Chapter 07
Air Quality

Contents

7. Air Quality

7.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) has considered the potential air quality impacts associated with the Construction and Operational Phases of the Bray to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme).

During the Construction Phase, the potential air quality impacts associated with the development of the Proposed Scheme have been assessed. This included construction activities such as utility diversions, road carriageway / cycleway / footway resurfacing and kerb / road realignments. Construction traffic haul routes are also assessed as part of the study area for this phase of the works.

During the Operational Phase, the potential air quality impacts associated with altered traffic flows along the Proposed Scheme, realigned traffic lanes and displaced traffic flows have been assessed.

The assessment has been carried out according to best practice and guidelines relating to air quality.

The aim of the Proposed Scheme when in operation is to provide enhanced walking, cycling and bus infrastructure on this key access corridor in the Dublin region, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor. The objectives of the Proposed Scheme are described in Chapter 1 (Introduction). The Proposed Scheme, which is described in Chapter 4 (Proposed Scheme Description), has been designed to meet these objectives.

The design of the Proposed Scheme has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Scheme are attained. In addition, feedback received from the comprehensive consultation programme undertaken throughout the option selection and design development process have been incorporated, where appropriate.

7.2 Methodology

The assessment has been undertaken with reference to the most applicable guidance documents relating to air quality which are set out in the following sections of this Chapter.

An overview of the methodology undertaken for the air quality impact assessment is outlined below:

- A detailed baseline air monitoring study has been undertaken in order to characterise the existing ambient environment in areas along the Proposed Scheme. This has been undertaken through a review of available published ambient air monitoring data and site-specific ambient air monitoring at sensitive locations along the Proposed Scheme;
- A review of the most applicable standards and guidelines has been undertaken in order to define the air quality significance criteria for the Construction and Operational Phases of the Proposed Scheme;
- Predictive calculations and impact assessments relating to the likely Construction Phase air quality impacts have been undertaken at the nearest sensitive locations to the construction work areas associated with the Proposed Scheme;
- Predictive calculations have been performed to assess the potential air quality impacts associated with traffic alterations associated with the operation of the Proposed Scheme at the most sensitive locations; and
- A schedule of mitigation measures has been incorporated where required, to reduce, where necessary, the identified potential air quality impacts associated with the Proposed Scheme.

7.2.1 Study Area

The study area for this assessment covers the length of the Proposed Scheme, approximately 18.5 kilometres (km) from Leeson Street in the City Centre to Fran O’Toole Bridge in Bray, and the area either side of the Proposed

Scheme up to a maximum distance of 350 metres (m) during the Construction Phase, and 200m during the Operational Phase. For the Construction Phase assessment, the focus is on air quality sensitive receptors adjacent to the proposed works (e.g. utility diversions, road widening works, road excavation works (where required), road reconfiguration and resurfacing works) that are susceptible to air quality impacts but also those receptors along construction traffic access routes or routes along which traffic is redistributed within the study area (please see Chapter 5 (Construction) of this EIAR for more information on construction traffic access routes). The extent of the overall study area is typically up to a maximum of 350m from a specific area of construction work, as per the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction (hereafter referred to as the IAQM Guidance) (IAQM 2014), with the key impacted study areas focused up to a maximum of 350m depending on the air emission sources in question and the local area under consideration. For the Operational Phase, assessment of the dust impacts from maintenance of the Proposed Scheme has been scoped out on the basis that these activities have low potential for dust release and are likely to have a negligible impact on air quality sensitive receptors.

For the Construction Phase and Operational Phase traffic assessment, the focus is on air quality sensitive receptors which bound the Proposed Scheme and those along diverted traffic routes within the study area. 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 2014). 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 (Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (hereafter referred to as the TII Air Quality Guidelines) (TII 2011)). Designated areas of conservation (either Irish or European designation) are also considered sensitive air quality receptors (TII 2011). Potential impacts to air quality relate to alterations to traffic patterns (e.g. introduction of a new bus lane or due to redistributed traffic), with particular attention focused on those areas where the Proposed Scheme is encroaching closer to air quality receptors, specifically where bus or traffic lanes are moving closer to air quality receptors.

For the Construction Phase and Operational Phase traffic assessment, the focus is on air quality receptors within an overall study area of 200m from the Proposed Scheme, as per the TII Air Quality Guidelines (TII 2011) or diverted routes within the key impacted study areas focused within 50m to 100m. The range of air quality sensitive receptors for the three geographical sections are discussed in Table 7.1. The locations of sensitive receptors are provided initially in Table 7.19 and also in Figures 7.3 to 7.8 in Volume 3 of this EIAR.

Table 7.1: Description of Air Quality Receptors within the Study Area

Geographical Section	Description of Study Area
Leeson Street to Donnybrook (Anglesea Road Junction)	Within this study area the key air quality sensitive receptors are predominately residential dwellings, Church of the Sacred Heart in Donnybrook, The Institute of Education and the Royal Victoria Eye and Ear Hospital.
Donnybrook (Anglesea Road Junction) to Loughlinstown Roundabout	Within this study area the key air quality sensitive receptors are predominately residential dwellings between 50m to 100m from the Proposed Scheme which have an existing high traffic environment. Other sensitive receptors include Teresian School, University College Dublin (UCD), Coláiste Íosagáin / Coláiste Eoin, St Thomas’ Church, Gleneagle Medical Clinic, Oatlands College, St John of God Hospital, Saint Brigid's National School, Belmont House Nursing home, St Laurence College, Church of Our Lady of Perpetual Succour Foxrock and The Down Syndrome Centre.
Loughlinstown Roundabout to Bray North (Wilford Roundabout)	Within this study area the key air quality sensitive receptors are predominately residential dwellings which bound the road, in particular in proximity to Shankill Village. In addition to residential receptors the following sensitive receptors are noted within this study area; St. Columcille's Hospital, Rathmichael Parish National School, Beechfield Manor Nursing Home, St. Joseph's Centre Nursing Home and Woodbrook College. The playground areas at Shanganagh Park will be relocated further back from the roadside. Land take may be required on both sides of the road in the region of Shanganagh Park. To the south of this study are there are sections of agricultural land with lower numbers of sensitive receptors.
Bray North (Wilford Roundabout) to Bray South (Fran O’Toole Bridge)	Within this study area the key air quality sensitive receptors are predominately residential dwellings which are within 20-100m of the Proposed Scheme.

7.2.2 Relevant Guidelines, Policy and Legislation

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

The statutory ambient air quality standards in Ireland are outlined in S.I. No. 180 of 2011 Air Quality Standards Regulations 2011 (hereafter referred to as the Air Quality Regulations), which incorporate the ambient air quality limits set out in Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (hereafter referred to as the CAFE Directive), for a range of air pollutants. The statutory ambient air quality guidelines are discussed in greater detail in Section 7.2.2.1.

In addition to the specific statutory air quality standards, the assessment has made reference to national guidelines, where available, in addition to international standards and guidelines relating to the assessment of ambient air quality impacts from road schemes. These are summarised below:

- The Institute of Air Quality Management Guidance (IAQM 2014, 2020);
- The Transport Infrastructure Ireland Air Quality Guidelines (TII 2011);
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes (hereafter referred to as the TII Ecological Guidelines) (TII 2009);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission 2013);
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017);
- United Kingdom (UK) Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management Policy Guidance (PG22) (hereafter referred to as LAQM (PG22)) (DEFRA 2022a);
- Part IV of the Environment Act 1995: Local Air Quality Management Technical Guidance (TG22) (hereafter referred to as LAQM (TG22)) (DEFRA 2022b);
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality (hereafter referred to as LA 105 Air Quality) (UKHA 2019);
- World Health Organization (WHO) Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide Global Update 2005 (hereafter referred to as the WHO Air Quality Guidelines) (WHO 2006); and
- WHO Global Air Quality Guidelines: Particulate Matter ($PM_{2.5}$ and PM_{10}), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide (WHO 2021).

The guidance 'PE-ENV-01107: Air Quality Assessment of Proposed National Roads – Standard' was issued by TII in December 2022. Section 1.9 of PE-ENV-01107 states that:

> *'where projects requiring approval under Section 51, Section 177AE or Part 8 have, at the date of publication of this SD, commenced planning and design, and in particular, where technical advisor contracts have been executed, this SD should be:*
>
> - *treated as advice and guidance;*
> - *employed to the greatest extent reasonably practicable; and*
> - *applied in a proportionate manner, having regard to the characteristics and location of the project/maintenance works and the type and characteristics of potential impacts.'*

At the date of publication of PE-ENV-01107, this EIAR was being finalised. It is therefore considered appropriate to retain the methodology outlined in the 2011 TII Air Quality Guidelines (TII 2011) and LA 105 Air Quality (UKHA 2019), particularly to preserve comparability of air quality impacts from the cumulative assessment of this scheme with 11 other Core Bus Corridor Schemes and the standalone assessments of other schemes already submitted for planning permission.

7.2.2.1 Ambient Air Quality Standards / Limit Values

In order to reduce the risk to health from poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. The applicable legal standards in Ireland are outlined the Air Quality Regulations, which incorporate the CAFE Directive. The Air Quality Regulations set limit values for the pollutants nitrogen dioxide (NO_2) and nitrogen oxides (NO_X), particulate matter (PM) with an aerodynamic diameter of less than 10 microns (PM_{10}), PM with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$), lead (Pb), sulphur dioxide (SO_2), benzene and carbon monoxide (CO) (see Table 7.2).

Table 7.2: Air Quality Regulations (based on the CAFE Directive)

Pollutant	Regulation*	Limit Type	Value**
NO_2	S.I. 739 of 2022	Hourly limit for protection of human health - not to be exceeded more than 18 times / year	200µg/m^3 NO_2
		Annual limit for protection of human health	40µg/m^3 NO_2
Nitrogen Oxides (NO + NO_2)		Critical limit for the protection of vegetation and natural ecosystems	30µg/m^3 NO + NO_2
Lead	S.I. 739 of 2022	Annual limit for protection of human health	0.5µg/m^3
SO_2	S.I. 739 of 2022	Hourly limit for protection of human health - not to be exceeded more than 24 times / year	350µg/m^3
		Daily limit for protection of human health - not to be exceeded more than three times / year	125µg/m^3
		Critical limit for the protection of vegetation and natural ecosystems (calendar year and winter)	20µg/m^3
PM (as PM_{10})	S.I. 739 of 2022	24-hour limit for protection of human health - not to be exceeded more than 35 times / year	50µg/m^3
		Annual limit for protection of human health	40µg/m^3
PM (as $PM_{2.5}$)	S.I. 739 of 2022	Annual limit for protection of human health	25µg/m^3
Benzene	S.I. 739 of 2022	Annual limit for protection of human health	5µg/m^3
CO	S.I. 739 of 2022	8-hour limit (on a rolling basis) for protection of human health	10mg/m^3

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

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

The WHO Air Quality Guidelines (WHO 2021) values relating to NO_2, PM_{10} and $PM_{2.5}$ are shown in Table 7.3. The WHO Air Quality Guidelines values are more stringent than the European Union (EU) statutory limit values for NO_2, PM_{10} and $PM_{2.5}$. However, the WHO NO_2 one-hour guideline value is an absolute value while the EU standards allows this limit to be exceeded for 18 hours / annum without breaching the statutory limit value.

In May 2020, a 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 (WHO 2006) by a target date of 2030.

In April 2023, the Government of Ireland published the Clean Air Strategy for Ireland, which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target (IT) 3 by 2026, the IT4 targets by 2030 and the final targets by 2040 (shown in Table 7.3). The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5µg/m^3. The strategy also acknowledges that '*meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2*'. Ireland will revise its air quality legislation in line with the proposed EU revisions to the CAFE Directive, which will set interim 2030 air quality standards and align the EU more closely with the WHO targets.

The appropriate compliance limit values for the assessment of air quality impacts of the Proposed Scheme are those outlined in the existing Air Quality Regulations, which incorporate the CAFE Directive.

Table 7.3: WHO Air Quality Guidelines (WHO 2021)

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

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the Construction Phase of a development in Ireland. Dublin City Council (DCC) has published a guidance document titled Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition (DCC 2018). However, this guidance does not specify a guideline value.

The Verein Deutscher Ingenieure (VDI) German Technical Instructions on Air Quality Control – TA Luft standard for dust deposition (VDI 2002) (non-hazardous dust) sets a maximum permissible emission level for dust deposition of 350mg/(m^2*day) averaged over a one-year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Health and Local Government (DEHLG) Quarries and Ancillary Activities, Guidelines for Planning Authorities (DEHLG 2004) apply the Bergerhoff limit of 350mg/(m^2*day) measured over monitoring periods of between 28 and 32 days which are then averaged over a one-year period to the site boundary of quarries. This guidance value is applied to dust impacts from the construction of the Proposed Scheme.

7.2.2.2 National Air Emission Targets

Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (hereafter referred to as the National Emissions Reduction Directive) was published in December 2016. The National Emissions Reduction Directive applied the limits set out in Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants (hereafter referred to as the National Emission Ceiling Directive) until 2020 and established new national emission reduction commitments which are applicable from 2020 and 2030 for SO_2, NO_X, non-methane volatile organic compounds (NMVOC), ammonia (NH_3), $PM_{2.5}$ and methane (CH_4). In relation to Ireland, the 2020 to 2029 emission targets are 25kt (kilotonnes) for SO_2 (65% on 2005 levels), 65kt for NO_X (49% reduction on 2005 levels), 43kt for NMVOCs (25% reduction on 2005 levels), 108kt for NH_3 (1% reduction on 2005 levels) and 10kt for $PM_{2.5}$ (18% reduction on 2005 levels) as shown in Table 7.4. In relation to 2030, Ireland's emission targets are 85% below 2005 levels for SO_2, 69% reduction for NO_x, 32% reduction for VOCs, 5% reduction for NH_3 and 41% reduction for $PM_{2.5}$, also shown in Table 7.4.

Table 7.4: National Air Emission Targets (Ireland's Air Pollutant Emissions 2020 to 2030)

Pollutant	2020 to 2029 Reduction Commitments (kt) (and % Reduction Compared to 2005 Levels)	2030 Reduction Commitments (kt) (and % Reduction Compared to 2005 Levels)
SO_2	25.6	11.0
	-65%	-85%
NO_X	66.8	40.6
	-49%	-69%
NMVOC	56.3	51.1
	-25%	-32%
NH_3	112.1	107.5
	-1%	-5%
$PM_{2.5}$	15.6	11.2
	-18%	-41%

7.2.2.3 Regional Policy

In 2009, the Dublin Regional Air Quality Management Plan 2009-2012 (DCC 2009) was published and a range of strategies defined to improve air quality in the Dublin region. The strategies included an improvement in co-ordination to build on the good work to date, to mainstream air quality management into all major policy areas, strengthen the decision-making by improving sharing of information on air quality, introduce measures related to local authority activities that will reduce air emissions and identify and prioritise the main potential threats to air quality.

In relation to specific policies, Policy 6 states that the local authorities shall:

> *'support and encourage the rapid implementation of Quality Bus Corridors and other bus priority measures along the routes identified in the Dublin Transportation Initiative strategy within their functional areas.'*

The Dublin Regional Air Quality Management Plan for Improvements in Levels of Nitrogen Dioxide in Ambient Air Quality (DCC 2011) was a companion document to the Dublin Regional Air Quality Management Plan 2009 – 2012. The document reviewed the measured levels of NO_2 in Dublin City. The document defined the current strategic planning approach as the promotion of *'consolidated urban development based on enhanced public transport*' and outlines a range of measures and policies which will help to improve ambient levels of NO_2.

As a result of an exceedance of the annual mean NO_2 ambient air quality limit value at the St John's Road West monitoring station in 2019 (EPA 2020a), an Air Quality Action Plan by Dublin Local Authorities in conjunction with the EPA was legally required by the end of 2021. The plan was subject to public consultation, which gave interested members of the public the opportunity to share their views and input to the plan, which is now complete and was issued to the Minister for the Environment and the EU Commission at the end of 2021. The plan sets out 14 broad measures and a number of associated actions to address the exceedance of the nitrogen dioxide annual limit value. This location of exceedance is outside the study area of the Proposed Scheme.

7.2.3 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 ambient monitoring surveys.

7.2.3.1 Desk Study

A desk-based air quality assessment was carried out following guidelines described in the TII Air Quality Guidelines (TII 2011). TII states that wherever possible, use should be made of existing certified air quality data such as that undertaken by the EPA. Air quality monitoring programmes have been undertaken in recent years by the EPA and Local Authorities in the Dublin region. The annual report most recent at the time of assessment, Air Quality in Ireland 2019 (EPA 2020a), details the range and scope of monitoring undertaken throughout Ireland. The Urban Environmental Indicators: Nitrogen dioxide levels in Dublin report (EPA 2020b) assessed spatial variations in ambient air quality in Dublin using diffusion tube sampling and detailed air dispersion modelling. The study found that there were potential exceedances of the ambient air quality standards for NO_2 close to busy City Centre road junctions, near the Dublin Port Tunnel entrance and exit and along the M50 Motorway. The baseline air quality data collected through the desk study is detailed in Section 7.3.2.1.

A review of potentially sensitive ecological areas has also been conducted using the National Parks and Wildlife Service (NPWS) online mapping services. This review is discussed in Section 7.2.4.1.4.

7.2.3.2 Site-Specific Baseline Surveys

A site-specific baseline monitoring study was undertaken at monthly intervals from November 2019 to June 2020 as part of the air quality assessment for NO_2 using diffusion tube monitoring at 12 locations as detailed in Section 7.3.2.2 and as shown in Figure 7.1 of Volume 3 of this EIAR. Passive sampling of NO_2 involves the molecular diffusion of NO_2 molecules through a polycarbonate tube and their subsequent adsorption onto a stainless steel disc coated with triethanolamine. Following a month of sampling, the tubes were analysed using ultraviolet (UV) spectrophotometry, at a United Kingdom Accreditation Service (UKAS) accredited laboratory (SOCOTEC Laboratories in Burton-on-Trent, UK).

The TII Air Quality Guidelines (TII 2011) note that NO_2 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 baseline study overlapped in time with traffic surveys being conducted as part of the Traffic Impact Assessment (TIA). Details of the baseline data collected is discussed in Section 7.3.2.

7.2.4 Appraisal Method for the Assessment of Impacts

7.2.4.1 Air Quality Impact Assessment from Traffic Emissions

The air quality assessment has been carried out following the EPA Guidelines (EPA 2022) and using the methodology outlined in LA 105 Air Quality (UKHA 2019), LAQM (PG22) (DEFRA 2022a) and LAQM (TG22) (DEFRA 2022b). The general approach outlined in the LA 105 Air Quality, LAQM (PG22) and LAQM (TG22) guidance documents and the methodology outlined within has been recommended for use in assessing Irish road schemes by the TII Air Quality Guidelines (TII 2011) as discussed in Section 7.2.4.1.1 below.

The potential changes in regional air emissions due to the Construction Phase and Operational Phase traffic impacts of the Proposed Scheme have been assessed using the National Transport Authority (NTA) Environmental Appraisal Tool (2015), which is based on the Environmental Evaluation Model (hereafter referred to as ENEVAL). The data also takes into account the modal shift from private car to bus (walk or cycle).

A validation study of ENEVAL was undertaken by Jacobs Systra in 2016 (Jacobs Systra 2016) which involved running the module on all the Regional Modelling System (RMS) base models to produce a national emission figure for CO_2 production against the national figure provided by the Department of Transport, Tourism and Sport (DTTAS) of 12 megatonnes. The resultant figure was 8.1 megatonnes for ENEVAL. The DTTAS figure included non-transport related fuel (agricultural and industrial use) and in addition the ENEVAL modelled year was 2012 whilst the DTTAS figures were based on 2015 which would be expected to have higher flows. Therefore, ENEVAL is deemed to be valid for the purposes of calculating regional emissions.

7.2.4.1.1 Local Air Quality Screening Assessment

In 2019 the UKHA DMRB air quality guidance was revised with the publication of LA 105 Air Quality (UKHA 2019) replacing a number of historical guidance documents (HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, part of IAN 185/15). The revised document outlines a number of changes of approach when assessing the air quality impact of road schemes.

LA 105 Air Quality states that modelling should be conducted for NO_2 for the base, construction and opening years for both the Do Minimum and Do Something scenarios (please see Chapter 6 (Traffic & Transport) for the definition of these terms). Modelling of PM_{10} is only required for the base year to demonstrate that the air quality limit values in relation to PM_{10} are not breached. Where the air quality modelling indicates exceedances of the PM_{10} air quality limits in the base year then PM_{10} should be included in the air quality model in the Do-Minimum and Do-Something scenarios. LA 105 Air Quality guidance states that modelling of $PM_{2.5}$ is not required, as modelling of PM_{10} can be used to show that the project does not impact on the $PM_{2.5}$ limit value. However, as outlined in Section 7.2.2.1, the four Dublin Local Authorities have signed up for the *BreatheLife* campaign (https://breathelife2030.org/) to work towards achieving the goal of compliance with the WHO Air Quality Guidelines (WHO 2006) by 2030. Modelling of PM_{10} and $PM_{2.5}$ was undertaken to consider the impact of the Proposed Scheme on these concentrations.

Historically modelling of CO, lead and benzene was required by UK HA Guidance (UKHA 2007) and TII Guidance. However, guidance has now been updated by the UK HA (LA 105 Air Quality). As concentrations of these pollutants have been monitored to be significantly below their air quality limit values in recent years, even in urban centres (see Section 7.3.2.1) CO, lead and benzene have been scoped out of detailed assessment (EPA 2020a).

LA 105 Air Quality states that the following scoping criteria shall be used to determine whether the air quality impacts of a project 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):

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV – includes goods vehicles, buses and other heavy vehicles) AADT changes by 200 or more;
- A change in speed band; and
- A change in carriageway alignment by 5m or greater.

The above scoping criteria have been used in the current assessment to determine the road links required for inclusion in the modelling assessment. Sensitive receptors within 200m of impacted road links were included within the modelling assessment as detailed in LA 105 Air Quality.

7.2.4.1.2 Atmospheric Dispersion Modelling System (ADMS)-Roads Dispersion Model

The TII Air Quality Guidelines (TII 2011) state that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc.).

Guidance from LA 105 Air Quality states that a detailed assessment must be conducted where the sensitivity of the environment is medium or above when combined with a high-risk project, due to a risk of exceeding air quality thresholds.

Considering the scale of the Proposed Scheme, its risk should be considered high as it has the potential to have an impact on ambient air quality over a large geographical area.

Guidance from LA 105 Air Quality states that a medium sensitivity environment includes areas that have annual mean NO_2 concentrations of 36μg/m^3 or above combined with sensitive receptors within 50m of the impacted roads. NO_2 concentrations (Section 7.3.2.1 and Section 7.3.2.2) were found to be generally below 36μg/m^3 along the suburban areas along the Proposed Scheme. However, towards the City Centre, ambient NO_2 concentrations were measured in excess of 36μg/m^3. The LA 105 Air Quality guidance states a detailed assessment should consider a representative number of receptors and all receptors with the likelihood of exceeding the air quality limit values.

Vehicle-derived air emissions for areas impacted by significant changes in AADT were modelled using the detailed ADMS-Roads dispersion model (Version 5.1) which has been developed by Cambridge Environmental Research Consultants (CERC) (CERC 2020). The model is a steady-state Gaussian plume model used to assess ambient pollutant concentrations associated with road sources.

The ADMS-Roads dispersion model (Version 5.1) has been used to predict the ground level concentrations (GLC) of NO_2 and PM_{10} / $PM_{2.5}$ in the vicinity of the impacted areas for the baseline year of 2020, the peak construction year of 2024 and the opening and design years of 2028 and 2043, respectively.

The modelling incorporated the following features:

- Hourly-sequenced meteorological information for Casement Aerodrome in 2019 has been used in the model (see Diagram 7.2) (Met Éireann 2020). The selection of the appropriate meteorological data has followed the guidance issued by the LAQM (TG22) (DEFRA 2022b). A primary requirement is that the data used should have a data capture of greater than 90% for all parameters; and
- Specific air sensitive receptors (ASRs) were also mapped into the model. Receptor heights were input at 1.5m to represent breathing height. Concentrations were reported for each ASR modelled for all modelling scenarios.

It is intended that the Proposed Scheme will have a peak construction year of 2024 and an opening year of 2028. Road traffic emission rates are derived using traffic data for the peak Construction Year of 2024, and the Opening Year of 2028 and Design Year of 2043 provided in Chapter 6 (Traffic & Transport) and using emission factors from the COPERT V database (EMISIA 2020) which has been incorporated into the UK DEFRA Emission Factor Toolkit (EFT) Version 10.1 (DEFRA 2020).

The EFT Version 10.1 has been incorporated into the ADMS-Roads model. The toolkit provides emission rates from 2017 to 2030 and traffic emissions for the Proposed Scheme were based on the following assumptions:

- EFT Version 10.1 is based on eight vehicle categories including petrol cars, diesel cars, diesel Light Goods Vehicles (LGV), rigid Heavy Goods Vehicles (HGV) and buses;
- Systra (ENEVAL) fleet composition data for Ireland (2016 base year) were selected to input car, LGV and HGV proportions (Table 7.5). 2019 projections were used for detailed modelling of the 2020 base year, 2022 projections and 2024 projections were used as conservatively representative of the peak Construction Year (2024) and the Opening Year (2028) respectively;
- National Transport Model (NTM) fleet projections provided in UK TAG (UK Department for Transport 2021) have been used to estimate the proportions of cars, LGV and HGV in 2043. No fleet projection tools currently exist, Irish or UK based, that accurately predict the proportion of electric vehicles in 2043, or which take the 2021 Climate Action Plan measures into account. A conservative approach is therefore inevitable, and is based on the use of the UK NTM as the most up to date and robust alternative to the older 2016 base year Systra fleet;
- Predicted bus fleet composition data was developed for 2019, 2028 and 2043 (Table 7.5). The 2019 bus fleet was also applied to the 2024 Construction Year;
- Emissions have been calculated using predicted emissions factors for 2019 (to represent the Base Year 2020), 2022 (to represent the peak construction year 2024), 2024 (to represent the Opening Year 2028) and 2030 (to represent the Design Year 2043). A conservative approach to emission years has been taken, similarly to the fleet projections, to counteract some of the uncertainty associated with improved vehicle standards;
- EFT Version 10.1 incorporates updated NOx (defined as NO and NO_2) and PM speed emission coefficient equations for Euro 5 and 6 vehicles, taken from the European Environment Agency (EEA) COPERT V emission calculation tool which reflects the most recent evidence on the real-world emission performance of these vehicles;
- Fleet composition based on European emission standards from pre-Euro 1 to Euro 6/VI. Systra fleet data was used to estimate Euro class proportions for cars, LGV, and HGV. The NTA provided Euro class proportions for the bus fleet; and
- Improvements in the quality of fuel and some degree of retrofitting; technology conversion in the national fleet.

