9 AIR QUALITY

9.1 Introduction

This chapter describes and assesses the potential impacts on air quality associated with the Proposed Development.

9.1.1 Quality Assurance and Competence

This chapter was prepared by Laura Griffin, Environmental Consultant, Enviroguide. Laura has a Master of Science (Hons) degree in Climate Change from Maynooth University and a Bachelor of Arts (Hons) degree in English and Geography from Maynooth University. Laura has 5+ years of professional experience and has worked as an Environmental Consultant with Enviroguide since 2021 and has experience preparing Environmental Impact Assessment (EIA) Screening Reports, Air Quality and Climate, Noise and Vibration and Material Assets (Waste and Utilities) Chapters of Environmental Impact Assessment Reports (EIAR)s.

The report has been reviewed by Gráinne Ryan, Principal Consultant with Enviroguide. Gráinne has worked in consulting for many years and most recently directly within the renewable energy industry. Gráinne's project experience in the waste, pharmaceutical, residential, industrial and commercial sectors cover the planning, consenting and operational stages.

9.2 Study Methodology

This study methodology is in line with accepted practices. Taking into account Ambient Air Quality Standards, the baseline air quality of the site is examined using EPA monitoring data. Air quality impacts from the Proposed Development are then determined by a qualitative assessment of the nature and scale of dust and emission generating activities associated with the construction phase of the Proposed Development in accordance with relevant guidance (Institute of Air Quality Management (IAQM) 2024).

9.2.1 Relevant Legislation and Guidance

The principal guidance and best practice documents used to inform the assessment of potential impacts on air quality is as follows:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government (DHPLG), 2018);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022);
- Guidance on the Assessment of Dust from Demolition and Construction Version 2.2 (Institute of Air Quality Management (IAQM), 2024);
- A Guide To The Assessment Of Air Quality Impacts On Designated Nature Conservation Sites (Version 1.1) (IAQM, 2020);
- TII Guidance Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 and TII Road Emissions Model (REM) online calculator tool (TII, 2022); and
- TII Road Emissions Model (REM): Model Development Report – GE-ENV-01107 (TII, 2024).

9.2.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, National and European statutory bodies, the Department of the Environment, Heritage and Local Government in Ireland (DEHLG, 2004) and the European Parliament and Council of the European Union, 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 based on compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2022, which incorporate European Commission Directive 2008/50/EC, which has set limit values for numerous pollutants with the limit values for NO_2, PM_{10}, and $PM_{2.5}$ being relevant to this assessment. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC) and includes ambient limit values relating to $PM_{2.5}$. The applicable limit values for NO_2, PM_{10}, and $PM_{2.5}$ are set out in Table 9.1.

Table 9.1: Limit Values of Cleaner Air for Europe (CAFE) Directive 2008/50/EC (Source: EPA, 2020)

Pollutant	Regulation[1]	Limit Type	Value
Dust Deposition	TA Luft (German VDI, 2002)	Annual average limit for nuisance dust	350 mg/m^2/day
Nitrogen Dioxide	2008/50/EC		200 μg/m^3
		Annual limit for protection of human health	40 μg/m^3
NOx	2008/50/EC		30 μg/m^3
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 μg/m^3 PM_{10}
		Annual limit for protection of human health	40 μg/m^3 PM_{10}
Particulate Matter (as $PM_{2.5}$) – Stage 1	2008/50/EC	Annual limit for protection of human health	25 μg/m^3 $PM_{2.5}$
Particulate Matter (as $PM_{2.5}$) – Stage 2[2]	2008/50/EC	Annual limit for protection of human health	20 μg/m^3 $PM_{2.5}$

On the 14th of October 2024 the European Parliament and the Council adopted a directive setting updated air quality standards across the EU. The directive aims to improve air quality across the EU by aligning standards with the latest World Health Organisation (WHO) guidelines and reducing air pollution's health impacts by more than 55% by 2030. The directive updates and consolidates previous directives (2004/107/EC and 2008/50/EC) to enhance clarity and effectiveness. This plan is

[1] EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

[2] Stage 2 Indicative limit value for $PM_{2.5}$ to be applied from 1 January 2020 after review by the European Commission

part of the broader European Green Deal, targeting significant reductions in air, water, and soil pollution by 2050. The revised directive will also ensure early action, with air quality roadmaps that need to be prepared ahead of 2030 if there is a risk that the new standards will not be attained by that date. The air quality standards will be reviewed regularly in line with latest scientific evidence to assess whether they continue to be appropriate.

The text will be published in the EU's Official Journal and enter into force on the twentieth day following publication. Member states will have two years after the entry into force to transpose the directive into national law.

By 2030, the European Commission will review the air quality standards and every five years thereafter, in line with latest scientific evidence.

At present, the applicable standards for assessing compliance in relation to air quality are those outlined in Table 9.1.

9.2.1.2 Air Quality and Traffic Emissions

The TII document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022) details a methodology for determining air quality impact significance criteria for road schemes which can be applied to any project that causes a change in traffic. The degree of impact is determined based on the percentage change in pollutant concentrations relative to the 'Do Nothing' scenario. The TII significance criteria are outlined in Table 4.9 of *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022) and reproduced in Table 9.2. These criteria have been adopted for the Proposed Development to predict the effect of NO_2, PM_{10} and $PM_{2.5}$ emissions as a result of the Proposed Development.

Table 9.2: Dust Emission Magnitude for the site

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentration Relative to Air Quality Limit Value (AQLV)			
	1%	2-5%	6-10%	>10%
75% or less of AQLV	Neutral	Neutral	Slight	Moderate
76-94% of AQLV	Neutral	Slight	Moderate	Moderate
95%-102% of AQLV	Slight	Moderate	Moderate	Substantial
95%-102% of AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

Source Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022)

9.2.2 Construction Phase

9.2.2.1 Construction Dust Impact Assessment

The main air quality impacts that may arise during demolition and construction activities are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;

- Elevated PM_{10}, $PM_{2.5}$ concentrations from demolition and construction activities (including earthworks and trackout); and
- An increase in concentrations of PM_{10}, $PM_{2.5}$ and nitrogen dioxide due to exhaust emissions from vehicles and equipment used on site (non-road mobile machinery) and vehicles accessing the site.

The risk of dust emissions from a demolition/construction site causing loss of amenity and/or health or ecological impacts (and effects) is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc.);
- The duration of these activities; the size of the site;
- The meteorological conditions (wind speed, direction and rainfall);
- The proximity of receptors to the activities;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of the receptors to dust.

A review of Casement Aerodrome meteorological data indicates that the prevailing wind direction is south-westerly, and wind speeds are generally moderate in nature (see Section 9.3.2.2). Moderate to high windspeeds (above 5m/s (7-10 knots)) are most likely to result in fugitive dust emissions. Approximately 32.85% of all hourly data featured winds of below 5m/s. 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 Casement Aerodrome indicates that on average 172 days per year will have rainfall over 0.2mm (Met Éireann, 2025) and it can be determined that 47% of the time dust generation will be reduced. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust.

As with any impact, the risk will be determined by the magnitude of the source, the effectiveness of the pathway and the sensitivity of the receptor.

The IAQM Guidance on the Assessment of Dust from Demolition and Construction (2024) provides a framework for the assessment of risk.

Activities on construction sites have been divided into four types:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

The potential for dust emissions is assessed for each activity that is likely to take place.

The assessment methodology considers three separate dust impacts:

- Annoyance due to dust soiling;
- The risk of health impacts due to an increase in exposure to PM_{10}; and
- Harm to ecological receptors with account being taken of the sensitivity of the area that may experience these effects.

The assessment is used to define appropriate mitigation measures to ensure that there will be no significant impact.

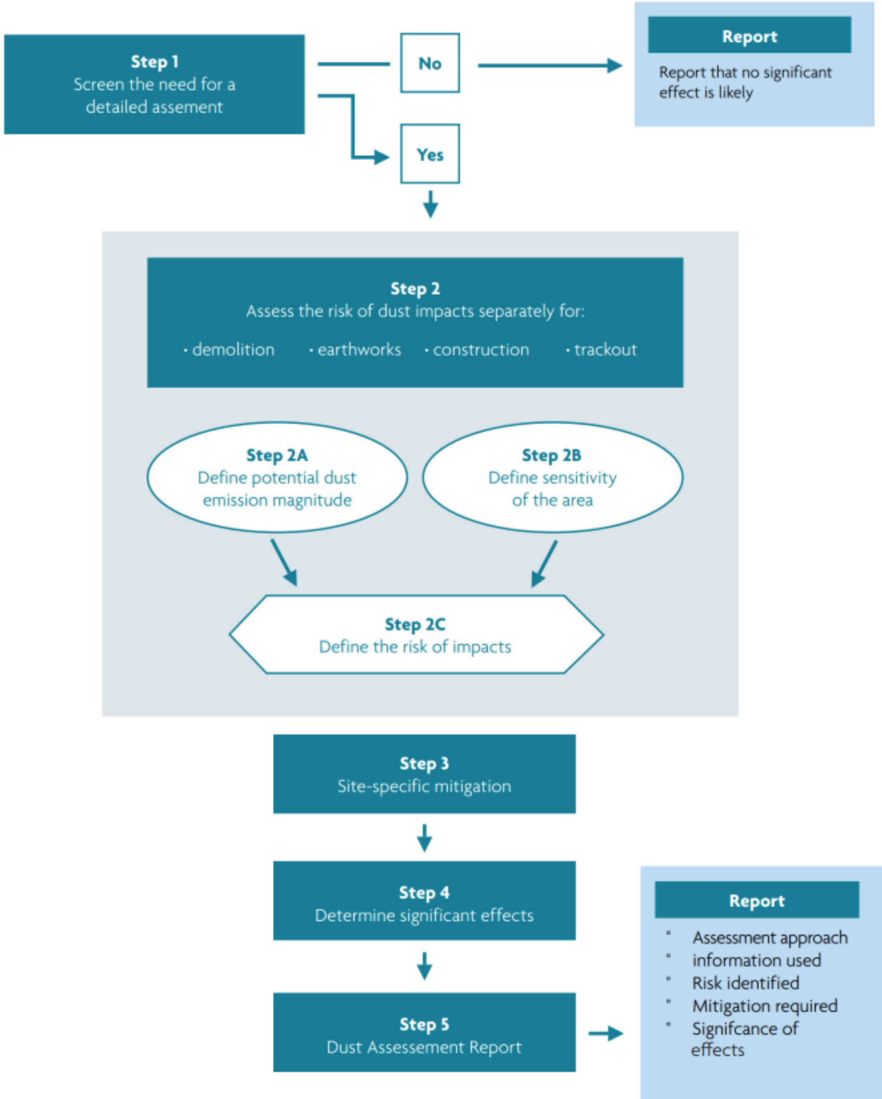

Figure 9.1: Steps to Perform a Dust Assessment (IAQM, 2024)

Step 1 - Screening the Need for a Detailed Assessment

Step 1 is to screen the requirement for a more detailed assessment. An assessment will normally be required where there is:

A human receptor within:

- 250m of the boundary of the site; and/or
- 50m of the route(s) used by the construction vehicles on the public highway, up to 250m from the site entrance(s).

An 'ecological receptor' within:

- 50m of the boundary of the site; and/or
- 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s).

A review of publicly available information indicates that there are no statutory (international or national) ecological receptors within 50m of the site or applicable construction routes. It can therefore be concluded, as there are no statutory receptors within the distance defined by the criteria, that the level of risk to ecological sites is negligible, and impacts will not be significant.

Therefore, assessment of potential impacts to ecological receptors has been scoped out and is not considered further in this assessment. As such, a detailed assessment of the potential impacts on ecological receptors is not required.

Figure 9.1: Map Showing 20m Buffer from the Plot 1 and Plot 2 Site Boundaries

Figure 9.2: Map Showing 50m Buffer from the Plot 1 and Plot 2 Site Boundaries

Figure 9.3: Map Showing 100m Buffer from the Plot 1 and Plot 2 Site Boundaries

Figure 9.4: Map Showing 250m Buffer from the Plot 1 and Plot 2 Site Boundaries

Step 2 - Assess the Risk of Dust Impacts

Step 2 is to assess the risk of dust impacts. This is carried out separately for each of the four activities (demolition, earthworks, construction and trackout). According to the IAQM (2024), the risk of dust arising in sufficient quantities to cause annoyance and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high. A site is allocated to a risk category based on two factors:

- The scale and nature of the works, which determines the potential dust emission magnitude as small, medium and large (Step 2A); and
- The sensitivity of the area to dust impacts (Step 2B), which is defined as low, medium or high sensitivity.

These two factors are combined in Step 2C to determine the risk of dust impacts with no mitigation applied. The risk category assigned to the site can be different for each of the four potential activities (demolition, earthworks, construction and trackout). More than one of these activities may occur on a site at any one time. Risks are described in terms of there being a low, medium and high risk of dust impacts for each of the four separate potential activities. Where there are low, medium and high risks of an impact, then site-specific mitigation will be required, proportionate to the level of risk.

Step 2A – Define the Potential Dust Emission Magnitude

The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium or Large.

Demolition: Definitions for demolition as follows:

- Large: Total building volume >75,000m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12m above ground level;
- Medium: Total building volume 12,000m^3 – 75,000m^3, potentially dusty construction material, demolition activities 6-12m above ground level; and
- Small: 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.

<u>Plot 1</u>

There is no demolition proposed for Plot 1.

<u>Plot 2</u>

The total volume of building to be demolished is 863m^3 and therefore, the dust emission magnitude for demolition is defined as small.

Earthworks: Earthworks will primarily involve excavating material, haulage, topping and stockpiling. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude from earthworks can be classified as small, medium and large based on the definitions from the IAQM guidance:

- Large: 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;
- Medium: Total site area 18,000m^2 – 110,000m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3m – 6m in height; and
- Small: 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.

<u>Plot 1</u>

The dust emission magnitude for the proposed earthwork activities can be classified as medium as the total site area for Luttrellstown Gate Phase 2 is 37,232m^2.

<u>Plot 2</u>

The dust emission magnitude for the proposed earthwork activities can be classified as medium as the total site area for St Mochtas LRD is 43,829 m^2.

Construction: The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s)/infrastructure, method of construction, construction materials, and duration of build. The IAQM example definitions for construction are:

- Large: Total building volume >75,000 m^3, on site concrete batching, sandblasting;

- Medium: Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- Small: Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Plot 1

The total building volume to be constructed for Luttrellstown Gate Phase 2 is 47,736 m^3, therefore the dust emission magnitude for construction is medium.

Plot 2

The total building volume to be constructed for St Mochtas LRD is 112,281 m3, therefore the dust emission magnitude for construction is large.

Trackout: Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers, geology and duration. As with all other potential sources, professional judgement must be applied when classifying trackout into one of the dust emission magnitude categories. IAQM definitions for trackout are:

- Large: >50 HDV (>3.5t) outward movements[3] in any one day[4], potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- Medium: 20-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and
- Small: <20 HDV (3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

These numbers are for vehicles that leave the site after moving over unpaved ground, where they will accumulate mud and dirt that can be tracked out onto the public highway.

Plot 1

It is anticipated that the worst-case scenario will occur during the excavation phase, during which 54 two-way trips per day are estimated for Luttrellstown Gate Phase 2. Therefore, the dust emission magnitude for the proposed trackout activities can be classified as large.

Plot 2

It is anticipated that the worst-case scenario will occur during the excavation phase, during which a total of 52 two-way trips per day are estimated for the St Mochtas. Therefore, the dust emission magnitude for the proposed trackout activities can be classified as large.

Table 9.3 and Table 9.4 provide a summary of the dust emission magnitude for the Plot 1 and Plot 2, respectively.

Table 9.3: Dust Emission Magnitude for Plot 1

Activity	Dust Emission Magnitude
Earthworks	Medium

[3] A vehicle movement is a one-way journey i.e., from A to B, and excludes the return journey.

[4] HDV movements during the construction project vary over its lifetime, and the number of movements is the maximum, not the average.

Activity	Dust Emission Magnitude
Construction	Medium
Trackout	Large

Table 9.4: Dust Emission Magnitude for Plot 2

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Medium
Construction	Large
Trackout	Large

Step 2B – Define the Sensitivity of the Area

The sensitivity of the area takes account of a number of factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Site.specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind.blown dust.

Sensitivities of People to Dust Soiling Effects

For the sensitivity of people and their property to soiling, the IAQM (2024) recommends that the air quality practitioner uses professional judgment to identify where on the spectrum between high and low the sensitivity of a receptor lies, taking into account the following general principles set out in Table 9.5.

Table 9.5: Sensitivities of People to Dust Soiling Effects (Source: IAQM, 2024)

Sensitivity	Features	Indicative Examples
High	• Users can reasonably expect enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by soiling; and • The people or property would reasonably be expected to be present continuously, or at least	• Dwellings; • Museums and other culturally important collections; and • Medium and long term car parks and show rooms.

Sensitivity	Features	Indicative Examples
	regularly for extended periods, as part of the normal pattern of the use of the land.	
Medium	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • The appearance, aesthetics or value of their property could be diminished by soiling; or • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.	• Parks; and • Places of work.
Low	• The enjoyment of amenity would not reasonably be expected; or • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or • There is a transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use for the land.	• Playing fields; • Farmland (unless commercially sensitive horticultural); • Footpaths; • Short-term carparks[5] • Places of work.

Sensitivities of People to Health Effects of PM_{10}

For the sensitivity of people to the health effects of PM_{10}, the IAQM (2024) recommends that the air quality practitioner assumes that there are three sensitivities based on whether or not the receptor is likely to be exposed to elevated concentrations over a 24-hour period, consistent with the Defra's advice for local air quality management, Defra LAQM Technical Guidance LAWM.TG (2022).

[5] Car parks have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with workplace or residential parking might have a high level of sensitivity compared to car parks used less frequently and for shorter durations, such as those associated with shopping. Cases should be examined on their own merits.

Table 9.6: Sensitivities of People to the Health Effects of PM_{10} (Source: IAQM, 2024)

Sensitivity	Features	Indicative Examples
High	• Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day)[6].	• Residential properties; • Hospitals; • Schools; and • Residential care homes.
Medium	• Locations where the people exposed are workers[7], and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	• Office and shop owners. (Workers occupationally exposed to PM_{10} are generally not included as protection is covered by Health and Safety at Work Legislation)
Low	• Locations where human exposure is transient[8].	• Public footpaths; • Playing fields; and • Shopping streets.

