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 Swords 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 access 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 reviewed 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 12 kilometre (km) from Pinnock Hill, Swords to Granby Row in the City Centre, 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 BusConnects Dublin - Core Bus Corridors Infrastructure Works (hereafter referred to as CBC Infrastructure 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) 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 100m 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 will 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) (Transport Infrastructure Ireland (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 will be 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 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) or diverted routes within the key impacted study areas focused within 50m to 100m. The range of air quality sensitive receptors for the five geographical sections are discussed in Table 7.1. The locations of sensitive receptors are provided initially in Table 7.19 and also in Figure 7.3 to Figure 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
Pinnock Hill to Airside Junction	The key air quality sensitive receptors are residential receptors at Boroimhe Willows and Carlton Court. In addition to these estates, there are a small number of detached houses within 50m of the R132. The study area includes the Tara Winthrop Private Clinic, which is a high sensitivity receptor located to the south of the R132 junction with the L2305 within 100m of the R132. This geographical section also includes medium sensitivity commercial properties such as the Premier Inn Dublin Airport hotel, Travelodge Dublin Airport North Swords hotel and Glenmore House B&B. The Airside Retail Park is located to the east of the Proposed Scheme at the junction with the L2305.
Airside Junction to Northwood Avenue	Due to the nature of this geographical section, between Pinnock Hill to Airside Roundabout, the key air quality sensitive receptors are medium sensitivity commercial properties. There are a low number of high sensitivity residential properties south of the Airside Junction within 10m of the R132.
Northwood Avenue to Shantalla Road	Within this study area the key air quality sensitive receptors are predominately residential dwellings which bound the east and west of the R132. A large number of these high sensitivity residential receptors are within 10m of the road edge. In addition to the residential receptors there are a number of medium sensitivity commercial receptors including Omni Shopping Centre and low sensitivity leisure receptors, Santry Park and Morton Stadium, within this study area.
Shantalla Road to Botanic Avenue	Within this study area, the key air quality sensitive receptors are predominately residential dwellings which bound the R132 to the east and west. Highfield Hospital, Whitehall Church of the Holy Child and Plunkett College are sensitive receptors located within 50m of the Proposed Scheme.
Botanic Avenue to Granby Row	Within this study area, the key air quality sensitive receptors are predominately high sensitivity residential dwellings in addition to the high sensitivity Rotunda, Mater Private and Temple Street Hospitals, which are also within 50m of the Proposed Scheme. St Mary's Primary School is located within 10m of the alignment, Gardiner Street School and Belvedere College are also within 200m of the Proposed Scheme. In addition to the high sensitivity receptors, medium sensitivity commercial receptors are located within 10m throughout the area of potential impact.

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 impact 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);
- Highways England's Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality (hereafter referred to as LA 105 Air Quality) (Highways England 2019); and

- 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 (Highways England 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 in the Air Quality Regulations, which incorporate the CAFE Directive. The Air Quality Regulations set limit values for the relevant 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/m³ (micrograms per cubic metre) NO_2
		Annual limit for protection of human health	40µg/m³ NO_2
Nitrogen Oxides (NO + NO_2)		Critical limit for the protection of vegetation and natural ecosystems	30µg/m³ NO + NO_2
Lead	S.I. 739 of 2022	Annual limit for protection of human health	0.5µg/m³
SO_2	S.I. 739 of 2022	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	350µg/m³
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	125µg/m³
		Critical limit for the protection of vegetation and natural ecosystems (calendar year and winter)	20µg/m³
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/m³
		Annual limit for protection of human health	40µg/m³
PM (as $PM_{2.5}$)	S.I. 739 of 2022	Annual limit for protection of human health	25µg/m³
Benzene	S.I. 739 of 2022	Annual limit for protection of human health	5µg/m³

Pollutant	Regulation*	Limit Type	Value**
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 Guideline 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 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 PM2.5 target of 5 µg/m3. The strategy also acknowledges that “meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both PM2.5 and NO2”. 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.

In May 2020, as part of the joint WHO/United Nations Environment Program (UNEP)/World Bank *BreatheLife* campaign, the four Dublin local authorities signed a commitment to achieve the WHO Air Quality Guidelines (WHO 2006) by a target date of 2030.

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)	Value
NO_2	WHO Air Quality Guidelines	24-hour limit for protection of human health	50µg/m3 NO2	50µg/m3 NO2	25µg/m^3 NO_2
		Annual limit for protection of human health	30µg/m3 NO2	20µg/m3 NO2	10µg/m^3 NO_2
PM (as PM_{10})		24-hour limit for protection of human health	75µg/m3 PM10	50µg/m3 PM10	45µg/m^3 PM_{10}
		Annual limit for protection of human health	30µg/m3 PM10	20µg/m3 PM10	15µg/m^3 PM_{10}
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5µg/m3 PM2.5	25µg/m3 PM2.5	15µg/m^3 $PM_{2.5}$
		Annual limit for protection of human health	15µg/m3 PM2.5	10µg/m3 PM2.5	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) (milligrams, per metre squared, per 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. This 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 2010 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 25.6kt (kilotonnes) for SO_2 (65% reduction on 2005 levels), 66.8kt for NOx (49% reduction on 2005 levels), 56.3kt for NMVOCs (25% reduction on 2005 levels), 112.1kt for NH_3 (1% reduction on 2005 levels) and 15.6kt 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 (kilotonnes) (and % Reduction Compared to 2005 Levels)	2030 Reduction Commitments (kilotonnes) (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 monitoring station in 2019 (EPA 2020a), a Dublin Region Air Quality Action Plan by Dublin Local Authorities in conjunction with the EPA was legally required by the end of 2021 (DCC, Fingal County Council, South Dublin County Council, Dún Laoghaire-Rathdown County Council 2021). The Air Quality Action 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 publication by TII (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 most recent annual report 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 Services online mapping services. This review is discussed in Section 7.2.4.2.

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 seven locations as detailed in Section 7.3.2.2 and as shown in Figure 7.1 in 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 Guidelines to be Contained in Environmental Impact Assessment Reports (EPA 2022) and using the methodology outlined in LA 105 Air Quality (Highways England 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 (NTA 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,walking or cycling.

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 base models to produce a national emission figure for carbon dioxide (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 DMRB air quality guidance was revised with the publication of LA 105 Air Quality (Highways England 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 United Kingdom Highways Agency (UKHA) Design Manual for Roads and Bridges document & calculation spreadsheet (UKHA 2007) and TII Air Quality Guidelines (TII 2011). However, guidance has now been updated by Highways England (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 Systems (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. Towards the City Centre, ambient NO_2 concentrations were measured in excess of 36µg/m^3. LA 105 Air Quality guidance states that 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 (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 2019, 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 Dublin Airport 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 2024 peak Construction Year (2024) and Opening Year (2028) respectively;
- National Transport Model (NTM) fleet projections provided in UK Technical Advisory Group (TAG) (UK Department for Transport 2020) 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 NO_X (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 (2020)	Construction Year (2024)	Operational Year (2028)	Design Year (2043)
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 Port Tunnel

The one source of tunnel emissions within the model domain is the northern exit of the Port road tunnel. To derive total vehicle emissions from road traffic utilising the tunnels, the EFT v10.1 was used to calculate the road traffic emissions for the links within the tunnels. Tunnel portal emissions are modelled using the emissions on the outflow links (those leaving the tunnel). Tunnel Portals are located at the northern (M50) end of the Port Tunnel. The southern exit near the port was excluded as it was outside the model domain.

7.2.4.1.4 Verification Study – Year 2019 Traffic Data

Model verification investigates the level of agreement between modelled and measured concentrations. Difference 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 2018), 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 metres.	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 Advanced 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 EFT v.9.0 dataset.	UK 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 Dublin Airport 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 Dublin Airport.
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.

Parameter	Description	Input Value
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 seven 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 underpredicts total NO_2 concentrations by around 21%.

Table 7.7: Diffusion Tube Monitoring Data Used for Model Verification

Diffusion Tube	Modelled NO_X Concentration ($\mu g/m^3$)	Modelled NO_2 Concentration ($\mu g/m^3$)	Monitored NO_X Concentration ($\mu g/m^3$)	Monitored NO_2 Concentration ($\mu g/m^3$)	Difference [(modelled – monitored)/ (monitored) *100]	Adjustment Factor
Clonturk Avenue, D9	17.9	30.2	65.1	49.8	-42%	2.55
2.4	17.4	26.5	36.8	37.8	-24%	
2.5	22.4	29.1	48.8	43.0	-28%	
2.2	9.3	23.6	26.2	32.9	-25%	
2.6	12.3	24.5	26.9	33.2	-21%	
2.3	13.1	28.6	19.0	29.4	-10%	1.40
Drumcondra Library	3.4	21.3	2.5	21.0	2%	

In line with LAQM (TG22) (DEFRA 2022b) 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:

- 2.55 – 'More congested'. Applied to modelled receptors closest to the R836 and R125 in Swords, the R104 Swords Road in Santry, the N1 from M50 junction to the City Centre, the R108 Phibsborough Road, the R101 North Circular Road, the R803 Summerhill/Parnell Street, the R802 Gardiner Street, R132 in the City Centre, the M50 and the M1; and
- 1.40 – '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 3.72µg/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.

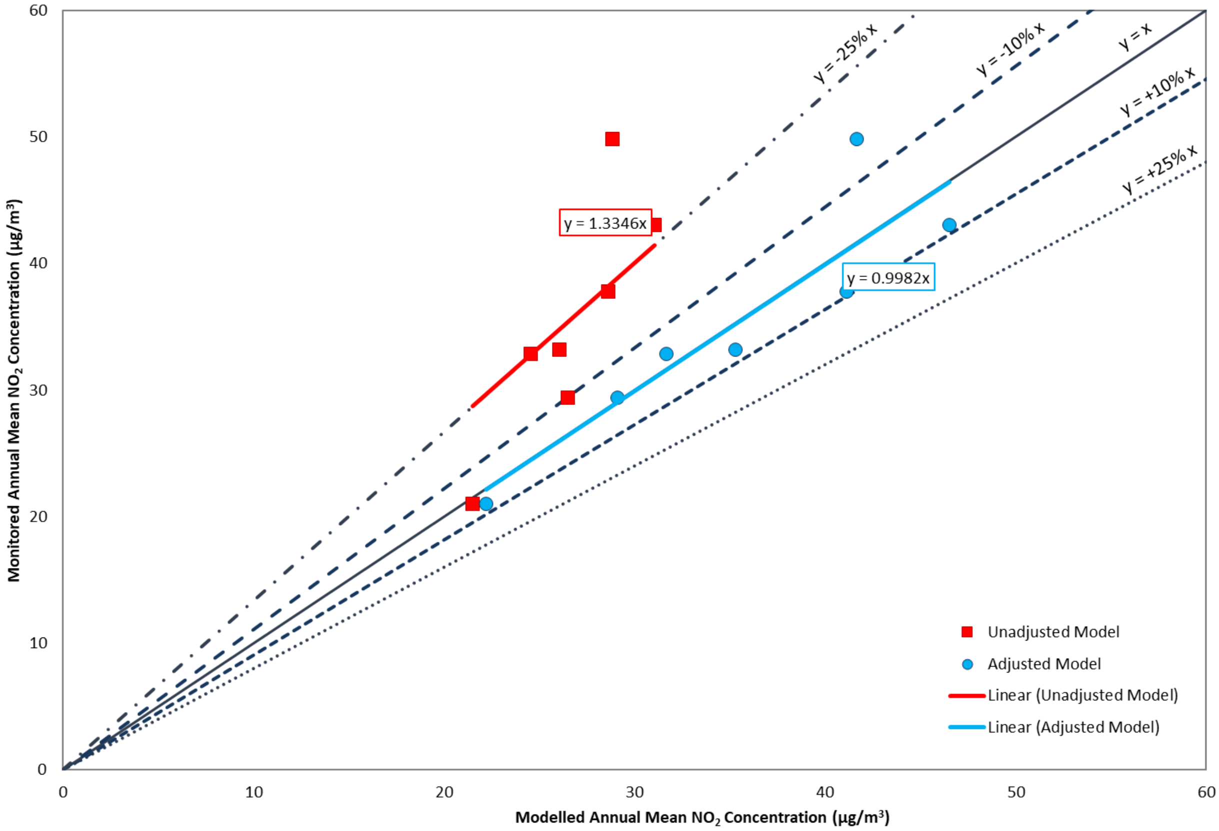


Diagram 7.1: Dispersion Model Verification - Comparison of Monitored and Modelled NO_2 Concentrations (µg/m³)

7.2.4.1.5 Air Quality Impact Significance Criteria

The TII Air Quality Guidelines (TII 2011) details 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 > 50µg/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 Proposed Scheme (⩾35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Proposed Scheme (32 - <35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Proposed 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 Proposed Scheme (⩾35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value with Proposed Scheme (32 - <35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value With Proposed Scheme (26 - <32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value With Proposed 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 LA 105 Air Quality (Highways England 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, in accordance with TII guidance, 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 Air Quality (Highways England 2019) 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 shown in Figure 12.3 in Volume 3 of this EIAR and are:

- Santry Demesne proposed Natural Heritage Area (pNHA) (Site Code: 000178);
- Feltrim Hill pNHA (Site Code: 001208);
- Malahide Estuary pNHA (Site Code: 000205);
- Malahide Estuary Special Protection Area (SPA) (Site Code: 004025);
- Malahide Estuary Special Area of Conservation (SAC) (Site Code: 000205); and
- Royal Canal pNHA (Site Code 002103).

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 (TII 2009) 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 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). There are a number of designations made within these sensitive sites for the protection of a specific habitat type. The sites are designated for the following habitats and/or species listed on Annex I/II of the E.U. Habitats Directive:

- Mudflats and sandflats not covered by seawater at low tide;
- Salicornia and other annuals colonising mud and sand;
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*);
- Mediterranean salt meadows (*Juncetalia maritimi*);
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes);
- Fixed coastal dunes with herbaceous vegetation (grey dunes);
- Great Crested Grebe (*Podiceps cristatus*);
- Light-bellied Brent Goose (*Branta bernicla hrota*);
- Shelduck (*Tadorna tadorna*);
- Pintail (*Anas acuta*);
- Goldeneye (*Bucephala clangula*);
- Red-breasted Merganser (*Mergus serrator*);
- Oystercatcher (*Haematopus ostralegus*);
- Golden Plover (*Pluvialis apricaria*);
- Grey Plover (*Pluvialis squatarola*);
- Knot (*Calidris canutus*);
- Dunlin (*Calidris alpina*);
- Black-tailed Godwit (*Limosa limosa*);
- Bar-tailed Godwit (*Limosa lapponica*) [A157];
- Redshank (*Tringa totanus*) and
- Wetland and waterbirds

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 (keq 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 keq 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 (Highways England 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 Guidance (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 here 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 limit value 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 limit value objective for PM_{10} (in the case of the 24-hour limit value 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 (IAQM 2014) also outlines 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 area 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/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28µg/m^3 - 32µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24µg/m^3 - 28µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	< 24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	> 32µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28µg/m^3 - 32µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24µg/m^3 - 28µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	< 24µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	1+	Low	Low	Low	Low	Low

Dust deposition impacts on ecology can occur due to chemical or physical effects. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Often impacts will be reversible once the works are completed, and dust deposition ceases. Designated sites within 50m of the boundary of the site or within 50m of the Proposed Scheme 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. The Royal Canal pNHA (Site Code: 0001203) is one sensitive ecological receptor 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 Guidance 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.

The Proposed Scheme will run along the eastern boundary of Dublin Airport at the closest point. The Dublin Airport meteorological station collects meteorological data in the correct format for the purposes of this assessment and has a data collection of greater than 90%. Long-term hourly observations at Dublin Airport meteorological station provide an indication of the prevailing wind conditions for the region (see Diagram 7.2). Results indicate that the prevailing wind direction is from the south and west over the period 2015 to 2019.

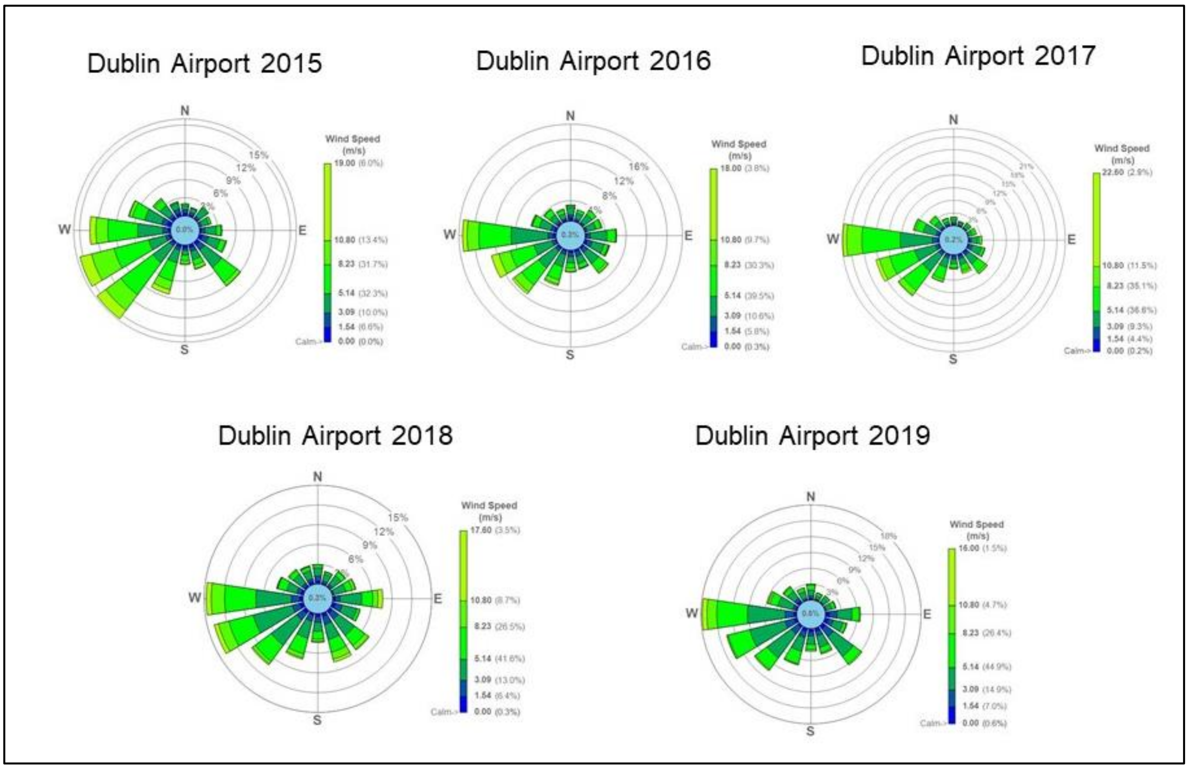


Diagram 7.2: Dublin Airport Meteorological Station Windrose 2015 to 2019 (Met Éireann 2020)

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 the writing, Air Quality in Ireland 2019 (EPA 2020a), 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 2020a). 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 area of the Proposed Scheme is located within Zone A, as shown in Figure 7.2 in Volume 3 of this EIAR (EPA 2020a).

