Environmental Impact Assessment Report (EIAR) – Volume 2

Chapter 9 – Air Quality

CHAPTER 9

Proposed ORE Capable Terminal on a 250m Wharf Extension & Ancillary Operational Support Infrastructure

Port of Waterford Company

Port of Waterford, Belview, Co. Kilkenny

MALONE O'REGAN ENVIRONMENTAL

FIGURES

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All appendices referenced in this document are presented in EIAR Volume III

APPENDIX 9

Appendix 9-1: PM Monitoring Data

9 AIR QUALITY

9.1 Introduction

This Chapter of the EIAR was prepared by the MOR Environmental Air Quality Team and provides a description and assessment of the potential effects of the Proposed Development on air quality. Potential effects on air quality arising from the Proposed Development assessed in this chapter include:

- Nuisance dust arising during the Construction and Operational Phase; and,
- Potential effects from road traffic, shipping and plant associated with the Proposed Development during Construction and Operational Phases.

Greenhouse gas ('GHG') emissions are discussed in Chapter 10.

9.2 Methodology

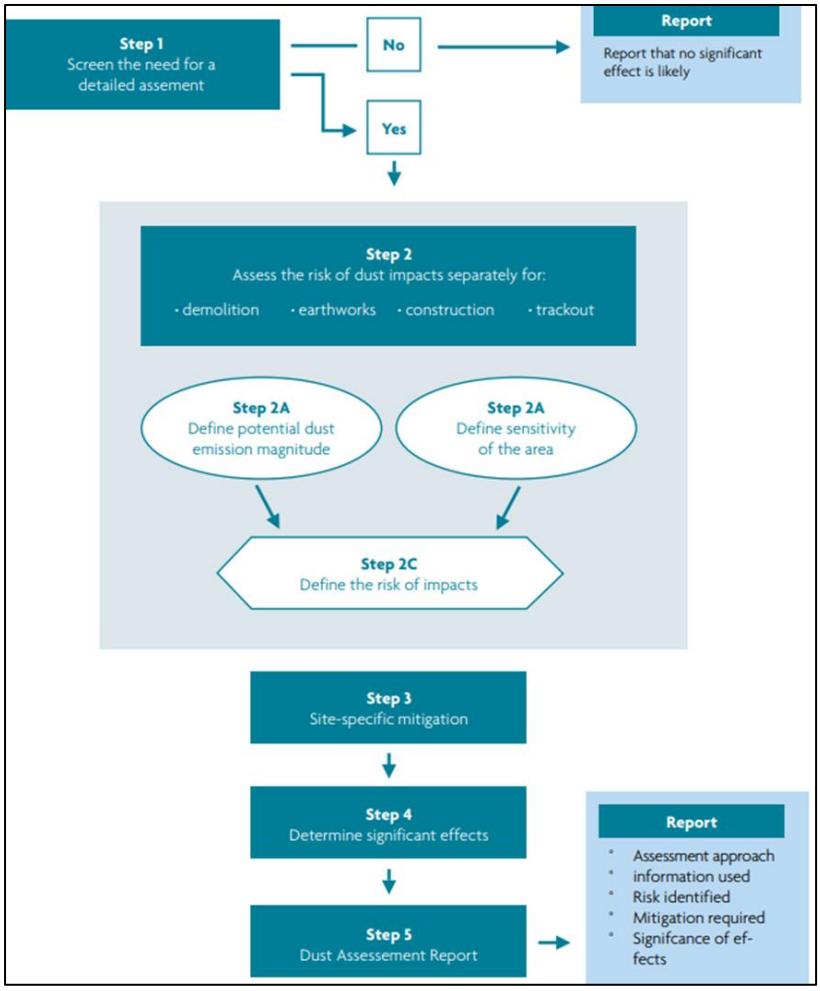
The following standards and guidance documents were used to assess the baseline conditions and in the assessment of potential effects:

- Institute of Air Quality Management ('IAQM') Guidance on the Assessment of Dust from Demolition and Construction - Version 2.2 [1];
- Air Quality in Ireland 2021 - Indicators of Air Quality [2];
- Air Quality in Ireland 2022 - Indicators of Air Quality [3];
- Air Quality in Ireland 2023 - Indicators of Air Quality [4]; and,
- Transport Infrastructure of Ireland – Air Quality Assessment for specified infrastructure projects [5].

9.2.1 Construction Dust Risk Assessment

A risk assessment of dust emissions, where dust refers to particles up to 7µm in diameter, arising from Construction and Demolition ('C&D') activities, was completed in accordance with the Institute of Air Quality Management ('IAQM') – Guidance on the Assessment of Dust from Demolition and Construction [1]. The steps used to perform a dust risk assessment are presented in Figure 9-1.

Figure 9-1: Steps to Perform a Dust Risk Assessment



Step 1 of the IAQM Guidance screens the need for a detailed dust risk assessment based primarily on the distance of human and ecological receptors to the Proposed Development.

An assessment is required where there is:

- A 'human receptor' within:
    - 250m of the boundary of the site; and/or,
    - 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s).
- An 'ecological receptor' within:
    - 50m of the boundary of the site; and/or,
    - 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s).
- For specific (high-risk) schemes, the planning authority may require dust assessment despite the proposed site falling outside the distances above.

Step 2 divides construction activities into four types of activities (demolition, earthworks, construction and track-out) to reflect their potential impacts. Table 9-1 below outlines the definition of these activities for the purpose of the risk assessment.

Table 9-1: Classification of Residual Source Emissions

Activities	Definition
Demolition	Any activity involved with the removal of an existing structure (or structures). This may also be referred to as deconstruction, specifically when a building is to be removed a small part at a time
Earthworks	Any activity involved with the provision of a new structure (or structures), its modification or refurbishment. A structure will include a residential dwelling, office building, retail outlet, road, etc.
Trackout	Covers the process of soil stripping, ground levelling, excavation, and landscaping.
Construction	The transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy goods vehicles (HGVs) leave the construction / demolition site with dust materials, which may then spill onto the road, and/or when HGVs transfer dust and dirt onto the road having travelled over muddy ground on-site.

Step 2A of the IAQM Guidance defines the magnitude of dust emissions arising from a development – See Table 9-2 below.

Step 2B of the dust risk assessment determines the sensitivity of the area to dust impacts from dust soiling (human and ecological receptors) and on the health effects of PM_{10} (human receptors).

In determining the sensitivity of people to dust soiling, the IAQM presents general guidelines, outlined in Table 9-3, and examples of high, medium and low-sensitivity receptors. Table 9-4 determines the sensitivity of the area to dust soiling based on the number of human receptors potentially impacted and their distance to the dust source.

Table 9-5 outlines the criteria to assess the sensitivity of people to the health effects of PM_{10}. In short, the criteria are based on whether a receptor is likely to be exposed to elevated concentrations of PM_{10} over 24 hours and utilises the background concentrations of PM_{10} as part of the assessment. Table 9-6 shows the general conditions when considering the sensitivity of the receptors to PM_{10} exposure.

Table 9-2: Sensitivity of the Area to Dust Soiling Effects on People and Property

Dust Emission Magnitude:	Demolition: Examples of works associated with each emission magnitude	Earthworks: Examples of works associated with each emission magnitude	Construction: Examples of works associated with each emission magnitude	Trackout: Examples of works associated with each emission magnitude
Large	Total building volume >75,000m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12 m above ground level.	Total site area >110,000m^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 >6m in height.	Total building volume >75,000m^3 on-site concrete batching, sandblasting.	>50 HGV (>3.5t) outward movements[1] in any one day[2], potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.
Medium	Total building volume 12,000m^3 – 75,000m^3, potentially dusty construction material, demolition activities 6-12m above ground level.	Total site area 18,000m^2 – 110,000m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earthmoving vehicles active at any one time, formation of bunds 3m - 6m in height.	Total building volume 12,000m^3–75,000m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching.	20-50 HGV (>3.5t) outward movements[1] in any one day[2], moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.
Small	Total building volume <12,000m^3 construction material with low potential for dust release (e.g. metal, cladding or timber), demolition activities <6m above ground, demolition during wetter months.	Total site area <18,000m^2, soil type with large grain size (e.g. sand), <5 heavy earth-moving vehicles active at any one time, formation of bunds <3m in height.	Total building volume <12,000m^3 construction material with low potential for dust release (e.g. metal, cladding or timber.)	<20 HGV (>3.5t) outward movements[1] in any one day, surface material with low potential for dust release, unpaved road length <50m

***Notes:**

1 Denotes a vehicle movement as a one-way journey i.e. A to B and excludes the return journey.

2 Denotes HGV movements during a construction project vary over its lifetime, and the number of movements is the maximum, not the average

Table 9-3: General Principle for Defining the Sensitivity of Receptors to Dust Soiling

Sensitivity Rating to Dust Soiling	General Principles Associated with Sensitivity Rating
Low	• The enjoyment of amenity would not reasonably be expected; • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or, • There is transient exposure, where the people or property would reasonably be expected to be present for limited periods of time as part of the normal pattern of use of the land.
Medium	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; • The appearance, aesthetics or value of the property could be diminished by soiling; or, • The people or property would not reasonably be expected to be present continuously or at least regularly for extended periods, as part of the normal pattern of use of land.
High	• Users can reasonably expect enjoyment of a high level of amenity; • The appearance, aesthetics or value of the property would be diminished by soiling; or, • The people or property would reasonably be expected to be present continuously or at least regularly for extended periods, as part of the normal pattern of use of the land.

