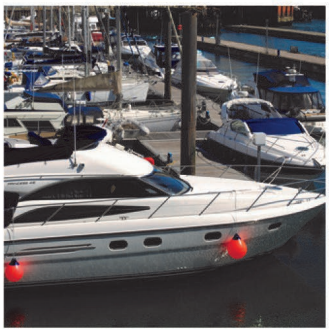
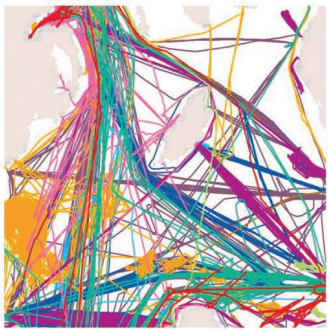
Associated British Ports

Immingham Eastern Ro-Ro Terminal

Preliminary Environmental Information: Appendix 13.1 Air Quality

January 2022





Innovative Thinking - Sustainable Solutions

ABP mer

Page intentionally left blank

Immingham Eastern Ro-Ro Terminal

Preliminary Environmental Information: Appendix 13.1 Air Quality

January 2022

Document Information

Document History and Authorisation		
Title	Immingham Eastern Ro-Ro Terminal	
	Preliminary Environmental Information: Appendix 13.1 Air Quality	
Commissioned by	Associated British Ports	
Issue date	January 2022	
Project no	R/5035/4	
Date	**Version**	**Revision Details**
14/01/2022	1	Issued for client use

Suggested Citation

AECOM (2022). Immingham Eastern Ro-Ro Terminal, Preliminary Environmental Information: Appendix 13.1 Air Quality, A report produced by AECOM Ltd for Associated British Ports, January 2022.

Authors

AECOM Ltd

Contents

Tables

1 Air Quality

1.1 Construction Dust Assessment Method

1.1.1 This section describes the technical method by which the air quality impact of the Proposed Development from construction phase particulate emissions has been considered.

1.2 Step 1: Screen the requirement for a detailed assessment

1.2.1 Sensitive receptors were identified and the distance to the site and construction routes were determined according to the examples of sensitivity shown in Table 1.

Table 1. Definition of Significance of Fugitive Dust and PM_{10} Effects

Sensitivity	Dust Soiling	Human Health	Ecological
High	• Dwellings • Museum and other culturally important collections, • Medium- and long-term car parks • Car showrooms	• Residential properties. • Hospitals, • Schools • Residential care homes	Locations with an international or national designation (e.g. SAC) and the designated features may be affected by dust soiling
Medium	• Parks • Places of work	Office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	Locations with a national designation (e.g. SSSI) where the features may be affected by dust deposition
Low	• Playing fields • Farmland (unless commercially sensitive horticultural) • Footpaths • Short term car parks • Roads	• Public footpaths • Playing fields • Parks • Shopping streets	Locations with a local designation where the features may be affected by dust deposition, such as and LWS with dust sensitive features.
Key SAC = Special Area of Conservation SSSI = Site of Special Scientific Interest LWS = Local Wildlife Site			

1.2.2 According to the IAQM, an assessment will normally be required where there are sensitive receptors within 350 m of the boundary of a site and/or within 50 m of route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance.

1.2.3 A human receptor, as considered within the IAQM guidance, is any location where a person or property may experience:

- The annoyance effects of airborne dust or dust soiling e.g. dwellings, industrial or commercial premises such as a vehicle showroom, food manufacturers, electronics manufacturers, amenity areas and horticultural operations; or
- Exposure to PM_{10} over a period relevant to the air quality objectives.

1.2.4 Ecological receptors within 50 m of the boundary of the site or routes used by construction vehicles on the public highway, up to 500 m from the site entrance, also need to be identified.

1.2.5 There are no ecological receptors which need to be considered as part of this assessment.

1.3 Step 2: Assess the Risk of Dust Impacts

1.3.1 The risk of dust arising in sufficient quantities to cause annoyance and/or health effects was determined for each activity (demolition, earthworks, construction works and track out), taking account of:

- The scale and nature of the works, which determines the potential dust emission magnitude (small, medium or large) (Step 2A); and
- The sensitivity of the area (low, medium or high) (Step 2B).