With regard to NO_2, continuous monitoring data from the EPA Zone A stations was reviewed. The stations representative of the Proposed Scheme include Swords, Ballyfermot, Rathmines, Coleraine Street (closed in 2017) and Winetavern Street. Sufficient data is available for the stations in Swords, Ballyfermot, Rathmines, Coleraine Street and Winetavern Street 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 three suburban background sites (Swords, Ballyfermot and Rathmines) range from 13µg/m^3 to 22µg/m^3 over the period 2015 to 2019, with an average concentration of 17µg/m^3 in 2019 compared to the annual limit value of 40µg/m^3.

Long-term annual average levels at the two urban traffic sites (Coleraine Street and Winetavern Street) in the City Centre range from 25µg/m^3 to 37µg/m^3 over the period 2015 to 2019, with an average concentration of 29µg/m^3 in 2019 compared to the annual limit value of 40µg/m^3. There were no exceedances of the one-hour limit value of 200µg/m^3 at the suburban background or urban stations over the last five years.

The ambient NO_2 monitoring results for Swords, Ballyfermot, Rathmines, Winetavern Street and Coleraine Street over the period 2015 to 2019, based on a three-year rolling average, are shown in Diagram 7.3. The data and trend line indicates 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	
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
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
Coleraine Street	Urban Traffic	Annual Mean NO_2 (µg/m^3)	25	28	26	-	-	40

Station	Station Classification Council Directive 96/62/EC*	Averaging Period	Year					Limit Value
			2015	2016	2017	2018	2019	
		99.8th%ile 1-hr NO_2 (µg/m^3)	157	147	189	-	-	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

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

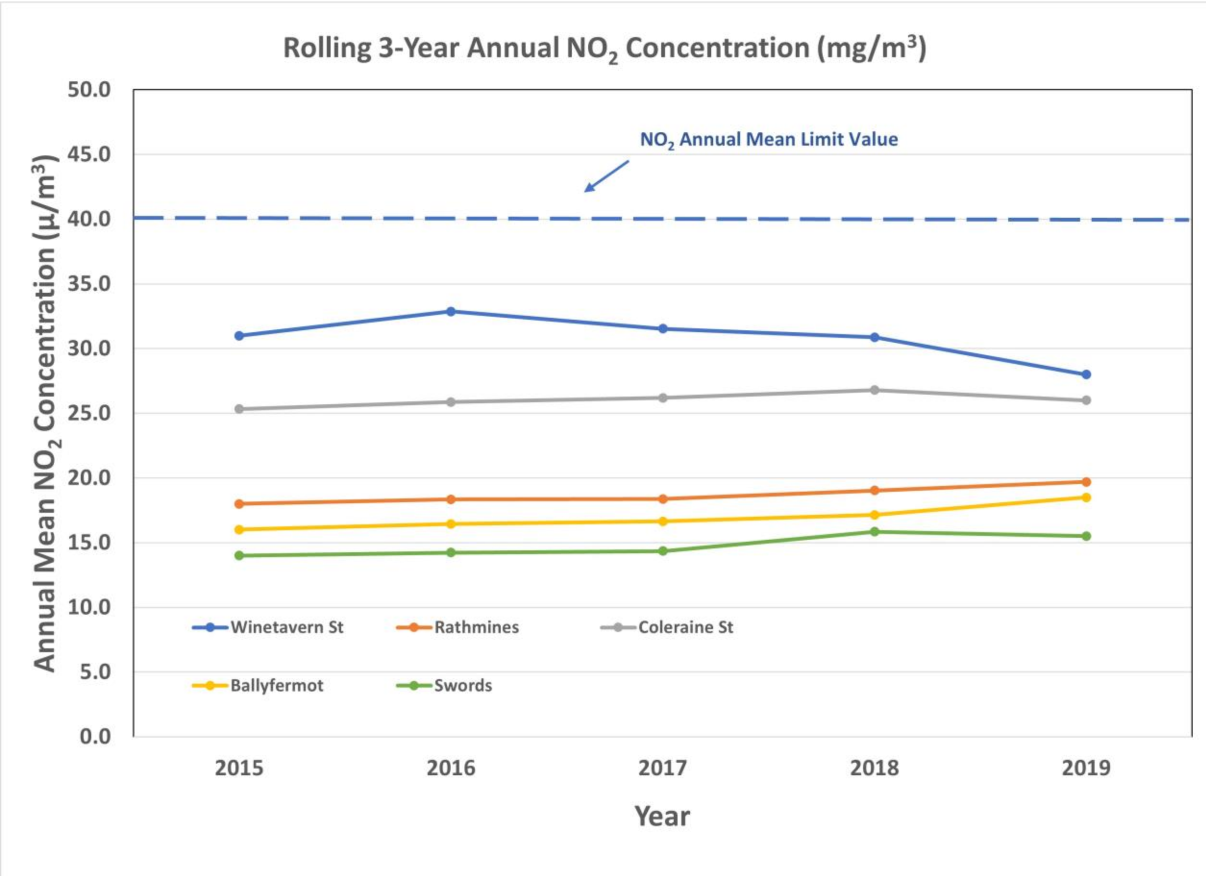


Diagram 7.3: Rolling Three-Year Annual NO_2 Concentration (µg/m^3)

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 detail 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 2018/2019 were recorded at the Bus Aras Environs locations, the Pearse Street locations, the Marino College of Further Education location and the North Wall 1 location.

Table 7.15: EPA NO_2 Diffusion Tube Monitoring Data

Monitoring Site	Monitoring Year	Annual Mean NO_2 Concentration (µg/m^3)
Aulden Grange, Santry, D9	2019	33.2
Blessington Street	2019	29.3
Bus Aras Environs 2 (Gardner St. Lower)	2019	57.2
Bus Aras Environs 3 (Amiens St. Upper)	2019	57.2
Bus Aras Environs 4 (Amiens St. Lower)	2019	50.9
Clonturk Avenue, D9	2019	49.8
Drumcondra Library	2019	21.0
Marino College of Further Education	2019	41.1
North Wall 1	2018	51.0
Pearse Street 2	2018	40.9
Pearse Street 3	2018	50.9
Pearse Street 4	2018	46.6
Pearse Street Continuous Monitor	2019	49.0

Continuous PM_{10} monitoring carried out at the suburban locations of Marino, Finglas, Tallaght, Dún Laoghaire, Ballyfermot, Rathmines, St Anne's Park and Phoenix Park showed level ranging between 11µg/m^3 - 15µg/m^3 in 2019, with a maximum of nine exceedances (at Rathmines) of the 24-hour limit value of 50µg/m3 (35 exceedances are permitted per year). Longer-term averages for Ballyfermot, Dún Laoghaire, Rathmines and Phoenix Park from 2015 to 2019 show average concentrations between 9µg/m^3 to 16µg/m^3 as shown in Table 7.16.

Average PM_{10} levels at the urban traffic monitoring location of Winetavern Street, which is south of the Proposed Scheme, 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.

Continuous $PM_{2.5}$ monitoring carried out at the Zone A locations of Ballyfermot, Phoenix Park, Finglas, Rathmines, St Anne's Park and Marino showed levels ranging between 8µg/m^3 - 10µg/m^3 in 2019. The annual average concentration measured in Marino was 9µg/m^3 in 2019, with the average concentrations of 6µg/m^3 to 9µg/m^3 over the period 2015 to 2019 compared to the annual limit value of 25µg/m^3. Marino 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 Marino was 0.64 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/m^3)	14	14	13	14	15	40
	90th%ile 24-hr PM_{10} (µg/m^3)	25	23	21	24	25	50
Rathmines	Annual Mean PM_{10} (µg/m^3)	15	15	13	15	15	40
	90th%ile 24-hr PM_{10} (µg/m^3)	28	28	24	25	24	50
Phoenix Park	Annual Mean PM_{10} (µg/m^3)	12	11	9	11	11	40
	90th%ile 24-hr PM_{10} (µg/m^3)	20	20	16	18	18	50
Ballyfermot	Annual Mean PM_{10} (µg/m^3)	12	11	12	16	14	40
	90th%ile 24-hr PM_{10} (µg/m^3)	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 ozone 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. 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. John's Road using Box 7.10 of LAQM (TG22). This factor was calculated to be 0.986 for the period of the diffusion tube monitoring.

The seven monitored locations in the vicinity of the Proposed Scheme are shown Table 7.17 and in Figure 7.1 in Volume 3 of this EIAR. Table 7.18 and Diagram 7.4 outlines the results of the baseline NO_2 diffusion tube monitoring over the period 15 November 2019 to16 March 2020.

The highest four-month average concentration was recorded at a roadside location in proximity to the junction of Wellpark Avenue on the Upper Drumcondra Road (tube no. 2.5). Concentrations at this location were 43.0μg/m^3 or 108% of the annual mean limit value with the bias adjustment and annualisation factor applied. This was the only location to show an exceedance of the annual mean limit value for NO_2. The second highest concentration, at 287 Swords Road, Santry South (tube no. 2.4), recorded a concentration of 37.8μg/m^3 or 94% of the annual mean limit value. The lowest concentration was recorded at the colocation site with the EPA monitoring station in Swords (tube no. 2.1) (19.2μg/m^3). The average concentration across all sites was 33.2μg/m^3 or 83% of the annual mean limit value of 40μg/m^3.

Based on LAQM (TG22), it can be considered that exceedances of the NO_2 one-hour objective may occur at roadside sites if the annual mean is above 60µg/m³ (DEFRA 2022b). None of the seven sites monitored are considered likely to exceed the NO_2 one-hour objective based on the results of the survey.

Table 7.17: Air Quality Monitoring Locations

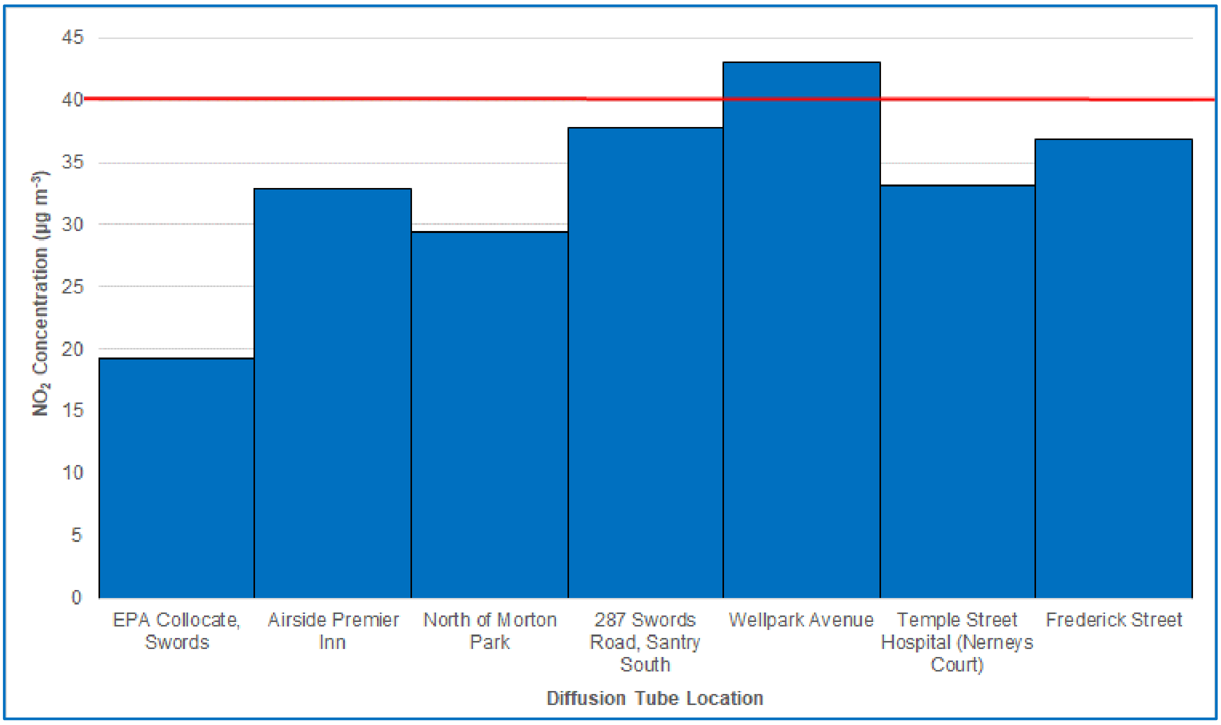
Tube No.	Reference	Site	East (ITM)	North (ITM)
2.1	CBC0002DT001	EPA Collocate, Swords (Triplicate Average)	717974	747368
2.2	CBC0002DT002	Airside Premier Inn	717741	745317
2.3	CBC0002DT003	North of Morton Park	716925	740539
2.4	CBC0002DT004	287 Swords Road, Santry South	716632	739254
2.5	CBC0002DT005	Wellpark Avenue/Drumcondra Road Upper	716338	737461
2.6	CBC0002DT006	Temple Street Hospital (Nerney's Court)	715715	735431
2.7	CBC0002DT007	Frederick Street	715595	735213

Table 7.18: Air Quality Monitoring Results

Tube No.	Site	15 November – 15 December 2019 (µg/m³)	15 December 2019 – 15 January 2020 (µg/m³)	15 January – 17 February 2020 (µg/m³)	15 February – 16 March 2020 (µg/m³)	Average	Locally Bias Adjusted and Annualised NO_2 Concentration (µg m⁻³) Note 1, Note 2
2.1	EPA Collocate, Swords (Triplicate Average)	Lost	27.8	22.9	Lost	25.3	19.2
2.2	Airside Premier Inn	50.8	44.4	Lost	34.7	43.3	**32.9**
2.3	North of Morton Park	46.8	48.8	Lost	20.5	38.7	29.4
2.4	287 Swords Road, Santry South	55.5	56.2	48.0	39.3	49.8	**37.8**
2.5	Wellpark Avenue/ Drumcondra Road Upper	66.0	64.0	55.6	41.2	56.7	**43.0**
2.6	Temple Street Hospital (Nerney's Court)	50.8	46.0	43.2	34.9	43.7	**33.2**
2.7	Frederick Street	57.1	Lost	Lost	39.9	48.5	**36.8**
Average		54.5	47.9	42.4	35.1	43.7	33.2
Max		66.0	64.0	55.6	41.2	56.7	43.0
Min		46.8	27.8	22.9	20.5	25.3	19.2

Note 1: Bias adjustment factor: 0.77, Annualisation factor: 0.98.

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/m^{-3})

