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 Tallaght / Clondalkin 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 resurfacing and road realignments. Construction traffic haul routes are also assessed as part of the study area for this phase of the works.

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

The assessment has been carried out according to best practice and guidelines relating to air quality, and in the context of similar large-scale transport infrastructural projects.

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 environment in areas along the Proposed Scheme. This has been undertaken through a review of available published ambient air monitoring data and site-specific ambient air monitoring at sensitive locations along the Proposed Scheme;
- A review of the most applicable standards and guidelines has been undertaken in order to define the air quality significance criteria for the Construction and Operational Phases of the Proposed Scheme;
- Predictive calculations and impact assessments relating to the likely Construction Phase air quality impacts have been undertaken at the nearest sensitive locations to the construction work areas associated with the Proposed Scheme;
- Predictive calculations have been performed to assess the potential air quality impacts associated with traffic alterations and bus corridor alignment reconfigurations 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 11.5 kilometre (km) from Belgard Square South, Tallaght to Christchurch Place in the City Centre and an offline cycling section of approximately 3.9km via Bunting Road, Kildare Road and Clogher Road (Tallaght to City Centre section), and approximately 4km from Woodford Walk, Clondalkin to Walkinstown Road, Drimnagh (Clondalkin to Drimnagh section) respectively, and the area either side of the Proposed Scheme up to a maximum distance of 350 metres (m) during construction, and 200m during the Operational Phase. For the Construction Phase assessment, the focus is on air quality sensitive receptors adjacent to the proposed works (e.g. utility diversions, road widening works, road excavation works (where required), road reconfiguration and resurfacing works) that are susceptible to dust impacts but also those receptors along construction traffic access routes or routes along which traffic is redistributed within the study area (please see Chapter 5 (Construction) of this EIAR for more information on construction traffic access routes). The extent of the overall study area is typically up to a maximum of 350m from a specific area of construction work, as per the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction (hereafter referred to as the IAQM Guidance) (IAQM 2014), with the key impacted study areas focused up to a maximum of 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 route has been scoped out on the basis that these activities have low potential for dust release and are likely to have a negligible impact on air quality sensitive receptors.

For the Construction Phase and Operational Phase traffic assessment, the focus is on air quality sensitive receptors which bound the Proposed Scheme and those along diverted traffic routes within the study area. Highly sensitive air quality receptors during the construction phase 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 (TII 2011). Designated areas of conservation (either Irish or European designation) are also considered sensitive air quality receptors (TII 2011). Potential impacts to air quality relate to alterations to traffic patterns (e.g., introduction of a new bus lane or due to redistributed traffic), with particular attention focused on those areas where the Proposed Scheme is encroaching closer to air quality receptors, specifically where bus or traffic lanes are moving closer to air quality receptors.

For the Construction Phase and Operational Phase traffic assessment, the focus is on air quality receptors within an overall study area of 200m from the Proposed Scheme, as per the Transport Infrastructure Ireland (TII) 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 three geographical sections are discussed in Table 7.1. The locations of sensitive receptors are provided initially in Table 7.19 and also in Figures 7.3 to 7.8 in Volume 3 of this EIAR.

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

Geographical Section	Description of Study Area
Tallaght to Ballymount	Within this study area, there are air quality sensitive areas in predominately residential receptors in Belgard Square residential area. These residential receptors are within 10m of the Proposed Scheme. Other air quality sensitive areas which are predominately residential dwellings include Bancroft Park, which is located within 30m of the east of the road edge. The route then passes through low sensitivity commercial receptors within 50m of the road edge on the R819 Greenhills Road. Residential receptors lining either side of R819 Greenhills Road are within 10m to 100m of the Proposed Scheme. There are a small number of properties in Parkview estate that may experience a decrease in ambient air quality due to a closer proximity to the proposed new Greenhills Road, east of the existing Treepark Road. It should be noted that there are parts of the existing network along the Proposed Scheme which already experience higher air quality concentrations due to the existing heavy traffic in the area and proximity to the M50. Other sensitive receptors in this zone include Tallaght Hospital and TUD Tallaght within 40m to 100m of the road edge. Community receptors include Saint Maelruain's Church of Ireland within 10m of the Proposed Scheme.
Ballymount to Crumlin	The majority of the Ballymount Avenue and Calmount Road section of the Proposed Scheme is routed through business parks with large scale business premises and offices, within 20m to 50m of the road edge. Towards the Walkinstown Roundabout on the R819 Greenhills Road, a small number of residential receptors line the Proposed Scheme, within 10m to 20m of the road edge. Other sensitive receptors include Adorables School within 10m of the Proposed Scheme.
Crumlin to Grand Canal	Within this study area, the key air quality sensitive areas are predominately residential receptors lining R819 Walkinstown Road, R110 Drimnagh Road and R110 Crumlin Road, located within 7m to 20m of the Proposed Scheme. Other receptors include Our Lady's Children's Hospital Crumlin and Old County Road Health Centre, both within 10m of the road edge. Educational receptors include Little Tots Creche and Montessori, Crumlin College of Further Education, Loreto College and Scoil Mhuire Óg, all within 5m to 20m of the Proposed Scheme. Leisure air quality sensitive receptors include Guinness Pitch & Putt Club within 65m of the road edge on R110 Crumlin Road. To accommodate cyclists on this section of the route, an alternative cycle route is proposed along Bunting Road and St. Marys Road providing a quiet route linking Walkinstown Roundabout with Kildare Road. Along the proposed cycle route, the key air quality sensitive areas are predominately residential receptors lining Bunting Road, St. Mary's Road, Kildare Road and Clogher Road, within 10m to 20m of the Proposed Scheme. Other receptors include Marist National School, Pearse College of Further Education, St. Bernadette's Church and Mount Jerome Cemetery, within 15m to 100m of the Proposed Scheme.
Grand Canal to Christchurch	Within this study area, the key air quality sensitive areas are predominately residential receptors along R110 Dolphin's Barn, R110 Cork Street, R110 St. Luke's Avenue, R110 Dean Street, R137 Patrick Street and R137 Nicholas Street, within 15m to 40m of the Proposed Scheme. Other receptors include Coombe Women's Hospital and Brú Chaoimhin Hospital, within 15m to 70m of the road edge. Community receptors include Weaver Park, St. Patrick's Cathedral and Christ Church Cathedral, within 5m to 50m of the Proposed Scheme. St. Patrick's Park is between 100m to 150m from the Proposed Scheme.
Woodford Walk (R113) / New Nangor Road (R134) to Long Mile Road (R110) / Naas Road (R810) / New Nangor Road (R134) junction	The key air quality sensitive areas are residential and high-density commercial receptors. The key air quality sensitive residential receptors are located along the R134 New Nangor Road, in the Yellowmeadows residential area, within 5m to 100m of the Proposed Scheme. The majority of this section of the Proposed Scheme is routed through business parks with large scale business premises and offices, within 10m to 50m of the road edge. It should be noted that there are parts of the existing network along the Proposed Scheme which already experience high air quality concentrations due to the existing heavy traffic in the area.
Long Mile Road (R110) / Naas Road (R810) / New Nangor Road (R134) junction to Drimnagh	Within this study area, the key air quality sensitive areas are predominately a small number of residential receptors to the south of R110 Long Mile Road, within 10m to 100m of the Proposed Scheme. Other sensitive receptors include Drimnagh Castle Primary and Secondary Schools, and Assumption Primary and Secondary Schools, within 20m to 50m either side of the road edge. The Parish of Walkinstown Church is a community receptor within 200m of the Proposed Scheme. High density, low sensitivity commercial receptors are within 10m to 50m of the road edge.

7.2.2 Relevant Guidelines, Policy and Legislation

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

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

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

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

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

> *'where projects requiring approval under Section 51, Section 177AE or Part 8 have, at the date of publication of this SD, commenced planning and design, and in particular, where technical advisor contracts have been executed, this SD should be:*

- *treated as advice and guidance;*
- *employed to the greatest extent reasonably practicable; and*
- *applied in a proportionate manner, having regard to the characteristics and location of the project/maintenance works and the type and characteristics of potential impacts.'*

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

7.2.2.1 Ambient Air Quality Standards / Limit Values

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

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

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

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

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

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

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

Table 7.3: WHO Air Quality Guidelines (WHO 2021)

Pollutant	Regulation	Limit Type	Value
NO_2	WHO Air Quality Guidelines	Hourly limit for protection of human health	25µg/m^3 NO_2
		Annual limit for protection of human health	10µg/m^3 NO_2
PM (as PM_{10})		24-hour limit for protection of human health	45µg/m^3 PM_{10}
		Annual limit for protection of human health	15µg/m^3 PM_{10}
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	15µg/m^3 $PM_{2.5}$
		Annual limit for protection of human health	5µg/m^3 $PM_{2.5}$

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

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

7.2.2.2 National Air Emission Targets

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

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

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

7.2.2.3 Regional Policy

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

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

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

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

As a result of an exceedance of the annual mean NO_2 ambient air quality limit value at the St John's Road West monitoring station in 2019 (EPA, 2020a), an Air Quality Action Plan by Dublin Local Authorities in conjunction with the EPA is now legally required by the end of 2021. Once prepared, the action plan will be submitted to the European Commission for analysis and approval. The plan was subject to public consultation, which gave interested members of the public the opportunity to share their views and input to the plan, 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.

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 (NPWS) online mapping services. This review is discussed in Section 7.2.4.3.

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 13 locations as detailed in Section 7.3.2.2 and as shown in Figure 7.1 of Volume 3 of this EIAR. Passive sampling of NO_2 involves the molecular diffusion of NO_2 molecules through a polycarbonate tube and their subsequent adsorption onto a stainless steel disc coated with triethanolamine. Following a month of sampling, the tubes were analysed using ultraviolet (UV) spectrophotometry, at a United Kingdom Accreditation Service (UKAS) accredited laboratory (SOCOTEC Laboratories in Burton-on-Trent, UK).

The TII Air Quality Guidelines (TII 2011) note that NO_2 diffusion tube monitoring provides a simple, cost-effective means of monitoring at a number of locations across an area and can provide useful information on spatial distributions. The baseline study overlapped in time with traffic surveys being conducted as part of the Traffic Impact Assessment (TIA). Details of the baseline data collected is discussed in Section 7.3.2.2.

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 on the information to be contained in Environmental Impact Assessment Reports (EPA 2022) and using the methodology outlined in LA 105 Air Quality (UKHA 2019), LAQM (PG22) (DEFRA 2022a) and LAQM (TG22) (DEFRA 2022b). The general approach outlined in the LA 105 Air Quality, LAQM (PG22) and LAQM (TG22) guidance documents and the methodology outlined within has been recommended for use in assessing Irish road schemes by the TII Air Quality Guidelines (TII 2011) as discussed in Section 7.2.4.1 below.

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

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

7.2.4.1.1 Local Air Quality Screening Assessment

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

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

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

LA 105 Air Quality states that the following scoping criteria shall be used to determine whether the air quality impacts of a project can be scoped out or require an assessment based on the changes between the Do Something traffic (with the Proposed Scheme) compared to the Do Minimum traffic (without the Proposed Scheme):

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

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

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

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

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

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

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

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

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

The ADMS-Roads dispersion model (Version 5.1) has been used to predict the ground level concentrations (GLC) of NO_2 and PM_{10} / $PM_{2.5}$ in the vicinity of the impacted areas for the baseline year of 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 Casement Aerodrome in 2019 has been used in the model (see Diagram 7.2) (Met Éireann 2020). The selection of the appropriate meteorological data has followed the guidance issued by the LAQM (TG22) (DEFRA 2022b). A primary requirement is that the data used should have a data capture of greater than 90% for all parameters; and
- Specific air sensitive receptors (ASRs) were also mapped into the model. Receptor heights were input at 1.5m to represent breathing height. Concentrations were reported for each ASR modelled for all modelling scenarios.

It is intended that the Proposed Scheme will have a peak construction year of 2024 and an opening year of 2028. Road traffic emission rates are derived using traffic data for the peak construction year of 2024, and the Opening Year of 2028 and Design Year of 2043 provided in Chapter 6 (Traffic & Transport) and using emission factors from the COPERT V database (EMISIA 2020) which has been incorporated into the UK DEFRA Emission Factor Toolkit (EFT) Version 10.1 (DEFRA 2019).

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 2019 base year, 2022 projections and 2024 projections were used as conservatively representative of the 2024 peak construction year and 2028 opening year respectively;
- National Transport Model (NTM) fleet projections provided in UK 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 on consultation from Systra, 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	Construction Year	Operational Year	Design Year
Car	Petrol Car	41%	38%	36%	38%
	Diesel Car	57%	60%	63%	25%
	Electric Car	2%	2%	2%	37%
LGV	LGV	99.9%	99.9%	99.9%	81.5%
	Electric LGV	0.1%	0.1%	0.1%	18.5%
HGV	Rigid HGV	86%	86%	86%	86%
	Artic HGV	14%	14%	14%	14%
Bus	Plug-in Hybrid Bus	0%	0%	24%	0%
	Fuel Cell Electric Bus	0%	0%	70%	100%
	Diesel Bus	100%	100%	6%	0%

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

7.2.4.1.3 Verification Study – Year 2020 Traffic Data

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

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

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

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

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

Parameter	Description	Input Value
Coordinate System	Spatial data in ADMS-Roads is linked to a Cartesian coordinate system, measured in meters.	Irish Transverse Mercator (ITM) Coordinate system was used.

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

The first step of model verification, in line with LAQM.TG22, is to consider the performance of the model, prior to any adjustment, by comparing modelled and measured road NO_X contribution at each of the site-specific survey and DCC diffusion tube locations. Some of the monitoring locations were not considered suitable for model verification, due to missing traffic or monitoring data, or other spatial considerations. A total of 12 monitoring sites were included in the verification exercise. The comparison is shown in Diagram 7.1, as the red points and trendline, and also in Table 7.7. This shows that on average, the unadjusted model under predicts total NO_2 concentrations by around 6%.

