10 CLIMATE (AIR QUALITY)

10.1 INTRODUCTION

This chapter identifies, describes and assesses the likely air quality impacts associated with the proposed Kishoge Part X residential development. The proposed development spans three sites within the Clonburris SDZ (Strategic Development Zone). These sites are defined as Site 3, Site 4 and Site 5. A full description of the development is available in Chapter 3 (Description of the Proposed Development).

This chapter was completed by Ciara Nolan. Ciara is a Principal Environmental Consultant in the Air Quality & Climate section of AWN Consulting, a Trinity Consultants Company. She holds a BSc in Energy Systems Engineering from University College Dublin and has also completed an MSc in Applied Environmental Science at UCD. She is a Member of the Institute of Air Quality Management (MIAQM) and the Institution of Environmental Sciences (MIEnvSc). She has over 8 years of experience in undertaking air quality and climate assessments. She has prepared air quality and climate impact assessments as part of EIARs for residential developments including Woodbrook, Shankill (Planning Application Ref. ABP30584419), Ballygossan Park, Skerries (Planning Application Ref. LRD0010/S3), SHD Ratoath (Planning Application Ref. SH305196), SHD Rathmullen, Drogheda (Planning Application Ref. SH305552), commercial and industrial developments by Dublin Airport Authority, Abbvie, Mountpark, Pfizer, Takeda, as well as renewable energy developments such as Crockahenny Windfarm, Upperchurch Windfarm, Knocknamona Windfarm and Keerglen Windfarm. She also specialises in conducting air dispersion modelling assessments of emissions from data centres, energy centres and the chemical industry as part of EPA Industrial Emissions Licences for Echelon DC, AWS, Takea, MSD and Regeneron. She has undertaken air quality and climate impact assessments for transportation schemes, primarily regional and national road schemes, from constraints, through to route selection and EIAR stage.

10.2 ASSESSMENT METHODOLOGY

10.2.1 Criteria for Rating of Impacts

10.2.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

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

The 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.

The ambient air quality standards applicable for nitrogen dioxide (NO_2) and particulate matter (as PM_{10} and $PM_{2.5}$) are outlined in Table 10.1. The limit values set out in Directive (EU) 2024/2881 will need to be achieved by 2030, with the limit values set out in the Air Quality Standards Regulations 2022 (and future updated regulations) applicable until 2030.

Pollutant	2008/50/EC Limit Type	2008/50/EC Limit Value (applicable until 2030)	Directive (EU) 2024/2881 Limit Type	Directive (EU) 2024/2881 Limit Value (to be attained by 2030)
Nitrogen Dioxide (NO_2)	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m³	Hourly limit for protection of human health - not to be exceeded more than 3 times/year	200 µg/m³
	n/a	n/a	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	50 µg/m³
	Annual limit for protection of human health	40 µg/m³	Annual limit for protection of human health	20 µg/m³
NO_X	Annual limit for protection of vegetation	30 µg/m³	Annual limit for protection of vegetation	30 µg/m³
Particulate Matter (as PM_{10})	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m³	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	45 µg/m³
	Annual limit for protection of human health	40 µg/m³	Annual limit for protection of human health	20 µg/m³
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/m³
	Annual limit for protection of human health	25 µg/m³	Annual limit for protection of human health	10 µg/m³

Table 10.1 Air Quality Limit Values

10.2.1.2 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 (shown in Table 10.2), the IT4 targets by 2030 and the final targets by 2040 (shown in Table 10.2). 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/m³. The strategy also acknowledges that "*meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and 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*.

Pollutant	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO_2	24-hour limit for protection of human health	-	-	25 µg/m³
	Annual limit for protection of human health	20 µg/m³	-	10 µg/m³
PM (as PM_{10})	24-hour limit for protection of human health	75 µg/m³	50 µg/m³	45 µg/m³
	Annual limit for protection of human health	30 µg/m³	20 µg/m³	15 µg/m³
PM (as $PM_{2.5}$)	24-hour limit for protection of human health	37.5 µg/m³	25 µg/m³	15 µg/m³
	Annual limit for protection of human health	15 µg/m³	10 µg/m³	5 µg/m³

Table 10.2 WHO Air Quality Guidelines 2021

The applicable air quality limit values for the purposes of this assessment are those set out in Table 10.1. The limit values stipulated under Directive 2008/50/EC and the Air Quality Standards Regulations 2022 are applicable for the construction phase and opening year 2027 for the proposed development. The limit values stipulated by Directive (EU) 2024/2881 are applicable for the design year 2042 for the proposed development.

10.2.1.3 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 10.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this 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.

10.2.1.4 Air Quality & Traffic Significance Criteria

10.2.1.4.1 Human Receptors

The Transport Infrastructure Ireland (TII) guidance 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 10.3 below. These criteria have been adopted for the proposed development to predict the impact of NO_2, PM_{10} and $PM_{2.5}$ emissions as a result of the proposed development.

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
103 – 109% of AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

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

Table 10.3 Air Quality & Traffic Significance Criteria

As per Table 10.3 a neutral effect is one where a change in concentration at a receptor is:

- 5% or less where the opening year, without the proposed development, annual mean concentration is 75% or less of the standard; or
- 1% or less where the opening year, without the proposed development, annual mean concentration is 94% or less of the standard.

Where an effect does not meet the criteria for neutral, as described above, the effect can either be positive or negative. The TII guidance (2022) states that *"the evaluation of significance of effects for the operational phase should be undertaken for the opening year only as the design year is likely to show lower total pollutant concentrations and changes in concentration"* (TII 2022).

Non-significant effects (i.e. of local importance only) are 'neutral' or 'slight' changes in concentrations while significant effects can be changes in pollutant concentrations that are either 'moderate' or 'substantial'. However, the TII guidance (2022) states that these must be considered in the context of the project and 'moderate' or 'substantial' increases are not necessarily always significant effects.

The impact descriptors in Table 10.3 are used to describe the impact at each modelled receptor location, and the significance of the impacts is then determined, aligning with the terminology in the EPA guidelines (EPA 2022). Whilst it may be determined that there are 'slight', 'moderate' or 'substantial' impacts at one or more receptors, an overall judgement should be made of whether the proposed development is 'significant' or 'not significant' in terms of air quality. Factors to consider when determining the overall significance of a proposed development are provided in Table 4.10 of the TII guidance (TII 2022).

10.2.1.4.2 Ecological Receptors

The Air Quality Standards Regulations 2022 (Table 10.1) outline an annual critical level of 30 µg/m^3 for NO_X for the protection of vegetation and natural ecosystems in general. Ammonia (NH_3) has an annual mean limit value of 1 µg/m^3 to 3 µg/m^3. The CAFE Directive (2008/50/EC) defines 'Critical Levels' as '*a level fixed on the basis of scientific knowledge, above which direct adverse effects may occur on some receptors, such as trees, other plants or natural ecosystems but not on humans*'.

The TII PE-ENV-01106 guidance (2022) outlines the assessment of significance of effects at sensitive designated habitats (Section 4.10.2 and Table 4.11 of the guidance), stating that if the total N deposition and acid deposition (due to the proposed development plus background concentrations) are more than 1% of the critical loads then the modelled results should be discussed further with the project ecologist.

A 'Critical Load' is defined by the United Nations Economic Commission for Europe (UNECE) as a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge (UNECE 2010).

To determine if the air quality impacts at a sensitive designated habitat are significant, the project ecologist shall consider:

- Factors such as the nature of site management
- Other factors such as regular flooding in maintaining a suitable habitat
- The degree of sensitivity of fauna to relatively subtle changes in botanical composition
- Whether nitrogen or phosphorus is the key limiting nutrient
- The extent of the sensitive designated site that is negatively affected

The assessment considers the absolute impact of the proposed development, i.e. the predicted pollutant concentrations due to the proposed development plus background concentrations. The assessment also considers the degree of change in pollutant concentrations between the Do-Nothing and Do-Something scenarios to determine how much the proposed development is contributing to predicted concentrations. The degree of change must be taken into consideration when assessing the significance of effects. If significant effects are determined, site survey information is required to determine if the sensitive habitat of relevance is actually present in the affected area and to inform potential mitigation measures that may be required.