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 ADMS-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, Volume 3 of this EIAR. Statistics for the full list of modelled receptors can be found in Table 1.1 (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)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ2	715427,735139	43.8	16.2	11.1	1
AQ8	715405,735172	43.9	16.0	11.0	1
AQ9	715754,735028	50.7	16.4	11.4	1
AQ11	715734,735056	39.9	15.8	11.0	1
AQ12	715349,735159	36.1	16.1	10.8	1
AQ15	715642,735181	38.2	16.2	11.2	1
AQ54	715932,736145	41.5	16.7	10.9	1
AQ85	715700,735702	53.5	18.7	11.7	2
AQ102	715976,736323	40.4	16.5	10.9	1
AQ103	715968,736305	36.5	15.8	10.6	1
AQ116	717718,745165	34.1	15.8	10.6	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ122	716460,737626	34.3	15.7	10.6	1
AQ124	716486,737677	36.7	16.0	10.7	1
AQ125	716322,737445	36.7	16.1	10.7	1
AQ130	716715,739900	32.6	16.0	10.8	1
AQ131	716779,740084	30.6	15.6	10.6	1
AQ140	716823,740382	28.6	15.3	10.5	<1
AQ142	717008,740688	33.5	15.6	10.6	1
AQ143	716672,739412	33.8	15.6	10.6	1
AQ144	716666,739359	35.5	15.8	10.6	1
AQ146	716615,739285	30.6	15.7	10.6	1
AQ148	716729,739735	31.2	15.7	10.6	1
AQ149	716699,739569	36.5	16.6	11.0	1
AQ152	716750,738324	34.3	15.9	10.7	1
AQ157	716640,739144	35.5	16.3	10.8	1
AQ159	716792,738462	34.1	16.1	10.8	1
AQ160	716831,738626	33.3	16.1	10.7	1
AQ161	716838,738676	34.5	16.1	10.7	1
AQ163	716808,738530	31.0	15.8	10.6	1
AQ165	716576,737802	29.7	15.6	10.6	1
AQ167	716812,738873	34.6	16.0	10.6	1
AQ170	716725,738217	33.5	15.7	10.6	1
AQ174	716666,739056	34.1	16.0	10.7	1
AQ180	717675,745525	31.1	15.9	10.7	1
AQ181	717705,745229	31.4	15.9	10.7	1
AQ194	717933,746144	34.8	16.3	10.8	1
AQ225	716906,738314	32.2	15.8	10.6	1
AQ282	715784,736235	29.0	15.2	10.4	<1
AQ284	715750,736206	28.0	15.1	10.4	<1
AQ285	715760,736187	29.7	15.4	10.5	<1
AQ341	715673,734937	40.2	17.1	11.1	1
AQ342	715173,734811	37.9	16.7	11.0	1
AQ343	715161,734821	35.8	16.3	10.8	1
AQ350	715529,734840	44.4	16.1	11.2	1
AQ354	715376,734937	35.8	16.3	10.9	1
AQ355	715272,735029	35.3	16.3	10.8	1
AQ356	715282,735057	33.9	16.1	10.8	1
AQ357	715233,734960	33.5	16.1	10.8	1
AQ386	715418,735866	42.8	17.2	11.1	1
AQ387	715481,735860	41.8	17.1	11.1	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ388	715545,735853	41.0	17.0	11.0	1
AQ396	715635,735758	41.1	16.8	10.9	1
AQ397	715628,735841	47.9	18.0	11.3	2
AQ398	715619,735843	42.8	17.0	11.0	1
AQ413	716028,735199	44.1	17.1	11.2	1
AQ414	716036,735180	39.1	16.4	10.9	1
AQ415	716061,735183	36.2	16.0	10.7	1
AQ417	716094,735049	42.9	17.1	11.0	1
AQ426	715776,735668	33.9	15.9	10.6	1
AQ443	715876,735475	35.1	16.1	10.8	1
AQ450	716102,735420	30.7	15.5	10.5	<1
AQ470	715904,735775	35.7	16.3	10.8	1
AQ471	716867,738954	34.7	16.4	10.8	1
AQ473	716906,739387	32.3	16.1	10.8	1
AQ475	716906,739413	33.4	16.3	11.1	1
AQ524	717830,746089	34.5	15.7	10.7	1
AQ525	715493,735321	38.3	16.1	11.2	1
AQ541	715567,735562	41.2	15.8	11.1	1
AQ542	715719,735020	36.7	16.3	10.8	1
AQ543	715659,735500	36.9	16.0	10.7	1
AQ551	715692,735462	35.2	15.9	10.6	1
AQ580	716267,735648	32.3	16.0	10.7	1
AQ581	716666,740058	37.0	16.2	10.7	1
AQ586	716539,737826	37.7	16.3	10.7	1
AQ587	716233,737178	34.0	15.7	10.6	1
AQ7	715378,735165	42.7	16.7	11.0	1
AQ14	715371,735192	42.1	16.7	11.1	1
AQ18	715552,735266	41.8	16.7	10.9	1
AQ23	715483,735360	42.0	16.9	11.1	1
AQ28	715475,735401	39.1	16.5	10.9	1
AQ48	715726,735815	40.9	16.9	11.0	1
AQ49	715878,736111	42.5	17.1	11.1	1
AQ51	715913,736107	42.2	17.0	11.0	1
AQ52	715929,736207	41.5	17.0	11.1	1
AQ56	716139,736802	43.8	17.0	11.0	1
AQ57	716117,736703	37.2	16.0	10.7	1
AQ58	716102,736815	43.6	16.4	10.8	1
AQ59	716153,736826	38.8	16.4	10.8	1
AQ61	716181,737015	41.9	16.4	10.8	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ66	716232,737086	39.6	16.6	10.8	1
AQ72	717649,743842	38.2	16.4	10.8	1
AQ73	716272,737186	38.5	16.4	10.8	1
AQ86	715819,735992	44.6	17.2	11.1	1
AQ94	715758,735885	49.6	18.2	11.5	2
AQ96	715846,736048	42.0	17.1	11.0	1
AQ99	715814,735918	48.2	17.9	11.3	2
AQ100	715977,736224	46.1	17.7	11.2	1
AQ104	716028,736451	40.5	16.3	10.8	1
AQ105	716020,736419	40.2	16.3	10.8	1
AQ109	716024,736311	40.0	16.3	10.8	1
AQ110	716087,736612	45.8	17.2	11.1	1
AQ111	716113,736681	37.3	16.1	10.7	1
AQ112	716086,736672	38.4	16.0	10.7	1
AQ113	716053,736517	39.1	16.1	10.7	1
AQ120	716510,737705	40.0	16.3	10.7	1
AQ126	716368,737427	39.4	16.6	10.8	1
AQ127	716336,737339	38.3	16.1	10.7	1
AQ129	716725,739993	40.4	16.9	11.0	1
AQ151	716723,739734	39.0	16.2	10.7	1
AQ153	716730,738375	37.4	16.3	10.8	1
AQ158	716737,738414	38.8	16.5	10.9	1
AQ162	716818,738578	36.0	16.2	10.8	1
AQ164	716841,738746	39.7	16.4	10.8	1
AQ168	716646,738058	37.3	16.2	10.7	1
AQ169	716716,738190	39.1	16.3	10.8	1
AQ260	716434,739241	42.0	16.7	10.9	1
AQ270	715641,737863	40.6	16.3	10.8	1
AQ271	716078,736588	40.5	16.3	10.8	1
AQ275	715980,736491	39.7	16.2	10.7	1
AQ288	715882,736338	41.1	17.0	11.0	1
AQ340	716487,735518	44.7	16.4	11.4	1
AQ352	715395,734951	37.9	16.7	11.0	1
AQ535	715663,735426	48.0	16.9	11.2	1
AQ546	715450,735181	40.9	16.4	11.1	1
AQ557	715787,735655	38.4	16.8	10.9	1
AQ573	715903,735599	36.8	16.7	11.0	1
AQ585	716182,737013	39.5	16.4	10.8	1
AQ19	715441,735323	44.0	17.0	11.0	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ22	715546,735311	44.7	17.0	11.0	1
AQ24	715452,735298	43.4	16.6	10.9	1
AQ26	715618,734912	48.8	17.3	11.2	1
AQ27	715493,735383	46.7	16.7	11.0	1
AQ29	715431,735304	49.0	17.4	11.1	1
AQ30	715557,735545	51.1	17.7	11.3	1
AQ31	715574,735572	43.9	16.8	11.0	1
AQ32	715522,735485	49.5	17.4	11.2	1
AQ33	715576,735535	46.1	17.1	11.1	1
AQ34	715624,735601	44.5	16.9	11.0	1
AQ35	715541,735472	42.8	16.7	10.9	1
AQ36	715503,735448	49.4	17.8	11.2	1
AQ37	715667,735718	46.8	17.6	11.2	1
AQ38	715610,735631	51.5	17.7	11.3	1
AQ39	715589,735553	57.7	18.7	11.6	2
AQ40	715601,735612	50.7	17.6	11.2	1
AQ41	715596,735564	41.5	17.0	11.0	1
AQ42	715659,735646	43.9	17.5	11.1	1
AQ43	715635,735667	41.8	17.1	11.0	1
AQ44	715677,735671	64.0	20.2	12.0	4
AQ45	715718,735803	62.8	20.0	11.9	3
AQ46	715716,735798	57.9	19.3	11.7	3
AQ47	715728,735757	55.8	18.9	11.6	2
AQ50	715917,736183	45.8	17.7	11.3	1
AQ53	715898,736152	44.8	17.6	11.2	1
AQ55	715954,736257	53.8	18.0	11.3	2
AQ60	716181,736908	45.0	16.9	10.9	1
AQ62	716118,736823	43.0	17.0	11.0	1
AQ63	716185,736921	50.9	17.4	11.2	1
AQ65	717154,741144	45.6	17.1	11.0	1
AQ67	716288,737227	47.9	17.3	11.1	1
AQ84	717782,744756	47.4	17.5	11.1	1
AQ87	715797,735959	50.1	18.0	11.3	2
AQ88	715682,735736	54.5	18.5	11.4	2
AQ89	715709,735720	62.1	19.9	11.9	3
AQ90	715743,735788	54.3	18.7	11.6	2
AQ91	715755,735810	49.6	18.2	11.4	2
AQ92	715799,735893	43.8	17.2	11.1	1
AQ93	715769,735906	43.4	17.2	11.1	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ95	715871,736028	46.6	17.7	11.3	1
AQ97	715864,736083	51.5	18.1	11.4	2
AQ98	715831,735950	51.0	18.2	11.4	2
AQ106	715994,736363	43.8	16.7	10.9	1
AQ107	716050,736370	48.5	17.2	11.1	1
AQ108	716063,736412	44.3	16.9	11.0	1
AQ119	716294,737354	41.9	16.5	10.8	1
AQ121	716433,737570	43.6	16.7	10.9	1
AQ123	716376,737651	45.8	16.8	10.9	1
AQ128	716378,737598	41.8	17.0	11.0	1
AQ224	718643,745214	42.5	17.3	11.1	1
AQ425	716263,734737	41.9	17.4	11.1	1
AQ427	715759,735649	40.0	16.7	10.9	1
AQ428	715733,735678	49.3	17.9	11.2	2
AQ540	715644,734941	66.2	19.9	12.0	3
AQ553	715590,735000	46.7	17.7	11.4	1
AQ556	715939,735678	40.4	17.1	11.0	1
AQ578	716065,735518	40.8	17.0	11.0	1
AQ583	716594,738032	44.1	16.7	10.9	1
AQ584	716462,737712	47.0	17.1	11.0	1
AQ17	715603,735234	40.9	15.9	11.0	1
AQ25	715466,735381	31.1	15.3	10.7	<1
AQ222	717437,745845	37.7	17.1	11.7	1
AQ324	716837,736019	41.7	17.8	11.3	1
AQ325	716875,735898	34.9	16.5	10.9	1
AQ326	716897,735887	37.0	17.0	10.9	1
AQ327	716843,735868	36.0	16.8	10.8	1
AQ328	716864,735852	37.4	17.0	11.1	1
AQ329	716778,735800	35.3	16.6	10.9	1
AQ330	716798,735783	37.5	17.1	11.1	1
AQ331	716758,735744	36.2	16.8	11.0	1
AQ332	716738,735759	37.6	17.1	11.1	1
AQ333	716689,735669	36.0	16.8	11.0	1
AQ334	716670,735686	38.9	17.2	11.1	1
AQ335	716603,735617	40.0	17.3	11.1	1
AQ336	716611,735592	42.6	17.4	11.0	1
AQ337	716512,735536	41.1	17.2	11.1	1
AQ338	716524,735516	34.9	16.2	10.7	1
AQ339	716506,735499	35.9	16.3	10.7	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ375	715159,735753	39.0	16.5	10.9	1
AQ378	715118,735899	39.7	16.4	10.8	1
AQ379	715111,735877	39.9	16.5	10.9	1
AQ380	715126,735876	44.8	17.2	11.1	1
AQ381	714983,735877	53.5	18.4	11.5	2
AQ382	714996,735909	45.4	17.3	11.1	1
AQ383	714961,735925	41.1	16.7	10.9	1
AQ384	714965,735877	37.0	16.4	10.8	1
AQ385	715406,735868	37.7	16.4	10.8	1
AQ400	715489,736065	34.5	15.7	10.6	1
AQ401	714956,736106	42.2	16.4	10.8	1
AQ404	715011,736186	31.0	15.3	10.5	<1
AQ405	715651,735284	30.5	15.2	10.5	<1
AQ408	715791,735373	31.9	15.4	10.6	<1
AQ410	715843,735261	32.5	15.7	10.8	1
AQ411	715850,735291	32.3	15.6	10.7	1
AQ434	715923,735759	38.0	16.2	10.8	1
AQ439	716195,735673	27.9	15.1	10.4	<1
AQ440	716004,735575	28.5	15.2	10.4	<1
AQ441	716030,735573	27.9	15.1	10.4	<1
AQ444	715887,735457	35.6	16.3	10.9	1
AQ445	715946,735365	43.6	17.7	11.2	1
AQ446	715984,735345	35.9	16.4	10.8	1
AQ448	716110,735445	28.9	15.3	10.4	<1
AQ453	716110,735219	34.5	16.0	10.6	1
AQ456	716277,735369	32.8	16.0	10.6	1
AQ458	716441,735445	35.6	16.2	10.7	1
AQ464	716325,735632	38.2	16.7	11.0	1
AQ469	716252,735561	40.4	16.5	10.9	1
AQ483	717253,740069	43.8	18.2	11.4	2
AQ531	715631,735518	31.7	15.3	10.5	<1
AQ539	715826,735000	45.2	16.7	11.6	1
AQ548	716427,737419	38.2	16.4	10.8	1
AQ558	715847,735563	39.8	16.6	10.9	1
AQ563	716006,735013	32.3	16.0	10.6	1
AQ571	716186,735001	32.3	15.5	10.6	1
AQ596	715758,735392	31.7	15.5	10.5	<1
AQ597	715786,735355	31.4	15.3	10.5	<1
AQ598	715739,735355	47.0	17.5	11.2	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ599	714994,735890	42.3	16.8	10.9	1
AQ600	714948,735891	50.2	18.1	11.3	2
AQ601	714980,735925	50.5	17.9	11.3	2
AQ314	715004,736338	39.7	16.7	10.9	1
AQ376	715164,735867	55.1	18.7	11.7	2
AQ377	715164,735894	55.2	18.6	11.6	2
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; 127 exceedances were modelled at receptors on the N1 Drumcondra Road Upper/Drumcondra Road Lower/Dorset Street Upper/Dorset Street Lower/Bolton Street, the R101 North Circular Road, the R102 Griffith Avenue, the R104 Swords Road/Coolock Lane, the R108 Phibsborough Road/St Mobhi Road, the R125 Holywell, the R802 Gardiner Street Upper/Middle/Lower, the R131 Clonliffe Road, the R132 Dublin Road, the R803 Ballybough Road, the R836 Dublin Road, Belvedere Place, Cathal Brugha Street, Denmark Street Great, Frederick Street North, Granby Row, Mountjoy Square, Parnell Square, Parnell Street, Temple Street and Whitworth Road. Concentrations for these receptors can be found in Table 1.1 in Appendix A7.1 (Detailed Modelling Results) in Volume 4 of this EIAR. Some of these have been excluded from results tables in this Chapter as these locations do not exceed the NO_2 limit value in the DM or DS scenarios and they experience a negligible impact due to the Scheme. They are therefore not considered most impacted receptors. Annual mean NO_2 concentrations did exceeded 60µg/m³ at four receptors on the N1 Dorset Street Lower and Cathal Brugha Street, indicating that exceedances of the NO_2 1-hour mean are likely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality limit value objective in 2019 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 four 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.

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, public realm improvements including landscaping, and construction traffic access routes including movement of machinery and materials within and to and from the five Construction Compounds along the Proposed Scheme.

Other works specific to the Proposed Scheme will include:

- Preparatory and site clearance works including ground investigations;
- The setting up of five Construction Compounds; and
- A range of pavement works including construction of retaining walls, bus lanes, cycle tracks and bus stops.

Potential air quality impacts from 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 this EIAR, seven 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:** Pinnock Hill Junction to Airside Junction.
- **Section 2:** Airside Junction to Northwood Avenue:
  - **Section 2a:** Airside Junction to Airport Roundabout;
  - **Section 2b:** Airport Roundabout to Old Airport Road; and
  - **Section 2c:** Old Airport Road to Northwood Avenue.
- **Section 3:** Northwood Avenue to Shantalla Road:
  - **Section 3a:** Northwood Avenue to Omni Park Shopping Centre; and
  - **Section 3b:** Omni Park Shopping Centre to Shantalla Road.
- **Section 4:** Shantalla Road to Botanic Avenue:
  - **Section 4a:** Shantalla Road to Griffith Avenue; and
  - **Section 4b:** Griffith Avenue to Botanic Avenue.
- **Section 5:** Botanic Avenue to Granby Row:
  - **Section 5a:** Botanic Avenue to North Fredrick Street;
  - **Section 5b:** North Fredrick Street to Granby Row; and
  - **Section 5c:** Parnell Square including North Frederick Street.

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 7.4.2.2.

7.4.2.1 Construction Dust Assessment

In order to determine the level of dust mitigation required during the CBC Infrastructure 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 development 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 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 15µg/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 partial demolition of a commercial premises at Collinstown Cross and two semi-detached cottages at the Royal College of Surgeons Sports Ground. 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 > 50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities > 20 m above ground level;
- **Medium:** Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- **Small:** Total building volume < 20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities < 10 m above ground, demolition during wetter months.

The dust emission magnitude for the proposed demolition activities can be classified as small as the total building volume is likely to be less than 20,000m^3 and there is low potential for dust release as demolition will be carried out in a controlled manner.

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 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 7.20: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 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 > 10,000 m^2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved >100,000 tonnes;
- **Medium:** Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8 m in height, total material moved 20,000 – 100,000 tonnes; and
- **Small:** Total site area < 2,500 m^2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

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 and there is also likely to be potentially dusty material type such as clay.

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 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 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 – 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 small. There are no buildings being constructed as part of the works. The key construction activities after earthworks are construction of retaining walls and 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 low risk of temporary dust soiling impacts and an overall low 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 low. In relation to ecological impact, as the receptor is of medium sensitivity, the risk associated with the proposed construction activities is described as low.

Overall, in order to ensure that no dust nuisance occurs during the construction activities, a range of dust mitigation measures associated with a low 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 7.22: 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 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 - 50 HDV (> 3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 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 medium with between 10 and 50 HDV outward movements in any one day, during peak construction activity and with surface material with a low 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 medium 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 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 Proposed Scheme 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	Low Risk	Medium Risk
Human Health	Low Risk	Medium Risk	Low Risk	Medium Risk
Ecological	Low Risk	Medium Risk	Low Risk	Medium Risk

7.4.2.2 Construction Traffic Assessment

In addition to direct impacts from the construction works including site compounds, there is also 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 six public roads have been identified as required construction access routes which construction traffic will be permitted to travel along. Whilst the overall construction period is forecast as 24 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 36 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 flows. An additional 288 HGV 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 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, not including construction traffic associated with the Proposed Scheme. The output of this analysis and its impact on air quality has been modelled using ADMS-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 Figures 7.6 to 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(Detailed Modelling Results) 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 Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ2	715427,735139	42.2	16.2	11.4	1
AQ7	715378,735165	41.8	16.6	11.7	1
AQ8	715405,735172	42.8	16.0	11.3	1
AQ14	715371,735192	41.0	16.7	11.7	1
AQ24	715452,735298	41.0	16.8	11.8	1
AQ26	715626,734920	35.2	15.9	11.2	1
AQ29	715431,735304	38.2	16.4	11.5	1
AQ53	715898,736152	40.6	16.9	11.8	1
AQ54	715932,736145	43.8	17.4	12.2	1
AQ56	716139,736802	52.5	18.2	12.7	2
AQ57	716117,736703	42.8	16.9	11.8	1
AQ58	716102,736815	36.5	16.0	11.2	1
AQ100	715977,736224	47.2	17.7	12.3	1
AQ104	716028,736451	35.8	15.7	11.1	1
AQ117	716267,737272	33.4	15.8	11.1	1
AQ118	716289,737338	33.9	15.8	11.1	1
AQ123	716376,737651	34.2	15.7	11.1	1
AQ125	716322,737445	35.8	15.9	11.2	1
AQ126	716368,737427	35.8	16.0	11.3	1
AQ150	716706,739763	36.1	16.6	11.6	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ154	716876,738353	37.3	16.2	11.4	1
AQ168	716646,738058	34.0	15.9	11.2	1
AQ225	716906,738314	42.6	17.2	12.0	1
AQ289	715941,736161	40.3	16.8	11.8	1
AQ343	715161,734821	37.3	16.7	11.7	1
AQ355	715272,735029	35.3	16.3	11.5	1
AQ356	715282,735057	34.9	16.3	11.4	1
AQ397	715628,735841	40.7	16.7	11.7	1
AQ428	715733,735678	39.6	16.6	11.7	1
AQ482	717103,740124	36.0	17.5	12.1	1
AQ536	715388,735180	46.8	16.9	11.8	1
AQ547	715360,735199	39.5	16.4	11.5	1
AQ584	716462,737712	33.2	15.4	10.9	<1
AQ585	716182,737013	34.6	15.6	11.1	1
AQ586	716539,737826	30.5	15.3	10.8	<1
AQ19	715441,735323	40.7	16.6	11.7	1
AQ20	715447,735334	42.7	16.9	11.8	1
AQ23	715483,735360	43.2	16.9	11.8	1
AQ25	715466,735381	42.1	16.5	11.6	1
AQ27	715493,735383	47.0	17.2	12.0	1
AQ28	715475,735401	45.0	16.6	11.7	1
AQ32	715522,735485	42.6	16.7	11.7	1
AQ35	715541,735472	43.2	16.8	11.8	1
AQ36	715503,735448	41.6	16.6	11.6	1
AQ37	715667,735718	48.7	17.7	12.4	1
AQ42	715659,735646	40.8	17.0	11.8	1
AQ43	715635,735667	43.1	17.4	12.1	1
AQ44	715677,735671	41.1	17.0	11.9	1
AQ47	715728,735757	56.6	19.2	13.3	3
AQ48	715726,735815	54.5	18.8	13.0	2
AQ49	715878,736111	40.0	16.8	11.8	1
AQ51	715913,736107	44.7	17.5	12.2	1
AQ55	715954,736257	40.6	16.6	11.6	1
AQ60	716181,736908	37.8	16.3	11.5	1
AQ62	716118,736823	41.1	16.4	11.5	1
AQ67	716288,737227	38.6	16.5	11.6	1
AQ73	716272,737186	37.2	16.3	11.5	1
AQ74	716256,737143	37.5	16.3	11.5	1
AQ85	715700,735702	46.7	17.4	12.2	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ88	715682,735736	49.4	17.9	12.5	2
AQ89	715709,735720	53.7	18.4	12.8	2
AQ90	715743,735788	60.4	19.7	13.6	3
AQ91	715755,735810	53.0	18.6	12.9	2
AQ93	715769,735906	42.8	17.1	12.0	1
AQ94	715758,735885	42.6	17.1	12.0	1
AQ96	715846,736048	45.7	17.7	12.3	1
AQ97	715864,736083	41.1	17.0	11.9	1
AQ103	715968,736305	39.6	16.4	11.5	1
AQ105	716020,736419	39.6	16.2	11.4	1
AQ106	715994,736363	39.4	16.2	11.4	1
AQ110	716087,736612	39.2	16.2	11.4	1
AQ111	716113,736681	44.9	17.1	12.0	1
AQ112	716086,736672	36.7	16.0	11.3	1
AQ113	716053,736517	37.7	15.9	11.2	1
AQ114	716062,736541	38.3	16.0	11.3	1
AQ121	716433,737570	39.3	16.2	11.4	1
AQ127	716336,737339	38.4	16.5	11.6	1
AQ128	716378,737598	37.6	16.0	11.3	1
AQ129	716725,739993	41.5	17.0	11.8	1
AQ130	716715,739900	40.1	16.9	11.8	1
AQ152	716750,738324	38.5	16.1	11.3	1
AQ159	716792,738462	39.0	16.5	11.5	1
AQ163	716808,738530	36.2	16.1	11.3	1
AQ165	716576,737802	38.9	16.3	11.5	1
AQ169	716716,738190	36.7	16.1	11.3	1
AQ170	716725,738217	38.4	16.2	11.4	1
AQ271	716078,736588	39.7	16.2	11.4	1
AQ272	716130,736601	39.6	16.2	11.4	1
AQ276	716036,736470	38.9	16.1	11.3	1
AQ342	715173,734811	39.7	17.0	11.9	1
AQ353	715289,735015	37.2	16.7	11.7	1
AQ382	714982,735909	56.5	19.2	13.3	3
AQ407	715767,735381	39.0	16.4	11.5	1
AQ537	715752,735368	37.1	16.1	11.3	1
AQ544	715639,735578	36.2	15.9	11.2	1
AQ554	715385,735215	45.6	17.6	12.3	1
AQ574	715247,734937	36.4	16.7	11.7	1
AQ582	716595,737849	36.4	16.1	11.4	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ30	715557,735545	47.7	17.2	12.1	1
AQ31	715574,735572	49.9	17.6	12.3	1
AQ33	715576,735535	48.2	17.3	12.1	1
AQ34	715624,735601	45.1	17.0	11.9	1
AQ38	715610,735631	45.8	17.5	12.2	1
AQ39	715589,735553	50.5	17.6	12.3	1
AQ40	715601,735612	56.3	18.6	12.9	2
AQ41	715596,735564	49.6	17.5	12.2	1
AQ45	715718,735803	62.4	20.0	13.8	3
AQ46	715716,735798	61.2	19.8	13.7	3
AQ59	716153,736826	42.7	16.6	11.7	1
AQ61	716181,737015	43.7	16.8	11.8	1
AQ63	716185,736921	41.8	16.9	11.9	1
AQ64	716221,737028	49.5	17.3	12.1	1
AQ66	716232,737086	44.1	17.0	11.9	1
AQ68	716216,737011	46.6	17.2	12.0	1
AQ86	715819,735992	52.4	18.6	12.9	2
AQ87	715797,735959	43.6	17.1	12.0	1
AQ92	715799,735893	48.4	18.1	12.6	2
AQ95	715871,736028	48.5	18.1	12.6	2
AQ98	715831,735950	50.2	18.0	12.5	2
AQ99	715814,735918	49.8	18.1	12.6	2
AQ102	715976,736323	41.5	16.6	11.6	1
AQ107	716050,736370	42.7	16.6	11.6	1
AQ108	716063,736412	47.3	17.0	12.0	1
AQ109	716024,736311	43.3	16.7	11.8	1
AQ120	716510,737705	41.1	16.4	11.5	1
AQ122	716460,737626	42.9	16.6	11.7	1
AQ124	716486,737677	44.9	16.7	11.7	1
AQ261	716022,736298	41.1	16.5	11.6	1
AQ381	714984,735892	49.4	18.0	12.6	2
AQ383	714961,735909	52.0	18.4	12.8	2
AQ384	714964,735892	45.9	17.5	12.2	1
AQ541	715567,735562	64.8	19.7	13.7	3
AQ9	715754,735028	49.9	16.4	11.6	1
AQ11	715734,735056	38.9	15.8	11.1	1
AQ15	715642,735181	37.0	16.2	11.4	1
AQ18	715552,735266	39.5	16.3	11.4	1
AQ187	718131,746633	39.2	16.9	11.8	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (μg/m^3)			No of PM_{10} days > 50μg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ201	718009,746425	44.6	17.7	12.3	1
AQ223	718644,745279	38.8	17.3	12.0	1
AQ313	715041,736334	42.9	16.6	11.6	1
AQ325	716875,735898	42.1	17.7	12.3	1
AQ326	716897,735887	35.2	16.5	11.5	1
AQ327	716843,735868	37.4	16.9	11.8	1
AQ328	716864,735852	36.3	16.7	11.7	1
AQ329	716778,735800	37.7	17.0	11.8	1
AQ330	716798,735783	35.6	16.6	11.6	1
AQ331	716758,735744	37.9	17.1	11.9	1
AQ332	716738,735759	36.5	16.8	11.7	1
AQ333	716689,735669	38.0	17.1	11.9	1
AQ334	716670,735686	36.3	16.8	11.7	1
AQ335	716603,735617	39.1	17.1	11.9	1
AQ336	716611,735592	40.2	17.3	12.0	1
AQ338	716524,735516	41.2	17.2	12.0	1
AQ339	716506,735499	35.0	16.2	11.4	1
AQ340	716487,735518	36.1	16.4	11.5	1
AQ341	715673,734937	43.1	16.4	11.5	1
AQ351	715764,735006	43.2	16.1	11.3	1
AQ376	715164,735867	38.1	16.4	11.5	1
AQ377	715164,735894	53.5	18.6	12.9	2
AQ378	715118,735899	53.6	18.5	12.9	2
AQ379	715111,735877	38.7	16.4	11.5	1
AQ380	715126,735876	38.9	16.5	11.6	1
AQ399	715613,735821	42.8	17.0	11.9	1
AQ402	714980,736095	41.6	16.4	11.5	1
AQ404	715011,736186	36.3	16.3	11.4	1
AQ413	716028,735199	39.6	16.6	11.6	1
AQ414	716036,735180	44.3	17.2	12.0	1
AQ415	716061,735183	39.0	16.4	11.6	1
AQ426	715776,735668	41.8	17.4	12.1	1
AQ434	715923,735759	43.9	16.9	11.9	1
AQ435	715874,735772	37.3	16.2	11.4	1
AQ445	715946,735365	35.8	16.3	11.5	1
AQ447	715967,735331	36.1	16.4	11.5	1
AQ454	716084,735235	34.7	16.1	11.3	1
AQ456	716277,735369	30.9	15.7	11.1	1
AQ457	716416,735457	33.1	16.0	11.3	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ459	716448,735592	35.8	16.2	11.4	1
AQ464	716325,735632	34.9	16.1	11.3	1
AQ470	715904,735775	39.8	16.5	11.6	1
AQ484	717719,740074	41.7	18.2	12.6	2
AQ507	715181,735744	39.1	16.7	11.7	1
AQ540	715644,734941	43.6	16.7	11.7	1
AQ549	715200,735855	37.3	16.4	11.5	1
AQ551	715692,735462	36.2	16.3	11.4	1
AQ599	714994,735890	45.5	17.4	12.2	1
AQ601	714980,735925	48.7	18.0	12.5	2
AQ602	714948,735909	48.9	17.9	12.5	2
AQ17	715603,735234	39.5	15.9	11.2	1
AQ337	716512,735536	42.8	17.4	12.1	1
AQ437	716140,735690	34.6	16.2	11.4	1
AQ444	715887,735457	35.3	16.2	11.4	1
AQ446	715984,735345	44.0	17.8	12.3	1
AQ465	716360,735617	38.1	16.8	11.7	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; 114 exceedances were modelled at receptors on the N1 Drumcondra Road Upper/Drumcondra Road Lower/Dorset Street Upper/Dorset Street Lower/Bolton Street, the R101 North Circular Road, the R104 Coolock Lane, the R106 Swords Road, the R108 Phibsborough Road/St Mobhi Road, the R125 Holywell, the R802 Gardiner Street Upper/Middle/Lower, the R131 Clonliffe Road, the R132 Dublin Road, the R803 Ballybough Road, the R836 Dublin Road, Belvedere Place, Cathal Brugha Street, Denmark Street Great, Frederick Street North, Granby Row, Hill Street, Mountjoy Square, Parnell Square, Temple Street and Whitworth Road. Concentrations at all receptors with exceedances can be found in Table 2.1 (Appendix A7.1 (Detailed Modelling Results), 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 most impacted receptor. Annual mean NO_2 concentrations exceeded 60µg/m^3 at four locations on the N1 Dorset Street Lower, indicating that exceedances of the NO_2 1-hour mean are likely 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 three 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 ADMS-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 Figures 7.6 to 7.8, Volume 3 of this EIAR. Statistics for the full list of modelled receptors can be found in Table 2.2 (Appendix A7.1(Detailed Modelling Results) 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 Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ2	715427,735139	41.7	16.1	11.3	1
AQ7	715378,735165	39.8	16.3	11.5	1
AQ8	715405,735172	41.9	15.8	11.2	1
AQ14	715371,735192	39.4	16.4	11.5	1
AQ24	715452,735298	39.0	16.5	11.6	1
AQ26	715626,734920	30.6	15.3	10.8	<1
AQ29	715431,735304	36.4	16.1	11.3	1
AQ53	715898,736152	39.0	16.2	11.4	1
AQ54	715932,736145	42.2	16.6	11.6	1
AQ56	716139,736802	51.8	16.6	11.7	1
AQ57	716117,736703	42.1	15.8	11.2	1
AQ58	716102,736815	34.8	15.4	10.9	<1
AQ100	715977,736224	45.4	16.9	11.8	1
AQ104	716028,736451	29.5	15.3	10.8	<1
AQ117	716267,737272	28.7	15.2	10.8	<1
AQ118	716289,737338	31.2	15.5	10.9	1
AQ123	716376,737651	28.8	15.0	10.7	<1
AQ125	716322,737445	30.0	15.2	10.7	<1
AQ126	716368,737427	29.6	15.2	10.8	<1
AQ150	716706,739763	34.5	16.1	11.3	1
AQ154	716876,738353	35.7	16.1	11.3	1
AQ168	716646,738058	29.4	15.4	10.9	<1
AQ225	716906,738314	42.0	17.2	12.0	1
AQ289	715941,736161	39.6	16.2	11.4	1
AQ343	715161,734821	35.5	16.4	11.5	1
AQ355	715272,735029	33.1	16.0	11.2	1
AQ356	715282,735057	32.7	15.9	11.2	1
AQ397	715628,735841	40.1	16.7	11.7	1
AQ428	715733,735678	39.2	16.6	11.6	1
AQ482	717103,740124	35.3	17.2	11.9	1
AQ536	715388,735180	45.1	16.6	11.6	1
AQ547	715360,735199	38.3	16.2	11.4	1
AQ584	716462,737712	27.6	14.9	10.5	<1
AQ585	716182,737013	28.7	15.1	10.7	<1
AQ586	716539,737826	26.1	14.9	10.5	<1
AQ19	715441,735323	38.5	16.3	11.5	1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ20	715447,735334	40.5	16.6	11.6	1
AQ23	715483,735360	41.2	16.5	11.6	1
AQ25	715466,735381	39.5	16.3	11.4	1
AQ27	715493,735383	44.6	16.9	11.8	1
AQ28	715475,735401	41.5	16.4	11.5	1
AQ32	715522,735485	39.2	16.3	11.5	1
AQ35	715541,735472	40.1	16.4	11.5	1
AQ36	715503,735448	39.1	16.2	11.4	1
AQ37	715667,735718	46.1	17.4	12.1	1
AQ42	715659,735646	38.0	16.6	11.6	1
AQ43	715635,735667	39.9	16.9	11.8	1
AQ44	715677,735671	38.5	16.6	11.6	1
AQ47	715728,735757	53.1	18.6	12.9	2
AQ48	715726,735815	50.6	18.2	12.6	2
AQ49	715878,736111	37.3	16.2	11.4	1
AQ51	715913,736107	41.4	16.7	11.7	1
AQ55	715954,736257	38.3	15.9	11.2	1
AQ60	716181,736908	31.3	15.5	10.9	1
AQ62	716118,736823	37.9	15.6	11.0	1
AQ67	716288,737227	31.9	15.7	11.0	1
AQ73	716272,737186	31.2	15.6	11.0	1
AQ74	716256,737143	31.4	15.6	11.0	1
AQ85	715700,735702	44.4	17.1	12.0	1
AQ88	715682,735736	47.4	17.6	12.3	1
AQ89	715709,735720	51.6	18.1	12.6	2
AQ90	715743,735788	57.2	19.1	13.2	3
AQ91	715755,735810	50.0	18.1	12.6	2
AQ93	715769,735906	39.3	16.7	11.7	1
AQ94	715758,735885	39.2	16.7	11.7	1
AQ96	715846,736048	43.0	17.1	12.0	1
AQ97	715864,736083	38.2	16.3	11.5	1
AQ103	715968,736305	35.9	15.8	11.2	1
AQ105	716020,736419	31.0	15.5	10.9	1
AQ106	715994,736363	32.0	15.6	11.0	1
AQ110	716087,736612	35.2	15.6	11.0	1
AQ111	716113,736681	42.1	16.0	11.3	1
AQ112	716086,736672	34.3	15.3	10.9	<1
AQ113	716053,736517	30.4	15.3	10.8	<1
AQ114	716062,736541	31.0	15.4	10.9	<1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ121	716433,737570	32.4	15.3	10.8	<1
AQ127	716336,737339	31.9	15.7	11.0	1
AQ128	716378,737598	31.2	15.2	10.8	<1
AQ129	716725,739993	38.5	16.5	11.5	1
AQ130	716715,739900	37.4	16.4	11.5	1
AQ152	716750,738324	33.7	15.8	11.1	1
AQ159	716792,738462	36.6	16.3	11.5	1
AQ163	716808,738530	34.1	16.0	11.2	1
AQ165	716576,737802	33.1	15.8	11.1	1
AQ169	716716,738190	31.3	15.7	11.0	1
AQ170	716725,738217	32.5	15.7	11.1	1
AQ271	716078,736588	33.2	15.6	11.0	1
AQ272	716130,736601	33.4	15.5	11.0	1
AQ276	716036,736470	31.5	15.5	10.9	1
AQ342	715173,734811	37.6	16.7	11.7	1
AQ353	715289,735015	34.8	16.3	11.4	1
AQ382	714982,735909	52.6	18.5	12.8	2
AQ407	715767,735381	32.0	15.5	11.0	1
AQ537	715752,735368	30.9	15.3	10.8	<1
AQ544	715639,735578	34.0	15.7	11.1	1
AQ554	715385,735215	43.3	17.2	12.0	1
AQ574	715247,734937	34.1	16.3	11.4	1
AQ582	716595,737849	30.8	15.6	11.0	1
AQ30	715557,735545	42.7	16.9	11.8	1
AQ31	715574,735572	45.0	17.2	12.0	1
AQ33	715576,735535	43.0	16.9	11.8	1
AQ34	715624,735601	40.7	16.6	11.7	1
AQ38	715610,735631	41.7	17.1	11.9	1
AQ39	715589,735553	45.7	17.2	12.1	1
AQ40	715601,735612	49.6	17.9	12.5	2
AQ41	715596,735564	44.5	17.1	11.9	1
AQ45	715718,735803	58.1	19.3	13.3	3
AQ46	715716,735798	57.1	19.1	13.2	3
AQ59	716153,736826	38.4	15.7	11.1	1
AQ61	716181,737015	34.6	15.8	11.2	1
AQ63	716185,736921	33.3	15.8	11.1	1
AQ64	716221,737028	40.3	16.5	11.6	1
AQ66	716232,737086	36.1	16.1	11.3	1
AQ68	716216,737011	38.0	16.3	11.5	1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (μg/m^3)			No of PM_{10} days > 50μg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ86	715819,735992	46.7	17.8	12.4	1
AQ87	715797,735959	39.5	16.6	11.6	1
AQ92	715799,735893	43.9	17.4	12.1	1
AQ95	715871,736028	43.9	17.3	12.0	1
AQ98	715831,735950	44.5	17.3	12.1	1
AQ99	715814,735918	44.8	17.4	12.1	1
AQ102	715976,736323	36.6	16.0	11.3	1
AQ107	716050,736370	32.8	15.7	11.1	1
AQ108	716063,736412	34.3	16.0	11.2	1
AQ109	716024,736311	36.4	15.9	11.2	1
AQ120	716510,737705	32.1	15.5	10.9	<1
AQ122	716460,737626	34.6	15.6	11.0	1
AQ124	716486,737677	35.2	15.6	11.0	1
AQ261	716022,736298	36.4	15.8	11.1	1
AQ381	714984,735892	43.7	17.2	12.0	1
AQ383	714961,735909	44.6	17.3	12.1	1
AQ384	714964,735892	40.1	16.7	11.7	1
AQ541	715567,735562	58.1	19.2	13.3	3
AQ9	715754,735028	50.6	16.5	11.6	1
AQ11	715734,735056	39.4	15.9	11.2	1
AQ15	715642,735181	37.4	16.2	11.4	1
AQ18	715552,735266	41.1	16.2	11.4	1
AQ187	718131,746633	39.9	17.0	11.9	1
AQ201	718009,746425	45.9	17.8	12.4	1
AQ223	718644,745279	39.7	17.4	12.1	1
AQ313	715041,736334	43.4	16.6	11.7	1
AQ325	716875,735898	44.0	18.1	12.5	2
AQ326	716897,735887	36.5	16.7	11.7	1
AQ327	716843,735868	38.8	17.2	12.0	1
AQ328	716864,735852	37.6	17.0	11.8	1
AQ329	716778,735800	39.2	17.3	12.0	1
AQ330	716798,735783	36.9	16.8	11.7	1
AQ331	716758,735744	39.4	17.3	12.0	1
AQ332	716738,735759	37.9	17.0	11.9	1
AQ333	716689,735669	39.5	17.3	12.0	1
AQ334	716670,735686	37.6	17.0	11.8	1
AQ335	716603,735617	40.7	17.4	12.1	1
AQ336	716611,735592	41.8	17.5	12.2	1
AQ338	716524,735516	42.5	17.4	12.1	1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ339	716506,735499	36.4	16.4	11.5	1
AQ340	716487,735518	38.0	16.6	11.6	1
AQ341	715673,734937	43.6	16.4	11.5	1
AQ351	715764,735006	43.7	16.2	11.4	1
AQ376	715164,735867	38.7	16.5	11.6	1
AQ377	715164,735894	54.7	18.8	13.0	2
AQ378	715118,735899	54.8	18.7	13.0	2
AQ379	715111,735877	39.2	16.5	11.6	1
AQ380	715126,735876	39.5	16.5	11.6	1
AQ399	715613,735821	43.5	17.1	12.0	1
AQ402	714980,736095	42.9	16.4	11.5	1
AQ404	715011,736186	36.7	16.3	11.4	1
AQ413	716028,735199	41.1	16.8	11.8	1
AQ414	716036,735180	45.6	17.4	12.2	1
AQ415	716061,735183	40.0	16.6	11.7	1
AQ426	715776,735668	42.7	17.5	12.2	1
AQ434	715923,735759	45.3	17.1	12.0	1
AQ435	715874,735772	37.9	16.3	11.4	1
AQ445	715946,735365	37.0	16.5	11.6	1
AQ447	715967,735331	37.6	16.6	11.6	1
AQ454	716084,735235	36.6	16.4	11.5	1
AQ456	716277,735369	33.0	16.1	11.3	1
AQ457	716416,735457	35.3	16.4	11.5	1
AQ459	716448,735592	37.6	16.5	11.6	1
AQ464	716325,735632	36.6	16.4	11.5	1
AQ470	715904,735775	40.4	16.6	11.6	1
AQ484	717719,740074	42.1	18.3	12.6	2
AQ507	715181,735744	39.8	16.8	11.8	1
AQ540	715644,734941	44.2	16.7	11.7	1
AQ549	715200,735855	37.7	16.4	11.5	1
AQ551	715692,735462	37.2	16.4	11.5	1
AQ599	714994,735890	46.0	17.5	12.2	1
AQ601	714980,735925	49.4	18.1	12.6	2
AQ602	714948,735909	49.4	17.9	12.5	2
AQ17	715603,735234	43.1	15.9	11.2	1
AQ337	716512,735536	44.9	17.7	12.3	1
AQ437	716140,735690	36.9	16.5	11.6	1
AQ444	715887,735457	37.7	16.5	11.6	1
AQ446	715984,735345	46.5	18.2	12.6	2

