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Environmental Associates

Air Quality Assessment

Land off Eastfield, Shepley

September 2025

BANKS Property

Air Quality Assessment

Land off Eastfield, Shepley

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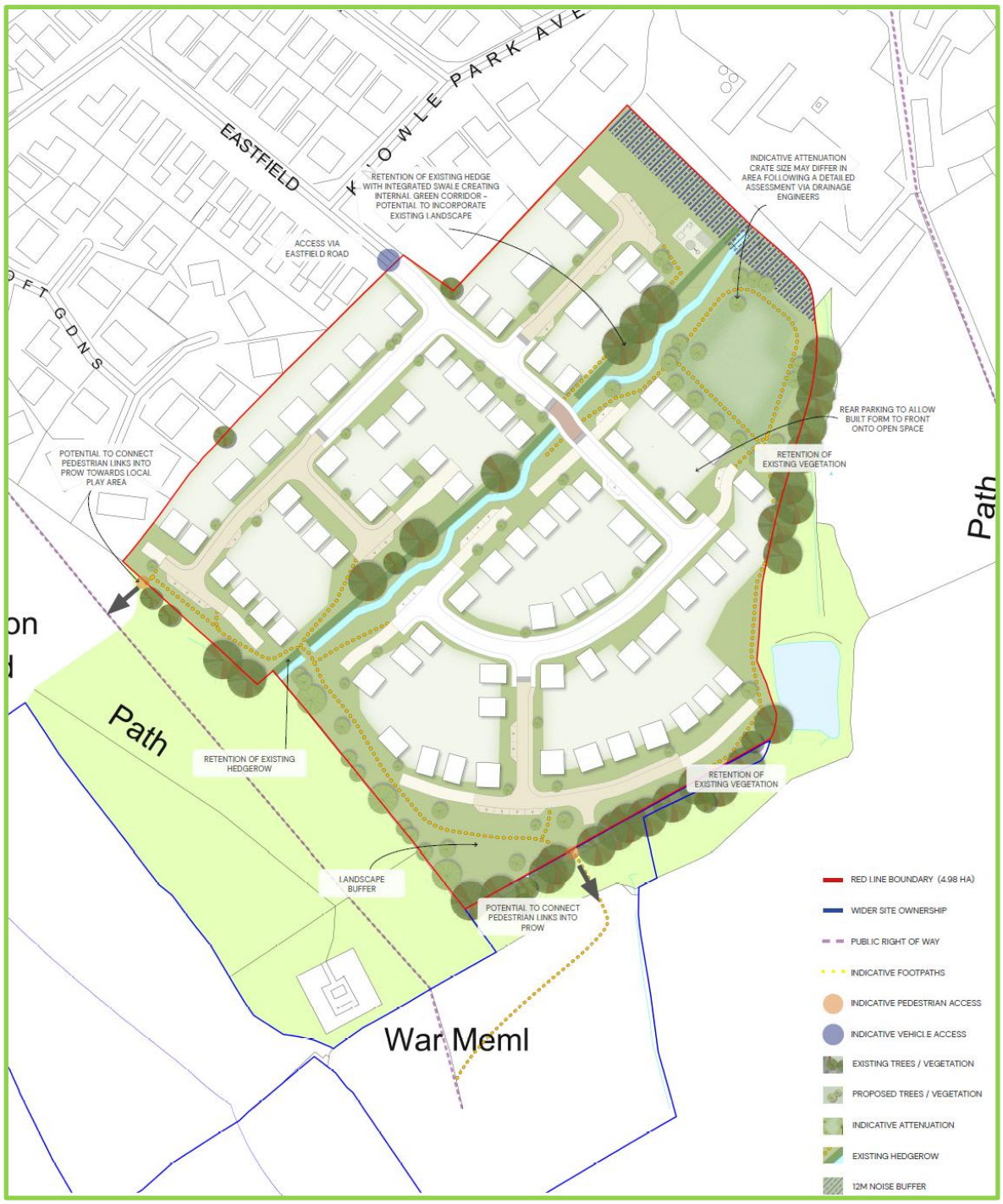
1 INTRODUCTION

1.1.1 NJD Environmental Associates Ltd was instructed by BANKS Property to prepare an Air Quality Assessment, to inform a planning application for a proposed residential development (the 'Proposed Development') located on land off Eastfield in Shepley.

