Chapter 12
Air Quality

CONTENTS

12. AIR QUALITY

12.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the DART + Coastal North project hereafter referred to as the 'proposed development' on air quality during the Construction and Operational Phases. This chapter describes and assesses the likely direct and indirect significant effects of the proposed development and within a wider study area in the vicinity of the proposed development.

This Chapter should be read in conjunction with the following Chapters and supporting appendices, which present related impacts arising from the proposed development and proposed mitigation measures to ameliorate the potential impacts:

- Chapter 4 – Description of the Proposed Development;
- Chapter 5 – Construction Strategy;
- Chapter 6 – Traffic and Transportation;
- Chapter 8 – Biodiversity;
- Chapter 13 – Climate; and
- Chapter 23 – Human Health.

This chapter identities, describes and assesses the likely direct, indirect, secondary and cumulative significant impacts of the proposed development on air quality. The assessment is based on a reasonable worst-case scenario with respect to potential air quality impacts arising from the proposed development as described in Chapter 4 and 5 of this EIAR. The description of the proposed development is based on the design prepared to inform the Railway Order application stage of the project and to allow for a robust assessment as part of the Environmental Impact Assessment process.

A reasonable worst-case scenario describes the most significant potential environmental impacts arising from the proposed development based on the project information available at this stage of the project, advised by an experienced and competent project design team. In the event that it is required to make assumptions as the basis of the assessment presented here, these assumptions are based on advice from competent project designers and are clearly outlined within the chapter.

The proposed development consists of works to approximately 50km of the existing railway line from Dublin City Centre to Drogheda, including the Howth Branch, enabling an increase in capacity and frequency of service. It includes the extension of electrification of the line for approximately 37km, from Malahide to Drogheda, as well as re-signalling works. The proposed development, therefore, will convert journeys that currently have tailpipe emissions from diesel train engines to an electrified service, and will provide increased capacity.

The burning of fossil fuels via diesel engines creates air quality emissions which can impact nearby sensitive human and ecological receptors. The proposed development is designed to attract users to move away from the private car and instead use public transport. It boosts interconnections with other major proposed public infrastructure projects such as BusConnects, Luas expansions, other DART+ Programme projects and MetroLink.

These interconnections aim to aid in achieving the Climate Action Plan (CAP 2024) commitments, including a 20% reduction in total vehicle kilometres, a reduction in fuel usage, and significant increases to sustainable transport trips and modal share. CAP 2024 implements the carbon budgets and sectoral emission ceilings and sets out a roadmap for taking decisive action to halve our emissions by 2030 and reach net zero no later than 2050, as committed to in the Programme for Government. While the CAP focuses on reductions in greenhouse gas emissions, the knock-on impact on the increased public transport and active travel and diversion from fossil fuel-based transport will aid with the improvement of localised air quality in the city.

During the Construction Phase, the air quality impact of the redistribution of local road traffic and additional construction vehicles will also be assessed using the same methodology as the Operational Phase. In addition, potential emissions of construction related dust due to works will be assessed.

The air quality assessment conducted for the Operational Phase of the proposed development focuses on the change in distribution of road vehicles which occurs due to the closure of road level crossings, the change of rail stock and frequency of service, and the potential impact of these changes on local air quality. Electrified rail stock will have a beneficial effect on local, regional and national emissions compared to the diesel alternative.

The Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII 2022) were considered when assessing the likelihood and significance of effects.

The closure of one level crossing (level crossing reference number XB001 at Malahide estuary south of Donabate) is proposed which would result in the closure of an agricultural (user worked) crossing at this location. Given that this is a user worked level crossing to provide access across lands, this will have no impact on road traffic redistribution and Operational Phase traffic emissions are not considered further.

The assessment methodology has been derived with reference to the most appropriate guidance documents relating to air quality which are set out in the following sections of this Chapter. An overview of the methodology undertaken for the air quality impact assessment is outlined below:

- A review of published baseline air quality with a particular focus on NO_2, PM_{10} and $PM_{2.5}$ concentrations to characterise the baseline environment;
- A review of the most applicable guidelines for the assessment of air quality to define the significance criteria for the Construction and Operational Phases of the proposed development;
- Predictive calculations to assess the potential regional air quality impacts associated with the proposed electrification of the line and the change in train schedules during the Operational Phase;
- Predictive quantification and impact assessments relating to the likely Construction Phase dust impacts of the proposed development including mitigation measures which are provided to ensure no residual dust impacts;

- Predictive calculations to assess the potential air quality impacts associated with Construction and Operational Phases road traffic movements which occur due to the proposed development, for the Operational Phase; and
- Review of any other potential minor emission sources.

This chapter has assessed the potential effects on air quality arising from the Proposed Development during the Construction and Operational Phases based on the draft Railway Order, Chapter 4 (Description of Proposed Development) and Chapter 5 (Construction Strategy).

12.2 Legislation, Policy and Guidance

12.2.1 Legislation

The Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022b) were considered and consulted in the preparation of this Chapter.

This assessment has been undertaken in accordance inter alia with EU Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU ("the EIA Directive"), the Transport (Railway Infrastructure) Act 2001 (as amended and substituted) ("the 2001 Act") and the European Union (Railway Orders) (Environmental Impact Assessment) (Amendment) Regulations 2021 (S.I. No. 743/2021) which gives further effect to transposition of the EIA Directive by amending the 2001 Act.

The statutory ambient air quality standards in Ireland are outlined in the Ambient Air Quality Standards Regulations (S.I. No. 739 of 2022) ("the Air Quality Regulations"), which incorporate the ambient air quality limits set out in 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 (as amended by Commission Directive (EU) 2015/1480) ("the CAFE Directive"), for a range of air pollutants. The statutory ambient air quality guidelines are discussed in greater detail in Section 12.2.1.1.

12.2.1.1 Ambient Air Quality Standards/Limits Values

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. The applicable legal standards in Ireland are outlined in the Air Quality Regulations, which transpose the CAFE Directive into Irish law. The Air Quality Regulations set limit values for the pollutants nitrogen dioxide (NO_2) and nitrogen oxides (NO_X), particulate matter (PM) with an aerodynamic diameter of less than 10 microns (PM_{10}), PM with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$), lead (Pb), sulphur dioxide (SO_2), benzene and carbon monoxide (CO) (see Table 12-1).

Table 12-1 Air Quality Regulations (based on the CAFE Directive)

Pollutant	Regulation*	Limit Type	Value**
NO_2	S.I. 739 of 2022	Hourly limit for protection of human health – not to be exceeded more than 18 times / year	200µg/m^3 NO_2
		Annual limit for protection of human health	40µg/m^3 NO_2

Pollutant	Regulation*	Limit Type	Value**
Nitrogen Oxides (NO + NO_2)		Critical limit for the protection of vegetation and natural ecosystems	30µg/m^3 NO + NO_2
Lead	S.I. 739 of 2022	Annual limit for protection of human health	0.5µg/m^3
SO_2	S.I. 739 of 2022	Hourly limit for protection of human health – not to be exceeded more than 24 times / year	350µg/m^3
		Daily limit for protection of human health – not to be exceeded more than three times / year	125µg/m^3
		Critical limit for the protection of vegetation and natural ecosystems (calendar year and winter)	20µg/m^3
PM (as PM_{10})	S.I. 739 of 2022	24-hour limit for protection of human health – not to be exceeded more than 35 times / year	50µg/m^3
		Annual limit for protection of human health	40µg/m^3
PM (as $PM_{2.5}$)	S.I. 739 of 2022	Annual limit for protection of human health	25µg/m^3
Benzene	S.I. 739 of 2022	Annual limit for protection of human health	5µg/m^3
CO	S.I. 739 of 2022	8-hour limit (on a rolling basis) for protection of human health	10mg/m^3

* CAFE Directive replaced the previous Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management and daughter directives, Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air and Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air

** µg/m^3 (micrograms per cubic metre); mg/m^3 (milligrams per cubic metre)

The WHO Global Air Quality Guidelines (WHO 2021) values relating to NO_2, PM_{10} and $PM_{2.5}$ are shown in Table 12-2. The WHO Air Quality Guideline values are more stringent than the European Union (EU) statutory limit values for NO_2, PM_{10} and $PM_{2.5}$.

In April 2023, the Government of Ireland published the new National Clean Air Strategy, a strategic policy framework to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target IT3 by 2026, IT4 targets by 2030 and the final targets by 2040 (shown in Table 12-2). The strategy 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". Ireland will revise its air quality legislation in line with the proposed EU revisions to the CAFE Directive, which will set interim 2030 air quality standards and align the EU more closely with the WHO targets.

Table 12-2 WHO Air Quality Guidelines Levels (WHO 2021)

Pollutant	Averaging Time		Interim Targets (µg/m3)			Final Target (µg/m3)
		IT1	IT2	IT3	IT4	AQG Level
NO_2	24-hour limit for protection of human health	120	50	-	-	25
	Annual limit for protection of human health	40	30	20	-	10
PM (as PM_{10})	24-hour limit for protection of human health	150	100	75	50	45
	Annual limit for protection of human health	70	50	30	20	15
PM (as $PM_{2.5}$)	24-hour limit for protection of human health	75	50	37.5	25	15
	Annual limit for protection of human health	35	25	15	10	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. Dublin City Council (DCC) has published a guidance document titled Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition (DCC 2018). However, this guidance does not specify a guideline value.

The Verein Deutscher Ingenieure (VDI) German Technical Instructions on Air Quality Control – TA Luft standard for dust deposition (VDI 2002) (non-hazardous dust) sets a maximum permissible emission level for dust deposition of 350mg/(m2day) averaged over a one-year period at any receptors outside the site boundary. Recommendations from the Quarries and Ancillary Activities, Guidelines for Planning Authorities (Government of Ireland, 2004) apply the Bergerhoff limit of 350mg/(m2day) measured over monitoring periods of between 28 - 32 days which are then averaged over a one-year period to the site boundary of quarries. This guidance value is applied to dust impacts from the construction of the proposed development.

The appropriate limits for the assessment of air quality impacts of the proposed development are those outlined in the Air Quality Regulations, which transposes the CAFE Directive into Irish law.

12.2.2 Policy

12.2.2.1 National Air Emission Targets

Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC ("the National Emissions Reduction Directive") was

published in December 2016. The National Emissions Reduction Directive is given effect in Irish law by the European Union (National Emission Ceilings) Regulations 2018 (S.I. 232 of 2018).

The National Emissions Reduction Directive applied the limits set out in Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants ("the National Emission Ceiling Directive") until 2020 and established new national emission reduction commitments which are applicable from 2020 and 2030 for SO_2, NO_x, non-methane volatile organic compounds (NMVOC), ammonia (NH_3), $PM_{2.5}$ and methane (CH_4). In relation to Ireland, the 2020 to 2029 emission targets are 25kt (kilotonnes) for SO_2 (65% on 2005 levels), 65kt for NO_X (49% reduction on 2005 levels), 43kt for VOCs (25% reduction on 2005 levels), 108kt for NH_3 (1% reduction on 2005 levels) and 10kt for $PM_{2.5}$ (18% reduction on 2005 levels) as shown in Table 12-2. In relation to 2030, Ireland's emission targets are 85% below 2005 levels for SO_2, 69% reduction for NO_x, 32% reduction for VOCs, 5% reduction for NH_3 and 41% reduction for $PM_{2.5}$, also shown in Table 12-3.

Table 12-3 National Air Emission Target (Ireland Air Pollutant Emissions 2020 to 2030)

Pollutant	2020 to 2029 Reduction Commitments (kt) (and % Reduction Compared to 2005 Levels)	2030 Reduction Commitments (kt) (and % Reduction Compared to 2005 Levels)
SO2	25.6	11.0
	-65%	-85%
NOX	66.8	40.6
	-49%	-69%
NMVOC	56.3	51.1
	-25%	-32%
NH3	112.1	107.5
	-1%	-5%
PM2.5	15.6	11.2
	-18%	-41%

12.2.2.2 Regional Policy

The Dublin Air Quality Plan 2021 (Air Quality Plan to Improve Nitrogen Dioxide Levels in Dublin Region) (DCC 2021) was prepared to *"address reducing nitrogen dioxide emissions from transport in the Dublin region*" and outlines a range of measures and policies which will help to reduce ambient levels of NO_2.

As a result of an exceedance of the annual mean NO_2 ambient air quality limit value at the St John's Road West monitoring station in 2019 (EPA, 2020a), an Air Quality Action Plan by Dublin Local Authorities in conjunction with the EPA was legally required in 2021. The actions plan was submitted to the European Commission for analysis and approval.

The plan was subject to public consultation, which gave interested members of the public the opportunity to share their views and input to the plan and it was issued to the Minister for the Environment and the EU Commission at the end of 2021. The plan sets out 14 broad measures and a number of associated actions to address the exceedance of the nitrogen dioxide annual limit value.

12.2.3 Guidance

In addition to the specific statutory air quality standards, the assessment has referred to national guidelines, where available, in addition to international standards and guidelines relating to the assessment of ambient air quality impacts from road schemes.

These are summarised below:

- Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction (IAQM, 2024);
- A guide to the assessment of air quality impacts on designated nature conservation sites (IAQM, 2020);
- Transport Infrastructure Ireland Air Quality Assessment of Proposed National Roads – Standard (TII 2022);
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes (TII, 2009)
- United Kingdom (UK) Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management Policy Guidance (PG22) (hereafter referred to as LAQM (PG22)) (DEFRA 2022a);
- Part IV of the Environment Act 1995: Local Air Quality Management Technical Guidance (TG22) (hereafter referred to as LAQM (TG22)) (DEFRA 2022b); and
- WHO Global Air Quality Guidelines: Particulate Matter (PM2.5 and PM10), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide (WHO 2021).

12.3 Methodology

12.3.1 Study Area

The proposed development consists of infrastructural works which will enable the increase in capacity and frequency of DART service between Dublin City Centre and Drogheda, including the Howth Branch. It also includes the extension of the electrification of the existing railway line, over a distance of approximately 37km from Malahide to Drogheda. The total length of the proposed development is approximately 50 kilometres (Km).

The proposed development has been divided into five geographical zones (A-E) from south to north, which are detailed in Chapter 4 (Description of the Proposed Development) and is summarised below.

- Zone A – North of Connolly Station to Howth Junction & Donaghmede Station;
- Zone B – Howth Junction & Donaghmede Station to Malahide Viaduct;
- Zone C – Malahide Viaduct to south of Gormanston Station (Fingal border);
- Zone D – South of Gormanston Station (Fingal border) to Louth/Meath border; and
- Zone E – Drogheda Station and surrounds (from boundary of Louth approximately 1.5km southeast of Drogheda Station).

12.3.1.1 Construction Phase Study Area

During the Construction Phase, the focus is on air quality sensitive receptors adjacent to dust generating activities or roads impacted due to construction activities. For construction dust, the

Institute of Air Quality Management (IAQM) 2014 guidance (IAQM, 2014) states that a dust assessment is typically required where there is:

- A 'human receptor' within:
  - 350 metres of the boundary of the site; or
  - 50 metres of the route(s) used by construction vehicles on the public highway, up to 500 metres from the site entrance(s).
- An 'ecological receptor' within:
  - 50 metres of the boundary of the site; or
  - 50 metres of the route(s) used by construction vehicles on the public highway, up to 500 metres from the site entrance(s).

To ensure a robust assessment, the zone of influence (ZoI) for the Construction Phase dust impacts is set at 350 metres from all works areas. In addition, emissions from construction vehicles accessing the site from public roads and alterations to traffic patterns due to road closures/traffic diversions are considered. The study area is up to 200m from roads that experience a significant change in traffic numbers, road alignment or speed band, as per the TII Standard. The assessment study area is focused on sensitive human receptors and designated ecological sites in proximity to the impacted routes.