DS (2024)					
Receptor	**Receptor Location (ITM)**	**Annual Mean Concentration (µg/m³)**			**No of PM_{10} days > 50µg/m³**
		NO_2	**PM_{10}**	**$PM_{2.5}$**	
AQ465	716360,735617	40.3	17.1	11.9	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; 87 exceedances were modelled at receptors on the N1 Drumcondra Road Upper/Drumcondra Road Lower/Dorset Street Upper/Dorset Street Lower/Bolton Street, the R101 North Circular Road, the R103 Collins Avenue, the R104 Coolock Lane, the R108 Phibsborough Road, the R802 Gardiner Street Upper/Middle/Lower, the R803 Ballybough Road, the R836 Dublin Road, Frederick Street North, Gardiner Row, Granby Row and Parnell Street. This is a decrease from 114 exceedances modelled in the DM scenario. Concentrations at all receptors with exceedances can be found in Table 2.2 (Appendix A7.1 (Detailed Modelling Results), 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 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 three 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 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 (Appendix A7.1(Detailed Modelling Results) 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 7.27: Predicted Changes in Construction DM and DS and Impact Significance Criteria at Most Impacted Receptor Locations

Receptor	**Receptor Location (ITM)**	**Change in Annual Mean Conc. (µg/m³)**			**Change in No of PM_{10} days > 50µg/m³**	**Impact on Annual Mean Concentration**		
		NO_2	**PM_{10}**	**$PM_{2.5}$**		**NO_2**	**PM_{10}**	**$PM_{2.5}$**
AQ2	721010,729636	-0.5	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ7	721010,729641	-2.0	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ8	721010,729642	-0.9	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ14	721010,729648	-1.6	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ24	721010,729658	-2.0	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ26	721010,729660	-4.6	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ29	721010,729663	-1.8	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ53	721010,729687	-1.6	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ54	721010,729688	-1.6	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ56	721010,729690	-0.7	-1.6	-1.0	-1	Slight Beneficial	Negligible	Negligible
AQ57	721010,729691	-0.7	-1.1	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ58	721010,729692	-1.7	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ100	721010,729734	-1.8	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ104	721010,729738	-6.3	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ117	721010,729751	-4.6	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50µg/m³	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ118	721010,729752	-2.7	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ123	721010,729757	-5.4	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ125	721010,729759	-5.8	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ126	721010,729760	-6.3	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ150	721010,729784	-1.6	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ154	721010,729788	-1.5	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ168	721010,729802	-4.7	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ225	721010,729859	-0.7	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ289	721010,729923	-0.7	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ343	721010,729977	-1.9	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ355	721010,729989	-2.1	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ356	721010,729990	-2.2	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ397	721010,730031	-0.6	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ428	721010,730062	-0.4	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ482	721010,730116	-0.7	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ536	721010,730170	-1.6	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ547	721010,730181	-1.2	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ584	721010,730218	-5.6	-0.5	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ585	721010,730219	-5.9	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ586	721010,730220	-4.4	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ19	721010,729653	-2.2	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ20	721010,729654	-2.2	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ23	721010,729657	-2.1	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ25	721010,729659	-2.5	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ27	721010,729661	-2.5	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ28	721010,729662	-3.6	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ32	721010,729666	-3.4	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ35	721010,729669	-3.1	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ36	721010,729670	-2.5	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ37	721010,729671	-2.6	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ42	721010,729676	-2.8	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ43	721010,729677	-3.3	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ44	721010,729678	-2.7	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ47	721010,729681	-3.4	-0.6	-0.4	-1	Moderate Beneficial	Negligible	Negligible
AQ48	721010,729682	-3.9	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ49	721010,729683	-2.8	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ51	721010,729685	-3.3	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ55	721010,729689	-2.3	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ60	721010,729694	-6.5	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ62	721010,729696	-3.2	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50µg/m³	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ67	721010,729701	-6.6	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ73	721010,729707	-6.1	-0.7	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ74	721010,729708	-6.1	-0.7	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ85	721010,729719	-2.3	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ88	721010,729722	-2.0	-0.3	-0.2	-1	Moderate Beneficial	Negligible	Negligible
AQ89	721010,729723	-2.1	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ90	721010,729724	-3.3	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ91	721010,729725	-3.0	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ93	721010,729727	-3.5	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ94	721010,729728	-3.4	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ96	721010,729730	-2.7	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ97	721010,729731	-3.0	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ103	721010,729737	-3.7	-0.5	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ105	721010,729739	-8.6	-0.7	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ106	721010,729740	-7.4	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ110	721010,729744	-4.0	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ111	721010,729745	-2.8	-1.1	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ112	721010,729746	-2.4	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ113	721010,729747	-7.3	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ114	721010,729748	-7.2	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ121	721010,729755	-6.8	-0.9	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ127	721010,729761	-6.5	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ128	721010,729762	-6.5	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ129	721010,729763	-3.0	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ130	721010,729764	-2.8	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ152	721010,729786	-4.8	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ159	721010,729793	-2.4	-0.1	-0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ163	721010,729797	-2.1	-0.1	-0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ165	721010,729799	-5.8	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ169	721010,729803	-5.3	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ170	721010,729804	-5.9	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ271	721010,729905	-6.5	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ272	721010,729906	-6.2	-0.7	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ276	721010,729910	-7.4	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ342	721010,729976	-2.1	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ353	721010,729987	-2.4	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ382	721010,730016	-3.9	-0.7	-0.4	-1	Moderate Beneficial	Negligible	Negligible
AQ407	721010,730041	-7.0	-0.9	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ537	721010,730171	-6.2	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ544	721010,730178	-2.3	-0.2	-0.1	<1	Moderate Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m^3)			Change in No of PM_{10} days > 50µg/m^3	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ554	721010,730188	-2.3	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ574	721010,730208	-2.3	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ582	721010,730216	-5.6	-0.5	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ30	721010,729664	-5.0	-0.4	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ31	721010,729665	-5.0	-0.4	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ33	721010,729667	-5.2	-0.4	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ34	721010,729668	-4.4	-0.4	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ38	721010,729672	-4.1	-0.5	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ39	721010,729673	-4.8	-0.4	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ40	721010,729674	-6.7	-0.7	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ41	721010,729675	-5.0	-0.4	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ45	721010,729679	-4.3	-0.7	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ46	721010,729680	-4.1	-0.7	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ59	721010,729693	-4.3	-0.9	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ61	721010,729695	-9.1	-0.9	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ63	721010,729697	-8.5	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ64	721010,729698	-9.2	-0.8	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ66	721010,729700	-8.0	-0.9	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ68	721010,729702	-8.6	-0.9	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ86	721010,729720	-5.7	-0.8	-0.5	-1	Substantial Beneficial	Negligible	Negligible
AQ87	721010,729721	-4.1	-0.5	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ92	721010,729726	-4.5	-0.7	-0.4	-1	Substantial Beneficial	Negligible	Negligible
AQ95	721010,729729	-4.6	-0.8	-0.5	-1	Substantial Beneficial	Negligible	Negligible
AQ98	721010,729732	-5.7	-0.7	-0.5	-1	Substantial Beneficial	Negligible	Negligible
AQ99	721010,729733	-5.1	-0.7	-0.4	-1	Substantial Beneficial	Negligible	Negligible
AQ102	721010,729736	-5.0	-0.5	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ107	721010,729741	-9.9	-0.8	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ108	721010,729742	-13.1	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ109	721010,729743	-6.9	-0.8	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ120	721010,729754	-9.0	-0.9	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ122	721010,729756	-8.3	-1.0	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ124	721010,729758	-9.7	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ261	721010,729895	-4.7	-0.7	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ381	721010,730015	-5.8	-0.8	-0.5	-1	Substantial Beneficial	Negligible	Negligible
AQ383	721010,730017	-7.4	-1.1	-0.7	-1	Substantial Beneficial	Negligible	Negligible
AQ384	721010,730018	-5.9	-0.8	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ541	721010,730175	-6.8	-0.6	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ9	721010,729643	0.7	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ11	721010,729645	0.4	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ15	721010,729649	0.4	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50µg/m³	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ18	721010,729652	1.6	-0.1	-0.1	<1	Slight Adverse	Negligible	Negligible
AQ187	721010,729821	0.6	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ201	721010,729835	1.3	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ223	721010,729857	0.8	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ313	721010,729947	0.5	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ325	721010,729959	1.9	0.3	0.2	1	Slight Adverse	Negligible	Negligible
AQ326	721010,729960	1.3	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ327	721010,729961	1.5	0.2	0.2	<1	Slight Adverse	Negligible	Negligible
AQ328	721010,729962	1.4	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ329	721010,729963	1.5	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ330	721010,729964	1.3	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ331	721010,729965	1.5	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ332	721010,729966	1.4	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ333	721010,729967	1.5	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ334	721010,729968	1.4	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ335	721010,729969	1.5	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ336	721010,729970	1.6	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ338	721010,729972	1.3	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ339	721010,729973	1.4	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ340	721010,729974	1.9	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ341	721010,729975	0.5	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ351	721010,729985	0.5	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ376	721010,730010	0.5	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ377	721010,730011	1.2	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ378	721010,730012	1.2	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ379	721010,730013	0.6	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ380	721010,730014	0.6	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ399	721010,730033	0.6	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ402	721010,730036	1.3	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ404	721010,730038	0.4	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ413	721010,730047	1.5	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ414	721010,730048	1.3	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ415	721010,730049	1.0	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ426	721010,730060	0.9	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ434	721010,730068	1.4	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ435	721010,730069	0.6	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ445	721010,730079	1.2	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ447	721010,730081	1.5	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ454	721010,730088	2.0	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ456	721010,730090	2.2	0.4	0.2	<1	Slight Adverse	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50µg/m³	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ457	721010,730091	2.2	0.4	0.2	<1	Slight Adverse	Negligible	Negligible
AQ459	721010,730093	1.8	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ464	721010,730098	1.7	0.2	0.2	<1	Slight Adverse	Negligible	Negligible
AQ470	721010,730104	0.7	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ484	721010,730118	0.4	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ507	721010,730141	0.7	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ540	721010,730174	0.6	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ549	721010,730183	0.5	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ551	721010,730185	1.0	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ599	721010,730233	0.5	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ601	721010,730235	0.8	0.1	0.1	<1	Slight Adverse	Negligible	Negligible
AQ602	721010,730236	0.5	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ17	721010,729651	3.7	<0.1	<0.1	<1	Moderate Adverse	Negligible	Negligible
AQ337	721010,729971	2.1	0.3	0.2	<1	Moderate Adverse	Negligible	Negligible
AQ437	721010,730071	2.3	0.3	0.2	<1	Moderate Adverse	Negligible	Negligible
AQ444	721010,730078	2.4	0.3	0.2	<1	Moderate Adverse	Negligible	Negligible
AQ446	721010,730080	2.5	0.4	0.2	1	Moderate Adverse	Negligible	Negligible
AQ465	721010,730099	2.2	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 Guidance (TII 2011). As shown in Table 7.27 and Figure 7.6 in Volume 3 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 35 receptors, a moderate beneficial impact at 63 receptors and a substantial beneficial impact at 34 receptors. All beneficial impacts are modelled along the Proposed Scheme due to the diversion of traffic off these routes. A slight adverse impact is expected at 55 receptors and a moderate adverse impact at six receptors on the R101 North Circular Road, the R802 Gardiner Street Upper/Middle/Lower, the R803 Ballybough Road and Gardiner Row. These localised moderate adverse impacts are considered negative, significant and short-term as NO_2 concentrations exceed the limit value but only occur during the short-term Construction Phase. 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 predicted environmental concentration (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 NOx 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 NOx 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. The lower critical load is exceeded in both the DM and DS by Binns Bridge, Cross Guns Bridge and Clarke's Bridge (western side) at the Royal Canal pNHA.

In accordance with the EPA Guidelines (EPA 2022) the ecological impacts associated with the Construction Phase traffic emissions are overall negative, slight and short-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 Min (µg/m³)**	**Distance from Road Beyond Which Concentration is Below Critical Level (30µg/m³) (m)**	**Do Something (µg/m³)**	**Distance from Road Beyond Which Concentration is Below Critical Level (30µg/m³) (m)**	**Impact (DS – DM) (µg/m³)**	**Change as a Percentage of Critical Level (30µg/m³) (%)**
Royal Canal pNHA (Binns Bridge, western side)	715830, 736004	149.0	>200m	123.5	>200m	-25.5	-85%
Royal Canal pNHA (Binns Bridge, eastern side)	715846, 735998	171.1	>200m	140.0	>200m	-31.1	-104%
Royal Canal pNHA (Clarke's Bridge, western side)	716654, 735657	98.3	>200m	104.6	>200m	6.3	21%
Royal Canal pNHA (Clarke's Bridge, eastern side)	716665, 735649	85.7	>200m	90.8	>200m	5.2	17%
Royal Canal pNHA (Clonliffe Bridge, western side)	716237, 735857	41.0	>200m	41.4	>200m	0.4	1%
Royal Canal pNHA (Clonliffe Bridge, eastern side)	716245, 735854	42.2	>200m	42.7	>200m	0.5	2%
Royal Canal pNHA (Cross Guns Bridge, western side)	715015, 736301	105.9	>200m	105.9	>200m	0.0	0%
Royal Canal pNHA (Cross Guns Bridge, eastern side)	715027, 736292	121.7	>200m	121.6	>200m	-0.1	0%
Royal Canal pNHA (Whitworth Road)	715183, 736244	34.9	>200m	35.0	>200m	0.1	0%
Santry Demesne pNHA (Santry Avenue)	716445, 740127	52.8	>200m	52.6	180m	-0.3	-1%
Santry Demesne pNHA (Swords Road)	716945, 740607	54.0	>200m	50.1	>200m	-3.9	-13%

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

Annual Mean Nitrogen 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 Min (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)
Royal Canal pNHA (Binns Bridge, western side)	715830, 736004	5	7.10	30m	6.21	20m	-18%	0m	-0.90
Royal Canal pNHA (Binns Bridge, eastern side)	715846, 735998	5	7.86	10m	6.81	10m	-21%	0m	-1.05
Royal Canal pNHA (Clarke's Bridge, western side)	716654, 735657	5	5.22	0m	5.48	0m	5%	0m	0.26
Royal Canal pNHA (Clarke's Bridge, eastern side)	716665, 735649	5	4.70	0m	4.93	10m	4%	120m	0.22
Royal Canal pNHA (Clonliffe Bridge, western side)	716237, 735857	5	2.64	0m	2.67	0m	0%	0m	0.02
Royal Canal pNHA (Clonliffe Bridge, eastern side)	716245, 735854	5	2.71	0m	2.73	0m	0%	0m	0.02
Royal Canal pNHA (Cross Guns Bridge, western side)	715015, 736301	5	5.52	20m	5.53	20m	0%	0m	0.01
Royal Canal pNHA (Cross Guns Bridge, eastern side)	715027, 736292	5	6.12	0m	6.14	0m	0%	0m	0.01
Royal Canal pNHA (Whitworth Road)	715183, 736244	5	2.33	0m	2.34	0m	0%	0m	0.01
Santry Demesne pNHA (Santry Avenue)	716445, 740127	5	3.23	0m	3.22	0m	0%	0m	-0.01
Santry Demesne pNHA (Swords Road)	716945, 740607	5	3.28	0m	3.10	0m	-4%	0m	-0.19

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 will 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)

	Vehicle Class	NO_X (tonnes)	NO_2 (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	Hydro-carbons (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		5	1	0.05	0.05	0.2	4.5	0.004	0.003
% Change		0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.3%	0.2%
DM	Goods	1436	408	11	11	43	223	0.4	0.5
DS		1440	409	11	11	43	223	0.4	0.5
Change		3	0.9	0.02	0.02	0.1	0.6	0.001	0.001
% Change		0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.2%
DM	Urban Bus	44	4	0.7	0.7	2	9	0	0.05
DS		46	5	0.8	0.7	2	9	0	0.05
Change		2	0.2	0.02	0.02	0.05	0.3	0	0.001
% Change		3%	3%	2%	2%	3%	3%	0%	2%
DM	**Total**	**3105**	**901**	**30**	**29**	**132**	**2183**	**2**	**2**
DS		**3114**	**904**	**31**	**29**	**132**	**2188**	**2**	**2**
Change		**10**	**2**	**0.1**	**0.1**	**0.4**	**5**	**0.005**	**0.005**
% Change		**0.3%**	**0.3%**	**0.3%**	**0.3%**	**0.3%**	**0.2%**	**0.3%**	**0.3%**

