5.11 Climate & Climate Change – Air Quality

5.11.1 Introduction

This Chapter of the EIAR has been prepared by AWN Consulting Limited (AWN) to assess the likely impacts associated with Air Quality and Climate during the demolition, construction and operational phases of the proposed development at Parnell Square North, Dublin 1. The proposed development will be a New City Library and Public Realm Works, provided in a combination of new building and renovated historic buildings.

This Chapter also outlines the methodology to be used to assess the Air Quality & Climate impacts of the proposed development.

5.11.2 Methodology

5.11.2.1 Ambient Air Quality Standards

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. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 5.11.1)

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate European Commission Directive 2008/50/EC which has set limit values for the pollutants SO2, NO2, PM10, benzene and CO (see Table 5.11.1). Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions were also made for the inclusion of new ambient limit values relating to PM2.5 (see Volume 2, Appendix 5.11.1).

Table 5.11.1: Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

Pollutant	Regulation Note 1	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 μg/m^3 NO_2
Nitrogen Dioxide	2008/50/EC	Annual limit for protection of human health	40 μg/m^3 NO_2
Nitrogen Dioxide	2008/50/EC	Annual limit for protection of vegetation	30 μg/m^3 NO + NO_2
Lead	2008/50/EC	Annual limit for protection of human health	0.5 μg/m^3
Sulphur dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	350 μg/m^3
Sulphur dioxide	2008/50/EC	Daily limit for protection of human health - not to be exceeded more than 3 times/year	125 μg/m^3
Sulphur dioxide	2008/50/EC	Annual & Winter limit for the protection of ecosystems	20 μg/m^3
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 μg/m^3 PM_{10}
Particulate Matter (as PM_{10})	2008/50/EC	Annual limit for protection of human health	40 μg/m^3 PM_{10}
$PM_{2.5}$	2008/50/EC	Annual limit for protection of human health	25 μg/m^3 $PM_{2.5}$
Benzene	2008/50/EC	Annual limit for protection of human health	5 μg/m^3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10 mg/m^3 (8.6 ppm)

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

5.11.2.2 Climate Agreements

The UNFCCC is continuing detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The most recent Conference of the Parties to the Convention (COP23) took place in Bonn, Germany from the 6th to the 17th of November 2017 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The "Paris Agreement", agreed by 200 nations, has a stated aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress has also been made on elevating adaption onto the same level as action to cut and curb emissions.

The EU, on the 23/24th of October 2014, agreed the "2030 Climate and Energy Policy Framework" (EU, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

5.11.2.3 Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. The initial objective of the Protocol was to control and reduce emissions of Sulphur Dioxide (SO2), Nitrogen Oxides (NOX), Volatile Organic Compounds (VOCs) and Ammonia (NH3). To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO2 (67% below 2001 levels), 65 kt for NOX (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH3 (6% reduction).

In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for PM2.5. In relation to Ireland, 2020 emission targets are 25 kt for SO2 (65% on 2005 levels), 65 kt for NOX (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH3 (1% reduction on 2005 levels) and 10 kt for PM2.5 (18% reduction on 2005 levels).

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD) (2014), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2007a; 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO2, VOCs and NH3 but failed to comply with the ceiling for NOX (EEA, 2012). Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016.

The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO2, NOX, NMVOC, NH3, PM2.5 and CH4. In relation to Ireland, 2020-29 emission targets are for SO2 (65% below 2005 levels), for NOX (49% reduction), for VOCs (25% reduction), for NH3 (1% reduction) and for PM2.5 (18% reduction). In relation to 2030, Ireland's emission targets are for SO2 (85% below 2005 levels), for NOX (69% reduction), for VOCs (32% reduction), for NH3 (5% reduction) and for PM2.5 (41% reduction).

5.11.2.4 Methodology – Local Air Quality Assessment

The air quality assessment was carried out following procedures described in the publications by the EPA (EPA 2002, 2003, 2015, 2017) and using the methodology outlined in the policy and technical guidance notes, LAQM.PG(16) and LAQM.TG(16), issued by UK Department for Environment, Food and Rural Affairs (UK DEFRA 2001, 2016a, 2016b; UK Department of the Environment, Transport and Roads 1998, UK Highways Agency 2007).

