The Lake Lothing (Lowestoft) Third Crossing Order 201[*]

Lake Lothing THIRD CROSSING

Document 6.3: Environmental Statement Volume 3 Appendices

Appendix 8A

Construction Phase Assessment Methodology

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Appendix 8A Construction Phase Assessment Methodology

1.1 Introduction and Scope of the Assessment

1.1.1 Appendix 8B of the Environmental Statement (ES) outlines the guidance provided by the Institute of Air Quality Management (IAQM) for the assessment of air quality impacts arising from demolition and construction activities[1], (herein referred to as "the Guidance"). The Guidance prescribes a five step process for undertaking this assessment as follows.

1.2 Step One: Screen the Need for a Detailed Assessment

1.2.1 An assessment of construction phase dust emissions will normally be required where there are:

- 'Human receptors' within 350m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and
- 'Ecological receptors' within 50m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

1.2.2 The Guidance refers to a 'Human receptor', as any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to PM_{10} over a time period relevant to the air quality objectives, as defined in Defra technical air quality guidance[2].

1.2.3 The Guidance refers to an 'Ecological receptor' as any sensitive habitat affected by dust soiling and includes locations with a statutory designation such as a Site of Specific Scientific Interest (SSSI), Special Area of Conservation (SACs), Special Protection Areas (SPAs) and RAMSAR sites, as designated under the RAMSAR convention. In addition to the sites identified as fulfilling the requirements of the Guidance, the Scoping Opinion (see Appendix 6B of the Environmental Statement) identified County Wildlife Sites (CWSs) and Local Nature Reserves (LNRs) to be included in the assessment.

1.2.4 Where the need for a more detailed assessment is screened out, the Guidance concludes that the level of risk is 'negligible' and that any effects are unlikely to be significant.

1.3 Step Two: Assess the Risk of Dust Impacts

1.3.1 The Guidance states that the risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk. 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 as small, medium or large (Step Two (A)); and

[1] Institute of Air Quality Management (IAQM) (2014). Assessment of Dust from Construction and Demolition, IAQM

[2] Defra (2016) Local Air Quality Technical Guidance TG(16).

- The sensitivity of the area to dust impacts (Step Two (B)) which is defined as low, medium or high sensitivity.

1.3.2 These two factors are combined to determine the risk of dust impacts with no mitigation applied. Depending on the activities undertaken, risk category designations may be required for each of four construction activities defined by the Guidance; namely Demolition, Construction, Earthworks and Trackout.

Step Two (A): Define the Potential Dust Emission Magnitude

1.3.3 The dust emission magnitude has been based on the scale of the anticipated works and is classified as 'Small', 'Medium', or 'Large' as identified for each construction activity from the criteria in Table 0-1.

Table 0-1 Dust Emission Magnitude Criteria

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

1.3.4 Table 0-1 details the risk of impacts for potential dust nuisance, health and ecosystem effects from demolition; earthworks; general construction activities and trackout, respectively. For the purposes of the Step Two (A) assessment, in accordance with the Guidance, it is assumed that no mitigation measures are applied, the dust emission magnitude is dependent on the available information on the construction phase and professional judgement.

1.3.5 A summary of the dust emission magnitude assigned to each construction activity as part of this assessment is outlined in Table 0-2.

Table 0-2 Dust Emission Magnitude Classification for Assessment

Activity	Dust Emission Magnitude	Justification
Demolition	Large	The construction demolition involves the removal of a wooden panelled shed, two brick garages, one two storey brick building and eight large sheds with corrugated roofs mounted on concrete pillars and associated hardstanding. A worst case assumption that asbestos may be present within structures has been taken.
Earthworks	Large	The exact extent of Earthworks is unknown at this ES stage. However, due to the size of the Scheme and taking a worst case approach to the assessment, it is judged that Earthworks could produce high levels of dust and it has accordingly been included within the assessment.
Construction	Large	Although a detailed construction programme was not available at this ES stage, given the size of the Scheme and likelihood of onsite works, a worst case assumption that works have the potential to generate high levels of dust was taken.
Trackout	Large	At the ES stage, the exact number of construction vehicles utilised throughout the construction phase is unknown, nor the amount and length of unpaved roads that will be used. As a worst case estimate, it is assumed the Scheme will generate up to 108 two way vehicle movements (including HDV movements), per day divided across multiple site entrances (see Section 8.3.5 of the ES) and it is likely that there will be sections of unpaved road during construction.

Step Two (B): Define the Sensitivity of the Area

1.3.6 The sensitivity of the area takes into account 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, such as trees, to reduce the risk of wind-blown dust.

1.3.7 The significance of dust effects associated with the construction phase was defined using the criteria detailed in Table 0-3, Table 0-4 and Table 0-5.

1.3.8 The sensitivity is derived for each of the four considered activities and the highest level recorded as part of the assessment. (See *Box Six to Box Nine* of the Guidance).

Table 0-3 Sensitivity of the Area to Dust Soiling Effects of People and Property [ab]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m) [c]			
		<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

[a] The sensitivity of the area is derived for each of the four activities: demolition, construction, earthworks and trackout.

