Chapter 13
Air Quality and Climate

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Chapter 13 Air Quality and Climate

13.1 Introduction

AWN Consulting were requested to assess the impacts on air quality and climate associated with both the construction and operational phases of the proposed River Suir Sustainable Transportation Bridge. The legislative air quality background of relevance to the proposed development is summarized below.

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13.1.1 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 13.1 and Appendix 13.1 Ambient Air Quality Standards).

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 SO_2, NO_2, PM_{10}, benzene and CO (see Tables 13.1 - 13.2). *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 particulate matter ($PM_{2.5}$) (see Appendix 13.1).

13.1.2 Climate Agreements

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994 and the Kyoto Protocol in 1997 (Framework Convention on Climate Change, 1999 and Framework Convention on Climate Change, 1997). For the purposes of the EU burden sharing agreement under Article 4 of the Kyoto Protocol, Ireland agreed to limit the net anthropogenic growth of the six greenhouse gases (GHGs) under the Kyoto Protocol to 13% above the 1990 level over the period 2008 to 2012 (ERM, 1998). 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 (COP23) to the agreement was convened in Bonn, Germany in November 2017. The conference in Paris in 2015, COP21, was an important milestone in terms of international climate change agreements. The "Paris Agreement", agreed by over 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 was also made on elevating adaption onto the same level as action to cut and curb emissions.

Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made on elevating adaption onto the same level as action to cut and curb emissions. The EU Effort Sharing Decision 406/2009/EC on GHG emissions requires Ireland to achieve a 20% reduction, relative to 2005 levels, by 2020 in GHG emissions for sectors of the economy not covered by the EU Emissions Trading Directive (i.e. non-Emissions Trading Scheme (ETS) GHG emissions). This is known as the EU 2020 Strategy.

2013 was the first year where the European Union's Effort Sharing Decision "EU 2020 Strategy" (Decision 406/2009/EC) was assessed. Ireland had non-ETS sectors emissions of 42.122 Mt CO_2 e.g. in 2013 when emissions covered by the EU's emissions trading scheme for stationary and aviation operators were removed.

The EU, on the 23rd/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.

13.1.3 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 (SO_2), Nitrogen Oxides (NO_X), Volatile Organic Compounds (VOCs) and Ammonia (NH_3). To achieve the initial targets, Ireland was obliged to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction) by 2010. 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 $PM_{2.5}$. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels).

European Commission Directive 2001/81/EC on National Emission Ceilings for certain atmospheric pollutants 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, 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_X (European Environment Agency (EEA), 2011). COM (Communication from the Commission) (2013) 920 Final is the "Proposal for a Directive on the reduction of national emissions of certain atmospheric pollutants and amending

Directive 2003/35/EC". The proposal will apply the 2010 National Emissions Ceiling Directive (NECD) limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, Non-Methane Volatile Organic Compounds (NMVOC), NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020-29 emission targets are for SO_2 (65% below 2005 levels), for NO_X (49% reduction), for VOCs (25% reduction), for NH_3 (1% reduction) and for $PM_{2.5}$ (18% reduction). In relation to 2030, Ireland's emission targets are for SO_2 (83% below 2005 levels), for NO_X (75% reduction), for VOCs (32% reduction), for NH_3 (7% reduction), for $PM_{2.5}$ (35% reduction) and for CH_4 (7% reduction).

Table 13.1 EU Air Quality Standards (based on *European Commission Directive 2008/50/EC and S.I. 180 of 2011)*

Pollutant	Regulation Note1	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
		Annual limit for protection of human health	40 µg/m^3 NO_2
		Annual Critical level for protection of vegetation	30 µg/m^3 NO + NO_2
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}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
$PM_{2.5}$ (Stage 1)	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

13.2 Methodology

13.2.1 Local Air Quality Assessment

The air quality assessment was carried out following procedures described in the publications by the Environmental Protection Agency (EPA) (EPA 2002, 2003 and 2017) and using the methodology outlined in the policy and technical guidance notes, Local Air Quality Management Policy Guidance LAQM.PG(16) and Technical Guidance 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 2016, 2017) has indicated that SO_2 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 (NO_2) and PM_{10} at busy junctions in urban centres (EPA 2016, 2017). Benzene, although previously reported at quite high levels in urban centres (EPA 2016, 2015), has recently been measured at several city centre locations to be well below the EU limit value (EPA 2016, 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 2016, 2017). The key pollutants reviewed in the assessments are NO_2, PM_{10}, $PM_{2.5,}$ benzene and CO, with particular focus on NO_2 and PM_{10}.