12.3.1.2 Operational Phase Study Area

The DART+ Coastal North Project will upgrade the rail line to an electrified system and as a result is not predicted to have significant adverse direct air quality emissions. By transitioning from fossil fuel to electrical traction local air emissions are beneficially impacted along the rail line. The proposed development will also increase passenger carrying capacity of the DART which has the potential for indirect positive impacts by improving the public transport offering and assisting in reducing private car mode of transport reliance. The study area due to Operational Phase rail emissions is at a national level as the changes are compared to Ireland's emissions ceilings.

12.3.2 Survey Methodology

12.3.2.1 Desk Study

A desk-based air quality assessment was carried out in accordance with the guidelines described in the TII Standard (TII, 2022). The TII Standard states that the need to undertake scheme specific air quality monitoring depends upon the availability of existing air quality data and the complexity of the proposed scheme. As the study is well served by EPA monitoring data and the traffic redistribution due to the proposed development is expected to be minor, no site-specific monitoring was carried out.

Air quality monitoring programmes have been undertaken in recent years by the EPA and Local Authorities in the Dublin region. The most recent annual report at the time of assessment, Air Quality in Ireland 2021 (EPA 2022a), details the range and scope of monitoring undertaken throughout Ireland.

The Urban Environmental Indicators: Nitrogen dioxide levels in Dublin report (EPA 2020a) assessed spatial variations in ambient air quality in Dublin using diffusion tube sampling and detailed air dispersion modelling. The study found that there were potential exceedances of the ambient air

quality standards for NO2 close to busy City Centre Road junctions, near the Dublin Port Tunnel entrance and exit and along the M50 Motorway. The baseline air quality data collected through the desk study is detailed in Section 12.4.2.

A review of potentially sensitive ecological areas has also been conducted using the National Parks and Wildlife Service (NPWS) online mapping services. This is further discussed in Section 12.5.1.

12.3.3 Consultation

Consultation is important to ensure that a sufficiently robust environmental baseline is established for the proposed development and its surroundings with full details of the consultations detailed in Chapter 1 (Introduction) and Chapter 3 (Alternatives) in Volume 2 of this EIAR. Consultation helps to identify specific concerns and issues relating to air quality early in the process. Public consultation was conducted as part of the early-stage design of the proposed development. The following organisations were also consulted:

- Dublin City Council;
- Fingal County Council;
- Louth County Council;
- Meath County Council;
- Development Applications Unit (NPWS); and
- Environmental Protection Agency (EPA).

12.3.4 Appraisal Method for the Assessment of Impacts

12.3.4.1 Air Quality Impact Assessment from Traffic Emission in Construction and Operational Phases

The air quality assessment has been carried out in accordance with the Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2022b) and using the methodology outlined in the TII Air Quality Standard (TII 2022).

The TII standard advises using a tool such as TII REM or detailed dispersion modelling software such as ADMS-Roads (CERC, 2022). The decision on the most appropriate modelling software to use is based on existing air quality and the complexity of the proposed scheme. A detailed level assessment is to be undertaken where existing concentrations are within 90% of the threshold. For all other areas an assessment using the TII REM can be undertaken.

Based upon traffic data, areas for assessment can be screened against the following criteria. The screening criteria are based on the changes between the Do Something (DS) traffic (i.e., with construction/operation) compared to the Do Minimum (DM) traffic:

- Road alignment will change by 5 m or more; or
- Annual average daily traffic (AADT) flows will change by 1,000 or more; or
- Heavy duty vehicle (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more; or
- Daily average speed change by 10 kph or more; or

- Peak hour speed will change by 20 kph or more.

If the criteria are not met, then a quantitative assessment of traffic can be scoped out and the effects are considered to be not significant. If the criteria are met a local Air Quality Assessment (AQA) is required.

12.3.4.2 Ecological Assessment

In accordance with the TII Standard (TII, 2022), any assessment of air quality impacts on sensitive designated habitats is to be discussed and agreed with the project biodiversity practitioner. The standard advises the use of TII REM or detailed modelling, to predict concentrations of NOx.

It also advises that concentrations of ammonia be predicted. Following this, nitrogen (N) deposition is to be calculated and evaluated.

There are 19 designated sites and 1 candidate site within 2km of the boundary of the proposed development which are:

- Malahide Estuary SPA (Site Code 004025);
- River Nanny Estuary and Shore SPA (Site Code 004158);
- Rogerstown Estuary SPA (Site Code 04015);
- North Dublin Bay SPA (Site Code 004006);
- Baldoyle Bay SPA (Site Code 004016);
- South Dublin Bay and River Tolka Estuary SPA (Site Code 004024);
- Ireland's Eye SPA (Site Code 004117);
- Baldoyle Bay SAC (Site Code 000199);
- North Dublin Bay SAC (Site Code 000206;)
- Rogerstown Estuary SAC (Site Code 000208);
- Malahide Estuary SAC (Site Code 000205);
- River Boyne And River Blackwater SAC (Site Code 002299;)
- Malahide Estuary pNHA (Site Code 00205);
- Sluice River Marsh pNHA (Site Code 001763);
- Laytown Dunes/Nanny Estuary pNHA (Site Code 000554);
- Rogerstown Estuary pNHA (Site Code 000208);
- Baldoyle Bay pNHA (Site Code 000199);
- North Dublin Bay pNHA (Site Code 00206); and
- Howth Head pNHA (Site Code 00202) and
- North-west Irish Sea cSPA (Candidate) (Site Code 004236).

The Air Quality Regulations outline an annual critical level for NO_X for the protection of vegetation and natural ecosystems in general. The CAFE Directive 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 United Nations Economic Commission for Europe (UNECE) Critical Loads for Nitrogen has defined a *'Critical Load'* 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 2022).

The guidance states that where the predicted environmental concentration (PEC) is less than 70% of the long-term critical level / load, the process contribution (PC) is likely to be insignificant.

The TII Ecological Guidelines outline a methodology to derive the road contribution to dry deposition and thereafter to compare with the published critical loads for the appropriate habitat.

The UNECE critical loads were updated in the 2022 Draft Review and revision of empirical critical loads of nitrogen for Europe (UNECE 2022). The affected ecological sites relevant to this assessment are North Bull Island SPA and North Dublin Bay SAC as these sites are located within 200m of affected construction routes. Critical loads of 20kg(N)/ha/yr to 30kg(N)/ha/yr (kilogrammes of nitrogen per hectare per year) have been used in the assessment as they apply to marine habitats.

In order to calculate the nitrogen deposition, the NO_2 / NO_X concentration determined through modelling including the background concentration must be converted firstly into a dry deposition flux using the equation below which is taken from UK Environment Agency (UKEA) publication 'AGTAG06 – Technical Guidance On Detailed Modelling Approach For An Appropriate Assessment For Emissions To Air' (UKEA 2014):

Dry deposition flux (µg m^{-2} s^{-1}) = ground-level concentration (µg/m^3) x deposition velocity (m/s)

Deposition velocities are provided in the IAQM Guidance document (IAQM 2020) for NO_2 in grassland and forestry. Once the dry deposition flux (µg m^{-2} s^{-1}) is calculated it must then be converted to nitrogen equivalent acidification flux (k_{eq} ha^{-1} $year^{-1}$) for comparison with critical loads.

In order to convert the dry deposition flux from units of µg m^{-2} s^{-1} to units of kg ha^{-1} $year^{-1}$ the dry deposition flux is multiplied by the conversion factors. For NO_2 this factor is 96. In order to convert kg ha^{-1} $year^{-1}$ to k_{eq} ha^{-1} $year^{-1}$, where k_{eq} is a unit of equivalents (a measure of how acidifying the chemical species can be), the deposition flux in units of kg ha^{-1} $year^{-1}$ is multiplied by the conversion factor (taken from AQTAG06 (UKEA 2014)). The conversion factor for nitrogen is 0.0714. LA 105 Air Quality (UKHA 2019) states that if the change in N deposition is greater than 0.4kg N/ha/yr or 1% of the critical level / load consultation with the ecologist should occur.

Table 12-4 Significance of effect at Sensitive Designated Habitats (TII 2022)

Description of results	Significance
Total N deposition and acid deposition are more than 1% of the critical load.	Discuss further with biodiversity practitioners (see below).
The total N deposition and acid deposition are less than 1% of the critical load.	Not significant.

12.3.4.3 Construction Dust Impact Assessment

The DART+ Coastal North project will be constructed along the existing operational railway and therefore this will reduce the potential for dust emissions compared to a new major infrastructure

project which would require significantly greater construction works.
The TII Standard advises the application of IAQM Guidance (IAQM, 2014) for the assessment of Construction Phase dust.

12.3.4.3.1 Demolition

The dust emission magnitude from demolition can be classified as small, medium or large based on the definitions from the IAQM Guidance (IAQM, 2014) as transcribed below:

- **Large:** Total building volume > 50,000m^3, potentially dusty construction material (e.g., concrete), on-site crushing and screening, demolition activities > 20m above ground level;
- **Medium:** Total building volume 20,000m^3 to 50,000m^3, potentially dusty construction material, demolition activities 10m to 20m above ground level; and
- **Small:** Total building volume < 20,000m^3, construction material with low potential for dust release (e.g., metal cladding or timber), demolition activities < 10m above ground, demolition during wetter months.

Table 12-5 Risk of Dust Impacts – Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

12.3.4.3.2 Earthworks

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

- **Large**: Total site area > 10,000 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 > 8 m in height, total material moved >100,000 tonnes;
- **Medium**: Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g., silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8 m in height, total material moved 20,000 – 100,000 tonnes; and
- **Small**: Total site area < 2,500 m^2, soil type with large grain size (e.g., sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

Table 12-6 Risk of Dust Impacts – Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

12.3.4.3.3 Construction

Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large**: Total building volume > 100,000 m^3, on-site concrete batching, sandblasting;
- **Medium**: Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g., concrete), on-site concrete batching; and
- **Small**: Total building volume < 25,000 m^3, construction material with low potential for dust release (e.g., metal cladding or timber).

Table 12-7 Risk of Dust Impacts – Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

12.3.4.3.4 Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large**: > 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;
- **Medium**: 10 - 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; and
- **Small**: < 10 HDV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

Table 12-8 Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Low	Low Risk	Low Risk	Negligible

12.3.5 Impact Assessment Criteria

12.3.5.1 Traffic Impacts in Construction and Operational Phases

Significance criteria have been adopted from the TII Standard and are presented in Table 12-9. These criteria provide a basis for assessing the level of effects due to the additional traffic present during construction.

Table 12-9 Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations (TII 2022)

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Standard Value (AQSV)			
	1	2-5	6-10	>10
75% or less of AQSV	Neutral	Neutral	Slight	Moderate
76 – 94% of AQSV	Neutral	Slight	Moderate	Moderate
95- 102% of AQSV	Slight	Moderate	Moderate	Substantial
103 – 109% of AQSV	Moderate	Moderate	Substantial	Substantial
110% or more of AQSV	Moderate	Substantial	Substantial	Substantial

12.3.5.2 Construction Dust

To determine the level of dust mitigation required during the Construction Phase, the potential dust emission magnitude for each dust generating activity needs to be considered, along with the sensitivity of the area which is established in Section 12.4.3. These major dust generating activities are divided into four types (where relevant) to reflect their different potential impacts as outlined below:

- Demolition - Any activity involved with the removal of an existing structure (or structures).
- Earthworks - The processes of soil-stripping, ground-levelling, excavation and landscaping.
- Construction - Any activity involved with the provision of a new structure (or structures), its modification or refurbishment.
- Trackout - The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

An assessment of the sensitivity of the proposed development is completed in Section 12.4.3 with respect to the criteria shown in Table 12-15 to Table 12-17.

12.3.5.3 National Direct Emissions from Rail Traffic during the Operational Phase

Emissions data for diesel units are provided using the European Monitoring and Evaluation Programme (EMEP) and European Environment Agency (EEA) 2019 Air Pollutant Emission Inventory Guidebook for Railways (EMEP and EEA 2019). The guidebook is part of a series published which are designed to facilitate reporting of emission inventories by countries to the UNECE Convention on Long-range Transboundary Air Pollution and the EU National Emission Ceilings Directive.

Emissions from diesel engines can be broken in three categories:

- Shunting locomotives;
- Rail-cars; and
- Line-haul locomotives.

These are presented in Table 12-10.

Table 12-10 Emission Factors for Rail

Tier 2 Shunting Locomotives			
Pollutant	**Kg/Fuel Tonne Note 1**	**Kg Pollutant/Km Note 2**	**g Pollutant/Km**
NO_x	54.4	0.031	30.50
PM_{10}	2.1	0.0012	1.18
$PM_{2.5}$	2	0.0011	1.12
SO_2 (Tier 1 only) Note 3	0.4	0.0002	0.22
Tier 2 Rail Cars			
Pollutant	**Kg/Fuel Tonne Note 1**	**Kg Pollutant/Km Note 2**	**g Pollutant/Km**
NO_x	39.9	0.022	22.37
PM_{10}	1.1	0.00062	0.62
$PM_{2.5}$	1	0.00056	0.56
SO_2	N/A	N/A	N/A
Tier 2 Line-Haul Locomotives			
Pollutant	**Kg/Fuel Tonne Note 1**	**Kg Pollutant/Km Note 2**	**g Pollutant/Km**
NO_x	63	0.035	35.32
PM_{10}	1.2	0.00067	0.67
$PM_{2.5}$	1.1	0.00062	0.62
SO_2	N/A	N/A	N/A

Note 1: Emissions factors from Air Pollutant Emission Inventory Guidebook for Railways (EMEP and EEA 2019)

Note 2: Emission factors based on Air Pollutant Emission Inventory Guidebook for Railways (EMEP and EEA 2019) and Iarnród Éireann average Diesel usage.

Note 3:IE confirmed sulphur content is less than 0.2%. Only Tier one emissions are available for SO2 as per Air Pollutant Emission Inventory Guidebook for Railways (EMEP and EEA 2019).

The approach for the Diesel Multiple Units (DMUs), referred to as Tier 2 in the Guidance (EMEP and EEA 2019), is based on apportioning the total fuel used by railways to that used by different locomotive technology types as the measure of activity. It assumes that the fuel can be apportioned for example using statistics on the number of locomotives, categorised by type, and their average usage, e.g. from locomotive maintenance records. The DMU carriage numbers are assumed to be the same in the DM and DS scenarios. Electrical Multiple Units (EMUs) are assumed to be 8 carriages in the DM scenario and 10 in the DS scenario. SO_2 is the exception to the use of Tier 2 emissions as only Tier 1 factors are available (EMEP and EEA 2019). As per the guidance (EMEP and EEA 2019) the SO_2 factor is calculated using the sulphur content of the fuel utilised. IÉ uses an ultra-low sulphur diesel with less than 0.2% sulphur (EN590).

Emissions related to the electricity produced are discussed in Section 12.3.5.4.

12.3.5.4 National Indirect Emissions from Energy Use during the Operational Phase

Electric multiple units (EMUs) are powered by electricity generated at stationary power plants as well as other sources. As the rail stock moves from diesel multiple units ("DMUs") to EMUs the associated emissions will be emitted at the power plants generating electricity rather than through the DMU tailpipe. The emissions of pollutants generated due to the electricity power demand for the EMUs are calculated using the carbon intensity of the fuel mix used in the generation of electricity nationally.

The pollutant intensity is the amount of a specific pollutant that will be released per kilowatt hour (kWh) of energy of a given fuel. For most fossil fuels the emissions per unit is almost constant, but in the case of electricity it will depend on the fuel mix used to generate the electricity and on the efficiency of the technology employed. A figure for carbon (CO_2) is updated by the Sustainable Energy Authority of Ireland (SEAI) annually. However, no figure for other pollutants (i.e. NO_x, $PM_{2.5}$, SO_2) is provided by the SEAI or the EPA. The provisional 2020 carbon intensity figure of 295.1 gCO_2/kWh has been published on the SEAI website (SEAI 2020). For other regional pollutants of local concern (NO_x, $PM_{2.5}$, SO_2) which do not have an intensity figure linked to their usage, estimated rates of emissions per kWh can be estimated for 2019 using data produced by the EPA (2020a) and SEAI (SEAI 2020). This is done using the emissions related to energy production for those pollutants EPA (2020a) and comparing it to the total energy produced. The emission factors are shown in Table 12-11.