Table 9.7 and 9.8 illustrate how the sensitivity of the area may be determined for dust soiling and human health impacts, respectively. It should be noted that the highest level of sensitivity from each table should be considered, as recommended by the IAQM.

The criteria detailed in Table 9.7 and 9.8 were used to determine the sensitivity of the area to dust soiling effects and human health impacts.

Table 9.7: Sensitivity of Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receivers	Distance from the Source (m)			
		<20m	<50m	<100m	<250m
High	>100	High	High	Medium	Low

[6] This follows Defra guidance as set out in LAQM.TG (2022)

[7] Notwithstanding the fact that the air quality objectives and limit values do not apply to people in the workplace, such people can be affected by the exposure of PM_{10}. However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. For this reason, workers have been included in the medium sensitivity category.

[8] There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.

Receptor Sensitivity	Number of Receivers	Distance from the Source (m)			
		<20m	<50m	<100m	<250m
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 9.8: Sensitivity of Dust Soiling Effects on People and Property

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

		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 μg/m^3	>100	Low	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low

Step 2C – Define the Risk of Impacts

In accordance with the IAQM Guidance, the dust emission magnitude (Step 2A) and sensitivity of the area (Step 2B) have been combined and the risk of impacts from demolition, construction, earthworks and trackout have determined (before mitigation is applied).

Table 9.9 to 9.12 illustrate how the dust emission magnitude should be combined with the sensitivity of the area to determine the risk with no mitigation measures applied.

Table 9.9: Risk of Dust - Demolition

Potential Impact	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 9.10: Risk of Dust - Earthworks

Potential Impact	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 9.11: Risk of Dust - Construction

Potential Impact	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 9.12: Risk of Dust - Traffic

Potential Impact	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

The risk of dust impacts is based on the potential dust emissions magnitude and the sensitivity of the area. These two factors are then combined to determine the risk of dust impacts with no mitigation applied. In the absence of any site-specific information, a higher risk category has been applied to represent a worst-case scenario.

The risk of dust soiling and the impact on human health impacts before mitigation, is summarised in Section 9.5.1 for Plot 1 and Plot 2.

9.2.2.2 Construction Traffic Emissions

Construction phase traffic has the potential to affect air quality. The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022), 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; or
- A change in road alignment by 5m or greater.

The construction stage traffic will not change by more 1,000 AADT or 200 HDV AADT and does not meet the above scoping criteria. It is estimated that for St. Mochtas LRD (Plot 2), the AADT will be approximately 221 two-way trips. For Luttrellstown Phase 2 (Plot 1), it is estimated that the AADT will be approx. 181 two-way trips, which includes HGV and workforce movements. In addition, there are no proposed changes to the traffic speeds or road alignment. As a result, a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

9.2.3 Operational Phase

Operational phase traffic has the potential to affect local air quality as a result of increased vehicle movements associated with the Proposed Development. The TII scoping criteria detailed in Section 9.2.2.2 were used to determine if any road links are affected by the Proposed Development and require inclusion in a detailed air quality modelling assessment. The Proposed Development will result in the operational phase traffic increasing by more than 1,000 AADT on 7 road links. Therefore, a detailed air quality modelling assessment of operational phase traffic emissions was conducted.

The impact to air quality due to changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The receptor locations are discussed in further detail within Section 9.2.3.2.

The TII guidance (TII, 2022) states that modelling should be conducted for NO_2, PM_{10} and $PM_{2.5}$ for the Base, Opening and Design Years for both the Do Minimum (Do Nothing) and Do Something scenarios. Modelling of operational NO_2, PM_{10} and $PM_{2.5}$ concentrations has been conducted for the Do Nothing and Do Something scenarios using the TII Road Emissions Model (REM) online calculator tool (TII, 2025).

The following inputs are required for the REM tool:

- Receptor locations;
- Light duty vehicle (LDV) annual average daily traffic movements (AADT);
- Annual average daily heavy duty vehicles (HDV AADT);
- Annual average traffic speeds;
- Road link lengths;
- Road type;
- Project county location; and
- Pollutant background concentrations.

The *Default* fleet mix option was selected along with the *Intermediate Case* fleet data base selection, as per TII Guidance (TII, 2024). The *Intermediate Case* assumes a linear interpolation between the *Business as Usual* case, where current trends in vehicle ownership continue and the *Climate Action Plan (CAP)* case, where adoption of low emission light duty vehicles occurs.

Using this input data, the model predicts the road traffic contribution to ambient ground level concentrations at the identified sensitive receptors using generic meteorological data. The TII REM uses county-based Irish fleet composition for different road types, for different European emission standards from pre-Euro to Euro 6/VI with scaling factors to reflect improvements in fuel quality, retrofitting, and technology conversions. The TII REM also includes emission factors for PM_{10} emissions associated with brake and tire wear (TII, 2024). The predicted road contributions are then added to the existing background concentrations to give the predicted ambient concentrations. The ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the Proposed Development with these ambient air quality standards.

9.2.3.1 Traffic Data Used in Modelling Assessment

Traffic flow information was obtained from Waterman Moylan Consulting Engineers (2025) for the purposes of this assessment. Two different year scenarios are presented in Table 9.10 for the operational phase vehicle trip generation data. The 'Do Nothing' and 'Do Something' scenarios for the Opening Year (2030) and Design Year (2045) (which is Opening Year plus 15 years, as per TII Guidance).

The traffic data are detailed in Table 9.13 7 road links met the TII scoping criteria and were within 200m of receptors therefore, these links were included in the modelling assessment. Background concentrations have been included as per Section 9.3.1 of this chapter based on available EPA background monitoring data (EPA, 2025).

Table 9.13: Traffic Data Used in Air Modelling Assessment

Link Number	Road Name	Opening Year (2030)		Design Year (2045)		Speed (Km/hr)	Link Length
		Do Nothing	Do Something	Do Nothing	Do Something		
		AADT	AADT	AADT	AADT		
1	Diswellstown Road (South)	22,683 (1.5% HGV)	23,703 (1.5% HGV)	25,285 (1.5% HGV)	26,235 (1.5% HGV)	50	100
2	Kellystown Link Road (West)	3,587 (0.33% HGV)	6,849 (0.33% HGV)	10,173 (0.33% HGV)	11,732 (0.33% HGV)	50	100
3	Kellystown Link Road (East)	5,097 (0.18% HGV)	6,888 (0.18% HGV)	10,173 (0.18% HGV)	11,732 (0.18% HGV)	50	100
4	Diswellstown Road (North)	23,509 (1.52% HGV)	24,276 (1.52% HGV)	27,684 (1.52% HGV)	28,633 (1.52% HGV)	50	100
5	Kellystown Link Road (West)	5,730 (0.34% HGV)	7,528 (0.34% HGV)	10,864 (0.34% HGV)	12,439 (0.34% HGV)	50	100
6	Access to Proposed Development	3,482 (0% HGV)	5,389 (0% HGV)	3,508 (0% HGV)	5,418 (0% HGV)	30	50
7	Kellystown Link Road (East)	3,832 (1.5% HGV)	5,623 (1.5% HGV)	8,841 (1.5% HGV)	10,401 (1.5% HGV)	50	100

9.2.3.2 Sensitive Receptors

Human Receptors

The impact to air quality as a result of changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The TII guidance (TII, 2022) states a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the Proposed Development are to be included in the modelling. The TII criteria state that receptors within 200m of affected road links should be assessed; roads which are greater than 200m from receptors will not affect pollutant concentrations at that receptor. The TII guidance (TII, 2022) defines sensitive receptor for the purposes of modelling annual mean pollutant concentrations as residential housing, schools, hospitals, care homes and short term-accommodation such as hotels, i.e. locations where members of the public are likely to be regularly present for 24 hours.

For the purpose of determining local air quality impacts, seven receptors were included in this modelling assessment and has been identified. The receptors modelled will represent the worst-case location in the vicinity the Proposed Development and was chosen based on proximity (within 200m) to the road links affected by the Proposed Development:

Table 9.14: Sensitive Receptors

Name	Type	ITM Coordinates	
		X	Y
R1	Residential	706193	737806
R2	Residential	706353	737798
R3	Residential	706318	737656
R4	School	705924	737408
R5	Residential	706127	737394
R6	Residential	706078	737334

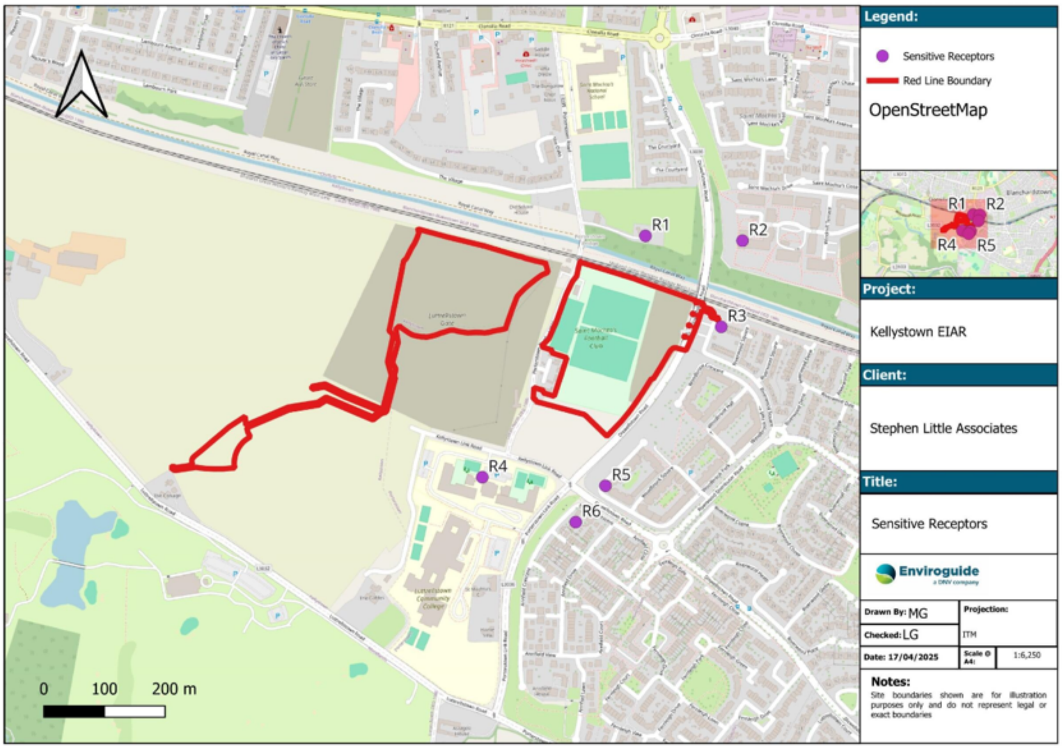

Figure 9.5: Road Traffic Emissions Sensitive Receptors

Air Quality Impacts on Sensitive Ecology

In addition to assessing the impact to people as a result of air quality, the impact to sensitive ecosystems must also be assessed as per the TII guidelines (TII, 2022; 2024). The EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the *'Habitats Directive'*) requires an Appropriate Assessment to be carried out where there is likely to be a significant impact upon a European protected site. TII requires the Air Quality Specialist to liaise with an ecologist on schemes where there is a European protected site within 2km of the site. However, as the potential impact of a scheme is limited to local level, detailed consideration need only be given to roads where there is a significant change to traffic flows, and the designated site lies within 200m of the road centre line. Where these two requirements are fulfilled, the assessment involves a calculation of nitrogen oxides (NOx) and ammonia (NH_3) concentrations to determine the N deposition and acid deposition rates using the methodology set out in TII Guidance document PE-ENV-01106 (TII, 2022).

A review of publicly available information indicates that there are no statutory (international or national) ecological receptors within 200m of any of the link roads identified in Table 9.13. Therefore, assessment of potential impacts to ecological receptors has been scoped out and is not considered further in this assessment. As such, a detailed assessment of the potential effects on ecological receptors is not required.

9.3 Receiving Environment

The sites (Plot 1 and Plot 2) are located to the south of Clonsilla Town, adjacent to the west of Carpenterstown and to the southwest of Blanchardstown. It is accessible through the R121 (regional road).

9.3.1 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 2023"* (EPA, 2024). 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 Framework Directive on Air Quality (1996/62/EC, four air quality zones have been defined in Ireland by the EPA for air quality management and assessment purposes.

The main areas defined in each zone are:

- **Zone A:** Dublin Conurbation
- **Zone B:** Cork Conurbation
- **Zone C:** Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- **Zone D:** Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C.

The sites (Plot 1 and Plot 2) are to the south of Clonsilla Town, Co. Dublin and falls into 'Zone A' of Ireland which is described by the EPA as 'Dublin Conurbation'. It is expected that existing ambient air quality in the vicinity of the site is characteristic of a suburban location with the primary source of air emissions such as particulate matter, NO_2, and hydrocarbons likely to be of traffic, combustion and agriculture, and domestic fuel burning.

The EPA launched a national air quality forecast in November 2023, to provide greater information to the public regarding expected air quality in Ireland for up to three days - "Today", "Tomorrow" and the "Day after Tomorrow".

Forecasts include daily Air Quality Index for Health (AQIH), Particulate Matter (PM), nitrogen dioxide (NO_2) and ozone (O_3). PM, NO_2 and O_3 are the three main air pollutants impacting human health in Ireland. All pollutants mapped are presented on the Air Quality Index for Health (AQIH) scale (1 – 10). The forecast maps are uploaded twice daily, once in the morning and once in the evening.

In conjunction with individual local authorities, the EPA undertakes ambient air quality monitoring at specific locations throughout the country in the urban and rural environment; an Air Quality Report based on data from monitoring stations and a number of mobile air quality units is developed on an annual basis. The EPA's most recent publication 'Air Quality in Ireland, 2023' reports the quality of the air in Ireland based on the data from the National Ambient Air Quality Monitoring Network throughout the year 2023 (EPA, 2024).

When assessing air quality, the EPA focuses on two main pollutants: particulate matter and nitrogen oxides. Measured concentrations of NO_2 for the years 2022 and 2023 are presented in Table 9.15 for Zone A monitoring stations.

Table 9.15: Concentrations of NO_2 at Zone A Monitoring Stations

Station	Objective	Concentration (µg/m³)		Limit or Threshold Value
		2022	2023	
Winetavern St	Annual Mean NO_2[9]	18.8	19.3	40 µg/m³
	Days >200µg/m³	0	0	35 days
Davitt Road	Annual Mean NO_2	16.5	17.3	40 µg/m³
	Days >200µg/m³	1	0	35 days
DAA	Annual Mean NO_2	19.8	20.5	40 µg/m³
	Days >200µg/m³	0	0	35 days
St Johns Road	Annual Mean NO_2	32.5	32.1	40 µg/m³
	Days >200µg/m³	0	0	35 days
Rathmines	Annual Mean NO_2	14.2	14.8	40 µg/m³
	Days >200µg/m³	0	0	35 days
Dún Laoghaire	Annual Mean NO_2	15.6	13.4	40 µg/m³
	Days >200µg/m³	0	0	35 days
Ballyfermot	Annual Mean NO_2	12.7	13.4	40 µg/m³
	Days >200µg/m³	0	0	35 days
Blanchardstown	Annual Mean NO_2	23.9	25.4	40 µg/m³

[9] NO_2 annual mean limit value for the protection of hum0an health: 40 µg/m³ per station

Station	Objective	Concentration (µg/m³)		Limit or Threshold Value
		2022	2023	
	Days >200µg/m³	0	0	35 days
Swords	Annual Mean NO_2	12.3	10.3	40 µg/m³
	Days >200µg/m³	0	0	35 days
Dublin Port	Annual Mean NO_2	27.3	23.1	40 µg/m³
	Days >200µg/m³	0	0	35 days
Pearse Street	Annual Mean NO_2	37.5	38.8	40 µg/m³
	Days >200µg/m³	0	0	35 days
Lucan	Annual Mean NO_2	-	20.6	40 µg/m³
	Days >200µg/m³	-	0	35 days
Tallaght	Annual Mean NO_2	13.5	13.8	40 µg/m³
	Days >200µg/m³	0	0	35 days
Ringsend	Annual Mean NO_2	19.1	19.2	40 µg/m³
	Days >200µg/m³	0	0	35 days

Based on the data summarised in Table 9.15, existing baseline air quality for the area in which the site is located be characterised as being of good quality with no exceedances of the Air Quality Regulations limit values of specific pollutants. The results show that current levels of NO_2 are well below the annual mean and 1-hour maximum limit values. In the year 2022, annual mean concentrations of NO_2 ranged from 12.3 – 37.5 ug/m³ across all Zone A stations, with no exceedance of the maximum hourly limit (EPA, 2023). In the year 2023, annual mean concentrations of NO_2 ranged from 10.3 – 38.8 ug/m³ across all Zone A stations, with no exceedance of the maximum hourly limit (EPA, 2024).

The average concentration of NO_2 in 2023 was 20.1 µg/m³. EPA 2023 background concentrations have been used in combination with correction factors to estimate annual average NO_2 concentrations in the region of the Proposed Development for the base year (2024). These factors have been adapted from both TII (2011) and DEFRA roadside NO_2 projection factors. Based on these correction factors, the current estimated NO_2 concentration in the region of the Proposed Development is 17.8 µg/m³.

Measured concentrations of PM_{10} for the years 2022 and 2023 are presented in Table 9.16 for Zone A monitoring stations.

Table 9.16: Concentrations of PM_{10} at Zone A Monitoring Stations

Station	Objective	Concentration (μg/m^3)		Limit or Threshold Value
		2022	2023	
Winetavern St	Annual Mean PM_{10}[10]	13.6	12.9	40 μg/m^3
	Days >50μg/m^3[11]	1	0	35 days
Rathmines	Annual Mean PM_{10}	14.7	15.1	40 μg/m^3
	Days >50μg/m^3	4	1	35 days
Phoenix Park	Annual Mean PM_{10}	10.9	9.1	40 μg/m^3
	Days >50μg/m^3	0	0	35 days
Blanchardstown	Annual Mean PM_{10}	15.1	13.3	40 μg/m^3
	Days >50μg/m^3	3	0	35 days
Dún Laoghaire	Annual Mean PM_{10}	12.3	11.6	40 μg/m^3
	Days >50μg/m^3	1	0	35 days
Ballyfermot	Annual Mean PM_{10}	12.6	11.1	40 μg/m^3
	Days >50μg/m^3	1	0	35 days
Tallaght	Annual Mean PM_{10}	11.1	11.5	40 μg/m^3
	Days >50μg/m^3	1	1	35 days
Ringsend	Annual Mean PM_{10}	15.9	13.8	40 μg/m^3
	Days >50μg/m^3	11	0	35 days
Pearse Street	Annual Mean NO_2	16.1	14.4	40 μg/m^3
	Days >50μg/m^3	2	0	35 days

[10] PM_{10} annual mean limit value for the protection of human health: 40 μg/m^3 per station

[11] PM_{10} daily limit for the protection of human health: No more than 35 days in a year >50 μg/m^3 per station

Station	Objective	Concentration (µg/m³)		Limit or Threshold Value
		2022	2023	
St. Anne's Park	Annual Mean PM_{10}	14.6	10.9	40 µg/m³
	Days >50µg/m³	1	0	35 days
St. John's Road	Annual Mean PM_{10}	12.9	11.9	40 µg/m³
	Days >50µg/m³	1	0	35 days
Dublin Airport	Annual Mean PM_{10}	11.7	11.9	40 µg/m³
	Days >50µg/m³	1	0	35 days
Davitt Road	Annual Mean PM_{10}	13.4	13.3	40 µg/m³
	Days >50µg/m³	4	0	35 days
Dublin Port	Annual Mean PM_{10}	18.1	15.4	40 µg/m³
	Days >50µg/m³	5	0	35 days
Finglas	Annual Mean PM_{10}	11.7	12.3	40 µg/m³
	Days >50µg/m³	1	0	35 days
Marino	Annual Mean PM_{10}	13.6	11.6	40 µg/m³
	Days >50µg/m³	3	0	35 days
Swords[12]	Annual Mean PM_{10}	-	9.0	40 µg/m³
	Days >50µg/m³	-	0	35 days
Clonskeagh	Annual Mean PM_{10}	11.3	10.3	40 µg/m³
	Days >50µg/m³	1	0	35 days
Lucan	Annual Mean PM_{10}	12.7	12.4	40 µg/m³
	Days >50µg/m³	0	0	35 days

[12] Station newly installed in 2023, therefore low data capture for 2023

As is evident from the results shown in Table 9.16, current levels of PM_{10} are well below the annual mean limit value. In the year 2022, annual mean concentrations of PM_{10} ranged from 10.9 – 18.1 ug/m^3 across all Zone A stations, with no exceedance of short-term limit values (EPA, 2023). In the year 2023, annual mean concentrations of PM_{10} ranged from 9.0 – 15.4 ug/m^3 across all Zone A stations, with no exceedance of short-term limit values (EPA, 2024).

The average concentration of PM_{10} in 2023 was 12.2 µg/m^3. A conservative estimate of the background PM_{10} levels for the region of the Proposed Development is 12.1 µg/m^3.

Measured concentrations of $PM_{2.5}$ for the years 2022 and 2023 are presented in Table 9.17 for Zone A monitoring stations.

Table 9.17: Concentrations of $PM_{2.5}$ at Zone A Monitoring Stations

Station	Averaging Period	Year	
		2022	2023
Rathmines	Annual Mean $PM_{2.5}$ (µg/m^3)[13]	7.5	7.2
Phoenix Park		6.3	5.6
Blanchardstown		7.8	7.1
Dún Laoghaire		7.8	7.4
Ballyfermot		7.5	6.9
Tallaght		6.2	5.9
Ringsend		7.7	6.6
Pearse Street		7.8	7.4
St. Anne's Park		7.8	6.5
St. John's Road		8.1	7.1
Dublin Airport		6.7	6.2
Davitt Road		8.6	7.0
Dublin Port		8.3	7.8
Finglas		7.3	6.6
Marino		8.9	7.2
Swords[14]		-	5.8
Clonskeagh		7.0	6.4
Lucan		9.9	6.9

[13] Annual average limit value - 25 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022)
Daily limit value - 50 µg/m3 (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022)

[14] Station newly added in 2023, therefore low data capture for Swords in 2023

As is evident from the results shown in Table 9.17, current levels of $PM_{2.5}$ are well below the annual mean limit value of 25 µg/m³. In the year 2022, annual mean concentrations of $PM_{2.5}$ ranged from 5.7 – 15.6 ug/m³ across all Zone C stations (EPA, 2023; EPA 2024). In the year 2023, annual mean concentrations of $PM_{2.5}$ ranged from 5.7 – 12.3 ug/m³ across all Zone C stations (EPA, 2024).

The average concentration of $PM_{2.5}$ in 2022 and 2023 was 7.7 µg/m³ and 6.8 µg/m³, respectfully. A conservative estimate of the background PM_{10} levels for the region of the Proposed Development is 7.3 µg/m³.

9.3.2 Macroclimate

Ireland has a typical maritime climate, largely due to its proximity to the Atlantic Ocean and the presence of the Gulf Stream. Due to the moderating effects of the Gulf Stream, Ireland does not suffer the temperature extremes that are experienced by many other countries at a similar latitude. Mean annual temperatures generally range between 9°C and 10°C. Winters tend to be cool and windy while summers are mostly mild and less windy. The prevailing wind direction is between the south and west with average annual wind speeds ranging between 6 knots in parts of south Leinster to over 15 knots in the extreme north. Rainfall in Ireland occurs throughout the year with reasonable frequency. The highest rainfall occurs in the western half of the country and on high ground; and generally, decreases towards the northeast. As the prevailing winds are from the west-southwest, the west of Ireland experiences the largest number of wet days. The area of least precipitation is along the eastern seaboard of the country.

9.3.3 Microclimate

The synoptic meteorological station of Baldonnel Aerodrome is located approximately 8km southwest of the Proposed Development (Plot 1 and Plot 2); and for the purposes of this chapter, weather data collected here may be considered similar to that which is experienced in the area of the site.

The weather in the area of the site is generally dominated by cool oceanic air masses, with cool winters, mild humid summers, and a lack of temperature extremes. Based on meteorological data at Baldonnel (Casement) Aerodrome over the last 3 years, the mean January temperature is 5 degrees Celsius (° C), while the mean July temperature is 16.3°C. The prevailing wind direction is from a quadrant centred on the southwest. These are moderately warm winds from the Atlantic and they habitually bring rain. The expected annual rainfall for the eastern half of the country ranges between 750mm and 1000mm. Easterly winds are less frequent, weaker, and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer.

Table 9.18: Latest 30-year Averages at Casement Aerodrome (1981-2010) (Source: Met Éireann, 2025)

Parameter	30 Year Average
Mean Temp (° C)	9.7
Mean Humidity at 0900UTC (%)	83.6
Mean Daily Sunshine (Hrs)	3.7
Mean Annual Rainfall (mm)	754.2
Mean Windspeeds (Knots)	10.7

9.3.3.1 Rainfall

Table 9.19 illustrates the monthly and annual rainfall data collected over a 3-year period (2022-2024) at Casement Aerodrome Station. The annual rates of precipitation ranged from 696.9 in 2021 to 870.0 in 2023 with distribution of the highest monthly rainfall values falling mainly in the autumn and winter months. This is broadly within the expected range of the eastern half of the country.

Table 9.19: Monthly Rainfall Volumes (mm) for Dublin Airport Weather Station from January 2021 to December 2023 (Source: Met Éireann, 2025)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2024	57.7	64.9	90.0	69.1	29.3	40.5	53.7	43.7	61.7	54.9	54.3	50.4	670.2
2023	52.1	15.7	109.3	67.3	24.3	45.0	124.2	84.5	112.5	116.0	41.2	77.9	870.0
2022	21.0	99.3	40.1	46.9	59.6	78.3	40.4	18.7	119.2	100.6	51.9	92.2	768.2
LTA[15]	63.8	48.5	50.7	51.9	59.1	62.5	54.2	72.3	60.3	81.6	73.7	75.7	754.3

9.3.3.2 Wind

Wind at a particular location can be influenced by a number of factors, such as obstructions by trees or buildings, the nature of the terrain, and deflection by nearby mountains or hills. Wind blows most frequently from the south and west for open sites while winds from the northeast and north occur less often. The analysis of hourly weather data from Casement Aerodrome synoptic weather station over a period of 30 years suggests that the predominant wind direction blows from the southwest, with windspeeds of between 11 to 16 knots occurring most frequently.

Figure 9.7 provides a wind speed frequency distribution which represents wind speed classes and the frequency at which they occur (% of time) at Casement Aerodrome weather station over a period of 30 years. Wind speeds of 7 knots have the highest frequency, occurring approximately 6.7% of the time.

