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Norwich to Tilbury

Volume 6: Environmental Statement

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Contents

7. Air Quality Assessment Methodology

7.1 Introduction

7.1.1 This appendix supports and should be read in conjunction with Chapter 7: Air Quality (document reference 6.7) of the Environment Statement (ES) (Volume 6 of the Development Consent Order (DCO) application) for Norwich to Tilbury (the 'Project'). This appendix presents the methodology followed for the construction dust assessment and construction traffic assessment undertaken as part of the ES (Volume 6 of the DCO application).

7.1.2 The Project has been sub-divided into eight geographical sections for reader accessibility, based largely on Local Planning Authority boundaries. These are shown on Figure 1.1: Site Location Plan and Project Sections (document reference 6.1.F1) and comprise:

- Section A – South Norfolk Council
- Section B – Mid-Suffolk District Council
- Section C – Babergh District Council, Colchester City Council and Tendring District Council
- Section D – Colchester City Council
- Section E – Braintree District Council
- Section F – Chelmsford City Council and Brentwood District Council
- Section G – Basildon Borough Council and Brentwood Borough Council (and part of Chelmsford City Council)
- Section H – Thurrock Council.

7.1.3 Receptors are reported with reference to the Project section in which they are located.

7.2 Construction Dust Assessment

7.2.1 The construction phase effects of the Project have been assessed using the five step, qualitative approach described in the Institute of Air Quality Management (IAQM) guidance (IAQM, 2024). The guidance applies to the assessment of dust from construction/demolition activities.

7.2.2 An 'impact' is described as a change in pollutant concentrations or dust deposition, while an 'effect' is described as the consequence of an impact. The main impacts that may arise during construction activities of the Project are:

- Dust deposition, resulting in the soiling of surfaces
- Visible dust plumes
- Elevated Particulate Matter (10 micrometers or less in diameter) (PM_{10}) concentrations because of dust generating activities on site

- An increase in Nitrogen Dioxide (NO_2) and PM_{10} concentrations due to exhaust emissions from non-road mobile machinery and vehicles accessing the site.

7.2.3 The IAQM guidance considers the potential for dust emissions from activities such as demolition of existing structures, earthworks, construction of new structures and track-out. Earthworks refer to the processes of soil stripping, ground levelling, excavation, and land capping, while track-out is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dust materials, which may then spill onto the road, or when they travel over muddy ground on site and then transfer dust and dirt onto the road network.

7.2.4 For each of these dust-generating activities, the guidance considers three separate effects:

- Annoyance due to dust soiling
- Harm to receptors, and
- The risk of health effects due to a significant increase in PM_{10} exposure.

7.2.5 The receptors can be human or ecological and are selected based on their sensitivity to dust soiling and PM_{10} exposure. Sensitive receptors are defined as those properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the Project.

7.2.6 The methodology takes into account the scale at which the above effects are likely to be generated (classed as small, medium or large), the levels of background PM_{10} concentrations and the distance to the closest receptor in order to determine the sensitivity of the area. This is then taken into consideration when deriving the overall risk of for the site. Suitable mitigation measures are also proposed to reduce the risk of the potential impacts on local air quality as a result of the construction works.

7.2.7 The five steps in the assessment process described in the IAQM guidance is summarised in the paragraphs that follow.

Step 1: Need for assessment

7.2.8 The first step is the initial screening for the need for a detailed assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors within 250 m of a site boundary (for ecological receptors it is 50 m) and/or within 50 m of the route(s) used by the construction vehicles on the public highway and up to 250 m from site entrance(s).

Step 2: Assess the risk of dust impacts

7.2.9 Step 2 is split into three sections as follows:

- 2A. Define the potential dust emission magnitude
- 2B. Define the sensitivity of the area
- 2C. Define the risk of impacts.

7.2.10 Each of the dust-generating activities is given a dust emission magnitude depending on the scale and nature of the works (step 2A) based on the criteria shown in Table A7.1.1.

7.2.11 The sensitivity of the surrounding area is then determined (step 2B) for each dust effect from the above dust-generating activities, based on the proximity and number of receptors, their sensitivity to dust, the local PM_{10} background concentrations and any other site-specific factors. Table A7.1.2 and Table A7.1.3 show the criteria for defining the sensitivity of the area to different dust effects.

7.2.12 The overall risk of the impacts for each activity is then determined (step 2C) prior to the application of any mitigation measures (Table A7.1.4) and an overall risk for the site derived.

