1 Construction Phase Impact Assessment

1.1 The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix A1), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

1.2 There will be a requirement to demolish a number of buildings and some internal areas with an approximate total volume of 32,000 m^3. This will take place in across approximately thirteen weeks in two phases; the first commencing September 2016 and the second in March 2018. The existing buildings are mainly comprised of concrete, brick and steel. Crushing and screening equipment will be used on site prior to removal of the material. Based on the example definitions set out in Table A1.1, the dust emission class for demolition is considered to be *medium* during both phase 1 and phase 2.

Earthworks

1.3 The characteristics of the soil at the development site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2016), as set out in Table 1. Overall, it is considered that, when dry, this soil has the potential to be dusty.

Table 1: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Argillaceous [a]
European Soil Bureau Description	Prequaternary Marine/Estuarine Sand and Silt
Soil Group	Medium to Light(Silty) to Heavy
Soil Texture	Clay to Silt

[a] grain size < 0.06 mm.

1.4 The earthworks will take place in two phases; the first in the autumn of 2016 and the second phase in the spring of 2018. The site area for the phase 1 comprises some 12,000 m^2, whilst that for phase 2 is around 6,000m^2. A proportion of these areas will be subject to earthworks, involving removal of the foundations of the demolished buildings and excavation. It is anticipated that 3,000 m^3 or around 5,000 tonnes will be excavated and removed from the site. Dust will arise mainly

from vehicles travelling over unpaved ground and from the handling of dusty materials. Based on the example definitions set out in Table A1.1, the dust emission class for earthworks is considered to be *medium* during both phase 1 and phase 2.

Construction

1.5 The proposals involve the construction of a number of buildings across the site, spread across two phases. Phase 1, which involves the construction of the Ribbon building, WES extension, LaSwap sixth form building and external works, will have a total building volume of around 41,000 m^3, and will take place between September 2016 and March 2018. Phase 2 involves the construction of the dining hall, multi-use games areas and external works, with a total building volume of around 2,200 m^3, and will take place between May 2018 and autumn 2018. Dust will mainly arise from the handling and storage of dusty materials, piling activities and from the cutting of concrete. Based on the example definitions set out in Table A1.1, the dust emission class for construction is considered to be *medium* during phase 1 and *small* during phase 2.

Trackout

1.6 The number of vehicles accessing the site during each phase, which may track out dust and dirt is currently unknown, but given the medium size of the site it is likely that there will be, on average, a maximum of between 10-50 outward heavy vehicle movements per day. Whilst the construction element of phase 2 is smaller than phase 1, there are more external and potentially dusty works and a longer average path length over unpaved roads for construction vehicles to take to the main road. As such, taking into account the potentially dusty soil type, and based on the example definitions set out in Table A1.1, the dust emission class for trackout is considered to be *medium* during both phase 1 and phase 2.

1.7 Table 2 summarises the dust emission magnitude for the proposed development.

Table 2: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude	
	Phase 1	Phase 2
Demolition	Medium	Medium
Earthworks	Medium	Medium
Construction	Medium	Small
Trackout	Medium	Medium

Sensitivity of the Area

1.8 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-

specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

Sensitivity of the Area to Effects from Dust Soiling

1.9 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling, while the elements of the on-site school not undergoing construction are considered to be a 'medium' sensitivity receptor (Table A1.2). There are more than 10 residential properties within 20 m of on-site works during both phase 1 and phase 2 (see Figure 1). Using the matrix set out in Table A1.3, the area surrounding the onsite works is of 'high' sensitivity to dust soiling during phase 1 and phase 2.

1.10 Table 2 shows that dust emission magnitude for trackout is *medium* and Table A1.3 thus explains that there is a risk of material being tracked 200 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that all construction traffic will travel north and south along Highgate Road during phase 1 and phase 2. There are greater than 10 residential properties within 20 m of the roads along which material could be tracked (see Figure 3), and Table A1.3 thus indicates that the area is of 'high' sensitivity to dust soiling due to trackout.

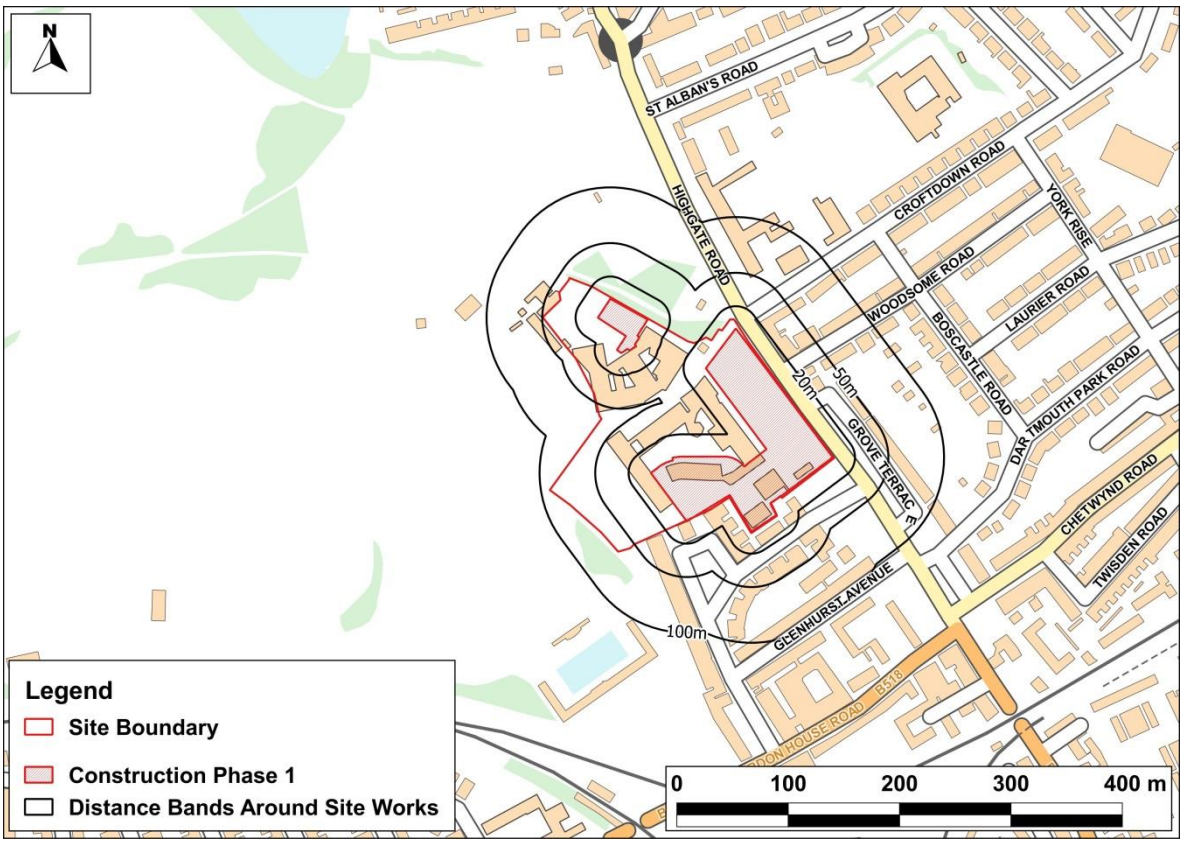

Figure 1: Distance Bands around Phase 1 Construction Area

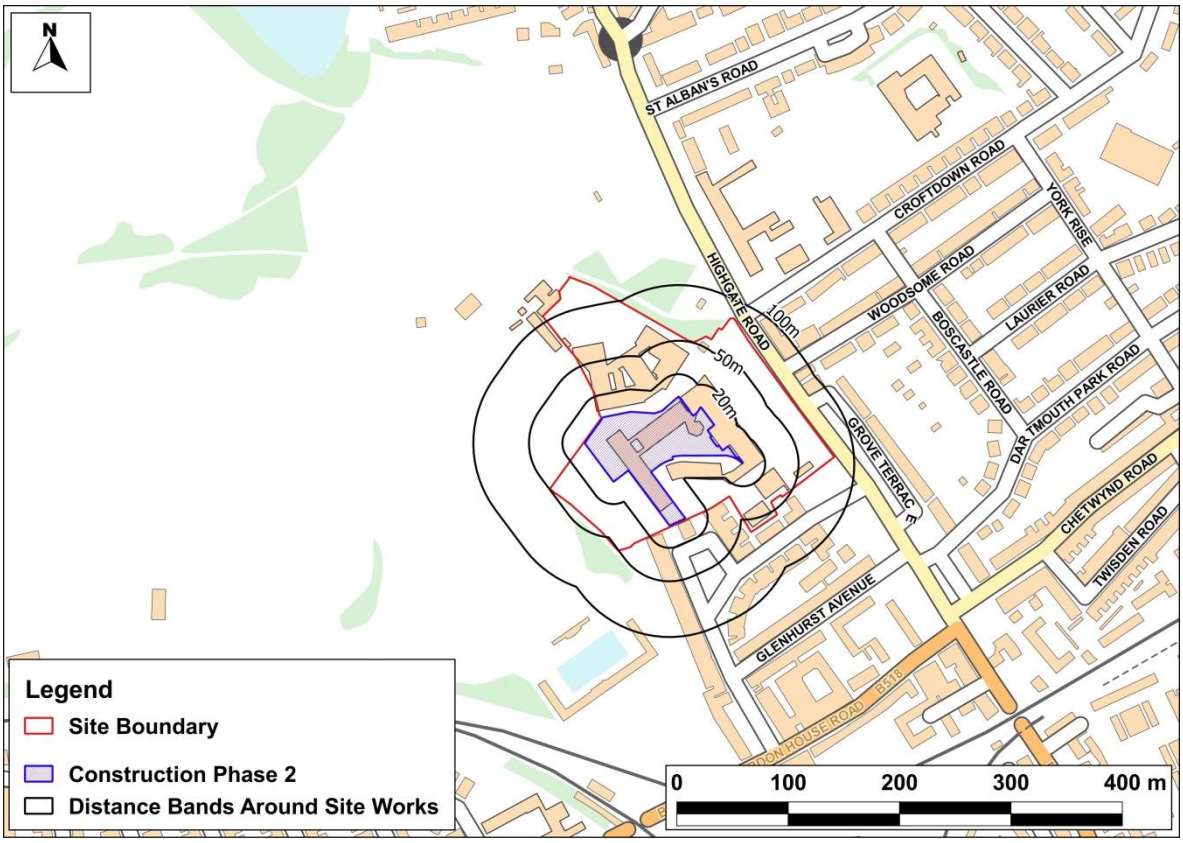

