

East Meath - North Dublin Grid Upgrade Environmental Impact Assessment Report (EIAR): Volume 3

Appendix A7.1 – Construction Dust Risk Assessment Methodology

EirGrid

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Appendix A7.1 – Construction Dust Risk Methodology

7.1 Introduction

Emissions of dust to air can occur from works associated with the preparation of land (e.g., demolition, land clearing or grading, earth moving and excavation) and during construction. This Appendix sets out the assessment of dust, which could potentially be emitted to air from construction activities associated with the East Meath - North Dublin Grid Upgrade (hereafter referred to as the Proposed Development).

This Appendix supports Chapter 7 (Air Quality) in Volume 2 of the Environmental Impact Assessment Report (EIAR) for the Proposed Development, and outlines a procedure developed by the Institute of Air Quality Management (IAQM) in their Guidance on the Assessment of Dust from Demolition and Construction (hereafter referred to as IAQM Guidance) (IAQM 2023) for the assessment of dust-related air quality impacts arising from construction activities associated with the Proposed Development.

The IAQM Guidance was produced by air quality professionals and regulators, and although aimed at developments in the United Kingdom, the process and principles of the assessment set out in the IAQM Guidance are applicable for other geographical locations and construction projects. It is also the approach recommended by Transport Infrastructure Ireland (TII) in the Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document PE-ENV-01106 (TII 2022), and therefore considered best practice in Ireland.

7.2 IAQM Methodology

The methodology for the assessment of the construction impacts is based on a five-step approach, as set out in Image 1.

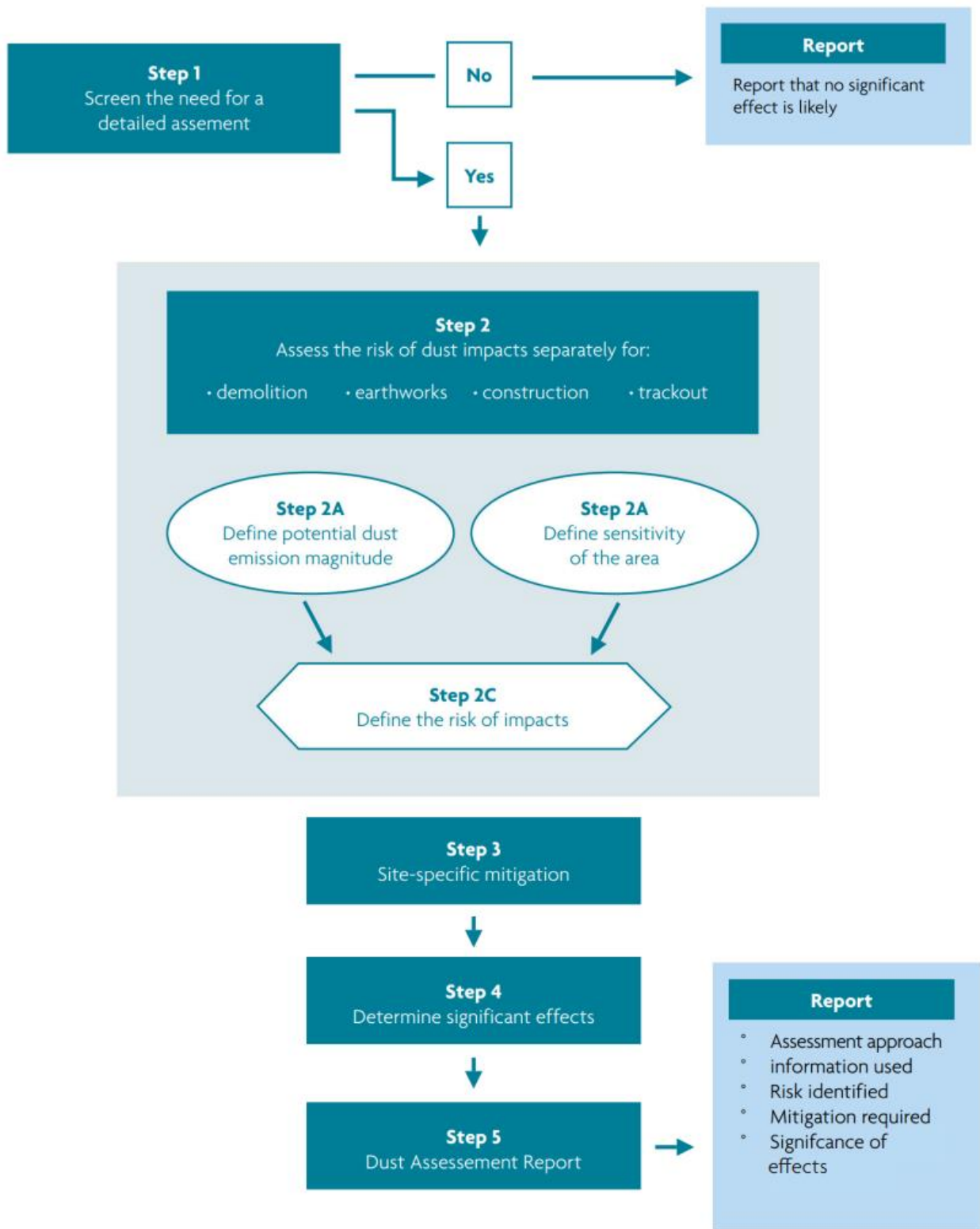


Image 1: Structure of the Dust Risk Assessment (IAQM 2023)

7.2.1 Step 1 – Identify the Need for a Detailed Assessment

An assessment would normally be required based on the following criteria:

- A human receptor within 250 metres (m) of the works area(s) associated with the Proposed Development and / or within 50m of the proposed access route(s) used by construction vehicles on the public highway, up to 50m from the study area site exit(s) for small sites, up to 200m from the study area site exit(s) for medium sites and up to 500 m from the study area site exit(s) for large sites; and / or
- An ecological receptor within 50m of the works area(s) associated with the Proposed Development and / or within 50m of the proposed access route(s) used by construction vehicles on the public highway, up to 250m from the study area site exit(s).

The requirement for a dust risk assessment can be screened out where the above criteria are not met. Therefore, it can be concluded that the level of risk is negligible and any impacts would be 'Not Significant'. If there are human or ecological receptors within the distance criteria set out in Step 1, then Steps 2 to 4 should be undertaken, as shown in Image 1.

7.2.2 Step 2 – Assess the Risk of Dust Impacts

A site is allocated to a risk category based on the scale and nature of the works (Step 2A – Define potential dust emission magnitude) and the sensitivity of the area to dust impacts (Step 2B – Define sensitivity of the area). These two factors are combined (Step 2C – Define the risk of dust impacts) to determine the risk of dust impacts before the implementation of mitigation measures. Risks are described in terms of there being a low, medium or high risk of dust impacts for each of four separate potentially dust emitting activities (i.e., demolition, construction, earthworks and trackout). Site-specific mitigation would be required, proportionate to the level of risk identified.

7.2.2.1 Step 2A - Define the Potential Dust Emission Magnitude

The potential dust emission magnitude is based on the scale of the anticipated works and is classified as small, medium or large. Table 1 presents the dust emission criteria outlined for each construction activity.

Table 1: Potential Dust Emission Magnitude.

Construction Activity	Large	Medium	Small
Demolition	Total building volume >75,000m ³ (metres cubed) potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12m above ground level.	Total building volume 12,000m ³ – 75,000m ³ , potentially dusty construction material, demolition activities 6m-12 m above ground level.	Total building volume <12,000m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6m above ground, demolition during wetter months.
Earthworks	Total site area >110,000m ² (metres squared), 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 >6 m in height.	Total site area 18,000m ² – 110,000m ² , moderately dusty soil type (e.g. silt), 5 -10 heavy earth moving vehicles active at any one time, formation of bunds 3m – 6m in height.	Total site area <18,000m ² , soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height.
Construction	Total building volume >75,000m ³ , on site concrete batching, sandblasting.	Total building volume 12,000m ³ – 75,000m ³ , potentially dusty construction material (e.g. concrete), on site concrete batching.	Total building volume <12,000m ³ , construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout	>50 Heavy Duty Vehicles (HDV) (>3.5 tonnes) outward movements ¹ in any one day ² , potentially dusty surface material (e.g. high clay content), unpaved road length >100m.	20-50 HDV (>3.5 tonnes) outward movements ¹ in any one day ² , moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m.	<20 HDV (3.5 tonnes) outward movements ¹ in any one day ² , surface material with low potential for dust release, unpaved road length <50m.
Note 1: A vehicle movement is a one-way journey. i.e. from A to B and excludes the return journey. Note 2: HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.			

7.2.2.2 Step 2B – Define the Sensitivity of the Area

The sensitivity of the area is described as low, medium or high and takes a number of factors into account:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- The local background particulate matter (PM₁₀) concentrations; and
- Site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Table 2 presents indicative examples of classification groups for the varying sensitivities of people to dust soiling impacts, to the health impacts of PM₁₀ and the sensitivities of receptors to ecological impacts. Professional judgement is made at the site-specific level where sensitivities may be higher or lower, for example a soft fruit business may be more sensitive to soiling than an alternative industry, such as coal mining, in the same location. Section 7.3 within the IAQM Guidance (IAQM 2023) outlines more detailed parameters for defining sensitivity.

Table 2: Indicative Examples of the Sensitivity of Different Types of Receptors.

Sensitivity of Receptor	Sensitivities of People and Ecological Receptors		
	Dust soiling activities impacts ¹	Health impacts of PM ₁₀ ²	Ecological impacts ³
High	Dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.	Residential properties, 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. Special Area of Conservation (SAC) / Special Protection Area (SPA) / Ramsar site). Locations where there is a community of a particular dust sensitive species such as vascular plant species included in the Red Data list for Great Britain (Cheffings et al. 2005)
Medium	Parks, places of work.	Office and shop workers not occupationally exposed to PM ₁₀ .	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. Natural Heritage Area (NHA)).
Low	Playing fields, farmland, footpaths, short-term car parks and roads.	Public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition.

Note 1: People's expectations would vary depending on the existing dust deposition in the area.
 Note 2: This follows the Department for Environment, Food and Rural Affairs (Defra) (Defra 2022) guidance as set out in Local Air Quality Management Technical Guidance (LAQM.TG (22)).
 Note 3: A Habitat Regulation 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) designated under the Habitats Directive (92/43/EEC) and Ramsar sites.

The receptor sensitivity and distance are then used to determine the potential dust risk for each dust effect for each construction activity, as shown in Table 3, Table 4: Table 4 and Table 5. It is noted that distances are between the dust source to the nearest receptor so a different area may be affected by trackout than by on-site works.

For trackout, the distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur from roads up to 500m from large sites, 200m from medium sized sites and 50m from small sites, as measured from the site exit(s). The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50m from the edge of the road.

Table 3: Criteria for the Sensitivity of the Area to Dust Soiling Effects on People and Property.

Receptor Sensitivity	Number of Receptors	Distance from the 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 4: Criteria for the Sensitivity of the Area to Human Health.

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration (micrograms per metre cubed (m ³))	Number of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	>32 µg/m ³	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28 – 32 µg/m ³	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24 – 28 µg/m ³	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m ³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m ³	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28 – 32 µg/m ³	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24 – 28 µg/m ³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m ³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

Table 5: Criteria for the Sensitivity of the Area to Ecological Impact

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

7.2.2.3 Step 2C – Define the Risk of Impacts

The dust emission magnitude is then combined with the sensitivity of the area to determine the overall risk of impacts with no mitigation measures applied. The matrices in Table 6 provide a method of assigning the level of risk for each activity. These can then be used to determine the level of mitigation that is required.

Table 6: Determination of 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 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

7.2.3 Step 3 – Site Specific Mitigation

During the Construction Phase, it would be important to control dust levels for high, medium and low risk construction activities. To avoid significant impacts from dust during the Construction Phase, suitable mitigation measures should be adopted. Following the identification of the overall risk category for the demolition, earthworks, construction and trackout activities based on Table 6, appropriate mitigation measures can be identified for the Proposed Development. Activities identified as a high risk would require a greater level of mitigation than those identified as low risk.

A selection of these measures has been specified for low risk to high risk sites in the IAQM Guidance (IAQM 2023), as measures suitable to mitigate dust emissions from activities such as those that will be undertaken during the construction of the Proposed Development.

7.2.4 Step 4 - Determine Significant Impacts

Following Step 2 (determining the risk of dust impacts for each activity) and Step 3 (identification of appropriate site-specific mitigation), the significance of the potential dust impacts can be determined. The recommended mitigation measures are considered to be sufficient to reduce emissions of dust based on the successful application of these measures at other large construction sites, such that a significant impact would not occur at off site receptors.

The approach in Step 4 of the IAQM Guidance (IAQM 2023) (determine significant impacts) has been adopted to determine the significance of impacts with regard to dust emissions. The guidance states the following:

"For almost all construction activity, the aim should be to prevent significant impacts on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'".

The IAQM Guidance also states that:

"Even with a rigorous DMP [Dust Management Plan] in place, it is not possible to guarantee that the dust mitigation measures will be effective all the time, and if, for example, dust emissions occur under adverse weather conditions, or there is an interruption to the water supply used for dust suppression, the local community may experience occasional, short-term dust annoyance. The likely scale of this would not normally be considered sufficient to change the conclusion that, with mitigation, the impacts will be 'not significant'".

Step 4 of IAQM Guidance recognises that the key to the above approach is that it assumes that the regulators ensure that the proposed mitigation measures are implemented. The management plan would include the necessary systems and procedures to enable on-going checking by the regulators to ensure that mitigation is being delivered, and that it is effective in reducing any residual impact to 'Not Significant' in line with the IAQM Guidance.

7.3 References

Cheffings, C.M. & Farrell, L. (eds), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. (2005). The Vascular Plant Red Data List for Great Britain. Species Status No. 7. JNCC, Peterborough, ISSN 1473-0154.

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