In accordance with the EPA Guidelines (EPA 2022), the regional impacts associated with the Construction Phase traffic emissions (pre-mitigation) will overall 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 ADMS-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} standard, 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 Figures 7.3 to 7.5 in Volume 3 of this EIAR. Statistics for the full list of modelled receptors can be found in Table 3.1 (Appendix A7.1(Detailed Modelling Results) 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 Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ2	715427,735139	39.5	16.1	11.3	1
AQ8	715405,735172	38.9	15.9	11.2	1
AQ9	715754,735028	46.3	16.5	11.5	1
AQ11	715734,735056	36.0	15.9	11.1	1
AQ12	715349,735159	34.7	16.0	11.2	1
AQ15	715642,735181	34.1	16.2	11.3	1
AQ55	715932,736145	39.7	16.5	11.5	1
AQ86	715700,735702	53.4	18.7	12.9	2
AQ103	715976,736323	38.5	16.3	11.4	1
AQ104	715968,736305	35.0	15.7	11.0	1
AQ117	717718,745165	32.5	15.7	11.0	1
AQ123	716460,737626	33.5	15.6	11.0	1
AQ125	716486,737677	34.7	15.9	11.1	1
AQ126	716322,737445	34.7	16.0	11.2	1
AQ131	716715,739900	32.4	16.0	11.2	1
AQ132	716779,740084	30.4	15.6	10.9	1
AQ141	716823,740382	28.4	15.3	10.8	<1
AQ143	717008,740688	32.1	15.5	10.9	1
AQ144	716672,739412	32.4	15.5	10.9	1
AQ145	716666,739359	33.8	15.7	11.0	1
AQ147	716615,739285	30.2	15.6	11.0	1
AQ149	716729,739735	30.7	15.6	11.0	1
AQ150	716699,739569	35.8	16.5	11.5	1
AQ153	716750,738324	34.7	15.8	11.1	1
AQ158	716640,739144	35.9	16.2	11.3	1
AQ160	716792,738462	33.9	16.0	11.2	1
AQ161	716831,738626	33.0	15.9	11.2	1
AQ162	716838,738676	34.3	15.9	11.2	1
AQ164	716808,738530	30.7	15.7	11.0	1
AQ166	716576,737802	29.4	15.5	10.9	<1
AQ168	716812,738873	33.6	15.9	11.1	1
AQ171	716725,738217	32.4	15.6	10.9	1
AQ175	716666,739056	33.1	15.9	11.1	1
AQ181	717675,745525	30.0	15.8	11.0	1
AQ182	717705,745229	30.8	15.8	11.1	1
AQ195	717933,746144	36.8	16.4	11.4	1
AQ226	716906,738314	32.4	15.6	11.0	1
AQ283	715784,736235	30.4	15.3	10.8	<1
AQ285	715750,736206	30.0	15.3	10.8	<1
AQ286	715760,736187	31.3	15.6	10.9	1
AQ326	716970,736002	40.5	17.0	11.8	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ345	715673,734937	40.9	17.0	11.8	1
AQ346	715173,734811	38.2	16.6	11.6	1
AQ347	715161,734821	36.0	16.3	11.4	1
AQ354	715529,734840	40.5	16.2	11.3	1
AQ358	715376,734937	35.2	16.2	11.3	1
AQ359	715272,735029	34.8	16.1	11.3	1
AQ360	715282,735057	33.6	16.0	11.2	1
AQ361	715233,734960	33.4	16.0	11.2	1
AQ390	715418,735866	42.2	17.0	11.8	1
AQ391	715481,735860	41.5	17.0	11.8	1
AQ392	715545,735853	41.1	16.9	11.8	1
AQ400	715635,735758	41.4	16.7	11.6	1
AQ401	715628,735841	48.6	17.8	12.3	1
AQ402	715619,735843	43.9	17.0	11.8	1
AQ417	716028,735199	46.5	17.5	12.1	1
AQ418	716036,735180	40.7	16.7	11.6	1
AQ419	716061,735183	37.4	16.2	11.4	1
AQ421	716094,735049	44.7	17.4	12.1	1
AQ430	715776,735668	34.0	16.0	11.2	1
AQ447	715876,735475	36.3	16.3	11.4	1
AQ454	716102,735420	31.0	15.5	10.9	1
AQ474	715904,735775	34.6	16.2	11.3	1
AQ475	716867,738954	34.5	16.3	11.4	1
AQ477	716906,739387	32.3	16.0	11.2	1
AQ479	716906,739413	33.3	16.2	11.3	1
AQ528	717830,746089	32.6	15.6	11.0	1
AQ529	715493,735321	34.2	16.2	11.3	1
AQ545	715567,735562	38.1	15.9	11.1	1
AQ546	715719,735020	37.4	16.4	11.4	1
AQ547	715659,735500	35.8	15.9	11.2	1
AQ555	715692,735462	34.5	15.9	11.2	1
AQ584	716267,735648	32.1	16.0	11.2	1
AQ585	716666,740058	35.9	16.1	11.3	1
AQ590	716539,737826	35.6	16.2	11.3	1
AQ591	716233,737178	32.9	15.6	11.0	1
AQ7	715378,735165	39.7	16.5	11.5	1
AQ14	715371,735192	38.9	16.6	11.5	1
AQ19	715552,735266	39.5	16.4	11.5	1
AQ24	715483,735360	39.8	16.6	11.6	1
AQ29	715475,735401	37.2	16.3	11.4	1
AQ49	715726,735815	39.8	16.8	11.7	1
AQ50	715878,736111	41.0	17.0	11.8	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (μg/m^3)			No of PM_{10} days > 50μg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ52	715913,736107	40.7	16.9	11.7	1
AQ53	715929,736207	39.9	16.9	11.7	1
AQ57	716139,736802	42.2	16.9	11.8	1
AQ58	716117,736703	36.2	15.9	11.2	1
AQ59	716102,736815	42.2	16.6	11.6	1
AQ60	716153,736826	37.0	16.3	11.4	1
AQ62	716181,737015	40.5	16.4	11.5	1
AQ67	716232,737086	37.2	16.4	11.5	1
AQ73	717649,743842	36.0	16.2	11.4	1
AQ74	716272,737186	36.4	16.2	11.4	1
AQ87	715819,735992	44.3	17.2	11.9	1
AQ95	715758,735885	49.0	18.2	12.5	2
AQ97	715846,736048	41.1	17.0	11.8	1
AQ100	715814,735918	46.5	17.6	12.2	1
AQ101	715977,736224	44.5	17.5	12.1	1
AQ105	716028,736451	38.4	16.1	11.3	1
AQ106	716020,736419	38.3	16.1	11.3	1
AQ110	716024,736311	38.3	16.2	11.4	1
AQ111	716087,736612	43.9	17.1	11.9	1
AQ112	716113,736681	36.3	16.0	11.2	1
AQ113	716086,736672	36.6	15.9	11.1	1
AQ114	716053,736517	37.2	15.9	11.2	1
AQ121	716510,737705	38.3	16.2	11.3	1
AQ127	716368,737427	37.1	16.4	11.5	1
AQ128	716336,737339	36.8	16.0	11.2	1
AQ130	716725,739993	39.6	16.8	11.7	1
AQ152	716723,739734	38.1	16.1	11.3	1
AQ154	716730,738375	37.6	16.2	11.3	1
AQ159	716737,738414	39.0	16.4	11.5	1
AQ163	716818,738578	36.0	16.0	11.2	1
AQ165	716841,738746	38.3	16.3	11.4	1
AQ169	716646,738058	36.2	16.1	11.3	1
AQ170	716716,738190	37.7	16.1	11.3	1
AQ261	716434,739241	40.1	16.5	11.5	1
AQ271	715641,737863	38.7	16.2	11.3	1
AQ272	716078,736588	38.5	16.2	11.3	1
AQ276	715980,736491	37.9	16.0	11.2	1
AQ289	715882,736338	39.7	16.8	11.7	1
AQ344	716487,735518	41.4	16.4	11.5	1
AQ356	715395,734951	37.2	16.5	11.5	1
AQ539	715663,735426	43.1	16.7	11.7	1
AQ550	715450,735181	37.1	16.3	11.4	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ561	715787,735655	39.5	16.9	11.8	1
AQ577	715903,735599	36.6	16.6	11.5	1
AQ589	716182,737013	38.2	16.3	11.4	1
AQ20	715441,735323	41.2	16.6	11.6	1
AQ23	715546,735311	42.3	16.8	11.7	1
AQ25	715452,735298	40.6	16.5	11.5	1
AQ27	715618,734912	45.3	17.2	11.9	1
AQ28	715493,735383	42.5	16.6	11.6	1
AQ30	715431,735304	46.5	17.2	12.0	1
AQ31	715557,735545	49.1	17.5	12.2	1
AQ32	715574,735572	41.4	16.6	11.6	1
AQ33	715522,735485	46.9	17.2	12.0	1
AQ34	715576,735535	44.2	17.0	11.8	1
AQ35	715624,735601	42.2	16.8	11.7	1
AQ36	715541,735472	40.5	16.5	11.5	1
AQ37	715503,735448	48.1	17.8	12.3	1
AQ38	715667,735718	44.8	17.5	12.1	1
AQ39	715610,735631	49.9	17.6	12.2	1
AQ40	715589,735553	54.7	18.5	12.8	2
AQ41	715601,735612	48.6	17.5	12.1	1
AQ42	715596,735564	40.3	17.0	11.8	1
AQ43	715659,735646	42.5	17.4	12.0	1
AQ44	715635,735667	40.7	17.0	11.8	1
AQ45	715677,735671	62.7	20.0	13.6	3
AQ46	715718,735803	61.0	19.8	13.5	3
AQ47	715716,735798	56.5	19.2	13.1	3
AQ48	715728,735757	54.9	18.7	12.9	2
AQ51	715917,736183	43.8	17.4	12.1	1
AQ54	715898,736152	43.0	17.4	12.0	1
AQ56	715954,736257	52.4	18.2	12.6	2
AQ61	716181,736908	42.2	16.7	11.6	1
AQ63	716118,736823	40.7	16.9	11.8	1
AQ64	716185,736921	48.1	17.2	12.0	1
AQ66	717154,741144	42.9	16.9	11.8	1
AQ68	716288,737227	45.3	17.1	11.9	1
AQ85	717782,744756	46.7	17.5	12.1	1
AQ88	715797,735959	49.0	17.9	12.4	2
AQ89	715682,735736	54.3	18.5	12.7	2
AQ90	715709,735720	60.3	19.7	13.5	3
AQ91	715743,735788	53.2	18.6	12.8	2
AQ92	715755,735810	49.1	18.2	12.5	2
AQ93	715799,735893	43.1	17.2	11.9	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ94	715769,735906	42.8	17.2	11.9	1
AQ96	715871,736028	46.4	17.9	12.3	2
AQ98	715864,736083	51.3	18.1	12.5	2
AQ99	715831,735950	51.1	18.2	12.6	2
AQ107	715994,736363	41.4	16.5	11.5	1
AQ108	716050,736370	45.7	17.0	11.8	1
AQ109	716063,736412	42.0	16.7	11.6	1
AQ120	716294,737354	40.6	16.4	11.5	1
AQ122	716433,737570	42.5	16.6	11.6	1
AQ124	716376,737651	44.5	16.7	11.6	1
AQ129	716378,737598	41.1	16.9	11.7	1
AQ225	718643,745214	43.0	17.1	11.9	1
AQ429	716263,734737	42.9	17.5	12.1	1
AQ431	715759,735649	40.3	16.7	11.6	1
AQ432	715733,735678	50.4	18.0	12.4	2
AQ544	715644,734941	64.3	19.7	13.5	3
AQ557	715590,735000	43.9	17.4	12.1	1
AQ560	715939,735678	41.2	17.3	11.9	1
AQ582	716065,735518	42.2	17.2	11.9	1
AQ587	716594,738032	42.8	16.5	11.6	1
AQ588	716462,737712	43.9	16.9	11.8	1
AQ17	715603,735234	35.9	15.8	11.1	1
AQ26	715466,735381	30.2	15.4	10.8	<1
AQ223	717437,745845	39.5	17.2	11.9	1
AQ328	716837,736019	42.8	17.7	12.2	1
AQ329	716875,735898	35.7	16.5	11.5	1
AQ330	716897,735887	38.1	16.9	11.7	1
AQ331	716843,735868	36.9	16.7	11.6	1
AQ332	716864,735852	38.3	17.0	11.8	1
AQ333	716778,735800	36.2	16.6	11.5	1
AQ334	716798,735783	38.7	17.1	11.8	1
AQ335	716758,735744	37.2	16.8	11.7	1
AQ336	716738,735759	38.9	17.1	11.8	1
AQ337	716689,735669	37.1	16.8	11.6	1
AQ338	716670,735686	40.2	17.2	11.9	1
AQ339	716603,735617	41.3	17.3	12.0	1
AQ340	716611,735592	44.7	17.5	12.1	1
AQ341	716512,735536	43.1	17.3	12.0	1
AQ342	716524,735516	36.5	16.3	11.4	1
AQ343	716506,735499	37.7	16.5	11.5	1
AQ379	715159,735753	37.7	16.4	11.4	1
AQ382	715118,735899	38.4	16.4	11.4	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ383	715111,735877	38.7	16.4	11.5	1
AQ384	715126,735876	42.3	17.0	11.8	1
AQ385	714983,735877	51.2	18.3	12.6	2
AQ386	714996,735909	43.5	17.2	11.9	1
AQ387	714961,735925	39.0	16.5	11.5	1
AQ388	714965,735877	36.5	16.3	11.4	1
AQ389	715406,735868	37.1	16.3	11.4	1
AQ404	715489,736065	33.1	15.5	10.9	1
AQ405	714956,736106	40.4	16.3	11.4	1
AQ408	715011,736186	29.6	15.2	10.7	<1
AQ409	715651,735284	29.9	15.2	10.7	<1
AQ412	715791,735373	31.0	15.4	10.8	<1
AQ414	715843,735261	33.0	15.7	11.1	1
AQ415	715850,735291	33.5	15.9	11.1	1
AQ438	715923,735759	38.3	16.2	11.4	1
AQ443	716195,735673	28.1	15.1	10.7	<1
AQ444	716004,735575	29.1	15.2	10.7	<1
AQ445	716030,735573	28.7	15.2	10.7	<1
AQ448	715887,735457	36.6	16.4	11.4	1
AQ449	715946,735365	45.8	18.0	12.4	2
AQ450	715984,735345	37.1	16.5	11.5	1
AQ452	716110,735445	30.4	15.5	10.9	<1
AQ457	716110,735219	36.3	16.3	11.4	1
AQ460	716277,735369	34.7	16.3	11.3	1
AQ462	716441,735445	37.1	16.3	11.4	1
AQ468	716325,735632	39.2	16.8	11.7	1
AQ473	716252,735561	41.9	16.6	11.6	1
AQ487	717253,740069	42.5	18.1	12.4	2
AQ535	715631,735518	29.9	15.2	10.7	<1
AQ543	715826,735000	41.3	16.7	11.6	1
AQ552	716427,737419	36.9	16.3	11.4	1
AQ562	715847,735563	38.7	16.5	11.5	1
AQ567	716006,735013	34.5	16.3	11.4	1
AQ575	716186,735001	31.2	15.4	10.9	<1
AQ602	715758,735392	32.0	15.5	10.9	1
AQ603	715786,735355	30.7	15.3	10.8	<1
AQ604	715739,735355	44.8	17.3	12.0	1
AQ605	714994,735890	40.6	16.7	11.6	1
AQ606	714948,735891	47.9	17.9	12.4	2
AQ607	714980,735925	48.5	17.8	12.3	1
AQ315	715004,736338	37.5	16.4	11.5	1
AQ380	715164,735867	53.2	18.5	12.8	2

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ381	715164,735894	53.4	18.4	12.7	2
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; 112 exceedances were modelled at receptors on the N1 Drumcondra Road Upper/Drumcondra Road Lower/Dorset Street Upper/Dorset Street Lower/Bolton Street, the R101 North Circular Road, the R104 Coolock Lane, the R106 Swords Road, the R108 Phibsborough Road/St Mobhi Road, the R125 Holywell, the R802 Gardiner Street Upper/Middle/Lower, the R131 Clonliffe Road, the R132 Dublin Road, the R803 Ballybough Road, the R836 Dublin Road, Belvedere Place, Cathal Brugha Street, Denmark Street Great, Frederick Street North, Hill Street, Mountjoy Square, Parnell Square, Parnell Street, Temple Street and Whitworth Road. Concentrations at all receptors with exceedances can be found in Table 3.1 (Appendix A7.1 (Detailed Modelling Results) 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 exceeded 60µg/m^3 at four receptors on the N1 Dorset Street Lower and Parnell Street, indicating that exceedances of the NO_2 1-hour mean are likely 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 13 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 limit value objective for all modelled receptors. Reported concentrations are lower in Opening Year 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 ADMS-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 in the 2028 DS scenario are listed in Table 7.32. Locations of these receptors are shown in Figures 7.3 to 7.5, Volume 3 of this EIAR. Statistics for the full list of modelled receptors can be found in Table 3.2 (Appendix A7.1 (Detailed Modelling Results) 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 Most Impacted Receptor Locations