The assessment of air quality is carried out using a phased approach as recommended by the UK Department for Environment, Food and Rural Affairs (UK DEFRA 2016a). The phased approach recommends that the complexity of an air quality assessment be consistent with the risk of failing to achieve the air quality standards. In the current assessment, an initial scoping of key pollutants will be carried out at sensitive receptors. These sensitive receptors have the potential to have an impact on the concentration of key pollutants due to the proposed development. An examination of recent EPA and Local Authority data in Ireland (EPA 2018, 2017), has indicated that SO2 and smoke and CO are unlikely to be exceeded at locations such as the current one and thus these pollutants do not require detailed monitoring or assessment to be carried out. However, the analysis did indicate potential problems in regards to nitrogen dioxide (NO2) and PM10 at busy junctions in urban centres (EPA 2018, 2017). Benzene, although previously reported at quite high levels in urban centres (EPA 2018, 2017), has recently been measured at several city centre locations to be well below the EU limit value (EPA 2018, 2017). Historically, CO levels in urban areas were a cause for concern. However, CO concentrations have decreased significantly over the past number of years and are now measured to be well below the limits even in urban centres (EPA 2018, 2017). The key pollutants reviewed in the assessments are NO2, PM10, PM2.5, benzene and CO, with particular focus on NO2 and PM10.

Key pollutant concentrations will be predicted for nearby sensitive receptors for the following five scenarios:

- The Existing scenario (2018), for model verification;
- Opening Year Do-Nothing scenario (DN), which assumes the retention of present site usage with no development in place;
- Opening Year Do-Something scenario (DS), which assumes the proposed development in place;
- Design Year Do-Nothing scenario (DN), which assumes the no development in place; and
- Design Year of the Do-Something scenario(DS), which assumes the proposed development in place.

The assessment methodology involved air dispersion modelling using the UK DMRB Screening Model (UK Highways Agency 2007) (Version 1.03c, July 2007), the NOx to NO2 Conversion Spreadsheet (UK DEFRA, 2014) (Version 4.1), and following guidance issued by the TII (TII 2011), UK Highways Agency (UK Highways Agency 2007), UK DEFRA (UK DEFRA 2009a) and the EPA (EPA 2002, 2003, 2015, 2017).

TII guidance states 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).

The UK DMRB guidance (UK Highways Agency 2007), on which the TII guidance was based, states that road links meeting one or more of the following criteria can be defined as being ‘affected’ by a proposed development and should be included in the local air quality assessment:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HDV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or

- Peak hour speed changes by 20 km/h or more.

Concentrations of key pollutants are calculated at sensitive receptors which have the potential to be affected by the proposed development.

For road links which are deemed to be affected by the proposed development and within 200 m of the chosen sensitive receptors inputs to the air dispersion model consist of; road layouts, receptor locations, annual average daily traffic movements (AADT), percentage heavy goods vehicles, annual average traffic speeds and background concentrations. The UK DMRB guidance states that road links at a distance of greater than 200 m from a sensitive receptor will not influence pollutant concentrations at the receptor.

Using this input data the model predicts the road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB Volume 11 Section 3 Part 1 – HA 207/07 Annexes B3 and B4. These worst-case road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the Proposed Development with these ambient air quality standards.

The TII Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII 2011) detail a methodology for determining air quality impact significance criteria for road schemes. The degree of impact is determined based on both the absolute and relative impact of the Proposed Development.

The TII significance criteria have been adopted for the Proposed Development and are detailed in Table 5.11.2 to Table 5.11.4. The significance criteria are based on PM10 and NO2 as these pollutants are most likely to exceed the annual mean limit values (40 µg/m3). However, the criteria have are also applied to the predicted 8-hour CO, annual benzene and annual PM2.5 concentrations for the purposes of this assessment.

Table 5.11.2 Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

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

Source: Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes – Transport Infrastructure Ireland (2011)

Table 5.11.3 Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

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

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

Note 1 Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible

Source: Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes - Transport Infrastructure Ireland (2011)

Table 5.11.4: Air Quality Impact Significance Criteria

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

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

Note 1 Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible Source: Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes - Transport Infrastructure Ireland (2011)

5.11.2.5 Regional Impact Assessment (Including Climate)

The impact of the proposed development at a national / international level has been determined using the procedures given by Transport Infrastructure Ireland (TII) (TII 2011) and the methodology provided in Annex 2 in the UK DMRB (UK Highways Agency 2007). The assessment focused on determining the resulting change in emissions of volatile organic compounds (VOCs), nitrogen oxides (NOx) and carbon dioxide (CO2). The Annex provides a method for the prediction of the regional impact of emissions of these pollutants from road schemes. The inputs to the air dispersion model consist of information on road link lengths, AADT movements and annual average traffic speeds.