Table A7.1.1 Dust emission magnitude

Dust Emission Magnitude		
Small	**Medium**	**Large**
Demolition		
• 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	• Total building volume 12,000 m^3 to 75,000 m^3 • Potentially dusty construction material • Demolition activities 6 to 12 m above ground level	• 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
Earthworks		
• Total site area <18,000 m^2, soil type with large grain size (e.g., sand) • < five heavy earth moving vehicles active at any one time • Formation of bunds <3 m in height	• Total site area 18,000 m^2 110,000 m^2, moderately dusty soil type (e.g., silt) • Five to 10 heavy earth moving vehicles active at any one time • Formation of bunds 3 to 6 m in height	• Total site area >110,000 m^2 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 material moved
Construction		
• Total building volume <12,000 m^3 • Construction material with low potential for dust	• Total building volume 12,000 m^3 to 75,000 m^3 • Potentially dusty construction material (e.g., concrete)	• Total building volume >75,000 m^3 • On-site concrete batching • Sandblasting

Dust Emission Magnitude		
Small	**Medium**	**Large**
release (e.g., metal cladding or timber)	• On-site concrete batching	
Track out		
• <20 Heavy-Duty Vehicle (HDV) (>3.5 t) trips in any one day • Surface material with low potential for dust release • Unpaved road length <50 m	• 20 to 50 HDV (>3.5 t) trips in any one day • Moderately dusty surface material (e.g., high clay content) • Unpaved road length 50 m to 100 m	• >50 HDV (>3.5 t) trips in any one day • Potentially dusty surface material (e.g., high clay content) • Unpaved road length >100 m

Table A7.1.2 Sensitivity of the area to dust soiling effects

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
	<10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table A7.1.3 Sensitivity of the area to human health impacts

Receptor Sensitivity	Annual Mean PM_{10} - Micrograms per cubic meter ($\mu g/m^3$)	Number of Receptors	<20	<50	<100	<250
High	>32 $\mu g/m^3$	>100	High	High	High	Medium
		10-100		High	Medium	Low
		<10		Medium	Low	
	28-32 $\mu g/m^3$	>100	High	High	Medium	Low
		10-100		Medium	Low	
		<10				
	24-28 $\mu g/m^3$	>100	High	Medium	Low	Low
		10-100				

Receptor Sensitivity	Annual Mean PM_{10} - Micrograms per cubic meter ($\mu g/m^3$)	Number of Receptors	<20	<50	<100	<250
		<10	Medium	Low		
	<24 $\mu g/m^3$	>100	Medium	Low	Low	Low
		10-100	Low			
		<10				
Medium	>32 $\mu g/m^3$	>10	High	Medium	Low	Low
		1-10	Medium	Low		
	28-32 $\mu g/m^3$	>10	Medium	Low	Low	Low
		1-10	Low			
	24-28 $\mu g/m^3$	>10	Low	Low	Low	Low
		1-10				
	<24 $\mu g/m^3$	>10	Low	Low	Low	Low
		1-10				
Low	-	>1	Low	Low	Low	Low

Table A7.1.4 Risk of dust impacts

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High risk site	Medium risk site	Medium risk site
Medium	High risk site	Medium risk site	Low risk site
Low	Medium risk site	Low risk site	Negligible
Earthworks			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Construction			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible

Sensitivity of Area	Dust Emission Magnitude		
	Large	**Medium**	**Small**
Track out			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible

Step 3: Determine the site-specific mitigation

7.2.13 Once each of the activities is assigned a risk rating, appropriate mitigation measures are identified. Where the risk is negligible, no mitigation measures are necessary.