The 2024 Climate Action Plan (CAP) has set a national target of up to 80% of electricity demand by renewables by 2030 for the national electricity grid. Currently, roughly 40% of the national grid electricity comes from renewable sources. Increasing the proportion of renewables, which will not have any additional fossil fuel emissions associated with them, will reduce the emissions per kWh of electricity produced on the national grid. Iarnród Éireann has agreed to purchase up to 80% of its operational demand from certified low or zero carbon electricity for operations (Iarnród Éireann Climate Action Plan 2023-2030).

A Corporate Power Purchase Agreement (CPPA) is a financial contract with a renewable generator that will allow for a guaranteed source of renewable power for the operation of the proposed development in future. This will ensure that should the CAP target of 80% renewables not be achieved, the proposed development will still achieve the target within itself.

For the purposes of the assessment, it has been assumed that both the Do Minimum and Do Something have 80% renewables.

The remaining power on the national grid will be supplied by fossil fuels, the emissions of which are carefully controlled by the EPA under the Industrial Emissions Directive, which ensures that no significant impacts occur due to air quality emissions of air pollutants (including NO_2, particulates and VOCs) to nearby sensitive human or ecology receptors.

Table 12-11 Emission Factors of Regional Pollutants per kWh

Pollutant	Kg Pollutant/kWh
Estimated Emission Factors at 80% Renewables	
NO_x	0.0000324
SO_2	0.000012
$PM_{2.5}$	0.0000013
CO_2	0.10204

12.3.6 Difficulties Encountered / Limitations

No particular difficulties were encountered in the preparation of this assessment.

12.4 Receiving Environment

The following sections describe the baseline conditions in the vicinity of the proposed development based on a review of published data and onsite monitoring.

12.4.1 Meteorological Conditions

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 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds, when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ to 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 Dublin Airport meteorological station is the closest meteorological station to the proposed development. The station collects meteorological data in the correct format for the purposes of this assessment and has a data collection of greater than 90%.

Long-term hourly observations at Dublin Airport meteorological station provide an indication of the prevailing wind conditions for the region (see Diagram 12-1). Results indicate that the prevailing wind direction is from the south and west over the period 2015 to 2019.

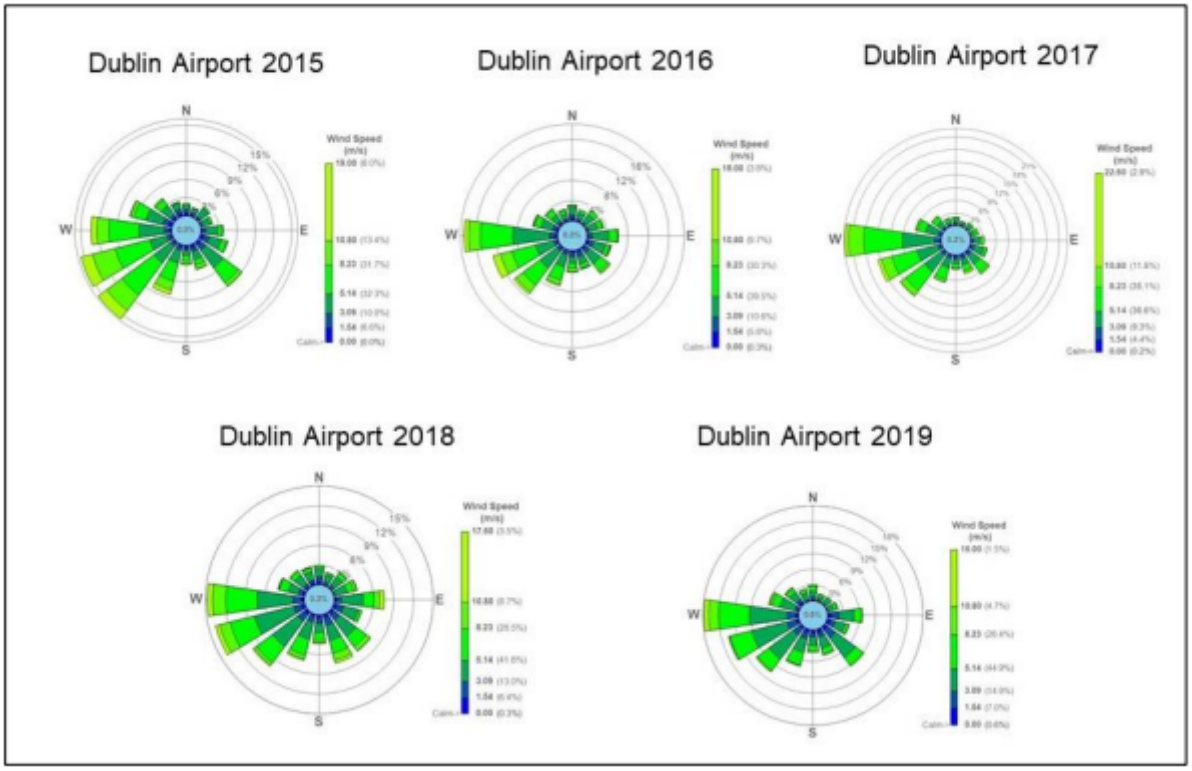

Diagram 12-1 Dublin Airport Meteorological Station Windrose 2015 to 2019 (Met Éireann 2020)

12.4.2 Baseline Ambient Air Quality

Background air quality is the air quality at a specific location when the local emissions of air quality have been subtracted from the measured air quality. Thus, a 'background' air concentration is usually representative of a wider area (such as an urban area or sub-urban area). Baseline air quality is the current air quality at a specific location including all local and non-local sources.

A desk study of the EPA air quality monitoring programmes has been undertaken. The most recent annual report at the time of the assessment, Air Quality in Ireland 2021 (EPA 2022), details the range and scope of monitoring undertaken throughout Ireland.

12.4.2.1 EPA Data

The Environmental Protection Agency (EPA) Air Quality in Ireland Reports describe the air quality zoning adopted in Ireland under the Air Quality Standards Regulations, 2022 as follows:

- Zone A (Dublin conurbation);
- Zone B (Cork conurbation);
- Zone C (24 Cities and towns); and
- Zone D (Rural Ireland: areas not in Zones A, B and C).

The proposed development site falls within Zones A, C and D for air quality zoning. Background pollutant levels from 2021, 2020, 2019, 2018 and 2017 air quality monitoring of NO_2, NO_x, $PM_{2.5}$ and PM_{10} are listed for Zone A, C and D, as provided by the EPA, and are presented in Table 12-12 to Table 12-14.

Concentrations of each pollutant recorded in Zone A, C and D are averaged to represent typical background levels. Average concentrations were obtained from all stations where 90% data capture was achieved. This is in accordance with the Air Quality Standards Regulations and Directive 2008/50/EC which specify that any site used for assessment purposes must comply with 90% data capture.

The continuous monitoring data from EPA monitoring stations in Zone A is outlined in Table 12-12 which presents a five-year maximum of background pollutant concentration values for NO_2, NO_x, $PM_{2.5}$ and PM_{10}.

Table 12-12 Annual Mean Background Pollutant Concentrations for Zone A

Year	Annual Average NO2 (µg/m³)	Annual Average PM10 (µg/m³)	Annual Average PM2.5 (µg/m³)	Annual Average NOx (µg/m³)
Limit	**40 µg/m³**	**40 µg/m³**	**25 µg/m³**	**30 µg/m³**
2018	24.8	14.1	7.6	39.0
2019	27.1	14.5	9.2	60.0
2020	17.4	13.1	7.6	39.0
2021	20.4	12.7	7.7	39.2
2022	20.3	13.5	7.7	40.7
Maximum	27.1	14.5	9.2	60

The background concentrations are within the Air Quality Standards for all pollutants in Zone A, except for NO_x which exceeded its Air Quality Standard for the protection of vegetation.

The continuous monitoring data from EPA monitoring stations in Zone C is outlined in Table 12-13 which presents a five-year maximum of background pollutant concentration values for NO_2, NO_x, $PM_{2.5}$ and PM_{10}.

Table 12-13 Annual Mean Background Pollutant Concentrations for Zone C

Year	Annual Average NO2 (µg/m³)	Annual Average PM10 (µg/m³)	Annual Average PM2.5 (µg/m³)	Annual Average NOx (µg/m³)
Limit	**40 µg/m³**	**40 µg/m³**	**25 µg/m³**	**30 µg/m³**
2018	10.3	14.0	8.3	14.7
2019	12.0	16.3	12.2	25.4
2020	11.4	14.4	9.5	21.6
2021	11.6	13.1	8.8	22.7
2022	11.9	13.3	9.5	21.6
Maximum	12	16.3	12.2	25.4

The background concentrations are well within the Air Quality Standards for all pollutants in Zone C.

The continuous monitoring data from EPA monitoring stations in Zone D is outlined in Table 12-14 which presents a five-year average of background pollutant concentration values for NO_2, NO_x, $PM_{2.5}$ and PM_{10}.

Table 12-14 Annual Mean Background Pollutant Concentrations for Zone D

Year	Annual Average NO2 (µg/m³)	Annual Average PM10 (µg/m³)	Annual Average PM2.5 (µg/m³)	Annual Average NOx (µg/m³)
Limit	40 µg/m³	40 µg/m³	25 µg/m³	30 µg/m³
2018	4.7	11.8	9.4	6.7
2019	5.7	14.3	9.3	7.8
2020	7.6	11.2	7.8	15.9
2021	7.5	11.9	8.7	14.2
2022	7.4	12.7	8.4	14.0
Maximum	7.6	14.3	9.3	15.9

The background concentrations are within the Air Quality Standards for all pollutants in Zone D.

12.4.2.2 Nitrogen deposition

In accordance with the TII Standard, background N deposition rate is obtained from the Air Pollution Information System (APIS) website (Centre for Ecology and Hydrology). These background levels are added to predicted nitrogen deposition to determine the cumulative level.

12.4.3 Existing Baseline Dust Sensitivity Assessment

The greatest potential impact on air quality during the Construction Phase is from construction dust emissions, PM_{10}/$PM_{2.5}$ emissions and the potential for nuisance dust. Dust is characterised as encompassing PM with a particle size of between 1 micron and 75 microns (1µm to 75µm). Deposition of dust typically occurs in close proximity to the source and with TII Standard (TII, 2022) defining a maximum impact area of 200m from the dust generating activity. Sensitivity to dust depends on the duration of the dust deposition, the dust generating activity, and the nature of the deposit. Therefore, a higher tolerance of dust deposition is likely to be shown if only short periods of dust deposition are expected and the dust generating activity is either expected to stop or move on.

An appraisal has been carried out to assess the risk to sensitive receptors as a result of dust soiling, health impacts and ecology impacts due to the Construction Phase in accordance with the IAQM's Guidance on the Assessment of Dust from Demolition and Construction (IAQM 2014), as advised by the TII Standard. This appraisal reviews the sensitivity of the site's location with respect to dust nuisance, human health and ecological impacts and then calculates a risk of impact using the magnitude of site activities.

Receptor sensitivity can be described as follows with respect to nuisance dust as per the IAQM guidance (IAQM 2014):

- High sensitivity receptor with respect to dust nuisance – surrounding land where:
  - Users can reasonably expect enjoyment of a high level of amenity; or
  - The appearance, aesthetics or value of their property would be diminished by soiling; and
  - The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land;
  - Examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.
- Medium sensitivity receptor with respect to dust nuisance – surrounding land where:
  - Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or
  - The appearance, aesthetics or value of their property could be diminished by soiling; or
  - The people or property would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land;
  - Indicative examples include parks and places of work.
- Low sensitivity receptor with respect to dust nuisance – surrounding land where:
  - The enjoyment of amenity would not reasonably be expected; or
  - Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or
  - There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land;
  - Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

Receptor sensitivity can be described as follows with respect to human health as per the IAQM guidance (IAQM 2014):

- High sensitivity receptor with respect to human health – surrounding land where:
  - Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day);
  - Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
- Medium sensitivity receptor with respect to human health – surrounding land where:
  - Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, relevant location would be one where individuals may be exposed for eight hours or more in a day);

- Indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.

- Low sensitivity receptor with respect to human health – surrounding land where:
  - Locations where human exposure is transient;
  - Indicative examples include public footpaths, playing fields, parks and shopping streets.

Receptor sensitivity can be described as follows with respect to ecology as per the IAQM guidance (IAQM 2014):

- High sensitivity receptor with respect to ecology – surrounding land where:
  - Locations with an international or national designation and the designated features may be affected by dust soiling;
  - Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
- Medium sensitivity receptor with respect to ecology – surrounding land where:
  - Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown;
  - Indicative example is a National Heritage Area (NHA) with dust sensitive features.
- Low sensitivity receptor with respect to ecology – surrounding land where:
  - Locations with a local designation where the features may be affected by dust deposition;
  - Indicative example is a local Nature Reserve with dust sensitive features.

Prior to assessing the impact from dust emissions, the sensitivity of the area must be established. The sensitivity of the area is determined using the headings:

- Dust Soiling Effects on People and Property;
- Human Health Impacts; and
- Ecological Impacts.

The sensitivity of the area is considered as per the criteria outlined in the IAQM Guidance (IAQM 2014) and reproduced in Table 12-15, Table 12-16 and Table 12-17.

In terms of the sensitivity of the area to dust soiling effects on people and property, the receptor sensitivity, number of receptors and their distance from the source are considered. Using these criteria as outlined in Table 12-15 the sensitivity of the area to dust soiling can be established. The sensitivity will change along the linear project with some areas more sensitive to potential dust soiling effects than others. As there are greater than 10 receptors within 20m of the rail boundary, the sensitivity of the area to dust soiling effects on people and property is considered high.

The IAQM Guidance also outlines the criteria for assessing the human health impact from PM10 emissions from construction activities based on the current annual mean PM10 concentration, receptor sensitivity and the number of receptors effected as per Table 12-16.

In addition to the track alignment there are other areas with the potential for dust emissions including temporary construction compounds, substation development/upgrade locations, depot

development/upgrade locations. Details of these construction works areas are available in Chapter 5 Construction Strategy in Volume 2 of this EIAR.

An assessment of the proposed development was completed with respect to the sensitivity criteria in Table 12-15 and Table 12-16. Where the number of receptors was not clear, conservative sensitivities were assumed.

Table 12-15 Sensitivity of the Area to Dust Soiling Effects on People and Property (IAQM 2014)

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<350
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 12-16 Sensitivity of the Area to Human Health Impacts (IAQM 2014)

Receptor Sensitivity	Annual Mean PM10 Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
High	> 32µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28µg/m^3 - 32µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24µg/m^3 - 28µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	> 32µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28µg/m^3 - 32µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24µg/m^3 - 28µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM10 Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
	< 24µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	1+	Low	Low	Low	Low	Low

Dust deposition impacts on ecology can occur due to chemical or physical effects. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Often impacts will be reversible once the works are completed and dust deposition ceases.

The proposed development will be within close proximity to the Malahide Estuary SPA, SAC and pNHA, Baldoyle Bay SPA, SAC and pNHA, Rogerstown Estuary SPA, SAC and pNHA, Sluice River Marsh pNHA, River Nanny Estuary and Shore SPA, Laytown Dunes/Nanny Estuary pNHA and North West Irish Sea cSPA which are classed as highly sensitive receptors. As shown in Table 12-17 the worst-case sensitivity of the area to ecological impacts is considered 'high' under this guidance without adequate mitigation.

An overall summary of the baseline sensitivity to dust nuisance, human health and ecological impacts is shown in Table 12-18.

Table 12-17 Sensitivity of the Area to Ecological Impacts (IAQM 2014)

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

In order to determine the level of dust mitigation required during the Construction Phase, the potential dust emission magnitude for each dust generating activity needs to be taken into account, along with the already established sensitivity of the area. These major dust generating activities are divided into four types (where relevant) to reflect their different potential impacts as outlined below:

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

Table 12-18 Summary of Sensitivity of the Area to Dust

Zone	Compound code	Location	Chainage	Nuisance Sensitivity	Human Health Sensitivity	Ecology Sensitivity
A	Rail line			High	Medium	N/A
B	Rail line			High	Medium	High (Baldoyle Bay SAC, SPA and pNHA / Sluice River Marsh pNHA / Malahide Estuary SPA, SAC and pNHA)
C	Rail line			High	Medium	High (Rogerstown Estuary SAC, SPA and pNHA)
D	Rail line			High	Medium	High (Laytown Dunes/Nanny Estuary pNHA / River Nanny Estuary and Shore SPA)
E	Rail line			High	Low	N/A
A	CC-2650	Fairview Depot (R834 Entrance car park)	2,650	Low	Low	N/A
A	CC-2700	Fairview Depot (R834 Entrance car park)	2,700	Low	Low	N/A
A	CC-3000	Fairview Depot (R807 Entrance car park)	3,100	Low	Low	N/A
B	CC-9000	Howth Junction and Donaghmede Station (Donaghmede Entrance)	9,000	Low	Low	N/A
B	CC-9050	Howth Junction and Donaghmede Station (Kilbarrack Entrance) Station	9,050	Low	Low	N/A
B	CC-9100	Howth Junction and Donaghmede Station (Central Access)	9,100	Low	Low	N/A
B	CC-9200	Howth Junction and Donaghmede Station (Baldoyle Industrial Estate) Station	9,200	Low	Low	N/A
B	CC-10600	Clongriffin Station	10,600	Low	Low	N/A
B	CC-15900E	Malahide Turnback (Strand Court)	15,900	Medium	Low	N/A

Zone	Compound code	Location	Chainage	Nuisance Sensitivity	Human Health Sensitivity	Ecology Sensitivity
B	CC-15900W	Malahide Turnback (Bissett's Strand)	15,900	Medium	Low	High (Malahide Estuary SPA, SAC and pNHA)
B	CC-16100	Malahide Turnback (Caves Strand)	16,100	Low	Low	Medium (Malahide Estuary SPA, SAC and pNHA)
B	CC-16250	Malahide Turnback (Marina Car Park)	16,250	Medium	Low	Medium (Malahide Estuary SPA, SAC and pNHA)
B	CC-16400	UBB30 Malahide Viaduct	16,400	Low	Low	High (Malahide Estuary SPA, SAC and pNHA)
C	CC-18800	Donabate Substation	18,800	Medium	Low	N/A
C	CC-19800	Donabate Station	19,800	High	Low	N/A
C	CC-23500	Rush and Lusk Station	23,500	Low	Low	N/A
C	CC-23772 (E)	Rusk & Lusk	23,772	Medium	Low	N/A
C	CC-23772 (W)	Rusk & Lusk	23,772	Low	Low	N/A
C	CC-25100	OBB44 Track Lowering	25,100	Low	Low	N/A
C	CC-25626 (E)	Tyrrelstown	25,626	Low	Low	N/A
C	CC-25626 (W)	Tyrrelstown	25,626	Low	Low	N/A
C	CC-27460 (E)	Baldongan	27,460	Low	Low	N/A
C	CC-27460 (W)	Baldongan	27,460	Low	Low	N/A
C	CC-29000	Skerries South Substation	29,000	Medium	Low	N/A
C	CC-29140 (E)	Golf Links Road	29,140	Low	Low	N/A
C	CC-29140 (W)	Golf Links Road	29,140	Medium	Low	N/A
C	CC-30200	Skerries Station	30,200	Low	Low	N/A
C	CC-32200	Skerries North Substation	32,200	Medium	Low	N/A

Zone	Compound code	Location	Chainage	Nuisance Sensitivity	Human Health Sensitivity	Ecology Sensitivity
C	CC-34400 (E)	Balbriggan	34,400	Medium	Low	N/A
C	CC-34400 (W)	Balbriggan	34,400	Low	Low	N/A
C	CC-36000	UBB56 Balbriggan Viaduct	36,000	Medium	Low	N/A
C	CC-37700	Balbriggan Substation	37,700	Low	Low	N/A
D	CC-40200	Gormanston Station	40,200	Low	Low	N/A
D	CC-41400	Gormanston Substation	41,400	Low	Low	N/A
D	CC-44390 (E)	Laytown	44,390	Medium	Low	N/A
D	CC-44390 (W)	Laytown	44,390	Low	Low	N/A
D	CC-44500	UBB72 Laytown Viaduct (South Abutment)	44,500	Medium	Low	High (River Nanny Estuary and Shore SPA)
D	CC-44600	UBB72 Laytown Viaduct (South Pier)	44,600	Low	Low	High (River Nanny Estuary and Shore SPA)
D	CC-44700	UBB72 Laytown Viaduct (North Pier)	44,700	Low	Low	High (River Nanny Estuary and Shore SPA / Laytown Dunes/Nanny Estuary pNHA)
D	CC-44900	Laytown Station	44,900	Medium	Low	N/A
D	CC-45200 (E)	Laytown	45,200	Medium	Low	N/A
D	CC-46900	Bettystown Substation	46,900	Medium	Low	N/A
D	CC-49600	OBB78 Track Lowering	49,600	Low	Low	N/A
D	CC-50270 (S)	Drogheda	50,270	Medium	Low	N/A
D	CC-50270 (N)	Drogheda	50,270	Low	Low	N/A
D	CC-51560 (S)	Drogheda	51,560	Medium	Low	N/A
E	CC-51800	OBB80 (North)	51,800	Medium	Low	N/A

Zone	Compound code	Location	Chainage	Nuisance Sensitivity	Human Health Sensitivity	Ecology Sensitivity
E	CC-51900	OBB80 (South)	51,900	Medium	Low	N/A
E	CC-52050	Drogheda Substation	52,050	Low	Low	N/A
E	CC-52250	Drogheda Station	52,250	Medium	Low	N/A
E	CC-52200	UBK01 Dublin Road Overbridge (Car Park)	52,200	Medium	Low	N/A

12.5 Description of Potential Impacts

The proposed development will involve electrification of the railway line north of Malahide as far as Drogheda and other infrastructural interventions, to enable a significant increase in train services and passenger capacity between Dublin City Centre and Drogheda, inclusive of the Howth Branch. The proposed development also assists Iarnród Éireann, Dublin Bus, MetroLink and Luas services, in creating a fully integrated public transport in the Greater Dublin Area. The total length of the proposed development is approximately 50 km. When considering a development of this nature, the potential air quality impact on the surroundings must be considered for each of two distinct stages:

- Construction Phase; and
- Operational Phase.

12.5.1 Potential Construction Impacts

12.5.1.1 Construction Traffic

12.5.1.1.1 Introduction

In accordance with the TII Standard (TII 2022), an assessment of air quality impacts should be considered where:

- Road alignment will change by 5 meters (m) or more; or
- Annual average daily traffic (AADT) flows will change by 1,000 or more; or
- Heavy duty vehicle (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more; or
- Daily average speed will change by 10 kph or more; or
- Peak hour speed will change by 20 kph or more.

The above scoping criteria has been used in the current assessment to determine the road links required for inclusion in the modelling assessment. Based on the traffic data provided by the traffic consultant for the project, a number of affected roads were screened in for assessment.

12.5.1.1.2 Construction Traffic Impacts on Human Receptors

The degree of impact is determined based on both the absolute and relative impact of the proposed development using the TII REM tool. Results are compared against the 'Do-Minimum' scenario (DM), which assumes that the proposed development is not under construction, to determine the degree of impact. The traffic data modelled is included in Table 12-19, with road links included where they meet the scoping criteria outlined in Section 12.3.4.1. Impacts were assessed at 46 no. worst-case sensitive receptors within 200 m of the road links impacted by the proposed development (see Figure 12.1 in Volume 3A of this EIAR for locations). These sensitive receptors include residential receptors and schools which are representative samples of sensitive receptors on the impacted roads. Receptors are assumed to be located within 10m of the centre of the affected link, as a worst-case.

Table 12-19 Traffic Data Construction Phase Simple Assessment (REM tool)

Link Number	Name	Do-Minimum (DM)		Do-Something (DS1)		DM – DS1	
		Total LDV (light duty vehicle) flow (AADT)	Total HDV (heavy duty vehicle) flow (AADT)	Total LDV flow (AADT)	Total HDV flow (AADT)	Total LDV Flow (AADT)	Total HDV flow (AADT)
36381_36010	R132 South	4,764	149	5,211	449	447	300
36011_36010	R132 North	4,251	84	4,698	384	447	300
36010_36011	R132 Drogheda Rd South	4,408	142	4,855	443	447	300
35506_36011	R132 Drogheda Rd North	4,251	84	4,698	384	447	300
35504_35505	Balbriggan Bypass	11,442	1,152	11,890	1,452	447	300
36773_35505	R132 North	12,340	1,024	12,787	1,324	447	300
35505_36773	R132 South	11,442	1,152	11,890	1,452	447	300
36771_36772	R132 South	9,705	1,026	10,152	1,326	447	300
38502_36772	R132 North	12,002	894	12,449	1,194	447	300
36765_38502	R132 Main Street	9,861	821	10,308	1,121	447	300
36772_38502	R132 South	11,159	1,034	11,606	1334	447	300
38502_36765	R132 Main St South	9,440	940	9,887	1241	447	300
38534_36765	R150 Laytown Road	4,789	52	5,236	352	447	300
36765_38534	R150 Laytown Road West	4,618	63	5,065	363	447	300
37115_38534	Ministon Rd	2,721	127	3,168	427	447	300
38732_38534	R150 Laytown Road East	2,302	44	2,749	344	447	300
36798_37115	Pilltown Road West	119	40	566	340	447	300
37116_37115	Pilltown Road East	2,810	167	3,257	467	447	300
38534_37115	Ministown Road	2,526	180	2,974	480	447	300
36012_36014	L5362	1,124	143	1,571	443	447	300
38557_36014	R150 Triton Road	754	165	1,201	465	447	300

Link Number	Name	Do-Minimum (DM)		Do-Something (DS1)		DM – DS1	
		Total LDV (light duty vehicle) flow (AADT)	Total HDV (heavy duty vehicle) flow (AADT)	Total LDV flow (AADT)	Total HDV flow (AADT)	Total LDV Flow (AADT)	Total HDV flow (AADT)
36012_36013	R150 Coast Road	157	2	606	300	449	298
36014_36013	R150 Triton Road	754	165	1,201	465	447	300
36799_36013	Golf Links Road	146	2	595	300	449	298
36013_36012	R150 Coast Road North	905	165	1,352	465	447	300
36776_36012	R150 Coast Road South	1,283	143	1,730	443	447	300
37115_37116	L5615 Pilltown Road	2,711	214	3,158	514	447	300
38459_37116	R150 Eastham Road	6,112	375	6,559	675	447	300
38550_37116	Bettystown Road	3,036	396	3,484	696	447	300
30027_37129	Costal Scenic Drive	3,505	390	3,952	690	447	300
37128_37129	Colpe Road	3,020	254	3,467	554	447	300
37142_37129	Mill Road	504	44	951	344	447	300
29721_37142	Marsh Road West	3,259	129	3,706	429	447	300
37129_37142	Mill Road	619	67	1,066	368	447	300
29360_29983	R132 Dublin Road South	7,205	278	7,652	578	447	300
29997_29983	R132 Dublin Road North	5,691	334	6,138	635	447	300
30231_29983	Bryanstown Vill	2,177	37	2,624	337	447	300
29984_29985	Blackbush Lane	1,209	7	1,656	307	447	300
30231_29985	Meadow View East	2,679	8	3,126	309	447	300
29985_29984	Blackbush Lane	1,127	2	1,576	300	449	298

Link Number	Name	Do-Minimum (DM)		Do-Something (DS1)		DM – DS1	
		Total LDV (light duty vehicle) flow (AADT)	Total HDV (heavy duty vehicle) flow (AADT)	Total LDV flow (AADT)	Total HDV flow (AADT)	Total LDV Flow (AADT)	Total HDV flow (AADT)
30350_29984	Sunnyside Cottages	1,209	7	1,656	307	447	300
29359_29997	R132 Dublin Road North	5,691	334	6,138	635	447	300
29983_29997	R132 Dublin Road South	5,634	278	6,081	579	447	300
29358_30350	R132 Dublin Road East	5,634	278	6,081	579	447	300
29984_30350	Sunnyside Cottages	1,127	2	1,576	300	449	298
30344_30350	R132 Dublin Road West	6,904	335	7,351	635	447	300

The results of the impact assessment due to construction traffic on NO_2, PM_{10} and $PM_{2.5}$ are shown in Table 12-20, Table 12-21 and Table 12-22 respectively with the predicted 'Do-Something' (DS) annual mean concentrations assessed relative to 'Do Minimum' (DM) levels.

Using the assessment criteria outlined in Table 12-9, the impact of the proposed development in terms of NO_2, PM_{10} and $PM_{2.5}$ is considered neutral. Therefore, give the temporary nature of the Construction Phase, the overall impact of NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of the proposed development is short-term and neutral.

Table 12-20 Predicted Annual Mean NO_2 Concentrations (µg/m³)

Receptor/ Link Number	Name	Impact Construction Phase				
		DN (µg/m³)	DS (µg/m³)	DS-DN (µg/m³)	% Change in concentration relative to Air Quality Standard Value (AQSV)	Description (TII Criteria)
36381_36010	R132 South	14.42	15.13	0.71	1.78	Neutral
36011_36010	R132 North	14.07	14.78	0.71	1.78	Neutral
36010_36011	R132 Drogheda Road South	14.23	14.93	0.7	1.75	Neutral
35506_36011	R132 Drogheda Road North	14.08	14.79	0.71	1.78	Neutral
35504_35505	Balbriggan Bypass	19.01	19.69	0.68	1.70	Neutral
36773_35505	R132 North	19.17	19.84	0.67	1.68	Neutral
35505_36773	R132 South	19.01	19.69	0.68	1.70	Neutral
36771_36772	R132 South	17.98	18.66	0.68	1.70	Neutral
38502_36772	R132 North	19	19.75	0.75	1.88	Neutral
36765_38502	R132 Main Street	17.97	18.72	0.75	1.88	Neutral
36772_38502	R132 south	18.85	19.59	0.74	1.85	Neutral
38502_36765	R132 Main St South	17.91	18.66	0.75	1.88	Neutral
38534_36765	R150 Laytown Road	14.21	14.9	0.69	1.73	Neutral
36765_38534	R150 Laytown Road West	14.19	14.88	0.69	1.73	Neutral
37115_38534	Ministon Road	13.59	14.45	0.86	2.15	Neutral
38732_38534	R150 Laytown Road East	13.12	13.83	0.71	1.78	Neutral

Receptor/ Link Number	Name	Impact Construction Phase				
		DN (µg/m³)	DS (µg/m³)	DS-DN (µg/m³)	% Change in concentration relative to Air Quality Standard Value (AQSV)	Description (TII Criteria)
36798_37115	Pilltown Road West	12.14	13	0.86	2.15	Neutral
37116_37115	Pilltown Road East	13.73	14.6	0.87	2.18	Neutral
38534_37115	Ministown Road	13.62	14.48	0.86	2.15	Neutral
36012_36014	L5362	12.86	13.72	0.86	2.15	Neutral
38557_36014	R150 Triton Road	12.72	13.59	0.87	2.18	Neutral
36012_36013	R150 Coast Road	12.08	12.94	0.86	2.15	Neutral
36014_36013	R150 Triton Road	12.72	13.57	0.85	2.13	Neutral
36799_36013	Golf Links Road	12.07	12.93	0.86	2.15	Neutral
36013_36012	R150 Coast Road North	12.78	13.63	0.85	2.13	Neutral
36776_36012	R150 coast Road South	12.91	13.76	0.85	2.13	Neutral
37115_37116	L5615 Pilltown Road	13.73	14.56	0.83	2.08	Neutral
38459_37116	R150 Eastham Road	15.31	16.04	0.73	1.83	Neutral
38550_37116	Bettystown Road	14.06	14.76	0.7	1.75	Neutral
30027_37129	Costal Scenic Drive	14.53	15.38	0.85	2.13	Neutral
37128_37129	Colpe Road	13.82	14.57	0.75	1.88	Neutral
37142_37129	Mill Road	12.31	13.06	0.75	1.88	Neutral
29721_37142	Marsh Road West	13.68	14.38	0.7	1.75	Neutral
37129_37142	Mill Road	12.4	13.15	0.75	1.88	Neutral
29360_29983	R132 Dublin Road South	15.93	16.78	0.85	2.13	Neutral