1.3.2 These factors were then combined to give the risk of dust effects with no mitigation applied, as Negligible, Low, Medium or High.

1.3.3 It should be noted that where detailed information was not available to inform the risk category, professional judgement and experience was used and a cautious approach adopted, in accordance with the guidance.

Step 2A: Determine the Dust Emissions Magnitude

Demolition

1.3.4 Table 2 presents the demolition works dust emission classification. Demolition works will be minimal given the current state of the site.

Table 2. Potential Demolition Works Dust Emission Classification

Emissions Class	Criteria
Large	• Total building volume >50,000 m^3 • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • Demolition activities >20 m above ground level
Medium	• Total building volume 20,000 m^3 – 50,000 m^3 • Potentially dusty construction material • Demolition activities 10-20 m above ground level
Small	• Total building volume <20,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber) • Demolition activities <10 m above ground • Demolition during wetter months

Earthworks

1.3.5 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. The classifications in Table 3 are based on examples of suitable criteria. Factors such as existing land use, topography, seasonality, duration and scale were also taken into consideration, where possible.

Table 3. Potential Earthworks Dust Emission Classification

Emissions Class	Criteria
Large	• Total site area: >10,000 m^2 • Potentially dusty soil type (e.g. clay) • >10 heavy earth moving vehicle active at any one time • Formation of bunds >8 m in height • Total material moved >100,000 tonnes
Medium	• Total site area: 2,500 - 10,000 m^2 • Moderately dusty soil type (e.g. silt) • 5 -10 heavy earth moving vehicle active at any one time • Formation of bunds 4 - 8 m in height • Total material moved 20,000 – 100,000 tonnes
Small	• Total site area: <2,500 m^2 • Soil type with large grain size (e.g. sand) • < 5 heavy earth moving vehicle active at any one time • Formation of bunds < 4 m in height • Total material moved <20,000 tonnes • Earthworks during wetter months

Construction

1.3.6 The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s)/ infrastructure, method of construction, construction materials and duration of build. The classifications in Table 4 are based on examples of suitable criteria. Factors such as seasonality, building type, duration and scale were also taken into consideration, where possible..

Table 4. Potential Construction Dust Emission Classification

Emissions Class	Criteria
Large	• Total building volume >100, 000 m^3 • Onsite concrete batching • Sandblasting
Medium	• Total building volume 25,000 m^3-100,000 m^3 • Potentially dusty construction material (e.g. concrete) • Onsite concrete batching
Small	• Total building volume <25,000 m^3 construction • Material with low potential for dust release (e.g. metal cladding or timber)

Trackout

1.3.7 Track-out is 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 local road network. The classifications in Table 5 are based on examples of suitable criteria. Factors such as vehicle size, speed, numbers, geology and duration were also taken into consideration, where possible.

Table 5. Potential Trackout Dust Emission Classification

Emissions Class	Criteria
Large	• 50 HGV (>3.5t) outward movements in any one day • Potentially dusty surface material • Unpaved road length > 100 m
Medium	• 25 – 100 HGV (>3.5t) outward movements in any one day • Moderately dusty surface material • Unpaved road length 50 – 100 m
Small	• < 25 HGV (>3.5t) outward movements in any one day • Surface material with low potential for dust release • Unpaved road length < 50 m

Step 2B: Define the Sensitivity of the Area

1.3.8 The sensitivity of the area takes account of the following factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentrations; and
- Site specific factors, such as whether there are natural shelters, such as trees to reduce the risk of wind-blown dust

1.3.9 The sensitivity of the area is determined separately for dust soiling impacts on people and properties (Table 6), human health impacts (Table 7) and ecology impacts (Table 8).