Step 4: Determine any significant residual effects

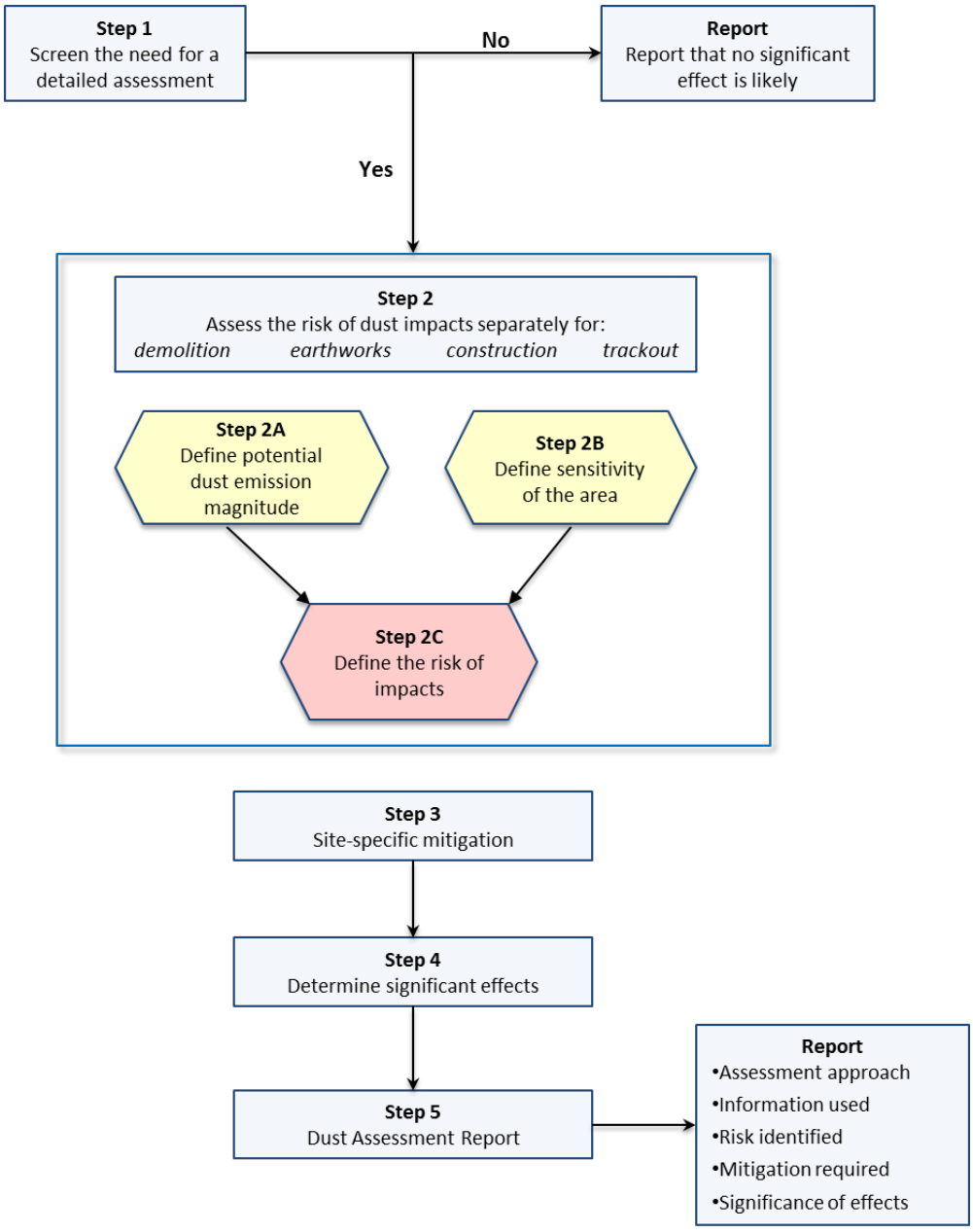
7.2.14 Once the risk of dust impacts has been determined and the appropriate dust mitigation measures identified, the final step is to determine whether there are any residual significant effects. The IAQM guidance (IAQM, 2024) notes that it is anticipated that with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases.

Step 5: Prepare a dust assessment report

7.2.15 The last step of the assessment is the preparation of a dust assessment report (Appendix 7.3: Air Quality Assessment Results (document reference 6.7.A3)).

7.2.16 This process is shown in Image A7.1.1.

Image A7.1.1 IAQM dust assessment methodology



7.3 Construction Traffic

7.3.1 The results of the traffic modelling (as shown in Chapter 16: Traffic and Transport (document reference 6.16)) confirm that changes to traffic for the Project during the construction period exceed the thresholds for requiring further assessment (more than 25 annual average daily traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA) and more than 100 elsewhere). On that basis, a detailed assessment of construction traffic has been scoped into the assessment.

7.3.2 This section provides the methodology for the assessment of the construction traffic phase.

Traffic Data

7.3.3 Traffic data for the air quality assessment have been provided by the Project transport modelling specialists (Arcadis, 2024). The traffic data included the Strategic Road Network, the Primary Access Routes, and the haul roads consisting of:

- 24-hour AADT
- Percentage of HDVs
- Speed band information for use in calculation of emission factors.

7.3.4 The traffic data provided for the haul roads include the traffic data for HDVs and Light-Duty Vehicles (LDVs) where LDVs count for the works vehicles. The baseline traffic data provided represents a baseline year of 2023.

7.3.5 Traffic data has been provided by the Project transport specialists for use in the assessment. The traffic data was screened against the latest IAQM/Environmental Protection UK (EPUK, 2017) thresholds to define the affected road network (ARN).