Key pollutant concentrations are assessed for nearby sensitive receptors for the following scenarios:

- The Existing scenario (2017);
- Opening Year Do-Nothing scenario (DN), which assumes the retention of present site usage with no development in place (2019); and
- Opening Year Do-Something scenario (DS), which assumes the proposed development in place (2019).

The assessment methodology involved air dispersion modelling using the UK Design Manual for Roads and Bridges Screening Model (UK Highways Agency 2007) (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (UK Department for Environment, Food and Rural Affairs, 2014) (Version 5.1), and following guidance issued by Transport Infrastructure Ireland (TII 2011), UK Highways Agency (UK Highways Agency 2007), UK Department for Environment, Food and Rural Affairs (UK DEFRA 2016a) and the EPA (EPA 2002, 2003, 2017).

Transport Infrastructure Ireland 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 Design Manual for Roads and Bridges guidance (UK Highways Agency 2007), on which Transport Infrastructure Ireland 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 annual average daily traffic (AADT) or more;
- Heavy Goods Vehicles (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.

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 200m of the chosen sensitive receptors, inputs to the air dispersion model consist of; road layouts, receptor locations, AADT, percentage heavy goods vehicles, annual average traffic speeds and background concentrations. The UK Design Manual for Roads and

Bridges guidance states that road links at a distance of greater than 200m 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 Design Manual for Roads and Bridges model uses conservative emission factors, the formulae for which are outlined in the Design Manual for Roads and Bridges 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 predicted 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. Transport Infrastructure Ireland 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 Scheme. Transport Infrastructure Ireland significance criteria have been adopted for the proposed development and are detailed in Tables 13.2 to 13.4. The significance criteria are based on PM_{10} and NO_2 as these pollutants are most likely to exceed the annual mean limit values (40 µg/m^3). However, the criteria have also been applied to the predicted 8-hour CO, annual benzene and annual $PM_{2.5}$ concentrations for the purpose of this assessment.

Table 13.2 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 13.3 Air Quality Impact Significance Criteria

Absolute Concentration in Relation to Objective / Limit Value	Change in Concentration		
	Small	Medium	Large
Increase with Road Development			
Above Objective/Limit Value With Road Development (≥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 Road Development (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 Road Development (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

Absolute Concentration in Relation to Objective / Limit Value	Change in Concentration		
	Small	Medium	Large
Well Below Objective/Limit Value With Road Development (<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 Road Development			
Above Objective/Limit Value With Road Development (≥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 Road Development (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 Road Development (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 Road Development (<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 13.4 Air Quality Impact Significance Criteria For Changes to Number of Days with PM_{10} Concentration Greater than 50 µg/m^3 at a Receptor

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

13.2.2 Ecological Sites

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

Transport Infrastructure Ireland'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 200m of the proposed development and a significant change in AADT flows are met, an assessment of the potential for impact due to nitrogen deposition should be assessed. The proposed development has the Lower River Suir Special Area of Conservation (SAC) designated site within its boundary. As this SAC is less than 200m from the site, an assessment is required if there is a traffic impact at the site.

13.3 Description of Existing Conditions

13.3.1 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 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 ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

Johnstown Castle Meteorological Station in Co. Wexford is the most representative meteorological data location for the proposed River Suir Sustainable Transport Bridge. This meteorological station replaced the nearby Rosslare Meteorological Station in 2008 and has reported an average wind speed of 4.3 m/s with a south westerly prevailing wind. Historical data from Rosslare Meteorological Station indicates the prevailing wind speed and direction over the period 1978-2007 is south westerly in direction, with generally moderate wind speeds, averaging 5.7 m/s.

