

Appendix A14.1 Construction Dust Assessment

A14.1 Construction Dust Assessment

A14.1.1 Introduction

The air quality impacts of construction dust and vehicle emissions have been considered following the Institute of Air Quality Management (2014) 'Guidance on the assessment of dust from demolition and construction'. Individual considerations for four activities are included in the guidance: demolition, earthworks, construction and track-out. The aim of the assessment is to determine the risk of dust impacts from each construction activity in order to identify the level of required mitigation. First, the magnitude of dust emissions is determined based on various factors followed by the sensitivity of the area(s) surrounding the construction site to specific dust impacts. Finally, these factors are combined to determine the overall risk of dust impacts.

A14.1.2 Assessment Methodology

The four construction activities have been assessed on the basis of the area sensitivity and the emission magnitude. The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium, or Large. Dust emissions are defined according to the scale and nature of the work for each activity, see Table A14.1.1 below.

The two types of sensitive receptors that may be impacted by dust from construction activities, as defined by IAQM (2014), are human and ecological. These are defined as, "a location that may be affected by dust emissions during demolition and construction. Human receptors include locations where people spend time and where property may be impacted by dust. Ecological receptors are habitats that might be sensitive to dust".

The guidance refers to human receptors as those properties that may be subject to adverse impacts of dust or PM₁₀ over a time period relevant to the air quality Standard. Specific properties include, dwellings, cultural heritage collections, food manufactures, etc. According to IAQM (2014) a single dwelling is classified as one receptor, whereas a school counts as 100. In addition, relevant designated (ecological) sites and their sensitivity to dust impacts, have been also considered. Designated sites include nature sites that have special status as protected areas because of their natural importance.

Receptor sensitivity is defined by a number of factors including:

- specific sensitivities of those receptors;
- number of receptors;
- proximity to construction site;
- background PM₁₀ concentrations; and
- site-specific factors.

The sensitivity of key receptors to each construction-related activity is determined for each of the following dust impacts:

- dust soiling;
- human health impacts; and
- impacts on ecological receptors.

The sensitivity of an area to the potential impacts of each activity is defined at various distances from the work site depending on the sensitivity and number of receptors. IAQM categorises these in several distance bands for different impacts at 20, 50, 100, 200 and 350 m. Receptor sensitivity to dust soiling is assessed for only four IAQM distance bands, whereas sensitivity to human health impacts is assessed for all five. Tables A14.1.2, A14.1.3 and A14.1.4 define the levels of sensitivity of areas at different distances for each of the impacts listed above.

Table A14.1.1: Quantitative determination of the magnitude of dust emissions for demolition & construction activities

Activity	Dust Emission Magnitude	
	Category	Description
Demolition	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; and
	Small	Total building volume <20,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.
Earthworks	Large	Total site area >10,000 m ² , potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes;
	Medium	Total site area 2,500 m ² – 10,000 m ² , moderately, dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes; and
	Small	Total site area <2,500 m ² , soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months.
Construction	Large	Total building volume >100,000 m ³ , on site concrete, batching, sandblasting;
	Medium	Total building volume 25,000 m ³ – 100,000 m ³ , potentially dusty construction material (e.g. concrete), on site concrete batching; and
	Small	Total building volume <25,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber).
Track-out	Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;
	Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m; and
	Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

Source: Institute of Air Quality Management (IAQM), Guidance on the assessment of dust from demolition and construction, 2014

Table A14.1.2: Area sensitivity to the effects of dust soiling

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

Source: Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction, 2014

The sensitivity of the area to human health impacts is determined not only by the number of receptors within various distance bands from the site, but also by background PM₁₀ concentrations. Estimated PM₁₀ concentrations were obtained for each area studied; the base year pollutant concentrations are considered the worst case, assuming improvements in air quality following stricter regulation in the future.

Ecological impacts of construction activities must be considered for designated sites within 20 and 50m from the works following Table A14.1.4. Construction and demolition impacts on designated sites may include physical changes that can affect photosynthetic processes, or chemical changes to the soil that

may lead to plant loss. Impacts are often reversible after work ceases. Designated sites near the Scheme have been identified and are considered for impacts.

Table A14.1.3: Area sensitivity to human health impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentrations	Number of receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m ³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m ³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m ³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m ³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Source: Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction, 2014

Table A14.1.4. Area sensitivity to ecological impacts

Receptor sensitivity	Number of receptors	Distance from the Source, m	
		<20	<50
High	>100	High	High
	10-100	High	Medium
	1-10	Medium	Low
Medium	>1	Medium	Low
Low	>1	Low	Low

Source: Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction, 2014

The two parts of the construction assessment, dust emissions magnitude and area sensitivities, will be combined in order to determine the overall risk of impacts with no applied mitigation, for each construction activity within each zone. Table A14.1.5 below provides a view of the levels considered. The level of risk determined by this table will determine the level of mitigation to be followed at the construction site.

Emissions from construction vehicles also need to be considered as they are a potential source of both NO₂ and PM₁₀. According to the IAQM guidance, where high numbers of vehicle movements, especially lorries, are expected to be generated over a long period of time (i.e. one year or more) in the same location, the impact of construction phase traffic should be also considered and assessed using the same methodology described for operational impacts.

Table A14.1.5. Risk of impacts from each activity

Sensitivity of area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks and Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Track-out			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible