The Great Grid Upgrade

North Humber to High Marnham

Preliminary Environmental Information Report

Volume 3: Appendix 15.1 Construction Dust Methodology and Assessment

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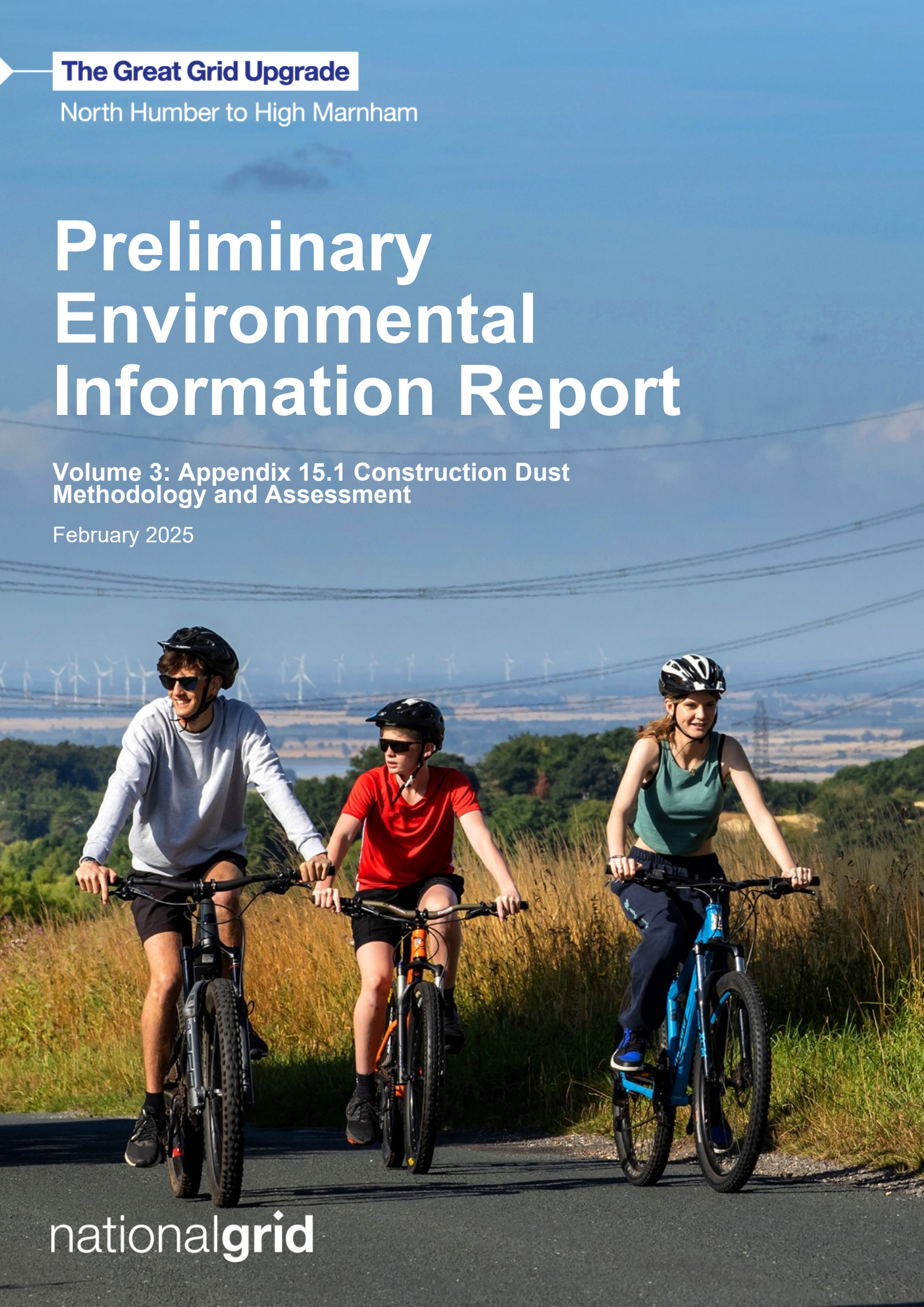

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1. Methodology

1.1.1 The dust risk assessment has been carried out in accordance with the Institute of Air Quality Management (IAQM) construction dust guidance (Ref 15.1).