Table 7.5: Summary of Fleet Proportions

Vehicle Type		Base Year	Construction Year	Operational Year	Design Year
Car	Petrol Car	41%	38%	36%	38%
	Diesel Car	57%	60%	63%	25%
	Electric Car	2%	2%	2%	37%
LGV	LGV	99.9%	99.9%	99.9%	81.5%
	Electric LGV	0.1%	0.1%	0.1%	18.5%
HGV	Rigid HGV	86%	86%	86%	86%
	Artic HGV	14%	14%	14%	14%
Bus	Plug-in Hybrid Bus	0%	0%	24%	0%
	Fuel Cell Electric Bus	0%	0%	70%	100%
	Diesel Bus	100%	100%	6%	0%

Advancements in engine technology and the addition of a higher percentage of electric vehicles to the fleet will assist in significantly reducing emissions between 2028 and 2043, even in circumstances where the number of vehicles using a road link increases. Emissions per road link using the EFT Version 10.1 were calculated for the 2043 Do Something scenario and compared to the 2028 Do Something scenario. Conservative assumptions were made for future fleet and uptake of electric vehicles. Across the Proposed Scheme, emissions decreased in 2043, therefore 2028 modelled impacts can be considered worst case. As a result, detailed modelling of the design year 2043 was scoped out for all pollutants on the basis that emissions will be lower compared to 2028 emissions.

7.2.4.1.3 Verification Study – Year 2020 Traffic Data

Model verification investigates the level of agreement between modelled and measured concentrations. Differences between modelled and measured pollutant concentrations can arise due to uncertainties in or limitations to the model input data (such as traffic data and meteorological data), uncertainties in monitoring data and inherent modelling limitations. As outlined in LAQM.TG22 (DEFRA 2022b), an adjustment to the modelled results is usually required in order to ensure that the final concentrations presented are representative of monitoring information in the area.

A verification study was undertaken using the traffic data for the study area which was received from the NTA Eastern Regional Model (ERM) traffic model (see Section 7.2.4.1.2 and Chapter 6 (Traffic & Transport)) for year 2020. The study compared the ambient NO_2 monitored concentration at a range of diffusion tube locations with the ADMS-Roads model output at these locations. DCC has undertaken a diffusion tube monitoring programme at a range of locations in the study area for both 2018 and 2019. This data has been used to compare model predictions of NO_2 to monitored NO_2 concentrations.

Background data was based on NO_2 levels from Ballyfermot for 2019. Ballyfermot was selected as a suitable suburban background station as it is an ambient air monitoring station suitably removed from Dublin City Centre and at a distance of over 200m from a main roadway. The backgrounds were also utilised in the 2024 and 2028 modelling.

The emission data for the ADMS-Roads model was based on EFT Version 10.1 and the ADMS-Roads model input parameters selected is summarised in Table 7.6.

Table 7.6:Summary of the ADMS-Roads Model Input Parameters

Parameter	Description	Input Value
Coordinate System	Spatial data in ADMS-Roads is linked to a Cartesian coordinate system, measured in meters.	Irish Transverse Mercator (ITM) Coordinate system was used.
Pollutants	A range of preset pollutants can be selected in ADMS-Roads for modelling.	NO_X, NO_2 and PM_{10} were specifically modelled.
Road Source Emissions	Road sources emissions can be entered manually or calculated from traffic flow data.	Road emissions have been calculated from traffic flow data.
Street Canyons	ADMS-Roads has to the ability to model street canyon effects either by using the Basic Street Canyon module or the Advance Street Canyon Module to simulate turbulent flow patterns along streets with relatively tall buildings.	Basic Street Canyon module has been used where canyons have been identified.
Road Emission Factors	ADMS-Roads has a range of emission factors including the recent UK Emission Factor Tool (EFT) v.9.0 dataset.	UK Emission Factor Tool (EFT) v.10.1 (8 VC) dataset has been used based on Northern Ireland (Urban)
Traffic Speed	ADMS-Roads can adjust pollutant emission factors to take account of traffic speed.	Average traffic speed specific to each link, as advised by traffic consultant, has been used in the model.
Meteorological Data	ADMS-Roads requires hourly meteorological data from a suitable meteorological station for a full year.	2019 data from Casement Aerodrome has been used in the model.
Surface Roughness	The model requires a representative surface roughness value for both the modelling domain and the meteorological station.	A value of 1.0m has been selected for the modelling domain with a value of 0.1m selected for Casement Aerodrome.
Time-varied Emissions	The model can accept a range of profiles including 3-day and 7-day diurnal profiles	3-day diurnal profile (Weekdays, Saturday, Sunday) has been used in the model.
Primary NO_2	Model will assume that a certain percentage of NO_X emissions are NO_2 when modelling chemistry	Primary NO_2 fractions (%) were calculated using the EFT for each modelled scenario: 2020 Base – 28.2% 2024 Do Minimum – 28.9% 2024 Do Something – 28.9% 2028 Do Minimum – 29.6% 2028 Do Something – 29.6%
Complex Terrain	Where terrain exceeds 1;10, terrain effects may be modelled	Flat terrain has been used in the modelling domain

The first step of model verification, in line with LAQM.TG22, is to consider the performance of the model, prior to any adjustment, by comparing modelled and measured road NO_X contribution at each of the site specific survey and DCC diffusion tube locations. Some of the monitoring locations were not considered suitable for model verification, due to missing traffic or monitoring data, or other spatial considerations. A total of 20 monitoring sites were included in the verification exercise. The comparison is shown in Diagram 7.1, as the red points and trendline, and also in Table 7.7. This shows that on average, the unadjusted model under predicts total NO_2 concentrations by around 9%.

Table 7.7: Diffusion Tube Monitoring Data Used for Model Verification

Diffusion Tube	Modelled NO_X concentration (µg/m^3)	Modelled NO_2 concentration (µg/m^3)	Monitored NO_X concentration (µg/m^3)	Monitored NO_2 concentration (µg/m^3)	Difference [(modelled – monitored)/(monitored) *100]	Adjustment Factor
Chancery Park	8.7	24.2	24.0	31.8	-24%	2.31
Bus Aras Environs 4 (Amiens St. Lower)	32.1	35.6	67.9	50.9	-30%	
Leeson St / Morehampton Road	22.8	31.3	80.5	55.8	-44%	
Pearse Street 2	22.7	26.0	43.9	40.9	-37%	
Pearse Street 3	23.1	31.2	67.9	50.9	-39%	
13.11	16.5	31.4	31.5	35.3	-11%	
16.5	14.9	28.2	37.6	38.1	-26%	
13.12	23.2	27.4	29.9	34.6	-21%	
Winetavern Street Continuous Monitor	13.27	31.4	16.1	28.0	12%	0.87
14.3	8.33	26.6	16.1	28.0	-5%	
Grand Canal 1	13.84	24.1	4.2	21.9	10%	
13.1	21.12	26.9	9.6	24.7	9%	
14.4	13.02	30.4	3.9	21.8	40%	
Grand Canal 2	6.50	26.4	7.8	23.8	11%	
13.10	11.99	23.1	8.5	24.2	-4%	
14.5	14.57	25.9	13.7	26.8	-3%	
14.6	14.01	27.2	19.2	29.5	-8%	
14.7	5.90	26.9	4.7	22.2	21%	
13.5	10.25	22.8	15.9	27.9	-18%	
14.9	13.70	25.0	17.9	28.9	-13%	

In line with LAQM.TG22, the model adjustment was based on NO_X rather than NO_2 with the NO_2 diffusion tube data first converted to NO_X using the NO_X to NO_2 Calculator (DEFRA 2020). Additionally, the adjustment was applied to the road source contribution only rather than total NO_X, again in line with LAQM.TG22. This process identified that the model performed better at some locations than others, and the adjustment of model bias took this into account.

The comparison of road NO_X contributions provided the following collective bias adjustment factors across the study area, which were then applied to the modelled road contributions at the air quality sensitive receptors most represented by them, before being converted into total NO_2 concentrations:

- 2.31 – "More congested". Applied to modelled receptors closest to the M11, N11 Bray Road / Stillorgan Road, R105 Burgh Quay, R110 Cuffe Street / Kevin Street Lower, R114 Aungier Street / Rathmines Rd Lower / Richmond Street South, R118 Merrion Road / Pembroke Road / Wyattville Road, R137 College Green / Dame Street / Lord Edward Street / Nicholas Street, R138 Donnybrook Road / Leeson Street Upper / Leeson Street Lower / Lincoln Place / Morehampton Road / Stillorgan Road / St. Stephen's Green, R148 Aston Quay / Wellington Quay, R802 Pearse Street / Tara Street, R811 Harcourt Road / Adelaide Road, R814 Lombard Street East, R816 Baggot Street Lower, R824 Ailesbury Road, Bride Street and Merrion Street Upper; and
- 0.87 – "Less congested". Applied to all other receptors.

Following the application of the model bias adjustment factor, the modelled and measured values at these locations included in the verification exercise were compared again. This comparison is shown in Diagram 7.1 as the blue points and trendline. This shows that on average, the adjusted model is within the target 10% of the air quality standard, with a root mean square error (RMSE) of 4.04 μg/m³. In the absence of measured PM_{10} and $PM_{2.5}$ at roadside locations in the study area, the same factors calculated for the modelled road NO_X contribution were applied to the road PM_{10} and road $PM_{2.5}$ contributions.

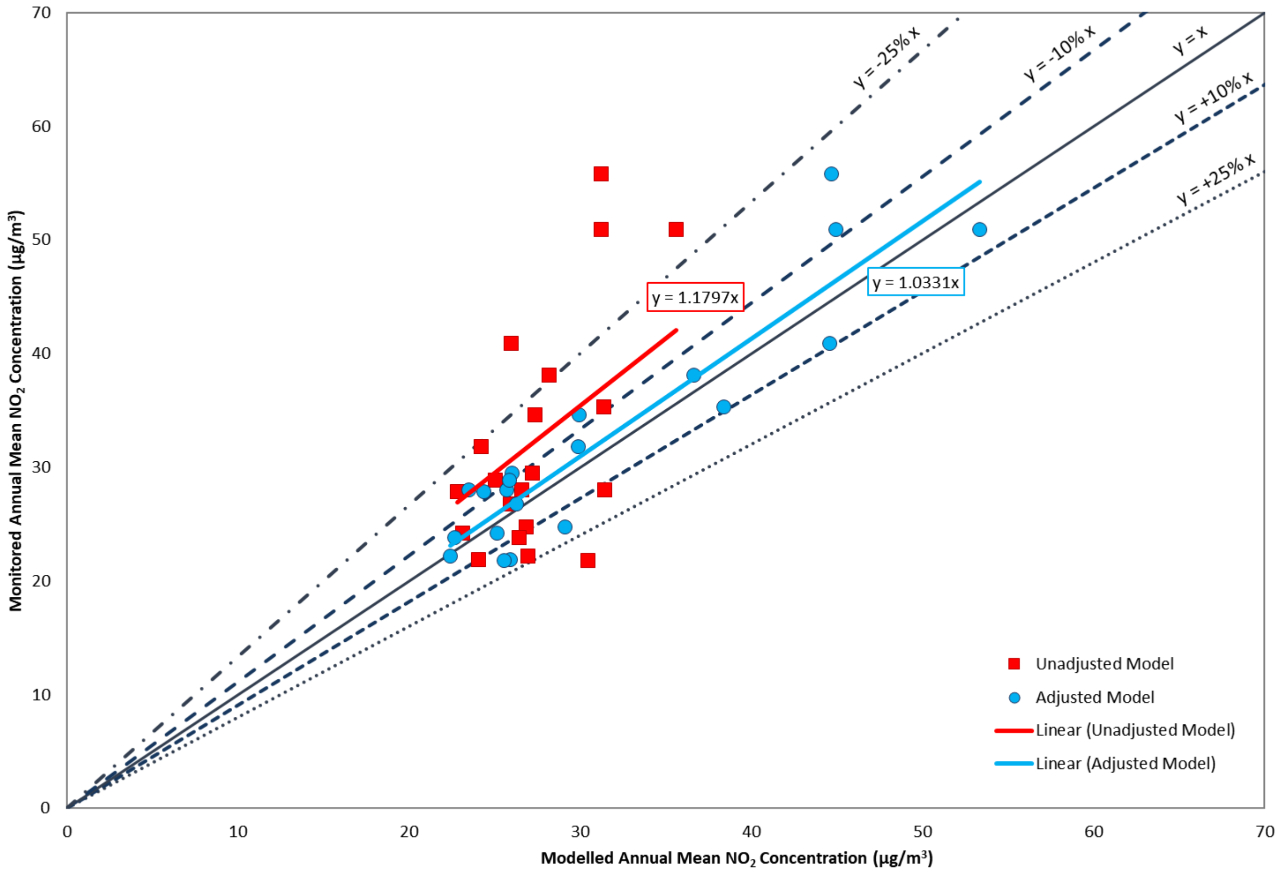


Diagram 7.1: Dispersion Model Verification - Comparison of Monitored and Modelled NO_2 Concentrations (μg/m³)

7.2.4.1.4 Air Quality Impact Significance Criteria

The TII Air Quality Guidelines (TII 2011) detail the methodology for determining air quality impact significance criteria for road schemes in Ireland. The degree of impact is determined based on both the absolute and relative impact of the Proposed Scheme. The significance criteria have been adopted for the Proposed Scheme and are detailed in Table 7.8, Table 7.9 and Table 7.10. The significance criteria are based on PM_{10} and NO_2 as these pollutants are most likely to exceed the annual mean limit values (40μg/m³). However, the criteria have also been applied to the predicted annual $PM_{2.5}$ concentrations for the purpose of this assessment.

Table 7.8: Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations (TII 2011)

Magnitude of Change	Annual Mean NO_2 / PM_{10}	No. Days with PM_{10} Concentration > 50 μg/m³	Annual Mean $PM_{2.5}$
Large	Increase / decrease ≥ 4μg/m³	Increase / decrease >4 days	Increase / decrease ≥ 2.5μg/m³
Medium	Increase / decrease 2μg/m³ - < 4μg/m³	Increase / decrease 3 or 4 days	Increase / decrease 1.25μg/m³ - <2.5μg/m³
Small	Increase / decrease 0.4μg/m³ - < 2μg/m³	Increase / decrease 1 or 2 days	Increase / decrease 0.25μg/m³ - <1.25μg/m³
Imperceptible	Increase / decrease < 0.4μg/m³	Increase / decrease <1 day	Increase / decrease < 0.25μg/m³

Table 7.9: Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations (TII 2011)

Absolute Concentration in Relation to Objective / Limit Value	Change in Concentration		
	Small	Moderate	Large
Increase with Proposed Scheme			
Above Objective / Limit Value with Proposed Scheme (≥40µg/m^3 of NO_2 or PM_{10}) (≥25µg/m^3 of $PM_{2.5}$)	Slight adverse	Moderate adverse	Substantial adverse
Just Below Objective / Limit Value with Proposed Scheme (36µg/m^3 - <40µg/m^3 of NO_2 or PM_{10}) (22.5µg/m^3 - <25µg/m^3 of $PM_{2.5}$)	Slight adverse	Moderate adverse	Moderate adverse
Below Objective / Limit Value with Proposed Scheme (30µg/m^3 - <36µg/m^3 of NO_2 or PM_{10}) (18.75µg/m^3 - <22.5µg/m^3 of $PM_{2.5}$)	Negligible	Slight adverse	Slight adverse
Well Below Objective / Limit Value with Proposed Scheme (<30µg/m^3 of NO_2 or PM_{10}) (<18.75µg/m^3 of $PM_{2.5}$)	Negligible	Negligible	Slight adverse
Decrease with Proposed Scheme			
Above Objective / Limit Value with Proposed Scheme (≥40µg/m^3 of NO_2 or PM_{10}) (≥25µg/m^3 of $PM_{2.5}$)	Slight beneficial	Moderate beneficial	Substantial beneficial
Just Below Objective / Limit Value with Proposed Scheme (36µg/m^3 - <40µg/m^3 of NO_2 or PM_{10}) (22.5µg/m^3 - <25µg/m^3 of $PM_{2.5}$)	Slight beneficial	Moderate beneficial	Moderate beneficial
Below Objective / Limit Value with Proposed Scheme (30µg/m^3 - <36µg/m^3 of NO_2 or PM_{10}) (18.75µg/m^3 - <22.5µg/m^3 of $PM_{2.5}$)	Negligible	Slight beneficial	Slight beneficial
Well Below Objective / Limit Value with Proposed Scheme (<30µg/m^3 of NO_2 or PM_{10}) (<18.75µg/m^3 of $PM_{2.5}$)	Negligible	Negligible	Slight beneficial

* Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible

Table 7.10: Air Quality Impact Significance Criteria (TII 2011)

Absolute Concentration in Relation to Objective / Limit Value	Change in Concentration		
	Small	Medium	Large
Increase with Proposed Scheme			
Above Objective / Limit Value with Scheme (≥35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective / Limit Value with Scheme (32 - <35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective / Limit Value with Scheme (26 - <32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective / Limit Value with Scheme (<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Proposed Scheme			
Above Objective / Limit Value with Scheme (≥35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective / Limit Value with Scheme (32 - <35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective / Limit Value with Scheme (26 - <32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective / Limit Value with Scheme (<26 days)	Negligible	Negligible	Slight Beneficial

* Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible

7.2.4.2 Regional Air Quality Assessment

The change in regional air quality emissions due to Operational Phase traffic impacts of the Proposed Scheme have been assessed using the NTA Environmental Appraisal Module. Emissions from the zonal level ENEVAL tool can provide information on the emissions of pollutants including NO_2, PM_{10}, CO_2 and VOCs for the different traffic scenarios on a regional basis. The ENEVAL software is recommended by Codema in the publication Developing CO_2 Baselines – A Step-by-Step Guide for Your Local Authority (Codema 2017). The ENEVAL tool is discussed in more detail in Section 7.2.4.1.

7.2.4.3 Ecology

For routes which pass within 2km of a designated area of conservation (either Irish or European designation) the TII Air Quality Guidelines (TII 2011) requires the air quality specialist to consult with the project ecologist. However, in practice the potential for impact on an ecological site is highest within 200m of the Proposed Scheme and within 200m of roads where significant changes in AADT (Section 7.2.4.1) occur. Sites identified within these parameters are considered Key Ecological Receptors

The TII Ecological Guidelines (TII 2009) and the Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DEHLG 2010) provide details regarding the legal protection of designated conservation areas. Further guidance can also be found in the IAQM document A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM 2020) and in the DMRB guidance LA105 Air Quality (UKHA 2019), both of which describe nitrogen deposition as the most likely source of significant impacts from road traffic. Pollutants such as CO_2, CO, SO_2, ammonia, particulate matter and volatile organic compounds have been scoped out of detailed assessment.

The following assessment criteria is used to determine whether an assessment for nitrogen deposition should be conducted:

- There is a designated area of conservation within 200m of the Proposed Scheme; and
- There is a significant change in AADT flows (see Section 7.2.4.1).

In circumstances where the above criteria are met, there is the potential for impacts on ecology as a result of nitrogen deposition and thus an assessment should be undertaken. For road transport sources within 200m of a designated habitat, individual ecological receptors along a transect at 10m intervals are modelled. Ecological receptors are modelled up to a maximum distance of 200m regardless of whether the habitat extends beyond 200m. It is considered that the greatest impacts will have occurred in proximity to the road. LA 105 notes that only sites that are sensitive to nitrogen deposition need to be included in the assessment, it is not necessary to include sites for example that have been designated as a geological feature or water course. The ecological receptors along the 200m transect are modelled using the methodology for sensitive human receptors in Section 7.2.4.1.2.

Designated sites which are within 2km of the boundary of the Proposed Scheme are Figure 12.3 and Figure 12.4 in Volume 3 of this EIAR and are:

- Ballyman Glen Special Area of Conservation (SAC) and proposed Natural Heritage Area (pNHA) (Site Code: 000713);
- Bray Head SAC and pNHA (Site Code: 000714);
- South Dublin Bay SAC and pNHA (Site Code: 000210);
- Booterstown Marsh pNHA (Site Code: 001205);
- Dalkey Coastal Zone, Killiney Hill pNHA (Site Code: 001206);
- Loughlinstown Woods pNHA (Site Code: 001211);
- Grand Canal pNHA (Site Code 002104); and
- Royal Canal pNHA (Site Code 002103).

Species of particular ecological importance at these sites include:

- Hairy St John's Wort;
- European dry heaths;
- Vegetated sea cliffs of the Atlantic and Baltic coast; and
- Opposite-leaved Pondweed.

The Air Quality Regulations outline an annual critical level for NO_X for the protection of vegetation and natural ecosystems in general. The CAFE Directive defines 'Critical Levels' as:

> '*a level fixed on the basis of scientific knowledge, above which direct adverse effects may occur on some receptors, such as trees, other plants or natural ecosystems but not on humans*'.

The TII Ecological Guidelines reference the United Nations Economic Commission for Europe (UNECE) Critical Loads for Nitrogen where a *'Critical Load*' is defined by the UNECE as:

> '*a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*' (UNECE 2003).

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

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

The UNECE critical loads were subsequently updated in the 2010 Review and Revision of Empirical Critical Loads and Dose-Response Relationships (UNECE 2010). The pNHAs are not currently designated for the protection of a specific habitat type. In the absence of a specific designation, the most stringent published critical load in the 2010 Review and Revision of Empirical Critical Loads and Dose-Response Relationships for inland and surface water habitats (5kg(N)/ha/yr to 10kg(N)/ha/yr) (kilogrammes of nitrogen per hectare per year) has been used in the assessment.

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

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

Deposition velocities are provided in both the TII Air Quality Guidelines (TII 2011) and IAQM Guidance (IAQM 2020) for NO_2 in grassland and forestry. Once the dry deposition flux (µg m^{-2} s^{-1}) is calculated it must then be converted to nitrogen equivalent acidification flux (k_{eq} ha^{-1} $year^{-1}$) for comparison with critical loads.

In order to convert the dry deposition flux from units of µg m^{-2} s^{-1} to units of kg ha^{-1} $year^{-1}$ the dry deposition flux is multiplied by the conversion factors. For NO_2 this factor is 96. In order to convert kg ha^{-1} $year^{-1}$ to k_{eq} ha^{-1} $year^{-1}$, where k_{eq} is a unit of equivalents (a measure of how acidifying the chemical species can be), the deposition flux in units of kg ha^{-1} $year^{-1}$ is multiplied by the conversion factor (taken from AQTAG06 (UKEA 2014)). The conversion factor for nitrogen is 0.071428. LA 105 Air Quality (UKHA 2019) states that if the change in nitrogen (N) deposition is greater than 0.4kg N/ha/yr or 1% of the critical level / load consultation with the ecologist should occur.

7.2.4.4 Construction Phase Assessment

The greatest potential impact on air quality during the Construction Phase is from construction dust emissions, PM_{10} / $PM_{2.5}$ emissions and the potential for nuisance dust. Dust is characterised as encompassing PM with a particle size of between 1 micron and 75 microns (1µm to 75µm). Deposition of dust typically occurs in close proximity to the source and with IAQM Guidance (IAQM 2014) defining a maximum impact area of 350m from the dust generating activity. Sensitivity to dust depends on the duration of the dust deposition, the dust generating activity, and the nature of the deposit. Therefore, a higher tolerance of dust deposition is likely to be shown if only short periods of dust deposition are expected and the dust generating activity is either expected to stop or move on.

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

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

- High sensitivity receptor with respect to dust nuisance – surrounding land where:
  - Users can reasonably expect enjoyment of a high level of amenity;
  - 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; or

    - 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 continuously or regularly for extended periods as part of the normal pattern of use of the land; or
    - 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;
    - 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; or
    - Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

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

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

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

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

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

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

The sensitivity of the area is considered as per the criteria outlined in the IAQM Guidance and as reproduced in Table 7.11, Table 7.12 and Table 7.13.

In terms of the sensitivity of the area to dust soiling effects on people and property, the receptor sensitivity, number of receptors and their distance from the source are considered. Using these criteria as outlined in Table 7.11, the sensitivity of the area to dust soiling can be established.

The IAQM Guidance 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 and the number of receptors effected as per Table 7.12.

An assessment of the Proposed Scheme was completed with respect to the sensitivity criteria in Table 7.11 and Table 7.12. Where the number of receptors was not clear (i.e. for an apartment building), conservative sensitivities were 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 region of the Proposed Scheme is discussed in Section 7.3.2.

Table 7.11: Sensitivity of the Area to Dust Soiling Effects on People and Property (IAQM 2014)

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 7.12: Sensitivity of the Area to Human Health Impacts (IAQM 2014)

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
High	> 32µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28µg/m³ - 32µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24µg/m³ - 28µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	< 24µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	> 32µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28µg/m³ - 32µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24µg/m³ - 28µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	< 24µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	1+	Low	Low	Low	Low	Low

Dust deposition impacts on ecology can occur due to chemical or physical effects. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Often impacts will be reversible once the works are completed, and dust deposition ceases. 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. The sensitivity of the area to ecological impacts are considered using the sensitivity criteria outlined in Table 7.13. Booterstown Marsh pNHA, Loughlinstown Woods pNHA (Site Code: 001211) and Grand Canal pNHA (Site Code 002104) are within 50m of the Proposed Scheme.