Receptor/ Link Number	Name	Impact Construction Phase				
		DN (µg/m³)	DS (µg/m³)	DS-DN (µg/m³)	% Change in concentration relative to Air Quality Standard Value (AQSV)	Description (TII Criteria)
29997_29983	R132 Dublin Road North	15.35	16.2	0.85	2.13	Neutral
30231_29983	Bryanstown Vill	13.09	13.95	0.86	2.15	Neutral
29984_29985	Blackbush Ln	12.57	13.43	0.86	2.15	Neutral
30231_29985	Meadow View East	13.25	14.11	0.86	2.15	Neutral
29985_29984	Blackbush Ln	12.54	13.43	0.89	2.23	Neutral
30350_29984	Sunnyside Cottages	12.59	13.47	0.88	2.20	Neutral
29359_29997	R132 Dublin Road North	15.4	16.27	0.87	2.18	Neutral
29983_29997	R132 Dublin Road South	15.24	16.1	0.86	2.15	Neutral
29358_30350	R132 Dublin Road East	15.23	16.09	0.86	2.15	Neutral
29984_30350	Sunnyside Cottages	12.53	13.4	0.87	2.18	Neutral
30344_30350	R132 Dublin Road West	15.9	16.75	0.85	2.13	Neutral

Table 12-21 Annual Mean PM_{10} Concentrations (µg/m³)

Receptor/ Link Number	Name	Impact Construction Phase				
		DN (µg/m³)	DS (µg/m³)	DS-DN (µg/m³)	% Change in concentration relative to Air Quality Standard Value (AQSV)	Description (TII Criteria)
36381_36010	R132 South	17.63	18.04	0.41	1.03	Neutral
36011_36010	R132 North	17.44	17.85	0.41	1.03	Neutral
36010_36011	R132 Drogheda Road South	17.54	17.94	0.40	1.00	Neutral
35506_36011	R132 Drogheda Road North	17.44	17.85	0.41	1.03	Neutral
35504_35505	Balbriggan Bypass	20.28	20.69	0.41	1.03	Neutral
36773_35505	R132 North	20.38	20.78	0.40	1.00	Neutral
35505_36773	R132 South	20.28	20.69	0.41	1.03	Neutral
36771_36772	R132 South	19.72	20.13	0.41	1.03	Neutral
38502_36772	R132 North	20.14	20.55	0.41	1.03	Neutral
36765_38502	R132 Main Street	19.54	19.95	0.41	1.03	Neutral
36772_38502	R132 south	20.07	20.48	0.41	1.03	Neutral
38502_36765	R132 Main St South	19.56	19.97	0.41	1.03	Neutral
38534_36765	R150 Laytown Road	17.54	17.95	0.41	1.03	Neutral
36765_38534	R150 Laytown Road West	17.51	17.92	0.41	1.03	Neutral
37115_38534	Ministon Road	17.1	17.52	0.42	1.05	Neutral

Receptor/ Link Number	Name	Impact Construction Phase				
		DN (µg/m³)	DS (µg/m³)	DS-DN (µg/m³)	% Change in concentration relative to Air Quality Standard Value (AQSV)	Description (TII Criteria)
38732_38534	R150 Laytown Road East	16.92	17.32	0.40	1.00	Neutral
36798_37115	Pilltown Road West	16.37	16.79	0.42	1.05	Neutral
37116_37115	Pilltown Road East	17.17	17.58	0.41	1.03	Neutral
38534_37115	Ministown Road	17.11	17.53	0.42	1.05	Neutral
36012_36014	L5362	16.72	17.14	0.42	1.05	Neutral
38557_36014	R150 Triton Road	16.66	17.07	0.41	1.03	Neutral
36012_36013	R150 Coast Road	16.34	16.76	0.42	1.05	Neutral
36014_36013	R150 Triton Road	16.66	17.07	0.41	1.03	Neutral
36799_36013	Golf Links Road	16.34	16.75	0.41	1.03	Neutral
36013_36012	R150 Coast Road North	16.69	17.11	0.42	1.05	Neutral
36776_36012	R150 coast Road South	16.76	17.18	0.42	1.05	Neutral
37115_37116	L5615 Pilltown Road	17.19	17.61	0.42	1.05	Neutral
38459_37116	R150 Eastham Road	18.17	18.58	0.41	1.03	Neutral
38550_37116	Bettystown Road	17.45	17.85	0.40	1.00	Neutral
30027_37129	Costal Scenic Drive	17.57	17.98	0.41	1.03	Neutral
37128_37129	Colpe Road	17.29	17.7	0.41	1.03	Neutral
37142_37129	Mill Road	16.47	16.88	0.41	1.03	Neutral
29721_37142	Marsh Road West	17.24	17.64	0.40	1.00	Neutral
37129_37142	Mill Road	16.52	16.93	0.41	1.03	Neutral

Receptor/ Link Number	Name	Impact Construction Phase				
		DN (µg/m³)	DS (µg/m³)	DS-DN (µg/m³)	% Change in concentration relative to Air Quality Standard Value (AQSV)	Description (TII Criteria)
29360_29983	R132 Dublin Road South	18.33	18.75	0.42	1.05	Neutral
29997_29983	R132 Dublin Road North	18.02	18.44	0.42	1.05	Neutral
30231_29983	Bryanstown Vill	16.87	17.28	0.41	1.03	Neutral
29984_29985	Blackbush Lane	16.6	17.02	0.42	1.05	Neutral
30231_29985	Meadow View East	16.96	17.38	0.42	1.05	Neutral
29985_29984	Blackbush Lane	16.57	16.99	0.42	1.05	Neutral
30350_29984	Sunnyside Cottages	16.6	17.02	0.42	1.05	Neutral
29359_29997	R132 Dublin Road North	18.02	18.44	0.42	1.05	Neutral
29983_29997	R132 Dublin Road South	17.95	18.37	0.42	1.05	Neutral
29358_30350	R132 Dublin Road East	17.95	18.37	0.42	1.05	Neutral
29984_30350	Sunnyside Cottages	16.57	16.99	0.42	1.05	Neutral
30344_30350	R132 Dublin Road West	18.32	18.74	0.42	1.05	Neutral

Table 12-22 Annual Mean $PM_{2.5}$ Concentrations (µg/m³)

Receptor/ Link Number	Name	Impact Opening Year				
		DN (µg/m³)	DS (µg/m³)	DS-DN (µg/m³)	% Change in concentration relative to Air Quality Standard Value (AQSV)	Description (TII Criteria)
36381_36010	R132 South	13.02	13.27	0.25	1	Neutral
36011_36010	R132 North	12.9	13.15	0.25	1	Neutral
36010_36011	R132 Drogheda Road South	12.96	13.21	0.25	1	Neutral
35506_36011	R132 Drogheda Road North	12.9	13.15	0.25	1	Neutral
35504_35505	Balbriggan Bypass	14.64	14.89	0.25	1	Neutral
36773_35505	R132 North	14.7	14.95	0.25	1	Neutral
35505_36773	R132 South	14.64	14.89	0.25	1	Neutral
36771_36772	R132 South	14.3	14.55	0.25	1	Neutral
38502_36772	R132 North	14.55	14.8	0.25	1	Neutral
36765_38502	R132 Main Street	14.18	14.43	0.25	1	Neutral
36772_38502	R132 south	14.51	14.76	0.25	1	Neutral
38502_36765	R132 Main St South	14.19	14.44	0.25	1	Neutral
38534_36765	R150 Laytown Road	12.97	13.21	0.24	0.96	Neutral
36765_38534	R150 Laytown Road West	12.95	13.19	0.24	0.96	Neutral
37115_38534	Ministon Road	12.7	12.95	0.25	1	Neutral
38732_38534	R150 Laytown Road East	12.58	12.83	0.25	1	Neutral

Receptor/ Link Number	Name	Impact Opening Year				
		DN (µg/m^3)	DS (µg/m^3)	DS-DN (µg/m^3)	% Change in concentration relative to Air Quality Standard Value (AQSV)	Description (TII Criteria)
36798_37115	Pilltown Road West	12.24	12.5	0.26	1.04	Neutral
37116_37115	Pilltown Road East	12.73	12.99	0.26	1.04	Neutral
38534_37115	Ministown Road	12.7	12.96	0.26	1.04	Neutral
36012_36014	L5362	12.46	12.72	0.26	1.04	Neutral
38557_36014	R150 Triton Road	12.42	12.68	0.26	1.04	Neutral
36012_36013	R150 Coast Road	12.23	12.48	0.25	1	Neutral
36014_36013	R150 Triton Road	12.42	12.68	0.26	1.04	Neutral
36799_36013	Golf Links Road	12.22	12.48	0.26	1.04	Neutral
36013_36012	R150 Coast Road North	12.44	12.7	0.26	1.04	Neutral
36776_36012	R150 coast Road South	12.49	12.74	0.25	1	Neutral
37115_37116	L5615 Pilltown Road	12.75	13.01	0.26	1.04	Neutral
38459_37116	R150 Eastham Road	13.35	13.59	0.24	0.96	Neutral
38550_37116	Bettystown Road	12.9	13.15	0.25	1	Neutral
30027_37129	Costal Scenic Drive	12.98	13.24	0.26	1.04	Neutral
37128_37129	Colpe Road	12.81	13.06	0.25	1	Neutral
37142_37129	Mill Road	12.3	12.55	0.25	1	Neutral
29721_37142	Marsh Road West	12.78	13.02	0.24	0.96	Neutral
37129_37142	Mill Road	12.33	12.58	0.25	1	Neutral
29360_29983	R132 Dublin Road South	13.44	13.7	0.26	1.04	Neutral

Receptor/ Link Number	Name	Impact Opening Year				
		DN (µg/m^3)	DS (µg/m^3)	DS-DN (µg/m^3)	% Change in concentration relative to Air Quality Standard Value (AQSV)	Description (TII Criteria)
29997_29983	R132 Dublin Road North	13.25	13.51	0.26	1.04	Neutral
30231_29983	Bryanstown Vill	12.54	12.8	0.26	1.04	Neutral
29984_29985	Blackbush Ln	12.38	12.64	0.26	1.04	Neutral
30231_29985	Meadow View East	12.6	12.86	0.26	1.04	Neutral
29985_29984	Blackbush Ln	12.37	12.62	0.25	1	Neutral
30350_29984	Sunnyside Cottages	12.38	12.64	0.26	1.04	Neutral
29359_29997	R132 Dublin Road North	13.25	13.51	0.26	1.04	Neutral
29983_29997	R132 Dublin Road South	13.21	13.47	0.26	1.04	Neutral
29358_30350	R132 Dublin Road East	13.21	13.47	0.26	1.04	Neutral
29984_30350	Sunnyside Cottages	12.37	12.62	0.25	1	Neutral
30344_30350	R132 Dublin Road West	13.43	13.69	0.26	1.04	Neutral

12.5.1.1.3 Construction Traffic Impacts on Ecological Receptors

The impact of the proposed development on the nearby ecologically sensitive areas during the Construction Phase using the REM tool is outlined in Table 12-23. The annual mean NO_x concentration has been compared to the critical level of 30 µg/m^3 at each of the designated habitat sites in proximity to affected routes. The predicted concentrations of mean annual NO_x at all sections modelled comply with the critical level for NO_x. There is a contribution at both locations above 1% of the critical level therefore the project ecologist was consulted. DS and DM concentrations are within air quality standards.

Table 12-23 Impacts at Key Ecological Receptors for the Construction Phase Simple Assessment (NO_X Annual Mean Concentration)

Ecological Receptor	Receptor Location (ITM)	Do Nothing (µg/m^3)	Distance from road beyond which concentration is below critical level (30 µg/m^3) (m)	Do Something (µg/m^3)	Distance from road beyond which concentration is below critical level (30 µg/m^3) (m)	Impact (DS – DN) (µg/m^3)	Change as a percentage of critical level (30 µg/m^3) (%)
River Nanny Estuary and Shore SPA - R150 Laytown Road West	713828, 770785	27.84	n/a	29.38	n/a	1.54	5.13
Boyne Coast and Estuary SAC, Boyne Estuary SAC -Mill Road	712156, 775725	25.79	n/a	27.2	n/a	1.41	4.70

Note: Two decimal places have been provided where required in order to provide clarity of results.

Nitrogen deposition levels have been compared to the lower critical load for the designated habitat sites where they are located in proximity to affected construction routes in Table 12-24. Background nitrogen deposition of 6kg/ha/yr is added to predicted levels to represent background values as sourced from APIS app | Air Pollution Information System at the designated sites, in accordance with TII Standard. All sites are below the lower critical load for the designated habitat site. In accordance with the EPA Guidelines (EPA 2022) the ecological likely effects associated with the Construction Phase traffic emissions will overall be negative, slight and short-term.

Table 12-24 Impacts at Key Ecological Receptors for the Construction Phase Simple Assessment (Nitrogen Deposition)

Receptor	Receptor Location (ITM)	Lower critical load for most sensitive feature (kgN/ha/yr)	Do Nothing (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Do Something (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Change in deposition (kgN/ha/yr)	Change relative to lower critical load (%)
River Nanny Estuary and Shore SPA - R150 Laytown Road West	713828, 770785	20	7.74	n/a	8.00	n/a	0.26	0.87
Boyne Coast and Estuary SAC, Boyne Estuary SAC -Mill Road	712156, 775725	20	7.76	n/a	9.87	2.04	0.10	7

Note: Two decimal places have been provided where required in order to provide clarity of results

12.5.1.2 Construction Dust

The greatest potential impact on air quality during the Construction Phase is from construction dust emissions, PM10 and PM2.5 emissions and the potential for nuisance dust. Dust is characterised as encompassing particulate matter with a particle size of between 1 and 75 microns (1- 75 µm), therefore includes both PM10 and PM2.5. Deposition typically occurs in close proximity to each site and potential impacts generally occur within 350m of the haulage route used by construction vehicles on the public road, up to 500m from the site entrance.

Large particle sizes (greater than 75 microns) fall rapidly out of atmospheric suspension and are subsequently deposited in close proximity to the source. Particle sizes of less than 75 microns are of interest as they can remain airborne for greater distances and give rise to the potential dust nuisance at the sensitive receptors.

This section of the chapter provides an overview of the typical activities that have potential for dust impacts during the Construction Phase of the proposed development. The potential for dust emissions due to construction can vary substantially day to day and are strongly influenced by the level of activity, the specific operations, and the prevailing meteorological conditions. While each individual site working area will differ, the processes that have the potential for the generation of construction dust will be similar. Further details on construction methods can be found in EIAR Volume 2 Chapter 5 which contains an overview of the typical activities and methods that are anticipated to be used during construction and commissioning of the proposed development.