1.1.2 The steps for assessing dust emissions in accordance with the IAQM construction dust guidance are detailed in the following sections.

1.2 Step 1

1.2.1 Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 250 m of the draft Order Limits or 50 m from the construction vehicle route up to 250 m from the proposed bellmouths, then the assessment proceeds to Step 2. Additionally, should ecological receptors be identified within 50 m of the draft Order Limits or 50 m from the construction vehicle route up to 250 m from the proposed bellmouths, then the assessment also proceeds to Step 2. Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

1.3 Step 2

1.3.1 Step 2 assesses the risk of potential dust impacts. The Project is allocated a risk category based on two factors:

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

1.3.2 The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

1.3.3 Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria (Ref 15.1) are summarised in Table 1.1.

Table 1.1 - Construction dust – magnitude of emission

Magnitude	Activity	Criteria
Large	Demolition	Total building volume greater than 75,000 m^3 Potentially dusty construction material (e.g. concrete) On-site crushing and screening Demolition activities greater than 12 m above ground level
	Earthworks	Total site area greater than 110,000 m^2 Potentially dusty soil type (e.g.,clay, which will be prone to suspension when dry due to small particle size)

Magnitude	Activity	Criteria
		More than 10 heavy earth moving vehicles active at any one time Formation of bunds greater than 6 m in height
	Construction	Total building volume greater than 75,000 m^3 On site concrete batching Sandblasting
	Trackout	More than 50 Heavy Duty Vehicle (HDV) outward trips per day Potentially dusty surface material (e.g., high clay content) Unpaved road length greater than 100 m
Medium	Demolition	Total building volume 12,000 m^3 to 75,000 m^3 Potentially dusty construction material Demolition activities 6 m to 12 m above ground level
	Earthworks	Total site area 18,000 m^2 to 110,000 m^2 Moderately dusty soil type (e.g., silt) 5 to 10 heavy earth moving vehicles active at any one time Formation of bunds 3 m to 6 m in height
	Construction	Total building volume 12,000 m^3 to 75,000 m^3 Potentially dusty construction material (e.g., concrete) On site concrete batching
	Trackout	20 to 50 HDV outward trips per day Moderately dusty surface material (e.g., high clay content) Unpaved road length 50 m to 100 m
Small	Demolition	Total building volume under 12,000 m^3 Construction material with low potential for dust release (e.g. metal cladding or timber) Demolition activities less than 6 m above ground level Demolition during wetter months
	Earthworks	Total site area less than 18,000 m^2 Soil type with large grain size (e.g., sand) Less than 5 heavy earth moving vehicles active at any one time Formation of bunds less than 3 m in height
	Construction	Total building volume less than 12,000 m^3 Construction material with low potential for dust release (e.g., metal cladding or timber)
	Trackout	Less than 20 outward HDV trips per day Surface material with low potential for dust release Unpaved road length less than 50 m

1.3.4 Step 2B defines the sensitivity of the area around the Project to potential dust impacts (Ref 15.1). The influencing factors are shown in Table 1.2.

Table 1.2 - Construction dust – examples of factors defining sensitivity of an area

Receptor sensitivity	Examples	
	Human receptors	**Ecological receptors**
High	Users expect high levels of amenity. High aesthetic or value property. People expected to be present continuously for extended periods of time. Locations where members of the public are exposed over a time period relevant to the air quality objective for particulate matter less than 10 microns in diameter (PM_{10}) e.g., residential properties, hospitals, schools and residential care homes.	Internationally or nationally designated site e.g., Special Area of Conservation, and the designated features may be affected by dust soiling. Locations where there is a community of a particular dust sensitive species such as vascular species included in the Red Data List for Great Britain.
Medium	Users would expect to enjoy a reasonable level of amenity. Aesthetics or value of their property could be diminished by soiling. 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 e.g., parks and places of work.	Nationally designated site e.g., Sites of Special Scientific Interest with dust sensitive features. Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown.
Low	Enjoyment of amenity would not reasonably be expected. Property would not be expected to be diminished in appearance. Transient exposure, where people would only be expected to be present for limited periods. e.g., public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads.	Locally designated site e.g., Local Nature Reserve where the features may be affected by dust deposition.