5.11.2.6 Conversion of NO_x to NO_2

NOx (NO + NO2) is emitted by vehicles exhausts. The majority of emissions are in the form of NO, however, with greater diesel vehicles and some regenerative particle traps on HGV's the proportion of NOx emitted as NO2, rather than NO is increasing. With the correct conditions (presence of sunlight and O3) emissions in the form of NO, have the potential to be converted to NO2.

Transport Infrastructure Ireland states the recommended method for the conversion of NOx to NO2 in "Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes" (TII, 2011). The TII guidelines recommend the use of DEFRAs NOx to NO2 calculator (UK DEFRA, 2014) which was originally published in 2009 and is currently on version 4.1. This calculator (which can be downloaded in the form of an excel spreadsheet) accounts for the predicted availability of O3 and proportion of NOx emitted as NO for each local authority across the UK. O3 is a regional pollutant and therefore concentrations do not vary in the same way as concentrations of NO2 or PM10.

The calculator includes Local Authorities in Northern Ireland and Transport Infrastructure Ireland guidance recommends the use of Craigavon as the choice for local authority when using the calculator. The choice of "Armagh, Banbridge and Craigavon" provides the most suitable relationship between NO2 and NOx for Ireland. The "All other Non-Urban UK Traffic" traffic mix option was used.

5.11.2.7 Ecological Sites

For routes which pass within 2 km of a designated area of conservation (either Irish or European designation) TII requires consultation with an Ecologist (TII 2011). However, in practice the potential for impact to an ecological site is highest within 200 m of the proposed development and when significant changes in AADT (>5%) occur.

TII's Guidelines for Assessment of Ecological Impacts of National Road Schemes (Rev. 2, Transport Infrastructure Ireland, 2009) and Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (Department of the Environment, Heritage and Local Government, 2010) provide details regarding the legal protection of designated conservation areas.

If the assessment criteria of, a designated area of conservation within 200 m of the proposed development and a significant change in AADT flows is met, an assessment of the potential for impact due to nitrogen deposition should be assessed.

Where the proposed development is predicted to adversely impact concentrations by 2 µg/m3 or more and causing overall concentrations to be within 10% of the 30 µg/m3 limit, then the sensitivity of the habitat to NOx should be assessed by the project Ecologist.

5.11.3 Receiving Environment (Baseline Situation)

5.11.3.1 Meteorological Data

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 PM10, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than PM2.5) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles (PM2.5 - PM10) will actually increase at higher wind speeds. Thus, measured levels of PM10 will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport, which is located approximately 8 km north east of the site. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 5.11.1) For data collated during five representative years (2012-2016), the predominant wind direction is south-westerly. The average wind speed over the period 1981 – 2010 is approximately 5.3 m/s.