13.3.2 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 road 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 NO_2 and NO_x for roadside monitoring sites in the UK. This study marked a decrease in NO_2 concentrations between 1996 and 2002, after which the concentrations stabilised with little reduction between 2004 and 2010. The result of this is that there now exists a gap between projected NO_2 concentrations which UK DEFRA previously published and monitored concentrations. The impact of this 'gap' is that the DMRB screening model can under-predict NO_2 concentrations for predicted 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. There is a lack of similar modelling in Ireland, however in order to ensure conservative modelling, IAN 170/12 is also applied to the predictions for future years.

13.3.3 Baseline Air Quality

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 2018). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise. 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, the region of the proposed development is categorised as Zone C (EPA 2017).

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 NO_2, continuous monitoring data from the EPA in the Zone C monitoring stations of Kilkenny Seville Lodge and Portlaoise show that current levels of NO_2 are below both the annual and 1-hour limit values (see Table 13.5) with average long term annual mean concentrations ranging from 7 to 11 µg/m^3 in 2016. Based on these results, a conservative estimate of the background NO_2 concentration in the region of the River Suir Sustainable Transport Bridge development in 2018 is 11 µg/m^3.

Table 13.5: Annual Mean NO_2 Concentrations in Zone C Locations (2012-2016) (µg/m^3)

Station	Averaging Period	Year				
		2012	2013	2014	2015	2016
Kilkenny Seville Lodge	Annual Mean NO_2 (µg/m^3)	4	4	5	5	7
	Max 1-hr NO_2 (µg/m^3)	62	90	57	70	43
Portlaoise	Annual Mean NO_2 (µg/m^3)	-	-	16	10	11
	Max 1-hr NO_2 (µg/m^3)	-	-	74	84	36

In terms of CO, the average annual mean concentration in the Zone C locations of Portlaoise, Mullingar and Balbriggan for 2012 to 2016 was 0.43 mg/m^3. This is well below the limit value of 10 mg/m^3 (EPA 2016). 2014 to 2016 annual mean concentrations ranged from 0.4 – 0.5 mg/m^3. Based on this EPA data, a conservative estimate of the background carbon monoxide concentration in Waterford in 2018 is 0.43 mg/m^3.

In terms of benzene, the average annual mean concentration in the Zone C locations of Mullingar and Kilkenny for 2012 to 2016 was 0.28 µg/m^3. This is well below the limit value of 5 µg/m^3 (EPA 2016). 2013 to 2016 annual mean concentrations ranged from 0.09 – 0.5 µg/m^3. Based on this EPA data, a conservative estimate of the background benzene concentration in Waterford in 2018 is 0.7 µg/m^3.

Continuous PM_{10} monitoring carried out at the Zone C locations of Galway, Portlaoise and Ennis showed average long term annual mean concentrations of 11 – 21 µg/m^3, with at most 12 exceedances (in 2016 at Ennis) of the 24-hour limit value of 50 µg/m^3 (35 exceedances are permitted per year) (EPA 2016) (Table 13.6). Based on these results, a conservative estimate of the background PM_{10} concentration in the region of the River Suir Sustainable Transport Bridge development in 2018 is 17 µg/m^3.

Table 13.6: nnual Mean PM_{10} Concentrations in Zone C Locations (2012-2016) (µg/m^3)

Station	Averaging Period	Year				
		2012	2013	2014	2015	2016
Galway	Annual Mean (µg/m^3)	16	21	15	15	15
	24-hr Mean > 50 µg/m^3 (days)	1	11	0	2	3
Portlaoise	Annual Mean (µg/m^3)	-	-	12	12	17
	24-hr Mean > 50 µg/m^3 (days)	-	-	2	1	1
Ennis	Annual Mean (µg/m^3)	19	20	21	18	12
	24-hr Mean > 50 µg/m^3 (days)	8	8	8	10	12

Continuous $PM_{2.5}$ monitoring carried out at the Zone C location of Ennis, showed average levels of 7 - 16 µg/m^3 between 2012 and 2016. The annual average level measured in Ennis in 2016 was 8 µg/m^3, with an average $PM_{2.5}/PM_{10}$ ratio of 0.7. Based on this information, a ratio of 0.7 was used to generate a background $PM_{2.5}$ concentration in Waterford in 2018 of 12 µg/m^3.