1.3.5 The guidance also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts:

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and receptors;
- any conclusions drawn from analysing local meteorological data which accurately represent the area;

- the season during which works will take place;
- any conclusions drawn from local topography;
- duration of the potential impact, as a receptor may become more sensitive over time; and
- any known specific receptor sensitivities which go beyond the classifications given in the document.

1.3.6 These factors were considered during the undertaking of the assessment.

1.3.7 The criteria (Ref 15.1) for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 1.3.

Table 1.3 - Construction dust – sensitivity of the area to dust soiling effects on people and property

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		Less than 20	Less than 50	Less than 100	Less than 250
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

1.3.8 Table 1.4 outlines the criteria (Ref 15.1) for determining the sensitivity of the area to human health impacts.

Table 1.4 - Construction dust – sensitivity of the area to human health impacts

Receptor sensitivity	Annual mean PM_{10} concentration	Number of receptors	Distance from the source (m)			
			Less than 20	Less than 50	Less than 100	Less than 250
High	Greater than 32µg/m^3	More than 100	High	High	High	Medium
		10 - 100	High	High	Medium	Low
		1 - 10	High	Medium	Low	Low
	28-32µg/m^3	More than 100	High	High	Medium	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low
	24-28µg/m^3	More than 100	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low

Receptor sensitivity	Annual mean PM_{10} concentration	Number of receptors	Distance from the source (m)			
			Less than 20	Less than 50	Less than 100	Less than 250
	Less than 24µg/m^3	More than 100	Medium	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Medium	Greater than 32µg/m^3	More than 10	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	28-32µg/m^3	More than 10	Medium	Low	Low	Low
		1 - 10	Low	Low	Low	Low
	24-28µg/m^3	More than 10	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
	Less than 24µg/m^3	More than 10	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Low	-	More than 1	Low	Low	Low	Low

1.3.9 Table 1.5 outlines the criteria (Ref 15.1) for determining the sensitivity of the area to ecological impacts.

Table 1.5 - Construction dust – sensitivity of the area to ecological impacts

Receptor sensitivity	Distance from the source (m)	
	Less than 20	Less than 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

1.3.10 Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts.

1.3.11 Table 1.6 outlines the risk category from demolition activities (Ref 15.1.)

Table 1.6 - Construction dust – dust risk category from demolition activities

Receptor Sensitivity	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

1.3.12 Table 1.7 outlines the risk category from earthworks and construction activities (Ref 15.1).

Table 1.7 - Construction dust - dust risk category from earthworks and construction activities

Receptor Sensitivity	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

1.3.13 Table 1.8 outlines the risk category from trackout activities (Ref 15.1).

Table 1.8 - Construction dust – dust risk category from trackout activities

Receptor sensitivity	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

1.4 Step 3

1.4.1 Step 3 requires the identification of site-specific mitigation measures within the guidance to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with negligible risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

1.5 Step 4

1.5.1 Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual effects. For almost all construction activity, the aim should be to control effects using effective mitigation. Experience shows that this is normally possible, hence the residual effect will normally be not significant.

2. Construction Dust Risk Assessment

2.1 Step 1

2.1.1 The Project has the potential to result in fugitive dust emissions throughout the construction works. Vehicle movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from highway surfaces. This construction dust assessment has been carried out to assess the risk associated with dust emissions from construction related activities associated with the Project.