7.3.6 Emissions from traffic data were calculated within the latest Department for Environment, Food and Rural Affairs (Defra) Emissions Factor Toolkit (Defra, 2025) (version 13.0.1) and the Calculator for Road Emissions of Ammonia (CREAM) emissions tool (Air Quality Consultants, 2025) (Version 2A) for the assessment of nitrogen deposition at designated ecological sites.

7.3.7 The geographic information system (GIS) software, ArcMap, was used to assist in inputting the road link information in the air quality spreadsheet model.

7.3.8 Assumptions made in relation to the traffic data used in the assessment are presented below.

- The road type[1] was not provided from the transport team therefore open-source data[2] was used to make assumptions for the road type. The road type for haul roads were assumed to be all 'rural'
- The speed for the haul roads is assumed to be 20 mph.

Human Receptors

7.3.9 This section details the human receptors selected for inclusion in the assessment. Human receptors are chosen to capture the closest receptors along the ARN and at junctions. The receptor choices are considered to capture the most sensitive receptors.

7.3.10 To identify receptors sensitive to air quality, the building usage was determined using the Ordnance Survey (OS) Address Base Plus dataset, and air quality calculations were made at the nearest façade to the busiest road. A total of 59 human receptors (Table A**7**.1.**5**) were included in the assessment and were selected using professional judgement at worst case locations.

[1] Road Type classifies as. London Central, Inner, Outer, Motorway, all other Areas Urban (not London), Rural (not London), Motorway (not London) (Emissions Factor Toolkit (EFT) v12 user guide, https://laqm.defra.gov.uk/wp-content/uploads/2023/11/EFTv12.0-user-guide-v1.0.pdf) .

[2] Rural-Urban Classification for Output Areas Locator Tool (arcgis.com)

7.3.11 The list of all sensitive receptors includes dwellings and educational establishments, and the locations are shown on Figure 7.5: Air Quality Affected Road Network (document reference 6.7.F5).

Table A7.1.5 Details of human receptors

ID	Description	Project Section(s)	Grid Reference (m)	
			X	Y
HR_1	Residential	Section A	621254	301210
HR_2	Residential	Section A	622182	300903
HR_3	Residential	Section A	615928	299851
HR_4	Residential	Section B	614345	278397
HR_5	Residential	Section B	608046	274493
HR_6	Residential	Section B	607368	271800
HR_7	Residential	Section B	606543	269201
HR_8	Residential	Section B	608410	265623
HR_9	Nursery	Section B	606716	258458
HR_10	Residential	Section B	611679	258380
HR_11	Residential	Section B	608504	257066
HR_12	Residential	Section B	605791	252315
HR_13	Residential	Section B	613035	249448
HR_14	Residential	Section B	608532	247863
HR_15	Residential	Section B	612035	246581
HR_16	Residential	Section C	610976	244637
HR_17	School	Section C	612607	243739
HR_18	Residential	Section C	612543	243549
HR_19	School	Section C	613080	243089
HR_20	Residential	Section C	622182	300903
HR_21	Residential	Section C	605492	237990
HR_22	Residential	Section C	606522	236505
HR_23	Residential	Section C	603569	232378
HR_24	Residential	Section C	603414	231908
HR_25	Residential	Section C	603490	231368

ID	Description	Project Section(s)	Grid Reference (m)	
			X	Y
HR_26	Residential	Section D	597740	230813
HR_27	Residential	Section D	599414	230414
HR_28	Residential	Section C	602754	230253
HR_29	Residential	Section C	604953	230008
HR_30	Residential	Section C	602456	229862
HR_31	Residential	Section C	607166	228967
HR_32	Hospital	Section D	599009	228939
HR_33	Residential	Section D	598562	228809
HR_34	School	Section D	599671	228501
HR_35	Residential	Section D	599282	228038
HR_36	Residential	Section D	611277	226568
HR_37	Residential	Section D	593412	226194
HR_38	Nursery	Section D	596003	225273
HR_39	Residential	Section D	594739	225179
HR_40	Residential/AQMA	Section D	595127	225129
HR_41	Residential	Section D	589338	224101
HR_42	Residential	Section D	588236	223829
HR_43	Residential	Section D	591370	223680
HR_44	Residential	Section D	589573	223440
HR_45	Residential	Section E	580918	223078
HR_46	Residential	Section E	574059	221695
HR_47	Residential	Section E	586511	221540
HR_48	Residential	Section E	573964	220030
HR_49	Residential	Section E	573964	220030
HR_50	Residential	Section F	573960	216331
HR_51	Residential	Section F	571781	215113
HR_52	Residential	Section F	570113	207277
HR_53	Residential	Section F	566186	205423