1.1.2 The site location and illustrative masterplan is provided below at Drawing 1.



Drawing 1: Site location and illustrative masterplan

1.1.3 This report determines existing baseline conditions in the vicinity of the Site and provides an assessment of potential air quality impacts during both the construction and operational phases of the Proposed Development. For both phases, the type, source and significance of potential air quality impacts are identified, and the mitigation measures that should be implemented to minimise these described.

1.1.4 Ambient pollutant concentrations, namely NO_2 and particulate matter (PM_{10} and $PM_{2.5}$), are considered at existing sensitive receptor (ESR) and proposed receptor (PR) locations in the vicinity of the Site.

2 LEGISLATION, POLICY AND GUIDANCE

2.1 Air Quality Legislation

Air Quality Strategy (2023)

2.1.1 The Air Quality Strategy for England is a strategic framework that fulfils the statutory requirement of the Environment Act 1995, as amended by the Environment Act 2021. The Strategy is aimed at local authorities, giving them a heightened level of responsibility to improve air quality in their areas of jurisdiction. The Strategy requires them to actively consider potential air quality implications of any new proposed development, with a focus on pollution prevention and improvement of local air quality throughout the planning process.

2.1.2 The Air Quality Strategy contains standards, objectives and measures for improving ambient air quality, including the ambitious new targets for fine particulate matter ($PM_{2.5}$) set out in the Environment Act 2021.

2.1.3 The Environmental Improvement Plan, released in January 2023, outlines both long-term and interim objectives aimed at minimising public exposure to $PM_{2.5}$. Following this, the 2040 concentration goal was established within the Environmental Targets (Fine Particulate Matter) Regulations (2023).

Air Quality Standards Regulations (2016)

2.1.4 The Air Quality Standards (Amendment) Regulations 2016 amend the Air Quality Standards Regulations 2010 that transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England. The regulations aim to protect human health and the environment by providing air quality limit values for seven pollutants and target values for an additional five pollutants.

2.1.5 Table 1 provides the air quality objectives (AQOs) for the pollutants considered within the assessment.

Table 1 - Air Quality Objectives		
Pollutant	**Concentration (µg/m³)**	**Averaging Period**
NO_2	40	Annual mean
	200	1-hour, not to be exceeded on more than 18 occasions per annum
PM_{10}	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
$PM_{2.5}$	20(12*)	Annual mean
*Interim target to be achieved by end of January 2028		

2.2 National Planning Policy

National Planning Policy Framework

2.2.1 The revised National Planning Policy Framework (NPPF), dated December 2024, sets out the Government's core policies and principles with respect to land use planning, including air quality.

2.2.2 The purpose of the planning system is to contribute to the achievement of sustainable development. In order to achieve this, the NPPF recognises three overarching objectives, including the following of relevance to air quality, detailed at paragraph 8:

> *"c) An environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."*

2.2.3 The NPPF also includes the following considerations which are relevant to the Proposed Development:

> *"110. […] Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. […]"*
>
> *"187. Planning policies and decisions should contribute to and enhance the natural and local environment by: […]*
>
> - *Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. […]"*

"198. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."

"199. Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

"201. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

2.2.4 The National Planning Practice Guidance (NPPG) states that whether or not air quality is relevant to a planning decision will depend on the proposed development air quality impacts in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).

2.3 Guidance

Local Air Quality Management

2.3.1 Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 1, are likely to be exceeded, the LA is required to declare an AQMA. For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3.2 The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by LAs in their review and assessment work. This guidance, referred to in this document as LAQM.TG22, has been used where appropriate in the assessment.

3 ASSESSMENT METHODOLOGY

3.1 Construction Phase

3.1.1 The IAQM '*Guidance on the assessment of dust from demolition and construction*' (2024) provides a methodology to determine the potential air quality impacts associated with demolition and construction activity. The emphasis of the guidance document is to classify the risk of dust impacts from a site from which then to identify appropriate mitigation measures commensurate with the risk.