Critical loads for N deposition and acid deposition were derived from the Air Pollution Information System (APIS) website (APIS 2025), as per the TII PE-ENV-01106 guidance (2022). These are only available for internationally designated habitats (Special Protection Area (SPA) and Special Area of Conservation (SAC)). Critical loads for nationally designated habitats (e.g. Natural Heritage Area (NHA)) or proposed designated habitats (e.g. proposed NHA (pNHA)) can be derived by searching APIS for the habitat type, rather than a specific site. The critical loads used for the current assessment are detailed in Table 10.4. Where predicted pollutant levels are within the upper threshold of the critical load then the levels are deemed to be in compliance and not in exceedance of the critical load.

Pollutant	Designated Site	Potential Sensitive Ecology Present for Determining Critical Load	Critical Load Range
N Deposition	Grand Canal pNHA	Semi-dry Perennial calcareous grassland	10 – 20 kgN/ha/yr
Acid deposition	Grand Canal pNHA	Semi-dry Perennial calcareous grassland	0.714 – 5.146 keqN/ha/yr

Table 10.4 Critical Loads for Nitrogen and Acid Deposition

10.2.2 Construction Phase

10.2.2.1 Construction Dust Assessment

The Institute of Air Quality Management in the UK (IAQM) guidance document *Guidance on the Assessment of Dust from Demolition and Construction* (2024) outlines an assessment method for predicting the 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 in order 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, 2022).

The major dust generating activities are divided into four types within the IAQM guidance (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 10.5; these are based on the IAQM guidance (2024). The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site-specific mitigation to be determined.

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		
• 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 (truck movements)		
• <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

Table 10.5 IAQM Criteria to Determine Dust Emissions Magnitude

Once the dust emission magnitude has been determined the next step, according to the IAQM guidance (2024), is to establish the level of risk by combining the magnitude with the overall sensitivity of the area to dust soiling, human health and ecological effects. The level of risk associated with each activity is determined using the criteria in Table 10.6.

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

Table 10.6 IAQM Criteria to Determine Risk of Dust Impacts

10.2.2.2 Construction Phase 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, 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;
- A change in road alignment by 5 m or greater.

CS Consulting have prepared a Traffic and Transport Impact Assessment for the proposed development, enclosed separately. It has been determined that the construction stage traffic will not increase by 1,000 AADT, or 200 HDV AADT, and that the development will not result in speed changes or changes in road alignment. Therefore, the traffic does not meet the above scoping criteria. A detailed air quality 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 with respect with human or ecological receptors.

10.2.3 Operational Phase

10.2.3.1 Operational Phase Traffic Assessment

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 0

were used to determine if any road links are affected by the proposed development and require inclusion in a detailed air dispersion modelling assessment. DBFL Consulting Engineers have prepared a Traffic and Transport Assessment for the proposed development enclosed separately and have prepared Chapter 13 (Material Assets – Transportation). The traffic data provided for the operational phase assessment has included traffic associated with Site 3, Site 4 and Site 5 of the Kishoge development. While the traffic associated with each individual site in isolation is below the above screening criteria, when assessed in combination with all proposed sites there is a greater than 1,000 AADT increase on a small number of road links. As a result, an assessment of traffic related emissions was conducted. Additionally, traffic associated with other cumulative developments in the vicinity of the proposed development was included in the figures supplied to ensure a full cumulative assessment was conducted. See Traffic and Transport Assessment and Chapter 13 (Material Assets – Transportation) for further details.

The impact of traffic emissions on air quality is assessed for both human and ecological receptors within 200 m of impacted roads as per the TII PE-ENV-01106 guidance (TII, 2022). The following sections describe the methodology for each assessment.

10.2.3.1.1 Air Quality Traffic Assessment – Human Receptors

The impact to air quality as a result of changes in traffic is assessed at sensitive human receptors in the vicinity of affected roads. These are discussed in further detail within Section 0 and shown graphically in Figure 10.3.

The TII guidance (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 – i.e. assuming the proposed development is not in place) and Do Something (with the proposed development in place) 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, 2024).

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 tyre 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.

10.2.3.1.2 Air Quality Traffic Assessment – Ecological Receptors

In addition to assessing the impact to people as a result of air quality, the impact to sensitive ecosystems has also been assessed as per the TII PE-ENV-01106 guidelines (2022). Sensitive ecological habitats include internationally, nationally and locally designated sites of ecological importance, referred to as 'designated habitats' within the TII guidance PE-ENV-01106 (2022). According to TII guidance PE-ENV-01106, designated habitats may include: Ramsar sites, Special Protection Areas (SPAs) and proposed sites (pSPA), Special Areas of Conservation (SACs) and proposed sites (pSAC), Natural Heritage Areas (NHA), and pNHA, ancient woodland, veteran trees, Nature Reserves, National

Parks, Refuge for Fauna and Flora, Wildfowl Sanctuaries, Biogenetic Reserves and UNESCO Biosphere Reserves.

Further guidance can also be found in the IAQM document *A Guide to The Assessment of Air Quality Impacts on Designated Nature Conservation Sites* (IAQM, 2020) and in the TII guidance (TII, 2022), both of which describe NO_X and ammonia emissions as the most likely source of significant impacts from road traffic. Pollutants such as CO_2, CO, SO_2 and volatile organic compounds are not considered in this guidance and have been scoped out of detailed assessment.

The assessment of impacts to ecology from air quality and traffic emissions requires the air quality specialist to liaise with an ecologist on schemes where there is a designated site within 2km of the route. However, as the potential impact of a scheme is limited to local level, a detailed assessment is only required where there is a significant change to traffic flows (>1,000 AADT or >200 HDV AADT) 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 (NO_X) and ammonia (NH_3) concentrations in order to determine the nitrogen (N) deposition and acid deposition rates using the methodology set out in TII PE-ENV-01106 (2022).

The Grand Canal pNHA (Site Code: 002104) is within 200 m of the road link *W: R136 (South of CSLR)* impacted by the proposed development. Therefore, there is the potential for impacts to ecology as a result of NO_X, NH_3, N deposition and acid deposition and an assessment is required.

Chapter 6 (Biodiversity) includes further details on the ecological sensitivities associated with these sites.

Modelling using the TII REM was conducted for the relevant sensitive habitats. The assessment consisted of modelling individual ecological receptors at a worst-case distance of 5 m from the road centreline. The greatest impacts would occur in closest proximity to the source of the emissions (the road) and therefore this represents a precautionary assessment.

Road traffic emission rates for NH_3 were generated using the best available method at the time of undertaking the assessment, namely the Calculator for Road Emissions of Ammonia (CREAM) Tool developed by Air Quality Consultants (AQC 2020), as recommended by the TII guidance (TII 2022, 2024).

The TII PE-ENV-01106 guidance (2022) outlines a methodology to derive the road contribution to dry deposition and thereafter to compare with the published critical loads for the appropriate habitat. The TII REM has the necessary calculation embedded within it to provide N deposition and acid deposition rates based on the calculated NO_X and NH_3 concentrations.

The REM uses the conversion factors outlined in Table 10.7 for NO_2 and NH_3 based on the methodology of AGTAG06 – Technical Guidance On Detailed Modelling Approach For An Appropriate Assessment For Emissions To Air (UK Environment Agency 2014) and the IAQM (2020).

Habitat Type	**NO_2 Conversion Factor**	**NH_3 Conversion Factor**
Grassland and similar habitats	1µg/m^3 of NO_2 = 0.14 kgN/ha/yr	1µg/m^3 of NH_3 = 5.2 kgN/ha/yr
Forestry and similar habitats	1µg/m^3 of NO_2 = 0.29 kgN/ha/yr	1µg/m^3 of NH_3 = 7.8 kgN/ha/yr

Table 10.7 NO_2 and NH_3 N Deposition Conversion Factors

The N deposition is then converted to an acid deposition within the REM software using a conversion factor of 0.071429 keqN/ha/yr for all habitat types.

N deposition and acid deposition are calculated for both the road contribution of NO_2 and NH_3, and these are then summed along with the background deposition rates in order to calculate the total N deposition and acid deposition at each sensitive designated habitat.