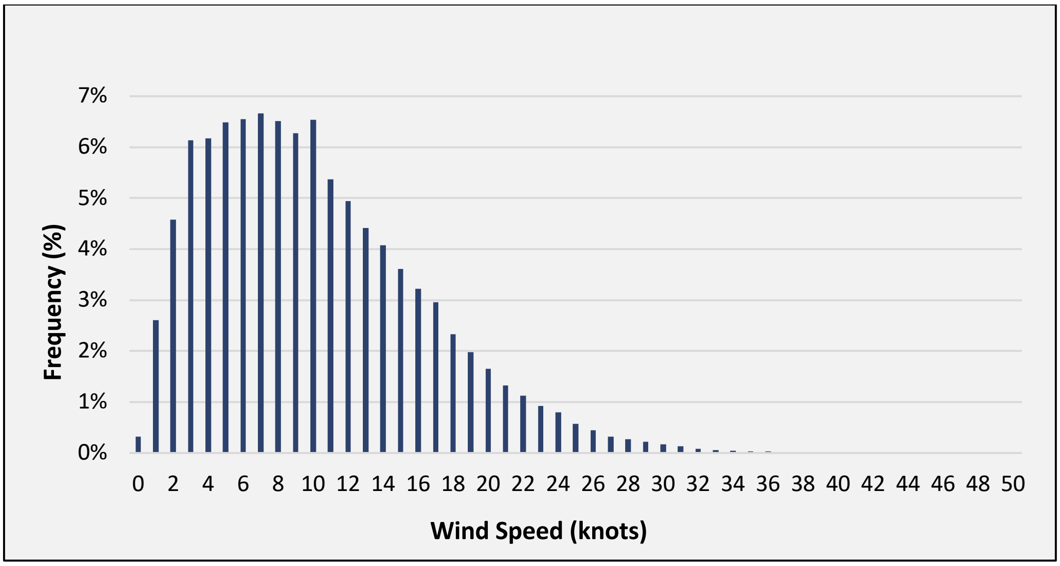

Figure 9.6: Wind Speed Frequency Distribution at Casement Aerodrome Weather Station 1991-2020 (Developed using Met Eireann Hourly Data)

[15] The ‘LTA’ is average for the climatological long-term-average (LTA) reference period 1981-2010

Figure 9.8 provides a wind rose of the predominant wind directions and associated wind speeds at Casement Aerodrome. As is visible from Figure 9.8, the prevailing wind is from a south-westerly direction with an annual incidence of 45.86% for winds between 200 and 250 degrees. The most frequent wind speed associated with this wind direction is between 11 and 16 knots which is considered a 'moderate breeze' in terms of the Beaufort scale, this wind direction and wind speed occurs in combination approximately 15.45% of the time. The overall most common windspeed is between 7 and 10 knots, occurring in 25.98% of incidences, and wind speeds of between 11 and 16 knots occurring in 25.42% of incidences.

The lowest frequency is for winds blowing from the northern quadrant at approximately 2.4% of the time. The incidence of wind between 1 and 6 knots is about 32.53% with wind speeds of above 17 knots (8.7 m/s) occurring in just 15.53% of incidences. The influence of topography can be seen in the low frequency of winds from a southerly direction at Casement Aerodrome, which occur at 7.41% of the time; this is due to the sheltering effect of the mountains to the south. This wind rose is broadly representative of the prevailing conditions experienced at the site.

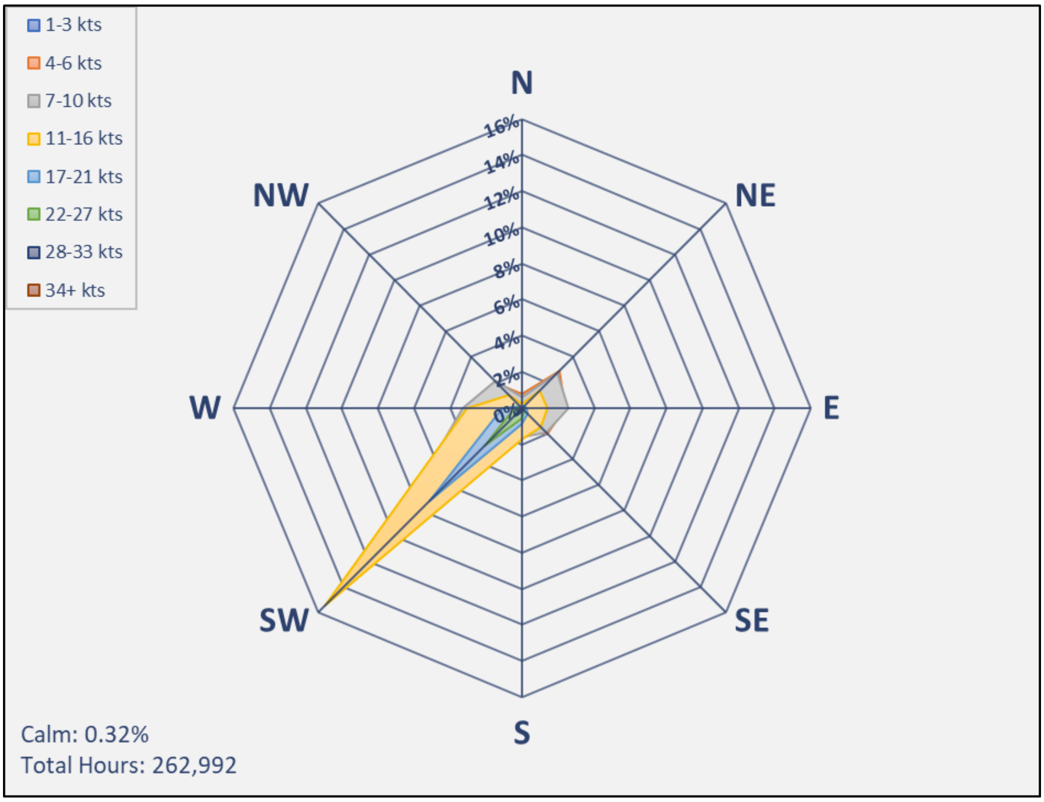

Figure 9.7: 30-year Windrose at Casement Aerodrome Weather Station 1991-2020 (Developed using Met Eireann Hourly Data)

9.4 Characteristics of the Proposed Development

A comprehensive description of the Proposed Development is presented in Chapter 3 of this EIAR.

9.4.1 Aspects Relevant to this Assessment

9.4.1.1 Construction Stage

The aspects of the construction phase relevant to this chapter are as follows:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;

- Elevated PM_{10}, $PM_{2.5}$ concentrations from demolition and construction activities (including earthworks and trackout); and
- An increase in concentrations of PM_{10}, $PM_{2.5}$ and nitrogen dioxide due to exhaust emissions from vehicles and equipment used on site (non-road mobile machinery) and vehicles accessing the site.

9.4.1.2 Operational Stage

The aspects of the operational phase relevant to this chapter are as follows:

- An increase in concentration of PM_{10}, $PM_{2.5}$ and nitrogen dioxide due to exhaust emissions from vehicles and equipment used on site (non-road mobile machinery) and vehicles accessing the site.

9.5 Potential Impact of the Proposed Development

9.5.1 Construction Phase

9.5.1.1 Dust Assessment

There is the potential for construction related air emissions to impact on local air quality due to the Proposed Development. The IAQM Guidance on the Assessment of Dust from Demolition and Construction (2024) provides a framework for the assessment of risk, details of which are provided in Section 9.2 of this chapter.

Potential Dust Emission Magnitude (Step 2A)

The potential magnitude of dust emissions from construction for Plot 1 from earthworks, construction and trackout, as identified in Table 9.20.

Table 9.20: Dust Emission Magnitude for Plot 1

Activity	Dust Emission Magnitude
Earthworks	Medium
Construction	Medium
Trackout	Large

The potential magnitude of dust emissions from construction for Plot 2 from demolition, earthworks, construction and trackout, as identified in Table 9.21.

Table 9.21: Dust Emission Magnitude for Plot 2

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Medium
Construction	Large
Trackout	Large

Sensitivity of the Area (Step 2B)

Table 9.22 outlines the sensitivity of the area to construction dust based on three factors: dust soiling, human health and ecology. The classification helps in assessing the potential impact of construction activities on air quality and guides mitigation.

Table 9.22: Sensitivity of the Area (Plot 1)

Sensitivity	Factors	Sensitivity of the Area	
		On-site	Trackout
Dust Soiling	In order to account for a worst-case scenario, the sensitivity of the area has been classified as high for on-site activity (earthworks and construction) and trackout.	High	High
Human Health	As per Section 9.3.1, a conservative estimate of the background PM_{10} levels for the region of the Proposed Development is 12.1 $\mu g/m^3$. As the PM_{10} concentration is less than 24 $\mu g/m^3$, the sensitivity of the area to human health effects is considered to be low.	Low	Low
Ecology	Not applicable – no ecological receptors within the study area		

Table 9.23: Sensitivity of the Area (Plot 2)

Sensitivity	Factors	Sensitivity of the Area	
		On-site	Trackout
Dust Soiling	In order to account for a worst-case scenario, the sensitivity of the area has been classified as high for on-site activity (demolition, earthworks and	High	High

Sensitivity	Factors	Sensitivity of the Area	
		On-site	Trackout
	construction) and trackout.		
Human Health	As per Section 9.3.1, a conservative estimate of the background PM_{10} levels for the region of the Proposed Development is 12.1 µg/m^3. As the PM_{10} concentration is less than 24 µg/m^3, the sensitivity of the area to human health effects is considered to be low.	Low	Low
Ecology	Not applicable – no ecological receptors within the study area		

Risk of Dust Impacts (Step 2C)

The outcomes of the assessments of potential magnitude of dust emissions (Step 2A) and the sensitivity of the area (Step 2B) are combined to determine the risk of effect. This risk is then used to inform the selection of appropriate mitigation. Table 9.24 details the risk of dust effects for earthworks, construction and trackout activities for Plot 1.