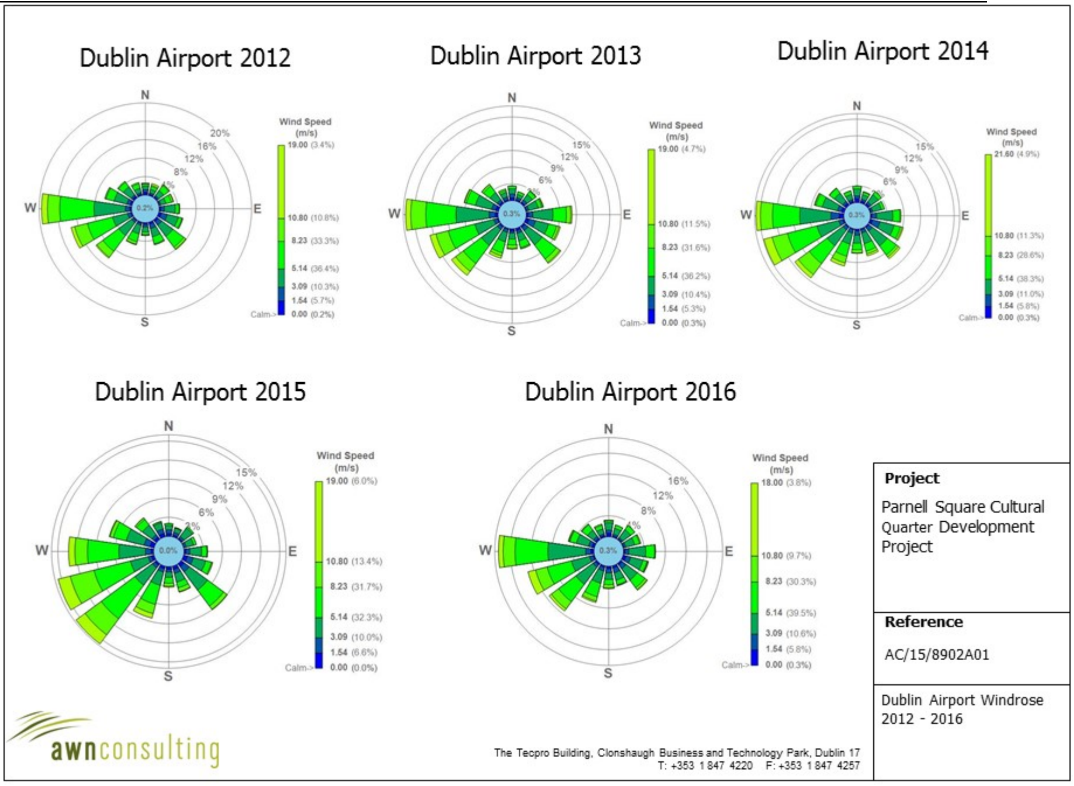

Figure 5.11.1: Dublin Airport Windroses 2012-2016

5.11.3.2 Trends in Air Quality

Air quality is variable and subject to both significant spatial and temporal variation. In relation to spatial variations in air quality, concentrations generally fall significantly with distance from major road sources (UK Highways Agency 2007). Thus, residential exposure is determined by the location of sensitive receptors relative to major roads sources in the area. Temporally, air quality can vary significantly by orders of magnitude due to changes in traffic volumes, meteorological conditions and wind direction.

In 2011 the UK DEFRA published research (UK DEFRA 2011) on the long term trends in NO2 and NOx for roadside monitoring sites in the UK. This study found a marked decrease in NO2 concentrations between 1996 and 2002, after which the concentrations stabilised with little reduction between 2004 and 2010. The result of this study is that there now exists a gap between projected NO2 concentrations which UK DEFRA previously published and monitored concentrations. The impact of this 'gap' is that the DMRB screening model can under-predict NO2 concentrations for predicted for future years. Subsequently, the UK Highways Agency (HA) published an Interim advice note (IAN 170/12) in order to correct the DMRB results for future years.

5.11.3.3 EPA Monitoring Data and Background Concentrations

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "Air Quality Monitoring Annual Report 2016" (EPA 2017), details the range and scope of monitoring undertaken throughout Ireland.

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA 2017). 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 and assessment, Parnell Square is within the Zone A Dublin region (EPA, 2018). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

With regard to NO2, continuous monitoring data from the EPA at urban locations in Rathmines, Coleraine Street, Dun Laoghaire and Winetavern Street show that current levels of NO2 are below both the annual and 1-hour limit values (see Table 5.11.1), with average long term annual mean concentrations ranging from 19 – 37 µg/m3 in 2016 with an average concentration of the two urban traffic sites of 32 µg/m3. The 2016 concentrations at Coleraine Street were significantly higher than the previous 5 years. Based on these results, an estimate of the background NO2 concentration in the region of Parnell Square in 2016 is 32 µg/m3. This is below the annual mean limit set for the protection of human health as discussed in Section 5.11.2.1.

Table 5.11.5: Trends In Dublin City Air Quality - Nitrogen Dioxide (NO_2)

Station	Station Classification Directive 96/62/EC	Averaging Period	Year						
			2010	2011	2012	2013	2014	2015	2016
Rathmines	Urban Traffic	Annual Mean NO_2 ($\mu g/m^3$)Note 1	25	20	21	19	17	18	20
	Distance From Road = 3 m	Max 1-hr NO_2 ($\mu g/m^3$)Notes 2,3	[139]	[118]	[138]	[107]	[165]	[112]	[102]
Coleraine Street	Urban Traffic	Annual Mean NO_2 ($\mu g/m^3$)	33	26	26	26	25	31	37

