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EIAR Chapter 8 Air Quality

Suir Island Infrastructure Links

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8 Air Quality

8.1 Introduction

This chapter includes an assessment of the likely air quality impacts associated with the proposed Suir Island Infrastructure Links development, located in Clonmel, Co. Tipperary. A full description of the development can be found in Chapter 2 – Description of Project and Planning Policy .

8.2 Assessment Methodology

8.2.1 Criteria for Rating of Impacts

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.

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 2022, which incorporate European Commission Directive 2008/50/EC. 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). Directive 2008/50/EC has set limit values for a range of pollutants. The limit values in relation to the pollutants NO_2, PM_{10}, and $PM_{2.5}$ are applicable to the proposed development (see Table 8.1).

Table 8.1: Ambient Air Quality Standards & TA Luft Guideline Value

Pollutant	Regulation (Note 1)	Limit Type	Value
Nitrogen Dioxide (NO_2)	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
Nitrogen Oxide (NO_X)	2008/50/EC	Annual limit 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}
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$
Dust Deposition	German TA-Luft	Annual average guideline for dust nuisance impacts beyond site boundary	350 mg/m^2/day

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 (Source: Based on EU Council Directive 2008/50/EC)

Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust which are less than 10 microns and the EU ambient air quality standards outlined in Table 8.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland.

However, guidelines for dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m^2/day averaged over a one-year period at any receptors outside the site boundary. The TA-

Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled 'Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006). The document recommends that the TA Luft limit of 350 mg/m^2/day be applied to the site boundary of quarries. This limit value can be implemented with regard to dust impacts from construction of the proposed development.

8.2.2 Construction Phase Methodology

Air Quality & Construction Dust

The greatest potential impact on air quality during the construction phase is from construction dust emissions, PM_{10}/$PM_{2.5}$ emissions and the potential for nuisance dust. Dust is characterised as encompassing particulate matter with a particle size of between 1 and 75 microns (1- 75µm), it therefore includes both PM_{10} and $PM_{2.5}$. Deposition typically occurs in close proximity to each site and potential impacts generally occur within 500m of the dust generating activity as dust particles fall out of suspension in the air. Sensitivity to dust depends on the duration of the dust deposition, the dust generating activity, and the nature of the deposit. Therefore, a higher tolerance of dust deposition is likely to be shown if only short periods of dust deposition are expected and the dust generating activity is either expected to stop or move on.

An appraisal has been carried out to assess the risk to sensitive receptors from dust soiling and health impacts due to the construction phase in accordance with the Institute of Air Quality Management's publication *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014). Prior to assessing the impact from dust emissions, the sensitivity of the area must be established. The guidance outlines the criteria for establishing the sensitivity of an area to dust soiling and human health impacts. The receptor sensitivity, number of receptors and their distance from the works area are taken into consideration (see **Section 8.3.3**). For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

The IAQM guidance (2014) outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development in order to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site-specific mitigation required. The use of UK guidance is recommended by Transport Infrastructure Ireland in their guidance document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a).

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

- Demolition.
- Earthworks.
- Construction.
- Trackout (movement of heavy vehicles).

The magnitude of each of the four categories is divided into Large, Medium or Small scale depending on the nature of the activities involved. The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site-specific mitigation to be determined.

Air Quality & Construction Traffic

Construction phase traffic also has the potential to impact air quality. The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a), 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.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5m or greater.

The construction stage traffic will not increase by 1,000 AADT, 200 HDV AADT, will not result in speed changes or changes in road alignment, therefore the traffic does not meet the above scoping criteria. As a result a detailed air quality assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

8.2.3 Operational Phase Methodology

Air Quality & Operational Traffic

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the proposed development. The TII scoping criteria detailed in **Section 8.2.2** were used to determine if any road links are affected by the proposed development and require inclusion in a detailed air dispersion modelling assessment. The proposed development will result in the operational phase traffic changing by more than 1,000 AADT on a small number of road links and therefore a detailed air dispersion modelling assessment of operational phase traffic emissions was conducted.

The impact to air quality as a result of changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The TII guidance (2022a) states a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling. The TII criteria state that receptors within 200m of impacted road links should be assessed; roads which are greater than 200m from receptors will not impact pollutant concentrations at that receptor. The TII guidance (2022a) defines sensitive receptor locations as: residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present. A total of 4 no. high to medium sensitivity receptors (R1 – R4) were included in the modelling assessment (see Figure 8-1). These include residential properties and commercial premises.

The TII guidance (2022a) states that modelling should be conducted for NO_2 and PM_{10} for the base, opening and design years for both the do minimum (do nothing) and do something scenarios. The modelling of PM_{10} can be used to show that the project does not impact on the $PM_{2.5}$ limit value as if compliance with the PM_{10} limit is achieved then compliance with the $PM_{2.5}$ limit will also be achieved. Modelling of operational NO_2 and PM_{10} concentrations has been conducted for the do nothing and do something scenarios using the TII Road Emissions Model (REM) online calculator tool (TII, 2022b).

The following inputs are required for the REM tool: receptor locations, light duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy-duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type, project county location and pollutant background concentrations. The *Default* fleet mix option was selected along with the *Intermediate Case* fleet data base selection, as per TII Guidance (TII, 2022b). The *Intermediate Case* assumes a linear interpolation between the *Business-as-Usual* case – where current trends in vehicle ownership continue and the *Climate Action Plan (CAP)* case – where adoption of low emission light duty vehicles occurs.

Using this input data the model predicts the road traffic contribution to ambient ground level concentrations at the identified sensitive receptors using generic meteorological data. The TII REM uses county-based Irish fleet composition for different road types, for different European emission standards from pre-Euro to Euro 6/VI with scaling factors to reflect improvements in fuel quality, retrofitting, and technology conversions. The TII REM also includes emission factors for PM_{10} emissions associated with brake and tyre wear (TII, 2022b). The predicted road contributions are then added to the existing background concentrations to give the predicted ambient concentrations. The 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 document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a) details a methodology for determining air quality impact significance criteria for road schemes which can be applied to any project that causes a change in traffic. The degree of impact is determined based on the percentage change in pollutant concentrations relative to the do-nothing scenario. The TII significance criteria are outlined in Table 4.9 of *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a) and reproduced in Table 8.2 below. These criteria have been adopted for the proposed development to predict the impact of NO_2 and PM_{10} emissions as a result of the proposed development.

Table 8.2: Air Quality Significance Criteria

Long term average concentration at receptor in assessment year	**% Change in concentration relative to Air Quality Limit Value (AQLV)**			
	1%	**2-5%**	**6-10%**	**>10%**
75% or less of AQLV	Neutral	Neutral	Slight	Moderate
76 – 94% of AQLV	Neutral	Slight	Moderate	Moderate
95 – 102% of AQLV	Slight	Moderate	Moderate	Substantial
103 – 109% of AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

Source: TII (2022a) Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106

Traffic Data Used in Modelling Assessment

Traffic flow information was obtained from CSEA Consulting Engineers for the purposes of this assessment. Data for the Base Year 2022 and the Do Nothing and Do Something scenarios for the opening year 2025 and design year 2040 were provided. The traffic figures also include cumulative figures associated with traffic from committed developments within the wider area. A review of specific developments was conducted as part of the traffic impact assessment (see EIAR Chapter 12) in order to identify relevant cumulative developments. The following developments were deemed relevant for inclusion within the traffic figures for the proposed development: Clonmel Arms Hotel Redevelopment (*Planning Reg. Ref.* 18601355), Bulmers Visitor Centre and Clonmel Urban Design Project. Further details are provided in Chapter 12 Material Assets: Traffic and Transportation of the EIAR.

The traffic data is detailed in Table 8.3. Only road links that met the TII scoping criteria and that were within 200m of receptors were included in the modelling assessment. Background concentrations have been included as per **Section 8.3.2** of this chapter based on available EPA background monitoring data (EPA, 2022).

Table 8.3: Traffic Data used in Air Modelling Assessment

Road Name	Speed (kph)	Base Year	Opening Year		Design Year	
			Do Nothing	Do Something	Do Nothing	Do Something
		LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
The Quay/Quay Street	50	4,668 (56)	4,840 (58)	3,887 (42)	5,341 (64)	4,288 (46)
Sarsfield Street	50	3,052 (61)	3,165 (63)	2,158 (47)	3,497 (69)	2,386 (52)
The Quay/ Joyces Lane	50	4,563 (58)	4,731 (60)	5,684 (76)	5,221 (67)	6,274 (84)
O'Connell Street West	50	6,118 (68)	6,343 (70)	7,296 (70)	6,997 (78)	8,046 (77)
Mary Street	50	4,429 (41)	4,592 (42)	3,849 (36)	5,064 (46)	4,245 (40)