Table 9-4: Defining the Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the source (m)			
		<20	<50	<100	<250
High	**>100**	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	**>1**	Medium	Low	Low	Low
Low	**>1**	Low	Low	Low	Low

Table 9-5: General Principles for Defining the Sensitivity of Receptors to PM_{10} Exposure

Sensitivity Rating to Human Health Impacts	General Principles Associated with Sensitivity Rating
Low	Locations where human exposure is transient.
Medium	Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more per day).
High	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24hr objectives, a relevant location would be one where individuals may be exposed for eight hours or more per day).

Table 9-6: Sensitivity Criteria for the Health Impact of PM_{10}

Receptor Sensitivity	Annual Mean PM_{10} Concentration[a]	No. of Receptors	Distance from Source (m)			
			<20	<50	<100	<250
High	>32 µg/m^3	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low

[a] The annual mean concentration at which an exceedance of the 24-hour objective is likely in England, Wales and Northern Ireland.

When determining the sensitivity of ecological receptors, the IAQM presents general guidances and examples of high, medium and low sensitivity receptors. The general principles under consideration are outlined in Table 9-7 below.

Table 9-7: General Principle for Defining the Sensitivity of Ecological Receptors

Sensitivity Rating of Ecological Receptors	General Principles Associated with Sensitivity Rating
Low	• Locations with a local designation where the features may be affected by dust deposition, e.g. a local Nature Reserve with dust-sensitive features.
Medium	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or, • Locations with a national designation where the features may be affected by dust deposition.
High	• Locations with an international or national designation and the designated features may be affected by dust soiling; or, • Locations where there is a community of a particularly dust-sensitive species.

Table 9-8: Defining the Sensitivity of the Area to Ecological Impacts

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

The dust emission magnitude in Step 2A is combined with the sensitivity of the area determined in Step 2B to determine the risk of impacts with no mitigation applied. For those cases where the risk category is 'negligible', no mitigation measures beyond those required by legislation will be required. This exercise was carried out for each of the construction activities, as presented in the following tables:

Table 9-9: Risk Matrix - Demolition Activities

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

Table 9-10: Risk Matrix - Earthworks, Construction and Trackout Activities

Sensitivity of the 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

9.2.2 Road Traffic Screening

To evaluate the potential for air quality impacts arising from traffic changes, linked to the Proposed Development, criteria was established to consider changes in Annual Average Daily Traffic ('AADT') within the traffic study area. According to *Transport Infrastructure of Ireland – Air Quality Assessments for specified infrastructure projects* (2022) [5], road links which change AADT by 1,000 or more are to be included in the assessment of air quality impacts from road traffic emissions. In addition, heavy-goods vehicle ('HGV') flows that will change by more than 200 AADT or more are to be included in the assessment of air quality impacts from road traffic emissions.

As such, these AADT changes will be used as screening criteria for assessment of the potential effects on air arising from road traffic.

9.2.3 Type of Assessment

Due to the nature of emission sources at the Port—primarily mobile sources such as vessels and equipment with relatively small engines—it is not feasible to reliably quantify or model pollutant concentrations in ambient air; nonetheless, a qualitative assessment will be undertaken. Nevertheless, to enable a quantitative assessment, annual mass emissions of nitrogen oxides ('NO_x') will be completed based on the fuel usage and engine types and assessed against the National Emission Ceiling.

9.3 Policy Context

The following sections will review and highlight relevant policies relating to the Proposed Development in the context of national, regional and local air quality objectives:

9.3.1 Clean Air Strategy

The Department of Environment, Climate and Communications published a National Clean Air Strategy in April 2023 [6]. The Strategy builds upon the National Air Pollution Control Plan ('NAPCP'), which sets out a pathway based on a comprehensive cross-government programme of policies and measures that will tackle all sources of air pollution, including those from the transport, agriculture and residential sectors. The aim of this strategy is to reduce certain specific sources of emissions to air that are having the greatest impact, whilst also identifying cost-effective approaches to emission reductions [6].

Ireland's National Emission Ceiling ('NEC') for nitrogen oxides ('NO_x') is governed by the EU Directive 2016/2284, which sets binding limits on the total annual emissions of key air pollutants to protect human health and the environment. Under this directive, Ireland committed to a 49% reduction in NO_x emissions by 2020 and a 69% reduction by 2030, relative to 2005 baseline levels. These targets are implemented through the National Air Pollution Control Programme ('NAPCP'), which outlines sector-specific policies and measures—particularly in transport, residential, agriculture and energy—to achieve compliance. The NEC framework excludes emissions from international maritime traffic and aircraft beyond the

landing and take-off cycle, focusing instead on anthropogenic sources within national boundaries.

9.3.2 Kilkenny City and County Development Plan 2021 -2027

The KCCDP 2021-2027 [7] recognises the importance of a clean environment for the economic and social life of the county. Though no objectives within the KCCDP specifically address air quality, it is discussed within Section 10.2.1.1 under pollution control. The council states it will "*promote the best ambient air quality compatible with sustainable development*". It seeks to achieve this through the promotion of "*a reduction in air pollution, through the implementation of relevant legislation and through the provision of advice and guidance on best practice*."

Additionally, Section 10.2.5 of the KCCDP sets out pollution control development management requirements relevant to air quality, including:

- "*To ensure that developments which are subject to the requirements of the Air Pollution Act 1987 and Air Pollution (Licensing of Industrial Plant) Regulations 1988 or any subsequent regulations meet appropriate emission standards and other relevant national and international standards; and,*
- *To seek to minimise noise and dust through the planning process by ensuring that the design of developments incorporate measures to prevent or mitigate the transmission of dust, noise and vibration, where appropriate."*

9.3.3 Air Quality Standards

Air Quality Standards within Ireland are laid down by the Clean Air For Europe ('CAFÉ') Directive (2008/E50/EC), which was transposed into Irish law as the Air Quality Standards Regulations 2011 (S.I. 180 of 2011).

Air Quality Standards ('AQS's') are typically based on the effects of relevant pollutants on human health, although effects on other receptors such as vegetation are sometimes considered. The current limit values are laid out in Table 9-11 below.

Table 9-11: Current EU and Irish Air Quality Standards

Pollutant	Objective			
	Concentration	Maximum No. of Exceedances permitted	Exceedance Expressed as Percentile	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3	18 times per year	99.8th percentile	1 hour mean
	40 µg/m^3	~	~	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3	24 times per year	99.7th percentile	1 hour mean (Human Health)
	125 µg/m^3	3 times per year	99.2th percentile	24 hour mean (Human Health)
	20 µg/m^3	~	~	Annual mean (Vegetation)
Particulate Matter (PM_{10})	50 µg/m^3	35 times per year	90.4th percentile	24 hour mean
	40 µg/m^3	~	~	Annual mean

Pollutant	Objective			
	Concentration	Maximum No. of Exceedances permitted	Exceedance Expressed as Percentile	Measured as
Fine Particulate Matter ($PM_{2.5}$)	20 µg/m^3	~	~	Annual mean

New air quality standards for 2030 onwards have been established by Directive (EU) 2024/2881 of the European Parliament and of the Council of 23rd October 2024 on ambient air quality and cleaner air for Europe [8]. These future 2030 limit values are laid out in Table 9-12 below.

Table 9-12: 2030 EU Air Quality Standards

Pollutant	Objective			
	Concentration	Maximum No. of Exceedances permitted	Exceedance Expressed as Percentile	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3	3 times per year	99.97th percentile	1 hour mean
	50 µg/m^3	18 times per year	95.1th percentile	24 hour mean
	20 µg/m^3	~	~	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3	3 times per year	99.97th percentile	1 hour mean (Human Health)
	50 µg/m^3	18 times per year	95.1th percentile	24 hour mean (Human Health)
	20 µg/m^3	~	~	Annual mean (Vegetation)
Particulate Matter (PM_{10})	45 µg/m^3	18 times per year	95.1th percentile	24 hour mean
	20 µg/m^3	~	~	Annual mean
Fine Particulate Matter ($PM_{2.5}$)	25 µg/m^3	18 times per year	95.1th percentile	24 hour mean
	10 µg/m^3	~	~	Annual mean

9.3.4 Shipping Emissions

9.3.4.1 International Convention for the Prevention of Pollution from Ships

The International Convention for the Prevention of Pollution from Ships, 1973, as amended by the Protocols of 1978 and 1997 ('MARPOL'), covers a range of different areas in relation to pollution from ships. It was established by the International Maritime Organisation ('IMO') in 1978 and has since been amended to include multiple Annexes to address specific maritime pollution concerns. The IMO was established to adopt legislation, and Governments are responsible for implementing them. When a government accepts an IMO Convention, it agrees to make it part of its own national law and to enforce it just like any other law. The Sea Pollution (Prevention of Air Pollution from Ships) Regulations 2010 (Statutory Instrument No. 313 of 2010) implement in Irish law the IMO's 2008 revised version of MARPOL Annex VI.

MARPOL Annex VI (as amended) was added to the convention in order to address air pollution from ships, entering into force in May 2005. Annex VI provides requirements for the control of emissions from ships for a wide range of pollutants, with nitrogen oxides ('NO_x') and grouped sulphur oxides ('SO_x') and particulate matter ('PM') being specifically relevant to this Proposed Development. One specific control outlined in Annex VI is an Emission Control Area ('ECA'), in which more stringent limits on emissions apply.