Table 7.13: Sensitivity of the Area to Ecological Impacts (IAQM 2014)

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

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

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

Trackout is defined by the IAQM as the transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

7.3 Baseline Environment

The following sections describe the baseline conditions in the vicinity of the Proposed Scheme based on a review of published data and on-site monitoring.

7.3.1 Meteorological Conditions

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

Casement Aerodrome meteorological station, which is located approximately 10km north of the Proposed Scheme at the closest point, collects meteorological data in the correct format for the purposes of this assessment and has a data collection of greater than 90%. Long-term hourly observations at Casement Aerodrome meteorological station provide an indication of the prevailing wind conditions for the region (see Diagram 7.2). Results indicate that the prevailing wind direction is from south to westerly in direction over the period 2015 to 2019.

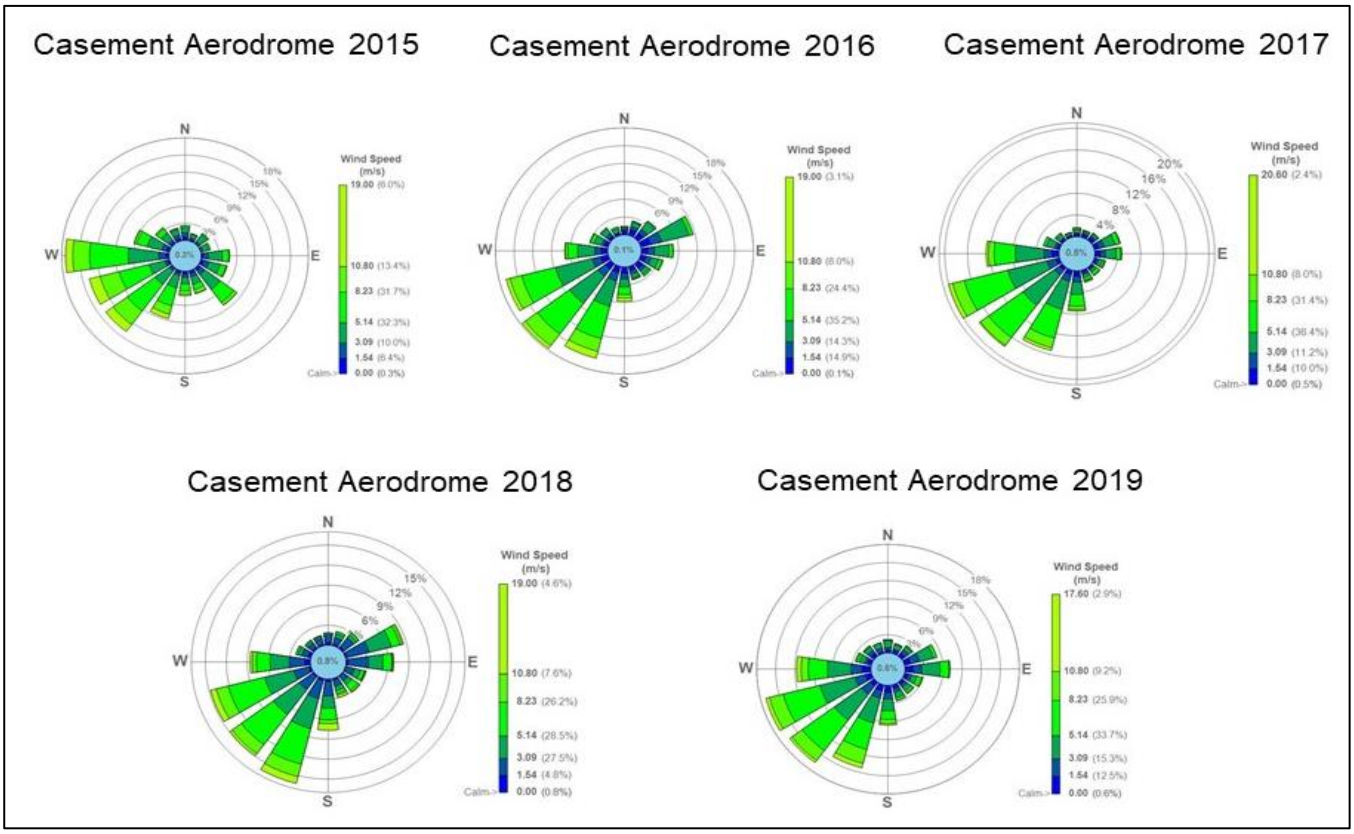


Diagram 7.2: Casement Aerodrome Meteorological Station Windrose 2015 to 2019 (Met Éireann 2020)

7.3.2 Baseline Ambient Air Quality

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

A desk study of the EPA air quality monitoring programs has been undertaken. The most recent annual report on air quality at the time of writing, Air Quality in Ireland 2019 (EPA 2020b), details the range and scope of monitoring undertaken throughout Ireland. In addition, scheme-specific baseline air quality monitoring has been conducted. The data collected has been included to provide site-specific baseline concentrations of NO_2 in areas which have the potential to be impacted by the Proposed Scheme.

7.3.2.1 EPA Data

As part of the implementation of S.I. No. 271/2002 - Air Quality Standards Regulations 2002, four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA 2020b). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D. In terms of air monitoring zoning, the vast majority of the area of the Proposed Scheme is located within Zone A, as shown in Figure 7.2 Volume 3 of this EIAR (EPA 2020b), therefore Zone A baseline ambient air quality is considered representative of the study area as a whole.

With regard to NO_2, continuous monitoring data from the EPA Zone A stations was reviewed (EPA 2020b). The stations representative of the Proposed Scheme include Ballyfermot, Swords, Rathmines and Dún Laoghaire. Sufficient data is available for the stations in Ballyfermot, Swords, Rathmines and Dún Laoghaire to review long-term trends over a five-year period (2015 to 2019) as shown in Table 7.14. Long-term annual average levels at the four suburban background sites range from 13µg/m^3 to 22µg/m^3 over the period 2015 to 2019 compared to the annual limit value of 40µg/m^3, with an average concentration of 17.2µg/m^3 over this period. Average concentrations in 2019 were of 18µg/m^3 across the representative stations.

Long-term trends at the City Centre location of Winetavern Street are available, which is located near the City Centre end of the Proposed Scheme. Concentrations of NO_2 were below the annual and 1-hour limit values, with annual average levels ranging from 27µg/m^3 to 37µg/m^3 over the period 2015 to 2019 compared to the annual limit value of 40µg/m^3. The average concentration in 2019 was 28µg/m^3.

The ambient NO_2 monitoring results for Winetavern Street, Ballyfermot, Dún Laoghaire, Swords and Rathmines over the period 2015 to 2019, based on a three-year rolling average, are shown in in Diagram 7.3. The data and trend line indicate that levels are reasonably constant at each location over the five-year period.

Table 7.14: Trends in Suburban and Urban NO_2 Concentration (µg/m^3) In Dublin 2015 to 2019

Station	Station Classification Council Directive 96/62/EC	Averaging Period	Year					Limit Value
			2015	2016	2017	2018	2019	
Rathmines	Urban Background	Annual Mean NO_2 (µg/m^3)	18	20	17	20	22	40
		99.8th%ile 1-hr NO_2 (µg/m^3)	105	88	86	87	102	200
Ballyfermot	Suburban Background	Annual Mean NO_2 (µg/m^3)	16	17	17	17	20	40
		99.8th%ile 1-hr NO_2 (µg/m^3)	127	90	112	101	101	200
Dun Laoghaire	Suburban Background	Annual Mean NO_2 (µg/m^3)	16	19	17	19	15	40
		99.8th%ile 1-hr NO_2 (µg/m^3)	91	105	101	91	84	200
Swords	Suburban Background	Annual Mean NO_2 (µg/m^3)	13	16	14	16	15	40
		99.8th%ile 1-hr NO_2 (µg/m^3)	93	96	79	85	80	200
Winetavern Street	Urban Traffic	Annual Mean NO_2 (µg/m^3)	31	37	27	29	28	40
		99.8th%ile 1-hr NO_2 (µg/m^3)	128	120	110	115	115	200

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

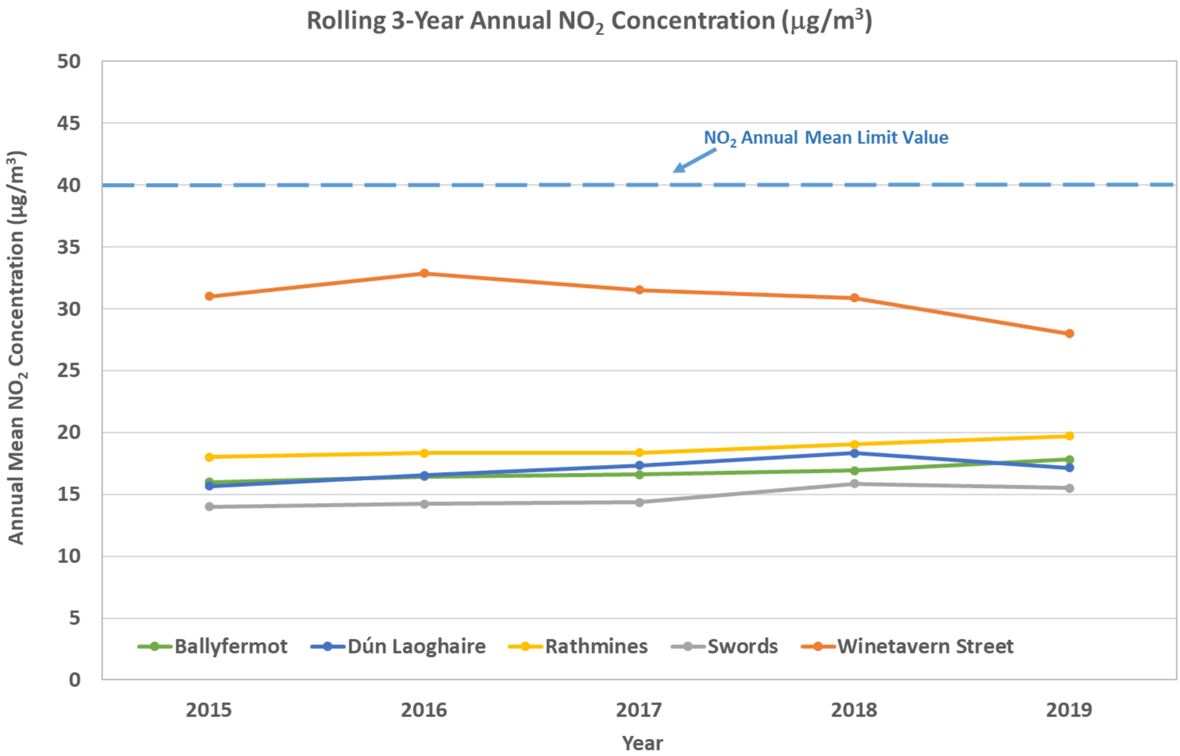


Diagram 7.3: Rolling Three-Year Annual NO_2 Concentration (µg/m³)

In addition to the continuous monitoring stations, the EPA has gathered NO_2 data using the passive diffusion tube methodology in proximity to the Proposed Scheme (EPA 2020c). The diffusion tube sampling was carried out in conjunction with DCC. Monitoring is for single year periods, therefore long-term averages are not available at diffusion tube locations. Further details on the diffusion tube methodology is discussed in Section 7.3.2.2 as part of the site-specific monitoring study. Exceedances of the annual mean NO_2 concentration in 2019 were recorded at Bus Aras Environs 2 (Gardner St. Lower), Bus Aras Environs 4 (Amien Street Lower), Camden Street / Wexford Street, Leeson Street / Morehampton Road, and Pearse Street Continuous Monitor.

Table 7.15: EPA NO_2 Diffusion Tube Monitoring Data

Monitoring Site	Monitoring Year	Annual Mean NO_2 Concentration (µg/m^3)
Busaras Environs 1 (Beresford Place)	2017	37.8
Bus Aras Environs 2 (Gardner St. Lower)	2019	57.2
Bus Aras Environs 4 (Amien St. Lower)	2019	50.9
Camden Street / Wexford Street	2019	49.1
Chancery Park	2019	31.8
Charlemont Mall	2017	23.8
Charlemont Place	2017	21.2
Grand Canal 1	2018	21.9
Grand Canal 1	2018	23.8
Grand Canal 1	2018	19.1
Leeson St / Morehampton Road	2019	55.8
Pearse St Continuous Monitor	2019	49.0
Pearse Street 2	2018	40.9
Pearse Street 3	2018	50.9
Pearse Street 4	2018	46.6
Ranelagh Road	2017	18.6
Winetavern Street - CEN Station	2016	30.2
Winetavern Street - Recycling	2016	38.9
Wood Quay	2016	49.1

With regard to PM_{10}, continuous monitoring data from the EPA Zone A stations was reviewed. The stations representative of the Proposed Scheme are Ballyfermot, Dún Laoghaire, Tallaght, Rathmines and Phoenix Park, which showed annual average levels ranging from 11µg/m^3 to 15µg/m^3 in 2019, with a maximum of nine exceedances of the 24-hour limit value of 50µg/m^3 (35 exceedances are permitted per year). Longer term averages from 2015 to 2019 show annual average concentrations of between 9µg/m^3 to 16µg/m^3 as shown in Table 7.16.

Average PM_{10} levels at the urban background monitoring location of Rathmines were reviewed. The annual average level in 2019 was 15µg/m^3, with nine exceedances of the 24-hour limit value of 50µg/m^3. The City Centre monitoring location of Winetavern Street has a long-term average (2015 to 2019) of 14µg/m^3 with an annual average in 2019 of 15µg/m^3. Average PM_{10} levels in 2019 at St. John's Road station were 14µg/m^3 and at Davitt Road station were 19µg/m^3.

Continuous $PM_{2.5}$ monitoring carried out at the Zone A locations of Finglas, Rathmines and Marino showed average levels of 9.3µg/m^3 in 2019. A suburban Zone C $PM_{2.5}$ monitoring station in Bray, 2.2 km south west of the Proposed Scheme, has sufficient long-term data for review. Long term averages for the Bray station from 2015 to 2019 show an average concentration of 6.6µg/m^3 compared to the annual limit value of 25µg/m^3. The annual average level measured in Rathmines in 2019 was 10µg/m^3. Rathmines monitors both PM_{10} and $PM_{2.5}$ allowing a ratio of PM_{10} to $PM_{2.5}$ to be calculated. The average $PM_{2.5}$ / PM_{10} ratio in Rathmines was 0.53 in 2019.

Table 7.16: Trends in Suburban and Urban PM_{10} Concentration (µg/m³) In Dublin 2015 to 2019

Station	Averaging Period	Year					Limit Value
		2015	2016	2017	2018	2019	
Winetavern Street	Annual Mean PM_{10} (µg/m³)	14	14	13	14	15	40
	90th%ile 24-hr PM_{10} (µg/m³)	25	23	21	24	26	50
Rathmines	Annual Mean PM_{10} (µg/m³)	15	15	13	15	15	40
	90th%ile 24-hr PM_{10} (µg/m³)	28	28	24	25	25	50
Dún Laoghaire	Annual Mean PM_{10} (µg/m³)	13	13	12	13	12	40
	90th%ile 24-hr PM_{10} (µg/m³)	22	22	21	21	21	50
Tallaght	Annual Mean PM_{10} (µg/m³)	14	14	12	15	12	40
	90th%ile 24-hr PM_{10} (µg/m³)	26	28	22	24	19	50
Phoenix Park	Annual Mean PM_{10} (µg/m³)	12	11	9	11	11	40
	90th%ile 24-hr PM_{10} (µg/m³)	20	20	16	18	18	50
Ballyfermot	Annual Mean PM_{10} (µg/m³)	12	11	12	16	14	40
	90th%ile 24-hr PM_{10} (µg/m³)	22	21	21	24	26	50

7.3.2.2 Site-Specific Monitoring Data

Monitoring of NO_2 in proximity to the Proposed Scheme, and roads that have the potential to be impacted by it, was carried out using passive diffusion tubes. The baseline monitoring study was carried out close to the alignment of the Proposed Scheme, with monitoring focusing on areas of greatest potential impact. The results of the monitoring survey allow for an indicative comparison with the annual limit value for NO_2. Diffusion tubes are a useful tool for assessing the spatial variation of NO_2 as they do not require an electrical connection and allow for multiple locations to be monitored at the same time. The results also provide information on the influence of road sources relative to the prevailing background level of these pollutants in the area. The spatial variation in NO_2 levels away from air emission sources is particularly important, as a complex relationship exists between NO, NO_2 and O_3 leading to a non-linear variation of NO_2 concentrations with distance from these sources.

A baseline NO_2 monitoring survey was undertaken as part of the air quality assessment for the CBC Infrastructure Works. Monitoring at 112 locations was completed for a seven-month data collection period (with six diffusion tube change overs between 15 November 2019 to 8 June 2020). However, due to COVID-19 impacts on the baseline traffic environment, the final two data sets (16 March 2020 to 8 June 2020) are considered non 'typical' baseline data and therefore are not included in the baseline data set.

Under the TII Air Quality Guidelines (TII 2011) a minimum of one-month baseline monitoring is required, ideally extending to at least three months. The TII Air Quality Guidance specifically states:

> *'Monitoring should ideally be carried out for a period of six months, including both summer and winter periods. However, for practical reasons, the monitoring period may be shorter, but, wherever possible, should extend for at least 3 months and should not be less than 1 month'.*

In general, four months of typical (i.e. prior to COVID-19 conditions) baseline data was collected which achieves the minimum monitoring period recommended in the TII Air Quality Guidelines.

Studies in the UK have shown that diffusion tube monitoring results generally have a positive or negative bias when compared to continuous analysers. This bias is laboratory specific and is dependent on the specific analysis procedures at each laboratory. A diffusion tube bias of 0.77 was obtained for the SOCOTEC laboratory (which analysed the diffusion tubes) from the UK DEFRA website (DEFRA 2018). In addition, three diffusion tubes were co-located with the continuous EPA NO_2 monitors at a number of locations across the CBC Infrastructure Works in order to develop a local bias adjustment factor specific to the CBC Infrastructure Works in order to develop a local bias adjustment factor specific to the Proposed Scheme. A bias adjustment factor was calculated for the St. John's Road (near Heuston Station) monitor of 0.76. A bias adjustment factor of 0.77 was selected for the diffusion tube monitoring results as this value was the more conservative of the laboratory derived and site-specific biases.

In addition to the bias adjustment, an annualisation factor is required as the monitoring period did not extend to a full year. The annualisation factor was prepared as per LAQM (TG22) (DEFRA 2022b). The annualisation factor is necessary as NO_2 concentrations vary across the year and this should be accounted for within the baseline monitoring. The factor was calculated using 2019 monitoring data from Ballyfermot, Winetavern, Davitt Road and St. Johns Road West using Box 7.10 of LAQM (TG22). This factor was calculated to be 0.986 for the period of the diffusion tube monitoring.

The twelve monitored locations in the vicinity of the Proposed Scheme are shown in Table 7.17 and shown in Figure 7.1 in Volume 3 of this EIAR. Table 7.18 and Diagram 7.4 outline the results of the baseline NO_2 diffusion tube monitoring over the period 15 November 2019 to 16 March 2020.

The highest four-month average concentration was recorded at a roadside location at 131 Donnybrook Road (tube no. 13.11). This is located on the main alignment of the Proposed Scheme. Concentrations at this location averaged 35.3μg/m^3 or 88% of the annual mean limit value with the bias adjustment and annualization factor applied. The second highest concentration monitored was monitored to the north of the Proposed Scheme at the roadside tube no. 13.12 on the Junction of Hume Street with St. Stephens Green. Concentrations at tube no. 13.12 location averaged 34.6μg/m^3 or 86% of the annual mean limit value. All other monitoring locations were 70% or below of the annual mean limit value.

The lowest concentration was recorded in 51 Beechfield Manor to the north of Shankill (tube no. 13.4) (21.4μg/m^3). This location has the potential to be impacted due to changes in traffic flows in the area.

Based on guidance from DEFRA, it can be considered that exceedances of the NO_2 one-hour limit value objective may occur at roadside sites if the annual mean is above 60μg/m^3 (DEFRA 2022b). None of the twelve sites monitored are considered likely to exceed the NO_2 one-hour objective.

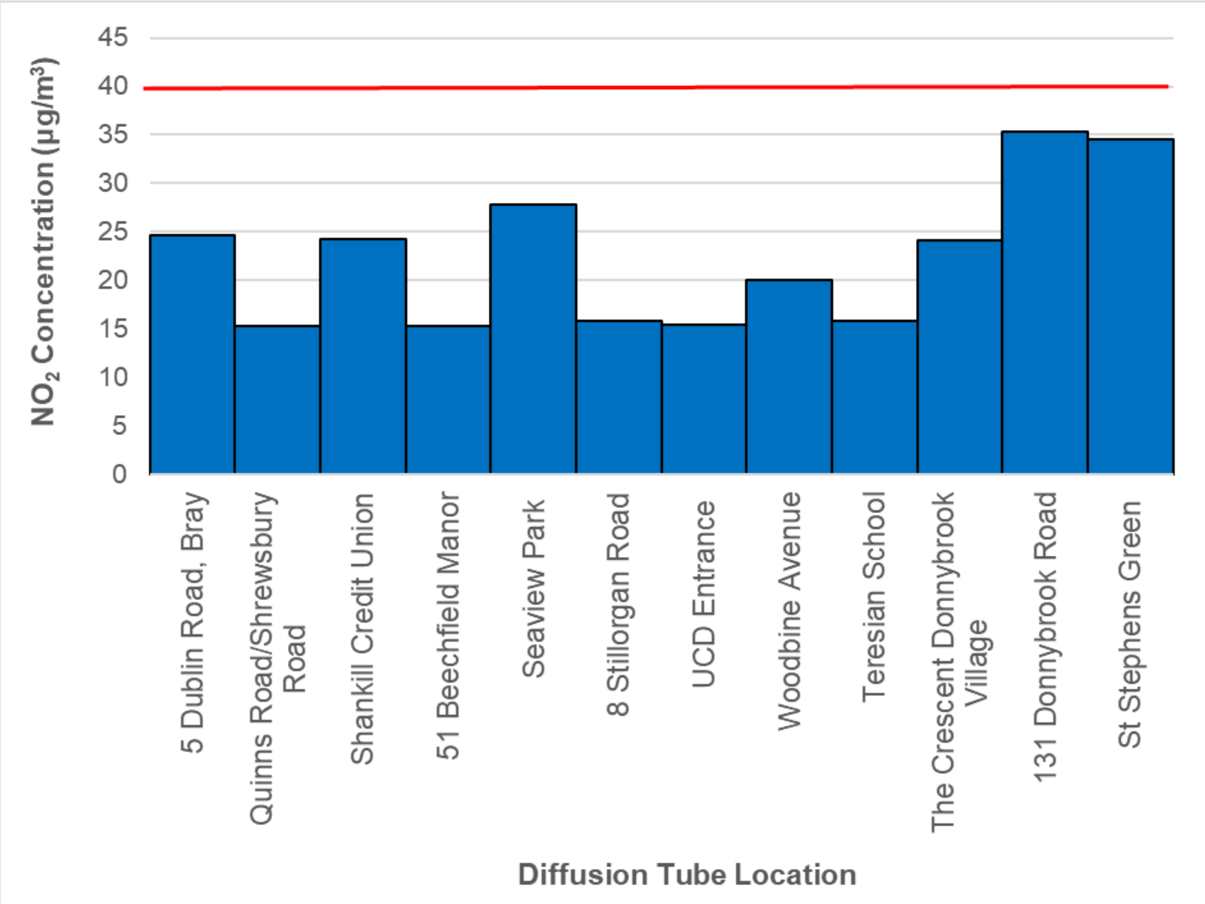
Table 7.17: Air Quality Monitoring Locations

Tube No.	Reference	Site	East (ITM)	North (ITM)
13.1	CBC0013DT001	5 Dublin Road, Bray	718100	730946
13.2	CBC0013DT002	Quinns Road / Shrewsbury Road	717617	731522
13.3	CBC0013DT003	Shankill Credit Union	717349	731762
13.4	CBC0013DT004	51 Beechfield Manor	716162	733365
13.5	CBC0013DT005	Seaview Park	721782	729110
13.6	CBC0013DT006	8 Stillorgan Road	720705	729916
13.7	CBC0013DT007	UCD Entrance	719200	731239
13.8	CBC0013DT008	Woodbine Avenue	718913	731218
13.9	CBC0013DT009	Teresian School	718504	730815
13.10	CBC0013DT010	The Crescent Donnybrook Village	718527	731908
13.11	CBC0013DT011	131 Donnybrook Road	717494	732563
13.12	CBC0013DT012	St Stephens Green	717381	732720

Table 7.18: Air Quality Monitoring Results

Tube No.	Site	15 Nov – 15 Dec 2019 (µg/m³)	15 Dec 2019 – 15 Jan 2020 (µg/m³)	15 Jan – 17 Feb 2020 (µg/m³)	15 Feb – 16 Mar 2020 (µg/m³)	Average	Locally Bias Adjusted and Annualised NO_2 Concentration (µg m⁻³) Note 1, Note 2
13.1	5 Dublin Road, Bray	37.6	32.9	35.2	24.5	32.6	24.7
13.2	Quinns Road / Shrewsbury Road	Lost	23.8	21.8	15.0	20.2	15.3
13.3	Shankill Credit Union	37.9	26.1	Lost	Lost	32.0	24.3
13.4	51 Beechfield Manor	23.5	21.2	21.7	14.0	20.1	15.3
13.5	Seaview Park	38.6	37.5	39.2	31.5	36.7	27.9
13.6	8 Stillorgan Road	Lost	Lost	25.5	16.3	20.9	15.9
13.7	UCD Entrance	25.7	21.6	20.5	13.2	20.3	15.4
13.8	Woodbine Avenue	32.3	25.8	28.0	19.6	26.4	20.1
13.9	Teresian School	Lost	Lost	Lost	20.8	20.8	15.8
13.10	The Crescent Donnybrook Village	37.5	42.3	28.1	19.4	31.8	24.2
13.11	131 Donnybrook Road	57.4	Lost	46.8	35.4	46.5	**35.3**
13.12	St Stephens Green	58.7	49.5	44.3	29.7	45.6	**34.6**
Average		38.8	31.2	31.1	21.8	29.5	22.4
Max		58.7	49.5	46.8	35.4	46.5	**35.3**
Min		23.5	21.2	20.5	13.2	20.1	15.3

Note 1: Bias adjustment factor: 0.77, Annualisation factor: 0.986
Note 2: Locally bias adjusted concentrations in bold exceed the 80% threshold value for screening modelling



* Annual mean limit value denoted by red line

Diagram 7.4: Locally Bias Adjusted and Annualised NO_2 Concentration (µg/m³)

7.3.3 Existing Modelled Baseline Scenario

In the Existing Baseline Scenario, the current air quality environment experienced within the study area has been modelled. The Existing Baseline Scenario has been modelled using AMDS-Roads for the representative baseline year of 2019, to establish baseline concentrations at receptors within the Proposed Scheme study area. Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24-hour PM_{10} limit value objective, at selected most impacted existing air quality sensitive receptors in the 2019 Existing Baseline scenario are listed in Table 7.19. Locations of these receptors are shown in Figures 7.3 to 7.8 in Volume 3 of this EIAR. Statistics for the full list of modelled receptors can be found in Table 1.1 in Appendix A7.1 Detailed Modelling Results in Volume 4 of this EIAR.