13.4 Characteristics of the Proposed Development

The proposed development spans from Meagher's Quay on the South of the River Suir to the North Quays on the North of the river. The bridge is restricted to pedestrians, cyclists and an electric shuttle bus service. Therefore, there is no predicted impact, adverse or beneficial on traffic. Therefore, in accordance with the guidelines set out by TII and DMRB guidelines, no traffic assessment is required.

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:

- Construction Phase; and
- Operational Phase

The primary sources of impacts from the proposed development occur in the construction phase of the project. These impacts are deemed to be due to construction related dust generation. As operational phase road traffic related to the project is expected to be an imperceptible source of emissions, the operational phase of the development is not predicted to generate significant impacts. Road traffic is also not expected to be a dominant source of greenhouse gas emissions resulting from the operational phase of the proposed development.

13.5 Predicted Impacts of the Proposed Development

13.5.1 Construction Phase: Air Quality

It is important to note that the predicted impacts associated with the construction phases of the proposed development are short term and temporary in nature. The Institute of Air Quality Management (IAQM) guidelines (IAQM 2014) for assessing the impact of dust emissions from construction and demolition activities were consulted based on the scale and nature of the works and the sensitivity of the area to dust impacts. In terms of receptor sensitivity, the area is characterised as having mostly medium sensitivity receptors with a small number of high sensitivity receptors within the area of the site. In terms of the south-westerly prevailing wind, the area downwind of the site is a high sensitivity environment (residential properties on Dock Road). However, as these receptors are situated up a hill from the proposed site, the potential impact is reduced.

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 13.7 below, the risk from dust soiling at the nearest sensitive receptor (a high sensitivity environment, distance < 50m) is considered medium under this guidance. The medium sensitivity receptors less than 50 metres from the site boundary are the numerous commercial buildings on the South Quay. As a result, the sensitivity of the area to dust soiling effects on people and property is **low** according to IAQM guidance (IAQM 2014).

Table 13.7 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 C locations as reported in Section 13.3.3 above is approximately 17 µg/m^3. As shown in Table 13.8 the worst-case sensitivity of the area to human health from PM_{10} (medium sensitivity, distance <50 m and with receptor numbers between 10 - 100) is considered **low** under this guidance.

Table 13.8: 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	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low

Construction dust has the potential to cause local impacts at ecologically sensitive areas. The proposed development is immediately adjacent to and within the River Suir SAC and therefore is a **high** sensitivity area. Dust can cause chemical changes to watercourses which may lead to the loss of plant or animal life due to a variety of reasons including changes in acidity. A project ecologist should assess the area for any additional risks.

Table 13.9: Sensitivity of the Area to Ecological Impacts

Sensitivity of Area	Distance from the 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 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:

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

Demolition

There is no significant demolition associated with the proposed development with just removal of a section of the flood defence and marina and minor ground works at the South Quays. Therefore, there is no material demolition impact.

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 > 8m 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 – 8m 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 < 4m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

Due to the urban nature of the project, the site area is limited. The dust emission magnitude for the proposed earthwork activities can be classified as small. This results in an overall **negligible** risk of **temporary** dust soiling impacts, **low** risk of ecological impact and an overall **negligible** risk of **temporary** human health impacts as a result of the proposed earthworks activities as outlined in Table 13.10. Overall, in order to ensure that no dust nuisance occurs during the earthworks 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 be insignificant and pose no nuisance at nearby receptors.

