Air Quality Appendix 6.2 – Construction Site Emissions Assessment Methodology

Introduction

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

Assessment Approach

Step 1 Screen the Requirement for a Detailed Assessment

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. According to the IAQM, an assessment will normally be required where there are sensitive receptors within 250 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.

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 PM10 over a period relevant to the air quality objectives.

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.

There are no ecological receptors which need to be considered as part of the assessment of construction site emissions.

Table 1 Construction Site Emissions Sensitive Receptors

Variable	Amenity / 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 not generally include workers occupationally exposed to PM10 as protection is	Locations with a national designation (e.g. SSSI) where the features may be affected by dust deposition

Variable	Amenity / Dust Soiling	Human Health	Ecological
		covered by Health and Safety at Work legislation	
Low	• Playing fields • Farmland (unless commercially sensitive horticulture) • 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 an LWS with dust sensitive features

Step 2 Assess the Risk of Dust Impacts

The risk of dust arising in sufficient quantities to cause annoyance and/or health effects were 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).

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

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

Table 2 presents the demolition works dust emission classification.

Table 2 Potential Demolition Works Dust Emission Classification

Variable	Amenity / Dust Soiling
High	• Total building volume >75,000 m^3 • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • Demolition activities >12 m above ground level
Medium	• Total building volume 12,000 m^3 – 75,000 m^3 • Potentially dusty construction material • Demolition activities 6 m – 12 m above ground level
Small	• Total building volume <12,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber) • Demolition activities <6 m above ground • Demolition during wetter months

Earthworks

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

Variable	Amenity / Dust Soiling
High	• Total site area: >110,000 m^2 • Potentially dusty soil type (e.g. clay) • >10 heavy earth moving vehicle active at any one time • Formation of bunds >6 m in height
Medium	• Total site area: 18,000 - 110,000 m^2 • Moderately dusty soil type (e.g. silt) • 5 -10 heavy earth moving vehicle active at any one time • Formation of bunds 3 - 6 m in height
Small	• Total site area: <18,000 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

Construction

The key issues when determining the potential dust emissions magnitude during the construction phase including 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 Works Dust Emission Classification

Variable	Amenity / Dust Soiling
High	• Total building volume >75,000 m3 • On site concrete batching • Sandblasting
Medium	• Total building volume 12,000 m3 – 75,000 m3 • Potentially dusty construction material (e.g. concrete) • On site concrete batching
Small	• Total building volume <12,000 m3 • Construction material with low potential for dust release (e.g. metal cladding or timber)

Track-out

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

Variable	Amenity / Dust Soiling
High	• >50 HDV (>3.5 t) outward movements in any one day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length >100 m
Medium	• 20 – 50 HDV (>3.5 t) outward movements in any one day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length >100 m
Small	• <20 HDV (>3.5 t) 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

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

- The specific sensitivities of receptors in the area;
- The proximity and number of these 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.

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

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

Receptor Sensitivity	Number of Receptors	Distance from 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 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	<50	<100	<250
High	>32 $\mu g/m^3$	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32 $\mu g/m^3$	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 $\mu g/m^3$	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 $\mu g/m^3$	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 $\mu g/m^3$	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32 $\mu g/m^3$	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28 $\mu g/m^3$	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 $\mu g/m^3$	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low

Step 2C Define the Risk of Impacts

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 8 Sensitivity of the Area to Ecological Impacts

Sensitivity of the Area	Dust Emission Magnitude		
	High	**Medium**	**Small**
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible Risk
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible Risk
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible Risk
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible Risk

Step 3 Identify the need for Site-Specific Mitigation

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.

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’.