Table 7.19: Existing Baseline Scenario Pollutant Statistics at Most Impacted Receptor Locations

Existing Baseline (2019)					No of PM_{10} days > 50 µg/m³
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			
		NO_2	PM_{10}	$PM_{2.5}$	
AQ27	719787,728598	31.8	15.9	11.2	1
AQ130	716188,732996	35.5	15.9	11.3	1
AQ139	716221,732991	37.5	16.4	11.6	1
AQ160	721177,726845	30.6	16.0	11.2	1
AQ163	717176,731934	37.4	16.5	11.6	1
AQ242	722041,726226	29.8	15.8	11.1	1
AQ301	715632,734259	38.1	16.2	11.4	1
AQ302	715731,734294	36.7	16.0	11.3	1
AQ303	715810,734323	36.2	15.9	11.2	1
AQ304	715881,734354	39.3	16.1	11.4	1
AQ305	715927,734354	37.9	15.8	11.2	1
AQ313	715613,734057	39.8	16.0	11.3	1
AQ314	715699,734064	37.9	15.9	11.2	1
AQ315	715711,734063	37.2	15.8	11.2	1
AQ316	715769,734071	35.7	15.6	11.1	1
AQ317	715787,734104	40.8	16.2	11.4	1
AQ319	715561,734050	39.4	16.0	11.3	1
AQ321	715202,733985	42.9	16.8	11.8	1
AQ322	715087,733873	40.8	16.9	11.9	1
AQ333	715479,733425	38.0	16.5	11.6	1
AQ334	715495,733400	37.1	16.5	11.6	1
AQ335	715479,733323	36.2	16.0	11.3	1
AQ336	715511,733317	39.3	16.3	11.5	1
AQ347	715549,732943	34.6	15.9	11.2	1
AQ350	716590,734091	47.9	17.4	12.2	1
AQ352	716553,734103	42.6	17.2	12.0	1
AQ358	716900,733998	35.4	15.8	11.2	1
AQ359	716507,733823	37.0	16.1	11.4	1
AQ361	716489,733837	38.3	16.2	11.5	1
AQ363	716469,733752	36.4	16.2	11.4	1
AQ368	716611,733248	34.6	15.8	11.2	1
AQ381	715539,733353	36.9	16.2	11.5	1
AQ403	716881,732943	36.2	16.1	11.4	1
AQ477	715594,732766	40.4	14.9	10.6	<1
AQ478	715620,732773	36.8	14.8	10.5	<1
AQ479	715623,732794	38.1	14.9	10.6	<1

Existing Baseline (2019)					No of PM_{10} days > 50 µg/m[3]
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m[3])			
		NO_2	PM_{10}	$PM_{2.5}$	
AQ480	715661,732801	37.6	14.9	10.6	<1
AQ481	715658,732784	36.8	14.8	10.5	<1
AQ482	715704,732811	37.9	14.8	10.6	<1
AQ484	715599,732706	34.9	14.6	10.4	<1
AQ485	715593,732687	35.8	15.8	11.2	1
AQ488	715607,732475	38.0	14.9	10.6	<1
AQ497	716173,733398	41.3	16.6	11.7	1
AQ498	716165,733378	38.8	16.3	11.5	1
AQ518	715232,733995	37.8	16.2	11.4	1
AQ528	716366,733393	36.2	16.2	11.4	1
AQ531	715888,732519	38.9	15.0	10.7	<1
AQ539	715629,732460	37.9	14.9	10.6	<1
AQ557	716265,732673	37.0	15.1	10.7	<1
AQ640	719382,729591	30.2	15.5	11.0	1
AQ886	725000,721015	36.3	17.0	12.0	1
AQ892	725333,719407	37.4	17.3	12.1	1
AQ988	716595,734109	42.6	16.7	11.8	1
AQ988	725552,719983	21.7	14.3	10.2	<1
AQ989	726057,719187	21.3	14.2	10.1	1
AQ990	719282,728662	21.4	14.3	10.2	1
AQ1019	716241,733063	23.9	14.5	10.3	<1
AQ1031	724097,723816	30.9	16.3	11.4	1
AQ1038	716189,734185	37.8	16.2	11.5	1
AQ1041	716471,733872	41.3	16.7	11.7	1
AQ1044	716468,733842	37.3	16.0	11.3	1
AQ13	724491,723268	32.9	16.2	11.4	1
AQ18	719660,729223	36.4	16.6	11.6	1
AQ19	719670,729181	35.7	16.8	11.8	1
AQ24	719894,728543	36.7	16.6	11.7	1
AQ26	719861,728598	34.7	16.3	11.5	1
AQ28	719757,728660	30.7	15.8	11.1	1
AQ29	719691,728848	28.9	15.5	10.9	1
AQ30	719677,728972	30.7	15.9	11.2	1
AQ31	719694,728907	34.3	16.4	11.5	1
AQ32	719739,729001	32.0	16.2	11.4	1
AQ34	719748,728862	36.1	16.7	11.7	1
AQ35	719753,728811	35.1	16.6	11.6	1
AQ36	719730,728710	29.1	15.6	11.0	1
AQ37	719714,728753	28.9	15.6	11.0	1
AQ38	719770,728767	33.1	16.2	11.4	1
AQ42	719617,729334	35.3	16.5	11.6	1
AQ106	716427,732630	32.9	16.0	11.3	1
AQ107	716572,732541	31.8	15.9	11.2	1
AQ108	716478,732534	31.0	15.7	11.1	1
AQ109	716416,732588	33.9	16.1	11.3	1
AQ114	722453,725949	30.9	16.3	11.4	1
AQ115	722498,725919	29.9	16.1	11.3	1

Receptor	Receptor Location (ITM)	Existing Baseline (2019) Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ129	716210,733007	41.7	16.8	11.8	1
AQ132	716461,732633	31.6	15.8	11.1	1
AQ133	716481,732648	33.1	16.0	11.3	1
AQ135	716440,732652	34.2	16.1	11.4	1
AQ138	716311,732813	34.9	15.8	11.2	1
AQ142	716289,732756	35.6	16.4	11.5	1
AQ143	716074,733164	36.4	16.0	11.3	1
AQ148	721405,726628	33.0	16.5	11.5	1
AQ150	721207,726735	32.0	16.3	11.4	1
AQ151	721221,726808	30.8	16.0	11.3	1
AQ153	721016,726940	34.4	16.2	11.4	1
AQ155	721024,726840	34.5	16.4	11.5	1
AQ156	721311,726708	34.5	16.8	11.7	1
AQ157	721352,726667	35.7	17.0	11.9	1
AQ158	721257,726688	31.4	16.1	11.3	1
AQ159	721280,726751	31.2	16.1	11.3	1
AQ161	717176,731954	38.7	16.6	11.7	1
AQ166	723696,724822	29.0	15.9	11.2	1
AQ171	717503,731644	35.2	16.0	11.3	1
AQ186	717596,731553	33.6	15.7	11.1	1
AQ207	724058,723871	30.6	16.3	11.4	1
AQ215	723859,724236	29.0	15.9	11.2	1
AQ216	723844,724267	28.6	15.8	11.1	1
AQ225	723800,724329	31.4	16.5	11.5	1
AQ226	720788,727080	34.3	16.2	11.4	1
AQ229	720720,727120	34.1	16.7	11.7	1
AQ233	721981,726266	30.9	16.0	11.3	1
AQ234	721923,726322	31.4	16.0	11.3	1
AQ238	721678,726463	33.7	16.5	11.6	1
AQ244	720643,727171	29.7	15.9	11.2	1
AQ245	720527,727264	34.9	16.1	11.3	1
AQ246	720557,727235	30.7	15.8	11.2	1
AQ249	718421,730711	31.9	16.0	11.2	1
AQ252	718628,730471	31.4	16.1	11.3	1
AQ253	718638,730455	31.1	16.0	11.3	1
AQ256	719158,729956	34.7	16.9	11.8	1
AQ257	718992,730135	32.4	16.3	11.4	1
AQ260	720355,727915	31.4	16.2	11.4	1
AQ263	720386,727403	29.7	15.3	10.8	<1
AQ264	720403,727360	31.2	15.5	11.0	1
AQ265	720249,728221	36.5	16.4	11.5	1
AQ266	720227,728250	34.4	16.1	11.4	1
AQ268	720051,728411	30.6	16.0	11.3	1
AQ269	720247,728118	31.8	15.8	11.2	1
AQ273	720356,727735	31.2	16.1	11.3	1
AQ279	720402,727951	33.3	16.6	11.6	1
AQ282	720411,727837	36.4	17.3	12.0	1

Existing Baseline (2019)					No of PM_{10} days > 50 µg/m³
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			
		NO_2	PM_{10}	$PM_{2.5}$	
AQ323	715064,733810	43.3	17.5	12.3	1
AQ325	715064,733764	52.4	18.4	12.9	2
AQ351	716579,734071	47.8	17.4	12.2	1
AQ380	715505,733367	39.8	16.6	11.7	1
AQ417	716922,732258	35.9	16.0	11.3	1
AQ431	717756,732518	42.8	16.9	11.9	1
AQ432	717741,732531	48.0	17.8	12.5	1
AQ433	717748,732487	35.7	16.0	11.3	1
AQ434	717786,732489	55.6	19.0	13.3	2
AQ435	717896,732423	39.2	16.6	11.7	1
AQ437	717871,732437	41.4	16.9	11.9	1
AQ521	716610,734148	37.8	16.1	11.4	1
AQ645	719530,729570	33.9	16.0	11.3	1
AQ646	719482,729634	32.0	15.9	11.2	1
AQ725	720367,727782	30.4	16.0	11.2	1
AQ739	720435,727269	33.6	15.8	11.2	1
AQ810	723458,725163	30.1	15.7	11.1	1
AQ811	723505,725129	34.6	16.3	11.5	1
AQ833	724655,723998	36.5	17.1	11.9	1
AQ1008	716170,733029	34.2	15.7	11.1	1
AQ1012	716299,732754	34.9	16.2	11.4	1
AQ1015	716181,733050	38.3	16.2	11.4	1
AQ1017	716112,733110	32.4	15.5	11.0	1
AQ1040	716552,734074	47.4	17.5	12.3	1
AQ23	719700,729075	39.4	17.8	12.3	1
AQ121	716610,732459	37.9	16.9	11.8	1
AQ144	716087,733189	40.4	16.5	11.6	1
AQ145	721499,726534	37.5	17.4	12.1	1
AQ154	721068,726904	39.5	17.4	12.2	1
AQ162	717228,731951	39.0	16.5	11.6	1
AQ167	717382,731761	41.5	16.5	11.7	1
AQ172	717393,731748	39.8	16.5	11.6	1
AQ179	716799,732376	39.9	16.5	11.7	1
AQ181	716885,732329	47.2	17.1	12.1	1
AQ182	717602,731574	42.3	16.6	11.7	1
AQ183	717727,731393	40.6	16.8	11.8	1
AQ184	717912,731226	39.1	17.6	12.2	1
AQ219	724778,723045	37.2	17.6	12.2	1
AQ228	720823,727056	38.9	17.0	11.9	1
AQ239	721867,726375	37.4	16.6	11.7	1
AQ240	721756,726432	39.4	16.8	11.8	1
AQ248	718458,730750	39.0	17.2	12.0	1
AQ258	720380,728005	38.0	17.2	12.0	1
AQ267	719943,728492	40.1	17.4	12.2	1
AQ271	717500,731661	39.4	16.6	11.7	1
AQ275	720403,727731	40.4	18.0	12.5	2
AQ445	717849,731391	40.3	17.1	12.0	1

Existing Baseline (2019)					No of PM_{10} days > 50 µg/m³
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			
		NO_2	PM_{10}	$PM_{2.5}$	
AQ1013	716054,733178	37.3	16.1	11.4	1
AQ1014	716089,733214	41.2	16.4	11.6	1
AQ1020	717751,731356	38.2	16.2	11.4	1
AQ1026	719608,729357	37.8	17.0	11.9	1
AQ1062	716314,732770	36.7	16.2	11.4	1
AQ131	716351,732738	41.4	16.8	11.8	1
AQ136	716373,732706	43.0	17.1	12.0	1
AQ141	716404,732715	50.0	18.1	12.7	2
AQ261	720354,728075	41.6	17.3	12.1	1
AQ300	715533,734232	39.7	16.4	11.6	1
AQ306	715983,734395	42.6	16.5	11.6	1
AQ307	716045,734416	38.4	16.1	11.4	1
AQ308	716093,734426	37.4	16.0	11.3	1
AQ309	716159,734438	40.7	16.4	11.6	1
AQ310	716174,734267	44.4	16.7	11.8	1
AQ311	716190,734228	45.3	17.1	12.0	1
AQ312	716174,734238	41.4	16.5	11.6	1
AQ318	715568,734073	43.3	16.4	11.6	1
AQ320	715196,734002	40.3	16.5	11.6	1
AQ349	716382,734156	40.9	16.9	11.9	1
AQ362	716503,733755	40.0	16.7	11.7	1
AQ395	716603,733291	43.2	16.5	11.6	1
AQ399	716626,733276	36.4	16.0	11.3	1
AQ474	715556,732792	45.2	16.8	11.8	1
AQ475	715564,732759	38.6	16.0	11.3	1
AQ476	715582,732763	42.4	16.4	11.6	1
AQ495	716176,733475	41.9	16.6	11.7	1
AQ496	716191,733435	40.5	16.5	11.7	1
AQ517	715231,734014	41.3	16.6	11.7	1
AQ519	715449,734204	38.5	16.3	11.5	1
AQ520	715583,734245	38.9	16.2	11.4	1
AQ523	716669,734066	35.6	16.0	11.3	1
AQ877	724796,721639	36.7	17.2	12.1	1
AQ878	724816,721595	36.8	17.2	12.1	1
AQ888	724992,720912	38.6	17.5	12.3	1
AQ895	725268,719121	39.6	17.8	12.4	1
AQ897	725218,718967	34.0	16.6	11.7	1
AQ989	716600,734087	44.6	17.0	12.0	1
AQ990	716605,734086	43.1	16.8	11.8	1
AQ1039	716415,734126	42.3	17.0	11.9	1
AQ402	716849,732964	39.2	16.4	11.6	1
AQ404	716901,732960	39.1	16.5	11.6	1
Air Quality Limit Value Objective		**40**	**40**	**25**	**35**

In the 2019 Existing Baseline scenario, annual mean concentrations of NO_2 are above the relevant national air quality limit value objective in some areas; 50 exceedances were modelled at receptors on the N11 Stillorgan Road, R105 Burgh Quay, R111 Canal Road / Grand Parade, R114 Aungier Street / Rathmines Road Lower / Richmond Street South, R118 Wyattville Road, R137 College Green / Dame Street / Lord Edward Street / Nicholas

Street, R138 Donnybrook Road / Leeson Street Upper / Leeson Street Lower / Lincoln Place / Morehampton Road / Stillorgan Road / St. Stephen's Green, R148 Aston Quay / Wellington Quay, R802 Pearse Street / Tara Street, R811 Harcourt Road / Adelaide Road, R814 Lombard Street East, R816 Baggot Street Lower / Pembroke Road and R824 Ailesbury Road. Concentrations at all receptors with exceedances can be found in Table 1.1 in Appendix A7.1 in Volume 4 of this EIAR. Some of these receptors have been excluded from this section as these locations experience a negligible impact due to the Scheme. They are therefore not considered most impacted receptors. Annual mean NO_2 concentrations did not exceed 60µg/m^3, indicating that exceedances of the NO_2 1-hour mean are unlikely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality standards in 2019 for all modelled receptors. At all receptors, modelling of the maximum 24-hour PM_{10} concentration indicated that there are likely to be no more than two exceedances of the 50µg/m^3 ambient limit value compared to the threshold which allows 35 daily exceedances in any one calendar year. Annual mean $PM_{2.5}$ concentrations are also below the relevant national air quality limit value objective for all modelled receptors.

7.4 Potential Impacts

This section presents potential impacts that may occur due to the Proposed Scheme, in the absence of mitigation. This informs the need for mitigation or monitoring to be proposed (refer to Section 7.5). Predicted 'residual' impacts taking into account any proposed mitigation is presented in Section 7.6.

7.4.1 Characteristics of the Proposed Scheme

In the context of the Proposed Scheme, the potential air quality impact on the surrounding environment must be considered for two distinct stages:

- Construction Phase; and
- Operational Phase.

7.4.2 Construction Phase

During the Construction Phase of the Proposed Scheme, works will involve predominately utility diversions, road widening works, road excavation works (where required), road and junction reconfiguration and resurfacing works, urban realm improvements including landscaping, and construction traffic access routes including movement of machinery and materials within and to and from the two construction compounds along the Proposed Scheme.

Other works specific to the Proposed Scheme will include:

- Preparatory and site clearance works including ground investigations, and demolition of the Woodbrook Side Lodge in Bray and elements of the Circle K Petrol Station, Dublin Road, Bray;
- The setting up of two Construction Compounds; and
- A range of structural works including widening of the St Laurence's Underpass, Stillorgan and the construction of retaining walls, general traffic carriageways, cycle tracks and bus stops.

Potential air quality impacts associated with the Proposed Scheme will be associated with the Construction Phase and the long-term Operational Phase. During the Construction Phase, site clearance and preparation, landscaping, road and junction construction works all have the potential to generate dust and gaseous air emissions on site.

Chapter 5 (Construction) provides a full description of the proposed construction phasing and works for the Proposed Scheme.

For the purposes of the EIAR, four individual construction sections split into 10 subsections are set out. Sections may be completed simultaneously and combined in certain areas. Table 5.1 in Chapter 5 (Construction) includes a summary of each section with the estimated time for the completion of works in these areas.

It is envisaged that construction may be completed in the following Sections:

- **Section 1:** Leeson Street to Donnybrook (Anglesea Road Junction):
  - **Section 1a:** Leeson Street to Morehampton Road (Wellington Place); and

  - **Section 1b:** Morehampton Road (Wellington Place) to Donnybrook (Anglesea Road Junction).
- **Section 2:** Donnybrook (Anglesea Road Junction) to Loughlinstown Roundabout:
  - **Section 2a:** Donnybrook (Anglesea Road Junction) to Whites Cross (Leopardstown Road); and
  - **Section 2b:** Whites Cross (Leopardstown Road) to Loughlinstown Roundabout.
- **Section 3:** Loughlinstown Roundabout to Bray North (Wilford Roundabout):
  - **Section 3a:** Loughlinstown Roundabout to Shanganagh Road, incl. Stonebridge Road;
  - **Section 3b:** Shanganagh Road to Quinns Road; and
  - **Section 3c:** Quinns Road to Bray North (Wilford Roundabout).
- **Section 4:** Bray North (Wilford Roundabout) to Bray South (Fran O'Toole Bridge):
  - **Section 4a:** Bray North (Wilford Roundabout) to Old Connaught Avenue;
  - **Section 4b:** Old Connaught Avenue to Upper Dargle Road; and
  - **Section 4c:** Upper Dargle Road to Bray South (Fran O'Toole Bridge).

Road works by their nature are transient in nature as the works progress along the length of the route of the Proposed Scheme. This includes excavation and fill works, structures, and road completion works.

The potential air quality impacts associated with this phase are set out within Sections 7.4.2.1 and 7.4.2.1.2.

7.4.2.1 Construction Dust Assessment

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the sensitivity of the area, as outlined above (Section 7.2.4.4).

The Institute of Air Quality Management (IAQM) has issued guidelines (IAQM 2014) which also outline the assessment criteria for assessing the impact of dust emissions from construction activities based on both receptor sensitivity and the number of receptors affected. In terms of receptor sensitivity, the area is characterised as having high, medium and low sensitivity receptors within 350m of the construction activities associated with the Proposed Scheme.

Table 7.11 identifies how the sensitivity of an area may be determined for dust soiling taking into account the number of receptors, the receptor sensitivity and distance from the source. The area in proximity to the Proposed Scheme would be an area of high sensitivity with greater than 100 receptors within 20m of the construction activities.

In addition, the IAQM Guidelines outline the assessment criteria for assessing the impact of PM_{10} emissions from construction activities based on the current annual mean PM_{10} concentration, receptor sensitivity and the number of receptors affected. The current PM_{10} concentration in Zone A locations as reported in Section 7.3.2.1 is approximately 15 $\mu g/m^3$. Based on the criteria outlined in Table 7.12 the risk to human health from PM_{10} emissions at the nearest residential receptor (high sensitivity, distance less than 20m and with receptor numbers between >100) is considered medium under this guidance.

Table 7.13 identifies how the sensitivity of an area may be determined for ecological impacts taking into account the distance from the source to the ecological receptor and the sensitivity of the ecological receptor. The Grand Canal pNHA is an ecological receptor of medium sensitivity in proximity to the Proposed Scheme with a particularly important plant species, where its dust sensitivity is uncertain or unknown within 20m of the construction activities.

The major dust generating activities are divided into four types within the IAQM Guidance (IAQM 2014) to reflect their different potential impacts. These are:

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

7.4.2.1.1 Demolition

Demolition will primarily involve the demolition of The Woodbrook Side Lodge in Bray and elements (awning, pumps, tanks) of Circle K Petrol Station, Dublin Road, Bray. The dust emission magnitude from demolition can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

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

The dust emission magnitude for the proposed demolition activities can be conservatively classified as medium as the total building volume is likely to be less than 20,000m^3, with low potential for dusty construction material.

The magnitude for each dust generating activity is combined with the sensitivity of the area to define the risk of dust impacts in the absence of mitigation. The sensitivity of the area is considered to be high for dust soiling and medium for human health impacts. As outlined in Table 7.20 this results in an overall low risk of temporary dust soiling impacts and a low risk of temporary human health impacts as a result of the proposed demolition activities. In relation to ecological impact, as the receptor is of medium sensitivity, the risk associated with the proposed demolition activities is described as low.

Overall, in order to ensure that no dust nuisance occurs during the demolition activities, a range of dust mitigation measures associated with a medium risk of dust impacts must be implemented. When the dust mitigation measures detailed in the mitigation section of this Chapter are implemented, fugitive emissions of dust from the site will not have a significant impact at nearby receptors.

Table 7.20:Risk of Dust Impacts - Demolition

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

7.4.2.1.2 Earthworks

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

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

The dust emission magnitude for the proposed earthwork activities required for the Proposed Scheme is conservatively classified as large. The proposed Construction Compounds plus the Proposed Scheme construction site areas will have a total site area greater than 10,000m^2, while there would be between five and ten heavy earth moving vehicles in use at any one time during peak construction activities.

The sensitivity of the area is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. The sensitivity of the area would be described as high for dust soiling and medium for human health impacts. As outlined in Table 7.21, this will result in an overall high risk of temporary dust soiling impacts and an overall medium risk of temporary human health impacts as a result of the proposed earthworks activities. In relation to ecological impact, as the receptor is of medium sensitivity, the risk associated with the proposed earthwork activities is described as medium.

Overall, in order to ensure that no dust nuisance occurs during the proposed earthworks activities, a range of dust mitigation measures associated with a high risk of dust impacts must be implemented. When the dust mitigation measures detailed in the mitigation section of this Chapter are implemented, fugitive emissions of dust from the site will not have a significant impact at nearby receptors.

Table 7.21: Risk of Dust Impacts – Earthworks

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

7.4.2.1.3 Construction

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

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

The dust emission magnitude for the proposed construction activities can be classified as large. There will be greater than 100,000m^3 being constructed as part of the works and there may be need for on-site concrete batching. The key construction activities after earthworks are installation of the paving materials.

The sensitivity of the area is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 7.22, this results in an overall high risk of temporary dust soiling impacts and an overall medium risk of temporary human health impacts as a result of the proposed construction activities. In relation to ecological impact, as the receptor is of medium sensitivity, the risk associated with the proposed construction activities is described as medium.

Overall, in order to ensure that no dust nuisance occurs during the construction activities, a range of dust mitigation measures associated with a high risk of dust impacts will be implemented. When the dust mitigation measures detailed in the mitigation section of this Chapter are implemented, fugitive emissions of dust from the site will not have a significant impact at nearby receptors.

Table 7.22: Risk of Dust Impacts – Construction

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

7.4.2.1.4 Trackout

Trackout is defined as the transport of dust and dirt from construction activity onto the public road network, where it may be deposited and then re-suspended by vehicles using the roads (IAQM 2014). Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM Guidance (IAQM 2014), as transcribed below:

- **Large**: > 50 HDV (> 3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100m;
- **Medium**: 10 to 50 HDV (> 3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m to 100m; and
- **Small**: < 10 HDV (> 3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50m.

The dust emission magnitude for the proposed trackout can be classified as large with more than 50 HDV outward movements in any one day during peak construction activity and with surface material with a moderate potential for dust release.

The sensitivity of the area is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 7.23, this will result in an overall high risk of temporary dust soiling impacts and an overall medium risk of temporary human health impacts as a result of the proposed trackout activities. In relation to ecological impact, as the receptor is of medium sensitivity, the risk associated with the proposed trackout is described as medium.

Overall, in order to ensure that no dust nuisance occurs during the trackout activities, a range of dust mitigation measures associated with a high risk of dust impacts must be implemented. When the dust mitigation measures detailed in the mitigation section of this Chapter are implemented, fugitive emissions of dust from the site will not have a significant impact at nearby receptors.

Table 7.23: Risk of Dust Impacts - Trackout

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

7.4.2.1.5 Summary of Potential Dust Impacts

The risk of dust impacts as a result of the Proposed Scheme are summarised in Table 7.24 for each activity. The magnitude of risk determined is used to prescribe the level of site specific mitigation required for each activity in order to prevent significant impacts occurring.

In accordance with the EPA Guidelines (EPA 2022) the impacts associated with the Construction Phase dust emissions pre-mitigation are overall Negative, Not Significant and Short-term.

Table 7.24: Summary of Dust Impact Risk Used to Define Site-Specific Mitigation

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

7.4.2.2 Construction Traffic Assessment

In addition to direct impacts from the construction works including Construction Compounds, there will also be the potential for air impacts from construction traffic along public roads.

A detailed analysis of construction traffic volumes has been conducted to determine the expected HDV movements required to transport the materials extracted and delivered to site. A total of 14 public roads have been identified as required construction access routes along which construction traffic will be permitted to travel. Whilst the overall construction period is forecast as 36 months, construction traffic movements are assumed to occur over a 12-month period along construction access roads accessing specific work zones as a worst-case. For national and regional roads serving multiple work zones, a construction period of 3 months has been assumed.

Traffic volumes for the base scenario are based on the 2024 Do Minimum flows projected along the local road network. These are AADT flows with percentage HGV. An additional 672 HDV vehicles per day associated with construction traffic along each road including construction deliveries and earthworks material haulage are added to the base traffic volumes. The estimated construction traffic volumes are based on the peak construction period volumes and are therefore a worst-case assumption. In reality the Proposed Scheme will be constructed in phases with lower volumes and the corridor of the Proposed Scheme will be used for a large bulk of construction delivery vehicles along its route.

In order to determine the potential air quality impacts associated with additional construction traffic on the identified construction access routes, a comparison between ambient air concentrations for the 2024 Do Minimum scenario and the 2024 Do Something (construction) scenario was carried out.

7.4.2.2.1 Do Minimum Scenario

The Do Minimum (DM) is a defined scenario within the traffic modelling exercise in Chapter 6 (Traffic & Transport) and is based on the likely conditions of the road network with all major committed transportation schemes in place that will impact on the use of public transport and private car, not including construction traffic associated with the Proposed Scheme. The output of this analysis and its impact on air quality has been modelled using AMDS-Roads for the Construction Year of 2024. Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24 hour PM_{10} limit value objective, at selected most impacted existing air quality sensitive receptors in the 2024 DM scenario are listed in Table 7.25. Locations of these receptors are shown in Figure 7.6 to Figure 7.8 in Volume 3 of this EIAR. Statistics for the full list of modelled receptors can be found in Table 2.1 in Appendix A7.1 in Volume 4 of this EIAR. 'Most impacted' refers to those receptors with non-negligible impacts due to the Construction Phase of the Proposed Scheme.

Table 7.25: Predicted 2024 Do Minimum Construction Pollutant Statistics At Most Impacted Receptor Locations

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (μg/m³)			No of PM_{10} days > 50 μg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ26	719861,728598	34.9	16.2	11.4	1
AQ27	719787,728598	32.0	15.9	11.1	1
AQ28	719757,728660	30.9	15.7	11.1	1
AQ31	719694,728907	34.6	16.3	11.4	1
AQ32	719739,729001	32.4	16.1	11.3	1
AQ35	719753,728811	35.2	16.5	11.5	1
AQ38	719770,728767	33.3	16.2	11.3	1
AQ42	719617,729334	35.5	16.4	11.5	1
AQ114	722453,725949	31.2	16.3	11.4	1
AQ115	722498,725919	30.2	16.1	11.2	1
AQ121	716610,732459	38.9	16.8	11.7	1
AQ131	716351,732738	42.3	16.7	11.7	1
AQ136	716373,732706	43.0	16.8	11.8	1
AQ141	716404,732715	49.8	17.8	12.4	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (μg/m³)			No of PM_{10} days > 50 μg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ142	716289,732756	36.5	16.3	11.4	1
AQ148	721405,726628	33.3	16.4	11.5	1
AQ151	721221,726808	31.0	16.0	11.2	1
AQ153	721016,726940	34.6	16.1	11.3	1
AQ156	721311,726708	34.7	16.7	11.6	1
AQ159	721280,726751	31.4	16.1	11.2	1
AQ160	721177,726845	30.8	15.9	11.2	1
AQ161	717176,731954	38.3	16.5	11.6	1
AQ162	717228,731951	39.0	16.4	11.5	1
AQ163	717176,731934	36.8	16.4	11.5	1
AQ167	717382,731761	41.4	16.4	11.5	1
AQ172	717393,731748	39.8	16.4	11.5	1
AQ179	716799,732376	40.3	16.4	11.4	1
AQ183	717727,731393	41.0	16.7	11.7	1
AQ184	717912,731226	39.3	17.4	12.1	1
AQ207	724058,723871	30.9	16.2	11.3	1
AQ219	724778,723045	37.2	17.5	12.1	1
AQ225	723800,724329	31.8	16.5	11.5	1
AQ226	720788,727080	34.5	16.2	11.3	1
AQ229	720720,727120	34.5	16.7	11.6	1
AQ233	721981,726266	31.1	16.0	11.2	1
AQ234	721923,726322	31.6	16.0	11.2	1
AQ238	721678,726463	33.9	16.4	11.5	1
AQ242	722041,726226	30.0	15.8	11.1	1
AQ244	720643,727171	30.0	15.9	11.1	1
AQ245	720527,727264	35.2	16.1	11.3	1
AQ246	720557,727235	30.9	15.8	11.1	1
AQ256	719158,729956	35.3	16.8	11.7	1
AQ257	718992,730135	33.0	16.2	11.3	1
AQ260	720355,727915	31.6	16.2	11.3	1
AQ266	720227,728250	34.4	16.1	11.3	1
AQ268	720051,728411	30.9	16.0	11.2	1
AQ269	720247,728118	31.9	15.8	11.1	1
AQ279	720402,727951	33.6	16.5	11.5	1
AQ300	715533,734232	40.1	16.4	11.5	1
AQ301	715632,734259	38.5	16.1	11.3	1
AQ302	715731,734294	37.1	16.0	11.3	1
AQ303	715810,734323	36.7	15.9	11.2	1
AQ304	715881,734354	40.0	16.1	11.3	1
AQ307	716045,734416	39.1	16.1	11.3	1
AQ308	716093,734426	38.0	15.9	11.2	1
AQ309	716159,734438	41.6	16.4	11.5	1
AQ311	716190,734228	46.3	17.1	11.9	1
AQ312	716174,734238	42.4	16.5	11.6	1
AQ322	715087,733873	41.5	16.9	11.8	1
AQ323	715064,733810	44.2	17.5	12.1	1
AQ325	715064,733764	53.8	18.3	12.7	2

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ333	715479,733425	38.4	16.4	11.5	1
AQ334	715495,733400	37.6	16.4	11.4	1
AQ335	715479,733323	36.4	15.9	11.2	1
AQ336	715511,733317	39.7	16.3	11.4	1
AQ347	715549,732943	35.6	15.8	11.0	1
AQ349	716382,734156	41.6	16.9	11.8	1
AQ350	716590,734091	48.8	17.4	12.2	1
AQ351	716579,734071	48.5	17.3	12.1	1
AQ352	716553,734103	43.3	17.2	12.0	1
AQ358	716900,733998	36.7	15.9	11.2	1
AQ359	716507,733823	37.3	16.1	11.3	1
AQ361	716489,733837	38.5	16.2	11.3	1
AQ362	716503,733755	40.5	16.6	11.6	1
AQ363	716469,733752	37.0	16.1	11.3	1
AQ380	715505,733367	40.3	16.5	11.5	1
AQ381	715539,733353	37.5	16.2	11.3	1
AQ395	716603,733291	44.4	16.4	11.5	1
AQ399	716626,733276	37.8	15.9	11.2	1
AQ402	716857,732973	39.6	16.3	11.4	1
AQ403	716871,732953	36.6	16.0	11.3	1
AQ404	716897,732967	39.4	16.4	11.5	1
AQ417	716922,732258	36.2	15.9	11.2	1
AQ431	717756,732518	43.0	16.9	11.8	1
AQ432	717741,732531	48.1	17.7	12.3	1
AQ434	717786,732489	56.5	19.0	13.2	2
AQ435	717896,732423	39.5	16.5	11.6	1
AQ437	717871,732437	41.9	16.8	11.8	1
AQ445	717849,731391	40.3	17.0	11.8	1
AQ478	715620,732773	38.3	16.0	11.2	1
AQ480	715661,732801	38.7	16.2	11.3	1
AQ481	715658,732784	37.9	16.1	11.3	1
AQ482	715704,732811	38.6	16.2	11.3	1
AQ485	715593,732687	36.8	15.7	11.0	1
AQ488	715607,732475	38.3	16.3	11.3	1
AQ517	715231,734014	41.4	16.5	11.2	1
AQ518	715232,733995	38.1	16.1	11.0	1
AQ519	715449,734204	38.8	16.3	11.4	1
AQ520	715583,734245	39.2	16.2	11.4	1
AQ521	716610,734148	38.3	16.1	11.3	1
AQ523	716669,734066	36.4	16.1	11.3	1
AQ528	716366,733393	36.7	16.1	11.3	1
AQ531	715888,732519	39.5	16.6	11.0	1
AQ539	715629,732460	38.1	16.2	11.2	1
AQ557	716265,732673	38.0	16.7	11.7	1
AQ640	719382,729591	30.3	15.4	10.9	<1
AQ645	719530,729570	34.2	16.0	11.2	1
AQ646	719482,729634	32.2	15.8	11.1	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ725	720367,727782	30.7	16.0	11.2	1
AQ877	724796,721639	37.4	17.1	11.9	1
AQ878	724816,721595	37.5	17.1	11.9	1
AQ886	725000,721015	37.1	16.9	11.8	1
AQ888	724992,720912	39.4	17.3	12.1	1
AQ892	725333,719407	38.0	17.1	11.9	1
AQ988	716595,734109	43.3	16.7	11.7	1
AQ989	716600,734087	45.4	17.0	11.9	1
AQ990	716605,734086	44.0	16.8	11.8	1
AQ1017	716112,733110	34.9	15.5	10.9	1
AQ1019	716241,733063	32.5	15.3	10.8	<1
AQ1020	717751,731356	38.5	16.1	11.3	1
AQ1031	724097,723816	31.1	16.3	11.4	1
AQ1038	716189,734185	38.6	16.2	11.4	1
AQ1039	716415,734126	42.9	17.0	11.9	1
AQ1040	716552,734074	48.0	17.5	12.2	1
AQ1041	716471,733872	41.5	16.6	11.6	1
AQ1044	716468,733842	37.6	16.0	11.2	1
AQ1062	716314,732770	37.3	16.2	11.3	1
AQ18	719660,729223	36.8	16.5	11.5	1
AQ19	719670,729181	36.2	16.7	11.7	1
AQ24	719894,728543	37.0	16.6	11.6	1
AQ34	719748,728862	36.3	16.6	11.6	1
AQ130	716188,732996	38.8	15.9	11.2	1
AQ139	716221,732991	39.8	16.4	11.5	1
AQ145	721499,726534	37.9	17.3	12.0	1
AQ154	721068,726904	40.1	17.3	12.0	1
AQ157	721352,726667	36.0	16.9	11.8	1
AQ181	716885,732329	47.9	17.0	11.9	1
AQ182	717602,731574	42.6	16.5	11.5	1
AQ228	720823,727056	39.2	16.9	11.8	1
AQ239	721867,726375	37.4	16.5	11.6	1
AQ240	721756,726432	39.4	16.7	11.7	1
AQ248	718458,730750	39.4	17.1	11.9	1
AQ258	720380,728005	38.3	17.1	11.9	1
AQ261	720354,728075	41.8	17.2	12.0	1
AQ265	720249,728221	36.5	16.3	11.4	1
AQ271	717500,731661	39.5	16.5	11.6	1
AQ282	720411,727837	36.8	17.3	12.0	1
AQ305	715927,734354	38.7	15.8	11.1	1
AQ306	715983,734395	43.5	16.5	11.5	1
AQ310	716174,734267	45.8	16.7	11.7	1
AQ313	715613,734057	40.6	15.9	11.2	1
AQ314	715699,734064	38.6	15.8	11.1	1
AQ315	715711,734063	37.8	15.8	11.1	1
AQ316	715769,734071	36.5	15.6	11.0	1
AQ317	715787,734104	42.0	16.1	11.3	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ318	715568,734073	44.2	16.4	11.5	1
AQ319	715561,734050	40.3	15.9	11.2	1
AQ320	715196,734002	40.9	16.4	11.1	1
AQ321	715202,733985	43.9	16.7	11.3	1
AQ368	716611,733248	36.3	15.8	11.1	1
AQ475	715564,732759	41.1	15.9	11.1	1
AQ477	715594,732766	42.8	16.2	11.3	1
AQ479	715623,732794	39.8	16.2	11.3	1
AQ484	715599,732706	36.4	15.6	10.9	1
AQ495	716176,733475	42.7	16.5	11.4	1
AQ496	716191,733435	41.5	16.4	11.5	1
AQ497	716173,733398	42.3	16.5	11.6	1
AQ498	716165,733378	39.7	16.2	11.4	1
AQ1008	716170,733029	39.5	15.7	11.0	1
AQ1026	719608,729357	38.1	16.9	11.8	1
AQ23	719700,729075	40.0	17.7	12.2	1
AQ129	716210,733007	47.6	16.8	11.7	1
AQ143	716074,733164	43.2	16.0	11.2	1
AQ144	716087,733189	45.8	16.5	11.5	1
AQ267	719943,728492	40.5	17.4	12.0	1
AQ275	720403,727731	40.9	17.9	12.4	2
AQ474	715556,732792	49.0	16.6	11.4	1
AQ476	715582,732763	45.6	16.3	11.3	1
AQ1013	716054,733178	43.1	16.0	11.3	1
AQ1014	716089,733214	46.3	16.4	11.5	1
AQ1015	716181,733050	46.1	16.2	11.3	1
Air Quality Limit Value Objective		**40**	**40**	**25**	**35**

In the 2024 DM annual mean concentrations of NO_2 are above the relevant national air quality limit value objective in some areas; 62 exceedances were modelled at receptors on the M11 at Junction 5, N11 Stillorgan Road, R105 Burgh Quay, R110 Kevin Street Lower, R114 Aungier Street / Richmond Street South, R137 College Green / Dame Street / Lord Edward Street / Nicholas Street, R138 Donnybrook Road / Leeson Street Upper / Leeson Street Lower / Lincoln Place / Morehampton Road / Stillorgan Road / St. Stephen's Green, R148 Aston Quay / Wellington Quay, R802 Pearse Street / Tara Street, R811 Harcourt Road / Adelaide Road, R814 Lombard Street East, R816 Baggot Street Lower / Pembroke Road and R824 Ailesbury Road. Concentrations at all receptors with exceedances can be found in Table 2.1 in Appendix A7.1 in Volume 4 of this EIAR. Some of these receptors have been excluded from this section as these locations experience a negligible impact due to the Proposed Scheme and are therefore not considered a most impacted receptor. Annual mean NO_2 concentrations did not exceed 60µg/m^3, indicating that exceedances of the NO_2 1-hour mean are unlikely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality limit value objective for all modelled receptors. At all receptors, modelling of the maximum 24-hour PM_{10} concentration indicated that there is likely to be no more than two exceedances of the 50µg/m^3 ambient limit value compared to the threshold which allows 35 daily exceedances in any one calendar year. Annual mean $PM_{2.5}$ concentrations are also below the relevant national air quality limit value objective for all modelled receptors.

7.4.2.2.2 Do Something Scenario

The Do Something (DS) is a defined scenario within the traffic modelling analysis in Chapter 6 (Traffic & Transport) and is based on the likely conditions of the road network with all major committed transportation schemes in place that will impact on the use of public transport and private car, including the construction traffic associated with the

Proposed Scheme. The output of this analysis and its impact on air quality has been modelled using AMDS-Roads for the Construction Year of 2024 in line with the methodology set out in Section 7.2.4.1. Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24 hour PM_{10} limit value objective, at selected most impacted existing air quality sensitive receptors in the 2024 DS scenario are listed in Table 7.26. Locations of these receptors are shown in Figure 7.6 to Figure 7.8, Volume 3 of this EIAR. Statistics for the full list of modelled receptors can be found in Table 2.2 in Appendix A7.1 in Volume 4 of this EIAR. 'Most impacted' refers to those receptors with non-negligible impacts due to the Construction Phase of the Proposed Scheme.

Table 7.26: Predicted 2024 Do Something Construction Scenario Pollutant Statistics at Most Impacted Receptor Locations

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ22	714911,733502	32.3	15.9	10.9	1
AQ26	719861,728598	29.5	15.4	10.8	<1
AQ27	719787,728598	29.5	15.4	10.9	<1
AQ28	719757,728660	27.4	15.0	10.7	<1
AQ31	719694,728907	29.6	15.4	10.9	<1
AQ32	719739,729001	29.5	15.4	10.8	<1
AQ35	719753,728811	29.7	15.5	10.9	1
AQ38	719770,728767	28.5	15.3	10.8	<1
AQ42	719617,729334	31.1	15.8	11.1	1
AQ114	722453,725949	28.0	15.7	11.0	1
AQ115	722498,725919	27.3	15.5	10.9	1
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AQ131	716351,732738	41.0	16.7	11.7	1
AQ136	716373,732706	41.6	16.8	11.8	1
AQ141	716404,732715	48.1	17.7	12.4	1
AQ142	716289,732756	35.3	16.3	11.4	1
AQ148	721405,726628	30.6	16.0	11.2	1
AQ151	721221,726808	28.9	15.7	11.0	1
AQ153	721016,726940	31.4	15.8	11.1	1
AQ156	721311,726708	31.8	16.3	11.4	1
AQ159	721280,726751	29.2	15.7	11.0	1
AQ160	721177,726845	28.8	15.6	11.0	1
AQ161	717176,731954	37.2	16.4	11.5	1
AQ162	717228,731951	37.1	16.2	11.4	1
AQ163	717176,731934	36.2	16.3	11.4	1
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AQ172	717393,731748	38.0	16.2	11.4	1
AQ179	716799,732376	38.7	16.4	11.5	1
AQ183	717727,731393	39.0	16.6	11.6	1
AQ184	717912,731226	37.7	17.3	12.0	1
AQ207	724058,723871	28.5	15.8	11.1	1
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AQ226	720788,727080	30.7	15.7	11.0	1
AQ229	720720,727120	30.6	16.0	11.2	1
AQ233	721981,726266	28.5	15.6	10.9	1
AQ234	721923,726322	28.8	15.5	10.9	1
AQ238	721678,726463	31.2	16.0	11.2	1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ242	722041,726226	27.9	15.4	10.8	<1
AQ244	720643,727171	27.4	15.4	10.8	<1
AQ245	720527,727264	31.8	15.6	11.0	1
AQ246	720557,727235	28.2	15.4	10.8	<1
AQ256	719158,729956	32.5	16.4	11.4	1
AQ257	718992,730135	30.4	15.9	11.1	1
AQ260	720355,727915	28.9	15.7	11.0	1
AQ266	720227,728250	30.0	15.2	10.7	<1
AQ268	720051,728411	26.0	15.1	10.7	<1
AQ269	720247,728118	28.7	15.2	10.7	<1
AQ279	720402,727951	30.0	15.9	11.1	1
AQ300	715533,734232	38.7	16.4	11.5	1
AQ301	715632,734259	37.0	16.1	11.3	1
AQ302	715731,734294	35.7	16.0	11.3	1
AQ303	715810,734323	35.2	15.9	11.2	1
AQ304	715881,734354	38.1	16.1	11.3	1
AQ307	716045,734416	37.3	16.1	11.3	1
AQ308	716093,734426	36.4	15.9	11.2	1
AQ309	716159,734438	39.9	16.4	11.5	1
AQ311	716190,734228	44.5	17.1	11.9	1
AQ312	716174,734238	40.6	16.5	11.6	1
AQ322	715087,733873	40.2	16.8	11.8	1
AQ323	715064,733810	42.9	17.4	12.2	1
AQ325	715064,733764	51.9	18.3	12.7	2
AQ333	715479,733425	37.1	16.4	11.5	1
AQ334	715495,733400	36.3	16.4	11.5	1
AQ335	715479,733323	35.5	15.9	11.2	1
AQ336	715511,733317	38.4	16.3	11.4	1
AQ347	715549,732943	33.6	15.8	11.1	1
AQ349	716382,734156	40.4	16.9	11.8	1
AQ350	716590,734091	47.6	17.4	12.2	1
AQ351	716579,734071	47.1	17.3	12.1	1
AQ352	716553,734103	42.2	17.2	12.0	1
AQ358	716900,733998	35.5	15.9	11.2	1
AQ359	716507,733823	36.1	16.0	11.3	1
AQ361	716489,733837	37.1	16.1	11.4	1
AQ362	716503,733755	39.0	16.6	11.6	1
AQ363	716469,733752	35.6	16.1	11.3	1
AQ380	715505,733367	39.0	16.5	11.6	1
AQ381	715539,733353	36.4	16.1	11.4	1
AQ395	716603,733291	42.6	16.4	11.7	1
AQ399	716626,733276	36.0	15.9	11.3	1
AQ402	716857,732973	38.5	16.3	11.9	1
AQ403	716871,732953	35.6	16.0	11.7	1
AQ404	716897,732967	38.4	16.4	12.0	1
AQ417	716922,732258	34.6	15.8	11.2	1
AQ431	717756,732518	42.2	16.9	11.9	1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ432	717741,732531	46.9	17.7	12.4	1
AQ434	717786,732489	55.7	18.9	13.2	2
AQ435	717896,732423	38.6	16.5	11.6	1
AQ437	717871,732437	41.1	16.8	11.8	1
AQ445	717849,731391	39.3	16.9	11.8	1
AQ478	715620,732773	36.3	16.0	11.3	1
AQ480	715661,732801	37.2	16.2	11.4	1
AQ481	715658,732784	36.4	16.1	11.3	1
AQ482	715704,732811	37.3	16.2	11.4	1
AQ485	715593,732687	35.3	15.8	11.1	1
AQ488	715607,732475	37.4	16.3	11.4	1
AQ517	715231,734014	39.6	16.5	11.6	1
AQ518	715232,733995	36.4	16.1	11.3	1
AQ519	715449,734204	37.6	16.3	11.4	1
AQ520	715583,734245	37.8	16.2	11.4	1
AQ521	716610,734148	37.5	16.1	11.3	1
AQ523	716669,734066	35.7	16.1	11.3	1
AQ528	716366,733393	35.6	16.1	11.3	1
AQ531	715888,732519	38.5	16.5	11.6	1
AQ539	715629,732460	37.3	16.3	11.4	1
AQ557	716265,732673	37.1	16.7	11.7	1
AQ640	719382,729591	27.9	15.2	10.7	<1
AQ645	719530,729570	30.5	15.5	10.9	1
AQ646	719482,729634	28.8	15.4	10.8	<1
AQ725	720367,727782	28.3	15.6	11.0	1
AQ877	724796,721639	37.0	17.1	11.9	1
AQ878	724816,721595	37.1	17.1	11.9	1
AQ886	725000,721015	36.6	16.9	11.8	1
AQ888	724992,720912	38.8	17.4	12.1	1
AQ892	725333,719407	37.6	17.3	12.0	1
AQ988	716595,734109	42.3	16.7	11.7	1
AQ989	716600,734087	44.4	17.0	11.9	1
AQ990	716605,734086	42.9	16.8	11.8	1
AQ1017	716112,733110	31.7	15.5	10.9	1
AQ1019	716241,733063	30.0	15.3	10.8	<1
AQ1020	717751,731356	37.1	16.1	11.3	1
AQ1031	724097,723816	28.6	15.8	11.1	1
AQ1038	716189,734185	37.1	16.2	11.4	1
AQ1039	716415,734126	41.7	17.0	11.9	1
AQ1040	716552,734074	46.7	17.5	12.2	1
AQ1041	716471,733872	39.8	16.6	11.6	1
AQ1044	716468,733842	36.1	16.0	11.2	1
AQ1062	716314,732770	36.4	16.1	11.4	1
AQ18	719660,729223	33.2	15.8	11.1	1
AQ19	719670,729181	33.3	15.9	11.2	1
AQ24	719894,728543	30.0	15.5	10.9	1
AQ34	719748,728862	30.8	15.6	11.0	1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (μg/m^3)			No of PM_{10} days > 50 μg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ130	716188,732996	34.8	15.9	11.2	1
AQ139	716221,732991	36.8	16.3	11.5	1
AQ145	721499,726534	34.3	16.8	11.7	1
AQ154	721068,726904	37.2	16.9	11.8	1
AQ157	721352,726667	32.8	16.5	11.5	1
AQ181	716885,732329	45.8	17.0	11.9	1
AQ182	717602,731574	39.8	16.3	11.5	1
AQ228	720823,727056	34.3	16.2	11.4	1
AQ239	721867,726375	34.2	16.1	11.3	1
AQ240	721756,726432	35.1	16.2	11.4	1
AQ248	718458,730750	36.3	16.7	11.7	1
AQ258	720380,728005	34.3	16.3	11.4	1
AQ261	720354,728075	38.4	16.4	11.5	1
AQ265	720249,728221	31.5	15.3	10.8	<1
AQ271	717500,731661	37.2	16.3	11.5	1
AQ282	720411,727837	32.1	16.4	11.4	1
AQ305	715927,734354	36.6	15.8	11.1	1
AQ306	715983,734395	41.2	16.5	11.6	1
AQ310	716174,734267	43.3	16.7	11.7	1
AQ313	715613,734057	37.7	15.9	11.2	1
AQ314	715699,734064	36.0	15.8	11.1	1
AQ315	715711,734063	35.4	15.8	11.1	1
AQ316	715769,734071	34.0	15.6	11.0	1
AQ317	715787,734104	38.6	16.1	11.3	1
AQ318	715568,734073	41.0	16.4	11.5	1
AQ319	715561,734050	37.4	15.9	11.2	1
AQ320	715196,734002	38.8	16.4	11.5	1
AQ321	715202,733985	41.2	16.7	11.7	1
AQ368	716611,733248	34.3	15.8	11.4	1
AQ475	715564,732759	37.7	15.9	11.2	1
AQ477	715594,732766	39.7	16.2	11.4	1
AQ479	715623,732794	37.6	16.2	11.4	1
AQ484	715599,732706	34.4	15.6	11.0	1
AQ495	716176,733475	40.5	16.5	11.6	1
AQ496	716191,733435	39.1	16.4	11.5	1
AQ497	716173,733398	39.9	16.5	11.6	1
AQ498	716165,733378	37.6	16.2	11.4	1
AQ1008	716170,733029	33.5	15.7	11.1	1
AQ1026	719608,729357	32.9	16.1	11.3	1
AQ23	719700,729075	35.5	16.3	11.4	1
AQ129	716210,733007	40.8	16.7	11.7	1
AQ143	716074,733164	35.6	16.0	11.2	1
AQ144	716087,733189	39.8	16.4	11.5	1
AQ267	719943,728492	31.8	15.9	11.1	1
AQ275	720403,727731	35.4	17.0	11.8	1
AQ474	715556,732792	44.2	16.6	11.7	1
AQ476	715582,732763	41.4	16.3	11.5	1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ1013	716054,733178	36.6	16.0	11.3	1
AQ1014	716089,733214	40.7	16.4	11.5	1
AQ1015	716181,733050	37.4	16.2	11.4	1
Air Quality Limit Value Objective		**40**	**40**	**25**	**35**

In the 2024 DS scenario, annual mean concentrations of NO_2 are above the relevant national air quality limit value objective in some areas; 35 exceedances were modelled at receptors on the M11 at Junction 5, N11 Stillorgan Road, R105 Burgh Quay, R114 Aungier Street / Richmond Street South, R118 Pembroke Road, R137 Dame Street / Lord Edward Street / Nicholas Street, R138 Leeson Street Upper / Leeson Street Lower / St. Stephen's Green, R148 Wellington Quay, R802 Pearse Street / Tara Street, R811 Harcourt Road / Adelaide Road, R814 Lombard Street East and R816 Baggot Street Lower. This is a decrease from 62 exceedances modelled in the DM scenario. Concentrations at all receptors with exceedances can be found in Table 2.2 in Appendix A7.1 in Volume 4 of this EIAR. Some of these receptors have been excluded from this section as these locations experience a negligible impact due to the Proposed Scheme and are therefore not considered a most impacted receptor. Annual mean NO_2 concentrations did not exceed 60µg/m^3, indicating that exceedances of the NO_2 1-hour mean are unlikely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality limit value objectives for all modelled receptors. At all receptors, modelling of the maximum 24-hour PM_{10} concentration indicated that there is likely to be no more than two exceedances of the 50µg/m^3 ambient limit value compared to the threshold which allows 35 daily exceedances in any one calendar year. Annual mean $PM_{2.5}$ concentrations are also below the relevant national air quality limit value objectives for all modelled receptors.