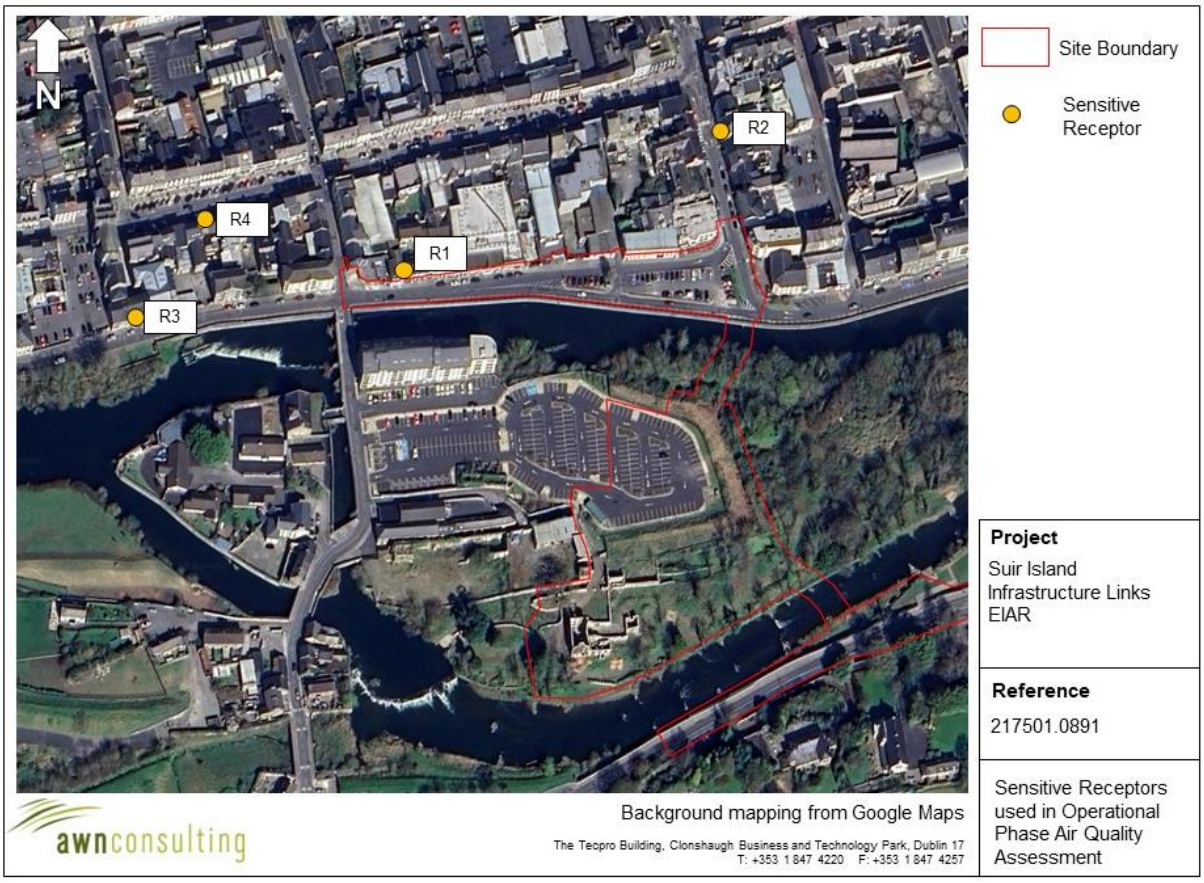

Figure 8-1: Sensitive Receptors included in Operational Phase Air Quality Modelling Assessment

Air Quality Impact on Ecological Sites

Air emissions of NOx and NO_2 can impact vegetation and therefore need to be considered as part of the air quality assessment for a development. In relation to the proposed development the primary source of NOx and NO_2 emissions will be from traffic exhaust emissions. TII guidance (2022a) states that only sites that are sensitive to nitrogen deposition need to be included in an air impact assessment; it is not necessary to include sites that have been designated as a geological feature or a water course. The proposed development crosses a portion of the Lower River Suir SAC (Site Code: 002137). As this sensitive ecological site is a water course it is not necessary to include it within the air quality assessment as the features are not likely sensitive to nitrogen deposition and therefore there is no potential for impact. ***Receiving Environment***

8.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality are 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.

The nearest representative weather station collating detailed weather records is Cork Airport, which is located approximately 78 km south-west of the closest point on the proposed Suir Island Infrastructure Links development. Cork Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 8-2). For data collated during five representative years (2017 - 2021), the predominant wind direction is south-westerly with predominantly moderate wind speeds.

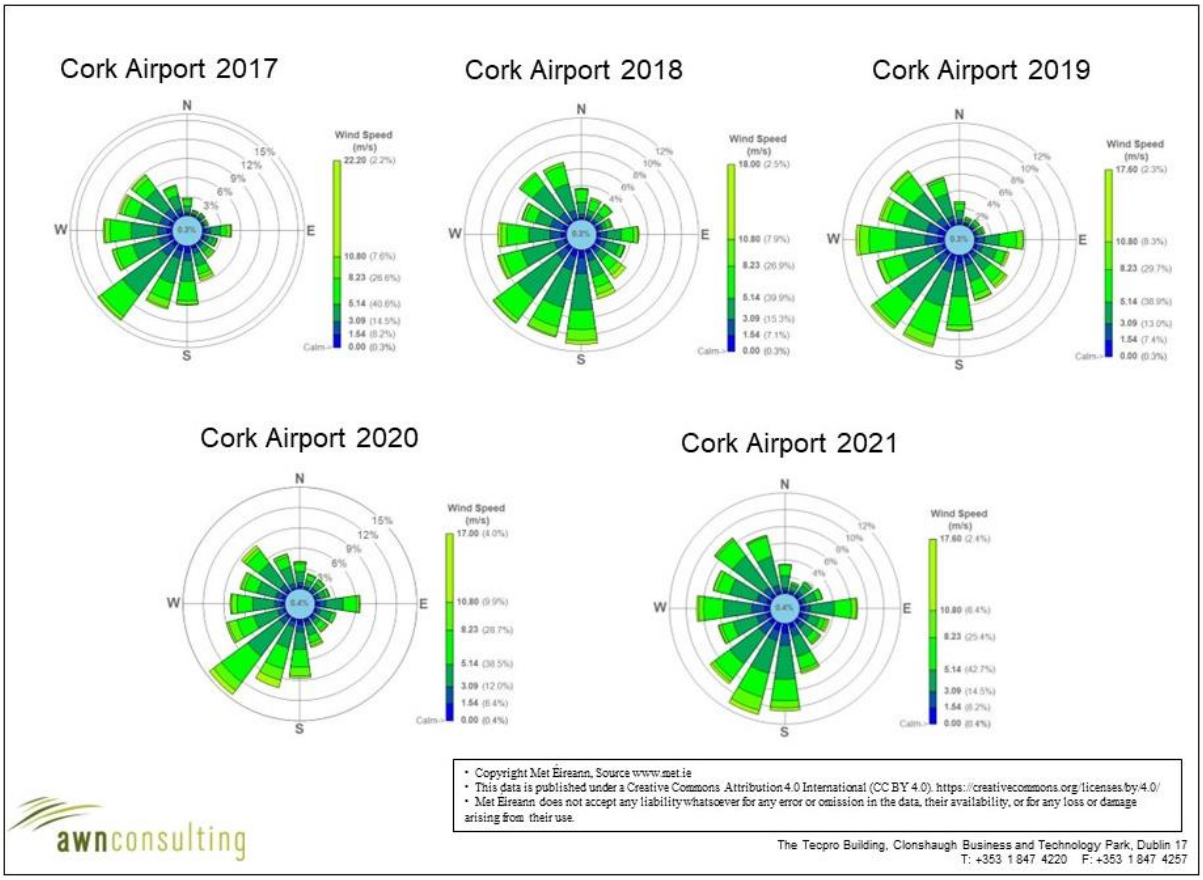

Figure 8-2: Cork Airport Windrose 2017 – 2021 (Met Éireann, 2023)

8.3.2 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent EPA published annual report on air quality "*Air Quality In Ireland 2021*" (EPA 2022) details the range and scope of monitoring undertaken throughout Ireland.