ID	Description	Project Section(s)	Grid Reference (m)	
			X	Y
HR_54	Residential	Section F	569509	205135
HR_55	Residential	Section G	567510	190146
HR_56	Residential	Section G	562375	189133
HR_57	Residential	Section H	567161	181536
HR_58	Residential	Section H	565384	181402
HR_59	Residential	Section H	565811	181354

Ecological Receptors

7.3.12 Sensitive ecological receptors are defined as those sites whose features have been designated as sensitive to air pollutants, either directly or indirectly. A total of 42 ecological receptors, as shown in Table A7.1.6, were included in the assessment and were selected using professional judgement at worst case locations.

7.3.13 High concentrations of Nitrogen Oxide (NOx) can adversely affect vegetation, including leaf or needle damage and reduce plant growth. Deposition of pollutants derived from NOx emissions contribute to acidification and/or eutrophication of sensitive habitats leading to loss of biodiversity. The likelihood of such effects occurring is determined by pollutant thresholds known as 'critical loads', defined by the United Nations Economic Commission for Europe (UNECE) in Article 1 of the Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution ((UNECE), 2005) as:

'a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge'.

7.3.14 It is important to distinguish between a critical load and the air quality standard (or critical level) for NOx. The critical load relates to the quantity of pollutant (in this case nitrogen) deposited from air to the ground, whereas the critical level is the gaseous concentration of a pollutant in the air. Critical loads are defined by Air Pollution Information System (APIS) and are specific to a particular ecological receptor site or the habitats in them.

Table A7.1.6 Details of ecological receptors

ID	Designated Sites	Description	Project Section(s)	Grid Reference (m)	
				X	Y
ER_1	Site of Special Scientific Interest (SSSI)	Gypsy Camp Meadows	Section B	611455	277462

ID	Designated Sites	Description	Project Section(s)	Grid Reference (m)	
				X	Y
ER_2	Ancient woodland (AW)	Calke Wood	Section B	602580	275032
ER_3	AW	Broad Border 1	Section B	601869	261708
ER_4	AW	Broad Border 3	Section B	600018	261507
ER_5	AW	Broad Border 2	Section B	600606	261403
ER_6	SSSI	Lingwood Meadows, Earl Stonham	Section B	611708	258496
ER_7	Local Nature Reserve (LNR)	Fen Alder Carr	Section B	608923	256769
ER_8	SSSI	Creating St. Mary Pits	Section B	609627	255855
ER_9	SSSI	Creating St. Mary Pits	Section B	609674	255510
ER_10	SSSI	Creeting St. Mary Pits	Section B	609720	255311
ER_11	SSSI	Middle Wood, Offton	Section B	605674	250050
ER_12	AW	Somersham Park	Section B	608416	247709
ER_13	AW	Millers Wood	Section B	610677	246214
ER_14	AW	Bullen Wood	Section B	610134	245924
ER_15	AW	Brockley Wood	Section C	611249	239910
ER_16	AW	Bentley Long Wood	Section C	610389	239068
ER_17	AW	Birch Wood	Section C	602829	230354
ER_18	AW	Kiln Wood	Section D	601662	229221
ER_19	AW	Walls Wood 2	Section C	603827	227540
ER_20	AW	Walls Wood 1	Section C	603829	227503
ER_21	AW	Unnamed Ancient Woodland 1	Section C	607555	225770
ER_22	SSSI	Marks Tey Brickpit	Section D	591439	223826
ER_23	LNR	Bocking Blackwater	Section E	577967	223478
ER_24	AW	Templeborder Wood	Section E	578151	223155
ER_25	LNR	Flitch Way	Section E	571737	222171

ID	Designated Sites	Description	Project Section(s)	Grid Reference (m)	
				X	Y
ER_26	LNR	Cuckoo Wood	Section E	573512	221100
ER_27	AW	Sheepcote Wood 1	Section E	579387	219510
ER_28	AW	Bushy/Breams Woods	Section F	573512	218747
ER_29	AW	Unnamed Ancient Woodland 2	Section E	576005	217567
ER_30	AW	Sheepcotes Wood 2	Section F	571259	213847
ER_31	AW	Lady Grove	Section F	565274	205512
ER_32	AW	Writtle-James Spring	Section F	565889	202346
ER_33	AW	Osbornes Wood	Section F	566111	201178
ER-34	AW	Friern Manor Wood	Section G	564925	189679
ER_35	AW	Eastlands Spring	Section G	564520	189606
ER_36	SSSI	Thorndon Park	Section G	562996	189493
ER_37	AW	Round Shaw	Section G	562786	189225
ER_38	AW	Warley Hall Wood	Section G	560148	188760
ER_39	AW	Brickbarn Wood	Section H	558659	179908
ER_40	AW	Harrow Wood[3]	Section D	598622	230639
ER_41	AW	Stonefield Strip[3]	Section D	590602	224645
ER_42	AW	Rainbow Wood[3]	Section H	566322	180066