Table 6. Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from Source			
		< 20 m	< 50 m	< 100 m	< 350 m
High	>100	High	High	Medium	Low
Medium	10 – 100	High	Medium	Low	Low
Low	1 -10	Medium	Low	Low	Low

Table 7. Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc. ($\mu g/m^3$)	Number of Receptors	Distance from Source (m)				
			< 20 m	< 50 m	< 100	< 200	< 350
High	>32	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 -10	High	Medium	Low	Low	Low
	28 – 32	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 -10	High	Medium	Low	Low	Low
	24 – 28	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 -10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 -10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1 -10	Medium	Low	Low	Low	Low
	28 – 32	>10	Medium	Low	Low	Low	Low
		1 -10	Low	Low	Low	Low	Low
	24 – 28	>10	Low	Low	Low	Low	Low
		1 -10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1 -10	Low	Low	Low	Low	Low
Low	-	1 -10	Low	Low	Low	Low	Low

Table8. Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from Source	
	< 20 m	< 50 m
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C: Define the Risk of Impacts

1.3.10 The dust emission magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of effects with no mitigation applied (Table 9). This Step is undertaken for each activity undertaken on site.

Table 9. Dust Risk without Mitigation

Activity	Sensitivity of Area	Dust Emission Classification		
		Large	*Medium*	*Small*
Demolition	*High*	High	Medium	Medium
	Medium	High	Medium	Low
	Low	Medium	Low	Negligible
Earthworks	*High*	High	Medium	Low
	Medium	Medium	Medium	Low
	Low	Low	Low	Negligible
Construction	*High*	High	Medium	Low
	Medium	Medium	Medium	Low
	Low	Low	Low	Negligible
Trackout	*High*	High	Medium	Medium
	Medium	Medium	Low	Negligible
	Low	Low	Low	Negligible

1.4 Step 3: Identify the need for Site-Specific Mitigation

1.4.1 Based on the risk of effects determined in Step 2C for each activity, appropriate site-specific mitigation measures were recommended. Appropriate mitigation measures are set out in the IAQM Guidance.

1.5 Step 4: Define Impacts and Their Significance

Finally, the significance of the potential residual dust impacts, i.e. after mitigation, was determined. According to the IAQM Guidance the residual impacts assumes that all mitigation measures (recommended in Step 3) to avoid or reduce impacts are adhered to, and therefore the residual impacts should be 'not significant'.

1.6 Screening Assessment Method

1.6.1 This section describes the methodology followed to undertake the screening assessment of construction phase and operational phase vehicle emissions impacts on local roads to the proposed development.

1.6.2 At this stage of the DCO process, partial traffic data has been made available. This has included:

- 2019 baseline traffic flow data for Queens Road and Humber Road;
- The total number of construction phase vehicles (LDV and HDV) accessing and leaving the site on the day of peak construction;
- The total number of maximum operational HDV movements accessing and leaving the site when the proposed development is in full operation (as 24-hour AADT); and
- The proportion of those operational vehicles that will access and leave the proposed development by the Port of Immingham east gate and the proportion of those vehicles that will access and leave the proposed development by the Port of Immingham west gate.

1.6.3 The full 100 % of construction traffic flow was added to the 2019 baseline flows on both Humber Road and Queens Road, to ascertain total concentrations and potential impacts should either route become the preferred construction route as detailed design of the proposed development evolves.

1.6.4 85 % of operational traffic flow was added to the 2019 baseline flows on Queens Road and 15 % was added to the 2019 baseline flows on Humber Road, to ascertain total concentrations and potential impacts with the local distribution of traffic assumed.

1.6.5 In the absence of future baseline traffic data, both construction phase and operational phase with development scenarios were compared against the 2019 baseline, to estimate a magnitude of change in pollutant concentrations as a result of the proposed development.

Assessment Method

Modelling Software

1.6.6 The dispersion model ADMS Roads was used to model the dispersion of emissions from road traffic sources and estimate the contribution at selected air quality sensitive receptors. ADMS Roads is an appropriate tool and recognised by all relevant planning and regulatory authorities in the UK. A summary of the general model conditions used in the assessment is provided in Table 10.