3.1.2 The underlying concept of Source-Pathway-Receptor is the basis of the guidance, with four main types of construction activity required to be considered as follows:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

3.1.3 The potential for dust emissions is assessed for each of these activities, taking into consideration three separate dust impacts:

- Annoyance due to dust soiling;

- The risk of health effects due to an increase in exposure to PM_{10}; and
- Harm to ecological receptors.

Assessment Procedure

3.1.4 The assessment steps provided within the IAQM guidance are summarised below.

Step 1

3.1.5 This step screens the requirement for a more detailed assessment. If there are no receptors within a certain distance then no further assessment is required.

3.1.6 For human receptors, these distances are specified as 250m from the site boundary or 50m from the construction vehicle route within 250m of the site entrance. Should any ecological receptors also be present within 50m of the site boundary or 50m of the construction vehicle route within 250m of the site entrance, these will require consideration. The assessment proceeds to Step 2 if any receptors are identified within these specified distances.

Step 2

3.1.7 This step assesses the risk of the dust impact for each of the four types of activity provided at paragraph 3.1.2, taking account of the scale and nature of the works to determine the dust magnitude (Step 2A) and the sensitivity of the area (Step 2B). Step 2C is then undertaken, considering these factors to provide the risk of dust impacts.

3.1.8 The criteria used during Step 2 of the assessment, as contained within the IAQM guidance, is summarised and provided at Appendix 1 of this report.

Step 3

3.1.9 Step 3 defines the site-specific mitigation measures to be adopted, based on the dust risk categories for each of the four activities undertaken at Step 2C.

3.1.10 Where the risk during Step 2C is defined as negligible, no mitigation measures beyond those required by legislation are required. However, control measures may be adopted as part of best practice.

Step 4

3.1.11 This step determines the significance of the effect after considering the construction activity with mitigation.

3.1.12 As recognised within the IAQM guidance, for almost all construction activity, the aim should be to prevent significant effects through the use of effective mitigation. Hence the residual effect will normally be 'not significant'.

Construction Traffic

3.1.13 At the planning stage, construction traffic figures are not known, however are unlikely to exceed 100 AADT for HDV, being located outside of an AQMA.

3.1.14 It is therefore considered that no significant effects on air quality are likely to occur as a result of construction traffic. No further assessment of air quality is therefore required, in accordance with the guidance.

3.1.15 Once the final contractor is appointed, should permission be granted and if construction traffic flows are likely to exceed the above criteria, a detailed assessment can be provided.

3.2 Operational Phase

3.2.1 In accordance with the EPUK and IAQM document *'Land-Use Planning and Development Control: Planning for Air Quality'* (2017), a significant change would be described as a change in Light Duty Vehicle (LDV) flows of 500 Annual Average Daily Traffic (AADT) and/or Heavy-Duty Vehicle (HDV) flows of 100 AADT or more. Alternatively, a change in LDV flows of 100 AADT and/or HDV flows of 25 AADT or more on routes through an AQMA would also be considered a significant change in accordance with the guidance. Where these thresholds are exceeded, a detailed assessment of air quality is normally required.

3.2.2 Traffic generated by the Proposed Development is therefore assessed against the above criteria in order to identify potential significant effects associated with the operational phase of the Site.

3.2.3 The number of vehicular trips generated by the scheme will exceed the IAQM criteria detailed above and therefore has the potential to affect existing sensitive receptors.

3.2.4 An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at existing sensitive locations in the vicinity of the Site.

3.2.5 ADMS-Roads dispersion modelling software (version 5.0.1.3) has therefore been used to predict the concentrations of NO_2, PM_{10} and $PM_{2.5}$ at existing sensitive receptors (ESRs), as road traffic is a major source of these pollutants and their concentrations are considered to be the most likely to exceed the AQOs in urban locations.

3.2.6 The model utilises detailed traffic flow data and considers surface roughness and local meteorological conditions to predict pollutant concentrations. Details of the model input parameters are presented in Appendix 2.