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes as outlined within the EPA document titled 'Air Quality in Ireland 2021' (EPA 2022). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of twenty-three towns with a population 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, the area of the proposed development is categorised as Zone C.

In 2020 the EPA reported (EPA 2021) that Ireland was compliant with EU legal limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA report details the effect that the Covid-19 restrictions had on stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, they have been included in the baseline section for representative purposes and previous long-term data has been used to determine baseline concentrations in the region of the proposed development.

NO_2

Long-term NO_2 monitoring was conducted at the Zone C locations of Kilkenny, Portlaoise and Dundalk for the period 2017 - 2021 (EPA, 2022). Long-term average concentrations are significantly below the

annual average limit of 40 µg/m^3. Average results range from 4 – 14 µg/m^3. The NO_2 annual average for this five-year period suggests an upper average limit of no more than 14 µg/m^3 (see Table 8.4) as a background concentration for the Zone C locations. In addition, the hourly limit value of 200 µg/m^3 (measured as a 99.8th percentile) was complied with at all stations. Based on the above information a conservative estimate of the current background NO_2 concentration for the region of the proposed development is 14 µg/m^3.

Table 8.4: Background NO_2 Concentrations in Zone C Locations (µg/m^3)

Station	Averaging Period (Note 1)	Year				
		2017	2018	2019	2020	2021
Kilkenny	Annual Mean NO_2 (µg/m^3)	5	6	5	4	4
	Max 1-hr NO_2 (µg/m^3)	58	71	59	52	51
Portlaoise	Annual Mean NO_2 (µg/m^3)	11	11	11	11	8
	Max 1-hr NO_2 (µg/m^3)	80	119	77	69	60
Dundalk	Annual Mean NO_2 (µg/m^3)	-	14	12	10	11
	Max 1-hr NO_2 (µg/m^3)	-	91	144	204	165

Note 1: Annual average limit value of 40 µg/m^3 and hourly limit value of 200 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

PM_{10}

Continuous PM_{10} monitoring was conducted at the Zone C locations of Galway, Ennis, Portlaoise and Dundalk from 2017 – 2021. These showed an upper average limit of no more than 20 µg/m^3 (Table 8.5). Levels range from 10 – 20 µg/m^3 over the five-year period with at most 17 exceedances of the 24-hour limit value of 50 µg/m^3 in Ennis in 2021 (35 exceedances are permitted per year) (EPA, 2022). Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the proposed development is 15 µg/m^3.

Table 8.5: Background PM_{10} Concentrations In Zone C Locations ($\mu g/m^3$)

Station	Averaging Period Note 1	Year				
		2017	2018	2019	2020	2021
Galway	Annual Mean PM_{10} ($\mu g/m^3$)	-	15	13	13	11
	24-hr Mean > 50 $\mu g/m^3$ (days)	-	0	1	1	0
Ennis	Annual Mean PM_{10} ($\mu g/m^3$)	16	16	18	20	19
	24-hr Mean > 50 $\mu g/m^3$ (days)	9	4	12	19	17
Portlaoise	Annual Mean PM_{10} ($\mu g/m^3$)	10	11	15	12	11
	24-hr Mean > 50 $\mu g/m^3$ (days)	0	1	0	0	1
Dundalk	Annual Mean PM_{10} ($\mu g/m^3$)	-	15	14	13	12
	24-hr Mean > 50 $\mu g/m^3$ (days)	-	0	2	2	0

Note 1: Annual average limit value of 40 $\mu g/m^3$ and 24-hour limit value of 50 $\mu g/m^3$ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

$PM_{2.5}$

Monitoring of both PM_{10} and $PM_{2.5}$ takes place at the station in Ennis which allows for the $PM_{2.5}/PM_{10}$ ratio to be calculated. Average $PM_{2.5}$ levels in Ennis over the period 2017 - 2021 ranged from 10 - 15 $\mu g/m^3$, with a $PM_{2.5}/PM_{10}$ ratio ranging from 0.63 – 0.78 (EPA, 2022). Based on this information, a conservative ratio of 0.8 was used to generate an existing $PM_{2.5}$ concentration in the region of the development of 12 $\mu g/m^3$.

Based on the above information the air quality in the Zone C areas is generally good, with concentrations of the key pollutants generally well below the relevant limit values. However, the EPA have indicated that road transport emissions are contributing to increased levels of NO_2 with the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$). The EPA predict that exceedances in the particulate matter limit values are likely in future years if burning of solid fuels for residential heating continues (EPA, 2022).

The current background concentrations have been used in the operational phase air quality assessment for both the opening and design year as a conservative approach in order to predict pollutant concentrations in future years. This is in line with the TII methodology (TII, 2022a).

8.3.3 Sensitivity of the Receiving Environment

The sensitivity of the receiving environment has been established using the IAQM methodology (2014) as outlined in **Section 8.2.2**. Prior to assessing the impact from dust emissions, the sensitivity of the area must be established. The IAQM guidance outlines the criteria for establishing the sensitivity of an area to dust soiling and human health impacts. The receptor sensitivity, number of receptors and their

distance from the works area are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, in order to be conservative, worst-case numbers were selected. With respect to receptors there are greater than 10 but less than 100 high to medium sensitivity receptors (residential dwellings and commercial premises) within 20m of the site boundary (see Figure 8-3). As a result, the sensitivity of the area to dust soiling effects on people and property is, as a worst-case, **high** according to the IAQM guidance in Table 8.6 (IAQM, 2014).