Station	Station Classification Directive 96/62/EC	Averaging Period	Year						
			2010	2011	2012	2013	2014	2015	2016
	Distance From Road = 3 m	Max 1-hr NO_2 (µg/m^3)	[168]	[167]	[142]	[118]	[127]	[107]	[104]
Dun Laoghaire	Urban Back-ground	Annual Mean NO_2 (µg/m^3)	23	18	18	16	15	16	19
		Max 1-hr NO_2 (µg/m^3)	[154]	[127]	[136]	[123]	[86]	[103]	[142]
Wood Quay / Winetavern Street	Urban Traffic	Annual Mean NO_2 (µg/m^3)	35	34	29	31	31	25	28
	Distance From Road = 7 m	Max 1-hr NO_2 (µg/m^3)	[186]	[176]	[18]	[181]	[136]	[127]	[114]

Note 1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Note 2 1-hour limit value - 200 µg/m^3 as a 99.8th%ile, i.e. not to be exceeded >18 times per year (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Continuous PM10 monitoring carried out in 2016 at the urban traffic locations of Rathmines, Wood Quay and Ringsend showed average long term annual mean concentrations of 11 – 15 µg/m3, with at most 3 exceedances (in Rathmines) of the 24-hour limit value of 50 µg/m3 (36 exceedances are permitted per year) (EPA, 2017). A conservative estimate of the background PM10 concentration in the region of Parnell Square in 2016 is 15 µg/m3. This is below the annual mean limit set for the protection of human health as discussed in Section 5.11.2.1.

Table 5.11.1 Trends In Trends In Dublin City Air Quality - PM_{10}

Station	Station Classifi-cation Directive 96/62/EC	Averaging Period	Year						
			2010	2011	2012	2013	2014	2015	2016
Rathmines	Urban Traffic Distance From Road = 3 m	Annual Mean (µg/m^3) Note 1	18	16	14	17	14	15	15
		24-hr Mean > 50 µg/m^3 Note 2 (days)	5	10	2	8	3	5	3
Wood Quay / Winetavern Street	Urban Traffic Distance From Road = 7 m	Annual Mean PM_{10} (µg/m^3)	19	14	13	14	14	14	14
		24-hr Mean > 50 µg/m^3 (days)	7	7	0	3	1	4	2
Phoenix Park	Suburban Back-ground Distance From Road = 250 m	Annual Mean PM_{10} (µg/m^3)	11	12	11	14	12	12	11
		24-hr Mean > 50 µg/m^3 (days)	1	3	0	3	0	2	0
Dun Laoghaire	Suburban Back-ground	Annual Mean PM_{10} (µg/m^3)	15	15	12	17	14	13	13
		24-hr Mean > 50 µg/m^3 (days)	5	11	1	5	2	3	0

Note 1 Annual average limit value - 40 µg/m3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Note 2 24-hour limit value - 50 µg/m3 as a 90.4th%ile, i.e. not to be exceeded >35 times per year (EU Council Directive 1999/30/EC & S.I. No. 180 of 2011).

Continuous PM2.5 monitoring carried out at the Zone A locations of Coleraine Street, Rathmines and Marino showed average levels of 7 – 10 µg/m3 respectively in 2016. The annual average level measured in Rathmines in 2016 was 10 µg/m3, with an average PM2.5/PM10 ratio of 0.75. Based on this information, a ratio of 0.675 was used to generate a background PM2.5 concentration in the region of Parnell Square in 2016 of 10 µg/m3. This is below the annual mean limit set for the protection of human health as discussed in Section 5.11.2.1.

In terms of benzene, the annual mean concentration in Rathmines for 2016 was 0.92 µg/m3. This is well below the limit value of 5 µg/m3 (EPA, 2017, 2018). 2012 to 2016 annual mean concentrations ranged from 0.92 – 1.2 µg/m3. Based on this EPA data, a conservative estimate of the background benzene concentration in Parnell Square in 2016 is 0.94 µg/m3. This is below the annual mean limit set for the protection of human health as discussed in Section 5.11.2.1.

5.11.4 Characteristics of the Proposed Development

The proposed development will involve 11,198 sq.m of cultural facilities, to be accommodated within a combination of new construction and renovated historic buildings at Parnell Square North together with associated public realm works. The Proposed Development is described in greater detail under Chapter 3: Description of the Proposed Development, of this EIAR.

When considering a development of this nature, the potential air quality and climate impact on the surroundings must be considered for each of two distinct stages:

A. Demolition and Construction phase, and;

B. Operational phase.

The construction phase will involve the construction of new buildings, which includes the demolition of some current buildings and the public realm works.

The primary sources of air and climatic emissions in the operational context are deemed long term and will involve the increased traffic flows or congestion in the local area which are associated with the development.