Table 7.7: Diffusion Tube Monitoring Data Used for Model Verification

Diffusion Tube Location	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
10.1	12.0	25.9	17.1	28.5	-8.9%	0.94
Winetavern Continuous Monitor	15.1	27.5	16.1	28.0	-1.9%	
8.13	13.9	26.9	9.8	24.8	8.2%	

Diffusion Tube Location	Modelled NO_X concentration (µg/m^3)	Modelled NO_2 concentration (µg/m^3)	Monitored NO_X concentration (µg/m^3)	Monitored NO_2 concentration (µg/m^3)	Difference [(modelled – monitored)/(monitored) *100]	Adjustment Factor
8.5	16.3	28.1	9.6	24.7	13.5%	
8.7	17.2	28.5	14.8	27.3	4.3%	
8.9	13.6	26.7	17.4	28.6	-6.6%	
8.10	26.0	32.8	26.1	32.8	-0.03%	
11.8	7.2	23.5	5.8	22.8	3.0%	
Davitt Road Continuous Monitor	11.6	25.7	8.2	24.0	7.1%	
Crumlin Road	20.3	30.0	40.7	39.5	-23.9%	
South Circular Road / Clanbrassil Street Lower	22.8	31.2	43.4	40.7	-23.3%	2.52
Naas Road	21.0	30.4	78.4	55.0	-44.8%	

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

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

- 2.338 – "More congested". Applied to modelled receptors closest to roads Naas Road, R110 East of Junction with Kildare Road, R804, R137, R811 and R108; and
- 0.800 – "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 3.97 µg/m^3. In the absence of measured PM_{10} and $PM_{2.5}$ at roadside locations in the study area, the same factors calculated for the modelled road NO_X contribution were applied to the road PM_{10} and road $PM_{2.5}$ contributions.

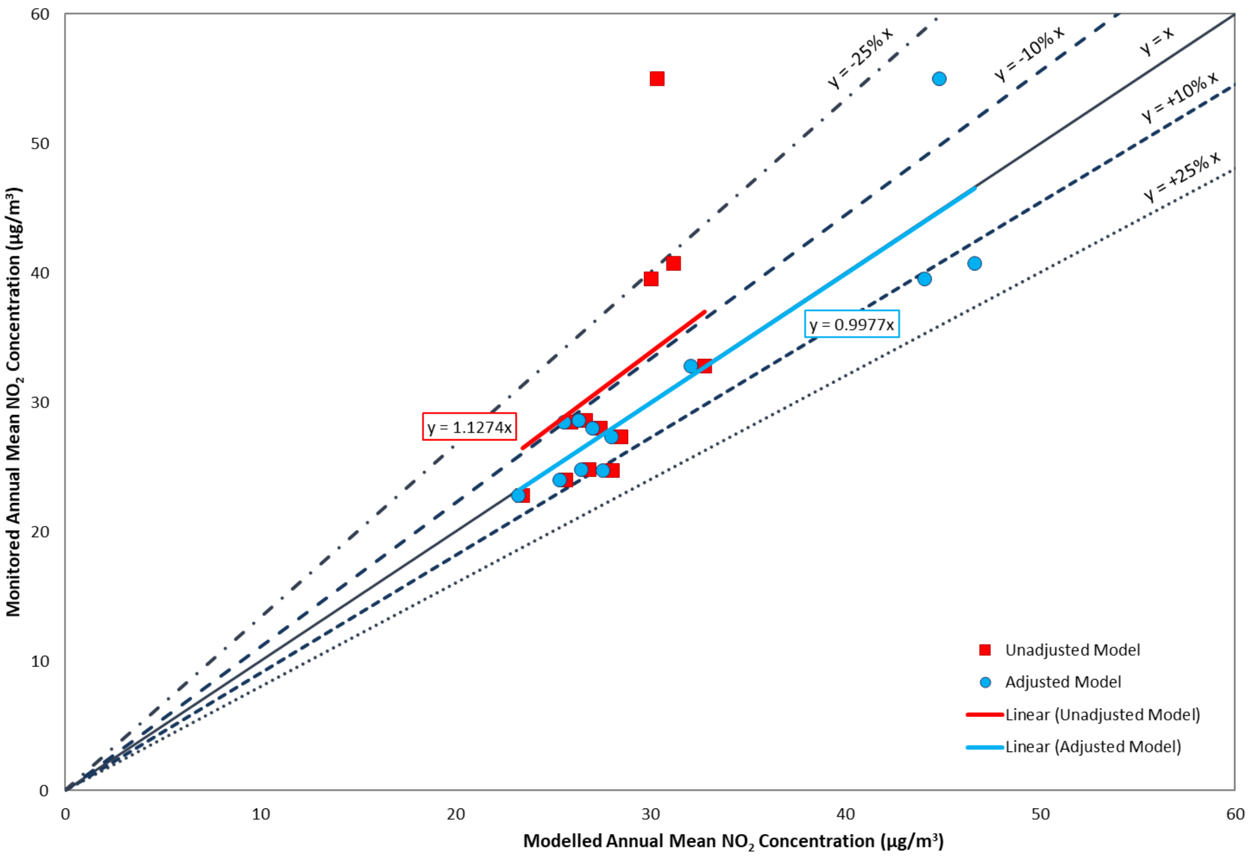

Diagram 7.1: Dispersion Model Verification - Comparison of Monitored and Modelled NO_2 Concentrations (µg/m³)

7.2.4.1.4 Air Quality Impact Significance Criteria

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

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

Magnitude of Change	Annual Mean NO_2 / PM_{10}	No. Days with PM_{10} Concentration > 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 to <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 Proposed 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

Absolute Concentration in Relation to Objective / Limit Value	Change in Concentration		
	Small	Medium	Large
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 LA105 Air Quality (UKHA 2019), both of which describe Nitrogen deposition as the most likely source of significant impacts from road traffic. Pollutants such as CO_2, CO, SO_2, ammonia, particulate matter and volatile organic compounds have been scoped out of detailed assessment.

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

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

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

There is one designated site within 2km of the boundary of the Proposed Scheme which is the Grand Canal proposed Natural Heritage Areas (pNHA) (Site Code 002104). This is shown in Figure 12.3 in Volume 3 of this EIAR. Species of particular ecological importance at this is site is Hairy St John's Wort and Opposite-leaved Pondweed.

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

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

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

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

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

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

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

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

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

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

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

7.2.4.4 Construction Phase Assessment

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

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

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

- High sensitivity receptor with respect to dust nuisance – surrounding land where:
  - Users can reasonably expect enjoyment of a high level of amenity;
  - The appearance, aesthetics or value of their property would be diminished by soiling;
  - The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land; or
  - Examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.
- Medium sensitivity receptor with respect to dust nuisance – surrounding land where:
  - Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home;
  - The appearance, aesthetics or value of their property could be diminished by soiling;
  - The people or property would not reasonably be expected to be present 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 objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day); or
  - Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
- Medium sensitivity receptor with respect to human health – surrounding land where:
  - Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, relevant location would be one where individuals may be exposed for eight hours or more in a day); or
  - Indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
- Low sensitivity receptor with respect to human health – surrounding land where:
  - Locations where human exposure is transient; or
  - Indicative examples include public footpaths, playing fields, parks and shopping streets.

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

- High sensitivity receptor with respect to ecology – surrounding land where:
  - Locations with an international or national designation and the designated features may be affected by dust soiling; or

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

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

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

The sensitivity of the area is considered as per the criteria outlined in the IAQM Guidance (IAQM 2014) and 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 guidelines (IAQM 2014) also outline the criteria for assessing the human health impact from PM_{10} emissions from construction activities based on the current annual mean PM_{10} concentration, receptor sensitivity and the number of receptors effected as per Table 7.12.

An assessment of the Proposed Scheme was completed with respect to the sensitivity criteria in Table 7.11 and Table 7.12. Where the number of receptors was not clear (i.e., for an apartment building, conservative sensitivities were assumed). In addition, when calculating the sensitivity with respect to human health, the background concentrations of particulates was reviewed. The background air quality in the 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

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

photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Often impacts will be reversible once the works are completed, and dust deposition ceases. Designated sites within 50m of the boundary of the site or within 50m of the route used by construction vehicles on public highways up to a distance of 500m from a construction site entrance can be affected according to the IAQM Guidance. The sensitivity of the area to ecological impacts are considered using the sensitivity criteria outlined in Table 7.13. The Grand Canal pNHA (Site Code 002104) 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 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 Clondalkin Section of the Proposed Scheme will run approximately 5km south-west of the Casement Aerodrome meteorological station, at the closest point, and the Tallaght Section will run approximately 5km north-west at the closest point. The Casement Aerodrome 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 Casement Aerodrome meteorological station provide an indication of the prevailing wind conditions for the region (see Diagram 7.2). Results indicate that the prevailing wind direction is from south to westerly in direction over the period 2015 to 2019.

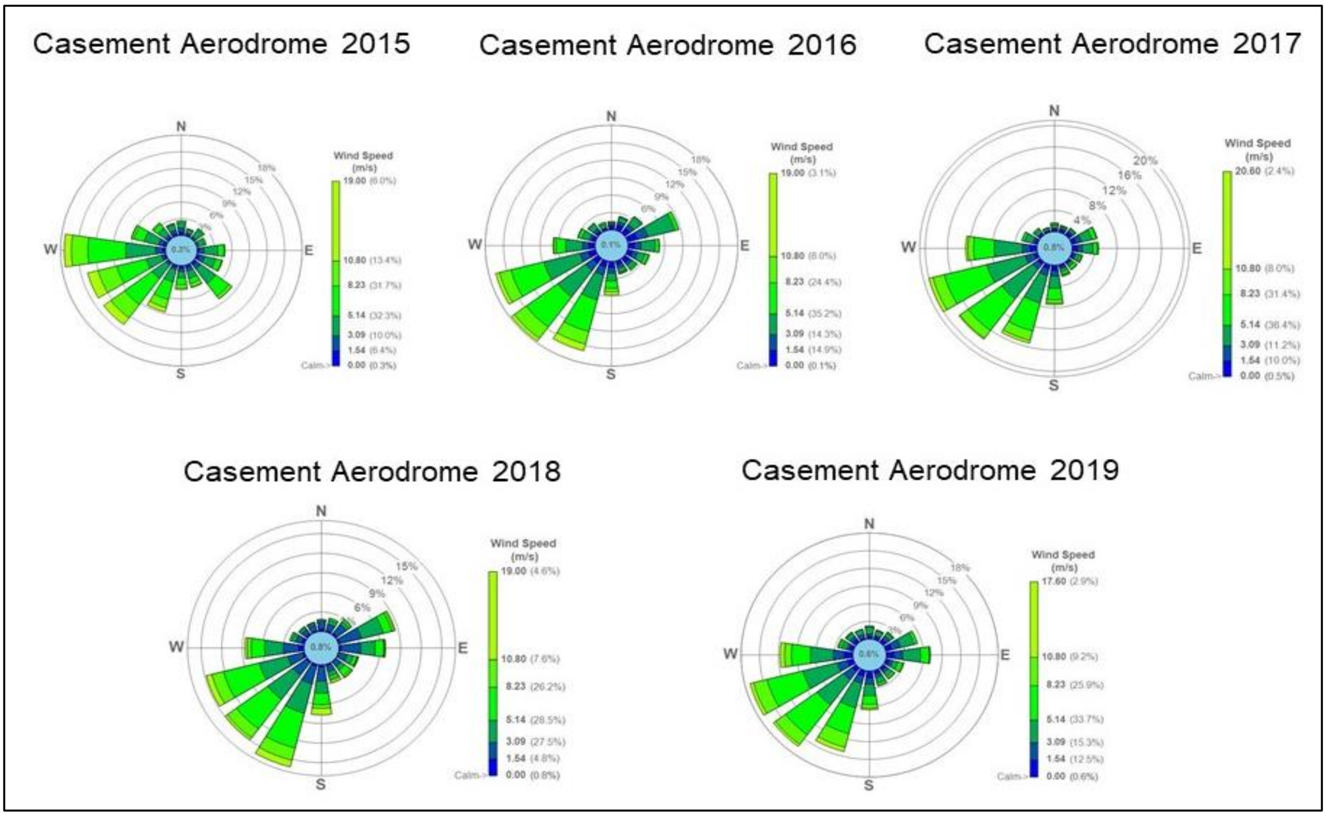

Diagram 7.2: Casement Aerodrome Meteorological Station Windrose 2015 to 2019 (Met Éireann 2020)

7.3.2 Baseline Ambient Air Quality

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

A desk study of the EPA air quality monitoring programmes has been undertaken. The most recent annual report at the time of the assessment, 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 of 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 at locations in close proximity to the Proposed Scheme was reviewed. Data is available for suburban stations in Rathmines, Dún Laoghaire and Ballyfermot to observe long-term trends over the period 2015 to 2019 as shown in Table 7.14. Results average between 15µg/m^3 to 22µg/m^3 for the annual mean concentrations at each location compared to the annual limit value of 40µg/m^3 with no exceedances of the one-hour limit value of 200µg/m^3. Rathmines, Dún Laoghaire and Ballyfermot had average NO_2 concentrations of 19µg/m^3 in 2019.

Long-term trends at the city centre location of Winetavern Street are available, which is located at the City Centre end of the Proposed Scheme. Concentrations of NO_2 were below the annual and 1-hour limit values, with annual average levels ranging from 27µg/m³ to 37µg/m³ over the period 2015 to 2019 compared to the annual limit value of 40µg/m³. The average concentration in 2019 was 28µg/m³.

The ambient NO_2 monitoring results for Rathmines, Dún Laoghaire, Ballyfermot and Winetavern 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 indicate that levels are reasonably constant at each location over the five-year period.