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ2	715427,735139	38.8	16.0	11.2	1
AQ8	715405,735172	37.1	15.6	11.0	1
AQ9	715754,735028	45.5	16.5	11.5	1
AQ11	715734,735056	34.3	15.6	11.0	1
AQ12	715349,735159	31.2	15.4	10.9	<1
AQ15	715642,735181	30.9	15.6	11.0	1
AQ54	715932,736145	38.2	16.1	11.3	1
AQ85	715700,735702	52.0	17.2	12.0	1
AQ102	715976,736323	38.1	16.2	11.3	1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m^3)			No of PM_{10} days > 50µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ103	715968,736305	30.4	15.4	10.9	<1
AQ116	717718,745165	30.3	15.5	10.9	1
AQ122	716460,737626	30.1	15.2	10.7	<1
AQ124	716486,737677	32.1	15.5	10.9	<1
AQ125	716322,737445	31.7	15.6	10.9	1
AQ130	716715,739900	29.4	15.3	10.8	<1
AQ131	716779,740084	28.1	15.2	10.7	<1
AQ140	716823,740382	24.3	14.8	10.4	<1
AQ142	717008,740688	28.8	15.2	10.7	<1
AQ143	716672,739412	29.1	15.3	10.8	<1
AQ144	716666,739359	29.7	15.3	10.8	<1
AQ146	716615,739285	27.3	15.1	10.6	<1
AQ148	716729,739735	27.7	15.1	10.7	<1
AQ149	716699,739569	30.4	15.5	10.9	1
AQ152	716750,738324	31.2	15.3	10.8	<1
AQ157	716640,739144	32.7	15.8	11.1	1
AQ159	716792,738462	26.6	14.9	10.6	<1
AQ160	716831,738626	26.0	14.9	10.5	<1
AQ161	716838,738676	26.6	14.9	10.5	<1
AQ163	716808,738530	25.0	14.8	10.5	<1
AQ165	716576,737802	24.7	14.8	10.4	<1
AQ167	716812,738873	26.3	14.8	10.5	<1
AQ170	716725,738217	28.6	15.2	10.7	<1
AQ174	716666,739056	30.4	15.3	10.8	<1
AQ180	717675,745525	27.0	15.1	10.7	<1
AQ181	717705,745229	28.5	15.3	10.8	<1
AQ194	717933,746144	36.2	16.3	11.4	1
AQ225	716906,738314	29.8	15.3	10.8	<1
AQ282	715784,736235	27.4	14.9	10.6	<1
AQ284	715750,736206	27.0	14.9	10.5	<1
AQ285	715760,736187	28.2	15.0	10.6	<1
AQ341	715673,734937	40.2	16.8	11.7	1
AQ342	715173,734811	37.4	16.4	11.5	1
AQ343	715161,734821	34.6	16.0	11.2	1
AQ350	715529,734840	38.7	16.0	11.2	1
AQ354	715376,734937	30.9	15.6	10.9	1
AQ355	715272,735029	30.5	15.5	10.9	1
AQ356	715282,735057	30.3	15.5	10.9	1
AQ357	715233,734960	30.2	15.5	10.9	1
AQ386	715418,735866	41.0	16.9	11.7	1
AQ387	715481,735860	40.1	16.8	11.7	1
AQ388	715545,735853	39.5	16.7	11.6	1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ396	715635,735758	39.7	16.4	11.4	1
AQ397	715628,735841	46.8	17.5	12.1	1
AQ398	715619,735843	42.6	16.7	11.7	1
AQ413	716028,735199	45.9	17.5	12.1	1
AQ414	716036,735180	40.2	16.6	11.6	1
AQ415	716061,735183	36.2	16.1	11.3	1
AQ417	716094,735049	43.0	17.1	11.9	1
AQ426	715776,735668	30.6	15.4	10.8	<1
AQ443	715876,735475	35.6	16.1	11.3	1
AQ450	716102,735420	28.7	15.2	10.7	<1
AQ470	715904,735775	31.4	15.4	10.8	<1
AQ471	716867,738954	27.3	15.1	10.7	<1
AQ473	716906,739387	26.6	15.1	10.7	<1
AQ475	716906,739413	28.0	15.4	10.8	<1
AQ524	717830,746089	30.2	15.3	10.8	<1
AQ525	715493,735321	31.3	15.7	11.0	1
AQ541	715567,735562	37.4	15.9	11.1	1
AQ542	715719,735020	36.8	16.2	11.4	1
AQ543	715659,735500	31.9	15.4	10.9	<1
AQ551	715692,735462	31.4	15.4	10.9	<1
AQ580	716267,735648	29.6	15.5	10.9	1
AQ581	716666,740058	28.7	14.9	10.6	<1
AQ586	716539,737826	32.4	15.8	11.1	1
AQ587	716233,737178	30.3	15.1	10.7	<1
AQ7	715378,735165	35.8	15.8	11.1	1
AQ14	715371,735192	35.3	15.9	11.2	1
AQ18	715552,735266	34.0	15.8	11.1	1
AQ23	715483,735360	34.6	16.0	11.2	1
AQ28	715475,735401	32.0	15.6	11.0	1
AQ48	715726,735815	36.0	16.0	11.2	1
AQ49	715878,736111	37.6	16.1	11.3	1
AQ51	715913,736107	37.7	16.1	11.3	1
AQ52	715929,736207	36.4	16.0	11.2	1
AQ56	716139,736802	38.5	16.4	11.4	1
AQ57	716117,736703	34.1	15.7	11.0	1
AQ58	716102,736815	39.0	16.2	11.3	1
AQ59	716153,736826	32.4	15.3	10.8	<1
AQ61	716181,737015	37.4	16.0	11.2	1
AQ66	716232,737086	32.9	15.9	11.1	1
AQ72	717649,743842	32.3	15.8	11.1	1
AQ73	716272,737186	32.6	15.8	11.1	1
AQ86	715819,735992	41.4	16.2	11.4	1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ94	715758,735885	45.7	16.8	11.7	1
AQ96	715846,736048	37.1	16.1	11.3	1
AQ99	715814,735918	43.6	16.9	11.8	1
AQ100	715977,736224	41.1	16.6	11.6	1
AQ104	716028,736451	32.1	15.7	11.0	1
AQ105	716020,736419	33.2	15.8	11.1	1
AQ109	716024,736311	34.7	15.8	11.1	1
AQ110	716087,736612	41.0	16.5	11.5	1
AQ111	716113,736681	34.1	15.7	11.0	1
AQ112	716086,736672	31.4	15.6	10.9	1
AQ113	716053,736517	32.0	15.6	11.0	1
AQ120	716510,737705	35.3	15.6	11.0	1
AQ126	716368,737427	33.4	15.9	11.2	1
AQ127	716336,737339	33.5	15.5	10.9	<1
AQ129	716725,739993	33.3	16.0	11.2	1
AQ151	716723,739734	29.7	15.0	10.6	<1
AQ153	716730,738375	28.5	15.0	10.6	<1
AQ158	716737,738414	29.2	15.2	10.7	<1
AQ162	716818,738578	27.0	15.0	10.6	<1
AQ164	716841,738746	29.4	14.8	10.5	<1
AQ168	716646,738058	28.4	15.0	10.6	<1
AQ169	716716,738190	30.7	15.2	10.7	<1
AQ260	716434,739241	36.2	16.0	11.2	1
AQ270	715641,737863	33.6	15.8	11.1	1
AQ271	716078,736588	33.9	15.8	11.1	1
AQ275	715980,736491	32.7	15.7	11.1	1
AQ288	715882,736338	36.5	16.0	11.2	1
AQ340	716487,735518	39.0	16.5	11.5	1
AQ352	715395,734951	31.8	15.7	11.0	1
AQ535	715663,735426	39.5	16.1	11.3	1
AQ546	715450,735181	35.1	15.9	11.1	1
AQ557	715787,735655	33.9	16.0	11.2	1
AQ573	715903,735599	31.4	15.7	11.0	1
AQ585	716182,737013	29.0	14.8	10.5	<1
AQ19	715441,735323	36.4	16.0	11.2	1
AQ22	715546,735311	37.2	15.9	11.2	1
AQ24	715452,735298	35.7	15.7	11.0	1
AQ26	715618,734912	39.5	16.2	11.3	1
AQ27	715493,735383	36.5	15.8	11.1	1
AQ29	715431,735304	40.4	16.2	11.4	1
AQ30	715557,735545	40.4	16.3	11.4	1
AQ31	715574,735572	37.4	16.0	11.2	1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (μg/m^3)			No of PM_{10} days > 50μg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ32	715522,735485	41.4	16.3	11.4	1
AQ33	715576,735535	36.2	16.0	11.2	1
AQ34	715624,735601	36.5	15.9	11.1	1
AQ35	715541,735472	34.6	15.7	11.0	1
AQ36	715503,735448	39.8	16.4	11.4	1
AQ37	715667,735718	36.3	16.2	11.3	1
AQ38	715610,735631	42.7	16.6	11.6	1
AQ39	715589,735553	41.8	16.7	11.6	1
AQ40	715601,735612	40.4	16.3	11.4	1
AQ41	715596,735564	34.5	16.0	11.2	1
AQ42	715659,735646	34.7	16.1	11.2	1
AQ43	715635,735667	34.1	15.9	11.1	1
AQ44	715677,735671	52.5	17.5	12.2	1
AQ45	715718,735803	49.8	17.2	12.0	1
AQ46	715716,735798	46.9	17.1	11.9	1
AQ47	715728,735757	48.0	17.1	11.9	1
AQ50	715917,736183	39.0	16.4	11.4	1
AQ53	715898,736152	38.9	16.4	11.4	1
AQ55	715954,736257	47.2	17.6	12.2	1
AQ60	716181,736908	34.2	15.9	11.2	1
AQ62	716118,736823	32.7	15.5	10.9	1
AQ63	716185,736921	40.3	16.6	11.6	1
AQ65	717154,741144	37.2	16.4	11.4	1
AQ67	716288,737227	37.1	16.3	11.4	1
AQ84	717782,744756	38.8	16.2	11.3	1
AQ87	715797,735959	41.3	16.5	11.5	1
AQ88	715682,735736	44.6	16.8	11.7	1
AQ89	715709,735720	55.2	17.8	12.3	1
AQ90	715743,735788	47.9	17.0	11.9	1
AQ91	715755,735810	43.0	16.6	11.6	1
AQ92	715799,735893	38.7	16.1	11.3	1
AQ93	715769,735906	37.8	16.0	11.2	1
AQ95	715871,736028	42.3	16.6	11.6	1
AQ97	715864,736083	46.5	16.7	11.7	1
AQ98	715831,735950	45.8	16.8	11.7	1
AQ106	715994,736363	34.1	16.0	11.2	1
AQ107	716050,736370	36.2	16.4	11.4	1
AQ108	716063,736412	36.9	16.2	11.3	1
AQ119	716294,737354	31.4	15.3	10.8	<1
AQ121	716433,737570	36.8	15.9	11.1	1
AQ123	716376,737651	36.2	15.8	11.1	1
AQ128	716378,737598	36.9	16.3	11.3	1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ224	718643,745214	33.2	15.8	11.1	1
AQ425	716263,734737	36.3	16.4	11.4	1
AQ427	715759,735649	34.8	15.8	11.1	1
AQ428	715733,735678	42.0	16.6	11.6	1
AQ540	715644,734941	51.2	17.6	12.2	1
AQ553	715590,735000	36.6	16.3	11.4	1
AQ556	715939,735678	35.1	16.2	11.3	1
AQ578	716065,735518	37.6	16.4	11.4	1
AQ583	716594,738032	33.7	15.6	10.9	1
AQ584	716462,737712	35.2	16.1	11.3	1
AQ17	715603,735234	37.6	15.9	11.1	1
AQ25	715466,735381	33.9	15.9	11.1	1
AQ222	717437,745845	41.2	17.5	12.1	1
AQ324	716837,736019	43.6	17.9	12.3	2
AQ325	716875,735898	36.2	16.6	11.5	1
AQ326	716897,735887	38.7	17.0	11.8	1
AQ327	716843,735868	37.5	16.8	11.7	1
AQ328	716864,735852	39.0	17.1	11.9	1
AQ329	716778,735800	36.8	16.7	11.6	1
AQ330	716798,735783	39.5	17.2	11.9	1
AQ331	716758,735744	37.9	17.0	11.8	1
AQ332	716738,735759	39.7	17.3	11.9	1
AQ333	716689,735669	37.8	16.9	11.7	1
AQ334	716670,735686	41.0	17.3	12.0	1
AQ335	716603,735617	42.2	17.5	12.1	1
AQ336	716611,735592	45.8	17.7	12.2	1
AQ337	716512,735536	43.8	17.4	12.0	1
AQ338	716524,735516	37.2	16.4	11.5	1
AQ339	716506,735499	38.8	16.7	11.6	1
AQ375	715159,735753	39.1	16.5	11.5	1
AQ378	715118,735899	39.8	16.5	11.5	1
AQ379	715111,735877	40.1	16.6	11.6	1
AQ380	715126,735876	43.1	17.1	11.9	1
AQ381	714983,735877	53.2	18.5	12.8	2
AQ382	714996,735909	44.7	17.3	12.0	1
AQ383	714961,735925	39.6	16.6	11.6	1
AQ384	714965,735877	37.4	16.3	11.4	1
AQ385	715406,735868	37.8	16.4	11.4	1
AQ400	715489,736065	35.2	15.7	11.1	1
AQ401	714956,736106	41.0	16.2	11.4	1
AQ404	715011,736186	31.6	15.4	10.9	<1
AQ405	715651,735284	32.6	15.5	10.9	1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Concentration (µg/m³)			No of PM_{10} days > 50µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ408	715791,735373	35.0	15.8	11.1	1
AQ410	715843,735261	35.8	16.1	11.3	1
AQ411	715850,735291	35.8	16.2	11.3	1
AQ434	715923,735759	39.1	16.1	11.3	1
AQ439	716195,735673	30.3	15.3	10.8	<1
AQ440	716004,735575	32.0	15.6	11.0	1
AQ441	716030,735573	30.9	15.5	10.9	1
AQ444	715887,735457	37.1	16.4	11.4	1
AQ445	715946,735365	47.2	18.2	12.5	2
AQ446	715984,735345	37.9	16.6	11.6	1
AQ448	716110,735445	33.2	15.9	11.1	1
AQ453	716110,735219	37.1	16.5	11.5	1
AQ456	716277,735369	36.0	16.5	11.5	1
AQ458	716441,735445	38.3	16.4	11.5	1
AQ464	716325,735632	40.3	17.0	11.8	1
AQ469	716252,735561	43.6	16.6	11.6	1
AQ483	717253,740069	44.2	18.4	12.6	2
AQ531	715631,735518	32.0	15.4	10.9	<1
AQ539	715826,735000	42.6	17.2	11.9	1
AQ548	716427,737419	38.1	16.4	11.5	1
AQ558	715847,735563	39.7	16.6	11.6	1
AQ563	716006,735013	36.0	16.6	11.5	1
AQ571	716186,735001	34.6	15.8	11.1	1
AQ596	715758,735392	34.6	15.8	11.1	1
AQ597	715786,735355	33.9	15.6	11.0	1
AQ598	715739,735355	46.1	17.5	12.1	1
AQ599	714994,735890	41.3	16.8	11.7	1
AQ600	714948,735891	49.6	18.1	12.5	2
AQ601	714980,735925	49.4	17.9	12.4	2
AQ314	715004,736338	40.2	16.7	11.6	1
AQ376	715164,735867	56.1	18.9	13.0	2
AQ377	715164,735894	56.2	18.8	12.9	2
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; 66 exceedances were modelled at receptors on the N1 Drumcondra Road Upper/Drumcondra Road Lower/Dorset Street Upper/Dorset Street Lower/Bolton Street, the R101 North Circular Road, the R104 Coolock Lane, the R106 Swords Road, the R108 Phibsborough Road/St Mobhi Road, the R802 Gardiner Street Upper/Middle/Lower, the R131 Clonliffe Road, the R803 Ballybough Road, the R836 Dublin Road, Belvedere Place, Cathal Brugha Street, Denmark Street Great, Forest Road, Frederick Street North, Hill Street, Mountjoy Square, Parnell Square, Parnell Street, Temple Street and Whitworth Road. This is a decrease from 112 exceedances modelled in the DM scenario. Concentrations at all receptors with exceedances can be found in Table 3.2 (Appendix A7.1 (Detailed Modelling Results) 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 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 13 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 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 Do Minimum and Do Something in 2028. Statistics for the full list of modelled receptors can be found in Table 3.3 in Appendix A7.1(Detailed Modelling Results) in Volume 4 of this EIAR, and Figure 7.3 to Figure 7.5 in Volume 3 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 Do Minimum and Do Something and Impact Significance Criteria at Most Impacted Receptor Locations