Dispersion Model Set-up

7.3.15 Table A7.1.7 details the inputs and set-up for the construction traffic dispersion modelling. NOx, PM_{10} and Particulate Matter (2.5 micrometers or less in diameter) ($PM_{2.5}$) have been modelled. The detailed assessment has been undertaken using ADMS-Roads v5.0.0.1 model.

Table A7.1.7 Model input parameters

Variables	Model Input
Surface roughness at source	0.3 m

[3] Woodland is not mapped as ancient woodland on the national Ancient Woodland Inventory (Woodland Trust, 2025), however is considered an ancient woodland for the purpose of the ES (Volume 6 of the DCO application), as a worst case, as its designation citation indicates it contains ancient woodland features

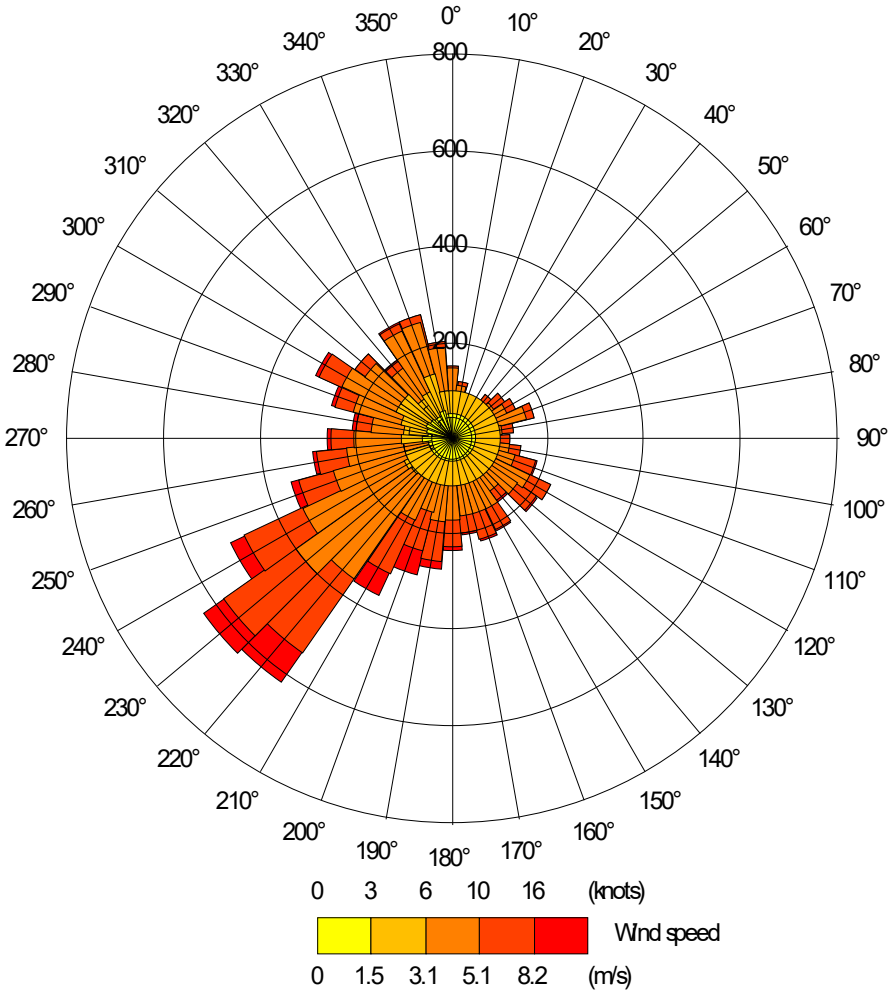
Variables	Model Input
Minimum Monin-Obukhov length for stable conditions	10 m
Terrain types	Flat
Receptor location	x,y coordinates determined by GIS. Z height of 1.5 m for human receptors, 0 m for ecological receptors.
Emissions	NOx, PM_{10}, $PM_{2.5}$
Emission Factors	Defra Emission Factor Toolkit v13.1
Meteorological data	1 year (2023) hourly sequential data from London Stansted Airport
Model output	Long term annual mean NOx concentrations ($\mu g/m^3$) Long-term annual mean PM_{10} concentrations ($\mu g/m^3$) Long-term annual mean $PM_{2.5}$ concentrations ($\mu g/m^3$) Long-term annual mean Ammonia ($NH_{3)}$ concentrations ($\mu g/m^3$)