Meteorological Data

3.2.7 The ADMS model utilises wind speed and directional data to determine pollutant concentrations at identified sensitive receptor locations. In line with the above, meteorological data for 2024 were obtained from Emley Moor observing station, located approximately 5km to the north west of the Site. This station is considered to provide representative data for the assessment verification year. A wind rose generated from the meteorological data is provided in Appendix 3.

Traffic Data

Traffic Flows

3.2.8 Traffic data for this assessment have been provided by the Project Transport Consultant (the 'PTC'), Andrew Moseley Associates, and the Department for Transport (DfT) Road Traffic Statistics website, where applicable. The DfT web tool enables the user to view and download available traffic flows on every link of the 'A' road and motorway network, as well as selected minor roads, in Great Britain for the years 2000 to 2023. It should be noted that the DfT web tool is referenced in Defra's LAQM.TG22 guidance as being a suitable source of data for Air Quality Assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the Site.

3.2.9 A summary of traffic data used in the assessment is presented in Appendix 2. This includes details of the Annual Average Daily Traffic (AADT) flows, vehicle speeds (km/h) and the percentage of heavy duty vehicles (HDVs) for the local road network for each assessment year considered. Traffic speeds were reduced at junctions in line with the relevant LAQM Technical Guidance document (LAQM.TG22), and using professional judgement.

3.2.10 Three scenarios were modelled, as follows:

- 2023 Model Verification;
- 2030 Completion Year Without Development; and
- 2030 Completion Year With Development.

3.2.11 The 2030 scenarios included baseline traffic data, inclusive of anticipated growth and allocated development, in addition to the predicted vehicle trips associated with the operation of the Proposed Development. Data were provided by the PTC or calculated using the UK Government's Trip End Model Presentation Program (TEMPro) version 8.0, where applicable. With regard to committed developments, the PTC utilised TEMPro growth factors to generate the future year 2030 scenarios. These factors take into consideration the natural growth of the MSOA in which the site is situated, and automatically the software includes a level of committed development.

3.2.12 Reference should be made to Figure 1 for a map of the modelled road link locations.

Vehicle Emission Factors

3.2.13 The Emissions Factors Toolkit (EFT) (version 13.1) was used to calculate emission factors for each road link in the model, utilising traffic flow and average speed data.

Background Concentrations

3.2.14 Background pollutant data have been taken from the national maps provided by Defra, with concentrations mapped at a grid resolution of 1kmx1km across the UK. These maps assume that background concentrations will improve over time, in line with the predicted reduction in vehicle emissions.

3.2.15 Background concentrations for the verification year of 2023 for oxides of nitrogen (NO_x), NO_2, PM_{10} and $PM_{2.5}$ have been utilised in this assessment for the anticipated 2030 completion year of the Proposed Development. This provides a robust assessment and is likely to overestimate pollutant concentrations during the operational phase.

Model Verification

3.2.16 Model verification was undertaken in accordance with the methodology outlined in LAQM.TG22. Model verification is undertaken to check the performance of the dispersion model, comparing the predicted concentrations with the measured roadside concentrations, at suitable monitoring locations. This aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor, to gain greater confidence in the results.

3.2.17 Model verification for this assessment has been performed for the year 2023, using four of Kirklees Council's roadside diffusion tubes, with suitable monitoring data.

3.2.18 A factor of **0.96** was obtained, indicating that the model was slightly over-predicting. This factor was applied to the modelled road-NO_x outputs prior to conversion to annual mean NO_2 concentrations utilising the NO_x to NO_2 Calculator (version 9.1, August 2024), provided by Defra.

3.2.19 Details of the verification factor calculations are provided in Appendix 2.

3.2.20 As local roadside monitoring data within the assessment extents were not available for PM_{10} or $PM_{2.5}$, the modelled road-PM_{10} and road-$PM_{2.5}$ concentrations have been adjusted by the verification factor obtained for NO_x. The NO_2, PM_{10} and $PM_{2.5}$ concentrations have then been combined with the respective background concentrations, to enable comparison with the relevant AQOs.

Sensitive Receptors

3.2.21 To complete the assessment of operational phase impacts, a number of receptors representative of locations of relevant public exposure were identified. Box 1-1 of LAQM.TG22 provides examples of the locations where the AQOs should/should not apply.

3.2.22 Sensitive receptors have been assessed along road links which experience the greatest change in traffic flows as a result of the Proposed Development and therefore, NO_2 and particulate matter concentrations, as a result of the Proposed Development.

3.2.23 The receptors considered within this assessment are shown on Figure 1 and detailed in Table 2.

Table 2 - Receptor Locations

Receptor	Description/Address	Grid Reference		Height (m)
		X (m)	Y (m)	
R1	22 Eastfield, Shepley, Huddersfield	419658.29	409748.25	1.5
R2	2 Eastfield, Shepley, Huddersfield	419610.54	409783.21	1.5
R3	1 Eastfield, Shepley, Huddersfield	419680.12	409783.50	1.5
R4	13 Eastfield, Shepley, Huddersfield	419590.96	409844.32	1.5
R5	4 Eastfield, Shepley, Huddersfield	419561.40	409819.83	1.5
R6	5 Eastfield, Shepley, Huddersfield	419625.38	409812.64	1.5
R7	38 Lea Dr, Shepley, Huddersfield	419481.78	409829.96	1.5
R8	32 Lea Dr, Shepley, Huddersfield	419530.10	409833.28	1.5
R9	17 Lea Dr, Shepley, Huddersfield	419508.96	409788.24	1.5
R10	209 Abbey Rd S, Shepley, Huddersfield	419534.06	409899.94	1.5
R11	The Black Bull, Shepley, Huddersfield	419384.24	409754.46	1.5
R12	219 Abbey Rd S, Shepley, Huddersfield	419450.17	409820.60	1.5
R13	22 Eastfield, Shepley, Huddersfield	419680.81	409746.45	1.5
R14	26 Stonecroft Gardens, Shepley, Huddersfield	419656.94	409577.13	1.5
R15	2A Knowle Park Ave, Shepley, Huddersfield	419816.84	409735.11	1.5

Significance Criteria

3.2.24 The predicted impacts have been assessed against the AQOs detailed in Table 1. Changes in pollutant concentrations between the 'Without Development' and 'With Development' scenarios are also assessed against the IAQM significance criteria, detailed below.

3.2.25 The significance of predicted air quality impacts, resulting from the additional emissions associated with traffic generated by the Proposed Development, was determined in accordance with the IAQM guidance.

3.2.26 Using this methodology, impacts are defined based on the relationship between the predicted pollutant concentration for the 'Without Development' and 'With Development' assessment scenarios and the magnitude of change as a proportion of the respective AQO. This is summarised in Table 3 below.

Table 3 - Significance of Impact

Concentration at Receptor in Assessment Year	Predicted Concentration Change as proportion of AQO (%)			
	1	2-5	6-10	>10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

4 BASELINE

4.1 Introduction

4.1.1 A desk-top baseline review of existing air quality conditions in the vicinity of the Site has been undertaken. This is detailed in the following sections.

4.2 Local Emission Sources

4.2.1 The Site is located in an area where air quality is mainly influenced by road traffic emissions along the local road network.

4.2.2 Existing industrial uses are located to the north east of the Site. A review of the Environment Agency's environmental permit register has ben undertaken to determine whether any of the uses are likely to have emissions to air. No environmental permits have been identified.

4.3 Local Air Quality Management

4.3.1 The Site is located within Kirklees Council. According to the latest available Air Quality Annual Status Report (ASR), dated June 2024, Kirklees Council currently has ten declared AQMAs. The Site is not located within or adjacent to any of the AQMAs.

4.4 Air Quality Monitoring

4.4.1 Kirklees Council currently monitor at three automatic (continuous) monitoring station and 120 non-automatic (passive) diffusion tube sites. The most recent monitoring results recorded closest to the Site are shown in Table 4.