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50µg/m³	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ2	715427,735139	-0.7	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ8	715405,735172	-1.8	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ9	715754,735028	-0.8	-0.1	0.0	<1	Slight Beneficial	Negligible	Negligible
AQ11	715734,735056	-1.7	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ12	715349,735159	-3.5	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ15	715642,735181	-3.2	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ54	715932,736145	-1.5	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ85	715700,735702	-1.4	-1.5	-0.9	-1	Slight Beneficial	Negligible	Negligible
AQ102	715976,736323	-0.5	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ103	715968,736305	-4.6	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ116	717718,745165	-2.1	-0.2	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ122	716460,737626	-3.4	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ124	716486,737677	-2.7	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ125	716322,737445	-3.0	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ130	716715,739900	-2.9	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ131	716779,740084	-2.3	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ140	716823,740382	-4.1	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ142	717008,740688	-3.4	-0.2	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ143	716672,739412	-3.3	-0.2	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ144	716666,739359	-4.0	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ146	716615,739285	-3.0	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ148	716729,739735	-3.0	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ149	716699,739569	-5.4	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ152	716750,738324	-3.5	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ157	716640,739144	-3.2	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ159	716792,738462	-7.3	-1.1	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ160	716831,738626	-7.0	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50µg/m³	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ161	716838,738676	-7.8	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ163	716808,738530	-5.7	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ165	716576,737802	-4.6	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ167	716812,738873	-7.3	-1.0	-0.6	<1	Slight Beneficial	Negligible	Negligible
AQ170	716725,738217	-3.8	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ174	716666,739056	-2.7	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ180	717675,745525	-3.1	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ181	717705,745229	-2.3	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ194	717933,746144	-0.6	-0.1	0.0	<1	Slight Beneficial	Negligible	Negligible
AQ225	716906,738314	-2.5	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ282	715784,736235	-2.9	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ284	715750,736206	-3.0	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ285	715760,736187	-3.1	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ341	715673,734937	-0.7	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ342	715173,734811	-0.8	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ343	715161,734821	-1.5	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ350	715529,734840	-1.9	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ354	715376,734937	-4.3	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ355	715272,735029	-4.3	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ356	715282,735057	-3.3	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ357	715233,734960	-3.2	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ386	715418,735866	-1.3	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ387	715481,735860	-1.5	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ388	715545,735853	-1.6	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ396	715635,735758	-1.7	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ397	715628,735841	-1.8	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ398	715619,735843	-1.4	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ413	716028,735199	-0.5	0.0	0.0	<1	Slight Beneficial	Negligible	Negligible
AQ414	716036,735180	-0.6	-0.1	0.0	<1	Slight Beneficial	Negligible	Negligible
AQ415	716061,735183	-1.2	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ417	716094,735049	-1.7	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ426	715776,735668	-3.4	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ443	715876,735475	-0.7	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ450	716102,735420	-2.3	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ470	715904,735775	-3.2	-0.8	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ471	716867,738954	-7.2	-1.2	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ473	716906,739387	-5.7	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ475	716906,739413	-5.4	-0.8	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ524	717830,746089	-2.4	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ525	715493,735321	-3.0	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50µg/m³	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ541	715567,735562	-0.7	0.0	0.0	<1	Slight Beneficial	Negligible	Negligible
AQ542	715719,735020	-0.6	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ543	715659,735500	-3.9	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ551	715692,735462	-3.0	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ580	716267,735648	-2.5	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ581	716666,740058	-7.2	-1.2	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ586	716539,737826	-3.1	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ587	716233,737178	-2.6	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ7	715378,735165	-3.9	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ14	715371,735192	-3.6	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ18	715552,735266	-5.5	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ23	715483,735360	-5.2	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ28	715475,735401	-5.2	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ48	715726,735815	-3.8	-0.9	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ49	715878,736111	-3.4	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ51	715913,736107	-3.0	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ52	715929,736207	-3.5	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ56	716139,736802	-3.7	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ57	716117,736703	-2.1	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ58	716102,736815	-3.2	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ59	716153,736826	-4.6	-1.0	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ61	716181,737015	-3.2	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ66	716232,737086	-4.4	-0.6	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ72	717649,743842	-3.7	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ73	716272,737186	-3.8	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ86	715819,735992	-2.8	-1.0	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ94	715758,735885	-3.3	-1.4	-0.8	-1	Moderate Beneficial	Negligible	Negligible
AQ96	715846,736048	-4.0	-0.9	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ99	715814,735918	-2.9	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ100	715977,736224	-3.4	-0.9	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ104	716028,736451	-6.3	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ105	716020,736419	-5.1	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ109	716024,736311	-3.6	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ110	716087,736612	-3.0	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ111	716113,736681	-2.2	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ112	716086,736672	-5.3	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ113	716053,736517	-5.2	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ120	716510,737705	-3.0	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ126	716368,737427	-3.8	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ127	716336,737339	-3.3	-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 > 50µg/m³	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ129	716725,739993	-6.3	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ151	716723,739734	-8.4	-1.1	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ153	716730,738375	-9.1	-1.1	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ158	716737,738414	-9.8	-1.2	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ162	716818,738578	-9.1	-1.1	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ164	716841,738746	-8.9	-1.5	-0.9	<1	Moderate Beneficial	Negligible	Negligible
AQ168	716646,738058	-7.8	-1.1	-0.7	<1	Moderate Beneficial	Negligible	Negligible
AQ169	716716,738190	-7.0	-1.0	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ260	716434,739241	-3.9	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ270	715641,737863	-5.0	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ271	716078,736588	-4.7	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ275	715980,736491	-5.2	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ288	715882,736338	-3.2	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ340	716487,735518	-2.4	<0.1	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ352	715395,734951	-5.5	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ535	715663,735426	-3.7	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ546	715450,735181	-2.0	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ557	715787,735655	-5.6	-0.9	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ573	715903,735599	-5.2	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ585	716182,737013	-9.2	-1.5	-0.9	<1	Moderate Beneficial	Negligible	Negligible
AQ19	715441,735323	-4.8	-0.7	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ22	715546,735311	-5.1	-0.9	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ24	715452,735298	-5.0	-0.8	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ26	715618,734912	-5.8	-1.0	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ27	715493,735383	-6.0	-0.8	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ29	715431,735304	-6.1	-1.0	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ30	715557,735545	-8.7	-1.2	-0.8	<1	Substantial Beneficial	Negligible	Negligible
AQ31	715574,735572	-4.1	-0.6	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ32	715522,735485	-5.5	-0.9	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ33	715576,735535	-8.0	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ34	715624,735601	-5.7	-0.9	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ35	715541,735472	-5.9	-0.8	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ36	715503,735448	-8.3	-1.4	-0.8	<1	Substantial Beneficial	Negligible	Negligible
AQ37	715667,735718	-8.5	-1.3	-0.8	<1	Substantial Beneficial	Negligible	Negligible
AQ38	715610,735631	-7.2	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ39	715589,735553	-13.0	-1.8	-1.1	-1	Substantial Beneficial	Negligible	Negligible
AQ40	715601,735612	-8.3	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ41	715596,735564	-5.8	-1.0	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ42	715659,735646	-7.8	-1.3	-0.8	<1	Substantial Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m^3)			Change in No of PM_{10} days > 50µg/m^3	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ43	715635,735667	-6.6	-1.1	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ44	715677,735671	-10.2	-2.4	-1.5	-2	Substantial Beneficial	Negligible	Negligible
AQ45	715718,735803	-11.2	-2.6	-1.6	-2	Substantial Beneficial	Negligible	Negligible
AQ46	715716,735798	-9.5	-2.1	-1.3	-2	Substantial Beneficial	Negligible	Negligible
AQ47	715728,735757	-6.9	-1.7	-1.0	-1	Substantial Beneficial	Negligible	Negligible
AQ50	715917,736183	-4.8	-1.0	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ53	715898,736152	-4.1	-1.0	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ55	715954,736257	-5.1	-0.7	-0.4	-1	Substantial Beneficial	Negligible	Negligible
AQ60	716181,736908	-8.0	-0.7	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ62	716118,736823	-8.0	-1.4	-0.8	<1	Substantial Beneficial	Negligible	Negligible
AQ63	716185,736921	-7.8	-0.6	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ65	717154,741144	-5.7	-0.5	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ67	716288,737227	-8.2	-0.8	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ84	717782,744756	-7.9	-1.3	-0.8	<1	Substantial Beneficial	Negligible	Negligible
AQ87	715797,735959	-7.7	-1.4	-0.8	-1	Substantial Beneficial	Negligible	Negligible
AQ88	715682,735736	-9.7	-1.7	-1.0	-1	Substantial Beneficial	Negligible	Negligible
AQ89	715709,735720	-5.1	-1.9	-1.2	-2	Substantial Beneficial	Negligible	Negligible
AQ90	715743,735788	-5.3	-1.6	-0.9	-1	Substantial Beneficial	Negligible	Negligible
AQ91	715755,735810	-6.1	-1.6	-0.9	-1	Substantial Beneficial	Negligible	Negligible
AQ92	715799,735893	-4.5	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ93	715769,735906	-5.0	-1.2	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ95	715871,736028	-4.0	-1.3	-0.8	-1	Substantial Beneficial	Negligible	Negligible
AQ97	715864,736083	-4.8	-1.4	-0.9	-1	Substantial Beneficial	Negligible	Negligible
AQ98	715831,735950	-5.3	-1.4	-0.8	-1	Substantial Beneficial	Negligible	Negligible
AQ106	715994,736363	-7.3	-0.5	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ107	716050,736370	-9.6	-0.6	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ108	716063,736412	-5.1	-0.5	-0.3	<1	Substantial Beneficial	Negligible	Negligible
AQ119	716294,737354	-9.2	-1.0	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ121	716433,737570	-5.7	-0.7	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ123	716376,737651	-8.3	-0.9	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ128	716378,737598	-4.2	-0.6	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ224	718643,745214	-9.8	-1.3	-0.8	<1	Substantial Beneficial	Negligible	Negligible
AQ425	716263,734737	-6.6	-1.2	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ427	715759,735649	-5.5	-0.9	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ428	715733,735678	-8.4	-1.3	-0.8	-1	Substantial Beneficial	Negligible	Negligible
AQ540	715644,734941	-13.1	-2.1	-1.3	-2	Substantial Beneficial	Negligible	Negligible
AQ553	715590,735000	-7.3	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m^3)			Change in No of PM_{10} days > 50µg/m^3	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ556	715939,735678	-6.1	-1.1	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ578	716065,735518	-4.6	-0.8	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ583	716594,738032	-9.1	-1.0	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ584	716462,737712	-8.7	-0.8	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ17	715603,735234	1.7	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ25	715466,735381	3.6	0.5	0.3	<1	Slight Adverse	Negligible	Negligible
AQ222	717437,745845	1.7	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ324	716837,736019	0.8	0.2	0.1	1	Slight Adverse	Negligible	Negligible
AQ325	716875,735898	0.5	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ326	716897,735887	0.6	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ327	716843,735868	0.6	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ328	716864,735852	0.7	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ329	716778,735800	0.6	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ330	716798,735783	0.8	0.2	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ331	716758,735744	0.7	0.2	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ332	716738,735759	0.8	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ333	716689,735669	0.7	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ334	716670,735686	0.8	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ335	716603,735617	0.9	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ336	716611,735592	1.1	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ337	716512,735536	0.7	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ338	716524,735516	0.7	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ339	716506,735499	1.1	0.2	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ375	715159,735753	1.4	0.2	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ378	715118,735899	1.4	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ379	715111,735877	1.4	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ380	715126,735876	0.8	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ381	714983,735877	2.0	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ382	714996,735909	1.2	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ383	714961,735925	0.6	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ384	714965,735877	0.8	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ385	715406,735868	0.7	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ400	715489,736065	2.1	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ401	714956,736106	0.6	0.0	0.0	<1	Slight Adverse	Negligible	Negligible
AQ404	715011,736186	2.0	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ405	715651,735284	2.8	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ408	715791,735373	4.0	0.4	0.3	<1	Slight Adverse	Negligible	Negligible
AQ410	715843,735261	2.8	0.4	0.2	<1	Slight Adverse	Negligible	Negligible
AQ411	715850,735291	2.3	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ434	715923,735759	0.8	-0.2	-0.1	<1	Slight Adverse	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50µg/m³	Impact on Annual Mean Concentration		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ439	716195,735673	2.2	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ440	716004,735575	2.9	0.4	0.2	<1	Slight Adverse	Negligible	Negligible
AQ441	716030,735573	2.2	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ444	715887,735457	0.5	0.0	0.0	<1	Slight Adverse	Negligible	Negligible
AQ445	715946,735365	1.4	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ446	715984,735345	0.8	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ448	716110,735445	2.9	0.4	0.2	<1	Slight Adverse	Negligible	Negligible
AQ453	716110,735219	0.8	0.2	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ456	716277,735369	1.3	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ458	716441,735445	1.2	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ464	716325,735632	1.1	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ469	716252,735561	1.7	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ483	717253,740069	1.7	0.3	0.1	<1	Slight Adverse	Negligible	Negligible
AQ531	715631,735518	2.1	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ539	715826,735000	1.3	0.5	0.3	<1	Slight Adverse	Negligible	Negligible
AQ548	716427,737419	1.2	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ558	715847,735563	1.1	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ563	716006,735013	1.6	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ571	716186,735001	3.4	0.4	0.3	<1	Slight Adverse	Negligible	Negligible
AQ596	715758,735392	2.6	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ597	715786,735355	3.1	0.3	0.2	<1	Slight Adverse	Negligible	Negligible
AQ598	715739,735355	1.3	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ599	714994,735890	0.7	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ600	714948,735891	1.7	0.2	0.1	<1	Slight Adverse	Negligible	Negligible
AQ601	714980,735925	0.9	<0.1	<0.1	1	Slight Adverse	Negligible	Negligible
AQ314	715004,736338	2.7	0.3	0.2	<1	Moderate Adverse	Negligible	Negligible
AQ376	715164,735867	3.0	0.4	0.2	<1	Moderate Adverse	Negligible	Negligible
AQ377	715164,735894	2.9	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 and Figure 7.3 in Volume 3 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 75 receptors, a moderate beneficial impact at 52 receptors and a substantial beneficial impact at 60 receptors due to the diversion of traffic off the Proposed Scheme routes. A slight adverse impact is expected at 61 receptors and a moderate adverse impact at three receptors on the R108 Phibsborough Road and the R101 North Circular Road Junction. 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 in Table 7.33 and Figure 7.4 in Volume 3 of this EIAR the Proposed Scheme will be neutral overall 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, will overall be 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 be lower by the Opening Year (2028), than in 2019. Older fleet projections were used in the absence of a fleet that incorporates the effects of the 2021 Climate Action Plan (Government of Ireland 2021) measures, including a larger proportion of electric vehicles planned by the Opening Year (2028) 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 operational 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 7.34. 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 exceed the critical level for NO_X within 200m of the scheme in both the DM and the DS.

Nitrogen deposition levels have been compared to the lower and higher critical loads for the designated habitat sites in Table 7.35. All sites are below the lower critical load for the designated habitat site.

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

Annual Mean NO_2 in 2028 at Closest Point Within Ecological Site to Road							
Receptor	Receptor Location (ITM)	Do Minimum (µg/m^3)	Distance from Road Beyond Which Concentration is Below Critical Level (30µg/m^3) (m)	Do Something (µg/m^3)	Distance from Road Beyond Which Concentration is Below Critical Level (30µg/m^3) (m)	Impact (DS – DM) (µg/m^3)	Change as a Percentage of Critical Level (30µg/m^3) (%)
Royal Canal pNHA (Binns Bridge, western side)	715830, 736004	151.3	>200m	143.7	>200m	-7.7	-26%
Royal Canal pNHA (Binns Bridge, eastern side)	715846, 735998	42.5	>200m	41.3	>200m	-1.2	-4%
Royal Canal pNHA (Clarke's Bridge, western side)	716654, 735657	34.9	>200m	34.0	>200m	-0.9	-3%
Royal Canal pNHA (Clarke's Bridge, eastern side)	716665, 735649	36.6	>200m	36.6	>200m	0.1	0%
Royal Canal pNHA (Clonliffe Bridge, western side)	716237, 735857	34.3	>200m	34.4	>200m	0.1	0%
Royal Canal pNHA (Clonliffe Bridge, eastern side)	716245, 735854	34.7	>200m	34.3	>200m	-0.4	-1%

Annual Mean NO_2 in 2028 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 (30µg/m³) (m)**	**Do Something (µg/m³)**	**Distance from Road Beyond Which Concentration is Below Critical Level (30µg/m³) (m)**	**Impact (DS – DM) (µg/m³)**	**Change as a Percentage of Critical Level (30µg/m³) (%)**
Royal Canal pNHA (Cross Guns Bridge, western side)	715015, 736301	99.0	>200m	111.3	>200m	12.2	41%
Royal Canal pNHA (Cross Guns Bridge, eastern side)	715027, 736292	33.7	>200m	33.5	>200m	-0.2	-1%
Royal Canal pNHA (Whitworth Road)	715183, 736244	40.9	>200m	37.8	>200m	-3.1	-10%
Santry Demesne pNHA (Santry Avenue)	716445, 740127	34.7	>200m	33.6	180m	-1.0	-3%
Santry Demesne pNHA (Swords Road)	716945, 740607	40.3	>200m	46.3	>200m	6.0	20%

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)**	**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 >0.4 kgN/ha/yr?**
Royal Canal pNHA (Binns Bridge, western side)	715830, 736004	5	7.26	20m	6.99	20m	-5%	0m	-0.27
Royal Canal pNHA (Binns Bridge, eastern side)	715846, 735998	5	2.72	0m	2.66	0m	-1%	0m	-0.06
Royal Canal pNHA (Clarke's Bridge, western side)	716654, 735657	5	2.33	0m	2.29	0m	-1%	0m	-0.05
Royal Canal pNHA (Clarke's Bridge, eastern side)	716665, 735649	5	2.42	0m	2.42	0m	0%	0m	0.00
Royal Canal pNHA (Clonliffe Bridge, western side)	716237, 735857	5	2.30	0m	2.31	0m	0%	0m	0.01
Royal Canal pNHA (Clonliffe Bridge, eastern side)	716245, 735854	5	2.32	0m	2.30	0m	0%	0m	-0.02
Royal Canal pNHA (Cross Guns Bridge, western side)	715015, 736301	5	5.29	20m	5.78	20m	10%	40m	0.49

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)	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 >0.4 kgN/ha/yr?
Royal Canal pNHA (Cross Guns Bridge, eastern side)	715027, 736292	5	2.27	0m	2.26	0m	0%	0m	-0.01
Royal Canal pNHA (Whitworth Road)	715183, 736244	5	2.64	0m	2.48	0m	-3%	0m	-0.16
Santry Demesne pNHA (Santry Avenue)	716445, 740127	5	2.32	0m	2.26	0m	-1%	0m	-0.06
Santry Demesne pNHA (Swords Road)	716945, 740607	5	2.61	0m	2.91	0m	6%	40m	0.30

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 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 overall beneficial, with reductions in emissions of all pollutants modelled. The majority of these reductions result from a predicted modal shift, with decreased car usage (Section 6.4.5.2.2, Chapter 6 (Traffic & Transport) and 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 emissions are 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	275	80	2	2	17	338	0.2	0.3
DS		272	79	2	2	17	337	0.2	0.2
Change		-3	-0.9	-0.02	-0.02	-0.2	-2	-0.003	-0.005
% Change		-1%	-1%	-1%	-1%	-1%	-0.5%	-1%	-2%
DM	Goods	348	96	1	1	10	61	0.1	0.1
DS		350	97	1	1	10	62	0.1	0.1
Change		2	0.5	0.004	0.004	0.02	0.6	0.002	-0.001
% Change		0.6%	0.5%	0.5%	0.5%	0.2%	1%	2%	-1%
DM	Urban Bus	6	0.6	0.1	0.1	0.3	2.0	0	0.002
DS		6	0.6	0.1	0.1	0.2	1.9	0	0.002
Change		-0.2	-0.02	-0.003	-0.003	-0.01	-0.1	0	-0.0001
% Change		-3%	-3%	-5%	-5%	-5%	-4%	0%	-5%

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	Total	629	177	3	3	28	402	0.3	0.4
DS		628	176	3	3	28	400	0.3	0.4
Change		-1	-0.4	-0.02	-0.02	-0.2	-1.2	-0.001	-0.006
% Change		-0.2%	-0.2%	-0.8%	-0.8%	-0.7%	-0.3%	-0.3%	-2%

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 Proposed Scheme will be overall beneficial, with reductions in emissions of all pollutants modelled.

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	98	28	1	1	8	122	0.1	0.1
DS		97	28	1	1	7	121	0.1	0.1
Change		-1	-0.4	-0.01	-0.01	-0.1	-0.6	-0.001	-0.003
% Change		-1%	-1%	-2%	-2%	-2%	-0.5%	-2%	-3%
DM	Goods	215	52	1	1	8	46	0.1	0.1
DS		216	52	1	1	8	47	0.1	0.1
Change		2	0.1	0.005	0.004	0.01	0.4	0.001	-0.001
% Change		1%	0.3%	0.5%	0.5%	0.1%	1%	2%	-1.0%
DM	Urban Bus	0	0	0.1	0.1	0	0	0	0
DS		0	0	0.1	0.05	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	313	80	2	2	15	168	0.1	0.2
DS		313	80	2	2	15	168	0.1	0.2
Change		0.2	-0.3	-0.01	-0.01	-0.1	-0.2	0.00002	-0.004
% Change		0.1%	-0.3%	-0.6%	-0.6%	-0.8%	-0.1%	0.01%	-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 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

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 soiling associated with construction activities 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.

7.5.1.1 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 adverse and moderate adverse impacts locally. 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, 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 required.

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, with some moderate adverse impacts locally. However, a worst-case scenario has been modelled, where in reality the works will be short-term and temporary in nature.

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 R101 North Circular Road and the R108 Phibsborough 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. Exceedances of the NO_2 annual mean limit value were also modelled in the existing baseline and the Do Minimum, indicating existing poor air quality in this area. However, the residual impacts due to the Proposed Scheme 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 on the R101 North Circular Road and the R108 Phibsborough Road due to the Opening Year (2028) of the Operational Phase of the Proposed Scheme are therefore considered Negative, Significant and Short-Term reducing to Negative and Slight/Negligible Long-Term in 2043 (Design Year) for the Operational Phase of the Proposed Scheme.

Overall, it is considered that the residual impacts as a result of the Proposed Scheme's Operational Phase will be Neutral and Long-Term.

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