Meteorological Data

7.3.16 The effect of meteorological conditions on dispersion has been accounted for in the dispersion model. The most significant factors that affect dispersion are wind speed, wind direction and atmospheric stability.

7.3.17 Meteorological data from Stansted Airport for 2023 has been used in the assessment. This meteorological site is located approximately 22 km north-west of Chelmsford. A wind rose for this site is presented in Image A7.1.2.

Image A7.1.2 Stansted airport 2023 wind rose



Background Concentrations

7.3.18 'Background' air quality is a concept used to enable assessment of the effects of particular emission sources without the need for all sources in the area to be explicitly considered. For the purpose of this assessment, the background air quality represents the contribution of all other relevant sources of air pollutants except those roads specifically included in the air quality model. The pollution due to the modelled roads has been added to the background pollution concentrations.

7.3.19 The Defra air quality website provides NOx and NO_2, PM_{10} and $PM_{2.5}$ for each 1 km by 1 km grid square covering England.

7.3.20 The total Defra background concentrations (with no road sector contributions removed) have been used in the modelling. This is because only the roads directly adjacent to the receptor being assessed are included in the model. Therefore, there is no risk of double counting road traffic emissions from additional road sources in the grid square.

7.3.21 Local Planning Authority background data are lower on average than the local monitored background data. The monitored background concentrations are well below the annual mean air quality standard 40 µg/m^3 for NO_2. Due to the limited existing

background monitoring data available specifically for the Study Area[4], and the geographical spread of the ARN, this assessment has used concentrations from the Defra maps to provide background concentrations.

Model Verification

7.3.22 A comparison of modelled and measured NO_2 concentrations has been undertaken. This process is known as model verification. Verification has been undertaken for the base year (2023), using the principles laid out in Local Air Quality Management (LAQM) Technical Guidance (TG.22) published in August 2022. The locations of selected verification points are shown on Figure 7.1: Air Quality Study Area and Constraints (document reference 6.7.F1)

7.3.23 The objectives of the model verification are to evaluate model performance, determine whether model adjustment is required, and to provide confidence in the assessment.

7.3.24 LAQM TG.22 suggests that if modelled annual mean NO_2 concentrations are within ±25% and preferably within ±10% of the monitored concentration and there is no systematic under or over prediction, then model adjustment is not considered necessary to further improve modelled results.

7.3.25 Modelled and monitored results may not compare well at some locations for several reasons including:

- Uncertainties in estimated traffic flow and speed data
- Model setup (including street canyons, road widths, receptor locations)
- Model limitations (treatment of roughness and meteorological data)
- Uncertainty in monitoring data (notably diffusion tubes, e.g., bias adjustment factors and annualisation of short-term data)
- Uncertainty in emissions / emission factors.

7.3.26 The above factors were investigated as part of the model verification process to reduce the uncertainties as far as practicable.

7.3.27 Some monitoring locations are not suitable for model verification purposes as there may be specific local influences, or they are located too close to the road. In these circumstances, LAQM TG.22 advises they should not be used. Therefore, each site was examined, and it was considered whether it was suitable for use in the verification study. Some locations were then removed from the verification. For those monitoring sites not used, the justification for their removal is provided in Table A7.3.4 of Appendix 7.3: Air Quality Assessment Results (document reference 6.7.A3).

7.3.28 Further detail on the verification process is provided in Appendix 7.3: Air Quality Assessment Results (document reference 6.7.A3).

NOx to NO_2

7.3.29 The approach to calculating the conversion of roadside NOx to NO_2 has been the guidance in (LAQM, 2022). This approach allows the calculation of NO_2 from NOx concentrations, considering the difference between ambient NOx concentration with and

[4] The baseline Study Area has included a review of sources and available monitoring data within 2 km of the Order Limits

without the Project, the concentrations of ozone and the different proportions of primary NO_2 emissions in different years. This approach is available as a spreadsheet calculator (Defra, 2024); the version released in August 2024 (v9.1) has been used.