Table 13.10 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 > 100,000m^3, on-site concrete batching, sandblasting;
- Medium: Total building volume 25,000m^3 – 100,000m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching; and
- Small: Total building volume < 25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The dust emission magnitude for the proposed construction activities can be classified as small. This results in an overall **negligible** risk of **temporary** dust soiling impacts, **negligible** risk of ecological impact and an overall **low** risk of **temporary** human health impacts as a result of the proposed construction activities as outlined in Table 13.11. Overall, in order to ensure that no dust nuisance occurs during the construction activities, a range of dust mitigation measures associated

with a **low** risk of dust impacts must be implemented. When the dust mitigation measures detailed in the mitigation section of this chapter are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

Table 13.11 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

The assessment of trackout accounts for the risk of dust being emitted as a result of dirt, mud or other debris from construction traffic, as they emerge from construction sites onto public roads. 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 Heavy-Duty Vehicle (HDV) (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100m;
- 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 - 100m; and
- Small: < 10 HDV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50m.

There is the potential that there will be unpaved road greater than 50m in length on the North Quays construction area. This area will also have between 10-50 HDVs movements per day. There will be no unpaved roads greater than 50m on the South Quays as site traffic will access the site compound directly off Meaghers Quay. 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, **low** risk of ecological impact and an overall **low** risk of **temporary** human health impacts as a result of the proposed trackout activities as outlined in Table 13.12. 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 insignificant and pose no nuisance at nearby receptors.

Table 13.12 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 in Table 13.13.

Table 13.13 Summary of Dust Risk to Define Site-Specific Mitigation

Potential Impact	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Negligible Risk	Negligible Risk	Low Risk
Human Health	N/A	Negligible Risk	Negligible Risk	Low Risk
Ecological	N/A	Low Risk	Low Risk	Low Risk

13.5.2 Construction Phase: Climate

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 of activities i.e. construction, CO_2 and NO_2 emissions will have a negligible impact on climate.

13.5.3 Operational Phase: Air Quality

The nature of the development is such that there is no predicted impact on traffic, beneficial or adverse. It is envisaged that there will be no change in AADT due to the proposed development. 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 assessment.

13.5.4 Operational Phase: Climate

The nature of the development is such that there is no predicted impact on traffic, beneficial or adverse. It is envisaged that there will be no change in AADT due to the proposed development. Therefore, using the DMRB screening criteria listed above in Section 13.5.3, no road links can be classed as 'affected' by the proposed development and do not require inclusion in the regional climate assessment.

13.5.4.1 Do Nothing Impact

In the do nothing scenario there will be no construction or operational phase impacts. Ambient air quality concentrations are predicted to improve in future years, with a 3% decrease in background NO_2 concentrations predicted between 2017 and 2019. Reductions in PM_{10} and $PM_{2.5}$ are predicted to be less significant.

It is predicted that concentrations in the vicinity of the development will be less than 22% of the NO_2 annual mean limit value. Concentrations of PM_{10} and $PM_{2.5}$ are predicted to be 59% and 49% of the annual mean limits respectively. Benzene and

carbon monoxide are predicted to be less than 10% and 6% of their respective limit values in 2017.

13.5.5 Air Quality Impacts on Sensitive Ecosystems

The EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats Directive") requires an Appropriate Assessment to be carried out where there is likely to be a significant impact upon a European protected site. Such sites include Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Community Interest (SCI), National Parks, Nature Reserves, Refuges for Fauna, Refuges for Flora, Wildfowl Sanctuaries, Ramsar Sites, Biogenetic Reserves and UNESCO Biosphere Reserves.

The TII guidelines state that as the potential impact of a development is limited to a local level, detailed consideration need only be given to roads where there is a significant change to traffic flows (>5%) and the designated site lies within 200m of the road centre line. While the River Suir SAC is within 200 m of the proposed development, there is no significant change in traffic flows, therefore, no further assessment is required for this development in terms of air quality.

