Preliminary Environmental Information Report

Volume 4
Appendix 6.2

Air Quality Construction Dust Assessment Method

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1 Dust Assessment Method

1.1.1 As detailed in Chapter 6 of the Preliminary Environmental Information Report (PEIR) for the River Thames Scheme (RTS or the 'project'), the construction dust assessment will use an approach combining that in the 'Guidance on the Assessment of Minerals Dust Impacts' ('the IAQM 2016 guidance') (IAQM, 2016) and the 'Guidance on the assessment of dust from demolition and construction' (IAQM, 2023) ('the IAQM 2023 guidance'). The IAQM 2023 guidance replaces the version of the same guidance issued in 2014.

1.1.2 A combined approach was agreed via the feedback received with local authorities in connection with discussing the Planning Inspectorate (PINS) EIA Scoping Opinion ('the PINS Scoping Opinion'). They requested the use of the IAQM 2016 guidance to assess impacts if the project resulted in over 200,000 tonnes per annum of excavated materials; however, this does not consider all types of construction related activity, whereas the IAQM 2023 guidance does.

1.1.3 The method that will be used to assess each type of impact within the Environmental Impact Assessment (EIA) air quality chapter of the Environmental Statement (ES) submitted to accompany the Development Consent Order (DCO) application is described below.

1.2 Dust Assessment (Disamenity and Ecological Impacts): Procedure Overview

1.2.1 The assessment for disamenity and ecological effects requires consideration of the dust emissions magnitude, pathway effectiveness and receptor sensitivity. Each is discussed below.

1.2.2 The project may be divided into assessment phases or zones, depending either on construction timescales or to allow for primary and tertiary mitigation to be differentiated by phase.

Dust Emissions Magnitude

1.2.3 Firstly, the dust emissions magnitude will be assessed as ‘negligible’, ‘low’, ‘medium’ or ‘high’, in the presence of all primary and tertiary mitigation. The criteria may be modified based on the frequency or duration of specific activities.

1.2.4 The IAQM 2016 guidance suggests that the dust emissions magnitude can be assessed for seven categories. These are: site preparation/ restoration; mineral extraction; materials handling; on-site transportation; mineral processing; stockpiles/ exposed surfaces; and off-site transportation. The IAQM 2023 guidance instead recommends that dust emissions are assessed for demolition; earthworks; construction and trackout (off-site transportation).

1.2.5 It is proposed that the dust emissions magnitude is principally assessed using the criteria in the IAQM 2016 guidance to cover all earthworks and trackout activities but using the criteria in the IAQM 2023 guidance to assess demolition and construction.

1.2.6 Regarding earthworks, at each location where earthworks will take place (such as the materials processing compounds), the magnitude of dust emissions will be assessed using information from across the remaining six sources of dust emissions cited in the IAQM 2016 guidance (e.g. stockpiling, materials processing, etc.). It is considered that mitigation can be applied at specific locations, so assigning the emissions magnitude at different locations rather than for different sources is more appropriate.

1.2.7 For ease of understanding, the criteria used to assess the dust emissions magnitude is in Section 1.4 and Section 1.5 of this Appendix.

Pathway Effectiveness

1.2.7.1 Secondly, the pathway effectiveness will be determined for each potentially dusty activity. This involves classifying receptors or groups of receptors (depending on their proximity to each other) based on both their distance from the source of emissions into distance ‘bands’; and the frequency of winds (greater 5 metres per second) from the dust source during hours with little or no rainfall to which receptors at each distance ‘band’ are exposed. The pathway effectiveness will therefore be classified as either ‘ineffective’, ‘moderately effective’ or ‘highly effective’, using lookup tables in the IAQM 2016 guidance. The effectiveness may also consider other factors, such as the presence or absence of screening from vegetation or existing buildings; or terrain.

1.2.7.2 The frequencies of the wind speed in each direction are calculated based upon meteorological data for five years from a representative meteorological station, in this instance the Heathrow Airport station. These are assigned to the frequency categories detailed in Table A.6.2.1.