Table 4 - Monitoring Results

Monitoring Site			Monitored NO_2 Concentration ($\mu g/m^3$)				
ID	**Location**	**Type**	**2019**	**2020**	**2021**	**2022**	**2023**
K55	Huddersfield Rd, Holmfirth	Roadside	29.9	23.8	25.2	25.7	23.2
K95	Hollowgate, Holmfirth	Roadside	n/a	21.0	24.0	22.6	20.6
K96	Victoria Street, Holmfirth	Roadside	n/a	n/a	n/a	n/a	27.7
K98	Huddersfield Rd, Holmfirth	Roadside	n/a	19.7	22.2	21.3	21.3

4.4.2 No monitoring of PM_{10} or $PM_{2.5}$ is currently undertaken in the vicinity of the Site.

4.5 Background Concentrations

4.5.1 In addition to the review of NO_2, PM_{10} or $PM_{2.5}$ monitoring undertaken in the vicinity of the Site, background concentrations have been obtained from the 2021 based default concentration maps provided by Defra for the relevant grid square for the Site and assessment extents. These data are provided below in Table 5.

Table 5 - Predicted Background Pollutant Concentrations (2023)

OS Grid Square (X, Y; m)	NO_2 (µg/m³)	NO_x (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)
419500, 409500	6.67	8.47	10.63	6.29

4.5.2 As shown in Table 5, predicted background concentrations were well below the national AQOs of 40µg/m³ for NO_2 and PM_{10} and 20µg/m³ for $PM_{2.5}$. For $PM_{2.5}$, predicted background concentrations were also below the target exposure level of 10µg/m³, implemented at the end of January 2023 under the Environment Act 2021.

4.6 Construction Phase

4.6.1 Human receptors within 250m of the site boundary or within 50m of the construction vehicle route, up to 250m from the site entrance, need to be considered during the construction phase assessment. A review of the Site location has indicated that with the closest sensitive receptors to north, there are 10 - 100 receptors located <20m from the Site boundary, at worst. When considering the sensitivity of the area to dust soiling effects based on the criteria contained within Table A1.4 of Appendix 1, due to the number and distance to existing **high sensitivity** receptors, the sensitivity of the area is deemed to be **high**, at worst.

4.6.2 When considering the sensitivity of the area to human health effects based on the criteria contained within Table A1.5 of Appendix 1, due to the number and distance to existing **high sensitivity** receptors, and considering the annual mean background PM_{10} concentrations at the Site presented in Table 5, the sensitivity is deemed to be **low**.

4.6.3 There are no ecological receptors located within 50m of the Site boundary or within 50m of the assumed route that construction vehicles would take upon departure, up to 250m from the site entrance.

4.7 Meteorological Data

4.7.1 The potential for dust and particulate matter to impact sensitive locations depends significantly on meteorology, particularly wind direction and wind speed, during emissions. To consider the prevailing conditions at the Site, a review of historical weather data has been undertaken. The closest observation station with a suitable dataset is Emley Moor, located approximately 5km to the north east of the Site. It is anticipated that meteorological conditions would be reasonably similar over a distance of this magnitude. Meteorological data were obtained for the period 1st January 2023 to 31st December 2023 (inclusive), and reference should be made to Appendix 3 for a wind rose of these data. A review of the wind rose has shown that any receptors located from the north east through to the east of the Site have the greatest potential to be affected by dust and particulate matter emitted and re-suspended during the construction phase, as a result of the prevailing wind direction. However, under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source.

5 IMPACT ASSESSMENT

5.1 Construction Phase

Step 1

5.1.1 A baseline review of the Site and surrounding area has identified human receptors within 250m of the Site boundary, and therefore, a detailed assessment has been undertaken.

5.1.2 There are no ecological receptors within the relevant screening distances of the Site or the local road network and as such, these effects are not considered further within the assessment. It is therefore concluded that, the level of risk for ecological receptors is **negligible**.

Step 2

5.1.3 The IAQM assessment methodology has been used to determine the potential dust emission magnitude for the following four dust and PM_{10} sources: demolition, earthworks, construction and trackout. The findings are presented below, with detailed descriptors for each magnitude presented in Table A1.1 of Appendix 1.