7.4.2.2.3 Comparison of Do Something with Do Minimum

Table 7.27 provides the predicted change in and impact on pollutant concentrations, between the DM and DS in 2024. Statistics for the full list of modelled receptors can be found in Table 2.3 in Appendix A7.1 in Volume 4 of this EIAR. 'Most impacted' refers to those receptors with non-negligible impacts due to the Construction Phase of the Scheme.

Table 7.27: Predicted Changes in 2024 Construction DM and DS and Impact Significance Criteria at Most Impacted Receptor Locations

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m^3)			Change in No of PM_{10} days > 50 µg/m^3	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ26	719861,728598	-5.4	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ27	719787,728598	-2.5	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ28	719757,728660	-3.5	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ31	719694,728907	-5.0	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ32	719739,729001	-2.8	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ35	719753,728811	-5.5	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ38	719770,728767	-4.8	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ42	719617,729334	-4.5	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ114	722453,725949	-3.1	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ115	722498,725919	-2.8	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ121	716610,732459	-1.2	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ131	716351,732738	-1.3	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ136	716373,732706	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ141	716404,732715	-1.7	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ142	716289,732756	-1.1	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ148	721405,726628	-2.6	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ151	721221,726808	-2.1	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ153	721016,726940	-3.2	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50 µg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ156	721311,726708	-2.9	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ159	721280,726751	-2.2	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ160	721177,726845	-2.0	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ161	717176,731954	-1.1	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ162	717228,731951	-1.8	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ163	717176,731934	-0.6	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ167	717382,731761	-1.6	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ172	717393,731748	-1.8	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ179	716799,732376	-1.5	<0.1	0.1	<1	Slight Beneficial	Negligible	Negligible
AQ183	717727,731393	-2.0	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ184	717912,731226	-1.6	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ207	724058,723871	-2.5	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ219	724778,723045	-1.8	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ225	723800,724329	-2.9	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ226	720788,727080	-3.8	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ229	720720,727120	-3.9	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ233	721981,726266	-2.7	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ234	721923,726322	-2.7	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ238	721678,726463	-2.7	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ242	722041,726226	-2.1	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ244	720643,727171	-2.6	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ245	720527,727264	-3.4	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ246	720557,727235	-2.7	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ256	719158,729956	-2.7	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ257	718992,730135	-2.6	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ260	720355,727915	-2.7	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ266	720227,728250	-4.4	-0.9	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ268	720051,728411	-4.8	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ269	720247,728118	-3.2	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ279	720402,727951	-3.6	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ300	715533,734232	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ301	715632,734259	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ302	715731,734294	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ303	715810,734323	-1.5	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ304	715881,734354	-1.9	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ307	716045,734416	-1.8	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ308	716093,734426	-1.6	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ309	716159,734438	-1.6	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ311	716190,734228	-1.8	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ312	716174,734238	-1.9	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ322	715087,733873	-1.3	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ323	715064,733810	-1.3	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ325	715064,733764	-1.9	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ333	715479,733425	-1.3	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ334	715495,733400	-1.2	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ335	715479,733323	-0.9	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ336	715511,733317	-1.3	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ347	715549,732943	-2.0	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m^3)			Change in No of PM_{10} days > 50 µg/m^3	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ349	716382,734156	-1.2	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ350	716590,734091	-1.2	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ351	716579,734071	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ352	716553,734103	-1.1	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ358	716900,733998	-1.2	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ359	716507,733823	-1.3	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ361	716489,733837	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ362	716503,733755	-1.5	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ363	716469,733752	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ380	715505,733367	-1.3	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ381	715539,733353	-1.2	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ395	716603,733291	-1.8	<0.1	0.1	<1	Slight Beneficial	Negligible	Negligible
AQ399	716626,733276	-1.8	<0.1	0.1	<1	Slight Beneficial	Negligible	Negligible
AQ402	716857,732973	-1.1	<0.1	0.4	<1	Slight Beneficial	Negligible	Negligible
AQ403	716871,732953	-0.9	<0.1	0.5	<1	Slight Beneficial	Negligible	Negligible
AQ404	716897,732967	-1.0	<0.1	0.5	<1	Slight Beneficial	Negligible	Negligible
AQ417	716922,732258	-1.6	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ431	717756,732518	-0.8	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ432	717741,732531	-1.2	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ434	717786,732489	-0.8	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ435	717896,732423	-0.9	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ437	717871,732437	-0.8	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ445	717849,731391	-1.1	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ478	715620,732773	-2.0	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ480	715661,732801	-1.5	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ481	715658,732784	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ482	715704,732811	-1.3	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ485	715593,732687	-1.5	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ488	715607,732475	-0.9	<0.1	0.2	<1	Slight Beneficial	Negligible	Negligible
AQ517	715231,734014	-1.9	<0.1	0.4	<1	Slight Beneficial	Negligible	Negligible
AQ518	715232,733995	-1.7	<0.1	0.3	<1	Slight Beneficial	Negligible	Negligible
AQ519	715449,734204	-1.2	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ520	715583,734245	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ521	716610,734148	-0.8	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ523	716669,734066	-0.8	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ528	716366,733393	-1.1	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ531	715888,732519	-1.1	<0.1	0.6	<1	Slight Beneficial	Negligible	Negligible
AQ539	715629,732460	-0.8	<0.1	0.2	<1	Slight Beneficial	Negligible	Negligible
AQ557	716265,732673	-0.9	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ640	719382,729591	-2.5	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ645	719530,729570	-3.7	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ646	719482,729634	-3.3	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ725	720367,727782	-2.3	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ877	724796,721639	-0.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ878	724816,721595	-0.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ886	725000,721015	-0.5	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ888	724992,720912	-0.6	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ892	725333,719407	-0.4	0.2	<0.1	<1	Slight Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50 µg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ988	716595,734109	-1.0	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ989	716600,734087	-1.1	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ990	716605,734086	-1.0	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1017	716112,733110	-3.2	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1019	716241,733063	-2.5	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1020	717751,731356	-1.4	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1031	724097,723816	-2.5	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ1038	716189,734185	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1039	716415,734126	-1.2	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1040	716552,734074	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1041	716471,733872	-1.7	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1044	716468,733842	-1.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1062	716314,732770	-0.9	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ18	719660,729223	-3.5	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ19	719670,729181	-2.9	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ24	719894,728543	-7.0	-1.1	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ34	719748,728862	-5.4	-1.0	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ130	716188,732996	-4.0	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ139	716221,732991	-3.0	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ145	721499,726534	-3.6	-0.6	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ154	721068,726904	-2.9	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ157	721352,726667	-3.2	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ181	716885,732329	-2.0	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ182	717602,731574	-2.8	-0.2	-0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ228	720823,727056	-4.9	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ239	721867,726375	-3.2	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ240	721756,726432	-4.3	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ248	718458,730750	-3.1	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ258	720380,728005	-4.0	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ261	720354,728075	-3.4	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ265	720249,728221	-5.0	-1.0	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ271	717500,731661	-2.3	-0.2	-0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ282	720411,727837	-4.7	-0.9	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ305	715927,734354	-2.1	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ306	715983,734395	-2.3	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ310	716174,734267	-2.5	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ313	715613,734057	-2.9	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ314	715699,734064	-2.5	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ315	715711,734063	-2.4	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ316	715769,734071	-2.5	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ317	715787,734104	-3.4	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ318	715568,734073	-3.3	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ319	715561,734050	-2.9	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ320	715196,734002	-2.1	<0.1	0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ321	715202,733985	-2.7	<0.1	0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ368	716611,733248	-2.0	<0.1	0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ475	715564,732759	-3.4	<0.1	0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ477	715594,732766	-3.1	<0.1	0.1	<1	Moderate Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50 µg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ479	715623,732794	-2.2	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ484	715599,732706	-2.0	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ495	716176,733475	-2.2	<0.1	0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ496	716191,733435	-2.4	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ497	716173,733398	-2.4	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ498	716165,733378	-2.1	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ1008	716170,733029	-6.0	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ1026	719608,729357	-5.3	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ23	719700,729075	-4.4	-1.3	-0.8	<1	Substantial Beneficial	Negligible	Negligible
AQ129	716210,733007	-6.8	<0.1	<0.1	<1	Substantial Beneficial	Negligible	Negligible
AQ143	716074,733164	-7.6	<0.1	<0.1	<1	Substantial Beneficial	Negligible	Negligible
AQ144	716087,733189	-6.1	<0.1	<0.1	<1	Substantial Beneficial	Negligible	Negligible
AQ267	719943,728492	-8.7	-1.5	-0.9	<1	Substantial Beneficial	Negligible	Negligible
AQ275	720403,727731	-5.5	-1.0	-0.6	-1	Substantial Beneficial	Negligible	Negligible
AQ474	715556,732792	-4.8	<0.1	0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ476	715582,732763	-4.2	<0.1	0.1	<1	Substantial Beneficial	Negligible	Negligible
AQ1013	716054,733178	-6.6	<0.1	<0.1	<1	Substantial Beneficial	Negligible	Negligible
AQ1014	716089,733214	-5.6	<0.1	<0.1	<1	Substantial Beneficial	Negligible	Negligible
AQ1015	716181,733050	-8.8	<0.1	<0.1	<1	Substantial Beneficial	Negligible	Negligible

The significance of the changes in the concentration of each of the ambient receptors has been determined in the context of the TII Air Quality Guidelines (TII 2011). As shown in Table 7.27, Figure 7.6 in Volume 3 of this EIAR and Table 2.3 in Appendix A7.1 in Volume 4 of this EIAR, the majority of modelled receptors are estimated to experience a negligible impact due to the Proposed Scheme in terms of the annual mean NO_2 concentration. A slightly beneficial impact is estimated at 129 receptors, a moderate beneficial impact at 43 receptors and substantial beneficial impacts are expected at 11 receptors. All beneficial impacts are modelled along the Proposed Scheme due to the diversion of traffic off these routes. As shown in Table 7.27 and Figure 7.7 in Volume 3 of this EIAR the Proposed Scheme will be overall neutral in terms of annual mean PM_{10} concentrations, with all receptors experiencing a negligible impact. As shown in Table 7.27 and Figure 7.8 in Volume 3 of this EIAR the Proposed Scheme will be overall neutral in terms of the annual mean $PM_{2.5}$ concentration with all receptors experiencing a negligible impact.

In accordance with the EPA Guidelines (EPA 2022) the impacts associated with the Construction Phase traffic emissions are overall Neutral and Short-Term.

7.4.2.2.4 Ecological Assessment

An assessment of the impact of the Proposed Scheme has been undertaken using the approach outlined in the IAQM Guidance document A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1) (IAQM 2020). The guidance states that where the PEC is less than 70% of the long-term critical level / load, the process contribution is likely to be insignificant. Where the process contribution is greater than 1% of the critical level / load it is recommended that the project ecologist be consulted.

The impact of the Proposed Scheme on the nearby ecologically sensitive areas within 200m of roads impacted by the Proposed Scheme, as defined in Section 7.2.4.1, is outlined in Table 7.28. The annual mean NO_X concentration has been compared to the critical level of 30µg/m³ at each of the designated habitat sites. All sites exceed the critical level for NO_X in both the DM and the DS scenarios.

Nitrogen deposition levels have been compared to the lower and higher critical loads for the designated habitat sites in Table 7.29. All sites are below the lower critical load for the designated habitat site, with the exception of the Grand Canal pNHA (Baggot St Bridge, Charlemont Bridge, Haddington Road, La Touche Bridge and Leeson Bridge).

In accordance with the EPA Guidelines (EPA 2022) the ecological impacts associated with the Construction Phase traffic emissions are overall Negative, Slight and Long-term.

Table 7.28: Significance of Impacts at Key Ecological Receptors (NO_X Annual Mean Concentration In 2024)

Annual Mean NO_X In 2024 At Closest Point Within Ecological Site To Road							
Receptor	Receptor Location (ITM)	Do Minimum (µg/m³)	Distance from road beyond which concentration is below critical level (30 µg/m³) (m)	Do Something (µg/m³)	Distance from road beyond which concentration is below critical level (30 µg/m³) (m)	Impact (DS – DM) (µg/m³)	Change as a percentage of critical level (30 µg/m³) (%)
Booterstown Marsh pNHA (Rock Road)	720171, 730286	52.7	>200m	54.8	>200m	2.1	7%
Grand Canal pNHA (Baggot St Bridge, western side)	716851, 732986	85.6	>200m	85.1	>200m	-0.5	-2%
Grand Canal pNHA (Baggot St Bridge, eastern side)	716866, 732989	127.8	>200m	127.1	>200m	-0.7	-2%
Grand Canal pNHA (Canal Road)	715821, 732513	88.8	>200m	88.8	>200m	0.0	0%
Grand Canal pNHA (Charlemont Bridge, western side)	715881, 732544	83.5	>200m	83.0	>200m	-0.5	-2%
Grand Canal pNHA (Charlemont Bridge, eastern side)	715894, 732549	104.3	>200m	103.3	>200m	-0.9	-3%
Grand Canal pNHA (Charlemont Mall)	715672, 732497	71.3	>200m	71.3	>200m	0.0	0%
Grand Canal pNHA (Cheltenham Road)	716863, 733129	32.7	>200m	32.7	>200m	0.0	0%
Grand Canal pNHA (Dartmouth Walk)	716126, 732631	62.7	>200m	62.7	>200m	0.0	0%
Grand Canal pNHA (Haddington Road)	716883, 732978	111.7	>200m	111.2	>200m	-0.5	-2%
Grand Canal pNHA (Huband Bridge, north side)	717062, 733223	40.0	>200m	39.8	>200m	-0.2	-1%
Grand Canal pNHA (Huband Bridge, south side)	717057, 733217	36.7	>200m	36.6	>200m	-0.1	0%
Grand Canal pNHA (La Touche Bridge, western side)	715609, 732499	105.4	>200m	106.3	>200m	0.9	3%
Grand Canal pNHA (La Touche Bridge, eastern side)	715621, 732500	128.7	>200m	130.4	>200m	1.6	5%
Grand Canal pNHA (Leeson Bridge, western side)	716368, 732736	115.6	>200m	114.2	>200m	-1.4	-5%
Grand Canal pNHA (Leeson Bridge, eastern side)	716382, 732741	154.1	>200m	151.8	>200m	-2.3	-8%
Grand Canal pNHA (Percy Place, northern end)	717137, 733286	34.7	>200m	34.7	>200m	-0.1	0%
Grand Canal pNHA (Percy Place, southern end)	716948, 733044	38.9	>200m	38.8	>200m	-0.1	0%
Loughlinstown Wood pNHA (Bray Road)	724496, 723292	65.5	>200m	64.0	>200m	-1.5	-5%
Loughlinstown Wood pNHA (Commons Road)	725024, 723001	35.6	160m	35.2	200m	-0.4	-1%

Table 7.29: Significance of Impacts at Key Ecological Receptors (N Deposition In 2024)

Annual Mean N Deposition In 2024 At Closest Point Within Ecological Site To Road									
Receptor	**Receptor Location (ITM)**	**Lower critical load for most sensitive feature (kgN/ha/yr)**	**Do Minimum (kgN/ha/yr)**	**Distance from road beyond which deposition is below critical load (m)**	**Do Something (kgN/ha/yr)**	**Distance from road beyond which deposition is below critical load (m)**	**Change relative to lower critical load (%)**	**Distance from road beyond which the change is <1% (m)**	**Change in deposition (kgN/ha/yr)**
Booterstown Marsh pNHA (Rock Road)	720171, 730286	5	3.22	0m	3.32	0m	2%	30m	0.10
Grand Canal pNHA (Baggot St Bridge, western side)	716851, 732986	5	4.70	0m	4.69	0m	0%	0m	-0.01
Grand Canal pNHA (Baggot St Bridge, eastern side)	716866, 732989	5	6.35	10m	6.34	10m	0%	0m	-0.01
Grand Canal pNHA (Canal Road)	715821, 732513	5	4.83	0m	4.84	0m	0%	0m	0.01
Grand Canal pNHA (Charlemont Bridge, western side)	715881, 732544	5	4.61	0m	4.60	0m	0%	0m	-0.01
Grand Canal pNHA (Charlemont Bridge, eastern side)	715894, 732549	5	5.46	10m	5.43	10m	-1%	0m	-0.03
Grand Canal pNHA (Charlemont Mall)	715672, 732497	5	4.08	0m	4.09	0m	0%	0m	0.01
Grand Canal pNHA (Cheltenham Road)	716863, 733129	5	2.22	0m	2.21	0m	0%	0m	<0.01
Grand Canal pNHA (Dartmouth Walk)	716126, 732631	5	3.69	10m	3.70	0m	0%	0m	<0.01
Grand Canal pNHA (Haddington Road)	716883, 732978	5	5.74	10m	5.74	10m	0%	0m	<0.01
Grand Canal pNHA (Huband Bridge, north side)	717062, 733223	5	2.59	0m	2.59	0m	0%	0m	-0.01
Grand Canal pNHA (Huband Bridge, south side)	717057, 733217	5	2.42	0m	2.42	0m	0%	0m	<0.01
Grand Canal pNHA (La Touche Bridge, western side)	715609, 732499	5	5.50	10m	5.55	10m	1%	10m	0.05
Grand Canal pNHA (La Touche Bridge, eastern side)	715621, 732500	5	6.38	10m	6.46	10m	2%	0m	0.08
Grand Canal pNHA (Leeson Bridge, western side)	716368, 732736	5	5.89	0m	5.85	0m	-1%	0m	-0.04
Grand Canal pNHA (Leeson Bridge, eastern side)	716382, 732741	5	7.28	10m	7.22	10m	-1%	0m	-0.06
Grand Canal pNHA (Percy Place, northern end)	717137, 733286	5	2.32	0m	2.32	0m	0%	0m	<0.01
Grand Canal pNHA (Percy Place, southern end)	716948, 733044	5	2.54	0m	2.53	0m	0%	0m	<0.01
Loughlinstown Wood pNHA (Bray Road)	724496, 723292	5	3.82	0m	3.76	0m	-1%	0m	-0.06
Loughlinstown Wood pNHA (Commons Road)	725024, 723001	5	2.37	0m	2.35	0m	0%	0m	-0.02

7.4.2.3 Regional Air Quality Assessment

The potential changes in regional air emissions due to the Construction Phase traffic impacts of the Proposed Scheme have been assessed using the NTA Environmental Appraisal Tool, which is based on ENEVAL. ENEVAL measures the regional emissions associated with road transport based on the various road links and their corresponding emissions.

Pollutant emissions (in tonnes) produced in both the DM and DS scenarios during the Construction Year 2024 of the Construction Phase are shown in Table 7.30. The Proposed Scheme will result in increases in emissions of all pollutants modelled. The majority of these increases result from redistribution of vehicles onto other longer routes, while construction of the Proposed Scheme takes place. To produce these emissions estimates, the traffic model and therefore the ENEVAL tool have applied the peak construction day in 2024 across the whole year. Emissions are therefore worst-case and likely to be lower in reality.

Table 7.30: Construction Phase Regional Pollutant Emissions (tonnes) – Construction Year 2024

Scenario	Vehicle Class	NO_X (tonnes)	NO_2 (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	HC (tonnes)	CO (tonnes)	Benzene (tonnes)	Butadiene (tonnes)
DM	Car	1624	489	18	18	86	1951	1	1
DS		1629	490	18	18	87	1956	1	1
Change		4	1	0.05	0.05	0.3	5	0.003	0.003
% Change		0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.3%
DM	Goods	1436	408	11	11	43	223	0.4	0.5
DS		1437	408	11	11	43	223	0.4	0.5
Change		0.6	0.2	0.004	0.004	0.06	0.5	0.001	0.001
% Change		0.05%	0.04%	0.03%	0.03%	0.1%	0.2%	0.3%	0.2%
DM	Urban Bus	44	4	0.7	0.7	2	9	0	0.05
DS		44	4	0.7	0.7	2	9	0	0.05
Change		0.30	0.03	0.003	0.003	0.01	0.06	0	0.0002
% Change		0.7%	0.7%	0.5%	0.5%	0.5%	0.6%	0%	0.4%
DM	**Total**	**3105**	**901**	**30**	**29**	**132**	**2183**	**2**	**2**
DS		**3110**	**903**	**30**	**29**	**132**	**2189**	**2**	**2**
Change		**5**	**1**	**0.06**	**0.06**	**0.4**	**5**	**0.004**	**0.004**
% Change		**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.3%**	**0.3%**	**0.2%**	**0.2%**

In accordance with the EPA Guidelines (EPA 2022) and considering that the change in concentrations is within the traffic model and ENEVAL tool margin of variability, the regional impacts associated with the Construction Phase traffic emissions pre-mitigation are considered overall to be Neutral and Short-term.

7.4.3 Operational Phase

7.4.3.1 Do Minimum Scenario

The Do Minimum (DM) is a defined scenario within the traffic modelling exercise in Chapter 6 (Traffic & Transport) and is based on the likely conditions of the road network with all major committed transportation schemes in place that will impact on the use of public transport and private car, not including the Proposed Scheme. The output of this analysis and its impact on air quality has been modelled using AMDS-Roads for the Opening Year of 2028. Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24-hour PM_{10} objective, at selected most impacted existing air quality sensitive receptors in the 2028 DM scenario are listed in Table 7.31. Locations of these receptors are shown in Figure 7.3 to Figure 7.5 in Volume 3 of this EIAR. Statistics for the full list of modelled receptors can be found in Table 3.1 in Appendix A7.1 in Volume 4 of this EIAR. 'Most impacted' refers to those receptors with non-negligible impacts due to the Operational Phase of the Proposed Scheme.

Table 7.31: Predicted 2028 Do Minimum Scenario Pollutant Statistics At Most Impacted Receptor Locations

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. ($\mu g/m^3$)			No of PM_{10} days > 50 $\mu g/m^3$
		NO_2	PM_{10}	$PM_{2.5}$	
AQ13	724491,723268	32.3	16.0	11.2	1
AQ18	719660,729223	35.5	16.4	11.4	1
AQ19	719670,729181	35.1	16.6	11.5	1
AQ24	719894,728543	35.6	16.4	11.5	1
AQ26	719861,728598	33.7	16.1	11.3	1
AQ28	719757,728660	30.1	15.7	11.0	1
AQ29	719691,728848	28.3	15.4	10.8	<1
AQ30	719677,728972	30.1	15.8	11.0	1
AQ31	719694,728907	33.4	16.2	11.3	1
AQ32	719739,729001	31.4	16.0	11.2	1
AQ34	719748,728862	35.0	16.5	11.5	1
AQ35	719753,728811	34.0	16.4	11.4	1
AQ36	719730,728710	28.6	15.5	10.9	1
AQ37	719714,728753	28.4	15.5	10.9	1
AQ38	719770,728767	32.2	16.1	11.2	1
AQ42	719617,729334	34.3	16.3	11.4	1
AQ106	716427,732630	32.5	15.9	11.1	1
AQ107	716572,732541	31.2	15.9	11.1	1
AQ108	716478,732534	30.5	15.7	11.0	1
AQ109	716416,732588	34.1	16.0	11.2	1
AQ114	722453,725949	30.7	16.3	11.3	1
AQ115	722498,725919	29.7	16.0	11.2	1
AQ129	716210,733007	38.8	16.6	11.5	1
AQ132	716461,732633	31.1	15.7	11.0	1
AQ133	716481,732648	32.7	16.0	11.2	1
AQ135	716440,732652	33.5	16.1	11.2	1
AQ138	716311,732813	33.6	15.7	11.0	1
AQ142	716289,732756	35.9	16.3	11.4	1
AQ143	716074,733164	35.2	16.0	11.2	1
AQ148	721405,726628	32.0	16.3	11.3	1
AQ150	721207,726735	30.9	16.0	11.2	1
AQ151	721221,726808	29.9	15.8	11.1	1
AQ153	721016,726940	33.3	16.0	11.2	1
AQ155	721024,726840	33.6	16.1	11.3	1
AQ156	721311,726708	33.3	16.5	11.5	1
AQ157	721352,726667	34.5	16.8	11.6	1
AQ158	721257,726688	30.3	15.9	11.1	1
AQ159	721280,726751	30.2	15.9	11.1	1
AQ161	717176,731954	36.8	16.3	11.4	1
AQ166	723696,724822	29.7	16.0	11.2	1
AQ171	717503,731644	32.8	15.8	11.1	1
AQ186	717596,731553	31.3	15.4	10.9	<1
AQ207	724058,723871	30.0	16.1	11.2	1
AQ215	723859,724236	28.3	15.8	11.0	1
AQ216	723844,724267	27.9	15.7	11.0	1
AQ225	723800,724329	30.7	16.3	11.3	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m[3])			No of PM_{10} days > 50 µg/m[3]
		NO_2	PM_{10}	$PM_{2.5}$	
AQ226	720788,727080	33.3	16.1	11.2	1
AQ229	720720,727120	33.4	16.6	11.5	1
AQ233	721981,726266	30.6	16.0	11.1	1
AQ234	721923,726322	31.0	15.9	11.1	1
AQ238	721678,726463	32.6	16.3	11.3	1
AQ244	720643,727171	29.1	15.8	11.0	1
AQ245	720527,727264	33.5	16.0	11.2	1
AQ246	720557,727235	29.8	15.7	11.0	1
AQ249	718421,730711	30.9	15.9	11.1	1
AQ252	718628,730471	30.7	16.0	11.2	1
AQ253	718638,730455	30.3	15.9	11.1	1
AQ256	719158,729956	34.2	16.8	11.6	1
AQ257	718992,730135	31.5	16.2	11.3	1
AQ260	720355,727915	30.5	16.0	11.2	1
AQ263	720386,727403	28.6	15.2	10.7	<1
AQ264	720403,727360	29.9	15.3	10.8	<1
AQ265	720249,728221	35.2	16.2	11.3	1
AQ266	720227,728250	33.3	16.0	11.2	1
AQ268	720051,728411	30.0	15.9	11.1	1
AQ269	720247,728118	30.9	15.7	11.0	1
AQ273	720356,727735	30.3	15.9	11.1	1
AQ279	720402,727951	32.4	16.4	11.4	1
AQ282	720411,727837	35.3	17.0	11.8	1
AQ323	715064,733810	43.1	17.4	12.0	1
AQ325	715064,733764	52.3	18.1	12.5	2
AQ351	716579,734071	45.7	17.4	12.0	1
AQ380	715505,733367	36.6	16.3	11.4	1
AQ417	716922,732258	33.2	15.8	11.1	1
AQ431	717756,732518	43.2	16.9	11.7	1
AQ432	717741,732531	47.7	17.7	12.1	1
AQ433	717748,732487	36.1	15.9	11.2	1
AQ434	717786,732489	57.7	19.0	13.0	2
AQ435	717896,732423	39.5	16.5	11.5	1
AQ437	717871,732437	42.2	16.8	11.7	1
AQ521	716610,734148	38.7	16.2	11.3	1
AQ645	719530,729570	32.9	15.9	11.1	1
AQ646	719482,729634	31.1	15.7	11.0	1
AQ725	720367,727782	29.6	15.8	11.1	1
AQ739	720435,727269	32.1	15.6	11.0	1
AQ810	723458,725163	30.0	15.6	11.0	1
AQ811	723505,725129	34.8	16.2	11.3	1
AQ833	724655,723998	36.7	17.0	11.7	1
AQ1008	716170,733029	31.9	15.6	10.9	1
AQ1012	716299,732754	35.1	16.1	11.3	1
AQ1015	716181,733050	34.8	16.0	11.2	1
AQ1017	716112,733110	30.8	15.4	10.9	<1
AQ1040	716552,734074	45.1	17.6	12.1	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ23	719700,729075	38.6	17.5	12.1	1
AQ121	716610,732459	37.0	16.7	11.6	1
AQ144	716087,733189	38.6	16.4	11.4	1
AQ145	721499,726534	36.2	17.1	11.8	1
AQ154	721068,726904	38.3	17.1	11.8	1
AQ162	717228,731951	36.2	16.2	11.3	1
AQ167	717382,731761	37.7	16.2	11.4	1
AQ172	717393,731748	36.5	16.2	11.3	1
AQ179	716799,732376	37.8	16.3	11.4	1
AQ181	716885,732329	42.3	16.7	11.7	1
AQ182	717602,731574	38.2	16.3	11.4	1
AQ183	717727,731393	38.6	16.5	11.5	1
AQ184	717912,731226	38.4	17.5	12.0	1
AQ219	724778,723045	36.5	17.3	11.9	1
AQ228	720823,727056	37.7	16.7	11.6	1
AQ239	721867,726375	36.0	16.4	11.4	1
AQ240	721756,726432	37.6	16.5	11.5	1
AQ248	718458,730750	37.5	17.0	11.8	1
AQ258	720380,728005	36.6	16.9	11.7	1
AQ267	719943,728492	38.8	17.2	11.9	1
AQ271	717500,731661	36.5	16.3	11.4	1
AQ275	720403,727731	39.0	17.7	12.1	1
AQ445	717849,731391	39.6	16.8	11.7	1
AQ1013	716054,733178	36.6	16.1	11.2	1
AQ1014	716089,733214	39.5	16.4	11.4	1
AQ1020	717751,731356	36.4	16.0	11.2	1
AQ1026	719608,729357	36.6	16.8	11.6	1
AQ1062	716314,732770	36.9	16.1	11.3	1
AQ131	716351,732738	41.1	16.7	11.6	1
AQ136	716373,732706	41.8	16.8	11.7	1
AQ141	716404,732715	47.8	17.7	12.3	1
AQ261	720354,728075	40.0	17.0	11.8	1
AQ300	715533,734232	36.4	16.3	11.4	1
AQ306	715983,734395	38.2	16.4	11.4	1
AQ307	716045,734416	35.7	16.1	11.2	1
AQ308	716093,734426	35.4	16.0	11.2	1
AQ309	716159,734438	40.3	16.6	11.6	1
AQ310	716174,734267	44.4	17.0	11.8	1
AQ311	716190,734228	45.7	17.2	12.0	1
AQ312	716174,734238	40.7	16.5	11.5	1
AQ318	715568,734073	35.8	16.1	11.2	1
AQ320	715196,734002	37.3	16.3	11.3	1
AQ349	716382,734156	39.5	16.9	11.7	1
AQ362	716503,733755	38.9	16.7	11.4	1
AQ395	716603,733291	40.0	16.4	11.4	1
AQ399	716626,733276	35.8	16.0	11.2	1
AQ474	715556,732792	42.1	16.5	11.5	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ475	715564,732759	36.4	15.9	11.1	1
AQ476	715582,732763	39.9	16.2	11.4	1
AQ495	716176,733475	38.0	16.3	11.4	1
AQ496	716191,733435	37.5	16.3	11.4	1
AQ517	715231,734014	37.6	16.4	11.4	1
AQ519	715449,734204	35.7	16.2	11.3	1
AQ520	715583,734245	35.5	16.1	11.2	1
AQ523	716669,734066	36.6	16.2	11.3	1
AQ877	724796,721639	37.7	17.0	11.8	1
AQ878	724816,721595	37.8	17.0	11.8	1
AQ888	724992,720912	39.9	17.3	12.0	1
AQ895	725268,719121	41.6	17.6	12.2	1
AQ897	725218,718967	35.6	16.6	11.5	1
AQ989	716600,734087	45.0	17.1	11.9	1
AQ990	716605,734086	43.7	17.0	11.8	1
AQ1039	716415,734126	40.9	17.0	11.8	1
AQ402	716849,732964	37.6	16.2	11.3	1
AQ404	716901,732960	37.0	16.2	11.3	1
Air Quality Limit Value Objective		**40**	**40**	**25**	**35**

In the 2028 DM scenario, annual mean concentrations of NO_2 are above the relevant national air quality limit value objective in some areas; 29 exceedances were modelled at receptors on the M11 at Junction 5, N11 Stillorgan Road, R105 Burgh Quay, R114 Richmond Street South, R118 Pembroke Road, R137 Nicholas Street, R138 Leeson Street Upper, R148 Wellington Quay, R802 Pearse Street / Tara Street, R814 Lombard Street East and R816 Baggot Street Lower. Concentrations at all receptors with exceedances can be found in Table 3.1 in Appendix A7.1 in Volume 4 of this EIAR. Some of these receptors have been excluded from this section as these locations experience a negligible impact due to the Proposed Scheme and are therefore not considered a most impacted receptor. Annual mean NO_2 concentrations did not exceed 60µg/m³, indicating that exceedances of the NO_2 1-hour mean are unlikely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality limit value objective for all modelled receptors. At all receptors, modelling of the maximum 24-hour PM_{10} concentration indicated that there is likely to be no more than two exceedances of the 50µg/m³ ambient limit value compared to the threshold which allows 35 daily exceedances in any one calendar year. Annual mean $PM_{2.5}$ concentrations are also below the relevant national air quality limit value objective for all modelled receptors. Reported concentrations are lower in 2028 due to the assumed modest improvements in vehicle emissions rates between now and then.

7.4.3.2 Do Something Scenario

The Do Something (DS) is a defined scenario within the traffic modelling exercise in Chapter 6 (Traffic & Transport) and is based on the likely conditions of the road network with all major committed transportation schemes in place that will impact on the use of public transport and private car, including the Proposed Scheme. The output of this analysis and its impact on air quality has been modelled using AMDS-Roads for the Opening Year of 2028 in line with the methodology set out in Section 7.2.4.1. Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24-hour PM_{10} limit value objective, at selected most impacted existing air quality sensitive receptors both along the Proposed Scheme and on routes affected by traffic diversions in the 2028 DS scenario are listed in Table 7.32. Locations of these receptors are shown in Figure 7.3 to Figure 7.5 in Volume 3 of this EIAR. Statistics for the full list of modelled receptors can be found in Table 3.2 in Appendix A7.1 in Volume 4 of this EIAR. 'Most impacted' refers to those receptors with non-negligible impacts due to the Operational Phase of the Proposed Scheme.

Table 7.32: Predicted 2028 Do Something Scenario Pollutant Statistics At Worst-Case Receptor Locations

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ13	724491,723268	30.2	15.6	11.0	1
AQ18	719660,729223	31.6	15.5	10.9	1
AQ19	719670,729181	30.2	15.5	10.9	1
AQ24	719894,728543	29.5	15.2	10.7	<1
AQ26	719861,728598	27.6	15.0	10.6	<1
AQ28	719757,728660	26.7	14.8	10.5	<1
AQ29	719691,728848	24.2	14.6	10.4	<1
AQ30	719677,728972	25.9	14.9	10.5	<1
AQ31	719694,728907	27.0	15.0	10.6	<1
AQ32	719739,729001	26.0	14.9	10.6	<1
AQ34	719748,728862	27.5	15.1	10.6	<1
AQ35	719753,728811	26.8	15.0	10.6	<1
AQ36	719730,728710	24.4	14.7	10.4	<1
AQ37	719714,728753	24.1	14.6	10.4	<1
AQ38	719770,728767	26.1	14.9	10.5	<1
AQ42	719617,729334	29.3	15.4	10.8	<1
AQ106	716427,732630	28.5	15.2	10.7	<1
AQ107	716572,732541	26.6	15.0	10.6	<1
AQ108	716478,732534	28.2	15.1	10.7	<1
AQ109	716416,732588	31.5	15.5	10.9	1
AQ114	722453,725949	25.8	15.2	10.7	<1
AQ115	722498,725919	25.3	15.1	10.6	<1
AQ129	716210,733007	36.9	15.8	11.1	1
AQ132	716461,732633	28.2	15.1	10.6	<1
AQ133	716481,732648	29.7	15.3	10.8	<1
AQ135	716440,732652	29.7	15.2	10.7	<1
AQ138	716311,732813	29.8	15.1	10.7	<1
AQ142	716289,732756	31.1	15.6	10.9	1
AQ143	716074,733164	31.6	15.3	10.8	<1
AQ148	721405,726628	26.7	15.1	10.7	<1
AQ150	721207,726735	27.2	15.1	10.7	<1
AQ151	721221,726808	25.8	15.0	10.6	<1
AQ153	721016,726940	29.0	15.2	10.7	<1
AQ155	721024,726840	31.2	15.6	11.0	1
AQ156	721311,726708	27.4	15.3	10.7	<1
AQ157	721352,726667	28.0	15.4	10.8	<1
AQ158	721257,726688	26.7	15.1	10.6	<1
AQ159	721280,726751	25.9	15.0	10.6	<1
AQ161	717176,731954	35.9	15.9	11.2	1
AQ166	723696,724822	25.1	15.1	10.6	<1
AQ171	717503,731644	29.3	15.4	10.8	<1
AQ186	717596,731553	28.7	15.2	10.7	<1
AQ207	724058,723871	26.4	15.3	10.8	<1
AQ215	723859,724236	23.1	14.7	10.4	<1
AQ216	723844,724267	22.8	14.6	10.3	<1
AQ225	723800,724329	23.4	14.7	10.4	<1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ226	720788,727080	27.2	15.1	10.7	<1
AQ229	720720,727120	26.9	15.3	10.8	<1
AQ233	721981,726266	26.9	15.0	10.6	<1
AQ234	721923,726322	27.1	15.0	10.6	<1
AQ238	721678,726463	27.6	15.1	10.7	<1
AQ244	720643,727171	24.7	14.9	10.5	<1
AQ245	720527,727264	26.5	15.0	10.6	<1
AQ246	720557,727235	24.9	14.9	10.5	<1
AQ249	718421,730711	28.6	15.2	10.7	<1
AQ252	718628,730471	27.5	15.3	10.7	<1
AQ253	718638,730455	27.1	15.2	10.7	<1
AQ256	719158,729956	29.1	15.8	11.0	1
AQ257	718992,730135	27.6	15.4	10.8	<1
AQ260	720355,727915	24.6	14.9	10.5	<1
AQ263	720386,727403	24.5	14.7	10.4	<1
AQ264	720403,727360	25.6	14.8	10.5	<1
AQ265	720249,728221	28.5	15.0	10.6	<1
AQ266	720227,728250	27.4	14.9	10.5	<1
AQ268	720051,728411	24.6	14.9	10.5	<1
AQ269	720247,728118	26.6	14.9	10.5	<1
AQ273	720356,727735	26.2	15.0	10.6	<1
AQ279	720402,727951	24.8	14.9	10.5	<1
AQ282	720411,727837	25.6	15.1	10.6	<1
AQ323	715064,733810	42.4	17.3	12.0	1
AQ325	715064,733764	51.3	18.0	12.5	2
AQ351	716579,734071	45.2	17.4	12.0	1
AQ380	715505,733367	35.5	16.2	11.3	1
AQ417	716922,732258	29.5	15.2	10.7	<1
AQ431	717756,732518	42.4	16.8	11.7	1
AQ432	717741,732531	46.6	17.6	12.2	1
AQ433	717748,732487	35.5	15.9	11.1	1
AQ434	717786,732489	56.4	18.7	12.9	2
AQ435	717896,732423	38.9	16.4	11.5	1
AQ437	717871,732437	41.2	16.7	11.6	1
AQ521	716610,734148	38.1	16.2	11.3	1
AQ645	719530,729570	28.9	15.2	10.7	<1
AQ646	719482,729634	27.7	15.1	10.7	<1
AQ725	720367,727782	24.6	14.8	10.5	<1
AQ739	720435,727269	27.0	15.1	10.6	<1
AQ810	723458,725163	25.8	14.9	10.5	<1
AQ811	723505,725129	28.6	15.3	10.7	<1
AQ833	724655,723998	35.7	16.8	11.7	1
AQ1008	716170,733029	29.7	15.1	10.7	<1
AQ1012	716299,732754	30.6	15.5	10.9	<1
AQ1015	716181,733050	31.0	15.2	10.7	<1
AQ1017	716112,733110	27.9	14.9	10.5	<1
AQ1040	716552,734074	44.5	17.5	12.1	1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ23	719700,729075	29.2	15.5	10.9	1
AQ121	716610,732459	32.0	15.5	10.9	1
AQ144	716087,733189	34.5	15.6	11.0	1
AQ145	721499,726534	28.8	15.5	10.9	1
AQ154	721068,726904	33.7	16.1	11.2	1
AQ162	717228,731951	33.3	15.6	11.0	1
AQ167	717382,731761	34.1	15.7	11.0	1
AQ172	717393,731748	33.9	15.7	11.0	1
AQ179	716799,732376	33.7	15.4	10.8	<1
AQ181	716885,732329	39.8	16.1	11.3	1
AQ182	717602,731574	33.3	15.8	11.1	1
AQ183	717727,731393	32.8	15.7	11.0	1
AQ184	717912,731226	34.4	16.4	11.4	1
AQ219	724778,723045	32.6	16.5	11.4	1
AQ228	720823,727056	29.8	15.5	10.9	1
AQ239	721867,726375	32.4	15.5	10.9	1
AQ240	721756,726432	31.5	15.3	10.8	<1
AQ248	718458,730750	32.1	15.8	11.1	1
AQ258	720380,728005	26.9	15.1	10.6	<1
AQ267	719943,728492	30.6	15.5	10.9	1
AQ271	717500,731661	31.9	15.8	11.1	1
AQ275	720403,727731	28.9	15.6	10.9	1
AQ445	717849,731391	34.4	16.0	11.2	1
AQ1013	716054,733178	34.1	15.6	11.0	1
AQ1014	716089,733214	37.5	16.0	11.2	1
AQ1020	717751,731356	31.4	15.4	10.9	<1
AQ1026	719608,729357	30.6	15.7	11.0	1
AQ1062	716314,732770	32.0	15.5	10.9	1
AQ131	716351,732738	34.6	15.7	11.0	1
AQ136	716373,732706	35.5	15.7	11.1	1
AQ141	716404,732715	39.4	16.2	11.3	1
AQ261	720354,728075	30.4	15.4	10.8	<1
AQ300	715533,734232	37.7	16.4	11.5	1
AQ306	715983,734395	39.1	16.6	11.5	1
AQ307	716045,734416	36.5	16.2	11.3	1
AQ308	716093,734426	36.3	16.1	11.3	1
AQ309	716159,734438	41.1	16.7	11.6	1
AQ310	716174,734267	44.8	17.1	11.9	1
AQ311	716190,734228	46.4	17.3	12.0	1
AQ312	716174,734238	41.3	16.6	11.6	1
AQ318	715568,734073	36.7	16.2	11.3	1
AQ320	715196,734002	37.7	16.4	11.4	1
AQ349	716382,734156	40.3	17.0	11.8	1
AQ362	716503,733755	39.6	16.8	11.7	1
AQ395	716603,733291	41.5	16.5	11.5	1
AQ399	716626,733276	37.0	16.1	11.3	1
AQ474	715556,732792	43.5	16.6	11.6	1

DS (2028)					
Receptor	**Receptor Location (ITM)**	**Annual Mean Conc. (µg/m^3)**			**No of PM_{10} days > 50 µg/m^3**
		NO_2	**PM_{10}**	**$PM_{2.5}$**	
AQ475	715564,732759	37.5	16.0	11.2	1
AQ476	715582,732763	41.4	16.4	11.5	1
AQ495	716176,733475	38.7	16.4	11.4	1
AQ496	716191,733435	38.2	16.3	11.4	1
AQ517	715231,734014	38.2	16.5	11.5	1
AQ519	715449,734204	36.7	16.3	11.4	1
AQ520	715583,734245	36.8	16.2	11.4	1
AQ523	716669,734066	38.0	16.4	11.4	1
AQ877	724796,721639	38.2	17.1	11.9	1
AQ878	724816,721595	38.3	17.1	11.9	1
AQ888	724992,720912	40.6	17.4	12.0	1
AQ895	725268,719121	42.1	17.8	12.3	1
AQ897	725218,718967	36.0	16.7	11.6	1
AQ989	716600,734087	45.6	17.2	11.9	1
AQ990	716605,734086	44.3	17.0	11.8	1
AQ1039	716415,734126	41.7	17.1	11.9	1
AQ402	716849,732964	40.1	16.4	11.5	1
AQ404	716901,732960	39.5	16.5	11.5	1
Air Quality Limit Value Objective		**40**	**40**	**25**	**35**

In the 2028 DS scenario, annual mean concentrations of NO_2 are above the relevant national air quality limit value objective in some areas; 29 exceedances were modelled at receptors on the M11 at Junction 5 and between Junctions 5 and 17, R105 Burgh Quay, R111 Mespil Road, R114 Richmond Street South, R118 Pembroke Road, R137 Lord Edward Street / Nicholas Street, R148 Wellington Quay, R802 Pearse Street / Tara Street, R814 Lombard Street East and R816 Baggot Street Lower. This is no change from the DM scenario. Concentrations at all receptors with exceedances can be found in Table 3.2 in Appendix A7.1 in Volume 4 of this EIAR. Some of these receptors have been excluded from this section as these locations experience a negligible impact due to the Proposed Scheme and are therefore not considered a most impacted receptor. Annual mean NO_2 concentrations did not exceed 60µg/m^3, indicating that exceedances of the NO_2 1-hour mean are unlikely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality limit value objectives for all modelled receptors. At all receptors, modelling of the maximum 24-hour PM_{10} concentration indicated that there is likely to be no more than two exceedances of the 50µg/m^3 ambient limit value compared to the threshold which allows 35 daily exceedances in any one calendar year. Annual mean $PM_{2.5}$ concentrations are also below the relevant national air quality limit value objectives for all modelled receptors.

7.4.3.3 Comparison of Do Something with Do Minimum

Table 7.33 provides the predicted change in and impact on pollutant concentrations, between the DM and the DS in 2028. Statistics for the full list of modelled receptors can be found in Table 3.3 in Appendix A7.1 in Volume 4 of this EIAR. 'Most impacted' refers to those receptors with non-negligible impacts due to the Operational Phase of the Proposed Scheme.