The following operations are the main dust generating sources or activities:

- Vegetation Clearance – removes grass and other soil covering which would otherwise prevent emission generation;
- Demolition – detailed demolition plans will be required to minimise dust;
- Movement of trucks along paved public roads – potential of trackout of dust on vehicle tyres from construction sites or resuspension of dust;
  Extraction of material – works will be broken down into different types however all will involve the movement of potentially dusty material which has the potential to generate dust; and
- Stockpiling of material – stockpiles have the potential to generate dust due to dry material movement and wind erosion.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude (Section 12.5.1) for dust generation at each site needs to be taken into account in conjunction with the previously established sensitivity of the area (Section 12.4.2.2). Using the appraisal criteria for the assessment of risk at sensitive receptors as detailed in Table 12-5 to Table 12-8, a summary of dust emission magnitudes from the main construction sites is shown in Table 12-25. Where construction compounds or work sites are located in proximity of each other, they have been grouped with respect to dust assessment. This is due to them acting as a single potential source with respect to dust emission magnitudes. The resultant requirement (i.e. high, medium or low levels) for mitigation with respect to nuisance dust, health impacts and ecological impacts are shown in Table 12-25 to Table 12-29 and an overall summary provided in Table 12-30. The mitigation requirement levels take into account the sensitivity of the location established in Section 12.4.2.2 and the activities proposed on site which may generate dust. The assessment finds that a high level of dust mitigation is required for the majority of sites.

Table 12-25 Summary of Emission Magnitude

Zone	Compound code	Location	Chainage	Demolition	Earthworks	Construction	Trackout
A	Rail line			N/A	Medium	Medium	Medium
B	Rail line			Low	Large	Large	Large
C	Rail line			Low	Large	Large	Large
D	Rail line			N/A	Large	Large	Large
E	Rail line			Medium	Large	Large	Large
A	CC-2650	Fairview Depot (R834 Entrance car park)	2,650	N/A	Small	Small	Small
A	CC-2700	Fairview Depot (R834 Entrance car park)	2,700	N/A	Small	Small	Small
A	CC-3000	Fairview Depot (R807 Entrance car park)	3,100	N/A	Small	Small	Small
B	CC-9000	Howth Junction and Donaghmede Station (Donaghmede Entrance)	9,000	N/A	Medium	Medium	Medium
B	CC-9050	Howth Junction and Donaghmede Station (Kilbarrack Entrance) Station	9,050	N/A	Medium	Medium	Medium
B	CC-9100	Howth Junction and Donaghmede Station (Central Access) Station	9,100	N/A	Medium	Medium	Medium
B	CC-9200	Howth Junction and Donaghmede Station (Baldoyle Industrial Estate) Station	9,200	N/A	Medium	Medium	Medium
B	CC-10600	Clongriffin Station	10,600	N/A	Large	Medium	Large
B	CC-15900E	Malahide Turnback (Strand Court)	15,900	N/A	Medium	Medium	Large
B	CC-15900W	Malahide Turnback (Bissett's Strand)	15,900	N/A	Medium	Small	Medium
B	CC-16100	Malahide Turnback (Caves Strand)	16,100	N/A	Medium	Small	Medium
B	CC-16250	Malahide Turnback (Marina Car Park)	16,250	N/A	Medium	Small	Large
B	CC-16400	UBB30 Malahide Viaduct	16,400	Small	Medium	Medium	Medium

Zone	Compound code	Location	Chainage	Demolition	Earthworks	Construction	Trackout
C	CC-18800	Donabate Traction Substation	18,800	N/A	Medium	Medium	Medium
C	CC-19800	Donabate Station	19,800	N/A	Large	Large	Large
C	CC-23500	Rush and Lusk Station	23,500	N/A	Small	Medium	Medium
C	CC-23772 (E)	Rusk & Lusk	23,772	N/A	Small	Small	Medium
C	CC-23772 (W)	Rusk & Lusk	23,772	N/A	Small	Small	Medium
C	CC-25100	OBB44 Track Lowering	25,100	N/A	Small	Small	Medium
C	CC-25626 (E)	Tyrrelstown	25,626	N/A	Small	Small	Medium
C	CC-25626 (W)	Tyrrelstown	25,626	N/A	Small	Small	Medium
C	CC-27460 (E)	Baldongan	27,460	N/A	Small	Small	Medium
C	CC-27460 (W)	Baldongan	27,460	N/A	Small	Small	Medium
C	CC-29000	Skerries South Substation	29,000	N/A	Medium	Medium	Medium
C	CC-29140 (E)	Golf Links Road	29,140	N/A	Medium	Small	Medium
C	CC-29140 (W)	Golf Links Road	29,140	N/A	Medium	Small	Medium
C	CC-30200	Skerries Station	30,200	N/A	Medium	Medium	Medium
C	CC-32200	Skerries North Substation	32,200	N/A	Medium	Medium	Medium
C	CC-34600	Balbriggan	34,600	N/A	Medium	Small	Medium
C	CC-34600	Balbriggan	34,600	N/A	Medium	Small	Medium
C	CC-36000	UBB56 Balbriggan Viaduct	36,000	N/A	Medium	Small	Medium
C	CC-37700	Balbriggan Substation	37,700	N/A	Medium	Medium	Large
D	CC-40200	Gormanston Station	40,200	N/A	Medium	Medium	Large
D	CC-41400	Gormanston Substation	41,400	N/A	Medium	Medium	Large
D	CC-44390 (E)	Laytown	44,300	N/A	Medium	Small	Medium

Zone	Compound code	Location	Chainage	Demolition	Earthworks	Construction	Trackout
D	CC-44390 (W)	Laytown	44,390	N/A	Medium	Small	Medium
D	CC-44500	UBB72 Laytown Viaduct (South Abutment)	44,500	N/A	Medium	Small	N/A
D	CC-44600	UBB72 Laytown Viaduct (South Pier)	44,600	N/A	Small	Small	N/A
D	CC-44700	UBB72 Laytown Viaduct (North Pier)	44,700	N/A	Small	Small	Medium
D	CC-44900	Laytown Station	44,900	N/A	Medium	Medium	Large
D	CC-44900	Laytown Station	44,900	N/A	Medium	Small	Medium
D	CC-46900	Bettystown Substation	46,900	N/A	Medium	Medium	Medium
D	CC-49600	OBB78 Track Lowering	49,600	N/A	Small	Small	N/A
D	CC-50270 (N)	Drogheda	50,270	N/A	Small	Small	Medium
D	CC-50270 (N)	Drogheda	50,270	N/A	Small	Small	Medium
D	CC-51560 (S)	Drogheda	51,560	N/A	Small	Small	Medium
E	CC-51800	OBB80 (North)	51,800	Medium	Medium	Medium	Large
E	CC-51900	OBB80 (South)	51,900	Medium	Medium	Medium	Large
E	CC-52050	Drogheda Substation	52,050	N/A	Medium	Medium	Medium
E	CC-52250	Drogheda Station	52,250	N/A	Small	Small	Large
E	CC-52200	UBK01 Dublin Road Overbridge (Car Park)	52,200	Small	Medium	Medium	Medium

Table 12-26 Summary of Demolition Risk to Define Site-Specific Mitigation

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
A	Rail line			N/A	N/A	N/A
B	Rail line			Low	Low	Low
C	Rail line			Low	Low	Low
D	Rail line			N/A	N/A	N/A
E	Rail line			Medium	Low	N/A
A	CC-2650	Fairview Depot (R834 Entrance car park)	2650	N/A	N/A	N/A
A	CC-2700	Fairview Depot (R834 Entrance car park)	2700	N/A	N/A	N/A
A	CC-3000	Fairview Depot (R807 Entrance car park)	3,100	N/A	N/A	N/A
B	CC-9000	Howth Junction and Donaghmede Station (Donaghmede Entrance)	9,000	N/A	N/A	N/A
B	CC-9050	Howth Junction and Donaghmede Station (Kilbarrack Entrance) Station	9,050	N/A	N/A	N/A
B	CC-9100	Howth Junction and Donaghmede Station (Central Access) Station	9,100	N/A	N/A	N/A
B	CC-9200	Howth Junction and Donaghmede Station (Baldoyle Industrial Estate) Station	9,200	N/A	N/A	N/A
B	CC-10600	Clongriffin Station	10,600	N/A	N/A	N/A
B	CC-15900E	Malahide Turnback (Strand Court)	15,900	N/A	N/A	N/A
B	CC-15900W	Malahide Turnback (Bissett's Strand)	15,900	N/A	N/A	N/A
B	CC-16100	Malahide Turnback (Caves Strand)	16,100	N/A	N/A	N/A
B	CC-16250	Malahide Turnback (Marina Car Park)	16,250	N/A	N/A	N/A
B	CC-16400	UBB30 Malahide Viaduct	16,400	Negligible	Negligible	Low
C	CC-18800	Donabate Substation	18,800	N/A	N/A	N/A
C	CC-19800	Donabate Station	19,800	N/A	N/A	N/A
C	CC-23500	Rush and Lusk Station	23,500	N/A	N/A	N/A
C	CC-23772 (E)	Rusk & Lusk	23,772	N/A	N/A	N/A
C	CC-23772 (W)	Rusk & Lusk	23,772	N/A	N/A	N/A
C	CC-25100	OBB44 Track Lowering	25,100	N/A	N/A	N/A
C	CC-25626 (E)	Tyrrelstown	25,626	N/A	N/A	N/A

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
C	CC-25626 (W)	Tyrrelstown	25,626	N/A	N/A	N/A
C	CC-27460 (E)	Baldongan	27,460	N/A	N/A	N/A
C	CC-27460 (E)	Baldongan	27,460	N/A	N/A	N/A
C	CC-29000	Skerries South Substation	29,000	N/A	N/A	N/A
C	CC-29140 (E)	Golf Links Road	29,140	N/A	N/A	N/A
C	CC-29140 (W)	Golf Links Road	29,140	N/A	N/A	N/A
C	CC-30200	Skerries Station	30,200	N/A	N/A	N/A
C	CC-32200	Skerries North Substation	32,200	N/A	N/A	N/A
C	CC-34600	Balbriggan	34,600	N/A	N/A	N/A
C	CC-34600	Balbriggan	34,600	N/A	N/A	N/A
C	CC-36000	UBB56 Balbriggan Viaduct	36,000	N/A	N/A	N/A
C	CC-37700	Balbriggan Substation	37,700	N/A	N/A	N/A
D	CC-40200	Gormanston Station	40,200	N/A	N/A	N/A
D	CC-41400	Gormanston Substation	41,400	N/A	N/A	N/A
D	CC-44390 (E)	Laytown	44,390	N/A	N/A	N/A
D	CC-44390 (W)	Laytown	44,390	N/A	N/A	N/A
D	CC-44500	UBB72 Laytown Viaduct (South Abutment)	44,500	N/A	N/A	N/A
D	CC-44600	UBB72 Laytown Viaduct (South Pier)	44,600	N/A	N/A	N/A
D	CC-44700	UBB72 Laytown Viaduct (North Pier)	44,700	N/A	N/A	N/A
D	CC-44900	Laytown Station	44,900	N/A	N/A	N/A
D	CC-45200	Laytown	45,200	N/A	N/A	N/A
D	CC-46900	Bettystown Substation	46,900	N/A	N/A	N/A
D	CC-49600	OBB78 Track Lowering	49,600	N/A	N/A	N/A
D	CC-50270 (S)	Drogheda	50,270	N/A	N/A	N/A
D	CC-50270 (N)	Drogheda	50,270	N/A	N/A	N/A
D	CC-50700 (S)	Drogheda	50,700	N/A	N/A	N/A
E	CC-51800	OBB80 (North)	51,800	Medium	Low	N/A
E	CC-51900	OBB80 (South)	51,900	Medium	Low	N/A
E	CC-52050	Drogheda Substation	52,050	N/A	N/A	N/A
E	CC-52250	Drogheda Station	52,250	N/A	N/A	N/A
E	CC-52200	UBK01 Dublin Road Overbridge (Car Park)	52,200	Negligible	Negligible	N/A

Note: Summary of Risk defined as per IAQM Guidance (IAQM 2014)

Note: N/A indicates that demolition will not take place at this location as part of the proposed development works

Table 12-27 Summary of Earthworks Risk to Define Site-Specific Mitigation

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
A	Rail line			Low	Low	N/A
B	Rail line			High	Medium	High
C	Rail line			High	Medium	High
D	Rail line			High	Medium	High
E	Rail line			High	Low	N/A
A	CC-2650	Fairview Depot (R834 Entrance car park)	2650	Negligible	Negligible	N/A
A	CC-2700	Fairview Depot (R834 Entrance car park)	2700	Negligible	Negligible	N/A
A	CC-3000	Fairview Depot (R807 Entrance car park)	3,100	Negligible	Negligible	N/A
B	CC-9000	Howth Junction and Donaghmede Station (Donaghmede Entrance)	9,000	Low	Low	N/A
B	CC-9050	Howth Junction and Donaghmede Station (Kilbarrack Entrance) Station	9,050	Low	Low	N/A
B	CC-9100	Howth Junction and Donaghmede Station (Central Access) Station	9,100	Low	Low	N/A
B	CC-9200	Howth Junction and Donaghmede Station (Baldoyle Industrial Estate) Station	9,200	Low	Low	N/A
B	CC-10600	Clongriffin Station	10,600	Low	Low	N/A
B	CC-15900E	Malahide Turnback (Strand Court)	15,900	Medium	Low	N/A
B	CC-15900W	Malahide Turnback (Bissett's Strand)	15,900	Medium	Low	Medium
B	CC-16100	Malahide Turnback (Caves Strand)	16,100	Low	Low	Medium
B	CC-16250	Malahide Turnback (Marina Car Park)	16,250	Medium	Low	Medium
B	CC-16400	UBB30 Malahide Viaduct	16,400	Low	Low	High
C	CC-18800	Donabate Substation	18,800	Medium	Low	N/A
C	CC-19800	Donabate Station	19,800	High	Low	N/A
C	CC-23500	Rush and Lusk Station	23,500	Low	Low	N/A
C	CC-23772 (E)	Rush and Lusk	23,772	Low	Low	N/A
C	CC-23772 (W)	Rush and Lusk	23,772	Negligible	Negligible	N/A
C	CC-25100	OBB44 Track Lowering	25,100	Low	Low	N/A
C	CC-25626 (E)	Tyrrelstown	25,626	Negligible	Negligible	N/A
C	CC-25626 (W)	Tyrrelstown	25,626	Negligible	Negligible	N/A
C	CC-27460 (E)	Baldongan	27,460	Negligible	Negligible	N/A
C	CC-27460 (E)	Baldongan	27,460	Negligible	Negligible	N/A
C	CC-29000	Skerries South Substation	29,000	Medium	Low	N/A
C	CC-29140 (E)	Golf Link Road	29,140	Negligible	Negligible	N/A
C	CC-29140 (E)	Golf Link Road	29,140	Low	Negligible	N/A

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
C	CC-30200	Skerries Station	30,200	Low	Low	N/A
C	CC-32200	Skerries North Substation	32,200	Medium	Low	N/A
C	CC-34,600 (E)	Balbriggan	34,600	Medium	Low	N/A
C	CC-34,600 (W)	Balbriggan	34,600	Low	Low	N/A
C	CC-36000	UBB56 Balbriggan Viaduct	36,000	Medium	Low	N/A
C	CC-37700	Balbriggan Substation	37,700	Low	Low	N/A
D	CC-40200	Gormanston Station	40,200	Low	Low	N/A
D	CC-41400	Gormanston Substation	41,400	Low	Low	N/A
D	CC-44390	Laytown	44,390	Medium	Low	N/A
D	CC-44390	Laytown	44,390	Low	Low	N/A
D	CC-44500	UBB72 Laytown Viaduct (South Abutment)	44,500	Medium	Low	High
D	CC-44600	UBB72 Laytown Viaduct (South Pier)	44,600	Low	Low	High
D	CC-44700	UBB72 Laytown Viaduct (North Pier)	44,700	Low	Low	High
D	CC-44900	Laytown Station	44,900	Medium	Low	N/A
D	CC-45,200 (E)	Laytown	45,200	Medium	Low	N/A
D	CC-46900	Bettystown Substation	46,900	Medium	Low	N/A
D	CC-49600	OBB78 Track Lowering	49,600	Low	Low	N/A
D	CC-50270 (S)	Drogheda	50,270	Low	Negligible	N/A
D	CC-50270 (N)	Drogheda	50,270	Negligible	Negligible	N/A
D	CC-51700 (S)	Drogheda	51,700	Low	Low	N/A
E	CC-51800	OBB80 (North)	51,800	Medium	Low	N/A
E	CC-51900	OBB80 (South)	51,900	Medium	Low	N/A
E	CC-52050	Drogheda Substation	52,050	Low	Low	N/A
E	CC-52250	Drogheda Station	52,250	Low	Negligible	N/A
E	CC-52200	UBK01 Dublin Road Overbridge (Car Park)	52,200	Low	Low	N/A

Note: Summary of Risk defined as per IAQM Guidance (IAQM 2014)

Table 12-28 Summary of Construction Risk to Define Site-Specific Mitigation

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
A	Rail line			Low	Low	N/A
B	Rail line			High	Medium	High
C	Rail line			High	Medium	High
D	Rail line			High	Medium	High
E	Rail line			High	Low	N/A
A	CC-2650	Fairview Depot (R834 Entrance car park)	2650	Negligible	Negligible	N/A
A	CC-2700	Fairview Depot (R834 Entrance car park)	2700	Negligible	Negligible	N/A
A	CC-3000	Fairview Depot (R807 Entrance car park)	3,100	Negligible	Negligible	N/A
B	CC-9000	Howth Junction and Donaghmede Station (Donaghmede Entrance)	9,000	Low	Low	N/A
B	CC-9050	Howth Junction and Donaghmede Station (Kilbarrack Entrance) Station	9,050	Low	Low	N/A
B	CC-9100	Howth Junction and Donaghmede Station (Central Access) Station	9,100	Low	Low	N/A
B	CC-9200	Howth Junction and Donaghmede Station (Baldoyle Industrial Estate) Station	9,200	Low	Low	N/A
B	CC-10600	Clongriffin Station	10,600	Low	Low	N/A
B	CC-15900E	Malahide Turnback (Strand Court)	15,900	Low	Negligible	N/A
B	CC-15900W	Malahide Turnback (Bissett's Strand)	15,900	Low	Negligible	Low
B	CC-16100	Malahide Turnback (Caves Strand)	16,100	Negligible	Negligible	Low
B	CC-16250	Malahide Turnback (Marina Car Park)	16,250	Low	Negligible	Medium
B	CC-16400	UBB30 Malahide Viaduct	16,400	Low	Low	Medium
C	CC-18800	Donabate Substation	18,800	Medium	Low	N/A
C	CC-19800	Donabate Station	19,800	High	Low	N/A
C	CC-23500	Rush and Lusk Station	23,500	Low	Low	N/A
C	CC-23772 (E)	Rusk & Lusk	23,772	Low	Negligible	N/A

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
C	CC-23772 (W)	Rusk & Lusk	23,772	Negligible	Negligible	N/A
C	CC-25100	OBB44 Track Lowering	25,100	Negligible	Negligible	N/A
C	CC-25626 (E)	Tyrrelstown	25,626	Negligible	Negligible	N/A
C	CC-25626 (W)	Tyrrelstown	25,626	Negligible	Negligible	N/A
C	CC-27460 (E)	Baldongan	27,460	Negligible	Negligible	N/A
C	CC-27460 (W)	Baldongan	27,460	Negligible	Negligible	N/A
C	CC-29000	Skerries South Substation	29,000	Medium	Low	N/A
C	CC-29140 (E)	Golf Links Road	29,140	Negligible	Negligible	N/A
C	CC-29140 (W)	Golf Links Road	29,140	Low	Negligible	N/A
C	CC-30200	Skerries Station	30,200	Low	Low	N/A
C	CC-32200	Skerries North Substation	32,200	Medium	Low	N/A
C	CC-34600 (E)	Balbriggan	34,600	Low	Negligible	N/A
C	CC-34600 (W)	Balbriggan	34,600	Negligible	Negligible	N/A
C	CC-36000	UBB56 Balbriggan Viaduct	36,000	Low	Negligible	N/A
C	CC-37700	Balbriggan Substation	37,700	Low	Low	N/A
D	CC-40200	Gormanston Station	40,200	Low	Low	N/A
D	CC-41400	Gormanston Substation	41,400	Low	Low	N/A
D	CC-44390 (E)	Laytown	44,390	Medium	Low	N/A
D	CC-44390 (E)	Laytown	44,390	Medium	Low	N/A
D	CC-44500	UBB72 Laytown Viaduct (South Abutment)	44,500	Low	Negligible	Medium
D	CC-44600	UBB72 Laytown Viaduct (South Pier)	44,600	Negligible	Negligible	Medium
D	CC-44700	UBB72 Laytown Viaduct (North Pier)	44,700	Negligible	Negligible	Medium
D	CC-44900	Laytown Station	44,900	Low	Negligible	N/A
D	CC-45200(E)	Laytown	45,200	Low	Negligible	N/A
D	CC-46900	Bettystown Substation	46,900	Medium	Low	N/A
D	CC-49600	OBB78 Track Lowering	49,600	Negligible	Negligible	N/A

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
D	CC-50270 (S)	Drogheda	50,270	Low	Negligible	N/A
D	CC-50270 (N)	Drogheda	50,270	Negligible	Negligible	N/A
D	CC-51700 (S)	Drogheda	51,700	Low	Negligible	N/A
E	CC-51800	OBB80 (North)	51,800	Medium	Low	N/A
E	CC-51900	OBB80 (South)	51,900	Medium	Low	N/A
E	CC-52050	Drogheda Substation	52,050	Low	Low	N/A
E	CC-52250	Drogheda Station	52,250	Low	Negligible	N/A
E	CC-52200	UBK01 Dublin Road Overbridge (Car Park)	52,200	Low	Low	N/A

Note: Summary of Risk defined as per IAQM Guidance (IAQM 2014)

Table 12-29 Summary of Trackout Risk to Define Site-Specific Mitigation

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
A	Rail line			Medium	Medium	N/A
B	Rail line			High	Medium	High
C	Rail line			High	Medium	High
D	Rail line			High	Medium	High
E	Rail line			High	Low	N/A
A	CC-2650	Fairview Depot (R834 Entrance car park)	2650	Low	Low	N/A
A	CC-2700	Fairview Depot (R834 Entrance car park)	2700	Low	Low	N/A
A	CC-3000	Fairview Depot (R807 Entrance car park)	3,100	Low	Low	N/A
B	CC-9000	Howth Junction and Donaghmede Station (Donaghmede Entrance)	9,000	Low	Low	N/A
B	CC-9050	Howth Junction and Donaghmede Station (Kilbarrack Entrance) Station	9,050	Low	Low	N/A
B	CC-9100	Howth Junction and Donaghmede Station (Central Access) Station	9,100	Low	Low	N/A
B	CC-9200	Howth Junction and Donaghmede Station (Baldoyle Industrial Estate) Station	9,200	Low	Low	N/A
B	CC-10600	Clongriffin Station	10,600	Low	Low	N/A
B	CC-15900E	Malahide Turnback (Strand Court)	15,900	Medium	Low	N/A
B	CC-15900W	Malahide Turnback (Bissett's Strand)	15,900	Medium	Low	Medium
B	CC-16100	Malahide Turnback (Caves Strand)	16,100	Low	Low	Medium

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
B	CC-16250	Malahide Turnback (Marina Car Park)	16,250	Medium	Low	Medium
B	CC-16400	UBB30 Malahide Viaduct	16,400	Low	Low	High
C	CC-18800	Donabate Substation	18,800	Medium	Low	N/A
C	CC-19800	Donabate Station	19,800	High	Low	N/A
C	CC-23500	Rush and Lusk Station	23,500	Low	Low	N/A
C	CC-23772 (E)	Rusk & Lusk	23,772	Medium	Low	N/A
C	CC-23772 (W)	Rusk & Lusk	23,772	Low	Low	N/A
C	CC-25100	OBB44 Track Lowering	25,100	Low	Low	N/A
C	CC-25626 (E)	Tyrrelstown	25,626	Low	Low	N/A
C	CC-25626 (W)	Tyrrelstown	25,626	Low	Low	N/A
C	CC-27460 (E)	Baldongan	27,460	Low	Low	N/A
C	CC-27460 (W)	Baldongan	27,460	Low	Low	N/A
C	CC-29000	Skerries South Substation	29,000	Medium	Low	N/A
C	CC-29140	Golf Links Road	29,140	Low	Low	N/A
C	CC-29140	Golf Links Road	29,140	Medium	Low	N/A
C	CC-30200	Skerries Station	30,200	Low	Low	N/A
C	CC-32200	Skerries North Substation	32,200	Medium	Low	N/A
C	CC-34600(E)	Balbriggan	34,600	Medium	Low	N/A
C	CC-34600(W)	Balbriggan	34,600	Low	Low	N/A
C	CC-36000	UBB56 Balbriggan Viaduct	36,000	Medium	Low	N/A
C	CC-37700	Balbriggan Substation	37,700	Low	Low	N/A
D	CC-40200	Gormanston Station	40,200	Low	Low	N/A
D	CC-41400	Gormanston Substation	41,400	Low	Low	N/A
D	CC-44390 (E)	Laytown	44,390	Medium	Low	N/A
D	CC-44390 (W)	Laytown	44,390	Low	Low	N/A
D	CC-44500	UBB72 Laytown Viaduct (South Abutment)	44,500	Medium	Low	N/A
D	CC-44600	UBB72 Laytown Viaduct (South Pier)	44,600	Low	Low	N/A
D	CC-44700	UBB72 Laytown Viaduct (North Pier)	44,700	Low	Low	High

Zone	Compound code	Location	Chainage	Dust Nuisance Risk	Human Health Risk	Sensitive Ecology Risk
D	CC-44900	Laytown Station	44,900	Medium	Low	N/A
D	CC-45200 (E)	Laytown	45,200	Medium	Low	N/A
D	CC-46900	Bettystown Substation	46,900	Medium	Low	N/A
D	CC-49600	OBB78 Track Lowering	49,600	Low	Low	N/A
D	CC-50270 (S)	Drogheda	50,270	Medium	Low	N/A
D	CC-50270 (N)	Drogheda	50,270	Low	Low	N/A
D	CC-51,700 (S)	Drogheda	51,700	Medium	Low	N/A
E	CC-51800	OBB80 (North)	51,800	Medium	Low	N/A
E	CC-51900	OBB80 (South)	51,900	Medium	Low	N/A
E	CC-52050	Drogheda Substation	52,050	Low	Low	N/A
E	CC-52250	Drogheda Station	52,250	Medium	Low	N/A
E	CC-52200	UBK01 Dublin Road Overbridge (Car Park)	52,200	Low	Low	N/A

Note: Summary of Risk defined as per IAQM Guidance (IAQM 2014)

12.5.2 Summary of Potential Dust Impacts

The risk of dust impacts because of the proposed development are summarised in Table 12-30. The magnitude of risk determined is used to prescribe the level of site-specific mitigation required for each activity to prevent significant impacts occurring.

In accordance with the EPA Guidelines (EPA 2022) the likely effects associated with the Construction Phase dust emissions pre-mitigation are overall *negative, moderate, and short-term*.

Table 12-30 Summary of Overall Dust Impact Risk to Define Site-Specific Mitigation

Zone	Compound code	Location	Chainage	Worst Case Risk
A	Rail line			Low
B	Rail line			High
C	Rail line			High
D	Rail line			High
E	Rail line			High
A	CC-2650	Fairview Depot (R834 Entrance car park)	2650	Low
A	CC-2700	Fairview Depot (R834 Entrance car park)	2700	Low
A	CC-3000	Fairview Depot (R807 Entrance car park)	3,100	Low

Zone	Compound code	Location	Chainage	Worst Case Risk
B	CC-9000	Howth Junction and Donaghmede Station (Donaghmede Entrance)	9,000	Low
B	CC-9050	Howth Junction and Donaghmede Station (Kilbarrack Entrance) Station	9,050	Low
B	CC-9100	Howth Junction and Donaghmede Station (Central Access) Station	9,100	Low
B	CC-9200	Howth Junction and Donaghmede Station (Baldoyle Industrial Estate) Station	9,200	Low
B	CC-10600	Clongriffin Station	10,600	Low
B	CC-15900E	Malahide Turnback (Strand Court)	15,900	Medium
B	CC-15900W	Malahide Turnback (Bissett's Strand)	15,900	Medium
B	CC-16100	Malahide Turnback (Caves Strand)	16,100	Medium
B	CC-16250	Malahide Turnback (Marina Car Park)	16,250	High
B	CC-16400	UBB30 Malahide Viaduct	16,400	High
C	CC-18800	Donabate Substation	18,800	Medium
C	CC-19800	Donabate Station	19,800	High
C	CC-23500	Rush and Lusk Station	23,500	Low
C	CC-23772 (E)	Rusk & Lusk	23,772	Medium
C	CC-23772 (W)	Rusk & Lusk	23,772	Low
C	CC-25100	OBB44 Track Lowering	25,100	Low
C	CC-25626 (E)	Tyrelstown	25,626	Low
C	CC-25626 (W)	Tyrelstown	25,626	Low
C	CC-27460 (E)	Baldongan	27,460	Low
C	CC-25626 (E)	Tyrelstown	25,626	Low
C	CC-29000	Skerries South Substation	29,000	Medium
C	CC-29140 (E)	Golf Links Road	29,140	Low
C	CC-29140 (W)	Golf Links Road	29,140	Medium
C	CC-30200	Skerries Station	30,200	Low
C	CC-32200	Skerries North Substation	32,200	Medium
C	CC-34600	Balbriggan	34,600	Medium
C	CC-34600	Balbriggan	34,600	Low
C	CC-36000	UBB56 Balbriggan Viaduct	36,000	Medium
C	CC-37700	Balbriggan Substation	37,700	Low
D	CC-40200	Gormanston Station	40,200	Low
D	CC-41400	Gormanston Substation	41,400	Low
D	CC-44390 (E)	Laytown	44,390	Medium
D	CC-44390 (W)	Laytown	44,390	Low

Zone	Compound code	Location	Chainage	Worst Case Risk
D	CC-44500	UBB72 Laytown Viaduct (South Abutment)	44,500	High
D	CC-44600	UBB72 Laytown Viaduct (South Pier)	44,600	High
D	CC-44700	UBB72 Laytown Viaduct (North Pier)	44,700	High
D	CC-44900	Laytown Station	44,900	Medium
D	CC-45200 (E)	Laytown	45,200	Medium
D	CC-46900	Bettystown Substation	46,900	Medium
D	CC-49600	OBB78 Track Lowering	49,600	Low
D	CC-50270 (S)	Drogheda	50,270	Medium
D	CC-50270 (N)	Drogheda	50,270	Low
D	CC-51560 (S)	Drogheda	51,560	Medium
E	CC-51800	OBB80 (North)	51,800	Medium
E	CC-51900	OBB80 (South)	51,900	Medium
E	CC-52050	Drogheda Traction Substation	52,050	Low
E	CC-52250	Drogheda Station	52,250	Medium
E	CC-52200	UBK01 Dublin Road Overbridge (Car Park)	52,200	Low

Note: Summary of Risk defined as per IAQM Guidance (IAQM 2014)

12.5.3 Potential Operational Impacts

The proposed development's primary objective is to provide a higher frequency, higher capacity, electrified heavy rail service. The Do Minimum (DM) and Do Something (DS) regional emissions from the railway have been quantified using the assessment method detailed in Section 12.3.5. The DM is defined as the scenario where the current rail schedule continues and the previously approved battery-electric multiple units (BEMUs) has been already implemented.

The DS is defined as the scenario where the rail schedule is updated as per the proposed development. Table 12-31 shows the change to carriage numbers on rail sections which are currently in operation using data provided by Iarnród Éireann. The rail traffic figures can be used in conjunction with the length of the section and the emission factors detailed in Section 12.3.5.3 to calculate the mass pollutant emission. A sizable increase in the number of carriages and trains daily are proposed as part of the proposed development.