Table 8.6: Sensitivity of the Area to Dust Soiling Effects on People and Property (IAQM, 2014)

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

In addition, the IAQM guidelines also outline the criteria for assessing the human health impact from PM_{10} emissions from construction activities based on the current annual mean PM_{10} concentration, receptor sensitivity and the number of receptors affected. An estimate of the current PM_{10} concentration in the region of the proposed development is 15 µg/m^3. As shown in Table 8.7 the worst-case sensitivity of the area to human health impacts from PM_{10} (high sensitivity, distance of less than 20m to construction boundary and with receptor numbers 10 - 100) is considered **low** under this guidance.

Table 8.7: Sensitivity of the Area to Human Health Impacts (IAQM, 2014)

Receptor Sensitivity	**Annual Mean PM_{10} Concentration**	**Number of Receptors**	**Distance from source (m)**			
			<20	**<50**	**<100**	**<350**
High	< 24µg/m^3	>100	Medium	Low	Low	Low
		10-100	**Low**	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	< 24µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24µg/m^3	>1	Low	Low	Low	Low

Dust deposition impacts on ecology can occur due to chemical or physical effects. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Often impacts will be reversible once the works are completed, and dust deposition ceases. The IAQM guidance (2014) states that dust impacts to vegetation can occur up to 50m from the site and 50m from site access roads, up to 500m for the site entrance. The proposed development red line boundary directly encompasses a section of the Lower River Suir SAC (Figure 8-3) which is classed

as highly sensitive receptor due to its European designation. As shown in Table 8.8 the worst-case sensitivity of the area to ecological impacts is considered **high**.

Table 8.8: Sensitivity of the Area to Ecological Impacts (IAQM, 2014)

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

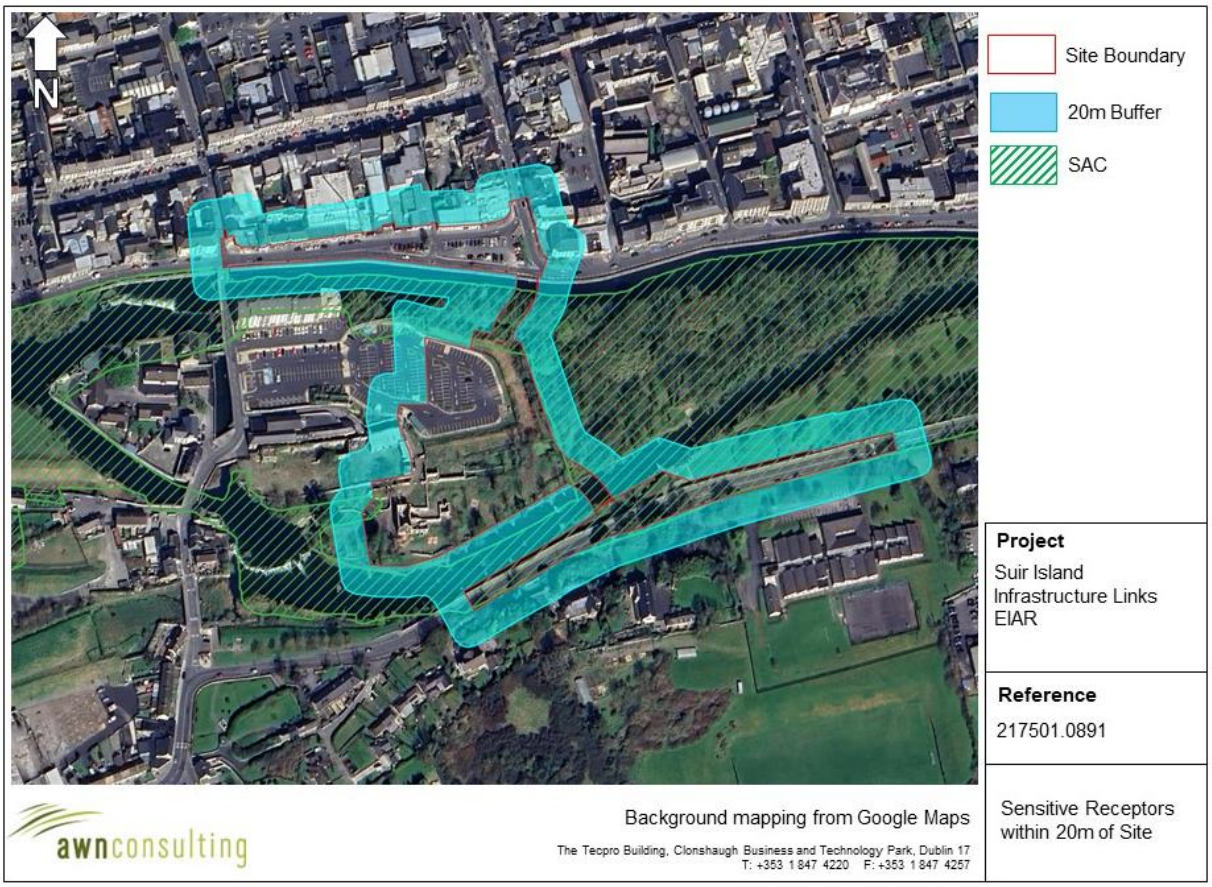

Figure 8-3: Sensitive Receptors within 20m of Site

8.4 Characteristics of Proposed Development

The proposed development involves the construction of pedestrian bridges, provision of new public open space and a number of other infrastructure elements and ancillary works. A full description of the proposed development is provided in Chapter 2 Project Description and Planning Policy Context of this EIAR document. Impacts to air quality can occur during both the construction and operational stages.

During the construction stage the main source of air quality impacts will be as a result of fugitive dust emissions from site activities. The primary sources of air emissions in the operational context are deemed long term and will involve the change in traffic flows in the local areas which are associated with the development. The following describes the primary sources of potential air quality impacts which have been assessed as part of this EIAR.

8.5 Impact Assessment

8.5.1 Construction Impacts

Air Quality & Dust Emissions

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.

The Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on local air quality, dust being the exception to this.

The potential for dust to be emitted will depend on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction. As indicated, dust generation rates depend on the site activity, particle size (in particular the silt content, defined as particles smaller than 75 microns in size), the moisture content of the material and weather conditions. Dust emissions are dramatically reduced where rainfall has occurred, due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume no dust is generated under "wet day" conditions where rainfall greater than 0.2mm has fallen. Information collected from Cork Airport metrological station (1981 – 2010, the most recent long-term data set) identified that typically 204 days per annum are "wet" which would indicate that for over half of the year conditions are favourable to dust suppression.

Large particle sizes (greater than 75 microns) fall rapidly out of atmospheric suspension and are subsequently deposited in close proximity to the source. Particle sizes of less than 75 microns are of interest as they can remain airborne for greater distances and can give rise to the potential dust nuisance at the sensitive receptors. This size range is broadly described as silt. Emission rates are normally predicted on a site-specific particle size distribution for each dust emission source.

Whilst construction activities are likely to produce some level of dust during earth moving and excavating phases of the development, these activities will mainly be confined to particles of dust greater than 10 microns. Particles of dust greater than 10 microns are considered a nuisance but do not have the potential to cause significant health impacts.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see **Section 8.3.3**). The major dust generating activities are divided into four types within the IAQM guidance to reflect their different potential impacts.

These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (movement of heavy vehicles).

Demolition

There is no proposed demolition associated with the proposed development.

Earthworks

Earthworks primarily involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude from earthworks can be classified as small, medium or large and are described as follows:

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

There will be approximately 2,000 m^3 (3,400 tonnes) of material excavated to facilitate construction of new foundations, underground services, and the installation of public spaces and bridges. Therefore, the magnitude of the earthworks' activities can be classified as medium. Combining this classification with the previously established sensitivity of the area to dust soiling and human health impacts and ecological impacts (**Section 8.3.3**) this results in an overall medium risk of dust soiling impacts, low risk of human health impacts and medium risk with respect to ecology impacts as a result of the proposed earthworks activities as outlined in Table 8.9.

Table 8.9: 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 magnitudes from construction can be classified as small, medium or large and are described as follows.

- **Large**: Total building volume > 100,000m^3, on-site concrete batching, sandblasting;
- **Medium**: Total building volume 25,000m^3 – 100,000m3, 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 construction activities can be classified as small as the construction of the bridge components will take place off-site and will be installed via crane once on site. In addition, the proposed materials are not particularly dusty, e.g. steel. This results in a low risk of dust soiling impacts, an overall negligible risk of human health impacts and a low risk with respect to ecology impacts as a result of the proposed construction activities as outlined in Table 8.10.

Table 8.10: 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 magnitudes from trackout can be classified as small, medium or large and are described as follows.

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

The trackout activities can be classified as medium due to the number of HGVs that will be required for the construction of the proposed development. There will be up to 20 HGV movements at peak hours during the construction phase. This results in an overall medium risk of dust soiling impacts; an overall low risk of human health impacts and a medium risk of ecology impacts as a result of the proposed trackout activities as outlined in Table 8.11.

Table 8.11: 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

Summary of Dust Emission Risk

The risk of dust impacts as a result of the proposed development are summarised in Table 8.12 for each activity. The magnitude of risk determined is used to prescribe the level of site-specific mitigation required for each activity in order to prevent significant impacts occurring.

In order to minimise dust emissions during earthworks, construction and trackout as detailed in Table 8.12, a series of mitigation measures associated with a medium risk of dust soiling, health and ecology impacts have been prepared in the form of a Dust Minimisation Plan as recommended by the Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (2014). 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. In the absence of mitigation, there is the potential for *localised*, *temporary, negative, slight* impacts to air quality as a result of dust emissions.

Table 8.12: Summary of Dust Risk to Define Site-Specific Mitigation

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

Air Quality & Traffic Emissions

There is the potential for traffic emissions to impact air quality in the short-term over the construction phase. Particularly due to the increase in HGVs accessing the site. The construction stage traffic was reviewed in line with the TII assessment criteria in **Section 8.2.2** to determine whether a detailed air quality assessment of traffic emissions was required. As the construction stage traffic did not meet the screening criteria a detailed air quality assessment of construction stage traffic emissions was screened out. It can be concluded that construction phase traffic emissions will have a short-term, localised, neutral and non-significant impact on air quality.

Air Quality & Human Health

Dust emissions from the construction phase of the proposed development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. As per **Section 8.3.3** the surrounding area is of low sensitivity to dust related human health impacts. It was determined that there is an overall low risk of dust related human health impacts as a result of the construction phase of the proposed development. Therefore, in the absence of mitigation there is the potential for *imperceptible*, *direct*, *negative*, *temporary* impacts to human health as a result of the proposed development.

8.5.2 Operational Impacts

Air Quality & Traffic Emissions

The potential impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. The traffic data includes the Do Nothing and Do Something scenarios (see **Section 8.2.3**). The impact of NO_2 and PM_{10} emissions for the opening and design years was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined.