2.1.2 This assessment has been undertaken based on the draft Order Limits for assessing earthworks and construction activities, and the access routes and haul routes for assessing trackout (where known).

2.1.3 The desk-study using Google Earth and MAGIC website (Ref 15.2) identified a number of sensitive receptors within 250 m of the site boundary (assumed at this stage of the assessment to be the draft Order Limits). As such, a detailed assessment of potential dust impacts has been undertaken.

2.2 Step 2

2.2.1 The following section assesses the risk of potential dust impacts of each of the four potential dust generating activities.

2.2.2 The dust emission magnitude for each dust generating activity associated with the Project is summarised in Table 2.1.

Table 2.1 - Construction dust – magnitude of emission

Activity	Dust emission magnitude	Reasoning
Demolition	Small	Minimal demolition (less than 12,000 m^3 building volume) anticipated.
Earthworks	Large	Total site area where earthworks are being undertaken is likely to be greater than 110,000 m^2. Potential for greater than 10 heavy earth moving vehicles at any one time.
Construction	Large	Total building volume is likely to be greater than 75,000 m^2. Potentially dusty material (e.g., concrete).
Trackout	Large	Anticipated that there will be greater than 50 outward HDV movements per day. Potentially dusty surfaces. The number of HDV movements per day during construction will be confirmed upon receipt of traffic data and the magnitude of dust emissions from trackout will be reviewed once received.

2.2.3 Receptors sensitive to potential dust impacts were approximated from a desktop study of the area up to 250 m from the draft Order Limits for earthworks and construction and up to 50 m from the road network within 250 m of the proposed bellmouths for trackout (Figure 15.2 Construction Dust Study Area). These are summarised in Table 2.2 below.

Table 2.2 - Approximate number of dust sensitive receptors

Distance from Site (m)	Approximate number of human receptors and sensitivities	Number of ecological receptors and sensitivities
Demolition, Earthworks and Construction		
Less than 20	10 to 100 receptors with high sensitivity	1-10 receptor(s) with high sensitivity
Less than 50	>100 receptors with high sensitivity	1-10 receptor(s) with high sensitivity
Less than 100	>100 receptors with high sensitivity	N/A
Less than 250	>100 receptors with high sensitivity	N/A
Trackout		
Less than 20	1-10 receptor(s) with high sensitivity	1-10 receptor(s) with high sensitivity
Less than 50	10 to 100 receptors with high sensitivity	1-10 receptor(s) with high sensitivity

2.2.4 Using the number of receptors and receptor sensitivities determined in Table 2.2, and the criteria outlined in Table 1.3, Table 1.4 and Table 1.5, the overall sensitivity of the receiving environment to specific dust impacts is summarised in Table 2.3. In accordance with the IAQM construction dust guidance (Ref 15.1), only the highest level of area sensitivity from the table needs to be considered. As such, as residential properties are present (high sensitivity), lower levels of sensitivity, such as farmland and footpaths, have not been considered.

Table 2.3 - Summary of the sensitivity of the study area

Potential Impact	Sensitivity of the surrounding area			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust soiling	High sensitivity	High sensitivity	High sensitivity	Medium sensitivity
Human health*	Low sensitivity	Low sensitivity	Low sensitivity	Low sensitivity
Ecological	High sensitivity	High sensitivity	High sensitivity	High sensitivity

** Based on the maximum background concentration being less than 24 µg/m³ (Table 15.8 of **Volume 1 Main Report, Chapter 15 Air Quality**)*

Table 2.4 - Summary of the risk of dust effects

Potential impact	Potential risk			
	Demolition (Small magnitude)	Earthworks (Large magnitude)	Construction (Large magnitude)	Trackout (Large magnitude)
Dust soiling	Medium risk	High risk	High risk	Medium risk
Human health	Negligible	Low risk	Low risk	Low risk
Ecological	Medium risk	High risk	High risk	High risk

2.2.5 As indicated in Table 2.4, the potential risk of dust soiling is medium for demolition and trackout and high for earthworks and construction. The potential risk of human health impacts is negligible for demolition and low for all other activities. The potential risk of ecological impacts is medium for demolition and high for all other activities. The assessment has therefore indicated that the risk of dust effects is high as a worst case for the Project.