Table 7.14: Trends in Suburban and Urban NO_2 Concentration (µg/m³) 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/m³)	31	37	27	29	28	40
		99.8th%ile 1-hr NO_2 (µg/m³)	128	120	110	115	115	200
Rathmines	Urban Background	Annual Mean NO_2 (µg/m³)	18	20	17	20	22	40
		99.8th%ile 1-hr NO_2 (µg/m³)	105	88	86	87	102	200
Ballyfermot	Suburban Background	Annual Mean NO_2 (µg/m³)	16	17	17	17	20	40
		99.8th%ile 1-hr NO_2 (µg/m³)	127	90	112	101	101	200
Dun Laoghaire	Suburban Background	Annual Mean NO_2 (µg/m³)	16	19	17	19	15	40
		99.8th%ile 1-hr NO_2 (µg/m³)	91	105	101	91	84	200

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

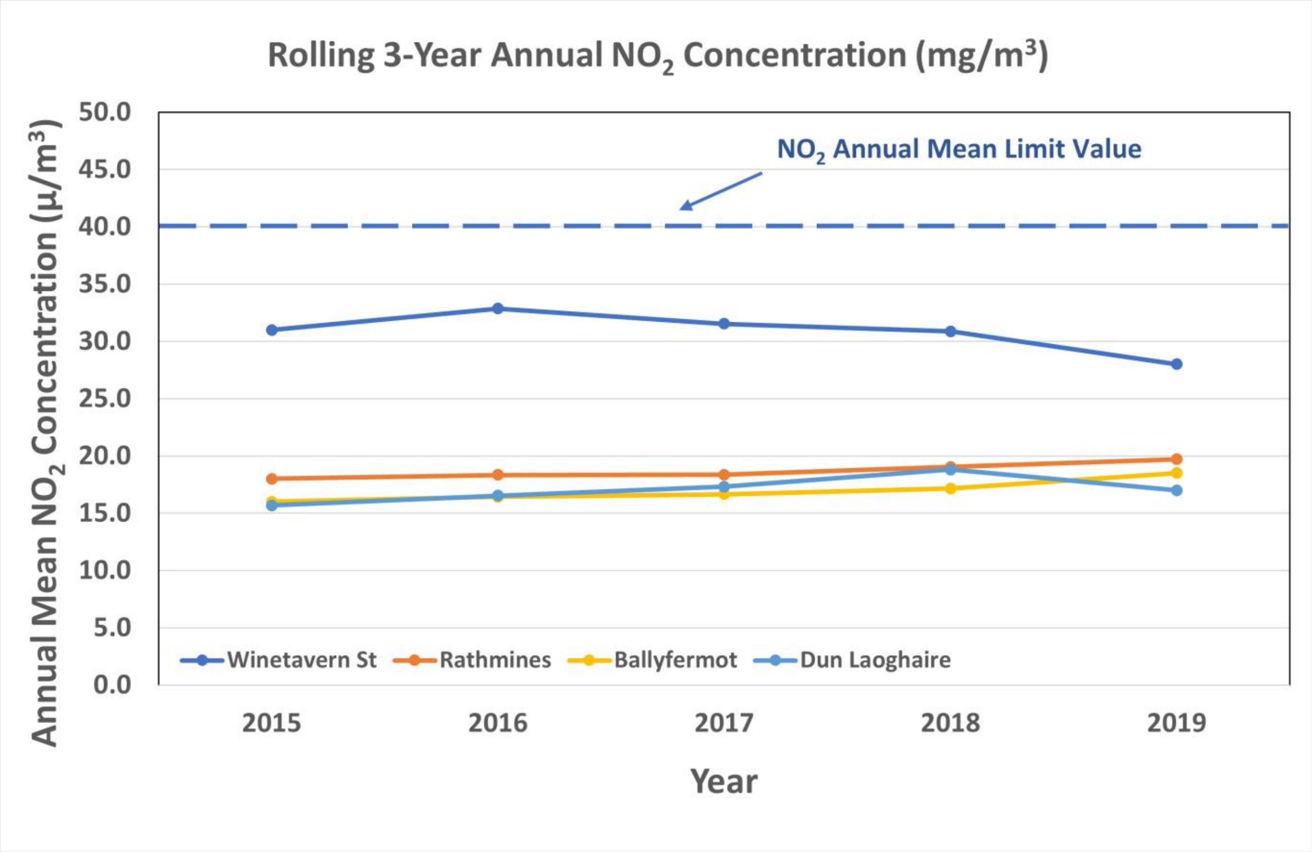

Diagram 7.3: Rolling Three Year Annual NO_2 Concentration (µg/m³)

In addition to the continuous monitoring stations, the EPA has gathered NO_2 data using the passive diffusion tube methodology in proximity to the Proposed Scheme (EPA 2020c). The diffusion tube sampling was carried out in conjunction with Dublin City Council. Monitoring is for single year periods; therefore, long-term averages are not available at diffusion tube locations. Further details on the diffusion tube methodology are discussed in Section 7.3.2.2 as part of the site-specific monitoring study. Exceedances of the annual mean NO_2 concentration in 2019 were recorded at Camden Street / Wexford Street, Naas Road and South Circular Road / Clanbrassil Street Lower.

Table 7.15: EPA NO_2 Diffusion Tube Monitoring Data

Monitoring Site	Monitoring Year	Annual Mean NO_2 Concentration (µg/m³)
Camden Street / Wexford Street	2019	49.1
Crumlin Road, D12	2019	39.5
Naas Road	2019	55.0
South Circular Road / Clanbrassil Street Lower	2019	40.7
Walkinstown	2019	18.8

Continuous PM_{10} monitoring carried out at the suburban locations of Ballyfermot, Dun Laoghaire, Tallaght, Rathmines and Phoenix Park showed annual average levels ranging from 11µg/m³ to 15µg/m³ in 2019, with a maximum of nine exceedances of the 24-hour limit value of 50µg/m³ (35 exceedances are permitted per year). Longer term averages from 2015 to 2019 show annual average concentrations of between 9µg/m³ to 16µg/m³ as shown in Table 7.16. Continuous PM_{10} monitoring carried out at the suburban locations of Davitt Road showed annual average level of 19µg/m³ in 2019.

Average PM_{10} levels at the urban traffic monitoring location of Winetavern Street, which is in close proximity to the City Centre end of the Proposed Scheme, were reviewed. The annual average level in 2019 was 15µg/m³, with nine exceedances of the 24-hour limit value of 50µg/m³. The City Centre monitoring location of Winetavern Street has a long-term average (2015 to 2019) of 14µg/m³.

Continuous $PM_{2.5}$ monitoring carried out at the Zone A locations of Finglas, Rathmines and Ballyfermot showed average levels of 10µg/m³ in 2019. Longer term averages from 2015 to 2019 show annual average concentrations of between from 6µg/m³ to 9µg/m³. The annual average level measured in Davitt Road in 2019 was 11µg/m³ compared to an annual mean limit value of 25µg/m³. Davitt Road 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 Davitt Road was 0.58 in 2019.

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

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

7.3.2.2 Site-Specific Monitoring Data

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

A baseline NO_2 monitoring survey was undertaken as part of the air quality assessment for the BusConnects Dublin - Core Bus Corridors Infrastructure Works (hereafter referred to as the Proposed 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 traffic 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 Proposed Works in order to develop a local bias adjustment factor specific to the Proposed 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. Johns 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 thirteen monitored locations in the vicinity of the Proposed Scheme are shown in Table 7.17 and shown in Figure 7.1 in Volume 3 of this EIAR. Table 7.18 and Diagram 7.4 outline the results of the baseline NO_2 diffusion tube monitoring over the period 15 November 2019 to 16 March 2020.

No locations recorded an exceedance in the annual mean limit value for NO2. The highest four-month average concentration was recorded at a roadside location in proximity to Crumlin Children's Hospital (tube no. 8.10) at the junction of Drimnagh Road and Kildare Road. Concentrations at this location were 32.8μg/m3 or 82% of the annual mean limit value with the bias adjustment and annualisation factor applied. The average concentration across all thirteen tubes was 24.5μg/m3 or 61% of the annual mean limit value.

The lowest concentration was recorded within the IT Tallaght Campus (tube no. 9) (12.7μg/m3). This location is no longer part of the proposed route after changes during the public consultation phase. The location is now roughly 200m from the Proposed Scheme

Based on guidance from DEFRA, it can be considered that exceedances of the NO_2 1-hour objective may occur at roadside sites if the annual mean is above 60μg/m^3 (DEFRA 2022b). None of the thirteen sites monitored are considered likely to exceed the NO_2 1-hour objective.

Table 7.17: Air Quality Monitoring Locations

Tube No.	Reference	Site	East (ITM)	North (ITM)
8.1	CBC0008DT001	Bus Terminus Tallaght	708357	727489
8.2	CBC0008DT002	Tallaght Hospital	708227	727763
8.3	CBC0008DT003	IT Tallaght	709244	727937
8.4	CBC0008DT004	23 Parkview, Tymon North	709758	729122
8.5	CBC0008DT005	25 Tymonville Drive	709823	729130
8.6	CBC0008DT006	Calmount Road	710311	730555
8.7	CBC0008DT007	Walkinstown Road	711009	730818
8.8	CBC0008DT008	1 Walkinstown Drive	711103	731144
8.9	CBC0008DT009	Drimnagh Castle National School	711100	731712
8.10	CBC0008DT010	Crumlin Children's Hospital	712098	731893
8.11	CBC0008DT011	342 Kildare Road	712417	731881
8.12	CBC0008DT012	96 Clonard Road	712825	731813
8.13	CBC0008DT013	Walkinstown Avenue	710474	731812

Table 7.18: Air Quality Monitoring Results

Tube No.	Site	15 Nov to 15 Dec 2019 (µg/m^3)	15 Dec 2019 to 15 Jan 2020 (µg/m^3)	15 Jan to 17 Feb 2020 (µg/m^3)	15 Feb to 16 Mar 2020 (µg/m^3)	Average	Locally Bias adjusted and annualised NO_2 Concentration (µg/m^3) Note 1, Note 2
8.1	Bus Terminus Tallaght	41.2	Lost	Lost	Lost	41.2	31.3
8.2	Tallaght Hospital	34.7	25.5	24.1	19.5	26.0	19.7
8.3	IT Tallaght	24.1	16.5	14.8	12.6	17.0	12.9
8.4	23 Parkview, Tymon North	33.6	23.9	Lost	Lost	28.8	21.8
8.5	25 Tymonville Drive	46.0	32.9	27.0	24.3	32.6	24.7
8.6	Calmount Road	41.2	33.0	33.1	24.2	32.9	24.9
8.7	Walkinstown Road	45.8	35.3	32.4	30.5	36.0	27.3
8.8	1 Walkinstown Drive	40.1	Lost	Lost	23.2	31.7	24.0
8.9	Drimnagh Castle National School	48.1	36.2	Lost	28.7	37.7	28.6
8.10	Crumlin Children's Hospital	53.6	46.2	41.1	31.9	43.2	32.8
8.11	342 Kildare Road	36.0	Lost	Lost	Lost	36.0	27.3
8.12	96 Clonard Road	29.6	25.7	24.0	16.3	23.9	18.1
8.13	Walkinstown Avenue	44.3	31.5	31.8	23.2	32.7	24.8
Average		39.9	30.7	28.5	23.4	32.3	24.5
Max		53.6	46.2	41.1	31.9	43.2	32.8
Min		24.1	16.5	14.8	12.6	17.0	12.9

Note 1: Bias adjustment factor: 0.77, Annualisation factor: 0.986

Note 2: Locally bias adjusted concentrations in bold exceed the 80% threshold value for screening modelling

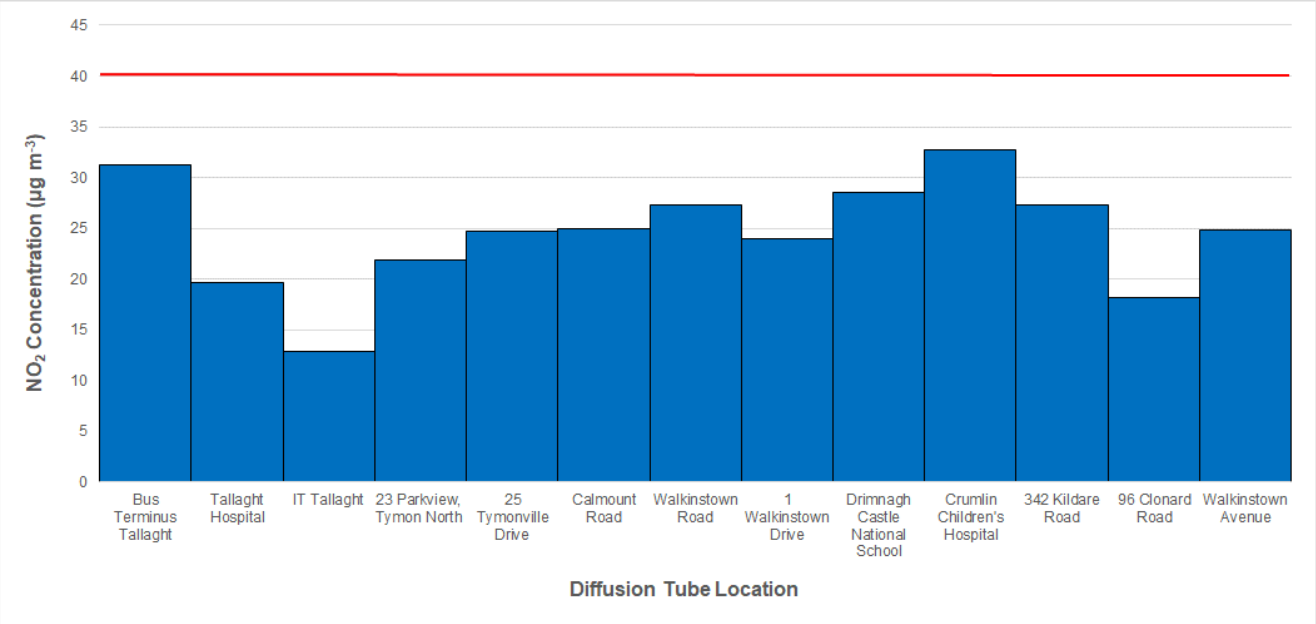

Diagram 7.4: Locally Bias Adjusted and Annualised NO_2 Concentration (µg/m³)

* Annual mean limit value denoted by red line.