Table A.6.2.1: Categorisation of Frequency of Potentially Dusty Winds (IAQM 2016 Guidance)

Frequency Category	Criteria
Infrequent	Frequency of winds (>5 m/s) from the direction of the dust source on during dry hours are less than 5%.
Moderately Frequent	The frequency of winds (>5 m/s) from the direction of the dust source during dry hours are between 5% and 12%.
Frequent	The frequency of winds (>5 m/s) from the direction of the dust source during dry hours are between 12% and 20%.
Very Frequent	The frequency of winds (>5 m/s) from the direction of the dust source during dry hours are greater than 20%.

1.2.7.3 The distance between each representative receptor and the dust source are categorised as outlined in Table A.6.2.2.

Table A.6.2.2: Categorisation of Receptor Distance from Source (IAQM 2016 Guidance)

Frequency Category	Criteria
Distant	Receptor is between 200 metres and 400 metres from the dust source
Intermediate	Receptor is between 100 metres and 200 metres from the dust source
Close	Receptor is less than 100 metres from the dust source

1.2.7.4 The pathway effectiveness is classified using the Frequency of Potentially Dusty Winds from Table A.6.2.1 and the Receptor Distance from Source from Table A.6.2.2, as per Table A.6.2.3.

Table A.6.2.3: Pathway effectiveness (adapted from IAQM 2016 Guidance)

	Infrequent potentially dusty winds	Moderately Frequent potentially dusty winds	Frequent potentially dusty winds	Very Frequent potentially dusty winds
Receptor Distance Category: Close	Ineffective	Moderately Effective	Highly Effective	Highly Effective
Receptor Distance Category: Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
Receptor Distance Category: Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

1.2.7.5 Third, the dust impact risk is determined for each potentially dusty activity and at each receptor or group of receptors by comparing the dust emissions magnitude with the pathway effectiveness. The dust impact risk will be either ‘negligible’, ‘low’, ‘medium’ or ‘high’, using lookup tables in the IAQM 2016 guidance.

1.2.7.6 The residual source emissions and the pathway effectiveness should be combined using the matrix in Table A.6.2.4 to determine the dust impact risk.

Table A.6.2.4: Estimation of Dust Impact Risk (IAQM 2016 Guidance)

	Residual source emissions: Small	Residual source emissions: Medium	Residual source emissions: Large
Highly Effective Pathway	Low Risk	Medium Risk	High Risk
Moderately Effective Pathway	Negligible Risk	Low Risk	Medium Risk
Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

Receptor Sensitivity and Dust Effects

1.2.7.7 Fourth, the dust impacts will be determined by comparing the dust impact risk and receptor (or group of receptor) sensitivity as ‘low’, ‘medium’ or ‘high’, using lookup tables in the IAQM 2016 guidance, replicated as Table A.6.2.5 below. The definitions of receptor sensitivity used in this assessment are shown in Section 1.6 of this Appendix.

Table A.6.2.5: Descriptors for magnitude of dust impacts (IAQM 2016 Guidance)

	Receptor sensitivity: Low	Receptor sensitivity: Medium	Receptor sensitivity: High
Dust impact: High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Dust impact: Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Dust impact: Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect

1.2.8 Fifth, the overall significance of effects will be determined, individually in relation to impacts on disamenity and ecological receptors. The significance will be determined using professional judgement (as recommended in the IAQM 2016 guidance), considering the different dust impacts at different receptors or groups of receptors; and the number of receptors which may be affected. The judgement of significant effects is more definitive at either end of the spectrum. For example, where moderate or substantial impacts are identified from multiple impact categories, these will have a significant effect. Conversely, where most activities have a negligible or slight adverse impact, they will collectively have a not significant effect. A greater degree of professional judgement will be required between these ends of the spectrum.

1.3 Dust Assessment (Impacts on Human Health)

1.3.1 The IAQM 2016 guidance includes a separate method to assess the impacts attributable to PM_{10} on human health, as follows.

1.3.2 First, the potential for receptors or groups of receptors to be exposed to PM_{10} concentrations exceeding the annual or 24-hour mean air quality objectives (AQOs) will be determined by screening background concentrations against a threshold of 17µg/m^3, below which impacts (and subsequent stages of assessment) can be screened out. Receptors or groups of receptors will be defined based on their sensitivity (as defined in Section 1.6 of this Appendix) and proximity to each other.

1.3.3 Annual mean background pollutant concentrations will be sourced from either the estimated background maps published by Defra (Defra, 2020b) or local PM_{10} monitoring data. Where background maps are used, the pollutant concentrations will be applied for the years during which construction related activities take place for the 1km^2 grid within which each receptor or group of receptors is located. Where monitoring data are used, this may be scaled forward based on the ratio between the base year (2019) and future year concentrations mapped. If construction activities occur over multiple years, the year in which PM_{10} concentrations are predicted to be highest (normally the first year) will be applied.

1.3.4 A threshold of 17µg/m^3 is applied as the IAQM 2016 guidance indicates that the maximum annual mean process contribution from minerals activities is unlikely to exceed 15µg/m^3. The value of 17µg/m^3 is derived by extracting 15µg/m^3 from 32µg/m^3. The latter value is that provided in the Local Air Quality Management Technical Guidance (Department for Environment, Food and Rural Affairs, 2022) ('TG22') as an indication of the relationship between annual mean concentrations and the risk of the 24-hour mean PM_{10} AQO being exceeded.

1.3.5 Second, where human health impacts cannot be screened out, the extent to which the process contribution (PC) reduces with distance from the source will be determined, using the formula cited in Appendix 5 of the IAQM 2016 guidance (as originally derived from the Local Air Quality Management Technical Guidance 2003). The PC will be added to the background to obtain the predicted environmental concentration (PEC).

1.3.6 Third, the impact magnitude of dust generated in connection with the potentially dusty construction related activities will be determined. This will involve comparing the background concentration (or assumed 'without development' PEC) to the PEC at the receptors (or assumed 'with development' PEC) and determining the impact magnitude in accordance with the method derived from the 'Land use planning & development

control: planning for air quality' guidance (Environmental Protection UK & Institute of Air Quality Management, 2017) ('the EPUK-IAQM guidance').

1.3.7 The significance of overall effects will be determined using professional judgement, with reference to the number of 'negligible', 'slight', 'moderate' or 'substantial' adverse impacts identified.

1.3.8 Where significant effects are identified despite the presence of primary and tertiary mitigation, secondary mitigation measures will be specified. The overall significance of effects will then be recalculated. The dust risk assessment and proposed mitigation measures will be fully reported and assessed in the ES.

1.4 Dust Assessment (Disamenity and Ecological Impacts): Assessment of Earthworks and Trackout Dust Emissions Magnitude

1.4.1 For earthworks and trackout, the residual dust source emission magnitude will be determined by drawing on information from across the definitions below.

1.4.2 The examples given below (relating to 'small' and 'large' activities) of the residual source emissions magnitude illustrate the factors that may be considered when making a professional judgement. It should be noted that the examples are based on the experience of the Working Group which co-wrote the IAQM 2016 guidance from data provided by the minerals sector, but these examples are not prescriptive. As 'medium' measures are not specified in the guidance, it is assumed that an attribute would be considered 'medium' where it falls between the small and large values.

1.4.3 When the assessment is undertaken, primary and tertiary mitigation measures are taken into account.

1.4.4 An example of a large potential dust magnitude from site preparation or restoration may include factors such as:

- a site with a working area >10ha;
- bunds >8 m in height;
- >100,000 m^3 material movement;
- >10 heavy plant simultaneously active;

- un-seeded bunds; and
- fine grained and friable material.

1.4.5 Conversely, a small potential dust magnitude may include:

- a site with a working area <2.5ha;
- bunds <4 m in height;
- <20,000 m^3 material movement;
- <5 heavy plant simultaneously active; and
- all bunds seeded or material with a high moisture content.

1.4.6 An example of a large potential dust magnitude from mineral extraction may include:

- a site with a working area >100 ha;
- drilling and blasting frequently used;
- dusty mineral of small particle size and/or low moisture content;
- 1,000,000 tpa (tonnes per annum) extraction rate.

1.4.7 A small potential magnitude may include:

- a site with working area <20 ha;
- hydraulic excavator;
- coarse material and/or high moisture content; and
- <200,000 tpa extraction rate.

1.4.8 An example of a large potential dust magnitude from materials handling may include factors such as:

- >10 loading plant within 50 m of a site boundary;
- transferring material of a high dust potential and/or low moisture content on dry, poorly surfaced ground.

1.4.9 Conversely, a small potential dust magnitude may include:

- <5 loading plant within more than 100 m of a site boundary, within the quarry void or clean hardstanding;
- transferring material of low dust potential and/or high moisture content.

1.4.10 An example of a large potential dust magnitude from on-site transportation could include:

- >250 heavy goods vehicle (HGV) movements in any one day on unpaved surfaces of potentially dusty material.

1.4.11 A small potential magnitude may include:

- the employment of covered conveyors used for the majority of the on-site transportation of material;
- <100 movements of vehicles per day, with surface materials of compacted aggregate;
- <500 m in length and a maximum speed of 15 mph.

1.4.12 An example of a large potential dust magnitude from mineral processing may include factors such as:

- a mobile crusher and screener with concrete batching plant on-site;
- processing >1,000,000 tpa of material with a high dust potential and/or low moisture content e.g. hard rock.

1.4.13 Conversely, a small potential dust magnitude may include

- a site with a fixed screening plant with effective design in dust control;
- processing <200,000 tpa of material with a low dust potential and/or high moisture content e.g. wet sand and gravel.

1.4.14 An example of a large potential dust magnitude from stockpiles and exposed surfaces could include:

- a stockpile with a total exposed area >10 ha in an area exposed to high wind speeds located <50 m of the project boundary;

- works involving the daily transfer of material with a high dust potential and/or low moisture content;
- stockpile duration of >12 months and where there is >1,000,000 tpa stored.

1.4.15 A small potential magnitude may include:

- stockpile duration of <1 month with a total area <2.5 ha in an area of low wind speed, located >100 m from the project boundary;
- works involving weekly transfers of material with a low dust potential and/or high moisture content and where there is <200,000 tpa stored.

1.4.16 An example of a large potential dust magnitude from off-site transportation could include:

- total HGV >200 movements in any one day on unsurfaced site access road <20 m in length;
- no effective HGV cleaning facilities and no road sweeper available.

1.4.17 A small potential magnitude may include:

- <25 HGV movements per day, a paved surfaced site access road >50 m in length;
- effective HGV cleaning facilities and procedures and the employment of an effective road sweeper.

1.5 Assessment of Demolition and Construction Dust Emissions Magnitude

1.5.1 To calculate the potential dust emission magnitude for activities relating to demolition and construction during the construction phase, the IAQM 2023 guidance has been followed. The methodology utilised is described using the examples presented below.

1.5.2 The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium, or Large. The following are examples of how the potential dust emission magnitude can be defined for demolition and construction activities. It should be noted that, in each case, not all the criteria listed need to be met, and that other criteria may be used if justified in the assessment.

Demolition

1.5.3 Example definitions of dust emission magnitude category for demolition are:

- **Large**: 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 6-12 m above ground level; and
- **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.

Construction

1.5.4 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. Example definitions for construction are:

- **Large**: Total building volume >75,000 m^3, on site concrete batching, sandblasting;
- **Medium**: Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- **Small**: Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

1.6 Receptor Sensitivity

1.6.1 Table A.6.2.6 summarises the definitions used to categorise each receptor assessed regarding their sensitivity to dust soiling (amenity), human health effects and dust deposition (ecosystems). These definitions are derived from both the IAQM 2023 and IAQM 2016 guidance documents, which take a consistent approach to defining receptor sensitivity. They have been adapted to account for feedback provided in the PINS Scoping Opinion.

Table A.6.2.6: Definitions and indicative examples of the sensitivity of different types of receptors

Sensitivity of receptor	Dust soiling effects [a]	Human health effects	Ecological effects [b]
High	Surrounding land where: • 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 to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Indicative examples include dwellings (including houseboats), museums and other culturally important collections, medium and long-term car parks and car showrooms.	Locations where members of the public are exposed over a time period relevant to the annual mean air quality objective (AQO) for fine particulate matter with a diameter of less than ten micrometres (PM_{10}). Indicative examples include residential properties/ facades (including houseboats), hospitals, schools and residential care homes.	Locations with an international or national designation and the designated features may be affected by dust soiling (e.g. SAC/SPA/Ramsar). Locations where there is a community of a species particularly sensitive to dust such as vascular species included in the Red Data list for Great Britain.
Medium	Surrounding land where: • 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	Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Office and shop workers not	Locations where there is a particularly important plant species, where dust sensitivity is uncertain or unknown. Locations with a national designation where the features may be affected by dust deposition (e.g. SSSIs).

	normal pattern of use of the land. Indicative examples include parks and places of work. As per feedback from the LPA Working Group, significant roads will also be considered.	occupationally exposed to PM_{10}.	
Low	Surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • property 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. Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.	Locations where human exposure is transient. Indicative examples include public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition (e.g. Local Nature Reserves).

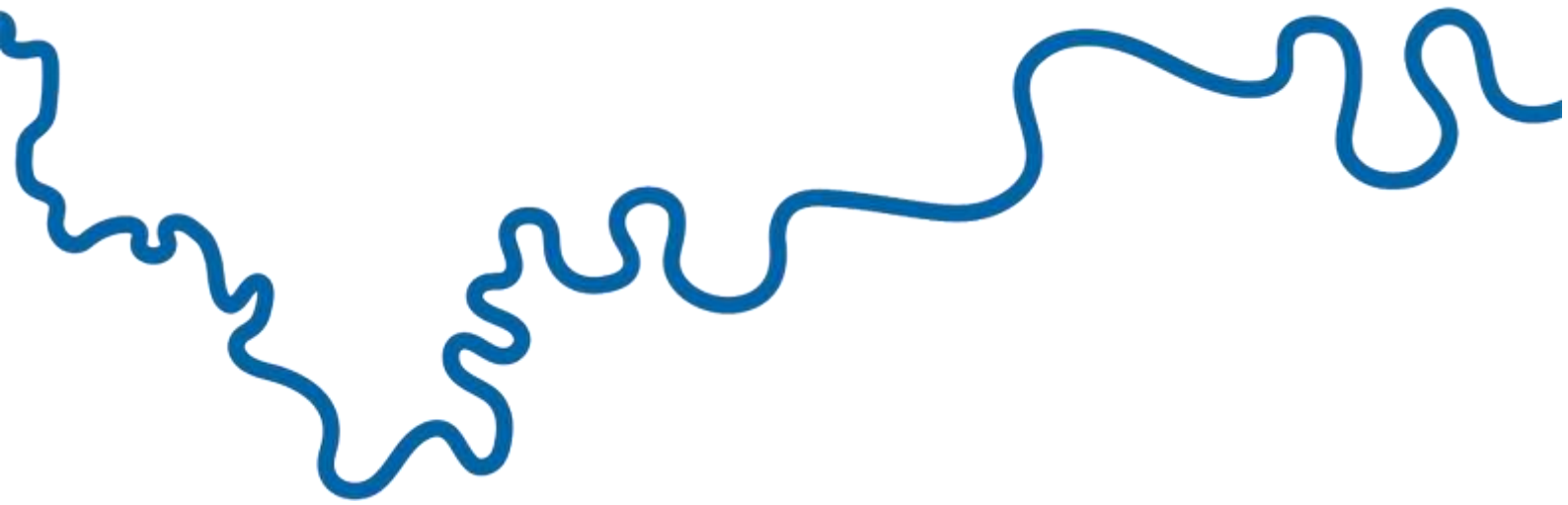
a. People's expectations would vary depending on the existing dust deposition in the area.
b. Only if there are habitats that might be sensitive to dust. A Habitats Regulations Assessment of the site may be required as part of the planning process if the site lies close to an internationally designated site i.e. SACs, SPAs and Ramsar sites.

References

EPUK & IAQM, (2017) Land use planning & development control: planning for air quality. (Online) (Accessed: 3 October 2023).

Institute of Air Quality Management (2023) IAQM Guidance on the assessment of dust from demolition and construction. (Online) (Accessed: 14 September 2023).

Institute of Air Quality Management (2016) Guidance on the Assessment of Mineral Dust Impacts for Planning. (Online) (Accessed: 28 February 2023).



SURREY COUNTY COUNCIL

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The River Thames Scheme represents a new landscape-based approach to creating healthier, more resilient and more sustainable communities by reducing the risk of flooding and creating high quality natural environments.

River Thames
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