Within Annex VI Regulation 13, NO_x emission limits from diesel engines have been determined and divided between three tiers and details any exemptions to controls. Ships with engines below 130kW or built before 1st January 2000 are generally exempt from NO_x controls. Major conversion to an engine over 130kW can remove this exemption unless a satisfactory justification is given.

At present, Tier I and Tier II NO_x controls are active at the Port of Waterford. Tier III controls are situationally applicable to vessels at the Port of Waterford, provided they are passing through a NO_x emissions ECA:

- Tier I controls prohibit the engine emissions of NO_x above the following limits based on rated engine speed (referred to as *n*) for applicable vessels constructed between 1st January 2000 and 1st January 2011:
    - 117.0g/kWh of NO_x for $n < 130$rpm;
    - $245*(n^{(-0.2)})$ g/kWh of NO_x for 130rpm < n < 2,000rpm; and,
    - 39.8/kWh of NO_x for $n > 2,000$rpm.
- Tier II controls prohibit the engine emissions of NO_x above the following limits based on rated engine speed for applicable vessels constructed after 1st January 2011:
    - 114.4g/kWh of NO_x for $n < 130$rpm;
    - $244*(n^{(-0.23)})$ g/kWh of NO_x for 130rpm < n < 2,000rpm; and,
    - 33.7/kWh of NO_x for $n > 2,000$rpm.
- Tier III controls prohibit the engine emissions of NO_x above the following limits based on rated engine speed for applicable vessels:
    - 13.4g/kWh of NO_x for $n < 130$rpm;
    - $29*(n^{(-0.2)})$ g/kWh of NO_x for 130rpm < n < 2,000rpm; and,
    - 32.0g/kWh of NO_x for $n > 2,000$rpm.
- Tier III controls have the following specific exemptions;
    - Engines on marine vessels below 24m in length or 24m in length but below 500 gross tonnages, which are solely for recreational usage; and,
    - Engines on marine vessels with a demonstrated combined nameplate diesel engine propulsion power of less than 750 kW, which cannot comply with standards due to design or construction.

Within Annex VI Regulation 14, SO_x controls are established and based on the sulphur content of any fuel oil used on board a ship. PM emissions are linked to SO_x emissions within Annex VI, and as such, control measures for SO_x are considered applicable to PM. SO_x controls are based on sulphur content by % mass and shall not exceed the following;

- 4.5% m/m prior to 1st January 2012;
- 3.5% m/m on and after 1st January 2012;

- 0.5% m/m on and after 1st January 2020; and,
- In ECAs, 0.1% m/m on and after 1st January 2015.

Measures for the reduction of SO_x listed include using fuels with low sulphur content, installing an exhaust gas cleaning system ('EGCS') or scrubbers and using alternative fuels such as LNG.

9.3.4.2 Sulphur Directive — reducing the sulphur content of certain liquid fuels

The European Union (Sulphur Content of Marine Fuels) Regulations 2015 (Statutory Instrument No. 361 of 2015) transposes into Irish law certain provisions of Directive 2012/33/EU of the European Parliament and of the Council of 21 November 2012 amending Council Directive 1999/32/EC (otherwise known as the 'Sulphur Directive') as regards the sulphur content of marine fuels. S.I. No. 361 of 2015 entered into force immediately upon signature on 20th August 2015.

The Directive lays down the maximum permitted sulphur content of:

- Marine diesel oil (sulphur content cannot exceed 1.5% by mass); and,
- Marine gas oil (sulphur content cannot exceed 0.1% by mass).

With regards to marine fuels, the directive incorporates into EU law the revised Annex VI MARPOL. In addition to the measure discussed in Section 9.2.4.1 above, the following relevant measures are:

- Ships are required to use marine fuel with a maximum sulphur content of 1.5% until stricter sulphur standards apply to all ships in territorial seas, exclusive economic zones and pollution control zones of EU Member States;
- Ships at berth in EU ports are required to not use marine fuels with a sulphur content exceeding 0.1% by mass, allowing sufficient time for the crew to complete any necessary fuel-changeover operation as soon as possible after arrival at berth and as late as possible before departure. The time of any fuel-changeover operation shall be recorded in the ship's logbooks. This measure does not apply to the following:
    - Whenever, according to published timetables, ships are due to be at berth for less than two hours; and,
    - Ships which switch off all engines and use shore-side electricity while at berth in ports.
- EU Member States shall ensure that marine gas oils are not placed on the market in their territory if the sulphur content of those marine gas oils exceeds 0.1% by mass.

The directive permits the use of emission abatement methods that can provide emission reductions at least equivalent to, or even greater than, the reduction achievable using low-sulphur fuel, provided that they:

- Have no significant negative impacts on the environment, such as marine ecosystems; and,
- Are developed subject to appropriate approval and control mechanisms.

To ensure the directive is correctly implemented, EU countries must:

- Ensure frequent and accurate sampling of marine fuel placed on the market or used on board ship;
- Ensure regular verification of ships' logbooks and bunker delivery notes; and,

- Introduce penalties that are effective, proportionate and dissuasive to deal with non-compliance.

9.4 Receiving Environment

9.4.1 Background Air Quality

EU legislation on air quality requires that all Member States divide their territory into zones for the assessment and management of air quality. The current trends in air quality in Ireland are reported in the EPA publication Air Quality in Ireland – Annual Report 2023 [9] [10] which is the most up-to-date report on air quality in Ireland.

For ambient air quality management and monitoring in Ireland, four zones (A, B, C and D) are defined in the AQS Regulations (S.I. No. 180 of 2011) and are defined as follows:

- Zone A: Dublin Conurbation;
- Zone B: Cork Conurbation;
- Zone C: 24 cities and large towns. Includes Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Newbridge, Mullingar, Letterkenny, Celbridge and Balbriggan, Portlaoise, Greystones and Leixlip; and,
- Zone D: Rural Ireland, i.e. the remainder of the State excluding Zones A, B & C.

According to the above classification, the Proposed Development will be located within Zone D. Tables 9-13 to 9-16 below show the baseline air quality data monitored by the EPA stations across towns located in Zone D.

Table 9-13: Annual Mean Concentrations of NO_2 Measured in Zone D

Monitoring Stations	Total Particulates NO_2 Annual Mean (µg/m³)	
	2022 Annual Mean (µg/m³)	2023 Annual Mean (µg/m³)
Birr	12.4	11.3
Briarhill	-	16.1
Carrick-on-Shannon	11.5	10.0
Castlebar	7.5	6.6
Edenderry	7.3	8.6
Emo Court	3.3	2.3
Kilkitt	2.0	1.7
Average Zone D	**7.4**	**8.1**
Average Zone D (2022-2023)	**7.7**	

The maximum concentration recorded in Zone D for NO_2 was at the Briarhill Station in 2023 (16.1µg/m^3). Annual concentrations recorded at Zone D from 2022 to 2023 ranged between 1.7 and 16.1µg/m^3.

Table 9-14: Annual Mean Concentrations of SO_2 Measured in Zone D

Monitoring Stations	Total Particulates SO_2 Annual Mean (µg/m³)	
	2022 Annual Mean (µg/m³)	2023 Annual Mean (µg/m³)
Askeaton	6.3	3.3
Cork Harbour	4.3	3.9
Edenderry	4.2	2.7
Kilkitt	2.1	1.6
Letterkenny	8.3	10.0
Average Zone D	**5.0**	**4.3**
Average Zone D (2022-2023)	**4.7**	

The maximum concentration recorded in Zone D for SO_2 was at the Letterkenny Station in 2023 (10.0µg/m^3). Annual concentrations recorded at Zone D from 2022 to 2023 ranged between 1.6 and 10.0µg/m^3.

Table 9-15: Annual Mean Concentrations of PM_{10} Measured in Zone D

Monitoring Stations	Total Particulates PM_{10} Annual Mean (µg/m³)	
	2022 Annual Mean (µg/m³)	2023 Annual Mean (µg/m³)
Birr	14.5	13.1
Carrick-on-Shannon	9.4	8.4
Castlebar	11.2	9.9
Cavan	11.0	10.0
Claremorris	7.9	8.1
Cobh Carrignafoy	13.2	11.8
Cobh Cork Harbour	14.4	11.4
Edenderry	17.7	16.3
Enniscorthy	15.0	13.3
Kilkitt	8.5	7.1
Killarney	9.1	8.9
Longford	16.0	13.1
Macroom	16.1	11.3
Malin Head	-	12.8
Mallow	13.5	10.5
Roscommon Town	11.2	9.7
Tipperary Town	13.9	10.8
Average Zone D	**12.7**	**11.0**
Average Zone D (2022-2023)	**11.8**	

The maximum concentration recorded in Zone D for PM_{10} was at the Edenderry Station in 2022 (17.7µg/m^3). Annual concentrations recorded at Zone D from 2022 to 2023 range between 7.1 and 17.7µg/m^3.