13.6 Mitigation Measures

13.6.1 Construction Phase: Air Quality

A dust minimisation plan has been formulated for the construction phase of the project as construction activities are likely to generate some dust emissions. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a dust minimisation plan, see Appendix 13.2. Provided the dust minimisation measures outlined in the plan are adhered to, the air quality impacts during the construction phase will be not be significant. Activities such as earthworks and the removal of hardstanding should be considered sensitive activities with respect to dust generation. 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;
- 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 such as rock blasting or earthworks are necessary during dry or windy periods;
- Before entrance onto public roads, trucks will be adequately inspected to ensure there is no potential for dust emissions and will be cleaned as necessary; and
- The contractor will be required to erect opaque hoarding of a minimum 2.0 metres in height around the site compound and works area on the South Quays. The hoarding shall be a high gloss printed finish with information and graphics about the project or as agreed with Waterford City and County Council. The precise hoarding type shall be agreed with Waterford City and County Council prior to works commencing.

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 will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

When these dust minimisation measures and the dust minimisation plan are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

13.6.2 Construction Phase: Climate

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

13.6.3 Operational Phase: Air Quality

There is no significant impact predicted during the operational phase with respect to air quality. Therefore, no site-specific mitigation measures in relation to air quality are required during the operational phase of the proposed development. It is predicted that none will be required.

13.6.4 Operational Phase: Climate

The impact of the proposed development on climate will be imperceptible. Thus, no site-specific mitigation measures are required.

13.7 Conclusions

The Institute of Air Quality Management (IAQM) guidelines (IAQM 2014) for assessing the impact of dust emissions from construction and demolition activities based on the scale and nature of the works and the sensitivity of the area to dust impacts have been used in this assessment. In terms of receptor sensitivity, the area is characterised as having mostly medium sensitivity receptors with a small number of high sensitivity receptors within the area of the site. In terms of the south-westerly prevailing wind, the area downwind of the site is a high sensitivity environment (residential properties on Dock Road). However, as these receptors are situated up a hill from the proposed site the potential impact is reduced. The results of the construction phase air quality and climate assessment have shown that, with appropriate mitigation measures in place, residual impacts of the proposed development on air quality and climate for the long- and short-term result in negligible impacts.

The nature of the development is such that there is no significant predicted impact on traffic during the operational phase, beneficial or adverse. The bridge is restricted to pedestrians, cyclists and an electric shuttle bus service. Therefore, there is no predicted impact, adverse or beneficial on traffic. Therefore, in accordance with the guidelines set out by TII and DMRB guidelines, no traffic assessment is required as the impact on AADT due to the development is deemed to be imperceptible.

Therefore, the overall results of the air quality and climate assessment have shown that, with appropriate mitigation measures in place, short and long term residual air quality and climate impacts of the proposed development will be negligible.

13.8 References

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Appendix 13.1
Ambient Air Quality Standards

ROD
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& Contae Phort Láirge
Waterford City
& County Council

Ambient Air Quality Standards

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time. In response to the problem of acid rain, sulphur dioxide, and later nitrogen dioxide were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent years the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, was passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002), and has set limit values which came into operation on 17th June 2002. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date. The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM_{10}, 40% for the hourly and annual limit value for NO_2 and 26% for hourly SO_2 limit values. The margin of tolerance commenced from June 2002, and started to reduce from 1 January 2003 and does so every 12 months by equal annual percentages to reach 0% by the attainment date. A second daughter directive, EU Council Directive 2000/69/EC, details limit values for both carbon monoxide and benzene in ambient air. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. This has also been passed into Irish Law under the Air Quality Standards Regulations 2011 (S.I. 180 of 2011). Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$. In regards to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition, new ambient standards for $PM_{2.5}$ are included in Directive 2008/50/EC. The approach for $PM_{2.5}$ is to establish a target value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2010) and a limit value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2018), coupled with a target to reduce human exposure generally to $PM_{2.5}$ between 2010 and 2020. This exposure reduction target will range from 0% (for $PM_{2.5}$ concentrations of less than 8.5 $\mu g/m^3$ to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 $\mu g/m^3$. Where the AEI is currently greater than 22 $\mu g/m^3$ all appropriate measures should be employed to reduce this level to 18 $\mu g/m^3$ by 2020. The AEI is based on measurements taken in urban background locations averaged over a three year period from 2008-2010 and again from 2018-2020. Additionally, an exposure concentration obligation of 20 $\mu g/m^3$ has been set to be complied with by 2018, again based on the AEI.
Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert

Threshold is defined in Council Directive 2008/50/EC as "a level beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken as laid down in Directive 2008/50/EC". These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television and the press).

The Margin of Tolerance is defined in Council Directive 2008/50/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 2008/50/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

An annual average limit for both NO_x (NO and NO_2) is applicable for the protection of vegetation in highly rural areas away from major sources of NO_x such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex III of EU Directive 2008/50/EC identifies that monitoring to demonstrate compliance with the NO_X limit for the protection of vegetation should be carried out distances greater than:

- 5 km from the nearest motorway or dual carriageway
- 5 km from the nearest major industrial installation
- 20 km from a major urban conurbation

As a guideline, a monitoring station should be indicative of approximately 1000 km^2 of surrounding area.

Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 21 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other things, population and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation. The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

Appendix 13.2
Dust Minimisation Plan

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Waterford City
& County Council

Dust Minimisation Plan

A Dust Minimisation Plan will be formulated for the construction phase of the project, as construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with meteorological factors, including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within 200m of the construction area.

In order to ensure mitigation of the effects of dust nuisance, a series of measures will be implemented. Site roads shall be regularly cleaned and maintained as appropriate, dry sweeping of large areas should be avoided. Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only. Given the nature of the development, it is unlikely any un-surfaced roads will be present. 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. All site fencing, barriers and scaffold should be kept clean using wet methods.

It is not expected that there will be any demolition activities associated with the construction phase. However, should demolition occur, explosive blasting should be avoided and water suppression should be used, preferably with a hand held spray. Only the use of cutting, grinding or sawing equipment fitted or used in conjunction with a suitable dust suppression technique such as water sprays/local extraction should be used. Drop heights from conveyors, loading shovels, hoppers and other loading equipment should be minimized. If necessary, fine water sprays should be employed.

Vehicles delivering material with dust potential to an off-site location shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust. Access gates are to be located at least 10 m from receptors where possible. Vehicles should have engines switched off when stationary i.e. no idling. Similarly, the use of diesel or petrol powered generators should be avoided and electricity or battery powered equipment should be used when practical.

Vehicles exiting the site will make use of a wheel wash facility where appropriate and prior to entering onto public roads must ensure mud and other wastes are not tracked onto public roads. Public roads outside the site shall be regularly inspected for cleanliness and cleaned as necessary. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions. On-site haul routes will be inspected for integrity and necessary repairs to the surface will be instigated as soon as reasonably practicable. Record will be kept of all inspections of the haul routes and any subsequent action will be recorded in a site log book.

Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Sand and other aggregates will be stored in bunded areas and will not be allowed to dry out, unless this is required for a particular process, in which case it will be ensured that appropriate additional control measures are in place. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods, and activities such as scabbling should be avoided. Bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
At all times, the procedures put in place will be strictly monitored and assessed by the contractor. In the event of dust nuisance occurring outside the site boundary, satisfactory

procedures will be implemented to rectify the problem. Dust deposition monitoring should be put in place to ensure dust mitigation measures are controlling emissions. Dust monitoring should be conducted using the Bergerhoff method in accordance with the requirements of the German Standard Verein Deutscher Ingenieure (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. The TA Luft (Technische Anleitung zur Reinhaltung der Luft) limit value is 350 mg/(m^2*day) during the monitoring period between 28-32 days.

The Dust Minimisation Plan will be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. The name and contact details of a person to contact regarding air quality and dust issues should be displayed on the site boundary. This notice board should also include head/regional office contact details. Community engagement before works commence on site should be put in place, including a communications plan. A ll dust and air quality complaints should be recorded and causes identified, along with the measures taken to reduce emissions. This complaints log should be available for viewing by the local authority, if requested. Daily on and off-site inspections should occur for nuisance dust and compliance with the dust management plan. This should include regular dust soiling checks of surfaces such as street furniture, windows, and cars within 100m of the site boundary. Cleaning should be provided if necessary.