Table 10. General Model Conditions

Variables	ADMS Roads Inputs
Surface roughness at source	0.5
Minimum Monin-Obukhov length for stable conditions	10
Terrain types	Flat
Emissions	NO_X, PM_{10} and $PM_{2.5}$, based on the traffic data supplied
Emission factors	Emission Factor Toolkit (Version 10.1)
Meteorological data	Hourly sequential data from Humberside Airport (2019)
Emission profiles	None assumed
Receptors	Selected receptors on Humber Road and Queens Road
Receptor location	X, Y and Z coordinates determined by GIS
Model output	Long-term annual mean road contributions for NO_X, PM_{10} and $PM_{2.5}$

Model Inputs

Air Quality Sensitive Receptors

1.6.7 With the traffic data available at this stage of the DCO process, the air quality screening assessment of construction and operational phase road traffic emissions has focused local roads and, in particular, the route between the Port of Immingham west gate and the A180, and the route between the Port of Immingham east gate and the A180. The air quality sensitive receptors selected for the screening assessment represent sensitive exposure at locations adjacent to Humber Road and Queens Road. These are summarised in Table 11.

Table 11. Air Quality Senstive Receptors – Human Health

Receptor ID	Grid Coordinate (x/y)		Description
R1	519948	414860	Residential property off Queens Road, Immingham
R2	515202	416114	Residential property off Humber Road, South Killingholme

Road Traffic Emissions

1.6.8 The road traffic data used to inform this assessment is summarised in Table 12. Vehicle emission rates were sourced from Defra's Emission Factor Toolkit (v.10.1).

Table 12. Traffic Data

Receptor	24-hour AADT	% HDV	Speed (kph)
Queens Road			
Baseline / Future baseline (2019)	3,883	14.6	64
With development construction phase	4,022	17.5	64
With development operational phase	6,475	48.8	64
Humber Road			
Baseline / Future baseline (2019)	10,536	48.9	97
With development construction phase	10,814	50.2	97
With development operational phase	13,128	78.7	97

Background Pollutant Concentration Data

1.6.9 Background pollutant concentration data for the pollutants considered in the screening assessment have been sourced from Defra's background pollutant maps. The background data value used to inform the assessment are provided in Table 13.

Table 13. Background Pollutant Concentration Data

Receptor	Coordinates (x,y)		NO_2 (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
R1	515500	416500	15.8	15.2	8.9
R2	519500	414500	16.1	14.8	8.8

Meteorological Data

1.6.10 Hourly sequential meteorological data has been sourced from Humberside Airport. Humberside Airport is located approximately 11 km to the southwest of the proposed development and is considered the most representative source of meteorological data available for the study area.

NO_X to NO_2 Conversion

1.6.11 The proportion of NO_2 in NO_X varies greatly with location and time according to a number of factors including the amount of oxidant available and the distance from the emission source. NO_X concentrations are expected to decline in future years due to falling emissions, therefore NO_2 concentration will not be limited as much by ozone and consequently it is likely that the NO_2/NO_X ratio will in the future increase. In addition, a trend has been noted in recent years whereby roadside NO_2 concentrations have been

increasing at certain roadside monitoring sites, despite emissions of NO_X falling. The direct NO_2 phenomenon is having an increasingly marked effect at many urban locations throughout the UK and must be considered when undertaking modelling studies.

1.6.12 In this study modelled NO_X values were converted to NO_2 using the 'NO_X to NO_2' calculator, version 8.1, released in June 2020, and available at the Air Quality Archive . The year and region for which the modelling has been undertaken are specified and local factors, such as an appropriate factor of NO_X emitted as NO_2, are used in the calculation.

Model Verification

1.6.13 In the absence of sufficient baseline monitoring data currently available in the study area (a project-specific survey is ongoing, but data is not yet available), a precautionary model bias-adjustment factor of 3 has been applied to the model road source output of all pollutants modelled. A factor of 3 is considered precautionary based on professional experience of model verification for dispersion modelling assessments of road traffic emissions across the UK.

Back Cover