Figure 2: Distance Bands around Phase 2 Construction Area

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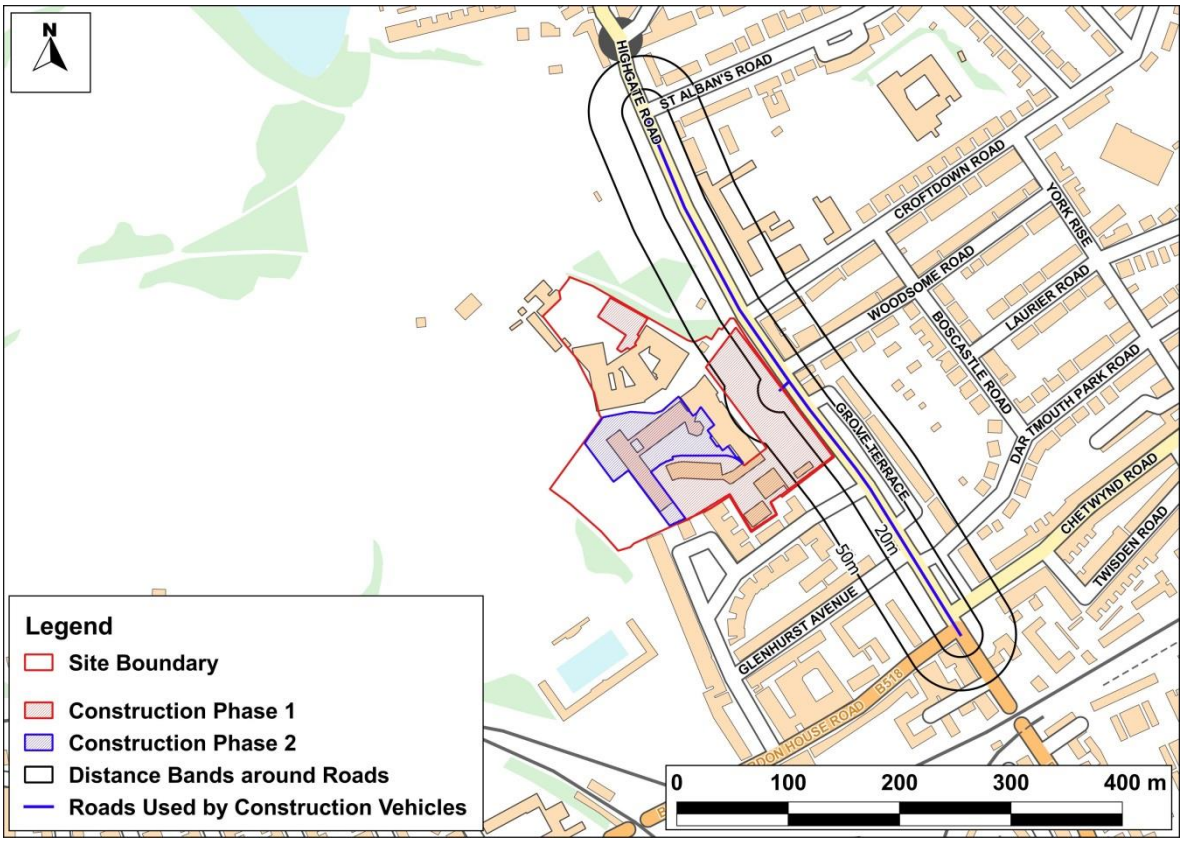