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 modelling scenario has been modelled using AMDS-Roads for the representative baseline year of 2019, to establish baseline concentrations at receptors within the Proposed Scheme study area. Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24-hour PM_{10} limit value objective, at selected most impacted existing air quality sensitive receptors in the 2019 Existing Baseline scenario are listed in Table 7.19. Locations of these receptors are shown in Figures 7.3 to 7.8, 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: Predicted Existing Baseline Pollutant Statistics At Worst-Case Receptor Locations

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ39	713142,732334	33.7	16.0	11.3	1
AQ71	713578,732585	33.9	16.1	11.4	1
AQ72	713587,732626	35.0	16.3	11.5	1
AQ73	713609,732606	34.2	16.1	11.4	1
AQ203	712588,732157	32.7	15.9	11.2	1
AQ205	712515,732128	33.1	15.9	11.2	1
AQ210	712726,732207	35.3	16.3	11.5	1
AQ211	712765,732187	34.0	16.1	11.4	1
AQ212	712807,732204	35.0	16.2	11.4	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ214	712998,732278	31.1	15.6	11.0	1
AQ215	713040,732294	31.3	15.6	11.1	1
AQ216	712939,732294	33.4	15.9	11.2	1
AQ235	712542,732099	31.9	15.7	11.1	1
AQ276	712240,731975	36.5	16.2	11.4	1
AQ277	712252,732026	36.6	16.2	11.4	1
AQ278	712334,732019	36.0	16.1	11.4	1
AQ280	713212,732362	33.3	15.9	11.2	1
AQ285	713310,732457	33.3	15.8	11.2	1
AQ333	713476,732509	32.7	15.9	11.2	1
AQ346	713430,732518	39.5	16.8	11.8	1
AQ16	710315,732026	28.4	15.1	10.7	<1
AQ26	713437,732489	40.4	16.8	11.8	1
AQ35	713377,732440	39.5	16.6	11.7	1
AQ38	713891,732900	34.7	15.9	11.2	1
AQ45	709907,729341	20.6	14.2	10.1	1
AQ57	713940,733135	31.2	15.6	11.1	1
AQ68	713970,733167	31.7	15.7	11.1	1
AQ69	714007,733184	35.3	16.2	11.5	1
AQ70	713551,732602	38.1	16.8	11.8	1
AQ74	713706,732687	36.1	16.3	11.5	1
AQ76	713761,732742	34.4	16.0	11.3	1
AQ79	713909,733056	33.5	16.0	11.3	1
AQ84	714335,733366	32.0	15.8	11.1	1
AQ85	714389,733378	31.9	15.8	11.1	1
AQ86	714301,733356	31.8	15.8	11.1	1
AQ87	714468,733396	34.2	16.0	11.3	1
AQ88	714437,733387	35.8	16.3	11.5	1
AQ89	714254,733340	35.7	16.4	11.5	1
AQ93	714595,733452	33.7	15.8	11.2	1
AQ95	714694,733471	31.6	15.6	11.1	1
AQ96	714743,733478	31.2	15.6	11.0	1
AQ97	714829,733480	35.3	16.1	11.4	1
AQ98	714775,733480	31.8	15.7	11.1	1
AQ113	715008,733471	35.6	16.0	11.3	1
AQ114	715108,733441	34.0	16.0	11.3	1
AQ119	715034,733702	35.7	16.0	11.3	1
AQ202	712465,732099	37.9	16.7	11.7	1
AQ204	712657,732137	37.1	16.4	11.6	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ206	712557,732136	37.0	16.5	11.6	1
AQ207	712853,732260	33.8	15.8	11.2	1
AQ208	712895,732238	36.3	16.2	11.5	1
AQ213	712933,732253	35.0	16.1	11.4	1
AQ265	712192,731847	30.6	15.5	11.0	1
AQ269	712133,731859	34.6	16.0	11.3	1
AQ274	712287,731999	36.4	16.2	11.4	1
AQ275	712228,732006	41.7	16.9	11.9	1
AQ279	712416,732080	37.5	16.6	11.7	1
AQ287	713345,732482	35.3	16.1	11.3	1
AQ303	713068,732335	37.0	16.5	11.6	1
AQ304	713094,732345	37.1	16.5	11.6	1
AQ342	713502,732567	38.6	16.9	11.8	1
AQ347	713466,732543	38.7	16.8	11.8	1
AQ445	714817,734262	60.2	19.3	13.5	3
AQ446	714795,734086	48.1	18.3	12.8	2
AQ58	714097,733222	39.5	16.7	11.7	1
AQ59	714047,733216	37.0	16.3	11.5	1
AQ60	714072,733235	37.2	16.3	11.5	1
AQ62	714183,733307	37.3	16.5	11.6	1
AQ64	714097,733260	39.3	16.7	11.7	1
AQ65	713950,733076	37.0	16.6	11.7	1
AQ66	713920,733080	37.8	16.7	11.7	1
AQ67	713972,733108	36.5	16.5	11.6	1
AQ77	713829,732828	39.3	16.4	11.6	1
AQ80	713805,732857	51.9	18.1	12.7	2
AQ83	713884,732966	41.0	17.0	11.9	1
AQ92	714903,733530	41.8	16.9	11.9	1
AQ94	714670,733457	36.9	16.4	11.6	1
AQ99	715080,733859	40.2	16.9	11.9	1
AQ101	714530,733414	38.3	16.4	11.6	1
AQ111	714995,733508	36.2	16.2	11.4	1
AQ112	715029,733549	38.9	16.6	11.7	1
AQ115	714984,733481	35.4	16.0	11.3	1
AQ117	715038,733814	37.5	16.6	11.7	1
AQ209	712703,732192	39.4	17.0	11.9	1
AQ272	712185,731985	47.3	17.5	12.3	1
AQ284	713327,732407	37.9	16.4	11.6	1
AQ286	713332,732412	39.9	16.6	11.7	1

Existing Baseline (2019)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ437	715062,733342	35.3	16.4	11.6	1
AQ441	715015,733129	36.4	16.4	11.6	1
AQ442	714886,732820	45.1	17.6	12.4	1
AQ5	715064,733787	50.1	18.4	12.9	2
AQ22	714911,733502	46.0	17.5	12.3	1
AQ63	714122,733271	49.8	18.1	12.7	2
AQ75	713781,732826	42.8	16.8	11.8	1
AQ78	713840,732860	45.4	17.2	12.1	1
AQ82	713877,732905	45.8	17.3	12.2	1
AQ91	714936,733512	41.2	16.9	11.9	1
AQ100	715039,733934	46.1	17.7	12.4	1
AQ110	715042,733653	42.6	17.1	12.0	1
AQ118	715064,733826	41.0	17.2	12.0	1
AQ120	715065,733668	41.4	17.0	12.0	1
AQ121	715065,733728	40.8	16.8	11.8	1
AQ46	709795,729237	20.3	14.1	10.1	1
AQ341	713387,732488	44.4	17.3	12.2	1
AQ436	714897,734062	35.2	16.1	11.4	1
Air Quality Limit Value Objective		**40**	**40**	**25**	**35**

In the 2019 Existing Baseline scenario, annual mean concentrations of NO_2 are above the relevant national air quality limit value objective in some areas; 23 exceedances were modelled at receptors on the N1 Church Street, the R108 High St, the R110 The Coombe / Cork Street / Dolphin Barn Street / Crumlin Rd and the R137 Patrick Street / Clanbrassil Street Lower. 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/m^3 at one receptor on the N1 Church St, 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 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 Potential Impacts

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 13 Construction Compounds along the Proposed Scheme.

Other works specific to the Proposed Scheme include the construction of:

- Preparatory and site clearance works including ground investigations;
- The setting up of 13 Construction Compounds; and
- A range of pavement works including construction of the three pedestrian / cyclist bridges, retaining walls, general traffic carriageways, cycle tracks and bus stops.

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

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

For the purposes of the EIAR, 46 individual construction Sections are set out. Sections may be completed simultaneously and combined in certain areas. 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 parallel in the following Sections:

- **Section 1:** Tallaght to Ballymount:
  - **Section 1a:** Old Blessington Road / Belgard Square South Junction;
  - **Section 1b:** Tallaght Bus Interchange;
  - **Section 1c:** Old Blessington Road;
  - **Section 1d:** Belgard Square West;
  - **Section 1e:** Belgard Square West / Belgard Square North Junction;
  - **Section 1f:** Belgard Square North;
  - **Section 1g:** Belgard Square North / Belgard Square East Junction;
  - **Section 1h:** Belgard Square East;
  - **Section 1i:** Belgard Square East / Blessington Road Junction;
  - **Section 1j:** Blessington Road;
  - **Section 1k:** Belgard Road / Blessington Road Junction;
  - **Section 1l:** Blessington Road – St. Maelruain's Church to Courthouse Square Apartments;
  - **Section 1m:** Main Road;
  - **Section 1n:** Old Greenhills Road;
  - **Section 1o:** Greenhills Road, Tallaght; and
  - **Section 1p:** Bus Route, Parkview.

- **Section 2:** Ballymount to Crumlin:
  - **Section 2a:** Greenhills Road, Ballymount;
  - **Section 2b:** Ballymount Avenue;
  - **Section 2c:** Calmount Road / Ballymount Avenue Junction;
  - **Section 2d:** Calmount Road;
  - **Section 2e:** Greenhills Road and Calmount Avenue;
  - **Section 2f:** Greenhills Road, Greenhills;
  - **Section 2g:** Walkinstown Roundabout (including Ballymount Road Lower and St. Peter's Road);
  - **Section 2h:** Link Road – St. Peter's Road to Greenhills Road;
  - **Section 2i:** Cromwellsfort Road; and
  - **Section 2j:** Walkinstown Avenue.
- **Section 3:** Crumlin to Grand Canal:
  - **Section 3a:** Walkinstown Road;
  - **Section 3b:** Drimnagh Road;
  - **Section 3c:** Bunting Road / St Mary's Road;
  - **Section 3d:** Drimnagh Road / Crumlin Road / Kildare Road / St. Mary's Road Junction;
  - **Section 3e:** Crumlin Road;
  - **Section 3f:** Kildare Road;
  - **Section 3g:** Sundrive Road Junction; and
  - **Section 3h:** Clogher Road.
- **Section 4:** Grand Canal to Christchurch:
  - **Section 4a:** Dolphins' Barn Street, Cork Street, and St. Luke's Avenue;
  - **Section 4b:** Dean Street;
  - **Section 4c:** Patrick Street / Kevin Street Upper / New Street South / Dean Street Junction;
  - **Section 4d:** Patrick Street and Nicholas Street; and
  - **Section 4e:** Christchurch Cathedral / Nicholas Street Junction.
- **Section 5:** Woodford Walk / New Nangor Road to Long Mile Road / Naas Road) / New Nangor Road junction.
  - **Section 5a:** New Nangor Road; and
  - **Section 5b:** Naas Road / Long Mile Road junction.
- **Section 6:** Long Mile Road (R110) / Naas Road (R810) / New Nangor Road (R134) junction to Drimnagh:
  - **Section 6a:** Naas Road;
  - **Section 6b:** Naas Road / Walkinstown Avenue Junction;
  - **Section 6c:** Walkinstown Avenue;
  - **Section 6d:** Walkinstown Avenue / Long Mile Road Junction; and
  - **Section 6e:** Long Mile Road.

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 7.2.4.1 and 7.4.2.2.

7.4.2.1 Construction Dust Assessment

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

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

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

In addition, the IAQM guidelines outline the assessment criteria for assessing the impact of PM_{10} emissions from construction activities based on 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 is approximately 15 $\mu g/m^3$. Based on the criteria outlined in Table 7.12 the risk to human health from PM_{10} emissions at the nearest residential receptor (high sensitivity, distance less than 20m and with receptor numbers between >100) is considered medium under this guidance.

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

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

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

7.4.2.1.1 Demolition

Demolition will primarily involve the demolition of existing boundary walls at Slievebloom Park, on the New Nangor Road and on the Naas Road. The dust emission magnitude from demolition can be classified as small, medium or large based on the definitions from the IAQM Guidance as transcribed below:

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

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.

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 will result 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 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 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 7.20: Risk of Dust Impacts - Demolition

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

7.4.2.1.2 Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling activities. Activities such as 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 can be 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 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 > 100,000 m^3, on-site concrete batching, sandblasting;
- **Medium**: Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g., concrete), on-site concrete batching; and
- **Small**: Total building volume < 25,000 m^3, construction material with low potential for dust release (e.g., metal cladding or timber).

The dust emission magnitude for the proposed construction activities can be classified as medium. There will be between 25,000 - 100,000 m^3 being constructed as part of the works and there is also a need for on-site concrete batching and sandblasting. The key construction activities after earthworks are installation of the pedestrian/cyclist bridges, paving materials, retaining walls and boundary walls.

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 medium risk of temporary dust soiling impacts and an overall medium risk of temporary human health impacts as a result of the proposed construction activities. In relation to ecological impact, as the receptor is of medium sensitivity, the risk associated with the proposed construction activities is described as medium.

Overall, in order to ensure that no dust nuisance occurs during the construction activities, a range of dust mitigation measures associated with a high risk of dust impacts 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 be insignificant and pose no nuisance 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

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

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

The dust emission magnitude for the proposed trackout can be classified as medium with between ten and 50 HDV outward movements in any one day.

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 results 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	Medium Risk	Medium Risk
Human Health	Low Risk	Medium Risk	Medium Risk	Medium Risk
Ecological	Low Risk	Medium Risk	Medium Risk	Medium Risk

7.4.2.2 Construction Traffic Assessment

In addition to direct impacts from the construction works including Construction Compounds, there 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 lorry movements required to transport the materials extracted and delivered to site. A total of 12 public roads have been identified as required haul routes where construction traffic will be permitted to travel along. Whilst the overall construction period is forecast as three years, 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 224 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 scenario. 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 during for the 2024 Do Minimum scenario and the 2024 Do Something (construction) scenario was carried out.

7.4.2.2.1 'Do Minimum' Scenario

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

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

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ22	714911,733502	34.7	16.6	11.6	1
AQ38	713891,732900	31.5	15.9	11.2	1
AQ39	713142,732334	32.9	15.9	10.8	1
AQ57	713940,733135	30.4	15.6	11.0	1
AQ59	714047,733216	35.8	16.3	11.4	1
AQ65	713950,733076	35.9	16.5	11.6	1
AQ67	713972,733108	35.4	16.4	11.5	1
AQ68	713970,733167	30.8	15.7	11.0	1
AQ69	714007,733184	34.3	16.2	11.4	1
AQ71	713578,732585	33.4	16.1	11.2	1
AQ72	713587,732626	34.5	16.2	11.3	1
AQ73	713609,732606	33.6	16.1	11.3	1
AQ74	713706,732687	35.4	16.3	11.3	1
AQ76	713761,732742	33.6	16.0	11.2	1
AQ79	713909,733056	32.5	15.9	11.2	1
AQ84	714335,733366	31.2	15.8	11.1	1
AQ85	714389,733378	31.1	15.7	11.0	1
AQ86	714301,733356	31.1	15.7	11.1	1
AQ87	714468,733396	33.2	16.0	10.9	1
AQ88	714437,733387	34.8	16.3	11.0	1
AQ89	714254,733340	34.8	16.3	11.4	1
AQ91	714936,733512	33.2	16.6	11.6	1
AQ92	714903,733530	33.3	16.1	11.3	1
AQ94	714670,733457	34.6	16.4	11.4	1
AQ95	714694,733471	30.0	15.6	11.0	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ97	714829,733480	30.6	15.6	11.0	1
AQ98	714775,733480	30.1	15.6	11.0	1
AQ110	715042,733653	41.2	17.0	11.9	1
AQ112	715029,733549	37.2	16.5	11.6	1
AQ120	715065,733668	40.2	16.9	11.8	1
AQ203	712588,732157	32.1	15.9	10.8	1
AQ205	712515,732128	32.6	15.9	10.9	1
AQ207	712853,732260	32.8	15.7	11.1	1
AQ208	712895,732238	35.2	16.1	11.3	1
AQ210	712726,732207	34.3	16.3	11.3	1
AQ211	712765,732187	33.0	16.0	11.2	1
AQ212	712807,732204	34.1	16.1	11.3	1
AQ213	712933,732253	34.1	16.1	11.2	1
AQ214	712998,732278	30.3	15.5	10.9	1
AQ215	713040,732294	30.5	15.6	10.7	1
AQ216	712939,732294	32.5	15.8	11.1	1
AQ235	712542,732099	31.4	15.8	10.8	1
AQ274	712287,731999	35.9	16.2	11.3	1
AQ278	712334,732019	35.5	16.1	11.1	1
AQ280	713212,732362	32.6	15.8	11.0	1
AQ285	713310,732457	32.5	15.7	10.9	1
AQ333	713476,732509	32.2	15.8	11.1	1
AQ341	713387,732488	43.7	17.2	11.9	1
AQ26	713437,732489	39.5	16.7	11.6	1
AQ35	713377,732440	38.7	16.6	11.4	1
AQ58	714097,733222	38.1	16.6	11.6	1
AQ60	714072,733235	36.0	16.3	11.4	1
AQ62	714183,733307	36.3	16.5	11.5	1
AQ64	714097,733260	38.1	16.6	11.6	1
AQ66	713920,733080	36.6	16.7	11.6	1
AQ70	713551,732602	37.5	16.8	11.7	1
AQ75	713781,732826	42.4	16.9	11.8	1
AQ77	713829,732828	39.4	16.5	11.5	1
AQ78	713840,732860	44.1	17.2	12.0	1
AQ82	713877,732905	37.8	17.3	12.1	1
AQ83	713884,732966	38.6	16.9	11.8	1
AQ101	714530,733414	36.8	16.4	11.4	1
AQ202	712465,732099	37.3	16.7	11.5	1
AQ204	712657,732137	36.9	16.4	11.4	1

DM (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ206	712557,732136	36.3	16.6	11.1	1
AQ209	712703,732192	38.4	17.0	11.8	1
AQ272	712185,731985	46.1	17.5	12.2	1
AQ275	712228,732006	40.9	16.9	11.8	1
AQ276	712240,731975	36.0	16.2	11.4	1
AQ277	712252,732026	36.1	16.2	11.3	1
AQ279	712416,732080	36.9	16.6	11.6	1
AQ284	713327,732407	37.1	16.3	11.1	1
AQ286	713332,732412	39.0	16.6	11.2	1
AQ303	713068,732335	36.0	16.4	11.0	1
AQ304	713094,732345	36.1	16.4	11.0	1
AQ342	713502,732567	38.0	16.8	11.7	1
AQ346	713430,732518	38.8	16.8	11.6	1
AQ347	713466,732543	38.0	16.8	11.7	1
AQ63	714122,733271	48.3	18.0	12.5	2
AQ80	713805,732857	51.0	18.2	12.6	2
AQ5	715064,733787	49.3	18.3	12.7	2
AQ99	715080,733859	39.4	16.8	11.8	1
AQ100	715039,733934	45.3	17.7	12.3	1
AQ118	715064,733826	40.4	17.1	11.9	1
AQ441	715015,733129	36.0	16.4	11.5	1
AQ442	714886,732820	44.8	17.6	12.2	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; 15 exceedances were modelled at receptors on the N1 Church Street, the R108 High Street, the R110 Cork Street / Dolphin Barn Street / Crumlin Road and the R137 Patrick Street / Clanbrassil Street Lower. Concentrations at all receptors with exceedances can be found in Table 2.1 (Appendix A7.1, 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 did not exceed 60 µg/m^3, indicating that exceedances of the NO_2 1-hour mean are unlikely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality limit value objective for all modelled receptors. At all receptors, modelling of the maximum 24-hour PM_{10} concentration indicated that there is likely to be no more than two exceedances of the 50 µg/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 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 construction traffic associated with the Proposed Scheme. The output of this analysis and its impact on air quality has been modelled using AMDS-Roads for the construction year of 2024 in line with the methodology set out in Section 7.2.4.1.

Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24-hour PM_{10} limit value objective, at selected most impacted existing air quality sensitive receptors in the 2024 DS scenario are listed in Table 7.26. Locations of these receptors are shown in 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 in Volume 4 of this EIAR). 'Most impacted' refers to those receptors with non-negligible impacts due to the Construction Phase of the Proposed Scheme.

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

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (μg/m³)			No of PM_{10} days > 50 μg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ22	714911,733502	32.3	15.9	10.9	1
AQ38	713891,732900	29.4	15.6	10.8	1
AQ39	713142,732334	29.4	15.3	10.8	<1
AQ57	713940,733135	28.4	15.3	10.8	<1
AQ59	714047,733216	32.4	15.9	11.2	1
AQ65	713950,733076	32.4	16.0	11.2	1
AQ67	713972,733108	32.0	16.0	11.2	1
AQ68	713970,733167	28.7	15.4	10.8	<1
AQ69	714007,733184	31.3	15.8	11.1	1
AQ71	713578,732585	30.8	15.5	10.9	<1
AQ72	713587,732626	31.8	15.6	11.0	1
AQ73	713609,732606	31.0	15.5	10.9	1
AQ74	713706,732687	33.3	15.9	11.1	1
AQ76	713761,732742	30.9	15.6	11.0	1
AQ79	713909,733056	29.9	15.6	11.0	1
AQ84	714335,733366	28.8	15.4	10.8	<1
AQ85	714389,733378	28.7	15.4	10.8	<1
AQ86	714301,733356	28.7	15.4	10.8	<1
AQ87	714468,733396	30.5	15.6	11.0	1
AQ88	714437,733387	31.6	15.8	11.1	1
AQ89	714254,733340	31.5	15.8	11.1	1
AQ91	714936,733512	31.1	15.9	10.8	1
AQ92	714903,733530	31.2	15.6	10.8	1
AQ94	714670,733457	31.1	15.7	11.0	1
AQ95	714694,733471	27.9	15.2	10.7	<1
AQ97	714829,733480	28.2	15.2	10.7	<1
AQ98	714775,733480	27.7	15.2	10.7	<1
AQ110	715042,733653	40.2	16.9	11.8	1
AQ112	715029,733549	36.3	16.3	11.4	1
AQ120	715065,733668	39.7	16.9	11.8	1
AQ203	712588,732157	29.4	15.3	10.8	<1
AQ205	712515,732128	30.1	15.4	10.9	<1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ207	712853,732260	29.5	15.2	10.7	<1
AQ208	712895,732238	32.5	15.5	10.9	<1
AQ210	712726,732207	29.5	15.6	11.0	1
AQ211	712765,732187	28.9	15.4	10.9	<1
AQ212	712807,732204	29.6	15.5	10.9	<1
AQ213	712933,732253	31.1	15.4	10.9	<1
AQ214	712998,732278	27.9	15.1	10.7	<1
AQ215	713040,732294	27.8	15.1	10.7	<1
AQ216	712939,732294	29.5	15.2	10.8	<1
AQ235	712542,732099	29.2	15.3	10.8	<1
AQ274	712287,731999	33.1	15.8	11.1	1
AQ278	712334,732019	33.0	15.7	11.0	1
AQ280	713212,732362	29.6	15.4	10.9	<1
AQ285	713310,732457	30.2	15.4	10.9	<1
AQ333	713476,732509	30.2	15.3	10.8	<1
AQ341	713387,732488	41.7	16.5	11.6	1
AQ26	713437,732489	36.8	15.9	11.2	1
AQ35	713377,732440	36.4	16.1	11.3	1
AQ58	714097,733222	34.2	16.1	11.3	1
AQ60	714072,733235	32.6	15.9	11.1	1
AQ62	714183,733307	32.8	15.9	11.2	1
AQ64	714097,733260	34.4	16.1	11.3	1
AQ66	713920,733080	33.0	16.1	11.3	1
AQ70	713551,732602	34.0	15.9	11.2	1
AQ75	713781,732826	38.5	16.3	11.4	1
AQ77	713829,732828	36.9	16.2	11.3	1
AQ78	713840,732860	40.4	16.8	11.7	1
AQ82	713877,732905	33.8	16.7	11.2	1
AQ83	713884,732966	34.7	16.4	11.4	1
AQ101	714530,733414	33.6	15.9	11.2	1
AQ202	712465,732099	34.3	15.9	11.2	1
AQ204	712657,732137	33.1	15.8	11.2	1
AQ206	712557,732136	32.6	15.8	11.1	1
AQ209	712703,732192	32.2	16.0	11.2	1
AQ272	712185,731985	43.9	17.0	11.9	1
AQ275	712228,732006	37.3	16.3	11.5	1
AQ276	712240,731975	33.5	15.8	11.2	1
AQ277	712252,732026	33.4	15.8	11.1	1
AQ279	712416,732080	34.2	15.9	11.2	1

DS (2024)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ284	713327,732407	34.3	16.0	11.3	1
AQ286	713332,732412	35.7	16.2	11.4	1
AQ303	713068,732335	30.8	15.5	10.9	1
AQ304	713094,732345	30.8	15.5	10.9	1
AQ342	713502,732567	34.4	16.0	11.2	1
AQ346	713430,732518	36.1	16.0	11.3	1
AQ347	713466,732543	34.7	16.0	11.2	1
AQ63	714122,733271	42.4	17.2	12.0	1
AQ80	713805,732857	47.0	17.7	12.3	1
AQ5	715064,733787	50.4	18.4	12.8	2
AQ99	715080,733859	40.2	16.9	11.8	1
AQ100	715039,733934	46.5	17.8	12.4	1
AQ118	715064,733826	41.1	17.2	12.0	1
AQ441	715015,733129	36.9	16.5	11.5	1
AQ442	714886,732820	45.7	17.7	12.3	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; 13 exceedances were modelled at receptors on the N1 Church Street, the R108 High Street, the R110 Cork Street / Dolphin Barn Street / Crumlin Road and the R137 Patrick Street / Clanbrassil Street Lower. This is a decrease from 15 exceedances modelled in the DM scenario. Concentrations at all receptors with exceedances can be found in Table 2.2 (Appendix A7.1, 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 60 µg/m^3, indicating that exceedances of the NO_2 1-hour mean are unlikely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality limit value objectives for all modelled receptors. At all receptors, modelling of the maximum 24-hour PM_{10} concentration indicated that there is likely to be no more than two exceedances of the 50 µg/m^3 ambient limit value compared to the threshold which allows 35 daily exceedances in any one calendar year. Annual mean $PM_{2.5}$ concentrations are also below the relevant national air quality limit value objectives for all modelled receptors.

7.4.2.2.3 Comparison of Do Something with Do Minimum

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

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

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50 µg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ22	714911,733502	-2.5	-0.7	-0.7	<1	Slight Beneficial	Negligible	Negligible
AQ38	713891,732900	-2.1	-0.3	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ39	713142,732334	-3.5	-0.6	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ57	713940,733135	-2.1	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ59	714047,733216	-3.3	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ65	713950,733076	-3.5	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ67	713972,733108	-3.4	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ68	713970,733167	-2.2	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ69	714007,733184	-3.0	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ71	713578,732585	-2.6	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ72	713587,732626	-2.7	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ73	713609,732606	-2.6	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ74	713706,732687	-2.2	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ76	713761,732742	-2.7	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ79	713909,733056	-2.6	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ84	714335,733366	-2.4	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ85	714389,733378	-2.4	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ86	714301,733356	-2.3	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ87	714468,733396	-2.7	-0.4	0.1	<1	Slight Beneficial	Negligible	Negligible
AQ88	714437,733387	-3.3	-0.5	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ89	714254,733340	-3.2	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ91	714936,733512	-2.0	-0.7	-0.8	<1	Slight Beneficial	Negligible	Negligible
AQ92	714903,733530	-2.0	-0.5	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ94	714670,733457	-3.5	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ95	714694,733471	-2.1	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ97	714829,733480	-2.4	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ98	714775,733480	-2.4	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ110	715042,733653	-1.0	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ112	715029,733549	-0.8	-0.2	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ120	715065,733668	-0.5	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ203	712588,732157	-2.7	-0.5	0.0	<1	Slight Beneficial	Negligible	Negligible
AQ205	712515,732128	-2.5	-0.5	0.0	<1	Slight Beneficial	Negligible	Negligible
AQ207	712853,732260	-3.3	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ208	712895,732238	-2.7	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ210	712726,732207	-4.7	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ211	712765,732187	-4.2	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ212	712807,732204	-4.5	-0.7	-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 > 50 µg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ213	712933,732253	-3.0	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ214	712998,732278	-2.4	-0.5	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ215	713040,732294	-2.8	-0.5	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ216	712939,732294	-3.0	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ235	712542,732099	-2.3	-0.5	0.0	<1	Slight Beneficial	Negligible	Negligible
AQ274	712287,731999	-2.8	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ278	712334,732019	-2.4	-0.4	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ280	713212,732362	-3.0	-0.4	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ285	713310,732457	-2.3	-0.3	0.0	<1	Slight Beneficial	Negligible	Negligible
AQ333	713476,732509	-2.0	-0.5	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ341	713387,732488	-1.9	-0.7	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ26	713437,732489	-2.6	-0.8	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ35	713377,732440	-2.3	-0.5	-0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ58	714097,733222	-3.9	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ60	714072,733235	-3.4	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ62	714183,733307	-3.4	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ64	714097,733260	-3.8	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ66	713920,733080	-3.7	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ70	713551,732602	-3.6	-0.9	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ75	713781,732826	-3.9	-0.6	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ77	713829,732828	-2.4	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ78	713840,732860	-3.7	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ82	713877,732905	-4.0	-0.6	-0.9	<1	Moderate Beneficial	Negligible	Negligible
AQ83	713884,732966	-3.9	-0.5	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ101	714530,733414	-3.1	-0.5	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ202	712465,732099	-3.0	-0.8	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ204	712657,732137	-3.9	-0.6	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ206	712557,732136	-3.6	-0.8	<0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ209	712703,732192	-6.2	-1.0	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ272	712185,731985	-2.2	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ275	712228,732006	-3.6	-0.6	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ276	712240,731975	-2.5	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ277	712252,732026	-2.7	-0.4	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ279	712416,732080	-2.8	-0.8	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ284	713327,732407	-2.7	-0.3	0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ286	713332,732412	-3.3	-0.4	0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ303	713068,732335	-5.3	-0.9	0.0	<1	Moderate Beneficial	Negligible	Negligible
AQ304	713094,732345	-5.3	-0.9	0.0	<1	Moderate Beneficial	Negligible	Negligible
AQ342	713502,732567	-3.6	-0.9	-0.5	<1	Moderate Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m^3)			Change in No of PM_{10} days > 50 µg/m^3	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ346	713430,732518	-2.7	-0.8	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ347	713466,732543	-3.4	-0.8	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ63	714122,733271	-5.8	-0.8	-0.5	-1	Substantial Beneficial	Negligible	Negligible
AQ80	713805,732857	-4.0	-0.5	-0.3	-1	Substantial Beneficial	Negligible	Negligible
AQ5	715064,733787	1.0	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ99	715080,733859	0.8	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ100	715039,733934	1.3	0.2	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ118	715064,733826	0.7	<0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ441	715015,733129	0.9	0.1	<0.1	<1	Slight Adverse	Negligible	Negligible
AQ442	714886,732820	0.9	0.1	0.1	<1	Slight 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 significance criteria (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 48 receptors, a moderate beneficial impact at 30 receptors and substantial beneficial impacts are expected at two 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 six receptors. 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 (PC) is likely to be insignificant. Where the process contribution is greater than 1% of the critical level / load it is recommended that the project ecologist be consulted.