Calculator for Road Emissions of Ammonia

7.3.30 The CREAM tool provides road link specific emissions outputs from traffic data inputs in a familiar format to Defra's Emissions Factors Toolkit (Defra, 2025). This has been used in the assessment to determine the nitrogen deposition at designated ecological sites within 200 m of the modelled road network.

Abbreviations

Abbreviation	Full Reference
AADT	Annual average daily traffic
AQMA	Air Quality Management Area
APIS	Air Pollution Information System
ARN	Affected Road Network
AW	Ancient woodland
CREAM	Calculator for Road Emissions of Ammonia
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
EFT	Emissions Factor Toolkit
EPUK	Environmental Protection UK
ES	Environmental Statement
GIS	Geographic Information System
HDV	Heavy-Duty Vehicles
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light-Duty Vehicles
LNR	Local Nature Reserve
NH_3	Ammonia
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxide
OS	Ordnance Survey
$PM_{2.5}$	Particulate Matter (2.5 micrometers or less in diameter)
PM_{10}	Particulate Matter (10 micrometers or less in diameter)
SSSI	Site of Special Scientific Interest
UNECE	United Nations Economic Commission for Europe
$\mu g/m^3$	Micrograms per cubic meter

Glossary

Term	Definition
Ancient Woodland	Land that has been continually wooded since at least 1600 in England. Regarded as 'irreplaceable habitat' in national planning guidance. Ancient woodland greater than 2ha is recorded on the Natural England Ancient Woodland Inventory.
Annual average daily traffic flow	24-hour traffic count data averaged for all the days in the year i.e. the total traffic flow on a road for a year divided by 365.
Construction route	These are the roads on the local road network that would be used by construction vehicles between the strategic road network and the access points within the Order Limits.
Critical load	The quantity of pollutant deposited from air to the ground.
Critical level	The gaseous concentration of a pollutant in the air.
Detailed Assessment	Use of a detailed dispersion model to determine if a particular emissions source is likely to create an exceedance of a given Air Quality objective.
Dispersion Modelling	The mathematical computation of the dispersal of emissions as they travel through the ambient atmosphere.
Dust emission magnitude	The potential scale of dust emissions as a result of construction activities, classified based on the nature, scale and intensity of the works being undertaken across four key construction phases (demolition, earthworks, construction and track-out).
Effect	The consequence of an impact.
Environmental Statement (ES)	The main output from the EIA process, an ES is the report required to accompany an application for development consent (under the Infrastructure Planning (EIA) Regulations 2017) to inform public and stakeholder consultation and the decision on whether a project should be allowed to proceed. The EIA Regulations set out specific requirements for the contents of an ES for Nationally Significant Infrastructure Projects.
Habitat	The natural home or environment of an animal, plant, or other organism.
Haul Roads	Another term used for the temporary access route, which is a temporary route built to carry construction vehicles within the Order Limits
Heavy Duty Vehicles	Vehicles weighing more than 3,500 kg.
Impact	Described as a change in pollutant concentrations or dust deposition.
Light Duty Vehicles	Vehicles weighing 3,500 kg or less.

Term	Definition
Local Nature Reserve	Sites dedicated by the Local Planning Authority under Section 21 of the National Parks and Access to the Countryside Act 1949 for nature conservation which have wildlife or geological features that are of special interest locally.
Mitigation	The action of reducing the severity and magnitude of change (impact) to the environment. Measures to avoid, reduce, remedy or compensate for significant adverse effects.
Non-statutory designated site	A site designated at a local level for its biodiversity and/or geological value. These are not underpinned by legislation.
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less.
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less.
Primary Access Routes	These are the roads on the local road network that would be used by construction vehicles between the strategic road network and the access points within the Order Limits.
Project Section	Geographical 'sections' have been identified that break the Project down into smaller units for ease of description within the documentation. These Project Sections are broken down into eight sections based largely on Local Planning Authority boundaries.
Receptor	The physical resource or user group that would respond to an effect e.g. somebody or something adversely affected by a pollutant.
Sensitivity	A term applied to specific receptors, combing judgements of the susceptibility of the receptors to the specific type of change or development proposed and the value related to that receptor.
Site of Special Scientific Interest	A statutory designation under the Wildlife and Countryside Act 1981 (as amended), protecting nationally important wildlife sites, habitats and geological sites.
Statutory designated site	A site which receives protection by means of legislation in recognition of its biodiversity value.
Track-out	The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.
Verification	A comparison of the modelled results versus monitoring results at relevant locations to enable the adjustment of model outputs, minimising the inherent uncertainties associated with dispersion modelling

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