Table 9-16: Annual Mean Concentrations of $PM_{2.5}$ Measured in Zone D

Monitoring Stations	Total Particulates $PM_{2.5}$ Annual Mean (µg/m³)	
	2022 Annual Mean (µg/m³)	2023 Annual Mean (µg/m³)
Askeaton	5.5	4.8
Birr	9.5	8.3
Carrick-on-Shannon	6.3	5.4
Cavan	7.3	6.4
Claremorris	6.1	5.2
Cobh Carrignafoy	7.6	6.8
Cork Glanmire Road	-	7.6
Edenderry	13.4	12.4
Enniscorthy	10.2	9.0
Killarney	5.6	5.4
Longford	10.9	9.2
Macroom	11.0	7.3
Malin Head	-	6.8
Mallow	7.5	6.1
Roscommon Town	7.6	6.4
Tipperary Town	9.1	6.7
Average Zone D	**8.4**	**7.1**
Average Zone D (2022-2023)	**7.8**	

The maximum concentration recorded in Zone D for $PM_{2.5}$ was at the Edenderry Station in 2022 (13.4µg/m^3). Annual concentrations recorded at Zone D from 2022 to 2023 range between 5.5 and 13.4µg/m^3.

In addition to the national dataset above, speciated PM monitoring was carried out at the Site between 21st and 27th August 2023, with a full report presented in Appendix 8-1. To summarise;

- 24-hour mean PM_{10} concentrations represent only partial daily averages, as full datasets were limited on these dates due to the installation and removal of the monitoring equipment; and,
- For the duration of the monitoring event:
    - The average 24-hour mean $PM_{2.5}$ concentrations at the monitoring location were 1.55µg/m^3 - 3.2% of the 2030 target daily AQS limit value of 25µg/m^3; and,
    - The average 24-hour mean PM_{10} concentrations at the monitoring location were 1.97µg/m^3- 4.4% of the 2030 target daily AQS limit value of 45µg/m^3.

The average and maximum values for PM_{10} and $PM_{2.5}$ concentrations were below the corresponding national dataset values. As such, to provide a conservative assessment of average annual background PM_{10} and $PM_{2.5}$, the national verified datasets will be utilised in this assessment due to their higher concentrations and full annual coverage when compared to the site-specific data.

9.4.2 Other Sources of Emissions to Air in the Vicinity of the Proposed Development

Notable sources of potential emissions to air within the vicinity of the Proposed Development include:

- Traffic associated with the nearby roads, including the L7582 industrial access road and the N29;
- Operations currently active at the Port of Waterford;
- Industrial facilities, including SmartPly Europe, Suir Shipping and O'Brien's Cement, that are active around Belview Port;
- Agricultural activities; and,
- Residential dwellings.

Emissions from these sources are already included in the background air quality at the Site.

9.4.2.1 Licenced Facilities

Table 9-17 below gives further information on IE licensed facilities within 5km of the Proposed Development. No IPC operations were identified within 5km.

Table 9-17: The nearest IEL facilities located around the Proposed Development

Licence Number	Name	Licensable activity	Orientation from Site	Distance
P0001	SmartPly Europe Designated Activity Company	Industry	North	Ca. 0.3km
P0040	Anglo Beef Processors Ireland Unlimited Company t/a ABP Proteins Waterford	Industry	Southwest	Ca. 3.9km
P0205	Anglo Beef Processors Ireland Unlimited Company trading as ABP Waterford	Industry	Southwest	Ca. 4.1km
P0606	SSE Generation Ireland Limited (Great Island)	Industry	Northeast	Ca. 2.4km
P0963	Tirlán Limited	Industry	Southwest	Ca. 0.9km
P1015	Glanway Limited	Industry	South	Ca. 0.5km
P1180	Kilkenny Cheese Limited	Industry	Southwest	Ca. 1.2km

9.4.2.2 Traffic

An outline of existing traffic is presented in Chapter 16 of this report. However, for the purposes of air quality assessment under the TII guidance [11], AADT values for the road are required. As Chapter 16 primarily utilises Peak AM/PM flows within its discussions of road traffic, AADT for the N29 road was obtained from the TII Traffic Count Data Website [12]; however, no other road links noted in Chapter 16 have available AADT data. Table 9-18 below shows the yearly data for the N29 between 2020 and 2023.

Table 9-18: TII N29 ADDT Data 2020 - 2023

Year	AADT	HGV %
2023	3,008	29.3
2022	2,605	34.8

Year	AADT	HGV %
2021	2,464	36.8
2020	2,351	37.2

9.4.2.3 Shipping

Following the implementation of MARPOL Annex VI on 1st January 2020, ships docking at the Port of Waterford are limited to using cleaner fuels such as Low Sulphur Fuel and Liquefied Natural Gas. Liquefied Natural Gas produces 25% less CO_2, 100% less SO_x and Particulate Matter and 90% less NO_x, when compared with Heavy Fuel Oil, the pre-2020 standard shipping fuel type. Therefore, since 2020, ships operating at the Port have significantly reduced effects on air quality.

Existing ships at berth are approximately 239 ships as of 2023 data, across four berths. Current usage of marine gasoil is 608,004L.

The transit of ships into the port is facilitated by tugboats contracted from Waterford City. Typical tugboat requirements at the port are:

- For vessels 120m – 130m one large tug may be required;
- For vessels 130m – 145m one large tug is compulsory; and,
- For vessels 145m – 190m two large tugs are compulsory.

Beyond the vessels and tugboats themselves, pilot vessels, used to transit to and from larger ships, utilise 11,500L hydrogenated vegetable oil ('HVO') at present.

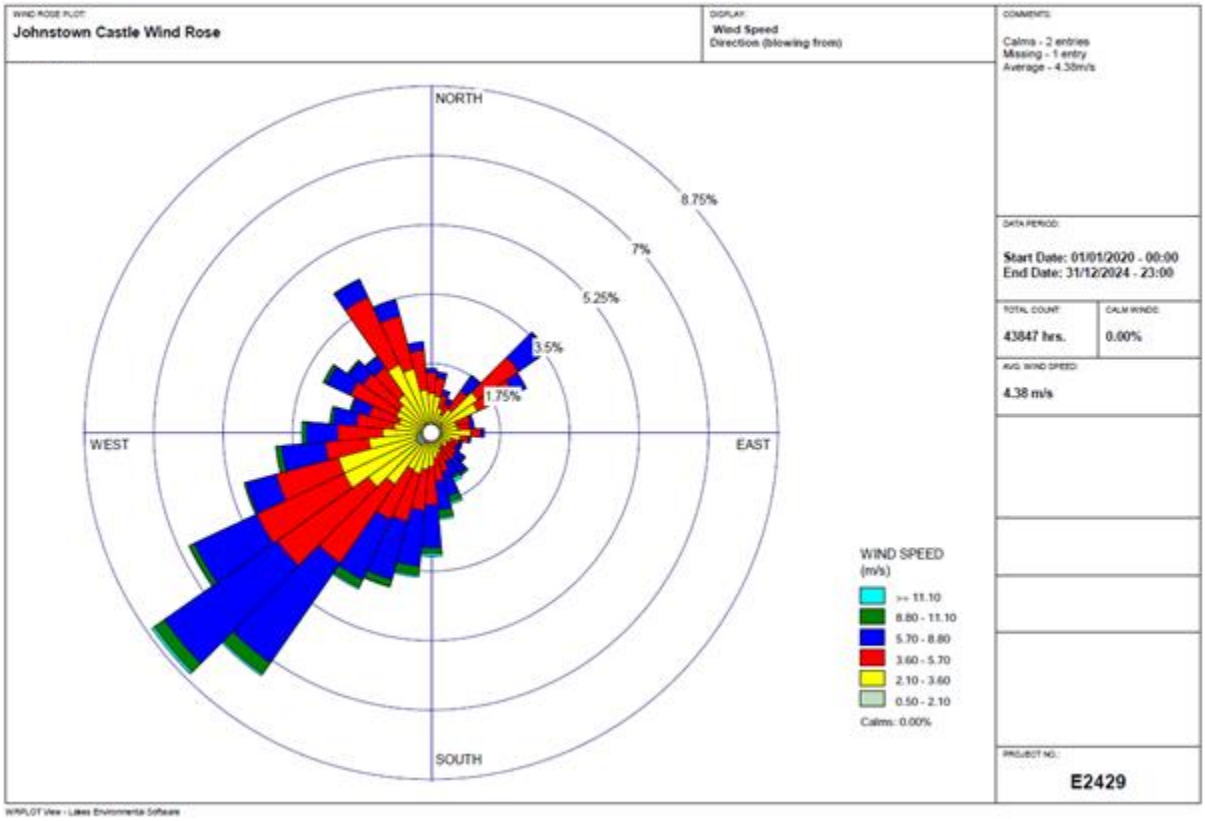
In addition to ships, there is onshore equipment associated with the loading / unloading of ships, including cranes. At present, three mobile harbour cranes operate using diesel engines, with secondary handling machinery contributing to approximately 140,000L of diesel fuel consumption annually.

9.4.3 Weather Conditions

Weather conditions can have a significant effect on the dispersion of emissions, including ambient dust, thus influencing the impacts on nearby sensitive receptors. Higher levels of dust deposition typically occur during dry spells associated with medium to strong breezes (>5.5m/s).

The nearest synoptic meteorological station is Johnstown Castle, Co. Wexford. The station is located ca. 36km east of the Proposed Development. A windrose diagram was completed to determine the potential influence of wind direction and speed on airborne dust particles, shown in Figure 9-2 below. The meteorological data consisted of five years of data (2020-2024 inclusive).

Figure 9-2: Windrose for Johnstown Castle (2020-2024)



The average wind speed recorded over the period is 4.38m/s (2020-2024), which remains below the 5.5m/s threshold. The prevailing wind direction is from the southwest; however, infrequent wind components occur from the northeast and northwest. Therefore, receptors located to the northeast will have increased sensitivity to the effects of dust from the Proposed Development. Table 9-19 below summarises the rainfall and wind speed data from the meteorological station.

Table 9-19: Weather Data for Johnstown Castle 2 station between 2020-2024

Year	Wind Speed (m/s)	Annual Precipitation (mm)
2020	4.72	1150
2021	4.18	1070
2022	4.34	996
2023	4.37	1300
2024	4.33	1180
Average Wind Speed and Average Annual Precipitation (2020-2024)	**4.38**	**1140**

9.4.4 Construction Phase Dust Sensitive Receptors

For the purposes of the Construction Dust Risk Assessment, a human receptor denotes any site where individuals could be subject to the health consequences of airborne particulate matter or disturbances in amenity or properties from dust deposition. An ecological receptor pertains to sensitive habitats that might be influenced by both airborne dust emissions and dust soiling [1]. Proxies are provided to represent the most prominent / closest receptors to the Proposed Development.

When numerating a receptor as a proxy, exact counting is not required. As an alternative, it is recommended that professional judgement is utilised by the competent person to determine the approximate number of receptors (i.e. residential dwelling: 1 receptor, school: >100 receptors).

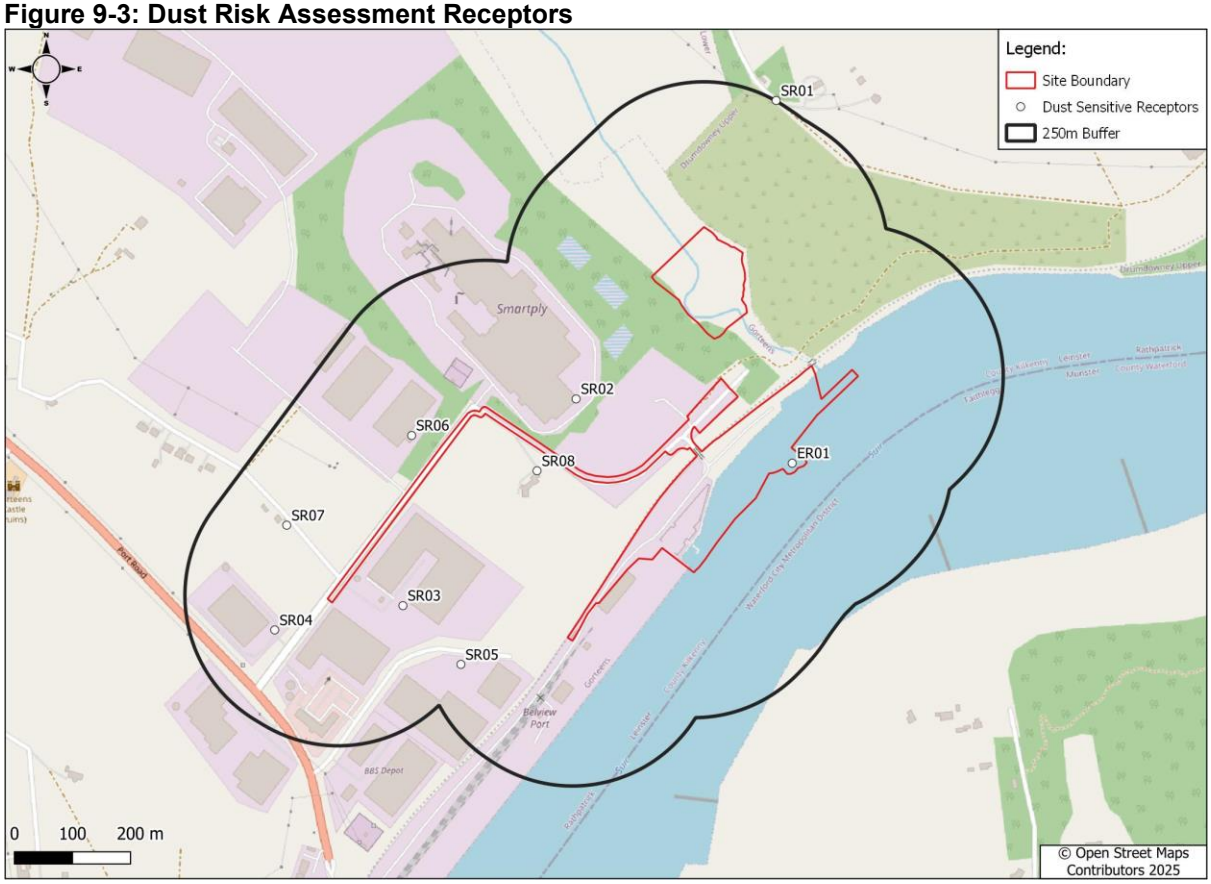
The IAQM approach for assessing receptors within 250m of the dust-generating activities has been adopted for this assessment. As such, a total of eight human receptors and one ecological receptor were identified at varying distances to the redline boundary and the primary access route (Table 9-20 and Figure 9-3 below). The distances displayed below show the receptor's distance to the nearest dust source, taken as the site boundary or the primary access route used by construction vehicles.

Table 9-20: Dust Sensitive Receptors

SR ID	Receptor Sensitivity	Distance to Nearest Applicable Boundary	Orientation From Wharf	Number of receptors expected to be impacted	Description of Receptor
SR01	High	ca.250m	North	1-10	Proxy for single residence
SR02	Medium	ca.97m	West	>10	Proxy for Smartply Europe
SR03	Medium	ca.101m	West	>10	Proxy for Belview Port Office
SR04	Medium	ca.112m	West	>10	Proxy for Signode Ireland Business
SR05	Medium	ca.189m	West	>10	Proxy for Target Fertilisers
SR06	Medium	ca.52m	West	>10	Trackout proxy Port warehouses
SR07	High	ca.228m	West	10-100	Proxy for residential houses
SR08	High	ca.32m	West	1-10	Proxy for single residence

SR ID	Receptor Sensitivity	Distance to Nearest Applicable Boundary	Orientation From Wharf	Number of receptors expected to be impacted	Description of Receptor
ER01	High	0m	Overlaps with Site	-	Lower River Suir SAC

Figure 9-3: Dust Risk Assessment Receptors



9.5 Characteristics & Potential Effects of the Proposed Development

9.5.1 Construction Phase – Activities

The potential effects caused by the construction activities and machinery on-site, releasing NO_x and SO_2, were screened out of this assessment, as any emissions will likely be minimal [1] and as such effects will be not significant.

9.5.2 Construction Phase – Traffic

The evaluation of construction-related traffic considered the following threshold identified within the TII guidance:

- HGV flows that will change by more than 200 AADT or more.

Current Construction Phase traffic predictions estimate peak HGV traffic (which excludes personnel and visitor vehicles) to occur during the reclamation works of the Construction Phase, with a predicted 87 HGVs per day. When including personnel and visitor vehicles (approximately 27) during this period, the increase in traffic corresponds to ca. 104 vehicles per day.

These counts are all below the threshold identified within the TII guidance for HGVs, even under the conservative inclusion of non-HGV construction traffic. Therefore, construction traffic was screened out of this assessment, and any effects arising will be not significant.

9.5.3 Construction Phase – Dust Risk Assessment

Construction activities can be divided into four types (demolition, earthworks, construction and trackout) to reflect their potential effects. These activities were rated based on their potential dust emission magnitude (small, medium, large) [1]. Concrete batching will be not likely to occur on-site.

No dust generation was predicted to occur from the dredging activities or potential reuse of this material (which would be immediately upon dredging), due to the high percentage of water within the dredged material upon initial removal.

9.5.3.1 Dust Magnitude

Below presents the activities for the Construction Phase and the associated dust emission magnitude in accordance with the methodology presented in Section 9.2.1, to summarise:

- Demolition: A total volume of ca. 3,000m^3 material, which includes concrete and metal, will be demolished as part of works to remove the downstream ramp. This will be reused for reclamation where possible. Demolition activities <6m above ground, adjacent to the waterfront. Note: Demolition of the existing pontoon will not generate any dust, and therefore not assessed any further. Dust emission magnitude for demolition activity has been determined as **Small**;
- Earthworks: The Proposed Development has an estimated total site area of 80,600m^2. The dominant material to be excavated consists of soils, stones and concrete slab. Land reclamation will occur on-site, involving the import of approximately 160,000 tonnes of engineering fill materials for deposition above and below the waterline. Dredged material arising from the capital dredging works will be incorporated into land reclamation materials as much as practicable. Dredged material will comprise estuarine clays, silts and sands. Between 5-10 heavy earth-moving vehicles were predicted to be in operation at any one time. The estimated dust emission magnitude from these factors was therefore determined as **Large**;
- Construction: It was estimated that the total construction volume 12,000m^3–75,000m^3 of concrete and other materials (e.g. stone and precast concrete) will be required. Dust emission magnitude for construction activity has been determined as **Medium**; and,
- Trackout: Due to the estimated number of HGVs travelling per day (87) traversing over <50m of unpaved road, the dust emission magnitude for trackout activities has been determined as **Large**.

9.5.3.2 Sensitivity

The sensitivity of the area (high, medium, low) was determined in accordance with IAQM Guidelines. The following effects are considered when assessing the sensitivity of the area:

- Sensitivity of people to dust soiling;
- Sensitivity of human health to the effects of PM_{10} exposure; and,
- Sensitivity of ecological receptors.

When determining the sensitivity of the area, the IAQM gives guidelines for assessing the sensitivity of the individual receptors. For each individual receptor, the sensitivity is determined through a combination of the number of receptors expected to be impacted and the distance

of the receptors to the source of emissions. Table 9-21 details the sensitivity of each individual receptor to dust soiling and the rating attributed.

Table 9-21: Sensitivity of human receptors to dust soiling from the Proposed Development

Receptor ID	Receptor Sensitivity	Distance to Nearest Applicable Boundary	Orientation From Wharf	Number of receptors expected to be impacted	Sensitivity Rating for Dust Soiling	Reason for Receptor Sensitivity
SR01	High	ca.250m	North	1-10	Low	Sensitivity rating justified based on Section 9.2.1 above.
SR02	Medium	ca.97m	West	>1	Low	Sensitivity rating justified based on Section 9.2.1 above.
SR03	Medium	ca.101m	West	>1	Low	Sensitivity rating justified based on Section 9.2.1 above.
SR04	Medium	ca.112m	West	>1	Low	Sensitivity rating justified based on Section 9.2.1 above.
SR05	Medium	ca.189m	West	>1	Low	Sensitivity rating justified based on Section 9.2.1 above.
SR06	Medium	ca.52m	West	>1	Low	Sensitivity rating justified based on Section 9.2.1 above.
SR07	High	ca.228m	West	10-100	Low	Sensitivity rating justified based on Section 9.2.1 above.
SR08	High	ca.32m	West	1-10	Low	Sensitivity rating justified based on Section 9.2.1 above.

To assess the sensitivity of individuals to potential PM_{10} exposure from construction activities, the sensitivity threshold identified in the IAQM Guidance was utilised. The sensitivity categorisation includes background concentrations for the area, established as 11.8µg/m^3 for PM_{10} based on an annual average for Zone D between 2022 and 2023, as published by the EPA [9] [10].

Table 9-22: Sensitivity of human receptors to PM_{10} exposure from the Proposed Development

SR ID	Receptor Sensitivity	Annual Mean PM_{10} Conc. (µg/m^3)	Distance to Nearest Applicable Boundary	Orientation From Wharf	Number of receptors expected to be impacted	Receptor Sensitivity Rating for PM_{10}	Description of Receptor
SR01	High	11.8	ca.250m	North	1-10	Low	Proxy for single residence

SR ID	Receptor Sensitivity	Annual Mean PM_{10} Conc. ($\mu g/m^3$)	Distance to Nearest Applicable Boundary	Orientation From Wharf	Number of receptors expected to be impacted	Receptor Sensitivity Rating for PM_{10}	Description of Receptor
SR02	Medium	11.8	ca.97m	West	>10	Low	Proxy for Smartply Europe
SR03	Medium	11.8	ca.101m	West	>10	Low	Proxy for Belview Port Office
SR04	Medium	11.8	ca.112m	West	>10	Low	Proxy for Signode Ireland Business
SR05	Medium	11.8	ca.189m	West	>10	Low	Proxy for Target Fertilisers
SR06	Medium	11.8	ca.52m	West	>10	Low	Trackout proxy Port warehouses
SR07	High	11.8	ca.228m	West	10-100	Low	Proxy for residential houses
SR08	High	11.8	ca.32m	West	1-10	Low	Proxy for single residence

In summary:

- Out of the eight human proxy receptors identified, all were classified as having a Low sensitivity to dust soiling, due to the distance from the Site boundary and the nature of the receptors – the majority are businesses, and the proxy receptors for residences do not represent enough individual receptors to have greater sensitivity to dust soiling;
- As per the IAQM Guidelines [1], the highest sensitivity rating considered for all receptors reflects the sensitivity of the area and therefore, the rating of the area was determined as **Low**, for dust soiling effects;
- Out of the eight human receptors identified, all were classified as having a Low sensitivity to PM_{10} exposure, due to background concentrations of PM_{10} being below $24\mu g/m^3$;
- Based on the IAQM Guidance, the highest sensitivity rating from an individual receptor was used to conservatively estimate the sensitivity of the area. Therefore, the sensitivity of the area to potential PM_{10} exposure was classified as **Low**; and,
- A single ecological receptor was identified for the Site – the Lower River Suir SAC. The Lower River Suir SAC is an internationally protected Site within the dust impact screening area; it was considered to have a **High** sensitivity rating. Therefore, the overall sensitivity to ecological impacts for the Lower River Suir SAC was **High**.

9.5.3.3 Risk of Impact

To identify the risk of impacts from dust emissions with no mitigation measures implemented, the dust magnitude and sensitivity of the area were used to determine the risk of impact for each activity during the Construction Phase of the Proposed Development. See Table 9-23 below.

Table 9-23: Summary of Potential Risk of Dust Effects

Potential Effect	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible	Low	Low	Low
Human Health (PM_{10} Exposure)	Negligible	Low	Low	Low
Ecological Impact	Medium	High	Medium	High

9.5.4 Operational Phase – Traffic

For the Operational Phase, the assessment focuses on the potential effects of traffic on emissions within the Traffic Study Area, which has been identified based on thresholds defined in the TII guidance [5];

- Daily traffic flows will change by 1,000 AADT or more; or,
- HGV flows will change by 200 AADT or more.

The predicted maximum daily traffic figures, detailed in Chapter 16, comprise a worst-case increase of 100 personnel vehicles (70 from ORE facilities and 30 from the Port of Waterford staffing increases) and 145 HGVs in one day (245 total). The actual AADT increase will likely be lower as the 70 ORE personnel vehicles represent a time when both offshore crews travel to or from the Site on the same day. However, the worst-case values predicted for the Operational Phase will be below the 200 AADT for HGVs and 1,000 AADT for overall traffic.

As such, an assessment of potential traffic-related pollutants has been screened out, as traffic generated during the operational phase of the Proposed Development will not have a significant air quality effect on human health or designated habitats.

9.5.5 Operational Phase - Fuel Usage

9.5.5.1 Emissions from Cargo Vessels

The predicted increase in capacity for shipping from the Proposed Development was approximately a total of 120 cargo vessels per year across two berths. As such, the Proposed Development was predicted to increase the total number of cargo vessels from ca. 239 to ca. 359 cargo vessels per year, or just over 1 cargo vessel per day across all berths. This equates to a 49.4% increase in ship numbers relative to the 2023 ship numbers (239). The primary pollutants associated with ship engine emissions are SO_2, PM_{10} and NO_x. However, as described in Section 9.3.4 above, there are international and EU regulations established limiting such emissions.

SO_2 emissions are strictly regulated within the EU under Directive (EU) 2016/802, wherein limits are set out for the sulphur content of fuels for ships sailing in EU territorial waters and for ships at berth. The lower the fuel sulphur percentages, the lower the amount of SO_2 generated in fuel burning. Given the particularly strict 0.1% sulphur content limit imposed by the directive on ships at berth, significant increases in SO_2 concentrations around the port,

resulting from the Proposed Development, were considered unlikely. Any effects resulting from increased ship traffic were predicted to be permanent slight negative, but not significant. As noted in the MARPOL Annex VI Regulation 14, PM_{10} is closely associated with SO_2 and as such negative effects resulting from the engine sourced PM_{10} Proposed Development were also predicted to be permanent but not significant.

NO_x emissions from shipping are similarly controlled by standards set for engines within the MARPOL Annex VI, as shown in Section 9.3.4.2. As NO_x emissions controls are in place at the port, the worst-case emissions scenario is that all ships entering use Tier 1 restrictions on emissions, with a rated engine speed of <130rpm (17g/kWh). Based on this assumption, worst-case increases in NO_x emitted can be calculated, using fuel quantities and UK Department for Energy Security and Net Zero ('DESNZ') conversion tables [13], as in Table 9-24 below:

Table 9-24: Worst-Case NO_x Marine Gas Oil emissions

Scenario	Ship No.	Marine Gas Oil Fuel Usage (litres)*	Marine Gas Oil Fuel Usage (kWh)	NO_x Emission (tonnes)
Existing (2023 Data)	239	608,004	6,531,577	111
Predicted Future	359	908,527	9,759,992	166
Increase	120	300,523	3,228,415	54.9

* Fuel Usage includes tugboat fuel usage associated with larger vessel, using the same 17g/kWh worst-case assumption.

It should be noted, however, that the NO_x emissions calculated within Table 9-24 are cumulative annual mass emissions. Moreover, they represent the total emissions generated by vessels over their transit paths from the Belview Port to international waters and while at berth, from the fuel supplied by the port for refuelling vessels. This means that these emissions will disperse over a large area, unlikely to cause a significant or even measurable increase in concentrations of NOx at any one location.

In addition to marine gas oil usage, a component of emissions will be sourced from pilot launches utilising HVO. Table 9-25 below shows the calculated HVO related NO_X emissions, using the same worst-case assumptions and DESNZ conversion tables [13].