5.11.5 Potential Impacts of the Proposed Development

5.11.5.1 Air Quality – Potential Impact of the Demolition and Construction Phase

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. In addition to construction dust, there is the potential for asbestos impacts to occur.

The potential for impact is short term and negative however mitigation measures can easily be put in place to neutralise this impact – Climate - Potential Impact of the Construction Phase

There is the potential for a number of greenhouse gas emissions to the atmosphere during the construction phase of the development. Construction vehicles, generators etc., may give rise to CO2 and N2O emissions.

5.11.5.2 Air Quality – Potential Impact of the Operational Phase

It is envisaged that there will be increases in AADT of up to 60 vehicles on the links close to Parnell Square due to the propose development. Sensitive receptors in the vicinity of the proposed development include the Rotunda Hospital, residential apartments, the Hugh Lane Gallery and a number of commercial businesses. 97% of the predicted 3,000 visitors per day are predicted to be dependent upon sustainable transport (public transport, cycle or on foot). Daily large HGV deliveries are not anticipated. Planned deliveries to the library include daily book deliveries and regular service deliveries, as well as infrequent deliveries of larger items such as exhibitions, displays, musical instruments etc.

However, they are unlikely to change HGVs flows by 200 vehicles per day. As detailed in the DMRB guidance, a quantitate air quality assessment is required under the following circumstances:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HGVs flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

Therefore, using the DMRB screening criteria, no road links can be classed as 'affected' by the proposed development and do not require inclusion in the local air quality or climate assessment as the impact will be neutral in the long term.

5.11.5.3 Climate – potential Impact of the Operation phase

There is the potential for a number of emissions to the atmosphere during the operational phase of the development. In particular, vehicle related air emissions may generate quantities of air pollutants such as NO_2, CO, VOC and $PM_{10}/PM_{2.5}$, CO and VOCs. The pollutants of most concern are NO_2 and PM_{10}, as these pollutants are generated as a direct result of vehicles and have the greatest potential to exceed the air quality standards.

As per the Air Quality potential impact the DMRB screening criteria, no road links can be classed as 'affected' by the proposed development and do not require inclusion in the climate assessment. The impact of the proposed development on emissions of CO_2 is therefore not required to be assessed.

5.11.5.4 Do-Nothing Impact

This is the impact if the site remains as currently operating. Vehicle related air emissions may generate quantities of air pollutants such as NO_2, CO, VOC and $PM_{10}/PM_{2.5}$, CO and VOCs. These will vary from the base year due to improvement with engine efficiency and varying traffic volumes in the city.

5.11.6 Avoidance, Remedial or Reductive Measures

In order to sufficiently ameliorate the likely air quality impact, a schedule of air control measures has been formulated for both demolition and construction and operational phases associated with the proposed development.

5.11.6.1 Air Quality – Demolition and Construction Phase

The greatest potential impact on air quality during the demolition and construction phase is from construction dust emissions and the potential for nuisance dust. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a dust minimisation plan. These plans will be finalised once all construction details have been delivered. Provided the dust minimisation measures outlined in the plan (see Volume 2, Appendix 5.11.2) are adhered to, the air quality impacts during the construction phase will be not be significant. In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

- Dust monitoring via Bergerhoff gauges are recommended for use during the construction period. This is discussed further in section 5.11.8.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

5.11.6.2 Air Quality - Operational Phase

There are no proposed mitigation measures in relation to the air quality at Operational Phase.

5.11.6.3 Climate – Construction Phase

Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term and temporary nature of these works the impact on climate will not be significant.

5.11.6.4 Climate – Operational Phase

There are no proposed mitigation measures in relation to the air quality at Operational Phase.

5.11.7 Predicted Impact of the Proposed Development

5.11.7.1 Air Quality - Demolition and Construction Phase

Increased road traffic arising from the proposed development may lead to increased levels of dust. It is important to note that the predicted impacts associated with the demolition and construction phases of the proposed development are short term and temporary in nature. The Institute of Air Quality Management (IAQM) recently issued guidelines (IAQM, 2014) for assessing the impact of dust emissions from construction and demolition activities based on the scale & nature of the works and the sensitivity of the area to dust impacts. In terms of receptor sensitivity, the area is characterised as having medium sensitivity receptors within the area of the site. In terms of the prevailing wind, which is south – westerly, to the dominant land use downwind of the site is medium sensitivity environments (commercial property).