[b] Estimate the total number of receptors within the stated distance. Only the **highest level** of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors <20 m of the source and 95 high sensitivity receptors between 20 and 50 m, then the total number of receptors <50 m is 102. The sensitivity of the area in this case would be high.

[c] For trackout, the distances are 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 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.

Table 0-4 Sensitivity of the Area to Human Health Impacts [ab]

Receptor Sensitivity	Annual Mean PM_{10} Concentration [c]	Number of Receptors [d]	Distance from the Source (m)[e]				
			<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	>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

Receptor Sensitivity	Annual Mean PM_{10} Concentration [c]	Number of Receptors [d]	Distance from the Source (m)[e]				
			<20	<50	<100	<200	<350
		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

[a] The sensitivity of the area is derived for each of the four activities: demolition, construction, earthworks and trackout.

[b] Estimate the total within the stated distance (e.g. the total within 350 m and not the number between 200 and 350 m), noting that only the **highest level** of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors <20 m of the source and 95 high sensitivity receptors between 20 and 50 m, then the total number of receptors <50 m is 102. If the annual mean PM_{10} concentration is 29 µg/m^3, the sensitivity of the area would be high.

[c] Most straightforwardly taken from the national background maps, but should also take account of local sources. The values are based on 32 µg/m^3 being the annual mean concentration at which an exceedance of the 24hr objective is likely in England, Wales and Northern Ireland.

[d] In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties.

[e] For trackout, the distances are measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large 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.

Table 0-5 Sensitivity of the Area to Ecological Impacts [ab]

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

[a] The sensitivity of the area is derived for each of the four activities: demolition, construction, earthworks and trackout and for each designated site.

[b] Only the **highest level** of area sensitivity from the table needs to be considered.

[c] For trackout, the distances are measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large sites, as measured from the site exit. The impact declines with distance from the site.

1.3.9 **Error! Reference source not found.** provides the method of defining the sensitivity of the area.

Table 0-6 Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Medium	Medium	Medium	Medium
Ecological	Low (Non Statutory Ecological Sites)			

Step Two (C): Define the Risk of Impacts

1.3.10 The dust emission magnitude determined using the criteria in Table 0-1 and justified in Table 0-2 has been combined with the sensitivity of the area determined through the implementation of Table 0-3, Table 0-4 and Table 0-5 to determine the risk of impacts without mitigation.

1.3.11 The matrices in Table 0-7 provide a method of assigning the level of risk for each activity. This has been used in determining the level of mitigation that must be applied and discussed in Step Three. For those cases where the risk category is 'negligible', no mitigation measures beyond those required by legislation are required.

Table 0-7 Risk of Dust Impacts

Sensitivity of Area	Dust Emission Magnitude		
	Small	Medium	Large
Demolition			
Low	Negligible	Low Risk	Medium Risk
Medium	Low Risk	Medium Risk	High Risk
High	Medium Risk	Medium Risk	High Risk
Earthworks			
Low	Negligible	Low Risk	Low Risk
Medium	Low Risk	Medium Risk	Medium Risk
High	Low Risk	Medium Risk	High Risk
Construction			
Low	Negligible	Low Risk	Low Risk
Medium	Low Risk	Medium Risk	Medium Risk
High	Low Risk	Medium Risk	High Risk
Trackout			
Low	Negligible	Low Risk	Low Risk
Medium	Negligible	Low Risk	Medium Risk
High	Low Risk	Medium Risk	High Risk

1.3.12 Table 0-8 provides a summary of the risk of dust impacts for the four activities and allows for site-specific mitigation measures to be specified for inclusion in this assessment (see Step Three).

Table 0-8 Summary of Risk for Definition of Mitigation Measures

Sensitivity of Area	Summary of Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High Risk	High Risk	High Risk	High Risk
Human Health	Medium Risk	Medium Risk	Medium Risk	Medium Risk
Ecological	Low Risk			

1.4 Step Three: Site-specific Mitigation

1.4.1 The dust risk categories for each of the four activities determined in Step Two have been used to define the appropriate, site-specific, mitigation measures to be adopted and reflected in the interim CoCP.

1.4.2 The mitigation measures are divided into general measures applicable to all site and measures applicable specifically to demolition, earthworks, construction and trackout, for consistency

with the assessment methodology. More information on the site-specific mitigation identified as part of this air quality assessment can be found in the section 8.6 of Chapter 8 of the ES.

1.5 Step Four: Determine Significant Effects

1.5.1 Once the risk of dust impacts has been determined in Step Two and the appropriate dust mitigation measures identified in Step Three, the final step has been to determine whether there are significant effects arising from the construction phase of the Scheme. This assessment is based on professional judgement and takes account of the significance of the effect of each of the four construction activities.

1.5.2 For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. The Guidance states that this is normally possible. Hence the residual effect will normally be 'not significant'.

1.6 Step Five: Dust Assessment Report

1.6.1 The findings of the construction phase dust assessment are reported in Section 8.5 and 8.6 of Chapter 8 of the ES. This assessment includes:

- A summary of dust emission magnitude and sensitivity of the study area;
- The potential risk of impacts associated with the construction phase, without mitigation; and
- Details of appropriate mitigation measures commensurate to the scale and nature of construction activities and locations; this will be applied via the full CoCP.