Table 9.24: Summary of Unmitigated Risks Plot 1

Potential Impact	Sensitivity	Magnitude		
		Earthworks	Construction	Trackout
		Medium	Medium	Large
Dust Soiling Impacts	High	Medium Risk	Medium Risk	High Risk
Human Health Impacts	Low	Low Risk	Low Risk	Low Risk
Ecological Impacts	Not applicable – no ecological receptors within study area			

Table 9.25 details the risk of dust effects for demolition, earthworks, construction and trackout activities for Plot 2.

Table 9.25: Summary of Unmitigated Risks Plot 2

Potential Impact	Sensitivity	Magnitude			
		Demolition	Earthworks	Construction	Trackout
		Small	Medium	Large	Large
Dust Soiling Impacts	High	Medium Risk	Medium Risk	High Risk	High Risk
Human Health Impacts	Low	Negligible	Low Risk	Low Risk	Low Risk
Ecological Impacts	Not applicable – no ecological receptors within study area.				

The dust risk categories for each of the four activities determined in STEP 2C have been used to define the appropriate, site-specific, mitigation measures to be adopted in Section 9.8 of this chapter (Step 3 as per the IAQM Guidance on the Assessment of Dust from Demolition and Construction (2024) (see Section 9.2 of this chapter)).

There is at most a high risk in terms of dust soiling and there is at most a low risk of human health effects associated with the works at the two sites (Plot 1 and Plot 2). Best practice dust mitigation measures appropriate for high-risk sites will be implemented to ensure there are no significant effects at nearby sensitive receptors.

9.5.1.2 Traffic Assessment

There is also the potential for traffic emissions to affect 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 affected by the Proposed Development satisfy the TII scoping assessment criteria in Section 9.2.2.2.

It can be determined that the construction stage traffic will have a ***direct, short-term, negative*** and ***imperceptible*** effect on air quality, which is overall not significant in EIA terms.

9.5.2 Operational Stage

The potential effects of the Proposed Development have been assessed by modelling emissions from the traffic generated as a result of the development using the TII Road Emissions Model (TII, 2025). The traffic data includes the Do Nothing and Do Something scenarios. The impact of NO_2, PM_{10} and $PM_{2.5}$ emissions for the modelled Opening Year and Design Year was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined.

The TII guidance PE-ENV-01106 (TII, 2022) details a methodology for determining air quality impact significance criteria for TII road schemes and infrastructure projects. However, this significance criteria can be applied to any development that causes a change in traffic. The degree of impact is determined based on both the absolute and relative effects of the Proposed Development. Results are compared against the 'Do-Nothing' scenario, which assumes that the Proposed Development is not in place in future years, to determine the degree of impact.

9.5.2.1 NO_2

The results of the assessment of the effects of the Proposed Development on NO_2 in the Opening Year 2030 and Design Year 2045 are shown in Table 9.26. The annual average concentration is in compliance with the limit value at the worst-case receptors in the year 2030 and 2045. Concentrations of NO_2 are at most 59% of the annual limit value in 2030 and 60% of the annual limit value in 2045. In addition, the TII guidance (TII, 2022) states that the hourly limit value for NO_2 of 200 $\mu g/m^3$ is unlikely to be exceeded at roadside locations unless the annual mean is above 60 $\mu g/m^3$. As predicted NO_2 concentrations are significantly below 60 $\mu g/m^3$. It can be concluded that the short-term NO_2 limit value will be complied with at all receptor locations.

The effects of the Proposed Development on annual mean NO_2 concentrations can be assessed relative to 'Do Nothing' levels. NO_2 concentrations at the receptors assessed will increase as a result of the proposed development when compared with the Do-Nothing scenario. There will be at most an increase of 1.39 $\mu g/m^3$ at receptor R4, which is a 3.5% change when compared with the ambient air quality limit value of 40 $\mu g/m^3$. Where the predicted annual mean concentrations in the Opening Year and Design Year without the Proposed Development (Plot 1 and Plot 2) are less than 75% of the air quality standard (see Table 9.1) and there is a less than 5% change in concentrations compared with the annual mean ambient air quality standard, then, the impact is considered neutral as per the TII significance criteria (see Table 9.2). Therefore, the effect of the Proposed Development on NO_2 concentrations according to the TII guidance (TII, 2022) is neutral.

Table 9.26: Predicted Annual Mean NO_2 Concentrations ($\mu g/m^3$)

Receptor	Do Nothing (DN)	% of AQLV	Do Something (DS)	% of AQLV	DS-DN	% of AQLV	Description
Impact Opening Year							
R1	18.46	46%	18.47	46%	0.01	0.025%	Neutral
R2	19.51	49%	19.53	49%	0.02	0.05%	Neutral
R3	20.7	52%	20.75	52%	0.05	0.125%	Neutral
R4	22.11	55%	23.5	59%	1.39	3.475%	Neutral
R5	19.81	50%	19.95	50%	0.14	0.35%	Neutral
R6	18.98	47%	19.12	48%	0.14	0.35%	Neutral
Impact Design Year							
R1	18.28	46%	18.3	46%	0.02	0.05%	Neutral
R2	19.06	48%	19.08	48%	0.02	0.05%	Neutral
R3	19.98	50%	20.01	50%	0.03	0.075%	Neutral
R4	23.19	58%	23.93	60%	0.74	1.85%	Neutral
R5	19.52	49%	19.61	49%	0.09	0.225%	Neutral
R6	18.9	47%	18.98	48%	0.08	0.2%	Neutral

9.5.2.2 PM_{10}

In relation to changes in PM_{10} concentrations as a result of the Proposed Development, the results of the assessment can be seen in Table 9.27 for the Opening Year 2030 and Design Year 2045. The annual average concentration is in compliance with the limit value at the worst-case receptors in the year 2030 and 2045. Concentrations of PM_{10} are at most 46% of the annual limit value in 2028 and 55% of the annual limit value in 2045. In addition, the Proposed Development will not result in any exceedances of the daily PM_{10} limit value of 50 μg/m^3. The effects of the Proposed Development on annual mean PM_{10} concentrations can be assessed relative to 'Do Nothing' levels. PM_{10} concentrations at the receptors assessed will increase as a result of the Proposed Development when compared with the Do-Nothing scenario.

There will be at most an increase of 1.59 μg/m^3 at receptor R4, which is a 4% change when compared with the ambient air quality limit value of 40 μg/m^3. As with NO_2, where the predicted annual mean concentrations in the Opening Year without the proposed scheme are less than 75% of the air quality standard (see Table 9.1) and there is a less than 5% change in concentrations compared with the annual mean ambient air quality standard, then, the impact is considered neutral as per the TII significance criteria (see Table 9.2). Therefore, the effect of the Proposed Development on PM_{10} concentrations according to the TII guidance (TII, 2022) is neutral.

Table 9.27: Predicted Annual Mean PM_{10} Concentrations (μg/m^3)

Receptor	Do Nothing (DN)	% of AQLV	Do Something (DS)	% of AQLV	DS-DN	% of AQLV	Description
Impact Opening Year							
R1	12.85	32%	12.88	32%	0.03	0.075%	Neutral
R2	14.07	35%	14.1	35%	0.03	0.075%	Neutral
R3	15.47	39%	15.53	39%	0.06	0.15%	Neutral
R4	16.99	42%	18.58	46%	1.59	3.975%	Neutral
R5	14.44	36%	14.58	36%	0.14	0.035%	Neutral
R6	13.46	34%	13.61	34%	0.15	0.375%	Neutral
Impact Design Year							
R1	12.89	32%	12.91	32%	0.02	0.05%	Neutral
R2	14.16	35%	14.19	35%	0.03	0.075%	Neutral
R3	15.65	39%	15.7	39%	0.05	0.125%	Neutral
R4	20.71	52%	21.87	55%	0.16	2.9%	Neutral
R5	14.9	37%	15.02	38%	0.03	0.3%	Neutral
R6	13.88	35%	14.01	35%	0.13	0.325%	Neutral

9.5.2.3 $PM_{2.5}$

In relation to changes in $PM_{2.5}$ concentrations as a result of the Proposed Development, the results of the assessment can be seen in Table 9.28 for the modelled Opening Year 2030 and Design Year 2045. The annual average concentration is in compliance with the limit value at the worst-case receptors in the year 2030 and 2045. Concentrations of $PM_{2.5}$ are at most 44% of the annual limit value in 2030 and 51% of the annual limit value in 2045. The effect of the Proposed Development on annual mean $PM_{2.5}$ concentrations can be assessed relative to 'Do Nothing' levels. $PM_{2.5}$ concentrations at the receptors assessed will increase as a result of the Proposed Development when compared with the Do-Nothing scenario.

There will be at most an increase of 0.89 µg/m^3 at receptor R4, which is a 3.6% change when compared with the ambient air quality limit value of 25 µg/m^3. As with NO_2, where the predicted annual mean concentrations in the Opening Year without the proposed scheme are less than 75% of the air quality standard (see Table 9.1) and there is a less than 5% change in concentrations compared with the annual mean ambient air quality standard, then, the impact is considered neutral as per the TII significance criteria (see Table 9.2). Therefore, the effect of the Proposed Development on $PM_{2.5}$ concentrations according to the TII guidance (TII, 2022) is neutral.