Table 7.33: Predicted Changes in Operational DM and DS and Impact Significance Criteria At Most Impacted Receptor Locations

Receptor	**Receptor Location (ITM)**	**Change in Annual Mean Conc. (µg/m^3)**			**Change in No of PM_{10} days > 50 µg/m^3**	**Impact on Annual Mean Conc.**		
		NO_2	**PM_{10}**	**$PM_{2.5}$**		**NO_2**	**PM_{10}**	**$PM_{2.5}$**
AQ13	724491,723268	-2.1	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ18	719660,729223	-3.9	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ19	719670,729181	-4.9	-1.1	-0.6	<1	Slight Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m^3)			Change in No of PM_{10} days > 50 µg/m^3	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ24	719894,728543	-6.1	-1.3	-0.8	<1	Slight Beneficial	Negligible	Negligible
AQ26	719861,728598	-6.1	-1.1	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ28	719757,728660	-3.4	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ29	719691,728848	-4.1	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ30	719677,728972	-4.2	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ31	719694,728907	-6.4	-1.2	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ32	719739,729001	-5.4	-1.1	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ34	719748,728862	-7.4	-1.4	-0.8	<1	Slight Beneficial	Negligible	Negligible
AQ35	719753,728811	-7.2	-1.4	-0.8	<1	Slight Beneficial	Negligible	Negligible
AQ36	719730,728710	-4.2	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ37	719714,728753	-4.3	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ38	719770,728767	-6.1	-1.2	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ42	719617,729334	-5.0	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ106	716427,732630	-4.0	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ107	716572,732541	-4.6	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ108	716478,732534	-2.3	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ109	716416,732588	-2.6	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ114	722453,725949	-4.9	-1.1	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ115	722498,725919	-4.4	-1.0	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ129	716210,733007	-1.9	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ132	716461,732633	-2.9	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ133	716481,732648	-3.0	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ135	716440,732652	-3.8	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ138	716311,732813	-3.8	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ142	716289,732756	-4.8	-0.8	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ143	716074,733164	-3.5	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ148	721405,726628	-5.3	-1.1	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ150	721207,726735	-3.7	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ151	721221,726808	-4.1	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ153	721016,726940	-4.3	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ155	721024,726840	-2.3	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ156	721311,726708	-5.9	-1.3	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ157	721352,726667	-6.5	-1.4	-0.8	<1	Slight Beneficial	Negligible	Negligible
AQ158	721257,726688	-3.6	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ159	721280,726751	-4.4	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ161	717176,731954	-0.9	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ166	723696,724822	-4.6	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ171	717503,731644	-3.5	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ186	717596,731553	-2.6	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ207	724058,723871	-3.5	-0.8	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ215	723859,724236	-5.2	-1.1	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ216	723844,724267	-5.1	-1.1	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ225	723800,724329	-7.3	-1.5	-0.9	<1	Slight Beneficial	Negligible	Negligible
AQ226	720788,727080	-6.2	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ229	720720,727120	-6.5	-1.3	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ233	721981,726266	-3.7	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ234	721923,726322	-3.9	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ238	721678,726463	-5.0	-1.1	-0.6	<1	Slight Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m^3)			Change in No of PM_{10} days > 50 µg/m^3	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ244	720643,727171	-4.5	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ245	720527,727264	-7.0	-0.9	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ246	720557,727235	-4.9	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ249	718421,730711	-2.4	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ252	718628,730471	-3.1	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ253	718638,730455	-3.2	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ256	719158,729956	-5.1	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ257	718992,730135	-4.0	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ260	720355,727915	-6.0	-1.2	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ263	720386,727403	-4.1	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ264	720403,727360	-4.3	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ265	720249,728221	-6.7	-1.2	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ266	720227,728250	-5.9	-1.1	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ268	720051,728411	-5.4	-1.1	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ269	720247,728118	-4.3	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ273	720356,727735	-4.2	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ279	720402,727951	-7.6	-1.5	-0.9	<1	Slight Beneficial	Negligible	Negligible
AQ282	720411,727837	-9.8	-2.0	-1.1	<1	Slight Beneficial	Negligible	Negligible
AQ323	715064,733810	-0.7	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ325	715064,733764	-1.0	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ351	716579,734071	-0.5	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ380	715505,733367	-1.1	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ417	716922,732258	-3.7	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ431	717756,732518	-0.8	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ432	717741,732531	-1.1	-0.1	0.1	<1	Slight Beneficial	Negligible	Negligible
AQ433	717748,732487	-0.6	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ434	717786,732489	-1.3	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ435	717896,732423	-0.6	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ437	717871,732437	-1.0	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ521	716610,734148	-0.6	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ645	719530,729570	-4.0	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ646	719482,729634	-3.4	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ725	720367,727782	-5.0	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ739	720435,727269	-5.1	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ810	723458,725163	-4.2	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ811	723505,725129	-6.3	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ833	724655,723998	-0.9	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ1008	716170,733029	-2.2	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ1012	716299,732754	-4.5	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ1015	716181,733050	-3.8	-0.8	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ1017	716112,733110	-2.9	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ1040	716552,734074	-0.6	-0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ23	719700,729075	-9.3	-2.0	-1.2	<1	Moderate Beneficial	Negligible	Negligible
AQ121	716610,732459	-5.0	-1.2	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ144	716087,733189	-4.1	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ145	721499,726534	-7.4	-1.6	-0.9	<1	Moderate Beneficial	Negligible	Negligible
AQ154	721068,726904	-4.7	-1.0	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ162	717228,731951	-2.9	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (μg/m³)			Change in No of PM_{10} days > 50 μg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ167	717382,731761	-3.6	-0.6	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ172	717393,731748	-2.6	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ179	716799,732376	-4.1	-1.0	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ181	716885,732329	-2.5	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ182	717602,731574	-4.9	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ183	717727,731393	-5.8	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ184	717912,731226	-4.0	-1.1	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ219	724778,723045	-3.8	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ228	720823,727056	-7.8	-1.2	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ239	721867,726375	-3.6	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ240	721756,726432	-6.0	-1.2	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ248	718458,730750	-5.4	-1.2	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ258	720380,728005	-9.8	-1.8	-1.1	<1	Moderate Beneficial	Negligible	Negligible
AQ267	719943,728492	-8.2	-1.7	-1.0	<1	Moderate Beneficial	Negligible	Negligible
AQ271	717500,731661	-4.5	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ275	720403,727731	-10.2	-2.1	-1.2	<1	Moderate Beneficial	Negligible	Negligible
AQ445	717849,731391	-5.3	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ1013	716054,733178	-2.5	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ1014	716089,733214	-2.0	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ1020	717751,731356	-5.0	-0.6	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ1026	719608,729357	-6.0	-1.1	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ1062	716314,732770	-4.9	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ131	716351,732738	-6.5	-1.0	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ136	716373,732706	-6.4	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ141	716404,732715	-8.4	-1.5	-0.9	<1	Substantial Beneficial	Negligible	Negligible
AQ261	720354,728075	-9.6	-1.7	-1.0	<1	Substantial Beneficial	Negligible	Negligible
AQ300	715533,734232	1.3	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ306	715983,734395	0.9	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ307	716045,734416	0.8	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ308	716093,734426	0.8	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ309	716159,734438	0.8	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ310	716174,734267	0.5	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ311	716190,734228	0.7	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ312	716174,734238	0.6	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ318	715568,734073	0.9	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ320	715196,734002	0.4	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ349	716382,734156	0.8	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ362	716503,733755	0.7	0.1	0.3	<1	Slight Adverse	Negligible	Negligible
AQ395	716603,733291	1.5	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ399	716626,733276	1.2	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ474	715556,732792	1.4	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ475	715564,732759	1.1	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ476	715582,732763	1.5	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ495	716176,733475	0.8	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ496	716191,733435	0.7	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ517	715231,734014	0.6	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ519	715449,734204	1.0	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ520	715583,734245	1.3	0.1	0.1	<1	Slight Adverse	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (μg/m^3)			Change in No of PM_{10} days > 50 μg/m^3	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ523	716669,734066	1.4	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ877	724796,721639	0.5	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ878	724816,721595	0.5	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ888	724992,720912	0.7	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ895	725268,719121	0.5	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ897	725218,718967	0.5	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ989	716600,734087	0.5	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ990	716605,734086	0.6	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ1039	716415,734126	0.8	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ402	716849,732964	2.5	0.2	0.2	<1	Moderate Adverse	Negligible	Negligible
AQ404	716901,732960	2.6	0.3	0.2	<1	Moderate Adverse	Negligible	Negligible

The significance of the changes in the concentration of each of the ambient receptors has been determined in the context of the TII Air Quality Guidelines (TII 2011). As shown in Table 7.33, Figure 7.3 in Volume 3 of this EIAR and Table 3.3 in Appendix A7.1 in Volume 4 of this EIAR, the majority of modelled receptors are estimated to experience a negligible impact due to the Proposed Scheme in terms of the annual mean NO_2 concentration. A slightly beneficial impact is estimated at 93 receptors, a moderate beneficial impact at 28 receptors and a substantial beneficial impact at four receptors due to the diversion of traffic off the Proposed Scheme routes. A slight adverse impact is expected at 31 receptors, and a moderate adverse impact at three receptors on the R111 Baggot Street Upper junction with Mespil Road. These localised moderate adverse impacts are considered Negative, Significant and Short-term as NO_2 concentrations exceed the limit value but will decrease below the limit by 2043 due to reductions in emissions between 2028 and 2043 from advancements in engine technology and the addition of a higher percentage of electric vehicles to the fleet. As shown Table 7.33 and Figure 7.4 in Volume 3 of this EIAR, the Proposed Scheme will be overall neutral in terms of annual mean PM_{10} concentrations, with all receptors experiencing a negligible impact. As shown in Table 7.33 and Figure 7.5 in Volume 3 of this EIAR, the Proposed Scheme will be neutral overall in terms of the annual mean $PM_{2.5}$ concentration with all receptors experiencing a negligible impact.

In accordance with the EPA Guidelines (EPA 2022), the impacts associated with the Operational Phase traffic emissions pre-mitigation are overall Neutral and Long-term.

The predictions reported are based on conservative assumptions regarding background pollutant concentrations and the improvement in vehicle emission rates. 2019 background pollutant concentrations have been used to represent 2028 and are likely to be lower by the opening year than in 2019. Older fleet projections were used in the absence of a fleet that incorporates the effects of 2021 Climate Action Plan measures – a larger proportion of electric vehicles is planned by the opening year than has been modelled. In reality, total concentrations (and magnitude of change) are likely to be lower than those reported here.

7.4.3.4 Ecological Assessment

An assessment of the impact of the Proposed Scheme has been undertaken using the approach outlined in the IAQM guidance document A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1) (IAQM 2020). The guidance states that where the PEC is less than 70% of the long-term critical level / load, the process contribution is likely to be insignificant. Where the process contribution is greater than 1% of the critical level / load it is recommended that the project ecologist should be consulted.

The impact of the Proposed Scheme on the nearby ecologically sensitive areas within 200m of roads impacted by the Proposed Scheme, as defined in Section 7.2.4, is outlined in Table 7.34. The annual mean NO_X concentration has been compared to the critical level of 30μg/m^3 at each of the designated habitat sites. All sites will exceed the critical level for NO_X in both the DM and the DS scenarios.

Nitrogen deposition levels have been compared to the lower and higher critical loads for the designated habitat sites in Table 7.35. All sites will be below the lower critical load for the designated habitat site in both the DM and the DS scenarios, with the exception of the Grand Canal pNHA (Baggot Street Bridge, Canal Road, Charlemont Bridge, Haddington Road, La Touche Bridge and Leeson Bridge).

In accordance with the EPA Guidelines (EPA 2022) the ecological impacts associated with the Operational Phase traffic emissions will overall be Negative, Slight and Long-term.

Table 7.34: Significance of Impacts at Key Ecological Receptors (NO_2 Annual Mean Concentration In 2028)

Annual Mean NO_2 in 2028 At Closest Point Within Ecological Site To Road							
Receptor	Receptor Location (ITM)	DM (µg/m³)	Distance from Road Beyond which Concentration is Below Critical Level (30 µg/m³) (m)	DS (µg/m³)	Distance from Road Beyond which Concentration is Below Critical Level (30 µg/m³) (m)	Impact (DS – DM) (µg/m³)	Change as a Percentage of Critical Level (30 µg/m³) (%)
Booterstown Marsh pNHA (Rock Road)	720171, 730286	51.7	>200m	55.8	>200m	4.2	14%
Grand Canal pNHA (Baggot St Bridge, western side)	716851, 732986	82.6	>200m	90.7	>200m	8.1	27%
Grand Canal pNHA (Baggot St Bridge, eastern side)	716866, 732989	121.6	>200m	136.8	>200m	15.2	51%
Grand Canal pNHA (Canal Road)	715821, 732513	92.5	>200m	77.3	>200m	-15.2	-51%
Grand Canal pNHA (Charlemont Bridge, western side)	715881, 732544	86.3	>200m	85.8	>200m	-0.5	-2%
Grand Canal pNHA (Charlemont Bridge, eastern side)	715894, 732549	107.7	>200m	112.6	>200m	4.8	16%
Grand Canal pNHA (Charlemont Mall)	715672, 732497	72.6	>200m	68.3	>200m	-4.4	-15%
Grand Canal pNHA (Cheltenham Road)	716863, 733129	32.5	>200m	32.8	>200m	0.3	1%
Grand Canal pNHA (Dartmouth Walk)	716126, 732631	64.6	>200m	54.0	>200m	-10.6	-35%
Grand Canal pNHA (Haddington Road)	716883, 732978	110.0	>200m	124.4	>200m	14.3	48%
Grand Canal pNHA (Huband Bridge, north side)	717062, 733223	39.9	>200m	42.3	>200m	2.3	8%
Grand Canal pNHA (Huband Bridge, south side)	717057, 733217	36.7	>200m	38.2	>200m	1.5	5%
Grand Canal pNHA (La Touche Bridge, western side)	715609, 732499	98.7	>200m	103.6	>200m	4.8	16%
Grand Canal pNHA (La Touche Bridge, eastern side)	715621, 732500	117.9	>200m	126.4	>200m	8.5	28%
Grand Canal pNHA (Leeson Bridge, western side)	716368, 732736	111.4	>200m	83.3	>200m	-28.2	-94%
Grand Canal pNHA (Leeson Bridge, eastern side)	716382, 732741	145.8	>200m	104.7	>200m	-41.1	-137%
Grand Canal pNHA (Percy Place, northern end)	717137, 733286	34.8	>200m	35.0	>200m	0.3	1%
Grand Canal pNHA (Percy Place, southern end)	716948, 733044	38.8	>200m	40.4	>200m	1.7	6%

Annual Mean NO_2 in 2028 At Closest Point Within Ecological Site To Road							
Receptor	Receptor Location (ITM)	DM (μg/m³)	Distance from Road Beyond which Concentration is Below Critical Level (30 μg/m³) (m)	DS (μg/m³)	Distance from Road Beyond which Concentration is Below Critical Level (30 μg/m³) (m)	Impact (DS – DM) (μg/m³)	Change as a Percentage of Critical Level (30 μg/m³) (%)
Loughlinstown Wood pNHA (Bray Road)	724496, 723292	64.6	>200m	58.3	>200m	-6.3	-21%
Loughlinstown Wood pNHA (Commons Road)	725024, 723001	35.8	>200m	36.3	170m	0.5	2%

Table 7.35: Significance of Impacts at Key Ecological Receptors (N Deposition In 2028)

Annual Mean N Deposition in 2028 At Closest Point Within Ecological Site To Road									
Receptor	Receptor Location (ITM)	Lower Critical Load for Most Sensitive Feature (kgN/ha/yr)	DM (kgN/ha/yr)	Distance From Road Beyond which Deposition is Below Critical Load (m)	DS (kgN/ha/yr)	Distance from Road Beyond which Deposition is Below Critical Load (m)	Change Relative to Lower Critical Load (%)	Distance from Road Beyond which the Change is <1% (m)	Change in Deposition >0.4 kgN/ha/yr?
Booterstown Marsh pNHA (Rock Road)	720171, 730286	5	3.18	0m	3.38	0m	4%	50m	0.20
Grand Canal pNHA (Baggot St Bridge, western side)	716851, 732986	5	4.60	0m	4.94	0m	7%	110m	0.34
Grand Canal pNHA (Baggot St Bridge, eastern side)	716866, 732989	5	6.17	10m	6.74	10m	11%	>200m	0.57
Grand Canal pNHA (Canal Road)	715821, 732513	5	5.02	10m	4.37	0m	-13%	0m	-0.65
Grand Canal pNHA (Charlemont Bridge, western side)	715881, 732544	5	4.76	0m	4.74	0m	0%	0m	-0.02
Grand Canal pNHA (Charlemont Bridge, eastern side)	715894, 732549	5	5.64	10m	5.83	10m	4%	10m	0.19
Grand Canal pNHA (Charlemont Mall)	715672, 732497	5	4.16	0m	3.96	0m	-4%	0m	-0.20
Grand Canal pNHA (Cheltenham Road)	716863, 733129	5	2.21	0m	2.22	0m	0%	0m	0.02
Grand Canal pNHA (Dartmouth Walk)	716126, 732631	5	3.79	0m	3.29	0m	-10%	0m	-0.50
Grand Canal pNHA (Haddington Road)	716883, 732978	5	5.73	10m	6.28	20m	11%	>200m	0.55
Grand Canal pNHA (Huband Bridge, north side)	717062, 733223	5	2.59	0m	2.71	0m	2%	20m	0.12
Grand Canal pNHA (Huband Bridge, south side)	717057, 733217	5	2.42	0m	2.50	0m	2%	10m	0.08
Grand Canal pNHA (La Touche Bridge, western side)	715609, 732499	5	5.28	0m	5.47	10m	4%	10m	0.20
Grand Canal pNHA (La Touche Bridge, eastern side)	715621, 732500	5	6.03	10m	6.36	10m	6%	20m	0.32
Grand Canal pNHA (Leeson Bridge, western side)	716368, 732736	5	5.78	10m	4.63	0m	-23%	0m	-1.15

Annual Mean N Deposition in 2028 At Closest Point Within Ecological Site To Road									
Receptor	Receptor Location (ITM)	Lower Critical Load for Most Sensitive Feature (kgN/ha/yr)	DM (kgN/ha/yr)	Distance From Road Beyond which Deposition is Below Critical Load (m)	DS (kgN/ha/yr)	Distance from Road Beyond which Depositio n is Below Critical Load (m)	Change Relative to Lower Critical Load (%)	Distance from Road Beyond which the Change is <1% (m)	Change in Deposition >0.4 kgN/ha/yr?
Grand Canal pNHA (Leeson Bridge, eastern side)	716382, 732741	5	7.07	20m	5.52	10m	-31%	0m	-1.55
Grand Canal pNHA (Percy Place, northern end)	717137, 733286	5	2.33	0m	2.34	0m	0%	0m	0.01
Grand Canal pNHA (Percy Place, southern end)	716948, 733044	5	2.53	0m	2.62	0m	2%	10m	0.09
Loughlinstown Wood pNHA (Bray Road)	724496, 723292	5	3.80	0m	3.50	0m	-6%	0m	-0.30
Loughlinstown Wood pNHA (Commons Road)	725024, 723001	5	2.38	0m	2.41	0m	1%	10m	0.03

7.4.3.5 Regional Air Quality Assessment

The potential changes in regional air emissions due to the Operational Phase traffic impacts of the Proposed Scheme have been assessed using the NTA Environmental Appraisal Tool, which is based on ENEVAL. ENEVAL measures the regional air emissions associated with road transport based on the various road links and their corresponding emissions.

Pollutant emissions (in tonnes) produced in both the DM and DS scenarios during the Opening Year of the Operational Phase are shown in Table 7.36. The Proposed Scheme will be detrimental overall, with increases in emissions of all pollutants modelled, where an increase in emissions from cars and light and heavy goods vehicles offsets the reductions achieved by cleaner buses in the fleet. This also reflects the technical challenges in converting particularly the heavy goods fleet to electric vehicles, which would reduce NO_X and NO_2 emissions. Reductions in bus emissions result from a cleaner and more efficiently routed bus fleet. The NTA has committed to replacing its diesel powered vehicles with plug-in hybrid and fuel cell electric buses by 2028 and zero emission vehicles by 2043, so the reductions in bus emissions due to the Proposed Scheme will be due to more efficiently operated routes, meeting the Scheme Objectives.

Table 7.36: Operational Phase Regional Pollutant Emissions (tonnes) – Opening Year 2028

Scenario	Vehicle Class	NO_X (tonnes)	NO_2 (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	HC (tonnes)	CO (tonnes)	Benzene (tonnes)	Butadiene (tonnes)
DM	Car	308	89	2	2	19	393	0.2	0.3
DS		310	90	2	2	19	398	0.2	0.3
Change		2	0.4	0.02	0.02	0.3	6	0.003	0.0003
% Change		0.5%	0.5%	1%	1%	1%	1%	1%	0.1%
DM	Goods	346	99	0.7	0.6	9	50	0.1	0.1
DS		347	99	0.7	0.6	9	52	0.1	0.1
Change		1	-0.02	0.01	0.01	0.1	2	0.01	0.001
% Change		0.3%	-0.02%	2%	2%	1%	3%	5%	1%
DM	Urban Bus	6	0.6	0.1	0.05	0.2	2	0	0.002
DS		6	0.6	0.0	0.05	0.2	2	0	0.002
Change		-0.1	-0.01	-0.002	-0.002	-0.01	-0.1	0	-0.0001
% Change		-2%	-2%	-3%	-3%	-4%	-3%	0%	-4%
DM	**Total**	**660**	**189**	**3**	**3**	**28**	**445**	**0.3**	**0.4**
DS		**663**	**189**	**3**	**3**	**29**	**452**	**0.3**	**0.4**
Change		**2**	**0.4**	**0.03**	**0.03**	**0.3**	**7**	**0.01**	**0.001**
% Change		**0.4%**	**0.2%**	**1%**	**1%**	**1%**	**2%**	**3%**	**0.3%**

Pollutant emissions (in tonnes) produced in both the DM and DS scenarios during the Design Year of the Operational Phase are shown in Table 7.37. The impact of the Proposed Scheme is overall negative, with small increases in emissions of all pollutants modelled. Increases in emissions from cars and light and heavy goods vehicles offset the reductions achieved by more electric and fuel cell buses in the fleet. This also reflects the technical challenges in converting particularly the heavy goods fleet to electric vehicles, which would reduce NO_X and NO_2 emissions.

Table 7.37: Operational Phase Regional Pollutant Emissions (tonnes) – Design Year 2043

Scenario	Vehicle Class	NO_X (tonnes)	NO_2 (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	HC (tonnes)	CO (tonnes)	Benzene (tonnes)	Butadiene (tonnes)
DM	Car	123	35	1	1	9	163	0.1	0.1
DS		123	36	1	1	9	166	0.1	0.1
Change		0.3	0.1	0.01	0.01	0.1	2	0.001	0.00001
% Change		0.3%	0.3%	1%	1%	1%	1%	1%	0.01%
DM	Goods	215	56	0.6	0.6	6	36	0.1	0.1
DS		221	57	0.6	0.6	6	37	0.1	0.1
Change		6	1	0.01	0.01	0.1	1	0.004	0.001
% Change		3%	2%	2%	2%	2%	4%	6%	1%
DM	Urban Bus	0	0	0.05	0.05	0	0	0	0
DS		0	0	0.05	0.04	0	0	0	0
Change		0	0	-0.002	-0.002	0	0	0	0
% Change		0%	0%	-4%	-4%	0%	0%	0%	0%
DM	**Total**	**338**	**91**	**2**	**2**	**15**	**199**	**0.1**	**0.2**
DS		**344**	**92**	**2**	**2**	**16**	**203**	**0.2**	**0.2**
Change		**6**	**1**	**0.02**	**0.02**	**0.2**	**4**	**0.005**	**0.001**
% Change		**2%**	**1%**	**1%**	**1%**	**1%**	**2%**	**3%**	**0.5%**

In accordance with the EPA Guidelines (EPA 2022), and considering that the change in emissions is within the traffic model and ENEVAL tool margin of uncertainty, the regional impacts associated with the Operational Phase traffic emissions pre-mitigation are considered overall Neutral and Long-term.

7.5 Mitigation and Monitoring Measures

In order to sufficiently ameliorate the likely air quality impact, a schedule of mitigation measures has been formulated for the Construction Phase of the Proposed Scheme.

7.5.1 Construction Phase

7.5.1.1 Construction Dust

In order to minimise dust nuisance impacts, a series of mitigation measures that are applicable to the Construction Phase of the Proposed Scheme will be implemented by the appointed contractor. In summary, the mitigation measures will include:

- Public roads affected by the Proposed Scheme will be regularly inspected for cleanliness and cleaned as necessary;
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays (or similar dust suppression methods) will be used as required if particularly dusty activities associated with the construction contract are necessary during dry or windy periods;
- During movement of dust generating materials both on and off-site, trucks will be covered with tarpaulin, and before entrance onto public roads, trucks will be checked to ensure the tarpaulins are properly in place; and
- The appointed contractor will provide a site hoarding of 2.4m height along noise sensitive boundaries, at a minimum, at the Construction Compounds, which will assist in minimising the potential for dust impacts off-site.

The appointed contractor will keep the effectiveness of the mitigation measures under review and revise them as necessary. In the event of dust nuisance occurring outside the works boundary associated with the Proposed Scheme, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem.

7.5.1.2 Construction Traffic

Construction vehicles, generators etc., may give rise to some NO_2 and PM_{10} / $PM_{2.5}$ emissions. Table 7.38 summarises the Construction Phase impacts pre and post mitigation. In terms of construction traffic impacts, the Proposed Scheme will have a generally neutral impact on air quality, with some slight beneficial impacts. Due to worst-case scenario modelling where in reality the works will be short-term and temporary in nature, the impact on air quality will not be significant. Therefore, no specific Construction Phase mitigation or monitoring measures are required.

Table 7.38: Summary of Predicted Construction Phase Impacts Following the Implementation of Mitigation and Monitoring Measures

Assessment Topic	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post Mitigation and Monitoring)
Construction dust	Negative, Not Significant, Short-term	Neutral, Short-term
Road traffic impacts on local human receptors	Neutral, Short-term	Neutral, Short-term
Road traffic impacts on local ecological receptors	Negative, Slight, Short-term	Negative, Slight, Short-term
Regional air quality	Neutral, Short-term	Neutral, Short-term

7.5.2 Operational Phase

Table 7.39 summarises the Operational Phase impacts prior and post mitigation. As the Proposed Scheme will have a generally neutral impact on air quality, no specific Operational Phase mitigation measures are recommended. The area where moderate adverse impacts were modelled is on the R111 Baggot Street Upper junction with Mespil Road, and both Existing Baseline and DM NO_2 concentrations are modelled near the limit value of 40 µg/m^3. The impact from the Proposed Scheme derives both from these high baseline concentrations and increase in traffic flows at this location due to the Proposed Scheme. Whilst not a mitigation measure as such, it is noted that in time, vehicle emissions technology will improve and the Irish vehicle fleet will continue to evolve to the extent that vehicle emissions impacts associated with the Proposed Scheme are anticipated to be short-term. City wide traffic management measures and proactive encouragement of low emissions vehicle uptake would accelerate these improvements.

Table 7.39: Summary of Predicted Operational Phase Impacts Following the Implementation of Mitigation and Monitoring Measures

Assessment Topic	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post Mitigation and Monitoring)
Road traffic impacts on local human receptors	Neutral, Long-term	Neutral, Long-term
Road traffic impacts on local ecological receptors	Negative, Slight, Long-term	Negative, Slight, Long-term
Regional air quality	Neutral, Long-term	Neutral, Long-term

7.6 Residual Impacts

7.6.1 Construction Phase

When the dust minimisation measures detailed in the mitigation section of this Chapter are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors. Thus, there will be no significant residual Construction Phase dust impacts.

The air dispersion modelling assessment of Construction Phase traffic emissions has found that the Proposed Scheme will be neutral overall in the study area. There are no substantial or moderate adverse effects expected as a result of the Construction Phase of the Proposed Scheme.

Therefore, overall it is considered that the residual effects as a result of the Proposed Scheme's construction are Neutral and Short-term. No significant residual impacts have been identified during the Construction Phase of the Proposed Scheme, whilst meeting the scheme objectives set out in Chapter 1 (Introduction).

7.6.2 Operational Phase

The air dispersion modelling assessment has found that the majority of all modelled receptors are predicted to experience negligible impacts due to the Proposed Scheme, and beneficial impacts are also estimated along the length of the Proposed Scheme. The number of receptors where an exceedance of the NO_2 limit value is predicted decreases as a result of the Proposed Scheme.

There are localised residual moderate adverse effects predicted at human receptors on the R111 Baggot Street Upper junction with Mespil Road as a result of the 2028 Operational Phase of the Proposed Scheme which are considered significant as NO_2 concentrations are predicted to exceed the limit value. However, NO_2 concentrations are expected to reduce to slight adverse or negligible by 2043, due to reductions in emissions between 2028 and 2043 from advancements in engine technology and the addition of a higher percentage of electric vehicles to the fleet. The localised impacts at human receptors on R111 Baggot Street Upper junction with Mespil Road due to the 2028 Operational Phase of the Proposed Scheme are therefore considered Negative, Significant and Short-term.

In 2043 all receptors are expected to have ambient air quality in compliance with the ambient air quality standards for the DM and the DS scenarios. Overall, it is considered that the residual effects as a result of the Proposed Scheme's operation are Neutral and Long-term.

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

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

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

S.I. No. 739 of 2022 Air Quality Standards Regulations 2022

S.I. No. 271/2002 - Air Quality Standards Regulations 2002