2.2.6 The potential for impacts depends upon the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the boundary of the draft Order Limits closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase.

2.3 Step 3

2.3.1 The IAQM construction dust guidance (Ref 15.1) provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the Project based on the risk of dust effects for each activity and for the overall site (Table 2.4) and are summarised in Table 2.5. These measures have been incorporated into **Appendix 4.1 Draft Outline Code of Construction Practice (CoCP)**.

Table 2.5 - Proposed dust mitigation measures based on the IAQM construction dust guidance

Mitigation measure	High Risk Measures H=Highly Recommended D=Desirable
Communications	
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	H
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	H
Display the head or regional office contact information.	H
Dust Management	
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	H
Site Management	
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	H
Make the complaints log available to the local authority when asked.	H
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 log book.	H
Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	H

Mitigation measure	High Risk Measures H=Highly Recommended D=Desirable
Monitoring	
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.	H
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	H
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	H
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible, commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	H
Preparing and maintaining the site	
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H
Erect solid screens or barriers around dusty activities such as around the construction compounds so that they are at least as high as any stockpiles on site (where appropriate and practical).	H
Avoid site runoff of water or mud.	H
Keep site fencing, barriers and scaffolding clean using wet methods.	H
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as described below.	H
Cover, seed or fence stockpiles to prevent wind whipping (where needed and depending on duration).	H

Mitigation measure	High Risk Measures H=Highly Recommended D=Desirable
Operating vehicle/machinery and sustainable travel	
Ensure all vehicles switch off engines when stationary - no idling vehicles where practicable.	H
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H
Impose and signpost a maximum-speed-limit on surfaced and unsurfaced haul roads and work areas (if long haul routes are required, these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the Local Authority, where appropriate).	H
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	H
Implement a Construction Staff Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing) and encourage construction works to report to an offsite location before loading into a site vehicle and travelling to site, where practicable	H
Operations	
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.	H
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H
Use enclosed chutes and conveyors and covered skips where reasonably practicable.	H
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H
Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	H

Mitigation measure	High Risk Measures H=Highly Recommended D=Desirable
Waste Management	
No bonfires or burning of waste materials to be undertaken anywhere within the site.	H
Demolition (medium risk)	
Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	H
Avoid explosive blasting, using appropriate manual or mechanical alternatives where reasonably practicable.	H
Bag and remove any biological debris or damp down such material before demolition.	H
Earthworks (high risk)	
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable – where appropriate	H
Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	H
Only remove the cover in small areas during work and not all at once, where practicable.	H
Construction (high risk)	
Avoid scabbling (roughening of concrete surfaces) if possible.	H
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	H
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	H

Mitigation measure	High Risk Measures H=Highly Recommended D=Desirable
For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.	D
Trackout (high risk)	
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site.	H
Avoid dry sweeping of large areas.	H
Ensure vehicles carrying dust-generating materials entering and leaving sites are covered to prevent escape of materials during transport.	H
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	H
Record all inspections of haul routes and any subsequent action in a site log book.	H
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned so far as reasonably practicable.	H
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	H
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	H
Access gates to be located at least 10 m from receptors where possible.	H

2.4 Step 4

2.4.1 Assuming the relevant mitigation measures outlined in Table 2.5 are implemented, the residual effect from all dust generating activities is predicted to be not significant for the Project. The confidence in prediction for this assessment is high.

3. References

Ref 15.1 Institute of Air Quality Management (2024). Guidance on the Assessment of Dust from Demolition and Construction Version 2.2. [Online]. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf [Accessed: November 2024].

Ref 15.2 Department for Environment, Food and Rural Affairs (2024). MAGIC. [Online]. Available at: https://magic.defra.gov.uk/ [Accessed: November 2024].

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