Background concentrations for NO_X, NH_3, N deposition and acid deposition at the closest point to the modelled road within each modelled designated habitat were derived from the 1km grid square concentrations provided on the Air Pollution Information System (APIS) website (APIS 2025), in line

with UK Environment Agency (2014) and UK Department for Environment, Food and Rural Affairs (Defra) (2022) guidance, as shown in Section 10.3.2 and Table 10.11 Background Concentrations for NOX, NH3, Nitrogen and Acid Deposition. These background concentrations were input into the REM to complete the necessary calculations.

10.2.3.1.3 Traffic Data used in Modelling Assessment

Traffic flow information is detailed in Table 10.8 as obtained from CS Consulting for the purposes of this assessment. Data for the Base Year 2023 and the Do Nothing and Do Something scenarios for the Opening Year 2027 and Design Year 2042 were provided. The traffic data included traffic associated with Site 3, Site 4 and Site 5 of the Kishoge development and other cumulative sites as relevant (see Chapter 13 for further details).

The modelling assessment has been undertaken for road links that were within 200 m of receptors. Background concentrations have been included as per Section 10.3.2 of this chapter based on available EPA background monitoring data (EPA, 2024).

Road Name	**Speed (kph)**	**Base Year**	**Opening Year**		**Design Year**	
			Do Nothing	**Do Something**	**Do Nothing**	**Do Something**
		LDV AADT (HDV AADT)	**LDV AADT (HDV AADT)**	**LDV AADT (HDV AADT)**	**LDV AADT (HDV AADT)**	**LDV AADT (HDV AADT)**
J: R136 (South of J4)	80: Base Year 50: Future Years	19,974 (618)	17,491 (2,052)	19,597 (2,057)	19,532 (2,050)	21,632 (2,061)
W: R136 (South of CSLR)	80: Base Year 50: Future Years	19,975 (618)	18,833 (2,568)	22,536 (2,560)	22,609 (2,568)	24,977 (2,561)

Table 10.8 Traffic Data used in Operational Phase Air Quality Assessment

10.3 RECEIVING ENVIRONMENT

10.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is 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, 2021). 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 3 km south of the site. Casement Aerodrome met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 10.1). For data collated during five representative years (2020 – 2024), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.2 m/s over the 30-year period of 1991 – 2020 (Met Éireann, 2025).

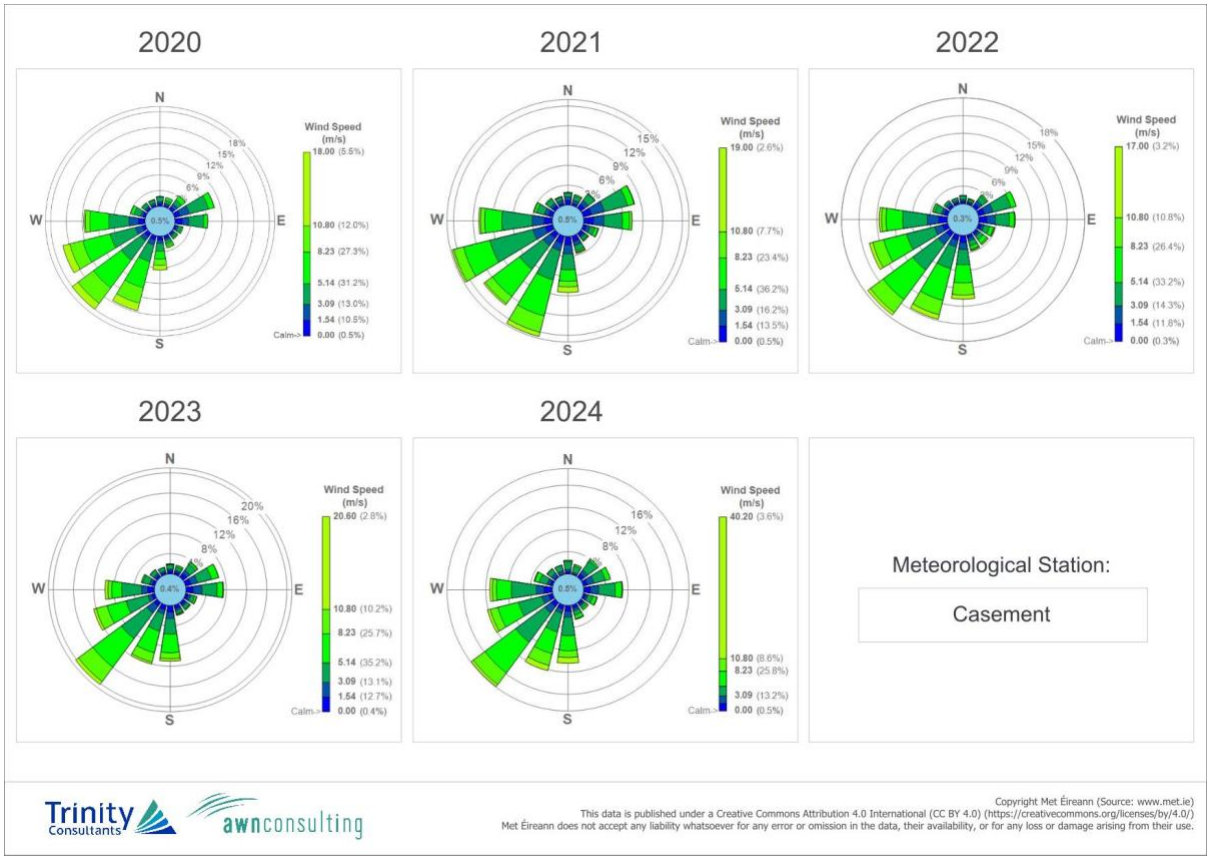

Figure 10.1 Wind Roses for Casement Aerodrome

10.3.2 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 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.

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, 2024). 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 A (EPA, 2024). 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.).

NO_2

Long-term NO_2 monitoring was carried out at the representative Zone A suburban background locations of Tallaght, Dún Laoghaire, Swords and Ballyfermot for the period 2019 – 2023 (see Table 10.9) (EPA, 2024). Long term average concentrations are significantly below the annual average limit of 40 µg/m^3. Average results range from 10 – 20 µg/m^3 for the suburban background locations. Additionally, there were no exceedances of the hourly limit value of 200 µg/m^3.

The average annual mean concentration for the suburban background monitoring sites over the 5-year period is 14 µg/m^3. Based on the above information, an estimate of the current background NO_2 concentration for the region of the proposed development is 14 µg/m^3.

Station	Averaging Period	Year				
		2019	2020	2021	2022	2023
Tallaght	Annual Mean NO_2 (µg/m³)	-	14	13	14	14
	1-hr Mean > 200 µg/m³ (days)	-	0	0	0	0
Dun Laoghaire	Annual Mean NO_2 (µg/m³)	15	13	16	16	13
	1-hr Mean > 200 µg/m³ (days)	0	0	0	0	0
Swords	Annual Mean NO_2 (µg/m³)	15	11	11	12	10
	1-hr Mean > 200 µg/m³ (days)	0	0	0	0	0
Ballyfermot	Annual Mean NO_2 (µg/m³)	20	12	13	13	13
	1-hr Mean > 200 µg/m³ (days)	0	0	0	0	0

Table 10.9 Trends In Zone A Air Quality - Nitrogen Dioxide (NO_2)

PM_{10}

Continuous PM_{10} monitoring was carried out at four representative Zone A locations from 2019 – 2023; Ballyfermot, Dún Laoghaire, Tallaght, Phoenix Park, Finglas, Marino and St. Anne's Park. Annual average PM_{10} concentrations across the sites ranged from 9 – 14 µg/m³ over the 2019 – 2023 period (see Table 10.10). There was at most 1 exceedance of the daily limit of 50 µg/m³ in 2023 (35 exceedances are permitted per year) (EPA, 2024). The EPA monitoring data indicates an average annual mean PM_{10} concentration over this 5-year period of 12 µg/m³. Based on the EPA data, an estimate of the current background PM_{10} concentration in the region of the proposed development is 12 µg/m³.

Station	Averaging Period	Year				
		2019	2020	2021	2022	2023
Ballyfermot	Annual Mean PM_{10} (µg/m³)	14	12	12	13	11
	24-hr Mean > 50 µg/m³ (days)	7	2	0	1	0
Dún Laoghaire	Annual Mean PM_{10} (µg/m³)	12	12	11	12	12
	24-hr Mean > 50 µg/m³ (days)	2	0	0	1	0
Tallaght	Annual Mean PM_{10} (µg/m³)	12	10	10	11	11
	24-hr Mean > 50 µg/m³ (days)	3	1	0	1	1
Phoenix Park	Annual Mean PM_{10} (µg/m³)	11	10	10	11	9
	24-hr Mean > 50 µg/m³ (days)	2	0	0	0	0
Finglas	Annual Mean PM_{10} (µg/m³)	13	12	12	12	12
	24-hr Mean > 50 µg/m³ (days)	2	0	0	1	0
Marino	Annual Mean PM_{10} (µg/m³)	14	13	12	14	12
	24-hr Mean > 50 µg/m³ (days)	4	0	0	3	0
St. Anne's Park	Annual Mean PM_{10} (µg/m³)	12	11	11	13	11
	24-hr Mean > 50 µg/m³ (days)	1	0	0	1	0

Table 10.10 Trends In Zone A Air Quality - PM_{10}

$PM_{2.5}$

Average $PM_{2.5}$ concentrations in the suburban background monitoring stations of Ballyfermot, Dún Laoghaire, Phoenix Park, Finglas, Marino and St. Anne's Park over the period 2019 – 2023 ranged from 6 – 10 µg/m³ (EPA, 2024). The overall annual average concentration for this 5-year period is 8 µg/m³. Based on this information, an estimate of the background $PM_{2.5}$ concentration in the region of the proposed development is 8 µg/m³.

Summary

Based on the above information the air quality in the suburban Dublin area is generally good, with concentrations of the key pollutants generally well below the relevant limit values set out in Directive 2008/50/EC. The current pollutant concentrations at the majority of monitoring sites are also in compliance with the 2030 limit values set out in Directive (EU) 2024/2881. However, further measures will be needed at a national scale to reduce air pollution in future years. The EPA have indicated that road transport emissions are contributing to increased levels of NO_2 with the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$). The EPA predict that exceedances in the particulate matter limit values are likely in future years if burning of solid fuels for residential heating continues (EPA, 2024).

The current estimated background concentrations have been used in the operational phase air quality assessment for both the Opening and Design Year as a conservative approach to predict future pollutant concentrations. This is in line with the TII methodology (TII, 2022).

Sensitive Designated Habitats

Background concentrations for NO_X, NH_3, nitrogen and acid deposition at the closest point to the modelled road within the modelled designated habitat were derived from the 1km grid square concentrations provided on the APIS website (APIS 2025), in line with UK Environment Agency (2014) and UK Defra (2022) guidance. These are shown in Table 10.11. The background concentrations vary depending on the location and therefore are provided for the specific designated ecological areas assessed.

Sensitive Designated Habitat	NO_X (µg/m³)	NH_3 (µg/m³)	Nitrogen Deposition (kg/ha/yr)	Acid Deposition (keqN/ha/yr)
Grand Canal pNHA	9.8	1.9	6.1	0.48

Table 10.11 Background Concentrations for NO_X, NH_3, Nitrogen and Acid Deposition

10.3.3 Sensitive Receptors

10.3.3.1 Construction Phase

In line with the UK Institute of Air Quality Management (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2024) prior to assessing the impact of dust from a proposed development, the sensitivity of the area must first 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.

The sensitivity of the area is assessed in relation to dust soiling, dust-related human health effects and dust-related ecological effects. Table 10.12, Table 10.12 Sensitivity of the Area to Dust Soiling Effects on People and Property and Table 10.13 Sensitivity of the Area to Human Health Impact outline the IAQM criteria for establishing the sensitivity of the area.

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

Table 10.12 Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Table 10.13 Sensitivity of the Area to Human Health Impact

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

Table 10.14 Sensitivity of the Area to Ecological Impacts

10.3.3.1.1 Site 3

In terms of receptor sensitivity to dust soiling, there are approximately 43 no. high sensitivity residential properties within 20 m of the proposed Site 3 development planning boundary (see Figure 10.2). Based on these receptor numbers and using the IAQM criteria in Table 10.12, the sensitivity of the area to dust soiling impacts from the proposed development is high.

In relation to the sensitivity of the area to dust-related 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 as per Table 10.12 Sensitivity of the Area to Dust Soiling Effects on People and Property.

A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is 12 µg/m^3. There are 43 no. high sensitivity residential receptors within 20 m of the proposed Site 3 development planning application boundary (see Figure 10.2). Based on the IAQM criteria outlined in Table 10.12 Sensitivity of the Area to Dust Soiling Effects on People and Property the worst-case sensitivity of the area to dust-related human health effects is low.

In relation to determining the sensitivity of the area to dust-related ecological impacts, dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant, as well as other effects. The IAQM 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 sensitivity of the area is determined based on the distance to the source, the designation of the site, (European, National or local designation) and the potential dust sensitivity of the ecologically important species present.

There are no sensitive ecological receptors within 50 m of the proposed Site 3 development boundary and therefore there is no potential for impacts to sensitive ecology from construction dust emissions and no further assessment is required.

10.3.3.1.2 Site 4

In terms of receptor sensitivity to dust soiling, there are approximately 68 no. high sensitivity residential properties greater than 50 m but within 100 m of the proposed Site 4 development planning boundary (see Figure 10.2). Based on these receptor numbers and using the IAQM criteria in Table 10.12, the sensitivity of the area to dust soiling impacts from the proposed development is low.

A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is 12 µg/m^3. There are 68 no. high sensitivity residential receptors greater than 50 m but within 100 m of the proposed Site 4 development planning application boundary (see Figure 10.2). Based on the IAQM criteria outlined in Table 10.12 Sensitivity of the Area to Dust Soiling Effects on People and Property the worst-case sensitivity of the area to dust-related human health effects is low.

The Grand Canal pNHA is within 20 m of the proposed Site 4 southern boundary. The Grand Canal pNHA can be considered a medium sensitivity receptor according to the IAQM criteria as it is of national designation and may have dust sensitive features present. Based on these criteria the sensitivity of the area to dust-related ecological impacts is low.

10.3.3.1.3 Site 5

In terms of receptor sensitivity to dust soiling, there are approximately 12 no. high sensitivity residential properties and 1 no. high sensitivity school within 20 m of the proposed Site 5 development planning boundary (see Figure 10.2). Based on these receptor numbers and using the IAQM criteria in Table 10.12, the sensitivity of the area to dust soiling impacts from the proposed development is high.

A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is 12 µg/m^3. There are 12 no. high sensitivity residential receptors and 1 no. school within 20 m of the proposed Site 5 development planning application boundary (see Figure 10.2). Based on the IAQM criteria outlined in Table 10.12 Sensitivity of the Area to Dust Soiling Effects on People and Property the worst-case sensitivity of the area to dust-related human health effects is low.

There are no sensitive ecological receptors within 50 m of the proposed Site 5 development boundary and therefore there is no potential for impacts to sensitive ecology from construction dust emissions and no further assessment is required.

Figure 10.2 Sensitive Receptors within 20m, 50m, 100m and 250m of Site

10.3.3.1.4 Summary of the Sensitivity of the Area to Dust Impacts

Table 10.15 details a summary of the sensitivity of the various sites within the proposed development in relation to potential construction dust impacts. In relation to the overall sensitivity for the cumulative sites combined, this is based on the maximum sensitivities below – high sensitivity for dust soiling, low sensitivity for human health and medium sensitivity for ecology.

Category	Site 3	Site 4	Site 5
Dust Soiling	High Sensitivity	Low Sensitivity	High Sensitivity
Dust-Related Human Health Effects	Low Sensitivity	Low Sensitivity	Low Sensitivity
Dust-Related Ecological Effects	N/A	Medium Sensitivity	N/A

Table 10.15 Sensitivity of the Area of Construction Dust Impacts

10.3.3.2 Operational Phase

The impact to air quality due to changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. As the air quality assessment of traffic emissions has included all sites within the proposed development the sensitive receptors chosen have been based on the proposed development as a whole rather than the specific sites.

The TII guidance (2022) states that a proportionate number of representative receptors, which are located in areas which will experience the highest concentrations or greatest improvements because of the proposed development, are to be included in the modelling. The TII criteria state that receptors within 200 m of impacted road links should be assessed; roads which are greater than 200 m from

receptors will not impact pollutant concentrations at that receptor (TII, 2022). The TII guidance (2022) defines sensitive receptor locations 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. A total of 2 no. high sensitivity residential receptors (R1 and R2) and the Grand Canal pNHA were included in the modelling assessment (see Figure 10.3).

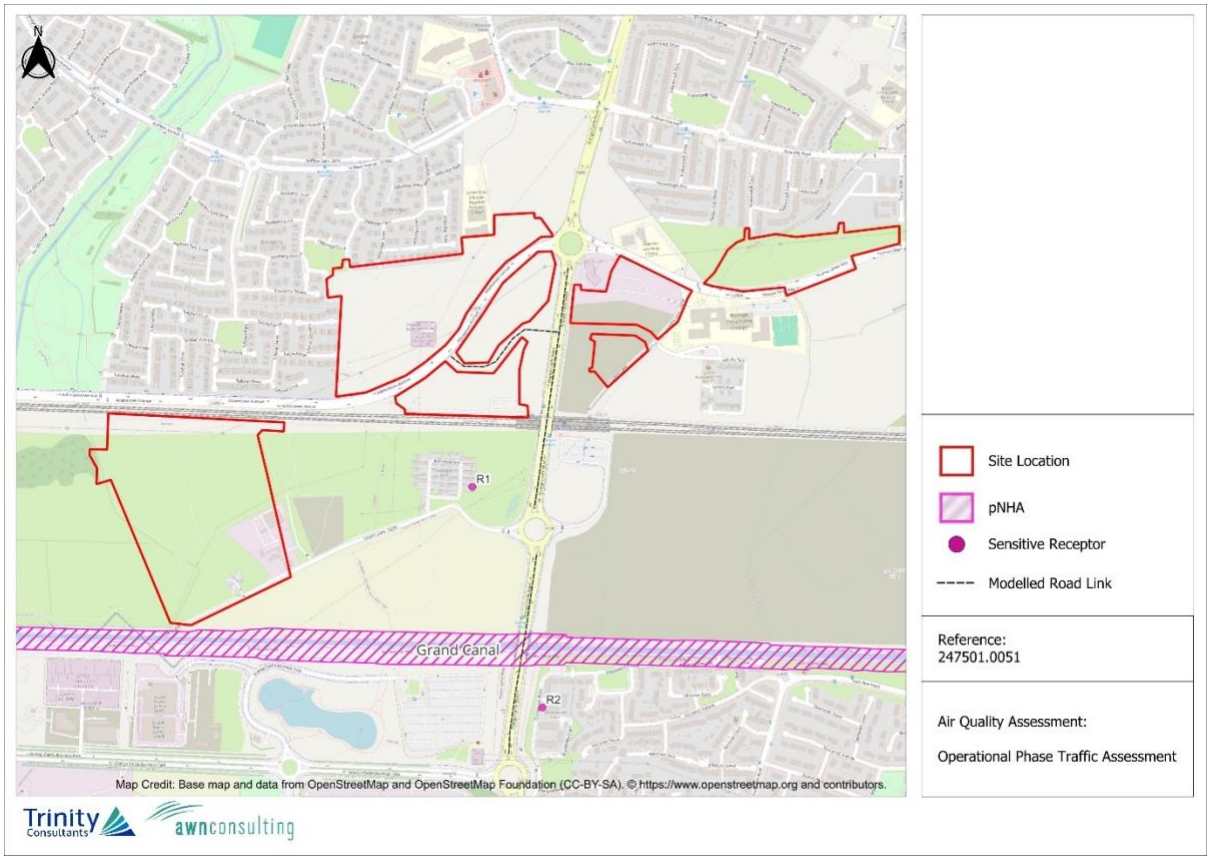

Figure 10.3 Sensitive Receptors Included in Operational Phase Air Quality Modelling Assessment

10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed residential development spans three sites within the Clonburris SDZ (Strategic Development Zone). These sites are defined as Site 3, Site 4 and Site 5. A full description of the development is available in Chapter 3 (Description of the Proposed Development).

10.4.1 Construction Phase

During the construction stage, the main source of air quality impacts will be due to fugitive dust emissions from site activities. Dust emissions will primarily occur as a result of site preparation works, earthworks, construction of proposed buildings and the movement of trucks on site and exiting the site.

10.4.2 Operational Phase

During the operational phase, air quality may be affected by increased traffic accessing the site. This can be attributed to a higher number of vehicles and the potential rise in vehicle exhaust emissions. Operational phase impacts will have a long-term impact on air quality.

10.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

10.5.1 Proposed Development

10.5.1.1 Construction Stage

10.5.1.1.1 Construction 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 250m 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 such as rainfall, wind speed and wind direction. 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 10.3.1). In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30-year average data for Casement Aerodrome meteorological station indicates that on average 194 days per year have rainfall over 0.2 mm (Met Eireann, 2025) and therefore it can be determined that 53% of the time dust generation will be reduced due to natural meteorological conditions.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see Section 10.3.3.1). The major dust generating activities are divided into four types within the IAQM (2024) guidance to reflect their different potential impacts. These are: demolition, earthworks, construction and trackout (movement of heavy vehicles).

Determining the Potential Dust Emission Magnitude

The magnitude of the works under each category can be classified as either small, medium or large depending on the scale of the works involved. The magnitude of each activity has been determined below for the proposed development using the criteria in Table 10.5.

Dust Emission Category	Site 3	Site 4	Site 5
Demolition	Small: minor demolition works, total building volume <12,000 m^3	Small: minor demolition works, total building volume <12,000 m^3	N/A - no demolition works required
Earthworks	Large: site area > 110,000 m^2	Large: site area > 110,000 m^2	Medium: Site area between 18,000 - 110,000 m^2
Construction	Large: total volume of buildings to be constructed > 75,000 m^3	Large: total volume of buildings to be constructed > 75,000 m^3	Large: total volume of buildings to be constructed > 75,000 m^3
Trackout	Medium: Between 20 - 50 outward HGV movements per day during peak construction	Medium: Between 20 - 50 outward HGV movements per day during peak construction	Medium: Between 20 - 50 outward HGV movements per day during peak construction

Table 10.16 Dust Emission Magnitude for Proposed Development

Determining the Risk of Dust Impacts

Once the dust emission magnitude has been determined the next step, according to the IAQM guidance (2024), is to establish the level of risk by combining the magnitude with the overall sensitivity of the area to dust soiling and dust-related human health effects (see Section 10.3.3.1). The level of risk associated with each activity is determined using the criteria in Table 10.6 and is shown in Table 10.17 for each of the sites within the proposed development.

There is at most a high risk of dust soiling impacts and a low risk of dust-related human health impacts associated with Site 3.

In relation to Site 4, there is at most a low risk of dust soiling and human health and a medium risk of ecology impacts.

There is at most a high risk of dust soiling impacts and a low risk of dust-related human health impacts associated with Site 5.

It is envisaged that construction on each site would occur concurrently and therefore, the overall dust risk for the cumulative assessment of all three sites can be determined as high.

Type of Impact	Sensitivity of the Area	Activity	Dust Emission Magnitude	Dust Emission Risk
Site 3				
Dust Soiling	High	Demolition	Small	Medium Risk
		Earthworks	Large	High Risk
		Construction	Large	High Risk
		Trackout	Medium	Medium Risk
Human Health	Low	Demolition	Small	Negligible Risk
		Earthworks	Large	Low Risk
		Construction	Large	Low Risk
		Trackout	Medium	Low Risk
Ecology	N/A	N/A	N/A	N/A
Site 4				
Dust Soiling	Low	Demolition	Small	Negligible Risk
		Earthworks	Large	Low Risk
		Construction	Large	Low Risk
		Trackout	Medium	Low risk
Human Health	Low	Demolition	Small	Negligible Risk
		Earthworks	Large	Low Risk
		Construction	Large	Low Risk
		Trackout	Medium	Low risk
Ecology	Medium	Demolition	Small	Low Risk
		Earthworks	Large	Medium Risk
		Construction	Large	Medium Risk
		Trackout	Medium	Medium risk
Site 5				
Dust Soiling	High	Demolition	Small	Medium Risk
		Earthworks	Large	High Risk

Type of Impact	Sensitivity of the Area	Activity	Dust Emission Magnitude	Dust Emission Risk
		Construction	Large	High Risk
		Trackout	Medium	Medium risk
Human Health	Low	Demolition	Small	Negligible Risk
		Earthworks	Large	Low Risk
		Construction	Large	Low Risk
		Trackout	Medium	Low risk
Ecology	N/A	N/A	N/A	N/A

Table 10.17 Dust Emission Risk for Proposed Development

10.5.1.2 Construction Stage Traffic Assessment

There is also the potential for traffic emissions to impact air quality with respect to human health and ecology 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 satisfies the TII assessment criteria in Section 0.

It can therefore be determined that the construction stage traffic will have an imperceptible, neutral, short-term and not significant impact on air quality.

10.5.1.3 Operational Stage

10.5.1.3.1 Operational Phase Traffic Assessment

The potential impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. 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 Opening Year 2027 and Design Year 2042 was predicted at the nearest sensitive receptors to the impacted road links. 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, 2022a) 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 impact 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.

Operational Phase Traffic Assessment – Human Receptors

Traffic related air emissions have the potential to impact air quality which can affect human health. The following details the results of the air dispersion modelling assessment of traffic emissions to determine the impact to human health. The predicted pollutant concentrations have been compared against the ambient air quality limit values set out in Table 10.1. The limit values set out in Directive 2008/50/EC and the Ambient Air Quality Standards Regulations 2022 are applicable to the Opening Year 2027. The limit values set out under Directive (EU) 2024/2881 are applicable to the Design Year 2042.

NO_2

The results of the NO_2 modelling are shown in Table 10.18. In the Opening Year 2027, predicted annual mean concentrations of NO_2 are in compliance with the annual mean limit value of 40 $\mu g/m^3$ set out

under Directive 2008/50/EC, reaching at most 38% of the limit. In addition, the TII guidance (2022a) states that the hourly limit value for NO_2 of 200 µg/m³ is unlikely to be exceeded at roadside locations unless the annual mean is above 60 µg/m³. As predicted NO_2 concentrations are significantly below 60 µg/m³ (Table 10.18), it can be concluded that the short-term NO_2 limit value will be complied with at all receptor locations. Some increases in NO_2 concentrations are predicted at the worst-case receptor assessed in the Opening Year when compared with the Do-Nothing scenario (see Table 10.18). Concentrations are predicted to increase by at most 0.06 µg/m³ at receptor R2. When comparing the change in concentration with the air quality limit value, it results in a maximum change of 0.15% at receptor R2. All other receptors in the area will experience similar or lesser impacts and all increases are considered 'neutral' as per the TII criteria in Table 10.3.

In the Design Year 2042, predicted annual mean NO_2 concentrations are in compliance with the limit value of 20 µg/m³ set out under Directive (EU) 2024/2881, at the worst-case receptor assessed, reaching at most 73% of the limit. The proposed development will result in at most 'neutral' increases in NO_2 concentrations according to the TII significance criteria in Table 10.3, with concentrations increasing by at most 0.02 µg/m³ as a result of the proposed development (at receptor R2, see Table 10.18 which is an increase of 0.1% when compared with the applicable annual mean limit value for NO_2.

Receptor	**Impact Opening Year**						
	DN	**% of AQLV**	**DS**	**% of AQLV**	**DS-DN**	**% Change of AQLV**	**Description**
R1	14.2	36%	14.2	36%	0.01	0.02%	Neutral
R2	15.3	38%	15.4	38%	0.06	0.15%	Neutral
Receptor	**Impact Design Year**						
	DN	**% of AQLV**	**DS**	**% of AQLV**	**DS-DN**	**% Change of AQLV**	**Description**
R1	14.1	71%	14.1	71%	0.00	0.00%	Neutral
R2	14.6	73%	14.6	73%	0.02	0.10%	Neutral

Table 10.18 Predicted Annual Mean NO_2 Concentrations (µg/m³)

PM_{10}

The results of the PM_{10} modelling can be seen in Table 10.19 for the Opening Year 2027 and Design Year 2042.

In the Opening Year 2027, annual mean PM_{10} concentrations are in compliance with the annual mean limit value of 40 µg/m³ set out under Directive 2008/50/EC reaching at most 34% of the limit. In the Design Year 2042 annual mean PM_{10} concentrations are also in compliance with the annual mean limit value of 20 µg/m³ set out under Directive (EU) 2024/2881 reaching at most 67% of the limit. In addition, the proposed development will not result in any days of exceedance of the daily PM_{10} limit value (Table 10.1) in both the opening and design years.

The changes in PM_{10} concentrations as a result of the proposed development can be assessed relative to the 'Do Nothing' (DN) levels. In the Opening Year 2027 annual PM_{10} concentrations will increase by at most 0.03 µg/m³ at receptor R2; this is a 0.07% increase when compared with the annual mean limit value of 40 µg/m³. All other receptors in the area will experience similar or lesser impacts and all increases are considered 'neutral' as per the TII criteria in Table 10.3.

In the Design Year 2042 the proposed development will result in a maximum increase of 0.02 µg/m³ at receptor R2, which is a 0.1% increase when compared with the annual mean limit of 20 µg/m³. The changes in concentrations in the Design Year are considered 'neutral' based on the TII criteria in Table 10.3.

Receptor	Impact Opening Year						
	DN	% of AQLV	DS	% of AQLV	DS-DN	% Change of AQLV	Description
R1	12.2	31%	12.2	31%	0.01	0.02%	Neutral
R2	13.5	34%	13.5	34%	0.03	0.07%	Neutral
Receptor	**Impact Design Year**						
	DN	**% of AQLV**	**DS**	**% of AQLV**	**DS-DN**	**% Change of AQLV**	**Description**
R1	12.2	61%	12.2	61%	0.00	0.00%	Neutral
R2	13.5	67%	13.5	67%	0.02	0.10%	Neutral

Table 10.19 Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

$PM_{2.5}$

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 10.20 for the modelled Opening Year 2027 and Design Year 2042.

In the Opening Year 2027, predicted annual mean concentrations of $PM_{2.5}$ are in compliance with the annual mean limit value of 25 $\mu g/m^3$ set out under Directive 2008/50/EC reaching at most 35% of the limit. There is predicted to be an increase in $PM_{2.5}$ concentrations at the worst-case receptor assessed in the Opening Year when compared with the Do-Nothing scenario (see Table 10.20). Concentrations are predicted to increase by at most 0.02 $\mu g/m^3$ at receptor R2. When comparing the change in concentration with the air quality limit value, it results in a maximum change of 0.08% at receptor R2. All other receptors in the area will experience similar or lesser impacts and all increases are considered 'neutral' as per the TII criteria in Table 10.3.

In the Design Year 2042, predicted annual mean $PM_{2.5}$ concentrations are in compliance with the limit value of 10 $\mu g/m^3$ set out under Directive (EU) 2024/2881 at all receptors assessed. Concentrations reach at most 88% of the annual mean limit value. The proposed development will result in at most 'neutral' increases in $PM_{2.5}$ concentrations according to the TII significance criteria in Table 10.3, with concentrations increasing by at most 0.01 $\mu g/m^3$ as a result of the proposed development (at receptor R2, see Table 10.3), which is an increase of 0.1% when compared with the annual mean limit value of 10 $\mu g/m^3$ for $PM_{2.5}$.

Receptor	Impact Opening Year						
	DN	% of AQLV	DS	% of AQLV	DS-DN	% Change of AQLV	Description
R1	8.1	33%	8.1	33%	0.00	0.00%	Neutral
R2	8.8	35%	8.8	35%	0.02	0.08%	Neutral
Receptor	**Impact Design Year**						
	DN	**% of AQLV**	**DS**	**% of AQLV**	**DS-DN**	**% Change of AQLV**	**Description**
R1	8.1	81%	8.1	81%	0.00	0.00%	Neutral
R2	8.8	88%	8.8	88%	0.01	0.10%	Neutral

Table 10.20 Predicted Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Significance of Predicted Changes in NO_2, PM_{10} and $PM_{2.5}$ Concentrations

As outlined in Section 10.2.1.4.1, the TII guidance (2022) states that significance of effects should be assessed based on the opening year only. Non-significant effects are 'neutral' or 'slight' changes in concentrations while significant effects can be changes in pollutant concentrations that are either 'moderate' or 'substantial' however, the TII guidance (2022) states that these must be considered in the context of the project and 'moderate' or 'substantial' increases are not necessarily always significant effects.

In relation to NO_2, PM_{10} and $PM_{2.5}$ the predicted changes in concentrations are all 'neutral' at the worst-case receptors assessed. Therefore, according to the TII criteria as outlined in Section 10.2.1.4.1, the impact is not significant.

For the purposes of this assessment it has been assumed that the current estimated background pollutant concentrations are applicable for both the opening and design years, with no decreases in future background concentrations allowed for. There will be some decreases in background concentrations in future years. However, at present there is no guidance-based methodology available for estimating future year background concentrations and therefore, as a conservative approach, the current estimated background concentrations have been applied to future years.

Due to the large uncertainty in future improvements in fleet composition and emissions, such as projected changes to vehicle registration and electric vehicle uptake, the future year emission rates utilised by the REM do not account for the full implementation of these measures. Predicted design year concentrations are therefore currently overly conservative as future emissions improvements are not fully taken into account, as well as no improvement in background concentrations being assumed. As a result the opening year predicted concentrations are the most appropriate for determining the significance of effects as per Section 10.2.1.4.1.

It can be concluded that the impact of traffic emissions on air quality and human health during the operational phase is ***long-term, direct, localised, imperceptible***, and overall ***not significant*** in EIA terms.

The measures set out in the *Clean Air Strategy for Ireland* (Government of Ireland 2023) aim to work towards solutions to ensure that air pollution concentrations are reduced in order to comply with the future changes in limit values. Ireland will need to continue to implement and develop measures to ensure continuing improvements in air quality in future years in order to meet the objectives of the Clean Air Strategy for Ireland (Government of Ireland, 2023) and to ensure the ambient air quality limit values set out in Directive (EU) 2024/2881 are achieved. The estimated background concentrations used in the assessment are the largest contribution to predicted pollutant concentrations, rather than pollutant contributions associated with the proposed development. Strategies to improve air quality at a national level in future years will contribute to reducing background concentrations and therefore it is envisioned that air quality will improve in the future.

Operational Phase Traffic Assessment – Ecological Receptors

An assessment of the impact of the changes in traffic associated with the proposed development and the impact on air quality and sensitive ecology has been undertaken using the approach outlined in the IAQM guidance document A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1) (IAQM, 2020) and the TII guidance (TII, 2022). An assessment of the ecologically sensitive sites listed in Section 10.2.3.1.2 has been carried out.

As outlined in Section 10.2.3.1.2, the Grand Canal pNHA (Site Code: 002104) is within 200 m of the road link *W: R136 (South of CSLR)* affected by the proposed development (See Table 10.8).

The results of the modelling assessment within the relevant section of the Grand Canal pNHA are detailed in Table 10.21 for NO_X, NH_3, N deposition and acid deposition. Background concentrations (as per Table 10.11) have been added to the modelled road contribution to give the total result. The 'total annual mean NO_X', 'total annual mean NH_3', 'total N deposition' and 'total acid deposition' referred to in the below tables includes the predicted modelled result from the operational phase traffic associated with the proposed development plus background concentrations as per Table 10.11. Results have been compared against the annual mean NO_X limit value of 30 µg/m^3 and the annual mean NH_3 limit value of 3 µg/m^3. The N deposition and acid deposition results have been compared to the critical load ranges set out in Table 10.4. The applicable N deposition critical load range for the Grand Canal pNHA is 10 kgN/ha/yr to 20 kgN/ha/yr. The critical load range for acid deposition for the Grand Canal pNHA is 0.714 keqN/ha/yr to 5.146 keqN/ha/yr.

As a conservative approach these, critical load ranges have been based on the ranges for the potentially most sensitive species within the designated site, regardless of whether that specific sensitive species is present within the impacted area.

In relation to NO_X, predicted concentrations are in compliance with the annual mean limit value of 30 µg/m^3 in both the Do-Nothing and Do-Something scenarios. The proposed development is predicted to increase NO_X concentrations within a section of the relevant designated site. As can be seen in Table 10.21, NO_X concentrations would increase by 0.46 µg/m^3 or 1.5% of the limit in the opening year 2027 at the Grand Canal pNHA. Overall, the proposed development is not predicted to have a substantial impact on NO_X concentrations at the relevant section of the designated site and concentrations remain well below the annual mean limit value.

Emissions of NH_3 as a result of the proposed development are in compliance with the limit value of 3 µg/m^3 (see Table 10.21). Concentrations will increase by at most 0.24 µg/m^3 in the opening year 2027, which is an 8% increase compared to the limit value. Overall, the proposed development is not predicted to have a substantial impact on NH_3 concentrations at the relevant section of the designated site.

Predicted N deposition rates are in exceedance of the lower critical load range of 10 – 20 kgN/ha/yr for the Grand Canal pNHA. The predicted N deposition rate in the 'do something' scenario with the proposed development in place is 15.41 kgN/ha/yr which is 154% of the lower threshold of 10 kgN/ha/yr. However, the predicted deposition rates are within the upper critical load range of 20 kgN/ha/yr. The majority of the impact is from existing background concentrations and existing traffic emissions; the modelling results indicated that the proposed development would increase N deposition levels by 1.29 kgN/ha/yr (see Table 10.21). The modelling has been based on a worst-case closest distance of 5m from the road and it should be noted that the impact will decrease with further distance from the road. Overall, the proposed development is not predicted to have a substantial impact on N deposition rates at the relevant section of the designated site.

Predicted acid deposition rates are within the critical load range of 0.714 – 5.146 keqN/ha/yr for the Grand Canal pNHA. The predicted acid deposition rate in the 'do something' scenario with the proposed development in place is 1.15 keqN/ha/yr which is 22% of the upper threshold of 5.146 keqN/ha/yr. The modelling results indicate that the proposed development would increase acid deposition rates by 0.1 keqN/ha/yr (see Table 10.21). The impact will decrease with further distance from the road.

The TII PE-ENV-01106 guidance referenced in Section 10.2.1.4.2 states that if the total N deposition and acid deposition (due to the proposed development plus background concentrations) are more than 1% of the critical loads then the modelled results should be discussed further with the project ecologist. The project ecologist was advised of these results to ensure a robust EIAR assessment. Input from the project ecologist is detailed below which has included determining the significance of impacts to ecology as a result of air quality changes from traffic emissions.

As per information from the project ecologist, given the mesotrophic to eutrophic conditions associated with the Grand Canal, the effects of locally increased acid deposition are notably reduced as the base cation supply is sufficient to buffer the potential adverse effects of acidification.

In accordance with the EPA Guidelines (EPA, 2022) the ecological impacts associated with the operational phase traffic emissions are overall ***localised, direct, long-term, negative*** and ***slight*** which is ***not significant*** in EIA terms.

The increases in emissions associated with this development are not likely to have a negative impact on protected species or habitats within this pNHA.

Ecology Receptor	**Scenario**	**Total Annual Mean NOx (ug/m^3)**	**Total Annual Mean NH_3 (ug/m^3)**	**Total Annual Mean N Dep (kgN/ha/yr)**	**Total Annual Mean N Acid Dep (keqN/ha/yr)**
	Opening Year				
Grand Canal pNHA	Do Nothing	19.12	3.31	14.12	1.05
	Do Something	19.58	3.55	15.41	1.15
	DS-DN	0.46	0.24	1.29	0.1

Ecology Receptor	Scenario	Total Annual Mean NOx (ug/m³)	Total Annual Mean NH_3 (ug/m³)	Total Annual Mean N Dep (kgN/ha/yr)	Total Annual Mean N Acid Dep (keqN/ha/yr)
	Critical Load	30	3	10 – 20kgN/ha/yr	0.714 – 5.146 keqN/ha/yr
	% Change Relative to Limit	1.5%	8.0%	12.9% - 6.5%	14.0% - 1.9%
	Design Year				
	Do Nothing	14.24	3.65	15.53	1.15
	Do Something	14.36	3.82	16.42	1.22
	DS-DN	0.12	0.17	0.89	0.07
	Critical Load	30	3	10 – 20 kgN/ha/yr	0.714 – 5.146 keqN/ha/yr
	% Change Relative to Limit	0.4%	5.7%	8.9% - 4.5%	9.8% - 1.4%

Table 10.21 Predicted NO_X, NH_3, Nitrogen and Acid Deposition Results at Closest Point within Ecological Sites to Road

10.5.2 Cumulative

10.5.2.1 Construction Phase

There is the potential for cumulative construction dust impacts to nearby sensitive receptors if the construction phase of the proposed development coincides with that of other large-scale developments within 500m of the site.