Figure 3: Distance Bands around Roads Used by Construction Traffic Within 200 m of the Site Exit

Sensitivity of the Area to any Human Health Effects

1.11 Residential properties and schools are classified as being of 'high' sensitivity to human health effects. The matrix in Table A1.4 requires information on the baseline annual mean PM_{10} concentration in the area. Defra's background maps (Defra, 2016b) for the study area in 2016 show a maximum background PM_{10} concentration of 21.2 µg/m^3. To estimate a maximum baseline PM_{10} concentration at these receptors, PM_{10} contributions from the local roads needs to be added. As such, it has been assumed for the purposes of this part of the assessment that the maximum predicted baseline PM_{10} concentration at these receptors falls between 24 and 28 µg/m^3. Using the matrix in Table A1.4, both the area surrounding the onsite works and the area surrounding roads along which material may be tracked from the site are of 'high' sensitivity.

Sensitivity of the Area to any Ecological Effects

1.12 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the

site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

1.13 Table 3 summarises the sensitivity of the area around the proposed construction works.

Table 3: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area			
	Phase 1		Phase 2	
	On-site Works	Trackout	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity	High Sensitivity	High Sensitivity
Human Health	High Sensitivity	High Sensitivity	High Sensitivity	High Sensitivity

Risk and Significance

1.14 The dust emission magnitudes in for each phase in Table 2 have been combined with the sensitivities of the area in Table 3 using the matrix in Table A1.5 in Appendix A1, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 4.

Table 4: Summary of Risk of Impacts Without Mitigation

Source	Phase 1		Phase 2	
	Dust Soiling	Human Health	Dust Soiling	Human Health
Demolition	Medium Risk	Medium Risk	Medium Risk	Medium Risk
Earthworks	Medium Risk	Medium Risk	Medium Risk	Medium Risk
Construction	Medium Risk	Medium Risk	Low Risk	Low Risk
Trackout	Medium Risk	Medium Risk	Medium Risk	Medium Risk

1.15 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (Institute of Air Quality Management, 2016).

2 Appendices

A1 Construction Dust Assessment Procedure

A1.1 The criteria developed by IAQM, upon which the GLA's guidance is based, divide the activities on construction sites into four types to reflect their different potential impacts. These are:

- demolition;
- earthworks;
- construction; and
- trackout.

A1.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

A1.3 An assessment is required where there is a human receptor within 350 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

A1.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A1.5 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

A1.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

A1.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table A1.1.

Table A1.1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >50,000 m3, 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 m3 – 50,000 m3, potentially dusty construction material, demolition activities 10-20 m above ground level
Small	Total building volume <20,000 m3, 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	
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due 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
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 <10,000 tonnes, earthworks during wetter months
Construction	
Large	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site 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 [a]	
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
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

[a] These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

A1.8 The sensitivity of the area is defined taking account of a number of 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 concentration; and
- site-specific factors, such as whether there are natural shelters to reduce the risk of wind-blown dust.

A1.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in Table A1.2. These receptor sensitivities are then used in the matrices set out in Table A1.3 and Table A1.4 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

A1.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the *risk* of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table A1.5 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A1.11 The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk.

STEP 4: Determine Significant Effects

A1.12 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (Institute of Air Quality Management, 2016).

A1.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table A1.2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected a to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
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; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that 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 only for limited periods of time as part of the normal pattern of use of the land	playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
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	Special Areas of Conservation 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	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table A1.3: Sensitivity of the Area to Dust Soiling Effects on People and Property [1]

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

Table A1.4: Sensitivity of the Area to Human Health Effects [1]

Receptor Sensitivity	Annual Mean PM_{10}	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

[1] For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

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

Table A1.5: Defining the Risk of Dust Impacts

Sensitivity of the 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			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible