	1	3	3	-	0
Cavan	Annual Mean PM_{10} (µg/m^3)	9	11	11	10	11
	24-hr Mean > 50 µg/m^3 (days)	0	0	2	-	0
Edenderry	Annual Mean PM_{10} (µg/m^3)	-	18	18	16	16
	24-hr Mean > 50 µg/m^3 (days)	-	4	10	-	5

Continuous $PM_{2.5}$ monitoring was carried out at twelve representative Zone D locations from 2020 - 2024: Claremorris, Shannon Estuary / Askeaton, Killarney, Malin Head, Cavan, Cobh Carrignafoy, Edenderry, Enniscorthy, Macroom, Mallow, Roscommon Town, and Tipperary Town (Table 8-8). Levels range from 4 - 18 µg/m^3 over the five-year period (EPA, 2025). Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the Proposed Development is 18 µg/m^3.

Table 8-8 Trends in Zone D Quality - $PM_{2.5}$

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
Killarney	Annual Mean $PM_{2.5}$ (µg/m^3)	-	-	6	5	7
Malin Head	Annual Mean $PM_{2.5}$ (µg/m^3)	-	-	-	7	7
Cavan	Annual Mean $PM_{2.5}$ (µg/m^3)	6	7	7	6	7
Cobh Carrignafoy	Annual Mean $PM_{2.5}$ (µg/m^3)	8	7	8	7	7
Edenderry	Annual Mean $PM_{2.5}$ (µg/m^3)	-	18	13	12	12
Enniscorthy	Annual Mean $PM_{2.5}$ (µg/m^3)	12	10	10	9	9
Macroom	Annual Mean $PM_{2.5}$ (µg/m^3)	11	10	11	7	8
Mallow	Annual Mean $PM_{2.5}$ (µg/m^3)	10	8	7	6	6
Roscommon Town	Annual Mean $PM_{2.5}$ (µg/m^3)	7	7	8	6	7
Tipperary Town	Annual Mean $PM_{2.5}$ (µg/m^3)	8	9	9	7	7

Based on the above information the air quality in the area is generally good, with concentrations of the key pollutants generally well below the relevant limit values.

8.3.3 Sensitivity of the Receiving Environment to Dust

The impact to air quality due from construction phase activities is assessed at sensitive receptors within 250 m of the development boundary. As mitigation will be applied across the whole site (and whole length of the pipeline), all of the chainages have been assessed together.

In terms of receptor sensitivity to dust soiling, there are between 1 and 10 residential properties within 20 m of the site boundary (for the whole length of the pipeline) and less than 100 sensitive receptors within 250 m. Based on the IAQM criteria outlined in Table 8-4, the sensitivity of the area to dust soiling is considered medium.

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 impacts. The criteria take into consideration the current annual mean PM_{10} 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. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the Proposed Development is 18 µg/m^3 and as discussed above, there are between 1 and 10 sensitive receptors within 20 m of the site boundary. Based on the IAQM criteria outlined in Table 8-4, the worst-case sensitivity of the area to human health is considered low.

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to dust-related ecological impacts. Dust from construction sites deposited on vegetation may create ecological stress within the local plant community. The guidance states that dust impacts to vegetation can occur up to 50 m from the site and 50 m from site access roads, up to 250 m for the site entrance. The following designated ecological sites are within this zone:

- Grand Canal Proposed Natural Heritage Area (pNHA); and
- Mount Hevey Bog Special Area of Conservation (SAC) / pNHA.

Based on the IAQM criteria outlined in Table 8-4 the worst-case sensitivity of the area to ecology is considered high.

Figures of the receptors in the construction phase dust assessment study area are presented in Volume 4 of the EIAR.

8.4 Characteristics of the Proposed Development

For a more comprehensive understanding of the Proposed Development, please refer to Chapter 2 (Description of the Proposed Development) of the EIA Report. Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant document in order to define the Proposed Development.

8.4.1 Construction Phase

During the construction phase, the primary air quality considerations relate to the generation, dispersion, and deposition of dust and particulate matter arising from excavation, earthworks, construction activities and vehicle movements. No demolition activities are occurring as part of the construction phase activities. The total site area is greater than 110,000 m^2, the total construction volume will be greater than 75,000 m^3, and the number of outward HDV movements per day will be between 20 and 50.

8.4.2 Operational Phase

Once constructed, the proposed pipeline will not require any on site staff to operate it. GNI maintenance staff, one van, will carry out checks every two weeks to a month along with routine inspection and maintenance, including pigging, of the asset every seven to ten years. The Ballykilleen AGI Packaged Boiler Unit (PBU) Kiosk will contain small boilers (<1MWth) and a gas-fired backup generator.

8.5 Potential Impacts of the Proposed Development

8.5.1 Construction Phase

8.5.1.1 Dust Assessment

The greatest potential impact on air quality during the construction phase of the Proposed Development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 250 m of a construction site, the majority of the deposition occurs within the first 50 m (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. A review of Casement meteorological data indicates that the prevailing wind direction is westerly to south-westerly (Section 8.3.1).

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 (Section 8.3.3). The major dust generating activities are divided into four types within the IAQM (IAQM, 2024) guidance to reflect their different potential impacts. These are: demolition, earthworks, construction and trackout (movement of heavy vehicles).

Figures of the receptors in the construction phase dust assessment study area are presented in Volume 4 of the EIAR.

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 magnitude of each activity (Table 8-8) has been determined below for the Proposed Development using the criteria in Table 8-3.

Table 8-9 Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude	Justification
Demolition	N/A	No demolition activities are occurring as part of the construction activities
Earthworks	Large	Total site area is greater than 110,000 m^2
Construction	Large	Total building volume will be greater than 75,000 m^3
Trackout	Medium	Between 20 and 50 outward HDV movements per day

Determining the Sensitivity of the Area

As determined in Section 8.3.3, there are between 1 and 10 residential properties within 20 m of the proposed works area and less than 100 sensitive receptors within 250 m. Grand Canal pNHA and Mount Hevey Bog SAC/pNHA are present within 50 m of the Site boundary. The sensitivity of the area to dust soiling, human health impacts and ecological impacts from dust are shown in Table 8-10.

Dust soiling refers to the deposition of particulate matter on surfaces such as buildings, vehicles, vegetation and infrastructure. During construction, dust may be generated from activities including soil stripping, trench excavation, handling of excavated materials, vehicle movements on unpaved surfaces, and the establishment of temporary construction compounds.

Potential impacts to human health in relation to air quality are primarily associated with the inhalation of airborne dust and exhaust emissions from construction plant and vehicles. Construction dust may include both coarse particulate matter (PM_{10}) and finer particles, which can exacerbate existing respiratory conditions if exposure is prolonged or uncontrolled.

Potential air quality impacts to ecological receptors are primarily related to the deposition of dust on vegetation, which can interfere with photosynthesis, affect plant health, or alter sensitive habitats where dust loads are excessive.

Table 8-10 - Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Medium	Medium	Medium
Human Health	N/A	Low	Low	Low
Ecology	N/A	High	High	High

Determining the Risk of Dust Impacts

As detailed in Table 8-5, The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation.

Table 8-11 below provides a summary of the risk of dust impacts for the Proposed Development.

There is at most a high risk of dust soiling impacts, a high risk of ecological impacts and a medium risk of dust-related human health impacts associated with the proposed works. Without mitigation in place, construction dust will overall have a ***short-term, direct, localised, negative*** and ***slight*** impact on air quality, which may potentially have a significant effect. As a result, best practice dust mitigation measures associated with high-risk works will be implemented to ensure there are no significant impacts at nearby sensitive receptors (see Section 8.6.1).

Table 8-11 - Risk of Dust Impacts used to Define Site-Specific Mitigation

Potential Impact	Risk of Dust Impacts			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Medium Risk	Medium Risk	Medium Risk
Human Health	N/A	Low Risk	Low Risk	Low Risk
Ecology	N/A	High Risk	High Risk	Medium Risk

8.5.1.1.1 Potential Impacts Due to Dust Soiling

There is at most a high risk of dust soiling impacts associated with the proposed works. Without mitigation in place, construction dust will have a ***short-term, direct, localised, negative*** and ***slight*** impact on air quality, which may potentially have a significant effect.

8.5.1.1.2 Potential Impacts to Human Health

There is at most a medium risk of dust-related human health impacts associated with the proposed works. Without mitigation in place, construction dust will have a ***short-term, direct, localised, negative*** and ***slight*** impact on air quality, which may potentially have a significant effect.

8.5.1.1.3 Potential Impacts to Ecological Receptors

There is at most a high risk of ecological impacts associated with the proposed works. Without mitigation in place, construction dust will have a ***short-term, direct, localised, negative*** and ***slight*** impact on air quality, which may potentially have a significant effect.

8.5.1.2 Potential Impacts Due to Traffic

There is also the potential for traffic emissions to impact air quality in the short-term over the construction phase. Particularly due to the increase in HGVs accessing the site. The construction stage traffic has been reviewed and a detailed air quality assessment has been scoped out as none of the road links impacted by the Proposed Development satisfy the TII assessment criteria in Section 8.2.2.2.

Following the completion of the initial site clearance works, the generation of HGV movements during the build period will be evenly spread throughout the day and, as such, will not impact significantly during the peak traffic periods.

It can therefore be determined that the construction stage traffic will have a ***short-term, direct, localised, negative*** and ***imperceptible*** impact on air quality.

8.5.2 Operational Phase

Once constructed, the proposed GNI143 Ballykilleen Pipeline will not require any on site staff to operate it. GNI maintenance staff, one van, will carry out checks every two weeks to a month along with routine inspection and maintenance, including pigging, of the asset every seven to ten years. Therefore, there is no potential for air quality impacts from operational traffic and no further assessment is required.

The Ballykilleen AGI will contain small boilers (<1MWth) and a gas-fired backup generator. Because of their size and low thermal output, the emissions of these boilers and generator are highly unlikely to cause a significant air quality effect and so have been scoped out of this assessment.

It can therefore be determined that the operational phase emissions will have a ***long-term, direct, localised, negative*** and ***not significant*** impact on air quality.

A qualitative assessment will be undertaken separately to review the likely changes in emissions as a result of the change in fuel source to the Cushaling Peaker Plant and determine if there are likely to be any significant air quality effects that require mitigation.

8.6 Mitigation Measures

8.6.1 Construction Phase

Based on the assessment results in Section 8.5.1, mitigation associated with a high risk of construction dust impacts is required to be implemented by the contractor. Mitigation measures for high-risk sites as recommended by IAQM construction dust guidance are as follows:

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- 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.

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 log book.
- Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

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.
- Erect solid screens or barriers around dust causing activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period
- 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.

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 24 kmph on surfaced and 16 kmph 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)
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)

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.

Waste management

- Bonfires and burning of waste materials are legally prohibited.

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.

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.

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.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

The measures above will mitigate the dust impacts for dust soiling, human health and ecology.

8.6.2 Operational Phase

There is no mitigation required for the operational phase of the development as impacts to air quality are predicted to be ***not significant*** (see Section 8.5.2).

8.7 Monitoring or Reinstatement Measures

8.7.1 Construction Phase

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase of the Proposed Development is recommended to ensure mitigation measures are working satisfactorily. The location should be at the site boundary close to dust-causing activities where there is potential to affect nearby residences or commercial properties. Given the length of the site, and that the areas with the largest amount of dust generation will move over time during the construction phase, the monitoring location should be moved with these activities to capture a worst-case location.

Monitoring can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2 m above ground level. The TA Luft limit value is 350 mg/m^2/day during the monitoring period of 30 days (+/- 2 days).

8.7.2 Operational Phase

No operational phase monitoring is required.

8.8 Residual Effects of the Proposed Development

8.8.1 Construction Phase

Best practice mitigation measures are proposed for the construction phase of the Proposed Development (Section 8.6.1), which will focus on the proactive control of dust and other air pollutants, to minimise generation of emissions at source. The mitigation measures that will be put in place during construction will ensure that the impact complies with all EU ambient air quality legislative limit values, which are based on the protection of human health (see Table 8-1).

Therefore, the predicted air quality impact of the construction phase of the Proposed Development is ***short-term, direct, localised, negative*** and ***not significant***. This applies to dust soiling, human health and ecological impacts from dust.

8.8.2 Operational Phase

Emissions of air pollutants during the operational phase are predicted to be significantly below the ambient air quality standards, which are based on the protection of human health. Therefore, residual impacts to human health related to air quality will be ***long-term, direct, localised, negative*** and ***not significant***.

8.9 References

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