Bonneagar Iompair Éireann
Transport Infrastructure Ireland

NTA
Údarás Náisiúnta Iompair
National Transport Authority

Luas Finglas

Environmental Impact Assessment Report 2024

Chapter 13: Air Quality

BARRY TRANSPORTATION
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Project Ireland 2040
Building Ireland's Future

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GLOSSARY OF FREQUENTLY USED TERMS

Acronym	Term
ADDT	Annual Average Daily Traffic
ARN	Affected Road Network
AQA	Air Quality Assessment
AQG	Air Quality Guideline
CAFE	Ambient Air Quality and Cleaner Air for Europe
CAP	Climate Action Plan
CEMP	Construction Environmental Management Plan
CO	Carbon Monoxide
DCC	Dublin City Council
DMP	Dust Management Plan
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
Pb	Lead
NH_3	Ammonia
NO_2	Nitrogen Dioxide
O_3	Ozone
OTD	Overarching Technical Document
PM	Particulate Matter
P&R	Park & Ride facility
SO_2	Sulphur Dioxide
TII	Transport Infrastructure Ireland
UNEP	United Nations Environment Program
WHO	World Health Organisation

SECTION 13: AIR QUALITY

13.1 Introduction

13.1.1 Purpose of this Report

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the air quality impact of Luas Finglas (hereafter referred to as the proposed Scheme) during the Construction Phase and Operational Phase. In accordance with the requirements of Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (i.e. the EIA Directive), it describes and assesses the likely direct and indirect significant effects of the proposed Scheme on air quality. This Chapter also provides a characterisation of the receiving environment within the proposed Scheme and within a wider study area in the vicinity of the proposed Scheme.

This Chapter should be read in conjunction with the following Chapters, and their Appendices, which present related impacts arising from the proposed Scheme and proposed mitigation measures to ameliorate the predicted impacts:

- Chapter 7 (Human Health);
- Chapter 8 (Population);
- Chapter 9 (Biodiversity);
- Chapter 11 (Land and Soils;
- Chapter 14 (Climate);
- Chapter 18 (Material Assets: Traffic and Transport); and
- Chapter 21 (Landscape and Visual Amenity).

The assessment is based on a worst-case scenario with respect to potential impacts arising from the proposed Scheme as described in Chapter 1 (Introduction) and in Chapter 5 (Description of the proposed Scheme) of this EIAR. The Description of the proposed Scheme is based on the design prepared to inform the planning stage of Luas Finglas and to allow for a robust assessment as part of the Environmental Impact Assessment (EIA) Process.

During the Construction Phase, the potential air quality impacts associated with the construction of the proposed Scheme have been assessed. This includes for construction activities such as demolition, excavations, rail carriageway and utilities construction, construction traffic haul routes, etc. which have been assessed as part of the construction phase of the proposed Scheme.

During the Operational Phase, the potential air quality impacts associated with altered traffic flows, including the changes in traffic flow volumes on account of the operation of the proposed Scheme and the Park & Ride facility at St Margaret's Road, have been assessed. The proposed Scheme itself is not an air pollutant emission source as the proposed Scheme is powered by electricity, which is more environmentally friendly than most other forms of transport which are fuelled by fossil fuels. Luas approach to energy consumption focuses on efficiency and the use of renewable energy sources. Luas has already transitioned to using 100% wind-generated electricity for its operations, significantly reducing reliance on fossil fuels and hence, reducing air pollutant emissions.

The proposed Scheme will impact positively on air quality by reducing transport emissions by providing a frequent, reliable, high capacity, electrified rail service and connected with an increase in cycle-LRT trips contributes to the modal shift away from private cars, thereby improving transport emissions. The interconnectivity between the light rail elements of Luas Finglas and the cycling facilities (segregated cycle lanes, bike parking facilities etc.) being provided as part of the Scheme, facilitate the multimodal shift to active travel "cycle LRT trips" as a core part of the Luas Finglas scheme. Integrated bicycle and LRT journeys are a convenient, fast and sustainable way to travel around Dublin, with added benefits for one's health and well-being, as well as improving air quality.

13.1.2 Outline Scheme Description

The proposed Scheme comprises a high-capacity, high-frequency light rail running from Broombridge to Charlestown, connecting Finglas and the surrounding areas with Dublin's wider public transport network by providing a reliable, and efficient public transport service to the city centre via Broombridge.

As shown in Volume 4 - Map Figure 1-1, starting from Broombridge, the proposed Scheme travels northwards, crossing the Royal Canal and the Maynooth railway line adjacent to Broome Bridge. It then runs adjacent to the east of Broombridge Road and the Dublin Industrial Estate. It then crosses the Tolka Valley Park before reaching the proposed St Helena's Stop and then proceeds northwards towards the proposed Luas Finglas Village Stop. From here, the route passes through a new corridor created within the Finglas Garda Station car park, making its eastern turn onto Mellowes Road. The route then proceeds through Mellowes Park, crossing Finglas Road, towards the proposed St Margaret's Road Stop. Thereafter, the proposed line continues along St Margaret's Road before reaching the terminus Stop proposed at Charlestown.

The proposed Scheme has been designed to integrate with the existing and future transport network, providing connections with bus services at all new Stops, mainline rail services at Broombridge, and a Park and Ride facility to intercept traffic on the N/M2. In addition, the proposed Scheme, through the inclusion of integrated cycle lanes and cycling infrastructure, sets out to facilitate multimodal "cycle- light rail transit (LRT) trips" as a key aspect of the Luas Finglas scheme.

The proposed Scheme will comprise a number of principal elements as outlined in Table 13-1 and Table 13-2. A full description of the proposed Scheme is provided in the following chapters of this Environmental Impact Assessment Report (EIAR):

- Chapter 1 (Introduction);
- Chapter 5 (Description of the proposed Scheme); and
- Chapter 6 (Construction Activities).

Table 13-1: Overview of the Key Features of the proposed Scheme

Scheme Key Features	Outline Description
Permanent Scheme Elements	
Light Rail track	3.9km extension to the Luas Green Line track from Broombridge to Finglas (2.8km of grass track, 700m of embedded track and 360m of structure track)
Depot Stabling facility	A new stabling facility (with stabling for eight additional LRVs) will be located just south of the existing Broombridge terminus, as an extension of the Hamilton depot area.
Luas Stops	Four Stops located at: St Helena's, Finglas Village, St Margaret's Road and Charlestown to maximise access from the catchment area including the recently re-zoned Jamestown Industrial Estate.
Main structures	Two new Light Rail Transit (LRT) bridges will be constructed as part of the proposed Scheme: a bridge over the River Tolka within the Tolka Valley Park and a bridge over the Royal Canal and the Iarnród Éireann (IÉ) railway line at Broombridge. A number of existing non-residential buildings shall be demolished to facilitate the proposed Scheme. In addition, the existing overbridge at Mellowes Park will be demolished.
At grade signalised junctions	10 at grade signalised junctions will be created at: Lagan Road, Ballyboggan Road, Tolka Valley Road, St Helena's Road, Wellmount Road, Cappagh Road, Mellowes Road, North Road (N2), McKee Avenue, Jamestown Business Park entrance. Note: The junction at Charlestown will be reconfigured but does not have a LRT crossing.

Scheme Key Features	Outline Description
Uncontrolled crossings	13 at grade uncontrolled crossings (11 pedestrian / cycle crossings and two local accesses located at: Tolka Valley Park, St Helena's, Farnham pitches, Patrickswell Place, Cardiff Castle Road, Mellowes Park, St Margarets Road, and ESB Networks.
Cycle facilities	Cycle lanes are a core part of the proposed Scheme in order to facilitate multimodal "cycle-LRT trips". Approximately 3km of segregated cycle lanes and 100m of non-segregated cycle lanes along the route. Covered cycle storage facilities will be provided at Broombridge Terminus, Finglas Village Stop and St Margaret's Road Stop and within the Park & Ride facility. "Sheffield" type cycle stands will be provided at all stop locations.
Power substations	Two new traction power substations for the proposed Scheme will be located near Finglas Village Stop behind the existing Fire Station, and near the N2 junction before St Margaret's Road Stop where the current spiral access ramp to the pedestrian overbridge is located. A third substation is required for the Park & Ride facility.
Park & Ride facility	A new Park & Ride facility, with e-charging substation, located just off the M50 at St Margaret's Road Stop will be provided with provision for 350 parking spaces and secure cycle storage to facilitate multimodal "cycle-LRT trips". The building will feature photovoltaic (PV) panel roofing and is the location for an additional radio antenna. This strategic Park and Ride facility will intercept traffic on the N/M2, before congestion begins to form.
Temporary Scheme Elements	
Construction compounds	There will be three principal construction compounds, two located west of Broombridge Road and one located at the northern extents of Mellowes Park. In addition, there are other secondary site compound locations for small works/storage. Details can be found in Chapter 6 (Construction Activities) of this EIAR.

Table 13-2: Summary of New Bridges of the proposed Scheme

Identity	Location	Description
Royal Canal and Rail Bridge	Approximately 10m east of the existing Broome Bridge and then continuing north, parallel with Broombridge Road on its east side	The proposed bridge is an eight-span structure consisting of two main parts: a variable depth weathering steel composite box girder followed by a constant depth solid concrete slab. The bridge has the following span arrangement: 35 + 47.5 + 30 + 17 + 3x22 + 17m. Steel superstructure extends over the first three spans. The bridge deck is continuous over the full length of 212.5m and has solid approach ramps at both ends.
Tolka Valley Park Bridge	Approximately 30m west of the existing Finglaswood Bridge	A three-span structure with buried end spans, thus appearing as a single span bridge. End spans as well as part of the main span consist of post-tensioned concrete variable depth girder, the central section of the main span is a suspended weathering steel composite box girder. The overall length of the bridge is 65m with spans 10m, 45m, 10m.

13.2 Methodology

The air quality impact assessment has been undertaken with reference to the most relevant and current guidance documents relating to this Chapter of the EIAR and the approach to the air quality impact assessment has been as follows:

- A baseline air quality monitoring study has been undertaken in order to characterise the existing ambient environment in the area of the proposed Scheme. This has included ambient air monitoring using

nitrogen dioxide diffusion tubes at representative sensitive locations in the study area of the proposed Scheme;
- A review of available published ambient air monitoring data relevant to the study area of the proposed Scheme has been undertaken;
- A review of the most applicable standards and guidelines has been done in order to define the air quality significance criteria for the Construction and Operational Phases of the proposed Scheme;
- An assessment of the likely Construction Phase air quality impacts has been undertaken at the nearest sensitive locations to the construction work areas associated with the proposed Scheme;
- An assessment of the likely Operational Phase air quality impacts associated with the altered traffic flows, including the changes in traffic flow volumes on account of the operation of the proposed Scheme and the Park & Ride facility at St Margaret's Road have been assessed; and
- A recommendation of appropriate mitigation measures has been outlined where required, to reduce Construction Phase and / or Operational Phase air quality impacts, where any identified potential air quality impacts associated with the proposed Scheme.

13.2.1 Study Area

The proposed Scheme is 3.9km in length and is the northern extension of the Luas Green Line from its current terminus in Broombridge to a new terminus in Charlestown, which will overpass the Royal Canal and the Maynooth railway line, will cross the Tolka Valley Park and proceed northward towards Luas Finglas Village Stop. The route will proceed through Mellowes Park, crossing Finglas Road, towards the proposed St Margaret's Road Stop. Thereafter, the proposed Scheme will continue along St Margaret's Road before reaching the terminus Stop proposed at Charlestown. The proposed Scheme will include four proposed Stops, an extension to the Luas Broombridge Hamilton Depot, a 350-space Park & Ride facility near St Margaret's Road, the Royal Canal and Rail Overbridge at Broombridge and the Tolka Valley Park Bridge, both of which are located at the southern end of the proposed Scheme, plus ancillary infrastructure.

The study area, within which the AQA is undertaken, includes all areas where a significant change in pollutant concentration at sensitive receptors may occur due to a significant change in traffic flow, composition and/or road alignments associated with the proposed scheme. The study area for the air quality impact assessment includes all sensitive receptors within a distance either side of the proposed Scheme up to a maximum distance of 250m during the Construction Phase, and 200m during the Operational Phase, in accordance with relevant Transport Infrastructure Ireland (TII) and Institute of Air Quality Management (IAQM 2024) guidance, as detailed below.

In terms of sensitive receptors, according to the IAQM, highly sensitive air quality receptors include residential properties, hospitals, schools and residential care homes, whilst commercial and workplace properties are generally viewed as being of medium sensitivity (IAQM 2024). According to TII, sensitive receptor locations include residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present (TII 2022). According to TII, designated ecologically sensitive areas of conservation (either Irish or European designation) are also considered sensitive air quality receptors (TII, 2022).

For the Construction Phase, the air quality impact assessment focuses on air quality sensitive receptors adjacent to the areas of proposed works, e.g. demolition, excavation, construction and haul road activities. (See Chapter 6 (Construction Activities) of this EIAR for detailed information regarding construction methodologies). For the Construction Phase, the extent of the overall study area is typically up to a maximum of 250m from a specific area of construction work, as per the relevant IAQM Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024). In addition, as per the IAQM Guidance (Box 1, IAQM, 2024), the potential for construction phase dust impacts have been focussed on ecologically designated or sensitive sites within a study area of 50m from the proposed Scheme boundary and/or 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance.

For the Operational Phase assessment, because the proposed Scheme is electrified there are no air pollutant emissions from it to appraise. For the Operational Phase traffic assessment, the air quality assessment focuses on the change in distribution of road vehicles and the likely effects of these changes on local air quality which is predicted to occur in the study area due to altered traffic flows on account of the

operation of the proposed Scheme and the Park & Ride facility at St Margaret's Road. Potential impacts to air quality relate to alterations to traffic patterns (e.g. introduction of Park and Ride facility traffic flows or due to redistributed traffic on the surrounding road network), with particular attention focused on areas where the proposed Scheme will result in increased traffic flows in proximity to sensitive air quality receptors. For the Operational Phase traffic assessment, the focus is on air quality receptors within an overall study area of 200m from the proposed Scheme, as per TII Guidance Air Quality Assessment of Specified Infrastructure Projects - Overarching Technical Document (OTD PE-ENV-01106, Dec 2022) and Air Quality Assessment of Proposed National Roads - Standard (SD PE-ENV-01107, Dec 2022).

The potential air quality impact associated with the Operational Phase of the proposed Scheme has taken into account the predicted changes in traffic flows on the surrounding road network due to the proposed Scheme and Park and Ride facility at St Margaret's Road. The changes in traffic flows on the surrounding road network were provided by the Luas Team traffic consultants and cross-referenced with Chapter 18 (Material Assets: Traffic and Transport) of this EIAR. The traffic data for the roads in the study area that will experience a reduction or increase in road traffic volumes by >1,000 AADT with the proposed Scheme in operation, have been used to assess vehicle pollutant emissions for 2023 Base Year, 2035 Opening Year and 2050 Design Year, as per TII Guidance.

13.2.2 Relevant Guidelines, Policy and Legislation

The air quality impact assessment has made reference to statutory air quality standards as well as the following national and international standards and guidelines relating to the assessment of ambient air quality impact from transport schemes;

- S.I. No. 180/2011 Air Quality Standards Regulations, 2011;
- S.I. No. 739/2022 Ambient Air Quality Standards Regulations, 2022;
- 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 (the CAFE 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 (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. No. 232 of 2018 - European Union (National Emission Ceilings) Regulations, 2018; and
- World Health Organisation (WHO) global air quality guidelines: particulate matter ($PM_{2.5}$ and PM_{10}), ozone, nitrogen dioxide, sulphur dioxide and carbon monoxide Update 2021 (WHO Air Quality Guidelines, WHO 2021).

The Ambient Air Quality Standards Regulations 2022 provide for the implementation of Directive 2008/50/EC on ambient air quality and cleaner air for Europe (as amended). The regulations set the limit values and alert thresholds for air pollution for particular pollutants and also specific the requirements for monitoring and reporting air quality data. The Environmental Protection Agency is the competent authority for the purpose of Directive 2008/50/EC and these Regulations. These Regulations replace S.I. No. 180 of 2011, as amended by SI 659 of 2016, which is revoked.

The air quality impact assessment has made reference to the following national and international guidelines and standards relating to the assessment of ambient air quality impact from transport schemes;

- PE-ENV-01106 - Air Quality Assessment of Specified Infrastructure Projects - Overarching Technical Document (OTD PE-ENV-01106, TII, Dec 2022);
- PE-ENV-01107 - Air Quality Assessment of Proposed National Roads - Standard (SD PE-ENV-01107, TII, Dec 2022);
- TII Road Emissions Model (REM): Model Development Report (GE-ENV-01107, Dec 2022);
- Institute of Air Quality Management, Land-Use Planning & Development Control: Planning For Air Quality, Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land-use planning and development control processes (January 2017);

- Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction (January 2024, Version 2.2) (IAQM 2024);
- Institute of Air Quality Management, A Guide to The Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1) (IAQM 2020);
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes (hereafter referred to as the TII Ecological Guidelines) (TII 2009);
- United Kingdom (UK) Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management Technical Guidance (TG22) (DEFRA, April 2021)
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017); and
- EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (May 2022).

13.2.2.1 Ambient Air Quality Standards & Emission Targets

The statutory ambient air quality standards in Ireland are outlined in S.I. No. 739/2022 Ambient Air Quality Standards Regulations 2022 (hereafter referred to as the Air Quality Regulations), which incorporate the ambient air quality limits set out in S.I. No. 180/2011 Air Quality Standards Regulations 2011 and 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 (hereafter referred to as the CAFE Directive), for a range of air pollutants.

In order to reduce the risk to human health and to the environment from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. The Air Quality Standards Regulations establish the limit values in Ireland for particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), carbon monoxide (CO) and benzene. These Regulations implement the Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive 2008/50/EC. The Environmental Protection Agency (EPA) is the competent authority for the purpose of Directive 2008/50/EC and these Regulations. These Regulations also provide for the dissemination of public information, including information on any exceedances of the target values, the reasons for the exceedances, the area(s) in which they occurred and appropriate information regarding effects on health and impact on the environment. Table 13-3 sets out the relevant limit values specified by the Air Quality Regulations.

Table 13-3: Limit Values of Ambient Air Quality Standards Regulations, 2022, S.I. No. 739/2022 (S.I. No. 180/2011 Air Quality Standards Regulations 2011 & CAFE Directive 2008/50/EC)

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Basis of Application of the Limit Value
NO_2	Protection of human health	1 hour	200	Not to be exceeded more than 18 times in a calendar year
	Protection of human health	calendar year	40	Annual mean
NO_X	Protection of ecosystems	calendar year	30	Annual mean
PM_{10}	Protection of human health	24 hours	50	Not to be exceeded more than 35 times in a calendar year
	Protection of human health	calendar year	40	Annual mean
$PM_{2.5}$ - Stage 1	Protection of human health	calendar year	25	Annual mean
$PM_{2.5}$ - Stage 2	Protection of human health	calendar year	20	Annual mean
SO_2	Protection of human health	1 hour	350	Not to be exceeded more than 24 times in a calendar year

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Basis of Application of the Limit Value
	Protection of human health	24 hours	125	Not to be exceeded more than 3 times in a calendar year
	Protection of vegetation	calendar year	20	Annual mean
	Protection of vegetation	1 Oct to 31 Mar	20	Winter mean
Lead	Protection of human health	calendar year	0.5	Annual mean
Carbon Monoxide	Protection of human health	8 hours	10,000	Not to be exceeded
Benzene	Protection of human health	calendar year	5	Annual mean

In May 2021, the European Commission (EC) adopted the EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil' (EC, 2021), as a key deliverable of the European Green Deal (EC, 2019). The EU Action Plan sets out the zero-pollution vision for 2050; *'a healthy planet for all'*, where air, water and soil pollution is reduced to levels no longer considered harmful to health and natural ecosystems and that respect the boundaries our planet can cope with, thus creating a toxic-free environment. To steer the EU towards the 2050 vision, the EU Action Plan sets out key 2030 targets to speed up pollution reduction. Relevant to air quality, the EU should reduce by 2030, more than 55% of the health impacts (premature deaths) of air pollution. The main objective of the EU Action Plan is to provide a compass for including pollution prevention in all relevant EU policies. Although the Action Plan states that the EU has a robust regulatory framework in place to cap ambient air pollution, the number of premature deaths and other diseases attributed to air pollution remains high. This can be attributed to the fact that some EU standards are still less stringent than the guidelines set by the World Health Organisation (WHO) in 2005 and the way the Ambient Air Quality Directives are implemented has only been partially effective. The Action Plan sets out that the EU plans to adopt limits that are more closely in line with WHO guidance for air quality in 2022. This was scheduled for 2022 to allow for an anticipated WHO update to its air quality guidance. In September 2021 the World Health Organisation (WHO) updated its air quality guidelines based on the latest scientific evidence for the protection of human health and the environment (WHO, 2021). The guidelines are more stringent than the current Ambient Air Quality Standards.

Table 13-4 outlines the World Health Organisation set of Air Quality Guidelines which are evidence-based recommendations of limit values for specific air pollutants developed to help countries achieve air quality that protects public health. The first release of the guidelines was in 1987. Since then, several updated versions have appeared and the latest version was published in 2021. WHO updates the Air Quality Guidelines on a regular basis so as to assure their continued relevance and to support a broad range of policy options for air-quality management in various parts of the world, especially taking into account the breadth of new health studies that have been published in the meanwhile. The 2021 update of the WHO air quality guidelines is in response to the real and continued threat of air pollution to public health. The WHO Air Quality Guidelines recommend levels and interim targets for common air pollutants such as PM, O_3, NO_2, and SO_2.

Table 13-4: Recommended 2021 WHO Air Quality Guidelines levels compared to 2005 WHO Air Quality Guidelines levels

Pollutant	Averaging Period	2005 AQGs (µg/m^3)	2021 AQGs (µg/m^3)
$PM_{2.5}$	Annual	10	5
	24 hours	25	15
PM_{10}	Annual	20	15
	24 hours	50	45

Pollutant	Averaging Period	2005 AQGs (µg/m^3)	2021 AQGs (µg/m^3)
SO_2	24 hours	20	40
NO_2	Annual	40	10
	24 hours	-	25
O_3	Peak Season	-	60
	8 hours	100	100
CO (mg/m^3)	24 hours	-	4

In May 2020, as part of the joint WHO / United Nations Environment Program (UNEP) / World Bank *BreatheLife* campaign, the four Dublin local authorities signed a commitment to achieve the WHO Air Quality Guidelines by a target date of 2030. The four Dublin Local Authorities – Dublin City Council, Dún Laoghaire-Rathdown County Council, Fingal County Council and South Dublin County Council are committed to protecting and enhancing air quality across the Dublin region. The exceedance of the EU limit value for nitrogen dioxide at one monitoring station (St John's Road West) in the Dublin region (approx. 3km south of the proposed Scheme) in 2019 necessitated the preparation of the *Dublin Region Air Quality Plan 2021 -Air Quality Plan to improve Nitrogen Dioxide levels in Dublin Region.* This air quality plan sets out 14 broad measures and a number of associated actions to address the exceedance of the nitrogen dioxide annual limit value.

The operation and associated operational impacts of the proposed Scheme has the potential to impact on nitrogen dioxide and particulate (PM_{10} and $PM_{2.5}$) concentrations in the study area. Potential effects on local air quality will be primarily due to altered traffic flows on account of the operation of the proposed Scheme and the Park & Ride facility. As outlined in OTD PE-ENV-01106, the pollutants of most concern in relation to emissions from road traffic are NO_2, PM_{10}, $PM_{2.5}$ and ammonia (with respect to sensitive designated habitats). Therefore, it is nitrogen dioxide and particulate (PM_{10} and $PM_{2.5}$) upon which the air quality impact assessment is primarily focussed.

13.2.2.2 Construction Dust Impact & Assessment Guidelines

Currently no Irish statutory standards or limits exist for the assessment of dust deposition and its tendency for causing nuisance. Similarly, no official air quality criterion has been set at a European or World Health Organisation (WHO) level, although a range of national 'yardstick' criteria from other countries is found in literature.

The German TA Luft Regulations, "Technical Instructions on Air Quality Control" (Verein Deutscher Ingenieure (VDI), 2002) state that total dust deposition (soluble and insoluble, measured using Bergerhoff type dust deposit gauges as per German Standard Method for determination of dust deposition rate, VDI 2119) should not exceed a dust deposition rate of 350mg/m^2/day (when averaged over a 30+/-2 day period). The use of this limit value is appropriate to minimise the impact of airborne dust levels on the receiving environment beyond the site boundary. The German TA Luft criteria for '*possible nuisance'* and *'very likely nuisance'* are 350mg/m^2/day and 650mg/m^2/day, respectively.

In 2005, the UK Highways Agency (Now Highways England) released an Interim Advice Note 61/05 Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSIs (UK Highways Agency, 2005) as a supplement to the Design Manual for Roads and Bridges (DMRB) Guidelines. This interim guidance states that dust or particles falling onto plants can physically smother the leaves affecting photosynthesis, respiration and transpiration. The literature suggests that the most sensitive species appear to be affected by dust deposition at levels above 1,000 mg/m^2/day which is considerably greater than the level at which most dust deposition may start to cause a perceptible nuisance to humans. As such, once dust deposition rates are maintained within the guidelines for human nuisance, the impact of dust deposition on sensitive ecosystems is considered negligible. Therefore, the following dust deposition and concentration limits are typically recommended:

- Dust Deposition Rate limit = 350mg/m^2/day (averaged over a 30+/-2 day period using Bergerhoff Gauge Method);
- Dust Deposition Rate limit affecting sensitive ecological receptors = 1,000mg/m^2/day;
- PM_{10} 24 Hour Mean concentration limit = 50µg/m^3 not to be exceeded >35 times a calendar year;
- PM_{10} Annual Mean concentration limit = 40µg/m^3; and
- $PM_{2.5}$ Annual Mean concentration limit = 20µg/m^3.

13.2.3 Data Collection and Collation

The baseline ambient air quality environment has been characterised through a desk study of publicly available published data sources and site-specific baseline nitrogen dioxide diffusion tube monitoring surveys.

13.2.3.1 Data Sources

A desk-based air quality assessment was carried out following guidelines described in OTD PE-ENV-01106.

OTD PE-ENV-01106 states that wherever possible, use should be made of existing certified air quality data such as that undertaken by the EPA or a Local Authority. Air quality monitoring programmes have been undertaken in recent years by the EPA and Local Authorities in Dublin.

The most recent report published by the EPA entitled Air Quality in Ireland 2022 (EPA, 2023) outlines that while Ireland met EU legal air quality limits in 2022, the WHO air quality guidelines are exceeded for particulate matter (PM_{10} & $PM_{2.5}$), NO_2, Ozone (O_3), sulphur dioxide (SO_2) due mainly to the burning of solid fuel in towns and villages, and traffic in cities. The report states that while air quality in Ireland is generally good and compares favourably with many of our European neighbours, there are concerning localised issues which lead to poor air quality. The report also acknowledges that in 2022 air monitoring results from EPA stations across Ireland show that fine particulate matter ($PM_{2.5}$), mainly from burning solid fuel in our homes, and nitrogen dioxide (NO_2) mainly from road traffic, remain the main threats to good air quality. High levels of these pollutants are often associated with cold, still weather from late autumn through to early spring, when generally short-term incidents of poor air quality occur. The report identifies the critical role for local authorities in enforcement, implementation of existing plans and investment in infrastructure to encourage cleaner and healthier air quality choices. It states that local authorities must provide more resources to increase air enforcement activities and implement the new solid fuel regulations, the Dublin local authorities must fully implement the Dublin Region Air Quality Plan 2021, to improve Nitrogen Dioxide levels in the Dublin Region. It also recommends that investment in clean public transport infrastructure across the country must be maintained and increased and more safe footpaths and cycle lanes must be created to continue to increase active travel as a viable and safe alternative to car use and associated nitrogen dioxide emissions.

The report published by the EPA entitled Air Quality in Ireland 2021 (EPA, 2022) highlights that the WHO published air quality guidelines in 2021 are exceeded for PM_{10}, $PM_{2.5}$, NO_2, O_3, SO_2 and Polyaromatic hydrocarbons (PAH) at a number of monitoring locations. The report acknowledges that achieving the WHO new air quality guidelines will be a major challenge for Ireland and all of Europe. The EPA Air Quality in Ireland 2020 (EPA 2021) report details the range and scope of monitoring undertaken throughout Ireland and outlines that that there are potential exceedances of the ambient air quality standards for NO_2 close to busy road junctions, near the Dublin Port Tunnel entrance and exit, and along the M50 Motorway.

The relevant proposed Scheme baseline air quality data collected is presented in Section 13.3 Baseline Environment. The desktop review has also determined the location of sensitive ecologically designated sites using the National Parks and Wildlife Services (NPWS) online mapping services.

13.2.3.2 Field Surveys

As described in Section 4.2 of OTD PE-ENV-01106, the pollutants of most concern in relation to emissions from road traffic are NO_2, PM_{10}, $PM_{2.5}$ and ammonia (for sensitive designated habitats). Therefore, scheme specific monitoring has focussed on these pollutants.

Pollutants Assessed

Nitrogen dioxide (NO_2): Nitrogen dioxide (NO_2) is a secondary pollutant produced by the oxidation of nitric oxide (NO). NO and NO_2 are collectively termed nitrogen oxides (NOx). In urban areas such as along the proposed Scheme alignment the significant source of NOx emissions is from combustion sources such as road transport as well as space heating emissions. The majority of NOx emitted from vehicles is in the form of NO, which oxidises rapidly in the presence of ozone (O_3) to form NO_2. In high concentrations, NO_2 can affect the respiratory system and can also enhance the response to allergens in sensitive individuals, whereas NO does not have any observable effect on human health at the range of concentrations found in ambient air. Elevated concentrations of oxides of nitrogen can have an adverse effect on vegetation, including leaf or needle damage and reduced growth. Deposition of pollutants derived from oxides of nitrogen emission contribute to acidification and/or eutrophication of sensitive habitats.

Particulate Matter (PM_{10} & $PM_{2.5}$): Dust particles can be classified into those that are easily deposited and those that remain suspended in the air for extended periods. This division is useful as deposited dust is usually the coarse fraction of particulates that causes dust annoyance, whereas suspended particulate matter is implicated more in exposure impacts. Airborne particles have a broad range of diameters, from nano-particles and ultrafine particles (diameters less than 0.1 microns (µm)) to the very large particles with diameters up towards 100µm. There is no clear dividing line between the sizes of suspended particulates and deposited particulates, although particles with diameters >50µm tend to be deposited more quickly and particles of diameter <10µm (PM_{10}) have an extremely low deposition rate in comparison. Therefore, the size of suspended and deposited dust particles affects their distribution and as such requires different approaches to sampling these fractions. PM_{10} is the fraction of airborne (suspended) particulates which contains particles of diameter less than 10µm. $PM_{2.5}$ is the fraction of airborne (suspended) particulates which contains particles of diameter less than 2.5µm. PM_{10} and $PM_{2.5}$ particles can penetrate deep into the respiratory system increasing the risk of respiratory and cardiovascular disorders. Total Suspended Particles (TSP) is the term used when referring to larger particles which do not have a specified size limit. It is common for TSP to be measured alongside PM_{10} and $PM_{2.5}$ particularly at industrial sites when dust monitoring is being undertaken.

Particulate matter can emanate from natural and anthropogenic sources. Natural sources include sea salt, forest fires, pollen and moulds. Natural sources are unregulated and harder to control. Anthropogenic sources can be regulated and understanding the sources of particulate matter is very important. PM_{10} is most commonly associated with road dust and construction activities. Wear and tear of brakes and tyres on vehicles and crushing activities at construction sites can all contribute to a rise in PM_{10}. $PM_{2.5}$ is associated with fuel burning, industrial combustion processes and vehicle emissions. Larger particles (100µm diameter) are likely to settle within 5-10m of their source under a typical mean wind speed of 4-5 metres per second (m/s), and particles between 30-100 µm diameter are likely to settle within 100m of the source. Smaller particles, particularly those <10 µm in diameter, i.e. PM_{10}, have a greater potential to have their settling rate impeded by atmospheric turbulence and to be transported further from their source. Dust emissions are exacerbated by dry weather and high wind speeds. The impact of dust therefore, also depends on the wind direction and the relative location of the dust source and receptor.

Ammonia (NH_3): The main sources of ammonia (NH_3) are agricultural practices such as fertilizer production and livestock waste. It is a colourless gas with a pungent odour. In terms of human health impacts, NH_3 is reactive and it can form a secondary particulate matter ($PM_{2.5}$) when combined with other pollutants in the atmosphere. NH_3 is an irritant to the eyes, nose, throat, and respiratory tract if inhaled in small concentrations due to its corrosive nature. In large concentrations, NH_3 is poisonous and can affect the respiratory system, which includes decreased lung function. In terms of the environmental impact of NH_3, it contributes to the eutrophication and acidification of terrestrial and aquatic ecosystems. NH_3 can leach into soil and increase its acidity affecting plant growth and/or it can be washed into nearby waterways, where it is toxic to aquatic species. Plants such as lichens and mosses are particularly sensitive to increased ammonia concentrations and even a slight increase can cause lichens and mosses to die. OTD PE-ENV-01106 states that where a project results in a significant change in traffic flow/composition or alignment of a road, the effects of ammonia and nitrogen oxides (NOx) should be considered with respect to the potential effects on sensitive designated habitats.

Nitrogen Dioxide (NO_2) & Ammonia (NH_3) Diffusion Tube Surveys

OTD PE-ENV-01106 notes that diffusion tube monitoring provides a simple, cost-effective means of monitoring at a number of locations across an area and can provide useful information on spatial distributions. The passive diffusion tube results allow an indicative comparison with the annual average limit value. Diffusion tube monitoring is useful for identifying areas of high pollutant concentration, particularly when dealing with sources such as traffic emissions, which do not change much from day to day. Diffusion tube monitoring is less useful for monitoring ambient concentrations around specific emission sources such as industrial plant, as they cannot identify short-term fluctuations in pollutants such as may result from fluctuations in wind direction. Diffusion tube monitoring is particularly useful in the following scenarios:

- when simple, indicative techniques will suffice;
- to give an indication of longer-term average pollutant concentrations;
- for indicative comparison with Limit Values and AQS Objectives based on the annual mean;
- for highlighting areas of high pollutant concentration; and
- where installation of an automatic analyser is not feasible.

Passive diffusion tube monitoring has been undertaken for nitrogen dioxide (NO_2) and ammonia (NH_3) and was carried out over consecutive one-month interval sampling periods (30+/-2 day period). The immediate area around the sample location was open, allowing free circulation of air around the tube. In order to reduce the potential for theft of the tubes, the tubes were placed at a height of 3-4 m. The sites were categorised as ‘kerbside’, ‘roadside’ or ‘urban background’.

Following completion of the monthly sampling periods, the passive diffusion tubes were capped, sample locations and exposure periods recorded on a chain of custody sheet and placed in a protective container and subsequently sent to the UKAS accredited (ISO: 17025) Gradko International Ltd laboratory for analysis. The NO_2 diffusion tubes were analysed by U.V spectrophotometry in accordance in-house Laboratory Method GLM7. The NH_3 diffusion tubes were analysed by Dionex ICS-1100 Ion Chromatography in accordance with in-house method GLM 8. All results are expressed in $\mu g/m^3$ and compared to relevant annual average limit values.

OTD PE-ENV-01106 outlines a methodology for ‘annualisation’ of diffusion tube data, which is a process of estimating annual means from the extrapolation of short-term monitoring results. The passive diffusion tube data analysis was undertaken in accordance with the DEFRA Local Air Quality Management Technical Guidance (TG22, April 2021). The methodology consists of using concentration data from nearby continuous monitoring sites to assist in estimating annual mean concentrations at the site(s) in question. The continuous monitoring sites used for comparison, where available, should be background (Urban Background, Suburban or Rural) sites to avoid any very local effects that may occur at Urban Centre, Industrial, Roadside or Kerbside sites. For any monitoring sites with fewer than nine months’ worth of data, it is necessary to perform annualisation. DEFRA LAQM.TG(22) Box 7.14 states that 3 months or 25% of data for the calendar year is the minimum to undertake annualisation. For annualisation to be completed, two to four nearby, long-term, continuous monitoring sites, ideally those forming part of the national network must be identified. The data capture for each of these sites should be at least 85%.

OTD PE-ENV-01106 outlines that diffusion tube data should be ‘bias adjusted’ to counteract tendencies in laboratory analysis methods to overestimate or underestimate diffusion tube NO_2 concentrations. Diffusion tubes may systematically under or over-report NO_2 concentrations when compared to a reference chemiluminescence analyser. This is described as ‘bias’ and can be corrected to improve the accuracy of the diffusion tube results, using a suitable bias-adjustment factor. The bias adjustment factor may be determined from a local study that has co-located diffusion tubes with an automatic monitoring station, or the factor may be derived from the national database of co-location studies. A process of ‘bias adjustment’ can be undertaken for a year of diffusion tube data. This can be undertaken when a triplicate set of diffusion tubes is co-located at long term fixed continuous monitoring sites operated by a local authority. The average concentration from the triplicate diffusion tubes is compared to the concentrations measured at the long term fixed continuous monitoring site and a correction factor is applied to monitoring locations in a survey area to bring these into line with the long term fixed continuous monitoring site.

Nitrogen Dioxide (NO_2) & Ammonia (NH_3) Monitoring

Baseline air quality monitoring survey locations using passive diffusion tube were spatially distributed at selected sensitive receptors along the alignment of the proposed Scheme to establish the current ambient nitrogen dioxide (NO_2) and ammonia (NH_3) concentrations in the proposed Scheme study area. Five monitoring locations were selected at sensitive residential receptors (See Section 13.3.1.2 and Volume 4 - Map Figure 13-2).

In total, six months of NO_2 diffusion monitoring has been undertaken in the study area. Three months of NO_2 diffusion monitoring was undertaken in Spring / Summer 2022. Due to the publication of the new TII Guidance in December 2022, and the recommendation for extended diffusion tube survey periods, a further three months of NO_2 diffusion monitoring was undertaken in Spring/Summer 2023.

Ammonia (NH_3) diffusion tube monitoring has been undertaken over a 3-month period in Spring / Summer 2023.

Particulate Matter (PM_{10} & $PM_{2.5}$) Monitoring

The EPA operate a continuous particulate (PM_{10} & $PM_{2.5}$) monitoring station within the proposed Scheme study area in the grounds of the Finglas Garda Station. This is located in the centre of the proposed Scheme study area. The particulate (PM_{10} & $PM_{2.5}$) monitoring at Finglas Garda Station, directly adjacent to the proposed Scheme commenced operation in August 2018. The measured PM_{10} and $PM_{2.5}$ concentrations at the Finglas Station have been reviewed and monitoring results have been reported from 2019 - 2023.

13.2.4 Methodology for the Assessment of Impacts

The air quality impact of the proposed Scheme has been assessed for the each of the two distinct phases of the proposed Scheme:

- Construction Phase; and
- Operational Phase

The methods used to assess the air quality impacts during each phase are discussed in the following sections.

13.2.4.1 Construction Phase

The most significant potential impact on air quality during the Construction Phase is from construction dust emissions, including PM_{10} and $PM_{2.5}$ emissions and the potential for nuisance dust deposition on human and ecological receptors. A Construction Dust Impact Assessment has been carried out to assess the risk to sensitive receptors as a result of dust soiling, health impacts and ecology impacts during the Construction Phase in accordance with the IAQM's Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024). This IAQM Guidance is recommended for use in OTD PE-ENV-01106. 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. The IAQM's Guidance outlines a step-wise process as follows;

- Step 1: Screening the Need for a Detailed Assessment;
- Step 2: Assess the Risk of Dust Impacts, including:
  - Step 2A: Define the Potential Dust Emission Magnitude;
  - Step 2B: Define the Sensitivity of the Area; and
  - Step 2C: Define the Risk of Impacts.
- Step 3: Site-Specific Mitigation, and
- Step 4: Determine Significant Effects.

Step 1: Screening the Need for a Detailed Assessment

A Construction Dust Impact Assessment will normally be required where there is:

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

Step 2: Assess the Risk of Dust Impacts

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based on two factors:

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

These two factors are combined in Step 2C to determine the risk of dust impacts with no mitigation applied. The risk category assigned to the site can be different for each of the four potential activities (demolition, earthworks, construction and trackout). More than one of these activities may occur on a site at any one time. Where appropriate, the site can be divided into 'zones' for the dust risk assessment.

Step 2A: Define the Potential Dust Emission Magnitude

Demolition, earthworks, construction and trackout will occur during the Construction Phase. Table 13-5 describes the potential dust emission class criteria for each outlined construction activity.

Table 13-5: Criteria Used in the Determination of Dust Emission Class

Activity	Criteria used to Determine Dust Emission Class		
	Small	Medium	Large
Demolition	Total building volume <20,000 m^3 Construction material with low potential for dust release (e.g. metal cladding or timber) Demolition activities <10 m above ground level Demolition during wetter months	Total building volume 20,000 m^3 - 50,000m^3 Potentially dusty construction material Demolition activities 10-20m above ground level	Total building volume >50,000m^3 Potentially dusty construction material (e.g. concrete) On-site crushing and screening, Demolition activities >20 m above ground level
Earthworks	Total site area <2,500m^2 soil type with large grain size (e.g. sand) <5 heavy moving earth vehicles active at any one time formation of bunds <4m in height	Total site area 2,500 – 10,000m^2 Moderately dusty soil type (e.g. silt) 5-10 heavy moving earth moving vehicles active at any one time. formation of bunds 4m - 8m in height,	Total site area >10,000m^2 potentially dusty soil type (e.g. clay) >10 heavy earth moving vehicles active at any one time formation of bunds >8m in height

Activity	Criteria used to Determine Dust Emission Class		
	Small	Medium	Large
	Total material moved <20,000 tonnes	Total material moved 20,000 – 100,000 tonnes	Total material moved >100,000 tonnes
Construction	Total building volume <25,000m^3 Construction material with low potential for dust release	Total building volume 25,000 – 100,000m^3 Potentially dusty construction material (e.g. concrete) On-site concrete batching	Total building volume >100,000m^3 On-site concrete batching Sandblasting
Trackout	<10 outward HDV trips in any one day surface material with low potential for dust release Unpaved road length <50m	10 - 50 outward HDV trips in any one day moderately dusty surface material (e.g. high clay content) Unpaved road length 50-100m	>50 outward HDV trips in any one day potentially dusty surface material (e.g. high clay content Unpaved road length >100m

Step 2B: Define the Sensitivity of the Area

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

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

Receptor sensitivity can be described as follows with respect to nuisance dust as per the IAQM guidance (IAQM, 2024):

- High sensitivity receptor with respect to dust nuisance – surrounding land where:
  - Users can reasonably expect enjoyment of a high level of amenity;
  - The appearance, aesthetics or value of their property would be diminished by soiling;
  - 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; and
  - 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;
  - The appearance, aesthetics or value of their property could be diminished by soiling;
  - 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; and
  - 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;
  - 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; and

- 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, 2024):

- 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); and
  - 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, a relevant location would be one where individuals may be exposed for eight hours or more in a day); and
  - 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; and
  - Indicative examples include public footpaths, playing fields, parks and shopping streets.

The IAQM guidance (IAQM 2024) also outline the criteria for assessing the human health impact from PM_{10} emissions from construction activities based on the current annual mean PM_{10} concentration, receptor sensitivity as detailed above and the number of receptors affected. Where the number of receptors is not clear, e.g. for an apartment building, conservative sensitivities can be assumed. In addition, when calculating the sensitivity with respect to human health, the background concentrations of particulates was reviewed. The background air quality in the area of the proposed Scheme is discussed in Section 13.3

An additional risk for hospital or health clinic sites is the potential for *Aspergillus* exposure. *Aspergillus* is a fungus that is found in soil and has the potential to be made airborne during demolition or excavation. *Aspergillus* is of particular concern near hospital wards where immune suppressed patients are accommodated. No such sensitive receptors were identified within the study area.

The IAQM guidance (IAQM, 2024, Boxes 6 & 7) outlines the criteria for determining the sensitivity of receptors to Dust Soiling Effects and Health Effects of PM_{10}. This is detailed is Table 13-6.

Table 13-6: Criteria for Determining Sensitivity of Receptors

Sensitivity of Receptor	Criteria for Determining Sensitivity	
	Dust Soiling Effects	**Health Effects of PM_{10}**
High	Dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms	Residential properties, hospitals, schools and residential care homes
Medium	Parks, places of work	Office and shop workers not occupationally exposed to PM_{10}
Low	Playing fields, farmland, footpaths, short-term car parks and roads	Public footpaths, playing fields, parks and shopping streets

The criteria detailed in Table 13-7, Table 13-8 and Table 13-9 (IAQM 2024, Tables 2-4) were used to determine the sensitivity of the area to dust soiling effects, human health impacts and ecological impacts respectively.

Table 13-7: Sensitivity of the Area to Dust Soiling Effects on People and Property.

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20m	<50m	<100m	<250m
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 13-8: Sensitivity of the Area to Human Health Impacts.

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

Table 13-9: Sensitivity of the Area to Ecological Impacts.

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

Construction dust control measures and good construction site management and practice is capable of effectively mitigating the potential for significant impact of fugitive dust emissions. Therefore, the potential for fugitive dust emission effects at the nearest sensitive receptors can be controlled to ensure dust impacts are of negligible significance.

Dust deposition due to demolition, earthworks, construction and trackout has the potential to affect sensitive habitats and plant communities. Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals for example via changes in acidity. Indirect effects can include increased susceptibility to stresses such as pathogens and air pollution. These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease.

Traffic Emissions during Construction

OTD PE-ENV-01106 outlines that Construction Phase traffic data should be screened against the following criteria. These scoping criteria have been used to determine whether the air quality traffic impacts of the proposed Scheme can be scoped out or require an assessment based on the changes between the Do Something traffic (with the proposed Scheme) compared to the Do Minimum traffic (without the proposed Scheme). The traffic data was screened to establish if traffic changes are expected due to the proposed Scheme and if these changes might affect air quality. As per Section 4.9.3.4 Step 3 – Screen the Traffic, the screening criteria are based on the changes within the affected road network (ARN) between the Do-Something (DS) traffic compared to the Do-Minimum (DM) traffic in the year of opening:

- Road alignment will change by 5m 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 10kph or more; or
- Peak hour speed will change by 20kph or more.

The TII guidance document outlines that there is a requirement for a change of HDV flows of more than 200 AADT to be “Indicative Criteria to Proceed to a detailed Air Quality Assessment”. The actual change in average daily traffic (AADT) flows per day during the Construction Phase will be below the threshold when considered against the OTD PE-ENV-01106 criteria. Therefore, as the construction of the proposed Scheme will include for fewer than 200 additional HDV traffic flows per day on the existing road network, on average, there will be no significant construction traffic impact on local air quality.

Refer to Chapter 18 (MA: Traffic and Transport) for further information on traffic impacts during Construction Phase.

13.2.4.2 Operational Phase

During the Operational Phase, the potential air quality impacts associated with altered road traffic flows due to the alignment and operation of the proposed Scheme and due to the use of the proposed Park & Ride facility at St Margaret’s Road as part of the proposed Scheme have been assessed. The proposed Scheme

itself is not a pollutant emission source. Luas is an electrified system and will not have direct air quality emissions and therefore, there are no significant local emissions from it to appraise.

The air quality assessment from associated road traffic emissions due to traffic flow changes on the ARN within the study area of the proposed Scheme, has been carried out following procedures described in OTD PE-ENV-01106.

OTD PE-ENV-01106 outlines that a quantitative assessment shall be undertaken to determine NO_2, PM_{10} and $PM_{2.5}$ concentrations in the base year, opening and design year (15 years after the opening year of the scheme) of the proposed Scheme, with and without the proposed Scheme being operational. Modelling should be conducted for NO_2, PM_{10} and $PM_{2.5}$ for the base, construction and opening years for both the Do Minimum and Do Something scenarios. This approach allows for a determination of significance of the effect of the proposed Scheme on local air quality.

As stated, the four Dublin local authorities have signed up for the *Breathe Life* campaign (https://breathelife2030.org/) to work towards achieving the goal of compliance with the WHO Air Quality Guidelines (WHO 2021) by 2030. Therefore, predictive modelling of NO_2, PM_{10} and $PM_{2.5}$ was undertaken to consider the impact of the proposed Scheme on these concentrations. Historically, because concentrations of CO, lead and benzene have been continuously monitored to be significantly below their air quality limit values even in urban centres in recent years, these pollutants have been scoped out of further detailed assessment.

OTD PE-ENV-01106 outlines that the following scoping criteria shall be used to determine whether the air quality traffic impacts of the proposed Scheme can be scoped out or require an assessment based on the changes between the Do Something traffic (with the proposed Scheme) compared to the Do Minimum traffic (without the proposed Scheme). The traffic data was screened to establish if traffic changes are expected due to a proposed Scheme and if these changes might affect air quality. As per 4.3.3 Step 1: Screen the Traffic Data, the screening criteria are based on the changes on the affected road network (ARN). between the Do-Something (DS) traffic compared to the Do-Minimum (DM) traffic in the year of opening:

- Road alignment will change by 5m 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 10kph or more; or
- Peak hour speed will change by 20kph or more.

The guidance has been used in the assessment to determine if certain road links are required for inclusion in the modelling assessment on account of the altered traffic flows within the study area due to the Park & Ride facilities and the operation of the proposed Scheme.