The impact of the Proposed Scheme on the nearby ecologically sensitive areas within 200m of roads impacted by the Proposed Scheme, as defined in Section 7.2.4.1, is outlined in Table 7.28. The annual mean NO_X concentration has been compared to the critical level of 30µg/m^3 at each of the designated habitat sites. 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 7.29. All sites are below the lower critical load for the designated habitat site, with the exception of the Grand Canal pNHA at eastern side of New Nangor Road.

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 Minimum (µg/m³)	Distance from road beyond which concentration is below critical level (30 µg/m³) (m)	Do Something (µg/m³)	Distance from road beyond which concentration is below critical level (30 µg/m³) (m)	Impact (DS – DM) (µg/m³)	Change as a percentage of critical level (30 µg/m³) (%)
Grand Canal pNHA (Camac Bridge, western side)	713666, 732686	63.9	>200m	58.3	>200m	-5.6	-19%
Grand Canal pNHA (Camac Bridge, eastern side)	713694, 732692	58.8	>200m	51.5	>200m	-7.3	-24%
Grand Canal pNHA (Killeen Road, western side)	709299, 732411	39.2	170m	39.4	>200m	0.3	1%
Grand Canal pNHA (Killeen Road, eastern side)	709310, 732419	42.0	200m	42.4	>200m	0.4	1%
Grand Canal pNHA (Kylemore Road, western side)	710132, 732601	43.4	80m	39.9	40m	-3.6	-12%
Grand Canal pNHA (Kylemore Road, eastern side)	710142, 732602	51.6	120m	45.9	80m	-5.6	-19%
Grand Canal pNHA (M50 northbound)	708026, 732149	78.2	>200m	78.8	>200m	0.6	2%
Grand Canal pNHA (M50 southbound)	708089, 732127	134.9	>200m	137.3	>200m	2.4	8%
Grand Canal pNHA (New Nangor Road, western side)	708012, 732111	56.3	>200m	56.6	>200m	0.3	1%
Grand Canal pNHA (New Nangor Road, eastern side)	708098, 732129	97.4	>200m	98.8	>200m	1.4	5%
Grand Canal pNHA (Ninth Lock Bridge, eastern side)	706773, 732174	87.2	>200m	88.8	>200m	1.6	5%
Grand Canal pNHA (Ninth Lock Bridge, western side)	706763, 732172	65.9	170m	66.9	160m	1.0	3%
Grand Canal pNHA (Oak Road, western side)	708566, 732235	41.3	>200m	41.6	>200m	0.3	1%
Grand Canal pNHA (Oak Road, eastern side)	708576, 732237	45.5	>200m	45.9	>200m	0.4	1%
Grand Canal pNHA (Parnell Road, western side)	714464, 732489	44.1	>200m	44.8	>200m	0.6	2%

Annual Mean NO_X In 2024 At Closest Point Within Ecological Site to Road							
Receptor	Receptor Location (ITM)	Do Minimum (µg/m³)	Distance from road beyond which concentration is below critical level (30 µg/m³) (m)	Do Something (µg/m³)	Distance from road beyond which concentration is below critical level (30 µg/m³) (m)	Impact (DS – DM) (µg/m³)	Change as a percentage of critical level (30 µg/m³) (%)
Grand Canal pNHA (Parnell Road, eastern side)	714169, 732549	39.4	110m	38.7	170m	-0.8	-3%
Grand Canal pNHA (Sally's Bridge, western side)	714295, 732544	51.1	>200m	53.7	>200m	2.6	9%
Grand Canal pNHA (Sally's Bridge, eastern side)	714305, 732541	57.4	>200m	61.1	>200m	3.6	12%
Grand Canal pNHA (Woodford Walk)	707653, 732123	55.1	>200m	54.9	>200m	-0.3	-1%

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

Annual Mean N Deposition In 2024 At Closest Point Within Ecological Site to Road									
Receptor	Receptor Location (ITM)	Lower critical load for most sensitive feature (kgN/ha/yr)	Do Minimum (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Do Something (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Change relative to lower critical load (%)	Distance from road beyond which the change is <1% (m)	Change in deposition (kgN/ha/yr)
Grand Canal pNHA (Camac Bridge, western side)	713666, 732686	5	3.75	0m	3.49	0m	-5%	0m	-0.26
Grand Canal pNHA (Camac Bridge, eastern side)	713694, 732692	5	3.51	0m	3.17	0m	-7%	0m	-0.34
Grand Canal pNHA (Killeen Road, western side)	709299, 732411	5	2.55	0m	2.56	0m	0%	0m	0.02
Grand Canal pNHA (Killeen Road, eastern side)	709310, 732419	5	2.69	0m	2.72	0m	0%	0m	0.02
Grand Canal pNHA (Kylemore Road, western side)	710132, 732601	5	2.77	0m	2.59	0m	-4%	0m	-0.18
Grand Canal pNHA (Kylemore Road, eastern side)	710142, 732602	5	3.17	0m	2.89	0m	-5%	0m	-0.27
Grand Canal pNHA (M50 northbound)	708026, 732149	5	4.39	0m	4.42	0m	1%	0m	0.03
Grand Canal pNHA (M50 southbound)	708089, 732127	5	6.61	10m	6.71	10m	2%	0m	0.10

Annual Mean N Deposition In 2024 At Closest Point Within Ecological Site to Road									
Receptor	Receptor Location (ITM)	Lower critical load for most sensitive feature (kgN/ha/yr)	Do Minimum (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Do Something (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Change relative to lower critical load (%)	Distance from road beyond which the change is <1% (m)	Change in deposition (kgN/ha/yr)
Grand Canal pNHA (New Nangor Road, western side)	708012, 732111	5	3.39	0m	3.41	0m	0%	0m	0.02
Grand Canal pNHA (New Nangor Road, eastern side)	708098, 732129	5	5.19	0m	5.25	0m	1%	0m	0.07
Grand Canal pNHA (Ninth Lock Bridge, eastern side)	706773, 732174	5	4.77	0m	4.84	0m	2%	0m	0.08
Grand Canal pNHA (Ninth Lock Bridge, western side)	706763, 732172	5	3.84	0m	3.89	0m	1%	0m	0.05
Grand Canal pNHA (Oak Road, western side)	708566, 732235	5	2.66	0m	2.67	0m	0%	0m	0.02
Grand Canal pNHA (Oak Road, eastern side)	708576, 732237	5	2.87	0m	2.89	0m	0%	0m	0.02
Grand Canal pNHA (Parnell Road, western side)	714464, 732489	5	2.80	0m	2.83	0m	1%	10m	0.03
Grand Canal pNHA (Parnell Road, eastern side)	714169, 732549	5	2.56	0m	2.53	0m	-1%	0m	-0.04
Grand Canal pNHA (Sally's Bridge, western side)	714295, 732544	5	3.14	0m	3.27	0m	3%	20m	0.13
Grand Canal pNHA (Sally's Bridge, eastern side)	714305, 732541	5	3.45	0m	3.62	0m	3%	20m	0.17
Grand Canal pNHA (Woodford Walk)	707653, 732123	5	3.34	0m	3.33	0m	0%	0m	-0.01

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 be overall detrimental, with increases in emissions of all pollutants modelled. The majority of these increases result from redistribution of vehicles onto other longer routes, while construction of the Proposed Scheme takes place. To produce these emissions estimates, the traffic model and therefore the ENEVAL tool have applied the peak construction day in 2024 across the whole year. Emissions are therefore worst-case and likely to be lower in reality.

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

	Vehicle Class	NO_x (tonnes)	NO_2 (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	HC (tonnes)	CO (tonnes)	Benzene (tonnes)	Butadiene (tonnes)
DM	Car	1624	489	18	18	86	1951	1	1
DS		1630	490	18	18	87	1960	1	1
Change		5	2	0.06	0.06	0.3	9	0.006	0.003
% Change		0.3%	0.3%	0.3%	0.3%	0.4%	0.5%	0.4%	0.3%
DM	Goods	1436	408	11	11	43	223	0.4	0.5
DS		1442	410	11	11	43	224	0.4	0.5
Change		6	1	0.04	0.03	0.1	1	0.003	0.001
% Change		0.4%	0.4%	0.3%	0.3%	0.3%	0.6%	1%	0.3%
DM	Urban Bus	44	4	0.7	0.7	2	9	0	0.05
DS		45	5	0.7	0.7	2	9	0	0.05
Change		0.6	0.06	0.005	0.004	0.01	0.1	0	0.0001
% Change		1%	1%	0.6%	0.6%	0.7%	1%	0%	0.1%
DM	**Total**	**3105**	**901**	**30**	**29**	**132**	**2183**	**2**	**2**
DS		**3117**	**905**	**31**	**29**	**132**	**2193**	**2**	**2**
Change		**12**	**3**	**0.1**	**0.1**	**0.5**	**10**	**0.01**	**0.005**
% Change		**0.4%**	**0.4%**	**0.3%**	**0.3%**	**0.4%**	**0.5%**	**0.5%**	**0.3%**

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

7.4.3 Operational Phase

7.4.3.1 'Do Minimum' Scenario

The Do Minimum (DM) is a defined scenario within the traffic modelling exercise in Chapter 6 (Traffic & Transport) and is based on the likely conditions of the road network with all major committed transportation schemes in place that will impact on the use of public transport and private car, not including the Proposed Scheme. The output of this analysis and its impact on air quality has been modelled using AMDS-Roads for the opening year of 2028. Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24-hour PM_{10} 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 in Volume 4 of this EIAR). 'Most impacted' refers to those receptors with non-negligible impacts due to the Operational Phase of the Proposed Scheme.

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

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. ($\mu g/m^3$)			No of PM_{10} days > 50 $\mu g/m^3$
		NO_2	PM_{10}	$PM_{2.5}$	
AQ16	710315,732026	35.8	16.4	11.4	1
AQ26	713437,732489	40.7	16.8	11.7	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ35	713377,732440	40.2	16.7	11.6	1
AQ38	713891,732900	35.6	15.9	11.2	1
AQ45	709907,729341	27.3	14.9	10.6	<1
AQ57	713940,733135	31.4	15.7	11.0	1
AQ68	713970,733167	31.8	15.7	11.0	1
AQ69	714007,733184	35.3	16.3	11.4	1
AQ70	713551,732602	38.4	16.8	11.7	1
AQ74	713706,732687	37.5	16.3	11.4	1
AQ76	713761,732742	34.7	16.0	11.2	1
AQ79	713909,733056	33.7	16.0	11.2	1
AQ84	714335,733366	32.0	15.9	11.1	1
AQ85	714389,733378	31.9	15.8	11.1	1
AQ86	714301,733356	31.8	15.8	11.1	1
AQ87	714468,733396	34.1	16.1	11.2	1
AQ88	714437,733387	35.7	16.4	11.4	1
AQ89	714254,733340	35.5	16.4	11.4	1
AQ93	714595,733452	33.8	15.9	11.1	1
AQ95	714694,733471	31.6	15.7	11.0	1
AQ96	714743,733478	31.0	15.7	11.0	1
AQ97	714829,733480	31.8	15.8	11.0	1
AQ98	714775,733480	31.3	15.7	11.0	1
AQ113	715008,733471	36.4	16.0	11.2	1
AQ114	715108,733441	35.5	16.1	11.3	1
AQ119	715034,733702	35.4	15.9	11.2	1
AQ202	712465,732099	37.1	16.6	11.5	1
AQ204	712657,732137	37.2	16.3	11.4	1
AQ206	712557,732136	36.4	16.5	11.5	1
AQ207	712853,732260	33.5	15.8	11.1	1
AQ208	712895,732238	35.9	16.2	11.3	1
AQ213	712933,732253	34.8	16.1	11.3	1
AQ265	712192,731847	30.4	15.5	10.9	1
AQ269	712133,731859	33.6	16.0	11.2	1
AQ274	712287,731999	35.5	16.0	11.2	1
AQ275	712228,732006	40.4	16.7	11.6	1
AQ279	712416,732080	36.7	16.5	11.5	1
AQ287	713345,732482	36.3	16.1	11.3	1
AQ303	713068,732335	37.0	16.4	11.5	1
AQ304	713094,732345	37.1	16.5	11.5	1
AQ342	713502,732567	38.9	16.9	11.7	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ347	713466,732543	39.0	16.9	11.7	1
AQ445	714817,734262	55.8	18.5	12.8	2
AQ446	714795,734086	50.0	18.4	12.6	2
AQ58	714097,733222	39.5	16.7	11.6	1
AQ59	714047,733216	37.0	16.4	11.4	1
AQ60	714072,733235	37.3	16.4	11.4	1
AQ62	714183,733307	37.2	16.6	11.5	1
AQ64	714097,733260	39.6	16.7	11.6	1
AQ65	713950,733076	37.2	16.6	11.6	1
AQ66	713920,733080	37.9	16.7	11.6	1
AQ67	713972,733108	36.6	16.5	11.5	1
AQ77	713829,732828	41.4	16.6	11.6	1
AQ80	713805,732857	54.2	18.4	12.6	2
AQ83	713884,732966	41.7	17.0	11.8	1
AQ92	714903,733530	37.0	16.3	11.4	1
AQ94	714670,733457	36.9	16.5	11.5	1
AQ99	715080,733859	40.1	16.8	11.7	1
AQ101	714530,733414	38.1	16.5	11.5	1
AQ111	714995,733508	36.8	16.2	11.3	1
AQ112	715029,733549	39.1	16.6	11.6	1
AQ115	714984,733481	36.0	16.1	11.3	1
AQ117	715038,733814	37.1	16.4	11.5	1
AQ209	712703,732192	38.8	16.9	11.7	1
AQ272	712185,731985	45.5	17.2	12.0	1
AQ284	713327,732407	38.3	16.4	11.5	1
AQ286	713332,732412	40.3	16.6	11.6	1
AQ437	715062,733342	37.0	16.7	11.6	1
AQ441	715015,733129	38.2	16.4	11.5	1
AQ442	714886,732820	47.9	17.7	12.3	1
AQ5	715064,733787	50.5	18.2	12.5	2
AQ22	714911,733502	40.5	16.8	11.7	1
AQ63	714122,733271	50.3	18.2	12.5	2
AQ75	713781,732826	44.1	17.0	11.8	1
AQ78	713840,732860	47.3	17.4	12.0	1
AQ82	713877,732905	47.2	17.4	12.1	1
AQ91	714936,733512	40.0	16.8	11.7	1
AQ100	715039,733934	47.4	17.7	12.3	1
AQ110	715042,733653	42.4	17.1	11.9	1
AQ118	715064,733826	41.0	17.1	11.8	1