For the DM, information has been provided on the number of carriages each locomotive has attached. This information has been utilised in calculating the total number of trains and carriages on a section of track (this assumes total train movements in both directions over a 24h period). For the DM, the existing EMUs are assumed to have 8 carriages, the new EMUs/BEMUs will have 10 carriages. For DMUs 8 carriages was assumed. In addition, both passenger and technical movements have been included for the DM and DS.

Table 12-31 Changes to Carriage Numbers

Section of Track	DMU		Change Carriages Daily	EMU		Change Carriage Daily
	DM	DS		DM	DS	
Connolly - Howth Junction (MP 0 1/4 - MP 4 3/4)	467	467	0 (0%)	2,186	2,200	14 (0.64%)
Howth Junction - Clongriffin (MP 4 3/4 -MP 5 3/4)	467	467	0 (0%)	1,426	2,200	774 (54%)
Clongriffin - Malahide Viaduct (MP 5 3/4 -MP 10 3/4)	467	467	0 (0%)	1,426	1,700	274 (19%)
Howth Branch	0	0	0 (0%)	1,056	1,490	434 (41%)
Malahide - South Gormanston (MP 10 3/4 -MP 24)	467	467	0 (0%)	530	1,200	670 (126%)
South Gormanston - Louth/Meath Border (MP 24 -MP 31 1/4)	467	467	0 (0%)	530	1,200	670 (126%)
Drogheda Station and Surrounds (MP 31 1/4 -MP 32 (ML)) (0 - 0 1/2 (Navan))	467	467	0 (0%)	530	1,200	670 (126%)
Total	**2,802**	**2,802**	**0 (0%)**	**7,684**	**11,190**	**3,506 (46%)**

Mass pollutant emissions produced in both the DM and DS scenarios during the Operational Phase are shown in Table 12-32 and

Table 12-33 respectively.

Table 12-34 shows the change in mass emissions between the DM and DS. The proposed development is beneficial, with reductions in emissions of all pollutants modelled. PM_{10} is not a pollutant which is included in the National Air Emission Targets and therefore is not included in the comparison.

The majority of these reductions result from the shift from diesel units to electric rail units. The impact in emissions is significant enough that the increased frequency (6 trains presently to 12 trains in the

future per hour) and capacity of the service does not result in an overall significant adverse impact. The emissions in the DS include emissions with respect to the generation of electricity to power the EMUs. As the national grid decarbonises in line with the 2024 CAP (up to 80% renewables by 2030) the improvements will become larger as fewer fossil fuels will be required to generate each kWh. Emissions calculations are based on this 80% target being reached by the national grid. IÉ has agreed to purchase of up to 80% of its operational demand from certified low or zero carbon electricity operations. This will ensure that should the CAP target of 80% renewables not be achieved, the proposed DART+ Coastal North project will still achieve this percentage.

Table 12-32 Do-Minimum (DM) Rail Emissions

Stations	Kg NO_x	Kg $PM_{2.5}$	Kg SO_2	Carriage KM Travelled
DM-DMUs				
Connolly - Howth Junction (MP 0 1/4 -MP 4 3/4)	65.75	1.67	0.60	2,988
Howth Junction - Clongriffin (MP 4 3/4 - MP 5 3/4)	16.44	0.42	0.15	747
Clongriffin - Malahide Viaduct (MP 5 3/4 - MP 10 3/4)	82.19	2.09	0.75	3,736
Howth Branch	0	0	0	0
Malahide - South Gormanston (MP 10 3/4 -MP 24)	219	5.57	1.99	9947.10
South Gormanston - Louth/Meath Border (MP 24 -MP 31 1/4)	119	3.03	1.08	5,417
Drogheda Station and Surrounds (MP 31 1/4 -MP 32 (ML)) (0 - 0 1/2 (Navan))	12.33	0.31	0.11	560
Sum Daily (kg Pollutant)	**515**	**13.1**	**4.7**	**23,397**
Sum Annually (kg Pollutant)	**187,875**	**4,782**	**1,708**	**8,539,796**
DM-EMUs				
Connolly - Howth Junction (MP 0 1/4 -MP 4 3/4)	0.65	0.03	0.24	13,990
Howth Junction - Clongriffin (MP 4 3/4 - MP 5 3/4)	0.11	0.00	0.04	2,281
Clongriffin - Malahide Viaduct (MP 5 3/4 - MP 10 3/4)	0.53	0.02	0.20	11,408
Howth Branch	0.26	0.01	0.10	5,702

Stations	Kg NO_x	Kg $PM_{2.5}$	Kg SO_2	Carriage KM Travelled
Malahide - South Gormanston (MP 10 3/4 -MP 24)	0.52	0.02	0.19	11,289
South Gormanston - Louth/Meath Border (MP 24 -MP 31 1/4)	0.28	0.01	0.11	6,148
Drogheda Station and Surrounds (MP 31 1/4 -MP 32 (ML)) (0 - 0 1/2 (Navan))	0.03	0.00	0.01	636
Sum Daily (kg Pollutant)	**2.38**	**0.10**	**0.88**	**51,455**
Sum Annually (kg Pollutant)	**870**	**34.91**	**322**	**18,781,221**
Sum Daily (kg Pollutant)	**573**	**14.66**	**6.06**	**77,373.9**
Sum Annually (kg Pollutant)	**208,996**	**5,333**	**2,214**	**28,241,473**

Table 12-33 Do-Something (DS) Rail Emissions

Stations	Kg NO_x	Kg $PM_{2.5}$	Kg SO_2	Carriage KM Travelled
DS-DMUs				
Connolly - Howth Junction (MP 0 1/4 -MP 4 3/4)	65.75	1.67	0.60	2,989
Howth Junction - Clongriffin (MP 4 3/4 -MP 5 3/4)	16.44	0.42	0.15	747
Clongriffin - Malahide Viaduct (MP 5 3/4 -MP 10 3/4)	82.19	2.09	0.75	3,736
Howth Branch	0.00	0.00	0.00	0
Malahide - South Gormanston (MP 10 3/4 -MP 24)	219	5.57	1.99	9,947
South Gormanston - Louth/Meath Border (MP 24 -MP 31 1/4)	119	3.03	1.08	5,417
Drogheda Station and Surrounds (MP 31 1/4 -MP 32 (ML)) (0 - 0 1/2 (Navan))	12.33	0.31	0.11	560
Sum Daily (kg Pollutant)	**515**	**13.10**	**4.68**	**23,397**
Sum Annually (kg Pollutant)	**187,876**	**4,782**	**1,708**	**8,539,796**
DS-EMUs				
Connolly - Howth Junction (MP 0 1/4 -MP 4 3/4)	0.65	0.03	0.24	14,080
Howth Junction - Clongriffin (MP 4 3/4 -MP 5 3/4)	0.16	0.01	0.06	3,520

Stations	Kg NO_x	Kg $PM_{2.5}$	Kg SO_2	Carriage KM Travelled
Clongriffin - Malahide Viaduct (MP 5 3/4 -MP 10 3/4)	0.63	0.03	0.23	13,60
Howth Branch	0.37	0.01	0.14	8,046
Malahide - South Gormanston (MP 10 3/4 - MP 24)	1.18	0.05	0.44	25,560
South Gormanston - Louth/Meath Border (MP 24 -MP 31 1/4)	0.64	0.03	0.24	13,920
Drogheda Station and Surrounds (MP 31 1/4 -MP 32 (ML)) (0 - 0 1/2 (Navan))	0.07	0.00	0.02	1,440
Sum Daily (kg Pollutant)	**3.71**	**0.15**	**1.38**	**80,166**
Sum Annually (kg Pollutant)	**1,356**	**54.4**	**502**	**29,260,590**
DS-All Rail				
Sum Daily (kg Pollutant)	**518**	**13.25**	**6.05**	**103,563**
Sum Annually (kg Pollutant)	**189,231**	**4,837**	**2,210**	**37,800,386**

Table 12-34 Change in Rail Emissions

Stations	Kg NO_x	Kg $PM_{2.5}$	Kg SO_2
DS-DM-All Rail			
Change Daily (kg Pollutant)	1.3	0.05	0.49
Change Annually (kg Pollutant)	485	19.5	179.8
DS as Percentage of DM	100.3%	100.4%	108.9%
Change as % of the 2030 National Target (Article 4 (1) of Directive 2016/2284)	0.000003%	0.00000048%	0.0000045%

In accordance with the EPA Guidelines (EPA 2022) the likely effects associated with the Operational Phase rail traffic emissions pre-mitigation are overall neutral and long-term.

12.6 Mitigation Measures

To sufficiently ameliorate the likely air quality impact of the proposed development, a schedule of air quality control measures has been formulated for both Construction and Operational Phases associated with the proposed development.

12.6.1 Construction Phase

12.6.1.1 Construction Phase Dust Mitigation Measures

Details on construction methods can be found in Chapter 5 (Construction Strategy), in Volume 2 of the EIAR, which contains an overview of the typical activities and methods that are anticipated to be used during the Construction Phase of the proposed development. In addition, the mitigation measures documented in this section and Appendix A12.1 (Dust Mitigation Measures), in Volume 4 of the EIAR, will be implemented in parallel with the Construction Environmental Management Plan (CEMP) (Appendix A5.1 in Volume 4 of this EIAR). Before commencing relevant works, an air quality management plan will be prepared by the contractor and submitted for approval to the relevant planning authorities.

The plan must include all appropriate dust and emissions mitigation measures, applicable to the circumstances of the relevant site, based on the local authority requirements and industry best practices. Dublin City Council (DCC) guidance document titled Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition (DCC 2018) will be taken into consideration with respect to mitigation dust measures.

The plan will be developed by the contractor and for each worksite shall include:

- An inventory and timetable of activities which may give rise to emissions or dust;
- Alert levels;
- Alert system to be used (including notification process);
- Details of control measures; and
- Details of dust monitoring arrangements, including the location of sensitive receptors, monitoring locations, and monitoring equipment to be used.

12.6.1.2 Details of the air quality reporting requirements

A pre-construction dilapidation survey of all bridge structures requiring demolition will be required prior to commencement of the Construction Phase. There are no buildings which have shown potential for asbestos containing material, however, a fully intrusive asbestos-containing materials survey, will be completed if asbestos potential is indicated in the pre-construction dilapidation survey. Prior to commencement of the demolition works, all asbestos containing materials identified by the Asbestos Survey and Refurbishment and Demolition Survey will be removed by a suitably trained and competent person. Asbestos-containing materials will only be removed from site by a suitably permitted/licensed waste contractor and will be brought to a suitably licensed facility. The Health and Safety Authority will be contacted where needed in relation to the handling of asbestos and material will be dealt with in accordance with the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006 (S.I. 386 of 2006), as amended and associated approved Codes of Practice. The mitigation measures put in place to control construction dust will be implemented as mitigation measures with respect to aspergillus as they will minimise the potential for spread of the fungal spores. To ensure that no dust nuisance occurs, a series of measures will be implemented, these have been detailed in Appendix A12.1 (Dust Mitigation Measures) in Volume 4 of the EIAR.

In summary, the measures which will be implemented will include:

- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;
- Liaison with local authorities and community groups;
- Hoarding will be provided around the construction compounds; and
- It is anticipated that methods of collecting rainwater and recycling for general site use, will be adopted where reasonably practical. Strict dust prevention will always be in place, to minimise any potential emissions and these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

12.6.1.3 Construction Phase Traffic Mitigation Measures

The modelling of road traffic for impacts on human and ecological receptors has found no significant impacts that require mitigation measures with respect to the modelling of emissions. However, some mitigation measures will be put in place to minimise emissions as far as reasonably practicable:

- Implement a policy which prevents idling of vehicles both on and off-site including HGV holding sites;
- Construction Phase traffic should be monitored to ensure construction vehicles are using the designated haul routes;
- The contractor must adhere to defined traffic routes as noted in the Construction Traffic Management Plan;
- Efficient scheduling of deliveries to minimise number of truck movements;

- Construction vehicles should conform to the current EU emissions standards and where reasonably practicable, their emissions should meet upcoming standards prior to the legal requirement date for the new standard. This will ensure emissions on haul routes are minimised. Mitigation measures are required for the control of dust with respect to HGV movements onsite and deliveries to/from the site:
    - HGV traffic leaving site will pass through a wheel wash.
    - Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary. If public roads are deemed to require additional cleaning where possible a suction device for road cleaning will be utilised to access spaces around cars and other street furniture more effectively.
    - During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

12.6.2 Operational Phase

As the Operational Phase of the development will result in neutral impacts, no specific Operational Phase mitigation measures are required.

12.7 Monitoring

12.7.1 Construction Phase

Monitoring of construction dust deposition at nearby sensitive receptors during the Construction Phase of the proposed development is proposed 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 Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2 m above ground level. The TA Luft limit value is 350 mg/(m^2day) during the monitoring period between 28-32 days. Consistent implementation of good dust minimisation practices will ensure that the likely effects from construction dust is short-term, localised, reversible and not significant when considered with respect to the EPA description of effects (EPA 2022).

12.7.2 Operational Phase

No monitoring is proposed for the Operational Phase.

12.8 Residual Effects

12.8.1 Construction Phase

No significant adverse impacts are likely to arise during the Construction Phase following the implementation of mitigation measures.

12.8.2 Operational Phase

No significant adverse impacts are identified during the Operational Phase.

12.9 Cumulative Effects

The cumulative assessment of relevant plans and projects is undertaken separately in Chapter 26 (Cumulative Effects) in Volume 2 of this EIAR.

12.10 References

DCC (2009). Dublin Regional Air Quality Management Plan 2009 – 2012.

DCC (2018). Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition.

DCC (2021). Dublin Air Quality Plan 2021 (Air Quality Plan to Improve Nitrogen Dioxide Levels in Dublin Region).

DEFRA (2022a). United Kingdom (UK) Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management Policy Guidance (PG22) (hereafter referred to as LAQM (PG22))

DEFRA (2022b). Part IV of the Environment Act 1995: Local Air Quality Management Technical Guidance (TG22).

Environment Agency (EA) (2014). AGTAG06 – Technical Guidance On Detailed Modelling Approach For An Appropriate Assessment For Emissions To Air.

Environmental Protection Agency (EPA) (2020a) Urban Environmental Indicators: Nitrogen dioxide levels in Dublin.

EPA (2020b). Diffusion Tube Results [Online] Available from https://www.epa.ie/air/quality/diffusiontuberesults/

EPA (2022a). Air Quality in Ireland 2021.

EPA (2022b). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. May 2022.

Government of Ireland (2004). Quarries and Ancillary Activities, Guidelines for Planning Authorities.

IAQM (2024). Guidance on the Assessment of Dust from Demolition and Construction.

IAQM (2020). A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites.

Iarnród Éireann (2021). Delivering Sustainability for 21st Century Ireland

Iarnród Éireann (2023). Climate Action Plan (2023 – 2030)

Met Éireann (2020). Historical Data – Dublin Airport. [Online] Available from https://www.met.ie/climate/available-data/historical-data

TII (2009). Guidelines for Assessment of Ecological Impacts of National Roads Schemes (Rev. 2, National Roads Authority, 2009).

TII (2022). Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes.

UK Highways Agency (2007). Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 - HA207/07 (Document & Calculation Spreadsheet).

UKHA (2019). Design Manual for Roads and Bridges – LA 105 Air Quality. Available from https://www.standardsforhighways.co.uk/prod/attachments/10191621-07df-44a3-892e-c1d5c7a28d90?inline=true

UNECE (2022). Draft Review and Revision of Empirical Critical Loads and Dose-Response Relationships.

Verein Deutscher Ingenieure (VDI) (2002). German Technical Instructions on Air Quality Control – TA Luft standard for dust deposition.

World Health Organisation (WHO) (2006). Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide Global Update 2005.

WHO (2021). WHO Global Air Quality Guidelines: Particulate Matter ($PM_{2.5}$ and PM_{10}), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide.

Directives and Legislation

Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air.

Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management and daughter directives.

Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air.

Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants.

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.

Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC.

S.I. 739 of 2022 Air Quality Standards Regulations 2022.