Table 9-25: Worst-Case NO_x HVO emissions

Scenario	HVO Fuel Usage (litres)	HVO Fuel Usage (kWh)	NO_x Emission (tonnes)
Existing	11,500	120,898	2.06
Predicted Future	14,687	154,403	2.62
Increase	3,187	33,505	0.570

As part of the commitments made under S.I. No. 232/2018 - European Union (National Emission Ceilings) Regulations [14], national reduction targets for NO_x emissions relative to 2005 levels (134,140 tonnes) were set – a 49% reduction between 2020-2029 and a 69% reduction from 2030 onwards. This 69% reduction is an effective 92,557 tonnes ceiling on NO_x emission from 2030 onwards, with the predicted emissions from the Proposed Development

of ca. 55.47 representing a 0.06% contribution to this ceiling. This represents a not significant effect on the National Emissions Ceiling for NO_x.

9.5.5.2 Emissions from ORE Operations

Operators for the ORE will have at maximum six vessels for usage in ORE activities – four CTVs and two SOVs. As discussed in Chapter 3, Section 3.5 above, the SOVs will predominantly spend time offshore, returning approximately every two weeks for maintenance and resupply. The CTVs will make a single round trip from the ORE installations each day. These vessels will predominantly emit into the air during transit to the ORE installations. Journeys associated with these vessels take them to offshore installations, away from onshore receptors, limiting any effects on onshore receptors arising from their emissions to air.

SO_2 and PM emissions from these vessels will be permanent, negative and imperceptible, based on the same justification as the other marine vessels in Section 9.5.5, accounting for their limited time spent near onshore receptors. This will be unlikely and 'not significant' effect.

The ORE vessels have a predicted usage of 1,452,820L (15,607,143kWh) of marine diesel fuel – See Table 17-4, based on daily operation of the four CTVs and fortnightly operation of the two SOVs. Using the same worst-case assumptions for NO_x emissions as in Section 9.5.5, this would account for 265 tonnes of NO_x or a 0.29% contribution to the 2030 NO_x ceiling. This will represent a not significant effect on the National Emissions Ceiling for NO_x.

9.5.5.3 Cargo Handling Equipment

Associated with shipping emissions are emissions sourced from the operations of onshore equipment, including cranes with fuelled engines, utilised in the loading and unloading of vessels, and other such onshore equipment. On-site mobile harbour cranes currently utilise diesel fuels and have engine power of 400kW; however, the proposed onshore cranes associated with ORE will be electrified. SO_2 emissions associated with diesel will be low, due to strict sulphur content regulations within the EU, and as such SO_2 emissions were considered to result in imperceptible effects (i.e. not significant).

The predicted increase in fuel usage for the cranes and ancillary equipment resulting from the Proposed Development was 70,000L of diesel. Directive 97/68/EC of the European Parliament 1997 (as amended) [15] sets out exhaust NO_x emissions standards and was transposed into Irish law under S.I. No. 396/1999 - European Communities (Control of Emissions of Gaseous and Particulate Pollutants From Non-Road Mobile Machinery) Regulations, 1999. Based on the provided engine specifications, including engine power, the applicable standard set out under this regulation is 0.40g/kWh for these crane engines.

Utilising the DESNZ conversion tables [13], the calculated NO_x emissions for the increased diesel usage 0.296 tonnes. This represents <0.001% of the National Emissions Ceiling for NO_x - an imperceptible effect, i.e. not-significant

9.5.5.4 Overall Operational Phase Emissions

Given the type of combustion sources, which are either travelling (i.e. vessels) or relatively small (e.g. cranes) or both (e.g. pilot vessels), type of fuel use (low sulphur diesel and marine diesel), low number of cargo vessels (ca. 1 per day), and regulations in place controlling the engine emissions, as well as good background air quality, all of which is detailed above, there will be no likely and significant effect on the ambient air quality, in the vicinity of the Site. Specifically, the concentrations of the relevant air quality pollutants, namely NO_x, SO_2 and PM_{10}, will not significantly increase. Therefore, no likely significant effects on human health or ecological receptors have been predicted.

NO_x mass emissions from cargo vessels, ORE operations and cargo handling equipment would account for ca. 320.77 tonnes of NO_x or a 0.35% contribution to the 2030 NO_x ceiling.

As such, NO_x emissions will be permanent, negative and slight, however, not significant, accounting for their limited time spent near onshore receptors.

9.5.6 Operational Phase – Loading / Unloading Vessels and Cargo Handling Equipment Dust

Beyond the engine emissions, dust emissions will occur as part of unloading / loading activities at the Site, which could produce disamenity for sensitive human receptors. No specific methodology exists for the assessment of disamenity effects for the unloading / loading of marine vessels on sensitive receptors. However, as noted in Section 9.4.3, prevailing wind direction and speed (above 5.5m/s) will influence the dispersion of dust, with the nearest weather station reporting wind data (Johnstown Castle, 36km east) indicating an average wind speed of 4.38m/s (2020-2024) and a prevailing wind direction from the southwest, with infrequent wind components occur from the northeast and northwest. Given this, dust dispersal was predicted to occur towards northeastern receptors when high winds overlap with material handling at the Site. Based on Figure 9-3, there are no human receptors for dust disamenity that occur northeast of the waterfront, where dust-generating activities will occur. As such, disamenity effects from dust deposition were predicted to be slight negative as disamenity will be restricted to receptors located downwind of the infrequent wind components. This will be an unlikely and 'not significant' effect.

9.6 Proposed Mitigation Measures and/or Factors

The following mitigation measures will be incorporated and adhered to during the Construction and Operational Phases of the Proposed Development.

9.6.1 Construction Phase

9.6.2 Dust Mitigation Measures

The mitigation measures have been divided into general measures applicable to the entire Site for the duration of the Construction Phase and measures applicable specifically to the demolition, earthwork, construction and trackout activity outlined below.

A Dust Management Plan ('DMP') will be prepared for the Site and agreed with the Planning Authority prior to the commencement of site works. The DMP will be implemented during the Construction Phase of the Proposed Development.

General Mitigation Measures will include:

- Site Management:
    - Will make the complaints log available to the Local Authority when asked;
    - A wheel wash facility will be provided at each exist point for the duration of the construction works. All vehicles will be required to pass through the wheel wash facility before exiting the Site to public road network. The wheel wash must be kept in place and used throughout the critical dirt-generating activities of the construction works. Where appropriate, water supplies servicing the wheel wash will be from recycled sources. All waters shall be drained through appropriate filter material prior to discharge or collected for offsite disposal;
    - Record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation in the logbook; and,
    - Records of any dust complaints will be made, and the appropriate time and action will be taken when required.
- Monitoring:
    - Carry out regular inspections of and/or around the boundary of the Site; and,

  - The frequency of the site inspections will be increased during high dust-generating activities and during prolonged dry or windy conditions, particularly in the case of earthworks.

- Site Preparation:
  - Erect barriers around the Site, where possible;
  - Keep fencing, barriers and/or scaffolding clean and free of dust;
  - Remove materials that have the potential to produce dust from the Site as soon as possible unless being re-used onsite. If being used onsite, they will be covered or wetted to prevent wind whipping;
  - Plan Site layout so that dust-generating activities will be located away from receptors, as far as is possible; and,
  - Cover or fence stockpiles to prevent wind whipping.
- Construction Vehicles:
  - The use of diesel- or petrol-powered generators will be avoided, where possible;
  - Traffic to and from the site will be managed to avoid congestion where possible; and,
  - Vehicle engines will be switched off when stationary- no-idling.
- Construction Works:
  - Use cutting, grinding, or sawing equipment fitted with suitable dust suppression techniques such as water sprays;
  - Ensure there will be a water supply onsite for the suppression of dust capable of reaching all parts of the Site;
  - Minimise drop heights from handling equipment will be implemented across all activities; and,
  - Ensure equipment will be readily available to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Waste Management:
  - No burning of waste will be permitted on-site.

The mitigation measures below detail the activity-specific mitigation measures related to the Proposed Development for the Construction Phase, which had a Large Risk of dust soiling and a High Risk of PM_{10} exposure from dust emissions:

- Demolition / Construction:
  - Use water suppression where possible / suitable
  - Scabbing (Roughening of concrete surfaces) will be avoided where possible;
  - Sand and other aggregates will be stored in enclosed or bunded areas unless required for a particular purpose;
  - Bulk cement or other dried powder material will be delivered in enclosed trucks; and,

- For smaller supplies of fine power materials, the bags will be sealed after use and stored appropriately to prevent dust.

- Earthworks:
  - Stabilise stockpiles as soon as possible.
- Trackout
  - Water-assisted dust sweeper(s) will be used on the access and local roads, to remove, as necessary any material tracked out of the Site;
  - Dry sweeping of large areas will be avoided; and,
  - On-site haul routes will be inspected for integrity, and necessary repairs will be instigated to the surface as soon as reasonably practicable.

With the implementation of the above mitigation measures, the residual effects of the Construction Phase on air quality will be not significant, and the risk of effects will be reduced to Negligible.

9.6.3 Operational Phase

9.6.3.1 Emissions from Cargo Vessels

As previously discussed within this chapter, there are a number of international regulations that control emissions, primarily through moderating fuel compositions or setting emission targets for engines. These controls will remain active across the Site, following the completion of the Proposed Development.

9.6.3.2 Loading / Unloading Vessels and Cargo Handling Equipment

Whilst no significant effects have been identified for the dust emissions from loading / unloading vessels at the Site, the following mitigation measures will be implemented on-site to minimise dust emissions;

- Minimise drop heights where possible; and,
- Utilise hoppers for granular/pelletised materials, when practical and/or possible.