DM (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ120	715065,733668	42.3	17.1	11.9	1
AQ121	715065,733728	40.5	16.6	11.6	1
AQ46	709795,729237	23.0	14.4	10.3	<1
AQ341	713387,732488	45.4	17.3	12.0	1
AQ436	714897,734062	35.6	16.1	11.3	1
Air Quality Limit Value Objective		**40**	**40**	**25**	**35**

In the 2028 DM scenario, annual mean concentrations of NO_2 are above the relevant national air quality limit value objective in some areas; 24 exceedances were modelled at receptors on the N1 Church Street, the R108 High Street, the R110 The Coombe / Cork Street / Dolphin Barn Street / Crumlin Road and the R137 Patrick Street / Clanbrassil Street Lower. 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 not exceed 60µg/m^3, indicating that exceedances of the NO_2 1-hour mean are unlikely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality limit value objective for all modelled receptors. At all receptors, modelling of the maximum 24-hour PM_{10} concentration indicated that there is likely to be no more than two exceedances of the 50µg/m^3 ambient limit value compared to the threshold which allows 35 daily exceedances in any one calendar year. Annual mean $PM_{2.5}$ concentrations are also below the relevant national air quality limit value 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 AMDS-Roads for the opening year of 2028 in line with the methodology set out in Section 7.2.4.1. Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24-hour PM_{10} limit value objective, at selected most impacted existing air quality sensitive receptors 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 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 Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ16	710315,732026	32.7	15.9	11.1	1
AQ26	713437,732489	40.1	16.4	11.5	1
AQ35	713377,732440	39.5	16.3	11.4	1
AQ38	713891,732900	33.2	15.7	11.0	1
AQ45	709907,729341	23.3	14.5	10.3	<1
AQ57	713940,733135	29.0	15.4	10.8	<1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ68	713970,733167	29.3	15.4	10.8	<1
AQ69	714007,733184	31.8	15.8	11.1	1
AQ70	713551,732602	37.0	16.6	11.6	1
AQ74	713706,732687	35.7	16.1	11.3	1
AQ76	713761,732742	32.5	15.7	11.0	1
AQ79	713909,733056	31.2	15.6	11.0	1
AQ84	714335,733366	27.4	15.2	10.7	<1
AQ85	714389,733378	27.4	15.2	10.7	<1
AQ86	714301,733356	27.7	15.2	10.7	<1
AQ87	714468,733396	28.7	15.4	10.8	<1
AQ88	714437,733387	29.5	15.5	10.9	1
AQ89	714254,733340	29.8	15.5	10.9	1
AQ93	714595,733452	31.4	15.4	10.9	<1
AQ95	714694,733471	27.9	15.2	10.7	<1
AQ96	714743,733478	27.2	15.1	10.7	<1
AQ97	714829,733480	27.8	15.1	10.7	<1
AQ98	714775,733480	27.2	15.1	10.7	<1
AQ113	715008,733471	34.6	15.6	11.0	1
AQ114	715108,733441	33.4	15.8	11.1	1
AQ119	715034,733702	32.5	15.6	10.9	1
AQ202	712465,732099	36.7	16.5	11.5	1
AQ204	712657,732137	36.6	16.2	11.4	1
AQ206	712557,732136	34.6	16.3	11.4	1
AQ207	712853,732260	30.8	15.6	11.0	1
AQ208	712895,732238	32.3	16.0	11.2	1
AQ213	712933,732253	32.2	15.9	11.1	1
AQ265	712192,731847	27.9	15.1	10.7	<1
AQ269	712133,731859	31.5	15.5	10.9	1
AQ274	712287,731999	33.2	15.8	11.1	1
AQ275	712228,732006	39.6	16.7	11.6	1
AQ279	712416,732080	36.2	16.4	11.4	1
AQ287	713345,732482	35.4	15.9	11.2	1
AQ303	713068,732335	35.7	16.4	11.5	1
AQ304	713094,732345	35.4	16.4	11.4	1
AQ342	713502,732567	37.9	16.7	11.6	1
AQ347	713466,732543	38.3	16.7	11.6	1
AQ445	714817,734262	53.9	18.4	12.7	2
AQ446	714795,734086	48.9	18.2	12.5	2
AQ58	714097,733222	36.4	16.1	11.3	1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
AQ59	714047,733216	33.4	15.8	11.1	1
AQ60	714072,733235	33.4	15.8	11.1	1
AQ62	714183,733307	31.9	15.7	11.0	1
AQ64	714097,733260	35.2	16.0	11.2	1
AQ65	713950,733076	33.5	16.1	11.3	1
AQ66	713920,733080	33.6	16.1	11.3	1
AQ67	713972,733108	33.0	16.0	11.2	1
AQ77	713829,732828	38.7	16.4	11.4	1
AQ80	713805,732857	50.3	18.1	12.5	2
AQ83	713884,732966	39.4	16.1	11.6	1
AQ92	714903,733530	31.8	15.3	10.8	<1
AQ94	714670,733457	30.6	15.6	10.9	1
AQ99	715080,733859	36.7	16.0	11.2	1
AQ101	714530,733414	31.8	15.6	11.0	1
AQ111	714995,733508	34.4	15.7	11.0	1
AQ112	715029,733549	35.8	16.1	11.3	1
AQ115	714984,733481	33.8	15.6	11.0	1
AQ117	715038,733814	34.3	15.9	11.2	1
AQ209	712703,732192	36.4	16.6	11.6	1
AQ272	712185,731985	43.2	16.9	11.8	1
AQ284	713327,732407	35.1	15.9	11.2	1
AQ286	713332,732412	36.7	16.1	11.3	1
AQ437	715062,733342	35.0	16.4	11.4	1
AQ441	715015,733129	35.0	16.1	11.3	1
AQ442	714886,732820	44.2	17.2	12.0	1
AQ5	715064,733787	41.4	16.8	11.7	1
AQ22	714911,733502	35.3	15.7	11.0	1
AQ63	714122,733271	45.6	16.8	11.7	1
AQ75	713781,732826	39.9	16.5	11.5	1
AQ78	713840,732860	42.9	17.0	11.8	1
AQ82	713877,732905	41.7	16.7	11.7	1
AQ91	714936,733512	34.9	15.6	11.0	1
AQ100	715039,733934	42.9	16.7	11.6	1
AQ110	715042,733653	38.3	16.5	11.5	1
AQ118	715064,733826	36.3	16.2	11.3	1
AQ120	715065,733668	36.2	16.2	11.3	1
AQ121	715065,733728	35.6	15.9	11.2	1
AQ46	709795,729237	28.4	15.2	10.7	<1
AQ341	713387,732488	46.3	17.0	11.8	1

DS (2028)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
AQ436	714897,734062	36.3	16.2	11.4	1
Air Quality Limit Value Objective		**40**	**40**	**25**	**35**

In the 2028 DS scenario annual mean concentrations of NO_2 are above the relevant national air quality limit value objective in some areas; 12 exceedances were modelled at receptors on the N1 Church Street, the R108 High Street, the R110 Cork Street / Dolphin Barn Street / Crumlin Road and the R137 Patrick Street / Clanbrassil Street Lower. This is a decrease from 24 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 60 µg/m^3, indicating that exceedances of the NO_2 1-hour mean are unlikely to occur. Annual mean PM_{10} concentrations are below the relevant national air quality limit value objectives for all modelled receptors. At all receptors, modelling of the maximum 24-hour PM_{10} concentration indicated that there is likely to be no more than two exceedances of the 50 µg/m^3 ambient limit value compared to the threshold which allows 35 daily exceedances in any one calendar year. Annual mean $PM_{2.5}$ concentrations are also below the relevant national air quality limit value objectives for all modelled receptors.

7.4.3.3 Comparison of Do Something with Do Minimum

Table 7.33 provides the predicted change in and impact on pollutant concentrations, between the DM and DS in 2028. Statistics for the full list of modelled receptors can be found in Table 3.3 (Appendix A7.1 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 Scheme.

Table 7.33: Predicted Changes in 2028 Operational DM and DS and Impact Significance Criteria at Most Impacted Receptor Locations

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m^3)			Change in No of PM_{10} days > 50 µg/m^3	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ16	710315,732026	-3.1	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ26	713437,732489	-0.6	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ35	713377,732440	-0.7	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ38	713891,732900	-2.4	-0.3	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ45	709907,729341	-4.1	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ57	713940,733135	-2.4	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ68	713970,733167	-2.5	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ69	714007,733184	-3.5	-0.5	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ70	713551,732602	-1.4	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ74	713706,732687	-1.8	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ76	713761,732742	-2.2	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ79	713909,733056	-2.5	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ84	714335,733366	-4.6	-0.7	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ85	714389,733378	-4.4	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ86	714301,733356	-4.1	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ87	714468,733396	-5.4	-0.7	-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 > 50 µg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ88	714437,733387	-6.3	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ89	714254,733340	-5.8	-0.9	-0.5	<1	Slight Beneficial	Negligible	Negligible
AQ93	714595,733452	-2.4	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ95	714694,733471	-3.7	-0.6	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ96	714743,733478	-3.9	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ97	714829,733480	-4.0	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ98	714775,733480	-4.1	-0.6	-0.4	<1	Slight Beneficial	Negligible	Negligible
AQ113	715008,733471	-1.9	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ114	715108,733441	-2.1	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ119	715034,733702	-2.8	-0.4	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ202	712465,732099	-0.5	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ204	712657,732137	-0.5	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ206	712557,732136	-1.8	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ207	712853,732260	-2.7	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ208	712895,732238	-3.6	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ213	712933,732253	-2.6	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ265	712192,731847	-2.4	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ269	712133,731859	-2.2	-0.4	-0.3	<1	Slight Beneficial	Negligible	Negligible
AQ274	712287,731999	-2.3	-0.3	-0.2	<1	Slight Beneficial	Negligible	Negligible
AQ275	712228,732006	-0.8	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ279	712416,732080	-0.5	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ287	713345,732482	-0.8	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ303	713068,732335	-1.3	<0.1	<0.1	<1	Slight Beneficial	Negligible	Negligible
AQ304	713094,732345	-1.7	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ342	713502,732567	-1.0	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ347	713466,732543	-0.7	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ445	714817,734262	-1.9	-0.1	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ446	714795,734086	-1.1	-0.2	-0.1	<1	Slight Beneficial	Negligible	Negligible
AQ58	714097,733222	-3.1	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ59	714047,733216	-3.6	-0.6	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ60	714072,733235	-3.8	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ62	714183,733307	-5.3	-0.9	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ64	714097,733260	-4.3	-0.7	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ65	713950,733076	-3.7	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ66	713920,733080	-4.3	-0.6	-0.4	<1	Moderate Beneficial	Negligible	Negligible
AQ67	713972,733108	-3.6	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ77	713829,732828	-2.7	-0.2	-0.1	<1	Moderate Beneficial	Negligible	Negligible
AQ80	713805,732857	-3.9	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ83	713884,732966	-2.3	-1.0	-0.2	<1	Moderate Beneficial	Negligible	Negligible

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50 µg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
AQ92	714903,733530	-5.2	-0.9	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ94	714670,733457	-6.3	-1.0	-0.6	<1	Moderate Beneficial	Negligible	Negligible
AQ99	715080,733859	-3.4	-0.8	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ101	714530,733414	-6.3	-0.9	-0.5	<1	Moderate Beneficial	Negligible	Negligible
AQ111	714995,733508	-2.4	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ112	715029,733549	-3.3	-0.6	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ115	714984,733481	-2.2	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ117	715038,733814	-2.8	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ209	712703,732192	-2.4	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ272	712185,731985	-2.2	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ284	713327,732407	-3.2	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ286	713332,732412	-3.6	-0.5	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ437	715062,733342	-2.0	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ441	715015,733129	-3.2	-0.3	-0.2	<1	Moderate Beneficial	Negligible	Negligible
AQ442	714886,732820	-3.8	-0.4	-0.3	<1	Moderate Beneficial	Negligible	Negligible
AQ5	715064,733787	-9.1	-1.4	-0.9	-1	Substantial Beneficial	Negligible	Negligible
AQ22	714911,733502	-5.2	-1.2	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ63	714122,733271	-4.7	-1.4	-0.8	-1	Substantial Beneficial	Negligible	Negligible
AQ75	713781,732826	-4.2	-0.4	-0.2	<1	Substantial Beneficial	Negligible	Negligible
AQ78	713840,732860	-4.4	-0.4	-0.2	<1	Substantial Beneficial	Negligible	Negligible
AQ82	713877,732905	-5.5	-0.7	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ91	714936,733512	-5.0	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ100	715039,733934	-4.5	-1.1	-0.7	<1	Substantial Beneficial	Negligible	Negligible
AQ110	715042,733653	-4.2	-0.6	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ118	715064,733826	-4.7	-0.9	-0.5	<1	Substantial Beneficial	Negligible	Negligible
AQ120	715065,733668	-6.0	-0.9	-0.6	<1	Substantial Beneficial	Negligible	Negligible
AQ121	715065,733728	-4.9	-0.7	-0.4	<1	Substantial Beneficial	Negligible	Negligible
AQ46	709795,729237	5.3	0.8	0.5	<1	Slight Adverse	Negligible	Negligible
AQ341	713387,732488	0.9	-0.3	-0.2	<1	Slight Adverse	Negligible	Negligible
AQ436	714897,734062	0.8	0.1	<0.1	<1	Slight 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 significance criteria (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 44 receptors, a moderate beneficial impact at 26 receptors and a substantial beneficial impact at 12 receptors due to the diversion of traffic off the Proposed Scheme routes. A slight adverse impact is expected at three receptors. Figure 7.4 in Volume 3 of this EIAR the Proposed Scheme will be overall neutral in terms of annual mean PM_{10} concentrations, with all receptors experiencing a negligible impact. As shown in Table 7.33 and Figure 7.5 in Volume 3 of this EIAR the Proposed Scheme will be 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 Operational Phase traffic emissions pre-mitigation are overall neutral and long-term.