Construction dust has the potential to cause local impacts through dust nuisance at the nearest sensitive receptors. Construction activities such as excavation, earth moving and backfilling may generate quantities of dust, particularly in dry and windy weather conditions. While dust from construction activities tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. Vehicles transporting material to and from the site also have the potential to cause dust generation along the selected haul routes from the construction areas.

As shown in Table 5.11.7 below the risk from dust soiling at the nearest sensitive receptor (a highly sensitivity environment, distance < 20 m) is considered medium under this guidance. The high sensitivity receptors within 20 metres of the site boundary are Hugh Lane Gallery, adjoining residential units to the North (Sheridan Court) and to the west (Granby Row) and Rotunda House. As result, the sensitivity of the area to dust soiling effects on people and property is **high** according to IAQM guidance (IAQM, 2014).

Table 5.11.7: Sensitivity of the Area to Dust Soiling Effects on People and Property)

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

In addition, the IAQM guidelines also outline the assessment criteria for assessing the impact of PM_{10} emissions from construction activities based on the current annual mean PM_{10} concentration, receptor sensitivity and the number of receptors affected. The current PM_{10} concentration in Zone A locations as reported in Section 5.11.8 above is approximately 15 µg/m^3. As shown in Table 5.11.8 below the sensitivity of the area to human health from PM_{10} (medium sensitivity, distance <20 m and with receptor numbers between 10 - 100) is considered **low** under this guidance.

Table 5.11.8: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<200
High	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	**Low**	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	< 24 µg/m^3	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low

In order to determine the level of dust mitigation required during the proposed demolition and construction phases, 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 to reflect their different potential impacts. These are:

1. Demolition;
2. Earthworks;
3. Construction; and
4. Trackout.

Demolition

Dust emission magnitude from demolition can be classified as small, medium and large and are described below.

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

The dust emission magnitude for the proposed demolition activities can be classified as small as the total building volume for demolition is below 20,000 m^3. This results in an overall **medium** risk of **temporary** dust soiling impacts and an overall **Negligible** risk of **temporary** human health impacts as a result of the proposed demolition activities as outlined in Table 5.11.9. Overall, in order to ensure that no dust nuisance occurs during the demolition activities, a range of dust mitigation measures associated with a medium risk of dust impacts must be implemented. When the dust mitigation measures detailed in the mitigation section of this chapter are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

Table 5.11.9: Risk of Dust Impacts – Demolition

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

Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling the site and landscaping. Dust emission magnitude from earthworks can be classified as small, medium and large and are described 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 can be classified as medium. This results in an overall **medium** risk of **temporary** dust soiling impacts and an overall **low** risk of **temporary** human health impacts as a result of the proposed earthworks activities as outlined in Table 5.11.10. Overall, in order to ensure that no dust nuisance occurs during the earthworks activities, a range of dust mitigation measures associated with a **medium** risk of dust impacts must be implemented. When the dust mitigation measures detailed in the mitigation section of this chapter are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

Table 5.11.10: 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

Construction

Dust emission magnitude from construction can be classified as small, medium and large and are described 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. This results in an overall **medium** risk of **temporary** dust soiling impacts and an overall **low** risk of **temporary** human health impacts as a result of the proposed construction activities as outlined in Table 5.11.12. Overall, in order to ensure that no dust nuisance occurs during the construction activities, a range of dust mitigation measures associated with a **medium** risk of dust impacts must be implemented. When the dust mitigation measures detailed in the mitigation section of this chapter are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

Table 5.11.12: 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

Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers, geology and duration. Dust emission magnitude from trackout can be classified as small, medium and large and are described 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 location of the proposed development means that there will be no unpaved road greater than 50m. This results in the dust emission magnitude from trackout activities to be classified as medium. This results in an overall **low** risk of **temporary** dust soiling impacts and an overall **negligible** risk of **temporary** human health impacts as a result of the proposed trackout activities as outlined in Table 5.11.13. 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 site will be short term, insignificant and pose no nuisance at nearby receptors.

Table 5.11.13: 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

The risk of dust impacts as a result of the proposed development are summarised below in Table 5.11.14.

Table 5.11.14: Summary of Dust Risk to Define Site-Specific Mitigation

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

An asbestos report published in February 2017 by About Safety Ltd. found significant amounts of asbestos containing materials in areas which will be demolished as part of the development. A Refurbishment and Demolition Survey of these buildings will be required prior to commencing of the demolition phase. This is a fully intrusive asbestos containing materials survey which will involve destructive inspection. Prior to commencement of the demolition works, all asbestos containing materials identified by the Management Asbestos Survey and Refurbishment and Demolition Survey will be removed by a suitably trained and competent person.