9.7 Cumulative and In-Combinations Effects

The Site is located within an active port that is surrounded by numerous industrial and port-related facilities, as listed in Chapter 6, Section 6.8 above. These facilities operate in tandem with the current Port of Waterford operations. It was considered that during the construction and operational phase of the Proposed Development, these facilities will continue to operate under normal activity levels. Furthermore, it was considered that during the construction phase, the Port will carry out normal operations, which include shipping traffic, maintenance dredging and port-related activities. However, the effects of all these activities are already included in the background air quality (refer to section 9.4.1). Background annual mean for NO_2 is ca. 19%, for PM_{10} is ca. 30% and for $PM_{2.5}$ is 39% of the relevant AQSs, i.e. well below the relevant AQSs with ample remaining capacity of the environment to absorb additional emissions.

Further, the EPA's AG4 Air Dispersion Modelling Guidance [16] defines the requirement for assessing cumulative emissions to air if annual emissions exceed 250 tonnes per annum of a given pollutant. As the emissions of NO_x, the key pollutant, will increase by ca. 320.77 tonnes per annum (refer to section 9.5.5 above), further cumulative assessment is required. The most significant source of NOx emissions outside of activities already captured by background industrial emissions is from maintenance dredging / ploughing of the channel. Port records from 2019 indicate that combining ploughing and dredging activities utilises 5,002,840kWh of

energy. Assuming a worst-case scenario for the maintenance vessels (a NO_x emission of 17g/kWh), this represents 85.0 tonnes of NO_x across the maintenance period, or 0.092% contribution to the 2030 NOx ceiling. Cumulatively, it was predicted that the current Port operations, the Proposed Development and the maintenance dredging operations will emit ca. 406 tonnes of NOx annually, or 0.44% of the National ceiling cumulatively. Given this, it was considered that the emissions associated with the Proposed Development's operational phase will not likely have a significant effect cumulatively with other emission sources in the area.

Cumulative effects of dredging operations on ambient air quality (i.e. concentrations of the pollutants), together with the Port's activities, can be screened out, due to dredgers being travelling sources, operating outside the immediate location of the Proposed Development, at a sufficient distance from all other sources detailed in Section 9.5.5. to allow sufficient dispersion of pollutants.

It should be noted that the Port of Waterford have previous planning applications that have been granted within the environs of the Port. However, these works have already been undertaken and, as such, are not considered likely to result in any in-combination effects with the Proposed Development during the construction phase.

9.8 Interactions with other Environmental Attributes

Air Quality interacts with other environmental attributes as follows:

- Chapter 5 (Population and Human Health). Potential effects on human health due to increased emissions to air are unlikely to occur following the implementation of mitigation measures. The air quality assessment concluded that the construction and operation phase effects will be not likely and not significant;
- Chapter 6 (Biodiversity). Potential effects on sensitive ecological receptors have been considered in the Dust Risk assessment. Following the implementation of mitigation measures, the effects of the Construction Phase on air quality will not be significant. Full discussion of the effects on biodiversity occurs in Chapter 6;
- Chapter 7 (Soils and Geology). The mobilisation of land, soils and geology through demolition and construction processes can affect air quality. The effects on air quality, as addressed in Chapter 9, will be not significant;
- Chapter 8 (Water). Due to the proximity of the nearby surface waterbody, particulates from the Proposed Development have the potential to enter surface waters and contribute to suspended solids (The effect of increased suspended solids on water are discussed in Chapter 8). Construction dewatering and dust suppression activities may involve minor water use but will not materially affect water availability. Overall, the interaction between water and air quality was predicted to be imperceptible;
- Chapter 10 (Climate). GHG emissions can directly impact air quality. However, it has been demonstrated in Chapters 9 and 10 that both of these effects will be 'not likely' and 'not significant'; and,
- Chapter 16 (Material Assets - Traffic and Transport). Traffic and air emissions are interlinked and discussed within this chapter, concluding that traffic-related effects will be not significant. A full discussion of the changes to traffic resulting from the Proposed Development is available in Chapter 16.

9.9 Indirect Effects

In the absence of the Proposed Development, the increase in ships arriving at the port would travel to Dublin or Cork ports. As such, goods from these vessels would then have to be transported by road to the midlands and southeast, via already congested routes and the most air quality-impacted areas in Ireland (M50/N7). The Proposed Development will bring goods

closer to their intended destination and thereby reduce air quality impacts on Dublin, Cork and connected roads.

Providing infrastructure to support renewable energy from offshore wind farms will not only have positive effects on climate change but will also lower air emissions from energy generation due to the replacement of energy generated by the combustion of fuels, resulting in emissions from wind energy, which produces no emissions to air. However, the exact scope of this positive effect was not possible to quantify within this assessment.

9.10 Residual Effects

Following the implementation of mitigation measures, effects arising from construction phase dust generation and traffic were predicted to be unlikely and not significant.

Operational traffic increases were predicted to be below the relevant TII thresholds for full assessment, and as such, emissions from increased traffic will be not significant. Similarly, whilst there will be some emissions from the ORE vessels during the operational phase of the Proposed Development, the small vessel size, combined with long periods of absence from the Site related to ORE operations, will result in emissions which will be not significant.

The expansion of the wharf will facilitate an increased number of ships at berth throughout the year, contributing to increased emissions from both the usage of onshore equipment for loading / unloading ships and from the auxiliary engines of the vessels themselves. Based on the stringent controls of sulphur content of fuel used within ship engines and the diesel utilised by onshore equipment, any increases in SO_2 from the Proposed Development were predicted to be not significant. Additionally, particulate matter emissions are explicitly linked to SO_2 emissions within legislation, and as such, based on the measures to limit/control SO_2 emissions, effects relating to PM_{10} and $PM_{2.5}$ emissions from the Proposed Development will be not significant.

NO_x emissions are similarly regulated to SO_2 emissions, though the controls are tiered based on both engine age and operational speeds. The conservative estimate, based on the NO_x controls, predicts a not significant negative effect. However, real operations will likely have lower emissions than the conservative assessment presented here, as the ageing vessels within the shipping industry are gradually being replaced with newer vessels with lower-emission engines.

Overall, NO_x, SO_2 and PM_{10} emissions will not significantly increase in concentrations and therefore, no likely significant effects on human health or ecological receptors was predicted.

Multiple mitigation measures have been proposed to control dust emissions during the construction phase, in order to limit any effects arising from construction dust. Following the implementation of mitigation measures, it was predicted that effects arising from construction dust emissions will be negative, temporary and not significant.

9.11 Monitoring

Monitoring of dust deposition using the Bergerhof method will be implemented during the Construction Phase, with details specified in the Dust Management Plan.

9.12 Reinstatement

Not applicable.

9.13 Difficulties Encountered in Compiling this Information

Some difficulties were encountered when compiling this information, primarily related to ship engine emissions. The exact types of ship engines and associated emissions were not available, as it is unknown which ships will berth there in the future; therefore, a worst-case

estimate was provided. This applies to ORE vessels, cargo vessels and port-operated and/or contracted vessels.

REFERENCES

[1] Institute of Air Quality Management, IAQM, “Guidance on the Assessment of Dust from Demolition and Construction - Version 2.2,” IAQM, January 2024.

[2] EPA, “Air Quality in Ireland Report,” EPA, 2021.

[3] EPA, “Air Quality in Ireland Report,” EPA, 2022.

[4] EPA, “Air Quality in Ireland Report,” EPA, 2023.

[5] TII, “Air Quality Assessment For Specified Infrastructure Projects,” Transport Infrastructure of Ireland, Dublin, 2022.

[6] Department of the Environment, Climate and Communications , “Clean Air Strategy,” Government of Ireland, Dublin, 2023.

[7] Kilkenny County Council, “Kilkenny County Development Plan 2021-2027,” Kilkenny County Council, 2023.

[8] European Parliment and the Council of the European Union, “Directive (EU) 2024/2881 of the European parliament and of the Council of 23rd October 2024 on ambient air quality and cleaner air for Europe,” *Offical Journal of the European Union,* 2024.

[9] EPA, “Air Quality in Ireland (Key Indicators of Ambient Air Quality) – Annual Report 2023,” EPA, Wexford, 2024.

[10] EPA, “Air Quality in Ireland (Key Indicators of Ambient Air Quality) – Annual Report 2022,” EPA, Wexford, 2023.

[11] TII, “Traffic and Transport Assessment Guidelines,” TII, Dublin, 2014.

[12] TII, Transport Infrastructure Ireland, “Traffic Count Data website,” TII, 2025. [Online]. Available: https://trafficdata.tii.ie/. [Accessed 2025].

[13] Sustainable Energy Authority of Ireland (SEAI), “Conversion and Emission Factors for Publication V1.5 - 2024 values,” 2025. [Online]. Available: https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors. [Accessed July 2025].

[14] Government of Ireland, “S.I. No. 232/2018 - European Union (National Emission Ceilings) Regulations,” Government of Ireland, 2018.

[15] The European Parliment and Council, “Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery,” Official Journal of the European Communities, 1997.

[16] EPA, “Air Dispersion Modelling from Industrial Installations Guidance Note (AG4),” Environmental Protection Agency, Johnstown Castle, Co. Wexford, 2020.

[17] RPS Group Limited, “MP2 Project - Environmental Impact Assessment Report - Main Document (Part 2),” Dublin Port Company, Dublin, 2018.