A review of the planned and permitted projects within the vicinity of the site was undertaken in order to identify developments with the potential for cumulative construction phase impacts. The following developments were identified: SD179A24/0004, SDZ24A/0033W, SDZ23A/0043, SDZ23A/0018, SDZ23A/0004, SDZ22A/0011, SD228/0003, SDZ21A/0013, SDZ20A/0021.

Considering all 3 no. sites within the proposed development, there is at most a high risk of dust impacts associated with the proposed development (see Table 10.17). The dust mitigation measures outlined in Section 10.6.1.1 will be applied during the construction phase which will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the proposed development and the aforementioned development are deemed ***short-term, direct, negative***, and ***slight*** which is overall ***not significant***.

10.5.2.2 Operational Phase

There is the potential for cumulative impacts to air quality during the operational phase as a result of traffic associated with other existing and permitted developments within the area. The traffic data provided for the operational stage air quality assessment included cumulative traffic associated with Site 3, Site 4 and Site 5 of the proposed development as well as other specific cumulative developments as required (see Traffic Impact Assessment and Chapter 13 for further details on specific developments). The cumulative operational phase impact is assessed within Section 10.5.1.3.1 and was found to result in at most neutral increases in pollutant concentrations as per the TII criteria (Table 10.3). The cumulative operational stage impact is ***long-term, localised, direct, negative, imperceptible*** and ***not significant.***

10.5.3 Do-Nothing Impact

In the Do-Nothing Scenario no construction works will take place, and the identified impacts of fugitive dust and particulate matter emissions will not occur at the subject site. The baseline air quality will continue to develop in line with future trends as per Section 11.3.2.

The Do-Nothing scenario associated with the operational phase of the development is assessed within 10.5.1.3.1 and it was found to be ***direct, long-term, negative, imperceptible*** and ***not significant***.

10.6 MITIGATION MEASURES (AMELIORATIVE, REMEDIAL OR REDUCTIVE MEASURES)

10.6.1 Proposed Development

10.6.1.1 Construction Stage

The proposed development has been assessed as having at most a high risk of dust soiling impacts and a low risk of dust related human health impacts and a medium risk of dust-related ecological impacts during the construction phase as a result of demolition, earthworks, construction and trackout activities (see Section 10.5.1.1.1). Therefore, the following dust mitigation measures shall be implemented during the construction phase of the proposed development. These measures are appropriate for sites with a high risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC (2018), DLRCC (2022)), the UK (IAQM (2024), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the overall Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before works commence on site. Community engagement includes explaining the nature and duration of the works to local residents and businesses.
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.

Site Management

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. Dry and windy conditions are favourable to dust suspension therefore mitigations must be implemented if undertaking dust generating activities during these weather conditions.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out

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.
- 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.

- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.

Operating Vehicles / 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 15 kph 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

- Avoid bonfires and burning of waste materials.

Measures Specific to Demolition

- Prior to demolition blocks should be soft stripped inside buildings (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- During the demolition process, water suppression should be used, preferably with a hand-held spray. Only the use of cutting, grinding or sawing equipment fitted or used in conjunction with a suitable dust suppression technique such as water sprays/local extraction should be used.
- Drop heights from conveyors, loading shovels, hoppers and other loading equipment should be minimised, if necessary fine water sprays should be employed.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.

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 practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- 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 power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Trackout

- A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles.
- 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.
- Access gates to be located at least 10 m from receptors where possible.

Monitoring

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

10.6.1.2 Operational Stage

No site-specific mitigation measures are proposed for the operational phase as impacts are predicted to be not significant.

10.6.2 Cumulative

There are no specific mitigation measures proposed for cumulative developments.

10.7 RESIDUAL IMPACT OF THE PROPOSED DEVELOPMENT

10.7.1 Proposed Development

10.7.1.1 Construction Stage

In order to minimise dust emissions during construction, a series of mitigation measures have been prepared as outlined in Section 10.6.1.1. Provided the dust minimisation measures are adhered to, the predicted residual air quality impacts during the construction phase are ***short-term, direct, negative, localised*** and ***not significant***.

Best practice mitigation measures are proposed for the construction phase of the proposed development, 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 (set out in Directive 2008/50/EC), which are based on the protection of human health (see Table 10.1). Therefore, the predicted residual, dust-related, human health impact of the construction phase of the proposed development is ***short-term, direct, negative, localised*** and ***not significant***.

10.7.1.2 Operational Stage

Dispersion modelling of traffic emissions at sensitive receptors in proximity to impacted road links during the operational phase indicate pollutant emissions will be in compliance with the TII assessment criteria which is based on the impacts in the opening year. Section 10.5.1.3.1 determined that the impact to air quality as a result of increased traffic volumes during the operational phase of the proposed development will be ***localised, direct, long-term, negative*** and ***imperceptible*** for the opening year, which is overall ***not significant*** in EIA terms. However, Ireland will need to develop measures to ensure continuing improvements in air quality in future years in order to meet the objectives of the Clean Air Strategy for Ireland (Government of Ireland, 2023) and to ensure the ambient air quality limit values set out in Directive (EU) 2024/2881 are achieved.

With respect to ecological impacts due to operational phase traffic, there is an overall negative, slight and long-term effect which is not significant in EIA terms.

10.7.1.3 Worst Case Impact

In terms of construction phase impacts, worst-case assumptions regarding volumes of excavation materials and number of vehicle movements have been used in order to determine the highest level of mitigation required in relation to potential dust impacts (see Section 10.6.1.1).

Worst-case traffic data was used in the assessment of construction and operational phase impacts. In addition, conservative background concentrations were used in order to ensure a robust assessment. Thus, the predicted results of the construction and operational stage assessment are worst-case, and the significance of effects is most likely overestimated.

10.7.2 Cumulative

10.7.2.1 Construction Phase

According to the IAQM guidance (2024), if the construction phase of the proposed development coincides with the construction phase of any other permitted projects within 500 m of the site, there is a possibility of cumulative dust impacts occurring at any nearby sensitive receptors. Should simultaneous construction phases occur, it would lead to cumulative dust soiling and dust-related impacts on human health, specifically localised to the works area associated with the proposed works.

As discussed in Section 0 a review of the planned and permitted projects within the vicinity of the site was undertaken in order to identify developments with the potential for cumulative construction phase impacts. The assessment has concluded that as the proposed development has a high risk of dust impacts. However, provided the dust mitigation measures outlined in Section 10.6.1.1 are

applied during the construction phase this will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the proposed development and the cumulative developments are deemed ***short-term, direct, negative*** and ***slight*** which is overall **not significant**.

10.7.2.2 Operational Phase

There is the potential for cumulative impacts to air quality during the operational phase as a result of traffic associated with other existing and permitted developments within the area. The traffic data provided for the operational stage air quality assessment included cumulative traffic associated with existing and permitted developments in the wider area as required (see Traffic Impact Assessment and Chapter 13 for further details on specific developments). The cumulative operational phase impact is assessed within Section 10.5.1.3.1 and was found to have at most neutral increases in pollutant concentrations as per the TII criteria (Table 10.3). The cumulative operational stage impact is ***long-term, localised, direct, negative, imperceptible*** and ***not significant***.

10.7.2.3 Worst Case Impact

The worst-case impact for the proposed development discussed in Section 10.7.1.3 is also applicable to the cumulative scenario.

10.8 MONITORING

10.8.1 Proposed Development

10.8.1.1 Construction Stage

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

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- 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. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff method 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).

10.8.1.2 Operational Stage

There is no monitoring recommended for the operational phase of the development as impacts to air quality are predicted to be imperceptible.

10.8.2 Cumulative

There are no monitoring requirements developed as part of this assessment for cumulative developments. Permitted and proposed developments will need to comply with the planning

conditions set out in the grant of planning which will aim to ensure there are no significant environmental impacts.

10.9 REINSTATEMENT

Not applicable to air quality

10.10 DIFFICULTIES ENCOUNTERED

There were no difficulties encountered in compiling the air quality assessment.