Chapter 14: Waste Management, of this EIAR sets out in detail how the management of waste material will be conducted during construction phase of the proposed development.

Asbestos containing materials will only be removed from site by a suitably permitted/licenced waste contractor and will be brought to a suitably licenced facility. The Health and Safety Authority should be contacted in relation to the handling of asbestos and material should be dealt with in accordance with the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006, as amended and associated approved Codes of Practice.

5.11.7.2 Climate – Construction and Demolition Phase

There is the potential for a number of greenhouse gas emissions to the atmosphere during the demolition and construction phases of the development. Greenhouse gas emitting sources such as construction vehicles, generators etc., have been considered and these may give rise to CO_2 and NO_2 emissions.

However, due to the nature and extent of activities i.e. demolition and construction CO_2 and NO_2 emissions will have a negligible impact on climate.

5.11.7.3 Air Quality - Operational Phase

It is envisaged that there will be increases in AADT of up to 60 vehicles on the links close to Parnell Square due to the propose development. Sensitive receptors in the vicinity of the proposed development include the Rotunda Hospital, residential apartments, the Hugh Lane Gallery and a number of commercial businesses. 97% of the predicted 3,000 visitors per day are predicted to be dependent upon sustainable transport (public transport, cycle or on foot). Daily large HGV deliveries are not anticipated. Planned deliveries to the library include daily book deliveries and regular service deliveries, as well as infrequent deliveries of larger items such as exhibitions, displays, musical instruments etc. However, they are unlikely to change HGVs flows by 200 vehicles per day. As detailed in the DMRB guidance, a quantitate air quality assessment is required under the following circumstances:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HGVs flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

Therefore, using the DMRB screening criteria, no road links can be classed as ‘affected’ by the proposed development and do not require inclusion in the local air quality or climate assessment.

5.11.7.4 Climate - Operational Phase

There is the potential for a number of greenhouse gas emissions to atmosphere during the operational phase of the development. Road traffic and space heating of buildings may give rise to CO_2 and N_2O emissions. There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 emissions. Due to the nature of this development the impact on climate from the operational phase is predicted to the negligible. The increase in traffic was scoped out for air quality and climate in accordance with the UK DMRB guidance.

With respect to climate change impacts on the proposed development, the greatest impact is predicted to be due to flooding. This assessment found that the potential for flooding impacts on the proposed development has been reviewed in a Flood Risk Assessment by Arup. The risk of tidal and groundwater flooding to the site is therefore remote including for Climate Change. The FRA also notes that the risk of fluvial flooding from the Bradoge River in a climate change scenario will be remote.

5.11.8 Monitoring

5.11.8.1 Demolition and Construction Phase

The site is within close proximity of a number of sensitive receptors, therefore it is recommended that dust monitoring (Bergerhoff Method) should be conducted during the demolition and construction phase as this will ensure the efficiency of the dust mitigation measures and will also highlight when more measures may need to be implemented.

Dust emissions resulting from site activities can potentially have a substantial temporary impact on local air quality. Dust emissions from this particular site would mainly be associated with demolition, earth excavation, loading/unloading of material and HGV traffic entering and leaving the site. Dust emissions often vary from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. Emissions from any single site can be expected to have a definable beginning and an end, and also to vary substantially due to varying site activity. Meteorological conditions significantly affect the level of dust emissions and subsequent deposition downwind of the source.

5.11.8.2 Dust Deposition Monitoring

Sampling is proposed to be carried out using a number of Bergerhoff Gauges in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level.

Analysis of the samples will be conducted by Environmental Laboratory Services Ltd., Blackrock, Co. Cork, based on the German Standard VDI 2119. The collecting vessel contains dustfall and liquid following sampling. The liquid is evaporated in a drying chamber and the dustfall residue weighed using a calibrated balance. The daily dust deposition rate is then calculated using information on the dustfall mass, the sampling period and the area of the collecting surface.

5.11.8.3 Operational Phase

No operational monitoring is required.

5.11.9 Difficulties Encountered

There were no significant difficulties encountered in the completion of this chapter.

5.11.10 Consultations

Consultation of EPA guidelines and databases and the National Parks and Wildlife Services mapping databases have been conducted as part of this assessment.

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