Specific sensitive human receptor locations have been identified at locations within 200m of the carriageway of impacted road links that have the potential to be significantly affected by the proposed scheme and have been selected for the modelling assessment as per the methodology detailed in OTD PE-ENV-01106.

A local air quality assessment to calculate NO_2, PM_{10} and $PM_{2.5}$ concentrations at representative worst-case human sensitive receptors within the air quality study area has been undertaken using the TII REM Tool.

The Air Quality Assessment (AQA) and the calculation of the local scale pollutant (NO_2, PM_{10} and $PM_{2.5}$) concentrations were undertaken to determine the absolute pollutant concentrations and relative change in concentration at selected specific sensitive receptors affected by traffic changes on the ARN within the study area of the proposed Scheme. The outcome of the local AQA informs the significance of the proposed scheme on local air quality. OTD PE-ENV-01106 advises that it is appropriate to calculate concentrations of NO_2, PM_{10} and $PM_{2.5}$ at a small number of 'worst-case' receptors in the base year, opening year and design year (15 years after the opening year of the scheme) of the proposed Scheme, with and without the proposed Scheme being operational. The local AQA has been undertaken using TII REM Tool. The

predicted nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) concentrations at the worst case sensitive receptors have been compared to the relevant air quality standard limit values.

The results of the local AQA show predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations at the selected worst-case sensitive receptor locations. These locations are shown in Volume 4 – Map Figure 13-1.

The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations at the selected worst-case sensitive receptor locations as a result of proposed Scheme have been compared with the relevant Air Quality Standards limit values, and the description of magnitude of impact on NO_2, PM_{10} and $PM_{2.5}$ concentrations at the receptor locations in the base year, opening and design year, has been assessed in accordance with the rationale for describing the impact of the proposal derived from *Table 4.9, Impact Descriptors* in OTD PE-ENV-01106.

13.2.4.3 TII Road Emissions Model

Emissions from road transport along the existing roads in the study area that will experience a potential net reduction or increase in road traffic pollution with the proposed Scheme in operation have been calculated using the TII Road Emissions Model (REM).

The TII REM tool calculates road transport emissions by integrating traffic volumes and vehicular speeds for light and heavy goods vehicles together with Irish fleet composition information. The TII REM tool provides a spatial and temporal estimate of carbon dioxide equivalent emissions and the pollutant concentrations resulting from vehicular use on the National Roads Network. The REM integrates:

- Traffic information from the TII National Transport Model which provides validated estimates of the volumes of light and heavy vehicles, and the speed at which they travel, on the National Roads Network;
- A Fleet Mix database developed by researchers in the Energy Policy and Modelling Group at University College Cork for cars based on economic projections, and for other light and heavy vehicles by AECOM. The Fleet Mix database is underpinned by the Central Statistics Office's goods vehicles registration data (both heavy and light goods vehicles);
- Emission Rate Database derived from the European Environment Agency's (EEA) COPERT Emissions Tool - the EU industry standard vehicle emissions calculator – published in the EMEP/EEA air pollutant emission inventory guidebook. These data were adjusted further using data published in the UK by DEFRA; and
- An Ambient Air Quality Model module, which calculates pollutants (NOx, NO_2, PM_{10} and $PM_{2.5}$) released from each individual road link, using predictions of atmospheric pollutants concentration and dispersion, scaled up to an annual average concentration.

Under EU and national policy on electric vehicles and fuel and engine technology, the proportions of the different vehicle classifications (EURO classification) will change in the future because it is expected the fleet will move towards increased adoption of newer and relatively lower emission vehicles in the future, including greater uptake of hybrid (HEV), battery-electric (BEV) and alternative fuelled vehicles. The extent of this change is unknown. Therefore, the TII REM tool can generate results for three separate Fleet Database scenarios within the REM model as follows:

- Business as Usual (BaU) scenario; i.e. excluding strategic policy interventions for reduction of CO_2, etc, and based on existing trends in vehicle purchasing and turnover of vehicles out of the vehicle fleet; the BaU fleet projection assumes that the same current trends in vehicle registrations continues into the future;
- Climate Action Plan (CAP) (Government of Ireland, 2021) scenario; based on achieving increases in EVs including 151,000 passenger car EV and PHEVs by 2025, and 840,000 passenger car EV and PHEVs by 2030; The CAP projection assumes that the policies set out in the CAP19 are implemented resulting in increased zero emission vehicles; and
- Intermediate scenario; case using linear extrapolation to a central value between BaU and CAP for each vehicle sub-classification. The intermediate fleet projection provides a conservative fleet for future predictions in the event that the full changes in the vehicle fleet intended in the CAP do not occur at the rate expected.

The BaU represents a scenario whereby there is no progression in reducing the average tailpipe greenhouse gas emissions per vehicle while the CAP scenario assumes a full implementation of current CAP policy and targets. Worst-case results for the BaU scenario are presented within this assessment of the existing roads in the study area that will experience a reduction or increase in road traffic volumes by >1,000 AADT with the proposed Scheme in operation.

The traffic data for the existing roads in the study area that will experience a reduction or increase in road traffic volumes by >1,000 AADT with the proposed Scheme in operation, have been input to the model to generate vehicle pollutant emissions for 2023 Base Year, 2035 Opening Year and 2050 Design Year.

Representative annual mean Nitrogen Dioxide (NO_2) concentrations, as recorded over the 6-month baseline survey, and annual mean Particulate Matter (PM_{10} & $PM_{2.5}$) concentrations recorded at the EPA monitoring station at Finglas Garda station from 2021 - 2023, were input into TII REM Human Receptor Template as the background concentration data in 2023 base year, 2035 opening year and 2050 design year (15 years after the opening year of the proposed Scheme). These annual mean Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10} & $PM_{2.5}$) concentrations are considered to be realistic representative concentrations across the study area.

13.2.4.4 Sensitivity of Receptors

Human Receptors

As outlined in OTD PE-ENV-01106, Step 3: Calculation of Local Scale Pollutant (NO_2, PM_{10} and $PM_{2.5}$) concentrations, a quantitative assessment to determine NO_2, PM_{10} and $PM_{2.5}$ concentrations in the base year, opening and design year (15 years after the opening year of the scheme) with and without the operational scheme has been undertaken. This assessment has been undertaken at selected sensitive human receptor locations, where the AADT flows will change by plus or minus 1,000 AADT or more and/or where the road alignment will change by greater than 5m. These locations represent the maximum likely impact of the proposed Scheme on local traffic flows in the study area and they cover locations where air quality is expected to improve as well as where it is expected to deteriorate. Air quality impact predictions have been carried out using the TII REM tool.

Volume 4 – Map Figure 13-1 highlights where the AADT flows will change by plus or minus 1,000 vehicles per day or more in the Opening Year, 2035 within the study area. Emissions in the design year of 2050 will be lower compared to 2035 emissions. Advancements in engine technology and the addition of a higher percentage of electric vehicles to the fleet will assist in significantly reducing emissions between 2035 and 2050, even in circumstances where the number of vehicles using the road link increases.

Specific representative human receptor locations have been selected at the closest air quality sensitive locations to specific road links included in the modelling assessment on account of the altered traffic flows due to the operation of the proposed Scheme and the Park & Ride facility at St Margaret's Road.

The predicted changes in annual average daily traffic (AADT) flows by plus or minus 1,000 vehicles per day or more in the Opening Year, 2035 and in the Design Year 2050 within the study area are summarised in Table 13-10.

Table 13-10: Summary of the predicted changes in annual average daily traffic (AADT) flows by plus or minus 1,000 vehicles per day or more in the Opening Year, 2035 and in the Design Year 2050 and where there is a change in road alignment by >5m.

Road	Base Year AADT	2035 Opening Year AADT (Do Minimum)	2035 Opening Year AADT (Do Something)	2050 Design Year AADT (Do Minimum)	2050 Design Year AADT (Do Something)	Air Quality Sensitive Receptor Ref.
Increase in AADT (>1000 AADT)						
Finglas Road (R135)	20,607	20,596	21,619	21,086	21,471	AQSR 1
Wellmount Road	8,493	10,023	11,805	10,997	11,550	AQSR 2
Glasanaon Road	4,062	7,406	8,524	8,197	9,038	AQSR 3
Jamestown Road (south of Melville Rd)	6,206	10,454	11,526	11,789	12,102	AQSR 4
Jamestown Road (north of Melville Rd)	5,415	6,913	8,183	7,721	9,099	AQSR 5
Charlestown Place	12,058	13,227	15,503	14,054	14,918	AQSR 6
Decrease in AADT (>1000 AADT)						
Patrickswell Place	4,444	7,551	5,975	8,044	6,641	AQSR 7
Finglaswood Road	4,132	6,952	5,106	7,643	5,709	AQSR 8
St Margarets Road	12,450	12,861	10,893	13,539	12,037	AQSR 9
North Road (south of St Margarets Road)	23,917	30,093	27,439	30,004	28,275	AQSR 10
North Road (north of St Margarets Road)	30,073	33,124	30,760	33,808	31,881	AQSR 11
Change in road alignment by >5m						
Broombridge Road	4,346	5,017	5,045	4,977	4,815	AQSR 12
St Margarets Road	14,038	14,040	10,200	14,006	9,892	AQSR 13
Patrickswell Place	4,444	7,551	5,975	8,044	6,641	AQSR 7

Ecological Receptors

In terms of sensitive ecological sites, there are European Designated Sites and Nationally Protected Sites. Special Areas of Conservation (SACs) and candidate SACs are protected under the Habitats Directive 92/43/EEC and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Special Protection Areas (SPAs) are protected under the Birds Directive 2009/147/EC and European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Collectively, these sites are referred to as Natura 2000 sites. The closest Natura 2000 site is the North Dublin Bay Special Area of Conservation (SAC) which is located approximately 8km east of the proposed Scheme. Therefore, on account of the distance from European designated ecological sites, there will be no significant air quality impact from the proposed Scheme on Natura 2000 sites.

Natural Heritage Areas (NHAs / pNHAs) are national designations under the Wildlife Act 1976, as amended. A Natural Heritage Area (NHA) is designated for its wildlife value and receives statutory protection. The Royal Canal Proposed Natural Heritage Area (Site Code: 2103) is located directly adjacent to the Broombridge Station with a proposed LRT bridge crossing the Iarnród Éireann railway line and the Royal Canal in this area of the proposed Scheme. The Royal Canal pNHA contains the rare and legally protected Opposite-leaved Pondweed (*Groenlandia densa*) (Flora Protection Order 1987) between Locks 4 and 5. *Tolypella intricata* (a stonewort listed in the Red Data Book as being Vulnerable) is also in the Royal Canal in Dublin, the only site in Ireland where it is now found. The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species.

For proposed Schemes within 2km of either an Irish or European designated area of conservation, OTD PE-ENV-01106 requires that the air quality specialist should consult with the project ecologist. Therefore, as the proposed Scheme crosses the Royal Canal pNHA at Broombridge, this process has been undertaken.

13.2.4.5 Magnitude of Impacts

In terms of the 'Significance of Potential Environmental Effects' the magnitude (scale of change) has been determined by considering the impacts of the proposed development on air quality with reference to the baseline conditions and environmental assessment criteria, i.e. the Ambient Air Quality Standards.

The rationale for describing the impact and significance of the proposed Scheme has been assessed in accordance with the rationale for describing the impact of the proposal derived from *Table 4.9, Impact Descriptors* in OTD PE-ENV-01106.

This approach has been derived from the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) guidance Land-Use Planning & Development Control: Planning for Air Quality (EPUK & IAQM, 2017). There is a two-stage process to be followed in the assessment of air quality impacts:

- A qualitative or quantitative description of the impacts on local air quality arising from the development; and
- A judgement on the overall significance of the effects of any impacts.

The suggested framework for describing the impacts set out in *Table 8.3 of the EPUK & IAQM guidance document* has been presented in *Table 4.9, Impact Descriptors* in OTD PE-ENV-01106. The term Air Quality Assessment Level (AQAL) has been adopted as it covers all pollutants, i.e. those with and without formal standards. AQAL is used to include air quality objectives or limit values where these exist. The UK Environment Agency uses a threshold criterion of 10% of the AQAL as a screening criterion for the maximum impact. The EPUK & IAQM guidance adopts this as a basis for defining an impact that is sufficiently small in magnitude to be regarded as having an insignificant effect.

Table 13-11: Impact Descriptors (from Table 4.9, Impact Descriptors in OTD PE-ENV-01106)

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

Explanation;

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

2. The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5% will be described as Negligible.

3. The Table is only designed to be used with annual mean concentrations.

4. Descriptors for individual Receptors only; the overall significance is determined using professional judgement (see Chapter 7). For example, a 'moderate' adverse impact at one Receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.

5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme' concentration for an increase.

6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.

7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

13.2.4.6 Significance of Impacts

OTD PE-ENV-01106 Box 8: Evaluation of Significance states that the evaluation of significance for the Operational Phase should be undertaken for the opening year only, as the design year is likely to show lower total pollutant concentrations and change in concentration. TII Guidance states that the determination of the significance of the impacts should align with the terminology in the EPA guidelines (EPA, 2022).

The following factors should be used to determine an overall judgement of whether the proposed Scheme is 'significant' or 'not significant' in terms of air quality. Impacts which are described as neutral or slight i.e. of local importance only, are considered to be 'not significant'. Impacts described as moderate or substantial should be considered in the overall evaluation of significance of a proposed Scheme. For these impacts, the following factors should be applied to determine if the effects are significant or not significant. The additional terms set out in the EPA Guidance e.g. very significant or profound, are not considered to be required within an AQA, as an effect which is significant requires the identification of suitable mitigation measures.

- The number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance;
- The number of people exposed to levels above the standard;
- Whether or not the exceedance of a standard is predicted to arise in the study area where none existed before, or the size of an exceedance area is substantially increased;
- Whether or not the study area exceeds a standard and this exceedance is removed, or the size of the exceedance area is reduced;
- Uncertainty, including the extent to which worse-case assumptions have been made; and

- The extent to which a standard is exceeded e.g. an annual mean NO_2 of 41µg/m^3 should attract less weight in the determination of significance than an annual mean of 51µg/m^3.

13.2.4.7 Significance of Impacts on Sensitive Designated Habitats

As stated in TII Guidance, it is the responsibility of the author of Chapter 9 (Biodiversity) to determine if the impact assessment results of the assessment for NOx, NH_3, N deposition and acid deposition are significant. The determination of significance of effects at sensitive designated habitats are described in OTD PE-ENV-01106. Table 13-12 describes the process to determine if the results of the assessment of effects at Sensitive Designated Habitats are significant or not.

Table 13-12: Significance of effects at Sensitive Designated Habitats (from *Table 4.11,* Significance of effects at Sensitive Designated Habitats in OTD PE-ENV-01106)

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

To determine if the air quality impacts at a sensitive designated habitat are significant, the author of the Biodiversity chapter had to consider:

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

Where significant effects are determined, site survey information is required to determine if the sensitive habitat of relevance is actually present in the affected area and to inform potential mitigation measures that may be required.

As stated above, the Royal Canal pNHA is a water course and therefore, it is not sensitive to nitrogen deposition impacts.

13.3 Baseline Environment

13.3.1 Baseline Ambient Air Quality

The baseline ambient air quality environment has been characterised through a desk study of publicly available data sources and proposed Scheme specific baseline ambient air quality monitoring surveys. Baseline air quality data has been characterised through review of desktop available air quality monitoring data and a proposed Scheme specific air quality monitoring survey in accordance with the approach to be taken for desktop reviews and scheme specific monitoring described in OTD PE-ENV-01106.

TII states that use should be made of existing quality assured air quality data such as that undertaken by the EPA and/or Local Authorities. Air quality monitoring programmes have been undertaken in recent years by the EPA and Local Authorities in the Dublin region.

Four air quality zones have been defined in Ireland for air quality management and assessment purposes. Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D. Zone D would be considered to have the best air quality due to low background levels of pollutants. The more populated Zones A and B are likely to have higher air pollutant concentrations. In terms of air quality, the proposed Scheme lies within Zone A. Long-term continuous monitoring data has been used to determine background concentrations for the key pollutants in the area of the proposed Scheme.

13.3.1.1 Desktop Available Baseline Monitoring Data

EPA & Local Authority Continuous Monitoring Data

The most recent annual reports, Air Quality in Ireland 2019, 2020, 2021 and 2022 (EPA 2020, 2021, 2022 & 2023), detail the range and scope of monitoring undertaken throughout Ireland.

As stated, the EPA operate a continuous particulate (PM_{10} & $PM_{2.5}$) monitoring station within the proposed Scheme study area in the grounds of the Finglas Garda Station.

The closest Local Authority operated continuous particulate (PM_{10} & $PM_{2.5}$) monitoring station to the proposed Scheme study area is located at Cabra Community College (300m from the proposed Scheme). This particulate monitoring station has operated intermittently since December 2020.

Neither the EPA nor the Local Authority operates a continuous NO_2 monitoring station within the proposed Scheme study area.

Other EPA operated continuous NO_2 and particulate (PM_{10} & $PM_{2.5}$) monitoring stations in proximity to the proposed Scheme study area are located at St John's Road, Kilmainham (c. 2.9km), Winetavern Street (c. 3.5km), Davitt Road, Inchicore (c. 4.4km) and Dublin Airport (c. 4.5km).

A summary of the NO_2, PM_{10} and $PM_{2.5}$ concentrations ($\mu g/m^3$) measured at the various monitoring locations for the period from 2019 – 2023 is outlined in Table 13-13.

Table 13-13: Summary of the NO_2, PM_{10} and $PM_{2.5}$ concentrations ($\mu g/m^3$) measured at the various monitoring locations for the period from 2019 – 2023.

Monitoring Station	Pollutant	Measured Concentration ($\mu g/m^3$)						AQS Limit Value
		2019	2020	2021	2022	2023	Average	
Finglas Garda Station	Annual Mean PM_{10}	13	12	11.8	11.8	10.6	11.8	40 $\mu g/m^3$
	Annual Mean $PM_{2.5}$	9	7	7.5	7.3	6.6	7.5	25 $\mu g/m^3$
	Annual Mean PM_{10}	-	-	9.4	11.6 Note 1	7.8 Note 2	9.6	40 $\mu g/m^3$

Monitoring Station	Pollutant	Measured Concentration (µg/m³)						AQS Limit Value
		2019	2020	2021	2022	2023	Average	
Cabra Community College	Annual Mean $PM_{2.5}$	-	-	5.5	7.7 Note 1	5.9 Note 2	6.4	25 µg/m³
St John's Road, Kilmainham	Annual Mean NO_2	43	30	33.2	32.6	33.1	34.4	40 µg/m³
	Annual Mean PM_{10}	14	13	13	14.6	13	13.5	40 µg/m³
	Annual Mean $PM_{2.5}$	9	7	7.6	8.1	7.9	7.9	25 µg/m³
Winetavern Street	Annual Mean NO_2	28	15	18	17.4	5.7 Note 3	16.8	40 µg/m³
	Annual Mean PM_{10}	15	13	12.4	-	-	13.5	40 µg/m³
Davitt Road, Inchicore	Annual Mean NO_2	24	14	15.2	14.0	15.7	16.6	40 µg/m³
	Annual Mean PM_{10}	19	15	14	12.2	14.0	14.8	40 µg/m³
	Annual Mean $PM_{2.5}$	11	9	8.5	6.8	7.5	8.6	25 µg/m³
Dublin Airport Authority	Annual Mean NO_2	-	23	19	19.7	22.2	21.0	40 µg/m³
	Annual Mean PM_{10}	-	13	11.2	11.8	12.7	12.2	40 µg/m³
	Annual Mean $PM_{2.5}$	-	6	6.4	6.7	7.0	6.5	25 µg/m³

Notes: 2019, 2020, 2021, 2022 & 2023 data extracted from EPA Air Quality in Ireland Reports. Data extracted from relevant monitoring data presented for each monitoring station in https://airquality.ie/

Note 1: Monitoring Period: 17.2.2022-3.4.2022.

Note 2: Monitoring Period: 17.1.2023-29.6.2023.

Note 3: Numerous negative values during monitoring period reported online.

The PM_{10} and $PM_{2.5}$ monitoring data at Finglas Garda Station, directly adjacent to the proposed Scheme has been reviewed. The PM_{10} monitoring data at Finglas Garda Station for the period 2019 - 2023 indicates an annual average PM_{10} concentration of 11.8µg/m³ over this period. This PM_{10} concentration equates to 29.5% of the annual mean limit value for PM_{10} of 40µg/m³. The PM_{10} levels in the area are in accordance with the WHO guideline of 15µg/m³. The $PM_{2.5}$ monitoring data at Finglas Garda Station for the period 2019 - 2023 indicates an annual average $PM_{2.5}$ concentration of 7.5µg/m³ over this period. This $PM_{2.5}$ concentration equates to 37.5% of the annual mean limit value for $PM_{2.5}$ of 20µg/m³. The $PM_{2.5}$ levels in the area are above the WHO guideline of 5µg/m³. Therefore, the annual mean PM_{10} and $PM_{2.5}$ concentrations at the monitoring station at Finglas Garda Station are below the relevant PM_{10} and $PM_{2.5}$ air quality limit values of 40µg/m³ and 20µg/m³ respectively.

The PM_{10} and $PM_{2.5}$ monitoring data at Cabra Community College, 300m south of the proposed Scheme, has been reviewed. There are gaps in the PM_{10} and $PM_{2.5}$ concentration data recorded during the period 1st January 2021 - 1st June 2023 at Cabra Community College. In 2021, an average PM_{10} concentration of 9.4µg/m³ and an average $PM_{2.5}$ concentration of 5.5µg/m³ was recorded. Between 11th February 2022 - 1st June 2022, an average PM_{10} concentration of 11.6µg/m³ and an average $PM_{2.5}$ concentration of 7.7µg/m³ was recorded during this period. Between 17th January 2023 - 1st June 2023, an average PM_{10} concentration of 7.8µg/m³ and an average $PM_{2.5}$ concentration of 5.90µg/m³ was recorded during this period. Therefore, the annual mean PM_{10} and $PM_{2.5}$ concentrations at the monitoring station at Cabra Community College are well below the relevant PM_{10} and $PM_{2.5}$ air quality limit values of 40µg/m³ and 20 µg/m³ respectively. The PM_{10} levels in the area are in accordance with the WHO guideline of 15µg/m³ and the $PM_{2.5}$ levels in the area are above the WHO guideline of 5µg/m³.

Table 13-13, which outlines a summary of the NO_2, PM_{10} and $PM_{2.5}$ concentrations (µg/m³) measured at the various monitoring locations for the period from 2019 - 2023, indicates that there is no recorded exceedance of the relevant air quality standard annual mean limit values for NO_2, PM_{10} and $PM_{2.5}$ in the proposed Scheme study area.

Sufficient data is available from the long-term monitoring stations most proximate to the proposed Scheme to review long-term air quality trends over a five-year period (2019 to 2023). Long-term annual mean NO_2 concentrations at the selected long-term monitoring stations range from 16.6µg/m^3 to 34.4µg/m^3 over the period from 2019 to 2023, with NO_2 concentrations in compliance with the annual limit value of 40µg/m^3. Long-term annual mean PM_{10} concentrations at the selected long-term monitoring stations range from 9.6µg/m^3 to 14.5µg/m^3 over the period from 2019 to 2023, with average PM_{10} concentrations in compliance with the annual limit value of 40µg/m^3. Long-term annual mean $PM_{2.5}$ concentrations at the selected long-term monitoring stations range from 6.4µg/m^3 to 8.6µg/m^3 over the period from 2019 to 2023, with average $PM_{2.5}$ concentrations in compliance with the annual limit value of 25µg/m^3.

Short-term NO_2 concentrations (99.8th percentile of 1-hour NO_2 concentrations) and short-term PM_{10} concentrations (90.41th percentile 24-hour PM_{10} concentrations) are also reported to be in compliance with the relevant air quality standard limit values for NO_2 and PM_{10} of 200µg/m^3 to 50µg/m^3 respectively as reported by the EPA in recent years.

In 2020, the EPA (EPA, 2021) reported that Ireland was compliant with all EU legal air quality limits at all locations, but qualified this finding by stating that this was largely due to the reduced traffic volumes on account of the COVID-19 restrictions enacted during the period. The EPA report stated that reductions of up to 50% of air pollutant concentrations were recorded at monitoring stations at which traffic was the dominant source in proximity to the monitoring station. Traffic volumes have now returned to pre-COVID levels, and while the lower concentrations recorded in 2020 are an exception, the most recent recorded concentrations reported on https://airquality.ie/ are consistent with long-term trends.

In 2022, the EPA (EPA 2023) reported that Ireland met all of its EU legal limit values (CAFE Directive). However, in 2022, Ireland failed to meet the 2021 WHO Air Quality Guidelines. Most of Ireland did not meet the 2021 WHO guideline for fine particulate matter ($PM_{2.5}$) of 5 µg/m^3. While most of Ireland meets the 2021 WHO guideline for nitrogen dioxide (NO_2) of 10 µg/m^3, air quality monitoring and modelling highlights elevated NO_2 concentrations along the major urban road network in Dublin and Ireland's larger cities. The 2021 WHO guidelines are not legally binding standards but they do provide WHO Member States with an evidence-informed tool that they can use to inform legislation and policy.

In 2021, the Clean Air Together (CAT) measurement campaign in Dublin took place from October-November 2021 where approximately 1,000 citizens across Dublin successfully measured NO_2 near their home, business, or school. The results clearly show that higher NO_2 levels are linked with higher traffic volumes. None of the results indicated a breach of EU air quality limit for NO_2 of 40 µg/m^3.

Local Authority Diffusion Tube Monitoring Data

In addition to the continuous monitoring stations operated in the proposed Scheme study area, the EPA measured indicative NO_2 concentrations at various locations in Dublin using the passive diffusion tube monitoring methodology from 2016-2020. No NO_2 diffusion tube monitoring sites were located within the immediate vicinity of the proposed Scheme during the period 2016-2020. In 2019, NO_2 diffusion tube monitoring was carried out in conjunction with Dublin City Council at various locations < 2km from the proposed Scheme alignment. The report entitled Urban Environmental Indicators: Nitrogen Dioxide Levels in Dublin (EPA, 2019) assessed spatial variations in ambient air quality in Dublin using indicative diffusion tube sampling and detailed air dispersion modelling. Overall, the findings of the monitoring study indicated that air quality throughout the Dublin area is in accordance with the relevant ambient air quality standard limit values.

Table 13-14 outlines a summary of the NO_2 concentrations (µg/m^3) measured at various diffusion tube monitoring locations < 2km from the proposed Scheme in Dublin in 2019, and this data indicates that there is no recorded exceedance of the relevant air quality standard limit values for NO_2.

Table 13-14: Summary of the NO_2 concentrations (µg/m^3) measured at various diffusion tube monitoring locations <2km from the proposed Scheme in Dublin in 2019.

Monitoring Site	Distance from proposed Scheme (km)	Annual Mean NO_2 Concentration (µg/m^3)
Creston Avenue, Ballymun	0.85km	30.7
Darling Estate Navan Road	1.9km	26.4
Blessington Street	1.9km	29.3
Drumcondra Library	2km	21.0
Annual Mean Limit Value	-	40 µg/m^3

13.3.1.2 Proposed Scheme Specific Monitoring Data

A baseline air quality monitoring survey was undertaken as part of the air quality impact assessment.

Initially in 2022, prior to the publication of OTD PE-ENV-01106, NO_2 diffusion tube monitoring was undertaken over three consecutive monthly periods from 11th January 2022 – 7th April 2022. NO_2 diffusion tube monitoring was undertaken at four locations close to the alignment of the proposed Scheme (Ref. Luas Diffusion Tube (LDT 1 – LDT 4) as shown in Volume 4 – Map Figure 13-2. An additional NO_2 diffusion tube monitoring location (LDT 5) was added to the baseline air quality monitoring survey in February 2022 and measured over two consecutive monthly periods from 9th February 2022 – 7th April 2022.

After the publication of the OTD PE-ENV-01106 in December 2022, it was determined by the Luas Team that a further three-month period of NO_2 diffusion tube monitoring should be undertaken in 2023. Additionally, a three-month period of ammonia (NH_3) diffusion tube monitoring was also undertaken. Therefore, NO_2 and NH_3 diffusion tube monitoring was undertaken at five locations (LDT 1 – LDT 5) close to the alignment of the proposed Scheme (Ref. LDT 1 – LDT 5) over three consecutive monthly periods from 13th April 2023 – 12th July 2023.

Nitrogen Dioxide (NO_2) Passive Diffusion Tube Sampling Results

OTD PE-ENV-01106 outlines a methodology for 'annualisation' of nitrogen dioxide (NO_2) diffusion tube data, which is a process of estimating annual means from the extrapolation of short-term monitoring results. Three continuous monitoring stations were used to complete the annualisation process, as follows;

- St Johns Road Kilmainham, c. 2.9km from the proposed Scheme;
- Winetavern Street, c. 3.5km from the proposed Scheme; and
- Davitt Road Inchicore, c. 4.4km from the proposed Scheme.

The annualisation process resulted in an annualisation factor of 0.91.

The EPA or the Local Authority do not operate a continuous NO_2 monitoring station in the proposed Scheme study area. Therefore, a specific co-location study was not undertaken to allow for a site-specific local bias adjustment factor to be derived from the diffusion tube monitoring results. Instead, a national bias adjustment factor has been used. This bias adjustment factor is laboratory specific and is dependent on the specific analysis procedures at each laboratory. A diffusion tube bias of 0.85 was obtained for the Gradko laboratory (which analysed the diffusion tubes) as referenced from the UK DEFRA website (UK DEFRA, 2023).

Table 13-15 presents the results of the baseline NO_2 monitoring in 2022 and 2023, including annualisation and bias adjustment.

Table 13-15: Results of the NO_2 diffusion tube monitoring from 11th January 2022 – 7th April 2022 (µg/m³).

Ref.	Location	NO_2 Conc. (µg/m³) 12.1.2022 - 9.2.2022	NO_2 Conc. (µg/m³) 9.2.2022 - 10.3.2022	NO_2 Conc. (µg/m³) 10.3.2022 - 7.4.2022	Mean	Annualised & Bias Adjusted NO_2 Concentration (µg/m³)
LDT 1	Carrigallen Drive	26.79	15.85	26.63	23.1	17.9
LDT 2	Farnham Cresent	24.89	16.27	26.64	22.6	17.5
LDT 3	Ravens Court	24.79	13.97	25.03	21.3	16.4
LDT 4	Mc Kelvey Road	30.71	22.38	30.21	27.8	21.5
LDT 5	Ballyboggan Road	N/A	18.79	22.86	20.8	16.1
Average		26.8	17.5	26.3	23.5	***18.2***
Maximum		30.7	22.4	30.2	27.8	21.5
Minimum		24.8	14.0	22.9	20.5	15.9
Annual Mean Limit Value		40				

Table 13-16: Results of the NO_2 diffusion tube monitoring from 13th April 2023 – 12th July 2023 (µg/m³).

Ref.	Location	NO_2 Conc. (µg/m³) 13.4.2023 - 11.5.2023	NO_2 Conc. (µg/m³) 11.5.2023 - 9.6.2023	NO_2 Conc. (µg/m³) 9.6.2023 - 12.7.2023	Mean	Annualised & Bias Adjusted NO_2 Concentration (µg/m³)
LDT 1	Carrigallen Drive	19.58	13.42	13.32	15.4	11.9
LDT 2	Farnham Cresent	19.18	14.61	14.47	16.1	12.4
LDT 3	Ravens Court	N/A	17.74	15.62	16.7	12.9
LDT 4	Mc Kelvey Road	24.22	18.77	24.96	22.7	17.5
LDT 5	Ballyboggan Road	19.76	29.42	18.36	22.5	17.4
Average		21.0	18.8	17.3	19.0	***14.7***
Maximum		24.2	29.4	25.0	26.2	20.3
Minimum		19.2	13.4	13.3	15.3	11.8
Annual Mean Limit Value		40				

Table 13-15 and Table 13-16 present the NO_2 concentrations measured over the 3-month monitoring periods in 2022 and 2023 respectively. The average of the annualised and bias adjusted NO_2 concentrations in 2022 and 2023 was 16.45µg/m³ across all monitoring locations. The measured NO_2 concentrations are below the annual EU limit value of 40µg/m³ for the protection of human health at all locations. The NO_2 levels in the area are above the WHO guideline of 10µg/m³.

Ammonia (NH_3) Passive Diffusion Tube Sampling Results

Table 13-17 presents the results of the baseline Ammonia (NH_3) monitoring in 2023.

Table 13-17: Results of the Ammonia (NH_3) diffusion tube monitoring from 13th April 2023 – 12th July 2023 (Concentrations µg/m³).

Ref.	Location	NH_3 Conc. (µg/m³) 13.4.2023 - 11.5.2023	NH_3 Conc. (µg/m³) 11.5.2023 - 9.6.2023	NH_3 Conc. (µg/m³) 9.6.2023 - 12.7.2023	Mean
LDT 1	Carrigallen Drive	3.34	4.17	3.59	3.70
LDT 2	Farnham Cresent	3.62	4.94	3.77	4.11
LDT 3	Ravens Court	4.09	4.85	3.24	4.06
LDT 4	Mc Kelvey Road	4.43	5.61	4.28	4.77
LDT 5	Ballyboggan Road	3.15	7.63	3.66	4.81

An average ammonia (NH_3) concentration of 4.29µg/m³ was recorded across all monitoring locations. The agriculture sector accounts for nearly all (99%) NH_3 emissions in Ireland. Therefore, local ammonia emission sources are not expected to be significant.

Selected Human Receptor Locations

Specific representative sensitive human receptor locations have been selected, as there is a potential for the altered road traffic flow volumes, as a result of the proposed Scheme, to result in a deleterious or beneficial change to the local air quality at the closest air quality sensitive locations to the affected road network. The 13 selected specific representative receptor locations are outlined in Table 13-18.

Table 13-18: Receptor locations selected at the specific road links of the affected road network included in the traffic emission modelling assessment on account of the altered traffic flows due to the proposed Scheme.

Receptor Ref.	Receptor Location Address	Receptor Grid Ref.	Receptor Distance to kerb (m)	Link Length (km)
AQSR 1	1 Glasnevin Oaks	314021, 237720	15m	0.225km
AQSR 2	Saint Canice's Square	313150, 238759	5m	0.145km
AQSR 3	190 Glasanaon Road	313591, 238956	15m	0.165km
AQSR 4	91 Jamestown Road	313431, 239455	14m	0.195km
AQSR 5	5 Melville Close	313704, 240223	7m	0.850km
AQSR 6	U Charlestown Apartments	312774, 240542	15m	0.470km
AQSR 7	1 Aylward Green	312812, 238827	13m	0.245km
AQSR 8	1 Finglaswood Road	312659, 238909	11m	0.170km
AQSR 9	Charlestown Place, St Margarets Road	312955, 240649	14m	0.425km
AQSR 10	112 North Road	312832, 239674	11m	1.125km
AQSR 11	449 Casement Road	312609, 240052	21m	0.665km
AQSR 12	174 North Road	312813, 239793	13m	0.038km
AQSR 13	4 St Margarets Court, St Margarets Road	312885, 240083	10m	0.093km

Sensitive Ecological Receptor Locations

The proposed Scheme crosses the Royal Canal pNHA at Broombridge, which is the most proximate designated area of conservation. OTD PE-ENV-01106 states that "*only sites that are sensitive to nitrogen (i.e. sensitive designated habitats) should be identified. It is not necessary to include sites, for example, that have been designated as a geological feature or a water course*". Therefore, as the Royal Canal pNHA is a water course it is not sensitive to nitrogen deposition.

13.4 Potential Impacts

The potential impact on air quality due to the proposed Scheme has been considered for each of two distinct stages of the development:

- Construction Phase; and
- Operational Phase.

During the Construction Phase the main potential impact on air quality during the Construction Phase is from construction dust emissions, i.e. PM_{10} and $PM_{2.5}$ emissions and the potential for nuisance dust deposition at the nearest air quality sensitive receptors. There is also the potential for increased traffic emissions due to Construction Phase generated traffic.

During the Operational Phase, the most significant potential impact with respect to air quality will be because of the potential air quality impacts associated with altered traffic flows due to the Park & Ride facility at St Margaret's Road and as a result of altered traffic flows on the surrounding road network within the study area due to the operation of the proposed Scheme. The proposed Scheme itself is not an air pollutant emission source as the proposed Scheme is powered by electricity, which is more environmentally friendly than most other forms of transport which are fuelled by fossil fuels.

13.4.1 Do Minimum Scenario

The Do Minimum scenario is based on the existing and likely future road network and road traffic volumes with all committed schemes in place that will impact on the use of public transport and private car, not including the construction or operational traffic flows associated with the proposed Scheme. The output of the 'Do-Minimum' scenario analysis and its impact on local air quality has been modelled using TII REM Tool. The predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ at the selected air quality sensitive receptor locations in the Base Year, 2035 Opening Year and 2050 Design Year are presented in Section 13.4.3. The 'Do-Minimum' scenario is the base year, 2035 Opening Year and 2050 Design Year network with the addition of committed road traffic in the study area, not including the operational traffic flows associated with the proposed Scheme. The relative impacts of the proposed Scheme have been assessed by comparing the 'Do-Minimum' scenario versus the 'Do-Something' scenario for 2035 Opening Year and 2050 Design Year and reporting this as a percentage change against the 'Do-Minimum' scenario. This is outlined in Section 13.4.3 Operational Phase Impact Assessment.

13.4.2 Construction Phase

13.4.2.1 Construction Phase Traffic Emissions

The Construction Phase traffic data has been screened against the following criteria, based on the changes between the Do-Something traffic (i.e., with construction) compared to the Do-Minimum traffic:

- Road alignment will change by 5m 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 10kph or more; or
- Peak hour speed will change by 20kph or more.

The traffic data indicates that there will be fewer than 200 AADT Heavy duty vehicles (HDV) on the existing road network during the Construction Phase of the proposed Scheme. Therefore, there will be no significant air quality impact during the construction phase from construction vehicle emissions.

13.4.2.2 Construction Phase Dust Emissions

The proposed Scheme is 3.9km long and entails the new northern extension of the Luas Green Line from its current terminus in Broombridge to a new terminus in Charlestown, near the N2-M50 interchange, with 4 new Stops, two major bridges, one new Park and Ride (P&R), an extension to a new Broombridge Stabling Site and associated works.

The proposed Scheme has been divided into four distinct areas as part of the design process and for ease of reference in this EIAR Chapter, namely:

- Area 30 Broombridge Depot: This is located at the northern end of the existing Green Line;
- Area 31 Broombridge to Tolka Valley Road: This area is approximately 0.85km long and includes two major structures, the tie-in to the existing Luas Green Line at Broombridge and the crossing of Tolka Valley Park and Tolka River, no Stops are included in this Section;
- Area 32 Tolka Valley Road to Finglas Village Stop: This area is approximately 1.45km long including two Stops: St Helena's and Finglas Village; and
- Area 33 North of Finglas Village Stop to the terminus (Charlestown Stop): This area is approximately 1.42km long and includes two Stops: St Margaret's and Charlestown terminus. This area also includes a major road junction with the N2, and the Section along St Margaret's Road. This area also includes the proposed Park and Ride facility.

The type of construction activities that could cause fugitive dust emissions are demolition; earthworks; handling and disposal of spoil; wind-blown particulate material from stockpiles; handling of loose construction materials; and movement of vehicles, both on and off-site. The main effect of any dust emissions, if not mitigated, could be annoyance due to soiling of surfaces, particularly windows, cars and laundry. However, it is normally possible, by implementation of proper control measures, to ensure that dust deposition does not give rise to significant adverse effects. The Dust Impact Assessment has been undertaken in accordance with IAQM Guidance (IAQM, 2024), to assess the risk of dust impacts and the level of mitigation that is required to control the residual effects to a level that is "not significant".

Dust generation rates depend on the site activity, particle size, the moisture content of the material and weather conditions. Dust emissions are dramatically reduced where rainfall has occurred due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume no dust is generated under "wet day" conditions where rainfall greater than 0.2mm (USEPA, 2006) has fallen (Dublin Airport had on average 191 wet days annually over a 30-year averaging period (1981-2010)). High levels of moisture either retained in the soil or as a result of rainfall help suppress the generation of dust due to the cohesive nature of water between dust particles. Rain also assists in removing dust from the atmosphere through washout. Wind can lift particles up into the air and transport the dust downwind as well as drying out the surface. The worst dust deposition conditions typically occur, therefore, during dry conditions with strong winds.

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. Due to the scale of the proposed Scheme construction, sites will be in operation for extended periods and therefore detailed consideration of potential dust impacts and how to mitigate them is required.

The Construction Dust Impact Assessment steps are outlined below:

Step 1: Screening the Need for a Detailed Assessment

A Construction Dust Impact Assessment is deemed to be required because of the following;

- There are 'human receptors' within 350m of the boundary of the site; and
- There is an 'ecological receptor' within 50m of the boundary of the site.

Step 2: Assess the Risk of Dust Impacts

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts has been determined using the four risk categories: negligible, low, medium and high risk. The construction site area has been allocated to a risk category based on the following approach:

- Step 2A – definition of the scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large;
  Step 2B – definition of the sensitivity of the area to dust impacts, which is defined as low, medium or high sensitivity; and
- Step 2C – determination of the risk of dust impacts with no mitigation applied.

Step 2A: Define the Potential Dust Emission Magnitude

The potential dust emission class for the proposed Scheme were determined using the criteria detailed in Table 13-5 using the 4 distinct areas (Areas 30-33) the dust emission class from the four sites has been discussed individually and assessed as the full proposed Scheme. The estimated peak numbers of vehicles and the plant and equipment working on each activity is indicated in Chapter 6 (Construction Activities) of this EIAR.

Demolition

It includes any activity involved with the removal of an existing structure (or structures).

- **Area 30** - No demolition required in this area;
- **Area 31** - Demolition of:
  - Unit 124 Broombridge Close, Glen Industrial Estate to East of Broombridge Road
  - Former Layertite building to East of Broombridge Road
  - Park Building in Tolka Valley Park at proposed Compound Location
- **Area 32** - Demolition of an existing building structure at the rear of Finglas Garda Station (OPW);
- **Area 33** - Demolition of:
  - Two DCC-owned Park buildings along the proposed alignment, just north of Mellowes Road and behind the Parks Superintendent's House, which is now in use as a counselling service;
  - Pedestrian bridge at southern end of St Margaret's Road over the N2;
  - North Road Motor Company and associated buildings at southern end of St Margaret's Road;
  - Pizza Hut building at the southern end and to the east of St Margaret's Road;
  - Discount DIY North Road for Park & Ride at the southern end and to the east of St Margaret's Road; and
  - Manhattan Peanuts Ltd., substation building at the southern end and to the east of St Margaret's Road.
- Full proposed Scheme;
  - Total building volume >50,000m^3
  - Potentially dusty construction material (e.g. concrete)
  - On-site crushing and screening

Therefore, the dust emission magnitude for Demolition is defined as Large.

Earthworks

This covers the processes of soil-stripping, ground-levelling, excavation and landscaping. Excavation works are proposed at the site of the proposed Scheme in order to facilitate the required vertical alignment, subgrade preparation and foundation construction. The proposed Scheme will be predominantly constructed at, or close to, existing grade and therefore does not require extensive excavation. The subsoils to be excavated are generally urban soil comprising 'Made Ground'.

The stratigraphic profile across the site is generally consistent, comprising an initial layer of topsoil or hard surfacing (bitumen or concrete pavement), followed by a variable thickness of made ground, underlain by natural strata comprising cohesive glacial till (known locally as Dublin boulder clay) and limestone bedrock occasionally interbedded with mudstone (known locally as Calp). The made ground can be generally described as reworked cohesive glacial deposits (described generally as grey/brown sandy slightly gravelly clay with frequent cobbles and boulders) containing a variable fraction of construction and demolition waste materials, such as brick, metal, and plastic.

Area 30 – The proposed Scheme generally follows the existing site area topography. However, there is a localised depression of up to 2m located towards the rear (northern end) of the former industrial building (now demolished) to be filled and levelled. The fill material will be sourced from the valley areas of the site in Area 32. Local roads will be used to transfer this material.

Area 31 – The elevations follow the proposed structure levels and the existing Broombridge Road tie-in levels. Further north, within Tolka Valley Park, the proposed Scheme navigates between two of the mounded landforms associated with the historic landfills once operated within the park with cut and fill operations required. The two plateaus situated either side are approximately 4-5m above the proposed alignment. Unsuitable materials will be disposed directly to a suitably licenced landfill.

Area 32 – The track alignment closely follows existing topography, with maximum cut and fill ranges up to 1m. The earthworks activities to comprise excavation of a box section for the track form and reinstatement with aggregate materials.

Area 33 – The track alignment closely follows existing topography, with maximum cut and fill ranges up to 1m. The earthworks activities to comprise excavation of a box section for the track form and reinstatement with aggregate materials.

Full proposed Scheme

- The total site area where earthworks will occur is >100,000 m^2;
- The site contains moderately dusty soil;
- There will be >10 heavy moving earth moving vehicles active at any one time; and
- Total material moved is >100,000 tonnes.

Therefore, the dust emission magnitude for earthworks is defined as Large.

Construction

It includes any activity involved with the provision of a new structure (or structures), its modification or refurbishment.

Track Construction - The track construction will entail the construction of both the trackbed and the track rail system. The trackbed construction will generally entail the excavation of a 6-7m wide trench varying in depth from 0.8m to 1.5m where level with existing ground. The track excavations will be either within pavement materials in roadways and soil or subsoil materials in the park areas. Multi-tubular ducts which carry the power supply cables and the communications links required for the LRVs will be installed once the ground has been excavated. The track drainage systems will also be constructed in advance and during the track construction. The trackbed formation will then be compacted and levelled.

Construction Compounds - Potential compound locations have been identified along the route and these are shown in Chapter 6 Construction Activities. There is the potential to use as compounds buildings which need to be demolished.

- Area 30 - No compounds;
- Area 31 - Four compounds (Area = 2,036m^2, 3,427m^2, 1,522m^2, 2,519m^2);
- Area 32 - Two compounds (Area = 5,448m^2, 1,034m^2); and
- Area 33 - Three compounds (Area = 1,829m^2, 2,017m^2, 948m^2).

Haul Roads - Where works are to be constructed on and adjacent to existing roads, they do not require newly prepared haul roads. However, where works are to be constructed off existing roads and in parks, haul roads for the transport of excavated material and the movement of construction materials, equipment and plant to and from the works will be required. The construction of the haul roads through the parks will typically entail a 6m wide hydraulically bound compacted layer of granular aggregate materials constructed parallel and offset from the track alignment. Summary of haul roads required:

- Area 30 – none required;
- Area 31 – Tolka Valley Road - 254m;
- Area 32 – Tolka Valley Road to St Helena's Road (545m) & Farnham Pitches to Wellmount Road (440m); and
- Area 33 – Mellowes Road to Casement Road (757m).

Structures - Structural works for the proposed Scheme consist of principal structures and minor structures.

Principal structures include the Royal Canal and Rail Overbridge at Broombridge and the Tolka Valley Park Bridge which are located at the southern end of the proposed Scheme. The Park & Ride building is located near the northern end of the scheme at St Margaret's Road Stop.

- Royal Canal and Rail Overbridge –The proposed bridge is an eight-span structure consisting of two main parts: a variable depth weathering steel composite box girder followed by a constant depth solid concrete slab. The bridge deck is continuous over the full length of 212.5m and has solid approach ramps at both ends.
- Tolka Valley Park Bridge – 65m long three-span structure. The bridge deck is 11.62m wide, and its depth varies between 1.5m at midspan and 2.5m at piers.
- Park & Ride facility - The proposed Park & Ride facility is located in the north-eastern corner of the existing North Road, Finglas Road, St Margaret's Road roundabout, within Area 33. The proposal is to provide a multi-storey car park on the site currently occupied by Discount DIY, to the north of the planned redeveloped LIDL site. The proposed building is six storeys high, including the ground floor. The roof is proposed to be a green or blue roof with PV panels. The eastern side of the ground floor is assigned to LIDL. The current proposed ground floor area is approximately 3,500m^2 and the gross floor area is approximately 19,250m^2. A new access road for the Park & Ride facility has been proposed from North Road.

Minor Structures include retaining walls, substations, non-motorised user (NMU) facilities, cycle facility upgrades, power and system provisions, stop platforms and surfacing works

The reinstatement and upgrades will include the roads and junctions at Broombridge Road, Ballyboggan Road, Tolka Valley Road, St Helenas Road, Farnham Drive and its extension, Wellmount Road, Patrickswell Place, Cappagh Road, Mellowes Road, the Finglas Road/North Road, St Margaret's Road and a new access Road off McKee Avenue for the Jamestown Little Industrial Estate and Manhattan Peanuts.

Full proposed Scheme:

- The total building volume will be >100,000m^3;
- Potentially dusty construction material; and
- On-site concrete batching.

Therefore, the dust emission magnitude for construction is defined as Large.

Trackout

This includes the transport of materials to and from the construction/demolition site areas onto the public road network. Dust and dirt may be deposited and then re-suspended by vehicles using the haul road network and public road network.

- There will be >50 outward HDV trips on average / day;
- Unpaved road length >100m; and
- The construction works will progress in multiple locations at one time with localised areas having several activities occurring concurrently. The estimated peak numbers of vehicles and the plant and equipment working on each activity is indicated in Chapter 6, Table 6 11: Peak HGVs and Plant by Activity.

Therefore, the dust emission magnitude for trackout is defined as Large.

Step 2B: The Sensitivity of the Area to Dust Impacts

A summary of the sensitive receptors in each Area within 250m of the proposed Scheme construction area are as follows:

Area 30 – Broombridge Depot

There currently are no receptors within 20m or 50m of the proposed Scheme. The nearest residential receptors are along Bannow Road and Carnlough Road. Broombridge Educate Together National School is approximately 150m from the proposed Scheme Beggsborough AFC and Cabra community college are approximately 200m from the proposed Scheme.

However, a DCC housing scheme is proposed to the south of the stabling area. This will comprise approximately 60 social and affordable homes. With no detailed plans available to review as yet it can be assumed that c. 60 sensitive receptors will be <50m and c. 30 houses < 20m from the proposed Scheme.

Area 31 – Broombridge to Tolka Valley Road

This area is approximately 850m long, extending from the existing Greenline at Broombridge to Tolka Valley Road. The initial part of the route passes through Broombridge Road. This area is predominantly industrial with no highly sensitive receptors within 250m of the proposed Scheme. The TU Sports complex Broombridge, which is considered a low sensitive receptor, is approximately 100m from the proposed Scheme. The route then proceeds through Tolka Valley Park across Tolka Valley Road. The park itself is considered a medium sensitive receptor in terms of dust soiling effects.

Area 32 – Tolka Valley Road to Finglas Village Stop

This area is approximately 1,450m long running from Tolka Valley Road to Finglas Village Stop and includes two Stops: St Helena's and Finglas Village. The proposed Scheme will pass through green space between the residential estates of Barnamore Grove and the Carrigallen estate near St Helenas where there are also a number of community facilities, along with retail facilities to the east. The Luas line will cross St Helena's Road and then pass through more green space which separates residential areas along Dunsink Road and Farnham Drive where sports fields and clubs are also located.

There are approximately 30 residential receptors within 20m of the proposed Scheme and approximately 100 residential receptors within 50m of the proposed Scheme. Sports and leisure facilities in the study area include Erin's Isle GAA (c. 20m from playing fields, c.100m from building), Rivermount Boys FC (c. 20 m from playing fields, c.70m from building). Schools in the proposed Scheme study area include, St Malachy's Mixed NS (c. 70m), St Oliver Plunkett's NS (building c.100m from P&R), St Malachy's Mixed NS (c. 70m), St Michael's Holy Faith Secondary School (c. 50m, grounds, St Fergal's Boys NS (c. 50m) and Finglas Parochial NS (c. 50m). St Helena's Family Resource and Childcare Centre (adjacent to proposed Stop, c. 12m). Churches in the proposed Scheme study area include St Oliver Plunkett's Church (c. 75m), and the Kingdom Hall of Jehovah's Witnesses (c. 25m).

Area 33 – North of Finglas Village Stop to the Terminus at Charlestown Stop

This area is approximately 1,420m long and includes two Stops: St Margaret's and Charlestown Terminus. McKelvey Celtic FC is adjacent to the proposed Scheme, as is Leisure Point Sport and Fitness Centre, and Finglas Area Office and Sports Centre. There are several residential receptors within 20m on North Road and on Mc Kee Avenue and a few within 50m along St Margarets Road.

Table 13-19: Cumulative number of sensitive receptors within 20m, 50m, 100m and 250m of the site

Parameter	Area	Number of Receptors within Distance from Site (m)			
		<20m	<50m	<100m	<250m
No. of high sensitivity receptors	Area 30	~30	~80	~120	>200
Receptor Sensitivity		High	High	High	Medium
No. of high sensitivity receptors	Area 31	0	0	~13	>100
Receptor Sensitivity		Medium	Low	Low	Low
No. of high sensitivity receptors	Area 32	30	100	>200	>200
Receptor Sensitivity		High	High	High	Medium
No. of high sensitivity receptors	Area 33	~5	~20	~100	>100
Receptor Sensitivity		High	High	High	Medium
Receptor Sensitivity for the full proposed Scheme	proposed Scheme	High	High	High	Medium

Sensitivity of People to Dust Soiling

- Demolition, Earthworks and Construction: In accordance with Table 13-19 the sensitivity of the area is High; and
- Trackout: For trackout, the distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout impact may occur from roads up to 50 m from large sites (as determined in Step 2A). The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road. As shown in Table 13-19, there are c. 200 sensitive receptors within 50m from the proposed site. Therefore Table 13-19 indicates that in terms of trackout dust impacts, the sensitivity of the area is also High.

Sensitivity of the Area to Human Health Impacts

The PM_{10} monitoring data at Finglas Garda Station for the period 2019 – 2023 indicates an average PM_{10} concentration of 11.8µg/m^3 over this period. This is 29.5% of the annual mean limit value for PM_{10} of 40µg/m^3. The $PM_{2.5}$ monitoring data at Finglas Garda Station for the 2019 – 2023 indicates an average $PM_{2.5}$ concentration of 7.5µg/m^3 over this period. This is 37.5% of the annual mean limit value for $PM_{2.5}$ of 20µg/m^3.

Therefore, the annual mean PM_{10} concentration at the site is below the relevant air quality limit value of 40µg/m^3. As shown in Table 13-19, there are <100 sensitive receptors within 20m of the proposed Scheme. Therefore, in terms of demolition, earthworks, construction and trackout dust impacts, the Sensitivity of the Area to Human Health Impacts is Low.

Sensitivity of the Area to Ecological Impacts

With respect to Ecological Impacts, receptor sensitivity can be described as follows as per the IAQM guidance (IAQM, 2024):

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; and

- Indicative examples include a 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:

- There is a particularly important plant species, where its dust sensitivity is uncertain or unknown; and
- Indicative example is a Natural 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; and
- Indicative example is a local Nature Reserve with dust sensitive features.

Designated sites within 50m of the boundary of the site or within 50m of the route used by construction vehicles on public highways up to a distance of 500m from a construction site entrance can be affected according to the IAQM guidance (IAQM, 2024). The sensitivity of the area to ecological impacts are considered using the sensitivity criteria outlined above.

The proposed Scheme traverses the Royal Canal proposed Natural Heritage Area (pNHA) at Broombridge. Therefore, the sensitivity of the Area to Ecological Impacts, in terms of earthworks, construction and trackout dust impacts is High.

Overall Sensitivity of the Area

The sensitivity of the area to dust soiling, human health impacts and ecological impacts for each activity is summarised Table 13-20 which helps to Define Site-Specific Mitigation.

Table 13-20: Outcome of Defining the Sensitivity of the Area - Summary Dust Risk Table to Define Site-Specific Mitigation

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Low
Ecological Impacts	High	High	High	High

Step 2C: Define the Risk of Impacts

In accordance with the IAQM Guidance (IAQM, 2024 - Tables 6 to 9), the dust emission magnitude determined in Step 2A and the sensitivity of the area determined in Step 2B have been combined and the risk of impacts from Demolition, Earthworks, Construction and Trackout are determined (before mitigation is applied). The risk of dust soiling, impact on human health and ecological impact before mitigation, is summarised in Table 13-21.

Table 13-21: Summary Dust Risk Table to Define Site-specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High Risk	High Risk	High Risk	High Risk
Human Health	Medium Risk	Low Risk	Low Risk	Low Risk
Ecological	High Risk	High Risk	High Risk	High Risk

Step 3: Site-Specific Mitigation Recommendation

In accordance with the IAQM Guidance (IAQM, 2024), for proposed mitigation measures, the highest risk category should be applied to the Construction Phase of the proposed Scheme. Therefore, the mitigation measures applicable to a High-Risk Site should be applied and these measures are outlined in Section 13.5.

13.4.3 Operational Phase

13.4.3.1 Impact on Human Receptors

The proposed Scheme itself is not an air pollutant emission source as the proposed Scheme is powered by electricity, which is more environmentally friendly than most other forms of transport which are fuelled by fossil fuels. Luas approach to energy consumption focuses on efficiency and the use of renewable energy sources. Luas has already transitioned to using 100% wind-generated electricity for its operations, significantly reducing reliance on fossil fuels and hence, reducing air pollutant emissions. As the proposed Scheme is electrified, there will be no air pollutant emissions from its operation to appraise. The proposed Scheme will provide a sustainable transport solution and facilitate compact growth and less reliance on private transport. The cumulative impact has the potential to be beneficial with respect to reduced transport emissions during the Operational Phase.

For the Operational Phase traffic assessment, the air quality assessment focuses on the change in distribution of road vehicles and the likely effects of these changes on local air quality which is predicted to occur in the study area due to altered traffic flows on account of the operation of the proposed Scheme and the Park & Ride facility at St Margaret's Road.

Annual average daily traffic (AADT) flows on the road network within the study area were provided by Luas team. The relevant AADT traffic flows on the surrounding road network include future predicted traffic volumes within the study area. The road traffic emission assessment in the Year of Opening 2025 and Design Year 2050 has been based on AADT traffic flows that incorporate all future predicted AADT traffic volumes within the study area, inclusive of all cumulative development projects considered in the traffic study.

Potential impacts to local air quality relate to alterations to traffic patterns (e.g. introduction of Park & Ride facility traffic flows or due to redistributed traffic on the surrounding road network), with particular attention focused on areas where the proposed Scheme will result in increased traffic flows near to sensitive air quality receptors. For the Operational Phase road traffic emission assessment, the focus is on air quality receptors within the overall study area of the proposed Scheme, as per OTD PE-ENV-01106.

As stated, there are properties along the existing roads in the study area that will experience a net reduction in road traffic pollution with the proposed Scheme in operation as a direct result of reducing the number of vehicles that will pass along these roads per day. A reduction of greater than 1,000 vehicles per day will occur along roads in the study area such as Patrickswell Place, Finglaswood Road, St Margarets Road and North Road (south and north of St Margaret's Road).

Conversely, there are properties along the existing roads in the study area that will potentially experience a net increase in road traffic pollution with the proposed Scheme in operation as a direct result of the predicted increase in the number of vehicles that will pass along these roads per day. An increase of greater than 1,000 vehicles per day will occur along roads in the study area such as a short section of Finglas Road (R135), Wellmount Road, Glasanaon Road, Jamestown Road (south and north of Melville Rd) and Charlestown Place.

There are also a number of sensitive receptors located along the existing road network in the study area that may experience changes in traffic volumes and/or slight road alignment changes that may result in impacts to air quality. However, the traffic volume changes will be less than 1,000 vehicles per day, and therefore, the changes will have an insignificant impact on existing local air quality.

The REM model has been employed to quantify the predicted changes in local air quality at each of the selected sensitive receptors. The projected traffic flows on the surrounding road network in the study area

with the proposed Scheme in operation in the Base Year, 2035 Opening Year and 2050 Design Year as identified in the traffic and transport assessment were used to predict the concentrations of traffic-derived pollutants in baseline and future years.

NO_2, PM_{10} and $PM_{2.5}$ are the pollutants of most concern with regard to road traffic emissions and the relevant statutory Air Quality Limit Values (AQLV). The REM model includes the NO_2, PM_{10} and $PM_{2.5}$ background pollutant concentrations as presented in the baseline description. The potential impact on local air quality is assessed the Base Year, 2035 Opening Year and 2050 Design Year for the following scenarios:

- 'Do-Minimum' (DM) – This scenario is the base year network with the addition of committed road traffic in the study area; and
- 'Do-Something' (DS) – The Do- Something scenario models the base year network with the addition of committed road traffic in the study area together with the operation of the proposed Scheme.

Pollutant concentrations have been provided at the worst-case receptors i.e. those properties that are closest to the existing roads in the study area and are likely to experience the most significant worst-case and beneficial impacts. The selected sensitive receptors assessed in the REM tool have been outlined in Table 13-18.

At each of the receptors the predicted percentage of the Air Quality Limit Values (AQLV) and the percentage change relative to the AQLV have been compared against the statutory limits (See Table 13-3) to ensure a robust assessment. The significance of the predicted impact at each of the receptors has also been presented relative to the TII criteria in Table 13-11.

Table 13-22 to Table 13-24 present the findings of the impact on local air quality as a result of the Operational Phase of the proposed Scheme. Table 13-22 to Table 13-24 detail the predicted nitrogen dioxide (NO_2), and particulate matter PM_{10} and $PM_{2.5}$ concentrations in the Base Year, 2035 Opening Year and 2050 Design Year as a result of the Operational Phase of the proposed Scheme respectively.

Table 13-22: Local Impact to Air Quality as a result of Operational Luas Scheme – Predicted Nitrogen Dioxide (NO_2) concentrations in Base Year, 2035 Opening Year & 2050 Design Year.

Receptor	Base Year	2035 Opening Year				2050 Design Year				Quality of Effect (TII 2022)
	Do-Minimum (µg/m³)	Do-Minimum (µg/m³)	Do-Something (µg/m³)	% of AQLV	% Change relative to AQLV	Do-Minimum (µg/m³)	Do-Something (µg/m³)	% of AQLV	% Change relative to AQLV	
AQSR 1	23.02	19.93	19.8	49.5%	-0.3%	19.8	19.81	49.5%	0.0%	Neutral
AQSR 2	21.21	19.5	19.79	49.5%	0.7%	19.53	19.61	49.0%	0.2%	Neutral
AQSR 3	19.36	19.01	19.19	48.0%	0.4%	19.05	19.17	47.9%	0.3%	Neutral
AQSR 4	20.02	19.36	19.51	48.8%	0.4%	19.43	19.47	48.7%	0.1%	Neutral
AQSR 5	19.94	18.96	19.16	47.9%	0.5%	19	19.2	48.0%	0.5%	Neutral
AQSR 6	21.54	19.47	19.71	49.3%	0.6%	19.45	19.54	48.9%	0.2%	Neutral
AQSR 7	19.48	19.12	18.86	47.2%	-0.7%	19.11	18.89	47.2%	-0.5%	Neutral
AQSR 8	19.57	19.07	18.75	46.9%	-0.8%	19.1	18.79	47.0%	-0.8%	Neutral
AQSR 9	21.89	19.57	19.31	48.3%	-0.7%	19.53	19.35	48.4%	-0.4%	Neutral
AQSR 10	24.28	20.68	20.58	51.5%	-0.3%	20.48	20.42	51.1%	-0.1%	Neutral
AQSR 11	22.94	19.97	19.91	49.8%	-0.1%	19.84	19.79	49.5%	-0.1%	Neutral
AQSR 12	22.52	19.77	19.77	49.4%	0.0%	19.58	19.12	47.8%	-1.1%	Neutral
AQSR 13	22.91	19.44	19.93	49.8%	1.2%	19.73	19.23	48.1%	-1.3%	Neutral
AQS Annual Limit for Protection of Human Health	40 µg/m³									
WHO Air Quality Guideline (AQG)	10 µg/m³									

Table 13-23: Local Impact to Air Quality as a result of Operational Luas Scheme – Predicted Particulate Matter (PM_{10}) concentrations in Base Year, 2035 Opening Year & 2050 Design Year.

Receptor	Base Year	2035 Opening Year				2050 Design Year				Quality of Effect (TII 2022)
	Do-Minimum (µg/m³)	Do-Minimum (µg/m³)	Do-Something (µg/m³)	% of AQLV	% Change relative to AQLV	Do-Minimum (µg/m³)	Do-Something (µg/m³)	% of AQLV	% Change relative to AQLV	
AQSR 1	14.4	14.26	14.29	35.7%	0.1%	14.29	14.32	35.8%	0.1%	Neutral
AQSR 2	12.84	13.15	13.59	34.0%	1.1%	13.39	13.53	33.8%	0.3%	Neutral
AQSR 3	11.42	12.02	12.24	30.6%	0.6%	12.17	12.33	30.8%	0.4%	Neutral
AQSR 4	12.05	12.93	13.17	32.9%	0.6%	13.23	13.3	33.3%	0.2%	Neutral
AQSR 5	11.99	12.31	12.62	31.6%	0.8%	12.51	12.84	32.1%	0.8%	Neutral
AQSR 6	13.3	13.45	13.87	34.7%	1.1%	13.62	13.81	34.5%	0.5%	Neutral
AQSR 7	11.5	12.18	11.85	29.6%	-0.8%	12.28	11.99	30.0%	-0.7%	Neutral
AQSR 8	11.53	12.09	11.7	29.3%	-1.0%	12.24	11.83	29.6%	-1.0%	Neutral
AQSR 9	13.33	13.31	12.9	32.3%	-1.0%	13.45	13.14	32.9%	-0.8%	Neutral
AQSR 10	15.36	15.61	15.43	38.6%	-0.4%	15.6	15.48	38.7%	-0.3%	Neutral
AQSR 11	14.34	14.34	14.23	35.6%	-0.3%	14.37	14.28	35.7%	-0.2%	Neutral
AQSR 12	13.76	13.64	13.64	34.1%	0.0%	13.53	12.75	31.9%	-2.0%	Neutral
AQSR 13	14.03	13.9	13.9	34.8%	0.0%	13.78	12.93	32.3%	-2.1%	Neutral
AQS Annual Limit for Protection of Human Health	40 µg/m³									
WHO Air Quality Guideline (AQG)	15 µg/m³									

Table 13-24: Local Impact to Air Quality as a result of Operational Luas Scheme – Predicted Particulate Matter ($PM_{2.5}$) concentrations in Base Year, 2035 Opening Year & 2050 Design Year.

Receptor	Base Year	2035 Opening Year				2050 Design Year				Quality of Effect (TII 2022)
	Do-Minimum (µg/m³)	Do-Minimum (µg/m³)	Do-Something (µg/m³)	% of AQLV	% Change relative to AQLV	Do-Minimum (µg/m³)	Do-Something (µg/m³)	% of AQLV	% Change relative to AQLV	
AQSR 1	8.78	8.63	8.65	43.3%	0.1%	8.65	8.66	43.3%	0.0%	Neutral
AQSR 2	7.9	8.03	8.28	41.4%	1.3%	8.16	8.24	41.2%	0.4%	Neutral
AQSR 3	7.1	7.42	7.54	37.7%	0.6%	7.5	7.59	38.0%	0.4%	Neutral
AQSR 4	7.44	7.91	8.04	40.2%	0.6%	8.07	8.11	40.6%	0.2%	Neutral
AQSR 5	7.42	7.57	7.74	38.7%	0.9%	7.68	7.86	39.3%	0.9%	Neutral
AQSR 6	8.15	8.19	8.42	42.1%	1.2%	8.28	8.38	41.9%	0.5%	Neutral
AQSR 7	7.14	7.51	7.32	36.6%	-0.9%	7.56	7.4	37.0%	-0.8%	Neutral
AQSR 8	7.16	7.46	7.24	36.2%	-1.1%	7.54	7.31	36.6%	-1.2%	Neutral
AQSR 9	8.18	8.12	7.89	39.5%	-1.2%	8.2	8.02	40.1%	-0.9%	Neutral
AQSR 10	9.32	9.38	9.28	46.4%	-0.5%	9.37	9.31	46.6%	-0.3%	Neutral
AQSR 11	8.74	8.68	8.62	43.1%	-0.3%	8.69	8.64	43.2%	-0.2%	Neutral
AQSR 12	8.12	8.3	8.3	41.5%	0.0%	8.24	7.81	39.1%	-2.2%	Neutral
AQSR 13	8.58	8.45	8.44	42.2%	0.0%	8.38	7.91	39.6%	-2.4%	Neutral
AQS Annual Limit for Protection of Human Health	20 µg/m³									
WHO Air Quality Guideline (AQG)	5 µg/m³									

In terms of the predicted local air quality impact, as a result of a potential net reduction or increase in road traffic on sections of the associated road network within the study area of the proposed Scheme, it is evident that there will be a 'neutral' impact on nitrogen dioxide (NO_2) and particulate matter (PM_{10} & $PM_{2.5}$) concentrations in the area.

At each of the selected sensitive receptor locations, there will be no predicted nitrogen dioxide (NO_2) and particulate matter (PM_{10} & $PM_{2.5}$) concentrations that will exceed 75% of the relevant annual mean air quality limit value.

At each of the selected sensitive receptor locations, there will be no predicted nitrogen dioxide (NO_2) and particulate matter (PM_{10} & $PM_{2.5}$) concentrations that will exceed an increase of 1% of the relevant annual mean air quality limit value.

Therefore, the worst-case affected sensitive receptor locations will experience a 'neutral' impact in the long term from road traffic changes as a result of the proposed Scheme.

It is noted that for both the Do Minimum and Do Something scenarios, the NO_2 concentrations are predicted to remain below the current statutory limits for the protection of human health. This is the case for the worst-case BaU scenario, and it can be expected that the Intermediate and CAP scenarios presents lower future scenario emissions.

For particulate matter (PM_{10} & $PM_{2.5}$), the predicted concentrations show an identical trend to that for NO_2 with the levels of PM_{10} & $PM_{2.5}$ predicted to remain below the current statutory limits for the protection of human health.

13.4.3.2 Potential Operational Impacts Scoped Out of the Assessment

During the Operational Phase, an assessment of the dust impacts from maintenance of the proposed Scheme has been scoped out on the basis that the operation of the proposed Scheme has a low potential for dust release and will have a negligible impact on air quality sensitive receptors.

A review of potential emissions from the Operational Phase maintenance activities, such as diesel powered maintenance vehicles and P&R maintenance activities have been scoped out from having potentially significant local air quality impacts and will have a negligible impact on air quality sensitive receptors. In the near future, such maintenance vehicles are most likely to be electric vehicles with zero air pollutant emissions.

13.4.3.3 Impact on Ecological Receptors

As stated above, only nationally and locally designated sites of ecological importance that are sensitive to nitrogen (i.e. sensitive designated habitats) should be identified and assessed. Therefore, as the Royal Canal pNHA is a water course it is not sensitive to nitrogen deposition. With the proposed Scheme in operation, there will be no significant increase in traffic volume on the Broombridge Road and there will be a reduction in traffic volume on the Ballyboggan Road close to the Royal Canal pNHA. During the Operational Phase of the proposed Scheme, the impact of the proposed Scheme crossing the Royal Canal pNHA will be insignificant in terms of local air quality because the proposed Scheme is electrified and there are no significant local emissions from it to appraise. The proposed Park & Ride facility at St Margaret's Road is located approximately 2.5km north of the Royal Canal pNHA. Therefore, there will be no associated potential impact on the Royal Canal pNHA due to Park & Ride facility associated road traffic emissions. The proposed Park & Ride facility is well in excess of 200m from the Royal Canal pNHA, beyond which significant changes to air quality will not occur due to changes in AADT flows. Therefore, in terms of nitrogen and acid deposition, there will be no impact on the Royal Canal pNHA.

13.5 Mitigation and Monitoring Measures

13.5.1 Construction Phase

Construction dust control measures and good construction site management and practice is capable of effectively mitigating the potential for significant impact of fugitive dust emissions. Therefore, the potential for fugitive dust emission effects at the nearest sensitive receptors can be controlled to ensure dust impacts are of negligible significance.

In accordance with the IAQM Guidance (IAQM, 2024), the following mitigation measures are proposed in accordance with the determination that the highest risk category should be applied to the construction phase of the proposed Scheme. These dust mitigation measures will be incorporated in the CEMP (in Volume 5 - Appendix A6.1) and are also referenced in Chapter 25 (Summary of Mitigation Measures) of this EIAR.

13.5.1.1 Construction Phase Mitigation Measures

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager; and
- Display the head or regional office contact information.

Dust Management

- Construction dust will be controlled and managed in accordance with the Dust Management Plan contained within the CEMP (Volume 5 - Appendix A6.1). The Dust Management Plan within the CEMP will be updated by the construction contractor prior to the commencement of the Construction Phase, so as to include any additional measures required pursuant to conditions attached to any decision to grant approval. The Dust Management Plan (DMP) may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and will include as a minimum the recommended dust mitigation measures outlined below. The recommended construction dust mitigation measures will be implemented as appropriate for the site. The DMP will include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and visual inspections.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints log available to the local authority when asked;
- Record any exceptional incidents that cause dust and/or air emissions, either on or offsite, and the action taken to resolve the situation in the logbook; and
- Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary if applicable, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.

Monitoring

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

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below; and
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles;
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable;
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas; and
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

Operations

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

Waste Management

- Avoid bonfires and burning of waste materials.

The IAQM Guidance (IAQM, 2024) Mitigation Measures applicable to the specific works to be undertaken as part of the proposed Scheme are as follows:

Measures Specific to Demolition

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

Measures Specific to Earthworks

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

Measures Specific to Construction

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

Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site logbook;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and
- Access gates to be located at least 10m from receptors where possible.

13.5.1.2 Construction Phase *Aspergillus* Mitigation Measures

As stated above, *Aspergillus* is a fungus that is found in soil and has the potential to be made airborne during demolition or excavation. *Aspergillus* is of particular concern near hospitals or health clinics where immune suppressed patients are accommodated. While no such sensitive receptors were identified within the proposed Scheme construction area, a competent contractor will be appointed to prepare an *Aspergillus* Prevention Plan taking into account the National Guidelines for the Prevention of Nosocomial Aspergillosis (HSE 2018) which provides a risk assessment for aspergillus and preventative dust mitigation measures and in Appendix B of the document pre-project planning and contractor advice. Survey and prevention works with respect to *Aspergillus* will take place before construction commences by a competent contractor at sensitive buildings and hospitals or health clinics. If pre-construction surveys indicate that *Aspergillus* is a risk, the prevention works will include sealing the windows at relevant façades of the sensitive buildings and hospitals or health clinics to prevent fugitive dust entering through windows. These works will form part of an *Aspergillus* Prevention Plan to be completed by a specialist and will ensure the prevention of *Aspergillus* spores spreading. Research has found that dust suppression techniques, such as proposed also prevent the suspension of aspergillus successfully (Fournel et al. 2010).

13.5.1.3 Construction Phase Asbestos Mitigation Measures

Asbestos is the name for a group of natural occurring mineral fibres which are strong and both heat and chemically resistant. Due to these properties, asbestos was commonly used in the past as insulation and fire proofing. It was also used as a component in other building materials. Asbestos can be found in any industrial, commercial, public or residential building built or refurbished before the year 2000. There are three main types of asbestos found in Ireland – chrysotile (white asbestos), amosite (brown asbestos) and crocidolite (blue asbestos). The risk associated with exposure to asbestos relates to the possibility that the fibres within the asbestos containing material can become released into the air and are then inhaled. Breathing in air containing asbestos fibres can lead to asbestos-related diseases (mainly cancers of the chest and lungs). These diseases will not occur immediately and can take from 15 – 60 years to develop.

A Demolition Survey of all buildings to be demolished will be required prior to commencement of any such demolition works. This will include an intrusive asbestos-containing materials survey, which will involve destructive inspection. Prior to commencement of the demolition works, all asbestos containing materials identified by the Management 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, as amended and associated approved Codes of Practice.

13.5.1.4 Monitoring

As part of the Construction Dust Management Plan, monitoring of Construction Phase dust deposition levels, PM_{10}, $PM_{2.5}$ and NO_2 will be undertaken in order to ensure on-site mitigation measures are being successfully implemented.

The monitoring of Construction Phase dust deposition levels, PM_{10}, $PM_{2.5}$ and NO_2 will be developed and implemented as part of the Dust Management Plan (DMP). Monthly monitoring of Construction Phase dust deposition levels, PM_{10}, $PM_{2.5}$ and NO_2 levels shall be undertaken by the Contractor for the duration of Construction Phase.

The results of the Construction Phase dust deposition levels shall be compared with the guideline of 350mg/m^2/day (for non-hazardous dusts). The results of the Construction Phase PM_{10}, $PM_{2.5}$ and NO_2 concentrations shall be compared with the relevant Ambient Air Quality Standard limit values.

This monitoring shall be carried out at a minimum of three locations at each construction compound and further monitoring locations shall be designated at sensitive receptors along the proposed Scheme alignment. The monitoring locations will be chosen with consideration of the prevailing wind direction and proximity of sensitive receptors.

If dust deposition levels are measured to be above the relevant guideline of 350mg/m^2/day and/or PM_{10}, $PM_{2.5}$ and NO_2 concentrations are measured to be above the relevant Ambient Air Quality Standard limit values, the mitigation measures in the area shall be reviewed and improved to ensure that dust deposition levels and/or PM_{10}, $PM_{2.5}$ and NO_2 concentrations are reduced.

Should high dust deposition levels and/or PM_{10}, $PM_{2.5}$ and NO_2 concentrations continue to occur following these improvements, the Contractor shall provide alternative mitigation measures and/or will modify the construction works taking place.

Six months of pre-construction dust monitoring will be undertaken at all sites to establish a baseline prior to construction works. The data will assist in confirming if the construction of the proposed Scheme has the potential for any air quality impacts which contribute to the risk of the respective limit values, or target values or alert thresholds being exceeded. During construction, trigger levels will be used to alert TII and the Contractor to a potential peak in particulate concentrations. These trigger levels were successfully used at Rotunda Hospital during Luas Cross City works. Any updates to the trigger levels can be agreed with DCC and FCC prior to construction. In the event that a trigger level is breached SMS text messages and/ or emails will be sent to the Employer's Representative and the Contractor from monitoring equipment. In such an event:

- The Employer's Representative and the Contractor will review the construction activities in the vicinity to determine the cause;
- The Employer's Representative will be entitled to stop the Works. Where activities outside the control of the Contractor may have had an influence on a trigger level being breached, these will be identified, and works can recommence following agreement with the Employer's Representative;
- The Contractor will review the monitoring data, including the most recent air quality data; and

- The Contractor will identify and agree with the Employer's Representative appropriate engineering controls and management procedures to reduce dust levels resulting from the works activities identified as the cause of the trigger level being reached.

The Contractor will confirm to the Employer's Representative that controls and management procedures have been implemented.

13.5.2 Operational Phase

The predicted air pollutant concentrations at all air quality sensitive receptors along diverted traffic routes within the study area due to the operation of the proposed Scheme will remain in compliance with the ambient air quality standards and the proposed Scheme will have a 'neutral' impact at all modelled receptors. Therefore, no specific Operational Phase mitigation measures are required.

As stated, the proposed Scheme is electrified and there are no air pollutant emissions from it to appraise.

No Operational Phase monitoring is proposed. It is most likely that Dublin City Council, Fingal County and / or the Environmental Protection Agency will continue to undertake air quality monitoring within the study area to assess on-going compliance with, compared to the relevant Ambient Air Quality Standard limit values.

13.6 Residual Impacts

13.6.1 Construction Phase

Construction site dust control measures and good construction site management and practice is capable of effectively mitigating the potential for significant impact of fugitive dust emissions. Therefore, when the dust mitigation measures detailed above are implemented, the potential for fugitive dust emission effects at the nearest sensitive receptors will be controlled to ensure potential impacts are of negligible significance. The Dust Management Plan is contained within the CEMP (Volume 5 - Appendix A6.1).

The IAQM Guidance (IAQM, 2024) recommends that significance is only assigned to the effect after considering the construction activity with mitigation measures in place.

Using the IAQM methodology for the assessment of air quality impacts from construction activities has indicated that the risk of dust impacts and ecological impacts for demolition, earthworks, construction and trackout is high risk and impacts on human health is low risk. Therefore, the significance of impacts arising from the risks identified together with the proposed mitigation measures are summarised in Table 13-25.

Table 13-25: Summary of Significance of Impact including Site-Specific Mitigation

Potential Impact	Significance			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible	Negligible	Negligible	Negligible
Human Health	Negligible	Negligible	Negligible	Negligible
Ecological	Negligible	Negligible	Negligible	Negligible

Together with the mitigation measures that are included in the CEMP, which is in Volume 5 - Appendix A6.1 of the EIAR, the existing low background particulate (PM_{10} & $PM_{2.5}$) concentrations and the determination of mitigation measures suitable for a high risk during the construction activities, the significance of dust impacts at the nearest receptor locations will be negligible.

The assessment of Construction Phase traffic has found that as the construction of the proposed Scheme will include for fewer than 200 additional HDV traffic flows per day on the existing road network, there will be no significant construction traffic impact on local air quality.

The Construction Phase of the assessment identifies a generally negligible impact on air quality in the vicinity of the proposed Scheme. Therefore, taking into account the residual effects per the EPA Guidelines (EPA, 2022) and considering the likely effects of emissions from the proposed Scheme construction, the likely effects are adjudged overall to be neutral, not significant and medium-term.

13.6.2 Operational Phase

The predicted air pollutant concentrations at all air quality sensitive receptors along diverted traffic routes within the study area due to the operation of the proposed Scheme will remain in compliance with the ambient air quality standards, and the proposed Scheme will have a 'neutral' impact at all modelled receptors. Therefore, there will be no significant residual impact as a result of the proposed Scheme.

Therefore, taking into account the residual effects per the EPA Guidelines (EPA 2022) and considering the likely effects of emissions from the operation of proposed Scheme, the likely effects are adjudged overall to be neutral, not significant and long-term.

13.7 Cumulative Impacts

The cumulative assessment of relevant plans and projects has been undertaken separately in Chapter 24 (Cumulative Impacts) of this EIAR.

13.8 Difficulties Encountered in Compiling Information

No significant difficulties were encountered in compiling information for this assessment.

13.9 References

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