Table 9.28: Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)

Receptor	Do Nothing (DN)	% of AQLV	Do Something (DS)	% of AQLV	DS-DN	% of AQLV	Description
Impact Opening Year							
R1	7.72	31%	7.74	31%	0.02	0.08%	Neutral
R2	8.4	34%	8.42	34%	0.02	0.08%	Neutral
R3	9.18	37%	9.2	37%	0.02	0.08%	Neutral
R4	10.02	40%	10.91	44%	0.89	3.56%	Neutral
R5	8.59	34%	8.68	35%	0.09	0.36%	Neutral
R6	8.05	32%	8.14	33%	0.09	0.36%	Neutral
Impact Design Year							
R1	7.74	31%	7.75	31%	0.01	0.04%	Neutral
R2	8.44	34%	8.5	34%	0.06	0.24%	Neutral
R3	9.27	37%	9.3	37%	0.03	0.12%	Neutral
R4	12.07	48%	12.73	51%	0.66	2.64	Neutral
R5	8.85	35%	8.92	36%	0.07	0.28	Neutral
R6	8.29	33%	8.35	33%	0.06	0.24	Neutral

9.5.2.4 Conclusion

Overall, the TII significance criteria have identified neutral impacts due to increases in NO_2, PM_{10} and $PM_{2.5}$ annual mean concentrations which are less than 5% of the annual mean ambient air quality standards (and the annual mean concentrations are less than 75% of the air quality standard). This equates to a potential effect of the Proposed Development on ambient air quality, and human health, in the operational stage according to the EPA guidelines (EPA, 2022) which is considered ***direct, long-term, negative*** and ***not significant***.

9.5.2.5 CO_2

There is the potential for increased traffic volumes to impact climate, therefore, traffic related CO_2 emissions have also been calculated through the use of the TII REM tool. The output is provided in terms of CO_2eq for the Opening Year (2030) and Design Year (2045). Both the 'Do Nothing' and 'Do Something' scenarios are quantified in order to determine the degree of change in emissions as a result of the Proposed Development.

The predicted concentrations of CO_2 for the Opening Year (2030) and Design Year (2045) are detailed in Table 9.29, the impact of the increased traffic volumes on Climate is discussed in Chapter 10 'Climate'.

Table 9.29: Climate Traffic Assessment

Year	Scenario	CO_2eq (tonnes/annum)
2030	Do Nothing	293.20
	Do Something	342.34
2045	Do Nothing	418.49
	Do Something	458.02
Increment in 2030		49.14
Increment in 2045		39.53

9.5.3 Do-Nothing Impact

If the Proposed Development were not to proceed, ambient air quality at Plot 1 and Plot 2 will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic etc). Under the Do-Nothing Scenario, construction works associated with the Proposed Development will not take place. Impacts from increased traffic volumes and associated emissions from the Proposed Development will also not occur.

9.5.4 Cumulative

Cumulative Impacts can be defined as "impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project". Effects which are caused by the interaction of effects, or by associated or off-site projects, are classed as indirect effects. Cumulative effects are often indirect, arising from the accumulation of different effects that are individually minor.

Cumulative air quality impacts have the potential to arise locally when construction activities associated with the Proposed Development take place at the same time as other developments in a specific location.

A review of other off-site developments was completed as part of this assessment. Chapter 3 of this EIAR details the planning permissions on record in the area, a review of these planning permissions has been completed as part of this assessment.

The cumulative effects on the air quality of the current Proposed Development (Plot 1 and Plot 2) and other permitted or existing developments have been considered, through the generation of air pollutants and GHG emissions. The potential impacts on air quality are assessed in Section 9.5 and it is considered that there are no other potential significant cumulative impacts associated with the Proposed Development and considered offsite permitted developments.

In terms of dust, no significant impacts are predicted; good construction practice, which incorporates the implementation of the identified mitigation measures, will be employed at the Proposed Development site. Due to the implementation of good construction practices at the Site of the Proposed Development and these offsite permitted developments, it is not anticipated that significant cumulative impacts will occur.

Assessment of road traffic emission impacts on air quality involved traffic data which is inclusive of traffic associated with other existing and permitted developments on the road networks surrounding the site. Therefore, cumulative impacts have been assessed in this regard and the impact on ambient air quality has been determined as not being significant.

It is considered that there are no other potential significant cumulative impacts associated with the Proposed Development and considered offsite permitted developments.

9.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

The mitigation measures discussed below are applicable to Plot 1 and Plot 2.

9.6.1 Construction Phase

Communications

- Display he 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; and
- Develop and implement a Dust Management Plan (DMP), the final dust management plan will form part of the overall construction management plan which will formally be prepared and submitted to Fingal County Council post grant of planning permission.

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 off-site, and the action taken to resolve the situation in the log book; and
- Hold regular liaison meetings with other high risk construction sites within 250m 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.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Fingal County Council when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary;
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the Fingal County Council when asked; and
- 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.

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 dusty 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; and
- 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; and
- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved haul roads.

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; and
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Demolition (Applicable to Plot 2 only)

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust);
- Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground;
- Avoid explosive blasting, using appropriate manual or mechanical alternatives; and
- Bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Construction

- 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 practicable; and
- Only remove the cover in small areas during work and not all at once.

Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and 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 log book;
- 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; and
- Access gates to be located at least 10 m from receptors, where possible.

9.6.2 Operational Phase

It has been determined that the operational phase air quality impact is negligible for Plot 1 and Plot 2 and therefore, no site-specific mitigation measures are proposed.

9.7 Residual Impact of the Proposed Development

The IAQM recommends that significance is only assigned to dust effect after considering the construction activity mitigation. The risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3 (Section 9.6.1 of this chapter) and the final step is to determine whether there are significant effects arising from the construction phase of the Proposed Development. The proposed mitigation measures will reduce the effects to be not significant for both Plot 1 and Plot 2.

The traffic generated by the Proposed Development (Plot 1 and Plot 2) has been assessed for its impact on air quality and it has been determined to have an overall not significant impact in terms of local air quality with the implementation of the proposed mitigation measures. Therefore, no significant adverse residual effects are anticipated from the Proposed Development in the context of air quality.

9.7.1 Worst Case Impact

A worst-case scenario has been applied in Step 2A (defining the potential dust emission magnitude) of the construction dust impact assessment and the highest risk category has been applied when selecting the mitigation measures that are general for the Proposed Development (Plot 1 and Plot 2).

It is expected that adequate mitigation measures, as outlined in Section 9.6.1, will assist in preventing nuisance dust from resulting in any significant effects. However, even with the most rigorous DMP in place, it is not possible to guarantee that the dust mitigation measures will be effective all the time, and if, for example, dust emissions occur under adverse weather conditions, or there is an interruption to the water supply used for dust suppression, the local community may experience occasional, short-term dust annoyance. The likely scale of this would not be considered sufficient to change the conclusion that with mitigation the effects will be ‘not significant’.

A worst-case scenario has been applied to the operational phase traffic emissions assessment in terms of traffic volumes experienced on the surrounding road network and associated air emissions. The worst-case contributions predicted by the tool are added to the existing background concentration to provide a worst-case predicted ambient concentration. The compliance of the Proposed Development with the relevant ambient air quality standards is subsequently assessed by comparison with the worst-case ambient concentrations. Associated impacts have been determined as negligible in this case.

9.8 Monitoring

The monitoring of construction dust during the construction phase of the Proposed Development (Plot 1 and Plot 2) is recommended to ensure that impacts are not experienced beyond the site boundary. Monitoring of dust can be carried out by using the Bergerhoff Method. This involves placing Bergerhoff Dust Deposit Gauges at strategic locations along the site boundaries for a period of 30 +/- 2 days. The selection of sampling point locations should be carried out in consideration of the requirements of *VDI 2119* with respect to the location of the samplers relative to buildings and other obstructions, height above ground, and sample collection and analysis procedures. After the exposure period is complete, the Gauges should be removed from the Site; the dust deposits in each Gauge will then be determined gravimetrically and expressed as a dust deposition rate in $mg/m^2/day$ in accordance with the relevant standard.

Due to the negligible impact on air quality from the operational phase of the Proposed Development, no specific monitoring is recommended except for monitoring via the Bergerhoff Method.

9.9 Interactions

9.9.1 Population and Human Health

Interaction between air quality and population and human health have been considered as the Proposed Development has the potential to cause health issues as a result of impacts on air quality from dust nuisances and potential traffic derived pollutants. However, the mitigation measures employed at the Proposed Development will ensure that all impacts are compliant with ambient air quality standards and human health will not be affected. Furthermore, traffic-related pollutants have been assessed and determined as having an overall insignificant impact, therefore air quality impacts from the Proposed Development are not expected to have a significant impact on population and human health.

9.9.2 Biodiversity

Interactions between air quality and biodiversity have been considered as the construction phase has the potential to interact with flora and fauna in adjacent habitats and designated sites due to dust emissions arising from the construction works. However, the mitigation measures employed at the Proposed Development will ensure that the impacts to flora and fauna are not significant.

9.9.3 Land and Soils

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and land and soils in the form of dust emissions. With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and land and soils during the construction phase. There are no potentially significant interactions identified between air quality, and land, soils and hydrogeology during the operational phase.

9.9.4 Climate

Air quality and climate have interactions as the emissions from the burning of fossil fuels during the construction phase generate both air quality and climate impacts. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

9.9.5 Traffic

There can be a significant interaction between air quality and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived pollutants which may affect air quality have been deemed not significant. Therefore, the impact of the interaction between air quality is not significant.

9.10 Difficulties Encountered

No difficulties have been encountered while compiling this chapter.