The predictions reported are based on conservative assumptions regarding background pollutant concentrations and the improvement in vehicle emission rates. 2019 background pollutant concentrations have been used to represent 2028 and are likely be lower by the opening year than in 2019. Older fleet projections were used in the absence of a fleet that incorporates the effects of 2023 Climate Action Plan measures – a larger proportion of electric vehicles is planned by the opening year than has been modelled. In reality, total concentrations (and magnitude of change) are likely to be lower than those reported here.

7.4.3.4 Ecological Assessment

An assessment of the 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 PC 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, with the exception of the Grand Canal pNHA at the M50 southbound, the eastern side of New Nangor Road and the western side of the Ninth Lock Bridge in both the DM and the DS. However, N deposition levels decrease at these sites due to the proposed scheme.

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_2 Annual Mean Concentration In 2028)

Annual Mean NOX 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 (30 μg/m^3) (m)	Do Something (μg/m^3)	Distance from road beyond which concentration is below critical level (30 μg/m^3) (m)	Impact (DS – DM) (μg/m^3)	Change as a percentage of critical level (30 μg/m^3) (%)
Grand Canal pNHA (Camac Bridge, western side)	713666, 732686	66.2	>200m	56.3	>200m	-9.9	-33%
Grand Canal pNHA (Camac Bridge, eastern side)	713694, 732692	60.7	>200m	56.1	>200m	-4.6	-15%
Grand Canal pNHA (Killeen Road, western side)	709299, 732411	40.4	>200m	38.2	>200m	-2.2	-7%
Grand Canal pNHA (Killeen Road, eastern side)	709310, 732419	43.5	>200m	40.6	>200m	-2.9	-10%
Grand Canal pNHA (Kylemore Road, western side)	710132, 732601	45.6	>200m	41.7	>200m	-4.0	-13%

Annual Mean NOX 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 (30 μg/m³) (m)**	**Do Something (μg/m³)**	**Distance from road beyond which concentration is below critical level (30 μg/m³) (m)**	**Impact (DS – DM) (μg/m³)**	**Change as a percentage of critical level (30 μg/m³) (%)**
Grand Canal pNHA (Kylemore Road, eastern side)	710142, 732602	54.4	>200m	48.3	>200m	-6.1	-20%
Grand Canal pNHA (M50 northbound)	708026, 732149	82.0	>200m	83.0	>200m	1.0	3%
Grand Canal pNHA (M50 southbound)	708089, 732127	153.7	>200m	148.1	>200m	-5.6	-19%
Grand Canal pNHA (New Nangor Road, western side)	708012, 732111	70.1	>200m	63.2	>200m	-6.9	-23%
Grand Canal pNHA (New Nangor Road, eastern side)	708098, 732129	113.4	>200m	107.1	>200m	-6.3	-21%
Grand Canal pNHA (Ninth Lock Bridge, eastern side)	706773, 732174	98.3	>200m	95.3	>200m	-3.0	-10%
Grand Canal pNHA (Ninth Lock Bridge, western side)	706763, 732172	73.2	>200m	71.2	>200m	-1.9	-6%
Grand Canal pNHA (Oak Road, western side)	708566, 732235	50.5	>200m	45.8	>200m	-4.8	-16%
Grand Canal pNHA (Oak Road, eastern side)	708576, 732237	59.2	>200m	52.2	>200m	-7.0	-23%
Grand Canal pNHA (Parnell Road, western side)	714464, 732489	46.1	>200m	47.3	>200m	1.2	4%
Grand Canal pNHA (Parnell Road, eastern side)	714169, 732549	40.7	>200m	42.4	>200m	1.8	6%
Grand Canal pNHA (Sally's Bridge, western side)	714295, 732544	53.0	>200m	54.1	>200m	1.1	4%
Grand Canal pNHA (Sally's Bridge, eastern side)	714305, 732541	59.8	>200m	61.2	>200m	1.4	5%
Grand Canal pNHA (Woodford Walk)	707653, 732123	59.0	>200m	58.0	>200m	-1.0	-3%

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 kgN/ha/yr
Grand Canal pNHA (Camac Bridge, western side)	713666, 732686	5	3.87	0m	3.39	0m	-10%	0m	-0.48
Grand Canal pNHA (Camac Bridge, eastern side)	713694, 732692	5	3.61	0m	3.38	0m	-5%	0m	-0.23
Grand Canal pNHA (Killeen Road, western side)	709299, 732411	5	2.62	0m	2.50	0m	-2%	0m	-0.12
Grand Canal pNHA (Killeen Road, eastern side)	709310, 732419	5	2.78	0m	2.62	0m	-3%	0m	-0.15
Grand Canal pNHA (Kylemore Road, western side)	710132, 732601	5	2.88	0m	2.68	0m	-4%	0m	-0.21
Grand Canal pNHA (Kylemore Road, eastern side)	710142, 732602	5	3.31	0m	3.00	0m	-6%	0m	-0.31
Grand Canal pNHA (M50 northbound)	708026, 732149	5	4.58	0m	4.59	0m	0%	0m	0.01
Grand Canal pNHA (M50 southbound)	708089, 732127	5	7.35	20m	7.07	20m	-6%	0m	-0.28
Grand Canal pNHA (New Nangor Road, western side)	708012, 732111	5	4.05	0m	3.71	0m	-7%	0m	-0.33
Grand Canal pNHA (New Nangor Road, eastern side)	708098, 732129	5	5.86	20m	5.57	10m	-6%	0m	-0.29
Grand Canal pNHA (Ninth Lock Bridge, eastern side)	706773, 732174	5	5.26	10m	5.10	10m	-3%	0m	-0.16
Grand Canal pNHA (Ninth Lock Bridge, western side)	706763, 732172	5	4.19	0m	4.08	0m	-2%	0m	-0.11
Grand Canal pNHA (Oak Road, western side)	708566, 732235	5	3.13	0m	2.88	0m	-5%	0m	-0.24
Grand Canal pNHA (Oak Road, eastern side)	708576, 732237	5	3.54	0m	3.19	0m	-7%	0m	-0.35

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 kgN/ha/yr
Grand Canal pNHA (Parnell Road, western side)	714464, 732489	5	2.91	0m	2.96	0m	1%	10m	0.05
Grand Canal pNHA (Parnell Road, eastern side)	714169, 732549	5	2.63	0m	2.71	0m	2%	20m	0.09
Grand Canal pNHA (Sally's Bridge, western side)	714295, 732544	5	3.24	0m	3.29	0m	1%	10m	0.04
Grand Canal pNHA (Sally's Bridge, eastern side)	714305, 732541	5	3.57	0m	3.62	0m	1%	10m	0.05
Grand Canal pNHA (Woodford Walk)	707653, 732123	5	3.53	0m	3.47	0m	-1%	0m	-0.06

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 in terms of car and bus emissions, 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	365	106	3	3	23	434	0.2	0.3
DS		362	105	3	2	23	433	0.2	0.3
Change		-3	-1	-0.02	-0.02	-0.2	-0.5	-0.002	-0.005
% Change		-1%	-1%	-1%	-1%	-1%	-0.1%	-0.6%	-1%
DM	Goods	534	148	1	1	16	91	0.2	0.2
DS		546	151	1	1	16	93	0.2	0.2
Change		12	3	0.02	0.02	0.2	2	0.01	0.002
% Change		2%	2%	1%	1%	1%	3%	4%	1%

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	Urban Bus	7	0.7	0.1	0.1	0.3	2	0	0.002
DS		7	0.7	0.1	0.1	0.3	2	0	0.002
Change		-0.1	-0.01	-0.003	-0.003	-0.01	-0.1	0	-0.0001
% Change		-2%	-2%	-4%	-4%	-5%	-4%	0%	-5%
DM	**Total**	**906**	**254**	**4**	**4**	**39**	**527**	**0.4**	**0.5**
DS		**915**	**256**	**4**	**4**	**39**	**529**	**0.4**	**0.5**
Change		**9**	**2**	**-0.01**	**-0.01**	**0.0**	**1.8**	**0.01**	**-0.003**
% Change		**1%**	**1%**	**-0.2%**	**-0.2%**	**-0.1%**	**0.3%**	**1%**	**-1%**

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	142	41	1	1	11	170	0.1	0.2
DS		137	39	1	1	11	166	0.1	0.2
Change		-5	-1	-0.05	-0.04	-0.4	-5	-0.004	-0.006
% Change		-3%	-3%	-4%	-4%	-4%	-3%	-4%	-4%
DM	Goods	353	82	1	1	11	70	0.1	0.1
DS		347	81	1	1	11	69	0.1	0.1
Change		-6	-1	-0.02	-0.02	-0.2	-1	-0.003	-0.003
% Change		-2%	-2%	-2%	-2%	-2%	-2%	-3%	-2%
DM	Urban Bus	0	0	0.1	0.1	0	0	0	0
DS		0	0	0.1	0.1	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**	495	123	3	2	22	241	0.2	0.3
DS		485	120	3	2	22	235	0.2	0.3
Change		-10	-3	-0.07	-0.06	-0.6	-6	-0.006	-0.01
% Change		-2%	-2%	-3%	-3%	-3%	-3%	-3%	-3%

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

7.5.1.1 Construction Dust

In order to ensure that no significant dust nuisance occurs, a series of mitigation measures that are applicable to the Construction Phase of the Proposed Scheme will be implemented. In summary, the mitigation measures will include:

- Public roads outside the Proposed Scheme will be regularly inspected for soiling associated with the 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 boundaries where sensitive receptors are located, at a minimum, and at Construction Compounds, which will assist in minimising the potential for dust impacts off-site.

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

7.5.1.2 Construction Traffic

Construction vehicles, generators etc., may give rise to some NO_2 and PM_{10} / $PM_{2.5}$ emissions. Table 7.38 summarises the Construction Phase impacts prior 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 impacts. Due to worst-case scenario modelling where in reality the works will be short-term and temporary in nature, the impact on air quality will not be significant. Therefore, no specific construction phase mitigation measures for construction traffic are required.

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

Assessment Topic	Predicted 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 operation phase mitigation measures are required.

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

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

7.6 Residual Impacts

7.6.1 Construction Phase

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

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

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

7.6.2 Operational Phase

The air dispersion modelling assessment has found that the Proposed Scheme will be neutral overall in the study area. The number of receptors where an exceedance of the NO_2 limit value is predicted reduces from 24 in the Do Minimum scenario to 12 as a result of the Proposed Scheme. In 2043, all receptors are expected to have ambient air quality in compliance with the ambient air quality standards for the Do Something (and Do Minimum) scenario. There are no substantial or moderate adverse effects expected as a result of the Operational Phase of the Proposed Scheme.

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

7.7 References

CERC (2020). ADMS-Roads dispersion model (Version 5.1)

Codema (2017). Developing CO_2 Baselines – A Step-by-Step Guide for Your Local Authority

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

DCC (2011). Dublin Regional Air Quality Management Plan for Improvements in Levels of Nitrogen Dioxide in Ambient Air Quality

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

DEFRA (2019). UK DEFRA Emission Factor Toolkit (EFT) Version 10.1

DEFRA (2020), NO_X to NO_2 Calculator Version 8.1, available online from https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

DEFRA (2022a). Part IV of the Environment Act 1995: Local Air Quality Management Policy Guidance (PG22)

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

DEHLG (2004). Quarries and Ancillary Activities, Guidelines for Planning Authorities

DEHLG (2010). Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities

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

European Commission, (2013). Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment

European Commission, (2017). Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report

EMISIA (2020). COPERT 5.3.26 Software [Online] Available from https://www.emisia.com/utilities/copert/versions/

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

EPA (2020b) Air Quality in Ireland 2019

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

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

IAQM (2014). Guidance on the Assessment of Dust from Demolition and Construction

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

Jacobs Systra (2016). Modelling Services Framework – Regional Model Development – Appraisal Tools – Environment Module Development Note

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

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

TII (2011). Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes

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

UKHA (2011). Design Manual for Roads and Bridges – LA 114 Climate. Available from https://www.standardsforhighways.co.uk/prod/attachments/d1ec82f3-834b-4d5f-89c6-d7d7d299dce0?inline=true

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

UNECE (2003). Critical Loads for Nitrogen Expert Workshop 2002

UNECE (2010). 2010 Review and Revision of Empirical Critical Loads and Dose-Response Relationships

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

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

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

Directives and Legislation

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

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

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

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

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

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

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

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