The TII guidance PE-ENV-01106 (TII, 2022a) details a methodology for determining air quality impact significance criteria for TII road schemes and infrastructure projects as per Table 8.2. The degree of impact is determined based on both the absolute and relative impact of the proposed development. Results are compared against the 'Do-Nothing' scenario, which assumes that the proposed development is not in place in future years, in order to determine the degree of impact.

The results of the assessment of the impact of the proposed development on NO_2 in the opening year 2025 and design year 2040 are shown in Table 8.13. The annual average concentration is in compliance with the limit value at the worst-case receptors in 2025 and 2040. Concentrations of NO_2 are at most 42% of the annual limit value in 2025 and 38% of the annual limit value in 2040. Due to predicted increases in traffic between the opening and design years, any decrease in concentration is due to increased uptake in electric vehicles and lower vehicle exhaust emissions. In addition, the TII guidance (2022a) states that the hourly limit value for NO_2 of 200 $\mu g/m^3$ is unlikely to be exceeded at roadside locations unless the annual mean is above 60 $\mu g/m^3$. As predicted NO_2 concentrations are significantly

below 60 µg/m^3 (Table 8.13) it can be concluded that the short-term NO_2 limit value will be complied with at all receptor locations.

The impact of the proposed development on annual mean NO_2 concentrations can be assessed relative to "Do Nothing (DN)" levels. NO_2 concentrations at the receptors assessed will increase at receptors R3 and R4 as a result of the proposed development when compared with the Do-Nothing scenario. There will be at most an increase of 0.39 µg/m^3 at receptor R3, this is a 2.4% change from baseline conditions. Positive impacts are predicted at receptors R1 and R2 as a result of redistributing traffic on Quay Street and Sarsfield Street; it is predicted that traffic along these two streets will decrease in future years. There will be at most a decrease of 0.42 µg/m^3 at receptor R2, this is a 2.7% change from baseline conditions. Where the predicted annual mean concentrations are less than 75% of the air quality standard (see Table 8.1) and there is a less than 5% change in concentrations compared with the Do-Nothing scenario then the impact is considered neutral as per the TII significance criteria (see Table 8.2). Therefore, the impact of the proposed development on NO_2 concentrations is neutral.

In relation to changes in PM_{10} concentrations as a result of the proposed development, the results of the assessment can be seen in Table 8.14 for the opening year 2025 and design year 2040. The annual average concentration is in compliance with the limit value at the worst-case receptors in 2025 and 2040. Concentrations of PM_{10} are at most 42% of the annual limit value in 2025 and 2040. In addition, the proposed development will result in at most one exceedance of the daily PM_{10} limit value of 50 µg/m^3 at receptor R3 in the design year 2040. However, 35 exceedances are permitted per year before the standard is deemed to have been exceeded (see Table 8.1).

The impact of the proposed development on annual mean PM_{10} concentrations can be assessed relative to "Do Nothing (DN)" levels. PM_{10} concentrations at the receptors assessed will increase at receptors R3 and R4 as a result of the proposed development when compared with the Do-Nothing scenario. There will be at most an increase of 0.26 µg/m^3 at receptor R3, this is a 1.6% change from baseline conditions. There will be a decrease in concentrations at receptors R1 and R2 as a result of redistributing traffic away from Quay Street and Sarsfield Street. There will be at most a decrease of 0.27 µg/m^3 at receptors R and R2, this is a 1.7% change from baseline conditions. As with NO_2, where the predicted annual mean concentrations are less than 75% of the air quality standard (see Table 8.1) and there is a less than 5% change in concentrations compared with the Do-Nothing scenario then the impact is considered neutral as per the TII significance criteria (see Table 8.2). Therefore, the impact of the proposed development on PM_{10} concentrations is neutral.

Overall, the impact of the proposed development on ambient air quality in the operational stage is considered *long-term, localised, neutral, imperceptible* and *non-significant*.

Table 8.13: Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Receptor	Impact Opening Year				Impact Design Year			
	DN	DS	DS-DN	Description	DN	DS	DS-DN	Description
R1	16.0	15.6	-0.39	Neutral	14.8	14.6	-0.15	Neutral
R2	15.3	14.9	-0.42	Neutral	14.5	14.3	-0.16	Neutral
R3	15.9	16.3	0.39	Neutral	14.7	14.9	0.15	Neutral
R4	16.6	16.9	0.37	Neutral	15.0	15.1	0.14	Neutral

Table 8.14: Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

Receptor	Impact Opening Year				Impact Design Year			
	DN	DS	DS-DN	Description	DN	DS	DS-DN	Description
R1	16.2	16.0	-0.25	Neutral	16.3	16.0	-0.27	Neutral
R2	15.8	15.6	-0.26	Neutral	15.9	15.6	-0.27	Neutral
R3	16.2	16.5	0.24	Neutral	16.3	16.5	0.26	Neutral
R4	16.6	16.8	0.23	Neutral	16.7	16.9	0.24	Neutral

Air Quality & Human Health

Traffic related air emissions have the potential to impact air quality which can affect human health. Emissions of air pollutants are predicted to be significantly below the ambient air quality standards which are based on the protection of human health. Therefore, impacts to human health are *long-term, direct, neutral, imperceptible* and *non-significant*.

8.5.3 Cumulative Impacts

Construction Phase - Cumulative Impacts

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction phase of any other development within 350m then there is the potential for cumulative construction dust impacts to nearby sensitive receptors. A review of recent planning permissions for the area was conducted and it was found that there was 1 no. relevant site for which cumulative impacts may occur should the construction phase and that of the proposed development overlap: Planning Reg. Ref.: P82201 - Suir Island Gardens. Cumulative developments are summarised in further detail in EIAR Chapter 1 Introduction Section 1.15 .

There is the potential for cumulative construction dust impacts should the construction phases overlap with that of the proposed development. However, the dust mitigation measures outlined in **Section 8.6.1** will be applied throughout the construction phase of the proposed development which will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the proposed development are deemed *temporary, direct, localised, negative,* and *slight*.

Operational Phase - Cumulative Assessment

There is the potential for cumulative impacts to air quality during the operational phase due to traffic associated with other existing and permitted developments within the area. The traffic data provided for the operational stage air quality assessment included cumulative traffic from committed developments within the wider area (see **Section 8.2.**3). A review of specific developments was conducted as part of the traffic impact assessment (see Chapter 12) in order to identify relevant cumulative developments. The following developments were deemed relevant for inclusion within the traffic figures for the proposed development: Clonmel Arms Hotel Redevelopment (*Planning Reg. Ref.* 18601355), Bulmers Visitor Centre and Clonmel Urban Design Project. Further details are provided in Chapter 12. Therefore, the cumulative operational phase impact is assessed within **Section 8.5.2** and was found to have a neutral impact on air quality. The cumulative operational stage impact is *long-term, localised, direct, neutral, imperceptible* and *non-significant*.

8.6 Mitigation and Monitoring Measures

8.6.1 Construction

Air Quality

The greatest potential impact on air quality during the 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. Provided the dust minimisation measures outlined in the plan (see **Appendix 8.1**) are adhered to, the air quality impacts during the construction phase will 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.
- 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.
- 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.

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

Construction phase dust monitoring should be put in place along the site boundary to sensitive receptors 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 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. Results are assessed against the TA Luft limit value of 350 mg/m^2/day during the monitoring period between 28-32 days.

8.6.2 Operational

The impact of the proposed development on air quality is predicted to be imperceptible and neutral with respect to the operational phase in the long-term. Therefore, no site-specific mitigation measures are required.

8.7 Residual Impacts

8.7.1 Construction

Air Quality

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 **Section 8.6.1** and **Appendix 8.1**). with the

implementation of dust mitigation measures outlined in the plan, the predicted residual air quality impacts during the construction phase are *temporary*, *direct*, *negative*, *localised* and *imperceptible* at nearby receptors.

Human Health

The measures outlined in **Section 8.6.1** are best practice mitigation measures. They are proposed for the construction phase of the proposed development, which will focus on the proactive control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact complies with all EU ambient air quality legislative limit values which are based on the protection of human health (see Table 8.1). Therefore, the predicted residual impact of construction of the proposed development is *direct*, *negative*, *temporary*, *localised* and *imperceptible* with respect to human health.

8.7.2 Operational

Air Quality

Air dispersion modelling of operational traffic emissions associated with the proposed development was carried out using the TII REM tool. The modelling assessment determined that the change in emissions of NO_2 and PM_{10} at nearby sensitive receptors as a result of the proposed development will be neutral. Therefore, the operational phase impact to air quality is *long-term, localised, neutral, imperceptible* and *non-significant*.

Human Health

As the air dispersion modelling has shown that emissions of air pollutants are significantly below the ambient air quality standards which are based on the protection of human health, impacts to human health are *long-term*, *direct*, *neutral* and *imperceptible*.

8.8 Interactions

Air quality does not have a significant number of interactions with other topics. The most significant interactions are between population and human health and air quality. An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures (see **Appendix 8.1**) that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all ambient air quality legislative limits and therefore the predicted impact is *temporary, negative* and *imperceptible* with respect to the construction phase and *long-term*, *neutral* and *imperceptible* with respect to the operational phase.

Interactions between air quality and traffic can be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase. The impacts of the proposed development on air quality are assessed by reviewing the change in AADT on roads close to the site. Applying this analysis to this this assessment however, the impact of the interactions between traffic and air quality during both construction and operational phases, are considered to be *imperceptible*.

There is the potential for interactions between air quality and biodiversity as works will take place within a section of the Lower River Suir SAC (site code 002137). There is the potential for NO_X and NO_2 emissions from traffic accessing the site to impact vegetation, however, the SAC is not considered a sensitive site in relation to nitrogen deposition as it is a designated watercourse. It has been determined that there is an overall medium risk of construction dust related emissions causing ecological impacts to vegetation. Once the mitigation measures outlined within **Section 8.6.1** are implemented dust related impacts are predicted to be *short-term*, *neutral* and *imperceptible*.

No other noteworthy interactions with air quality have been identified.

8.9 Difficulties in Compiling

There were no difficulties in compiling this chapter.

8.10 References

- BRE (2003) Controlling Particles, Vapours & Noise Pollution From Construction Sites
- Department of the Environment, Heritage and Local Government (DEHLG) (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities
- Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements – Draft
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- German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft
- Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction Version 1.1
- Met Éireann (2022) Met Eireann website: https://www.met.ie/
- The Scottish Office (1996) Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings
- Transport Infrastructure Ireland (2022a) Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106
- Transport Infrastructure Ireland (2022b) TII Road Emissions Model (REM): Model Development Report – GE-ENV-01107
- UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance
- USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures
- World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)

Appendix 8.1 Dust Management Plan

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland (DCC, 2018), the UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997).

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 8-1 for the windrose for Cork Airport). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (IAQM, 2014; UK ODPM, 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions is highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works 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. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Preparing and Maintaining the Site

- Planning the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 20 kph haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing) for construction staff.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure 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.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Track-out

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK ODPM, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. If sweeping using a road sweeper is not possible due to the nature of the surrounding area then a suitable smaller scale street cleaning vacuum will be used.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues.
- The development of a documented system for managing site practices with regard to dust control.

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