Demolition

5.1.4 The key factors when determining the potential dust emission magnitude for the demolition element include the volume and height of the buildings being demolished and the type of materials present.

5.1.5 The existing farm buildings would be demolished as part of the proposals. The total volume of buildings to be demolished on the Site will be < 12,000m^3. Therefore, the potential dust emission magnitude associated with demolition is considered to be **small**.

5.1.6 As the sensitivity of the area to dust soiling effects is **high** at worst, in accordance with Table A1.7 of Appendix 1, the risk of dust impact during demolition, with a **small** dust emission magnitude, is **medium risk**.

Earthworks

5.1.7 Earthworks involve excavating material, haulage, tipping and stockpiling. There may also be levelling of the Site and landscaping.

5.1.8 The exact number of heavy earth-moving vehicles active on the Site at any one time is unknown, however, as the total Site area is between 18,000 and 110,000m^2, the potential dust emission magnitude associated with earthworks is considered to be **medium.**

5.1.9 As the sensitivity of the area to dust soiling effects is **high** at worst, in accordance with Table A1.7 of Appendix 1, the risk of dust impact during earthworks, with a **medium** dust emission magnitude, is **medium risk**.

Construction

5.1.10 The key factors when determining the potential dust emission magnitude for the construction element include the size of the buildings, method of construction and the construction materials used.

5.1.11 It is assumed that the total volume of buildings to be constructed on the Site will be > 75,000m^3. Therefore, the potential dust emission magnitude associated with construction is considered to be **large**.

5.1.12 As the sensitivity of the area to dust soiling effects is **high** at worst, in accordance with Table A1.7 of Appendix 1, the risk of dust impact during construction, with a **large** dust emission magnitude, is **high risk**.

Trackout

5.1.13 Trackout is the term given to the transport of dust and dirt from the Site on vehicle tyres, deposited on the local road network that may later become suspended in the air as a result of vehicle movements.

5.1.14 At this stage, there is no information available regarding the number of HDVs or the proposed construction routes, and therefore, professional judgement has been used. Based on the size of the Site, the unpaved road length is likely to be between 50 and 100m in length and as such, it is considered that the potential dust emission magnitude associated with trackout is **medium.**

5.1.15 As the sensitivity of the area to dust soiling effects is **high** at worst, in accordance with Table A1.7 of Appendix 1, the risk of dust impact associated with trackout, with a **medium** dust emission magnitude, is **medium risk**.

Summary

5.1.16 The predicted dust emission magnitude has been combined with the defined sensitivity of the area (presented in Section 4.6) to determine the risk of dust impacts during the construction phase of the Proposed Development. A summary of the dust risk for each phase is provided in Table 6.

Table 6 - Summary of Dust Risk Prior to Mitigation

Potential Impact	Risk			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	Medium Risk	Medium Risk	High Risk	Medium Risk
Human Health	Low Risk	Low Risk	Low Risk	Low Risk
Ecological	N/A	N/A	N/A	N/A

Step 3

5.1.17 Appropriate, site-specific mitigation is to be adopted based on the dust risk categories determined above. The IAQM guidance provides examples of mitigation to reduce dust impact, provided at Appendix 4.

Step 4

5.1.18 Providing the mitigation measures summarised in Appendix 4 are implemented, the residual effect is considered to be **not significant** in accordance with the IAQM guidance.

5.2 Operational Phase

5.2.1 The number of vehicular trips generated by the scheme will approach the relevant IAQM criteria, particularly on Eastfield leading to the Site access, and as such, the Proposed Development was assessed to determine the potential for traffic movements on the local road network, and those associated with the proposed scheme, to affect

5.2.2 Sensitive receptors were identified along all road links where the trip generation will exceed the relevant EPUK/IAQM criteria and also along those road links in the vicinity of the Site where there will be no exceedances of the criteria. This was to inform a robust assessment approach and to capture all potential impacts at the closest sensitive receptor locations, along the full assessment extents provided by the PTC.

Nitrogen Dioxide (NO_2)

Annual Mean

5.2.3 Annual mean NO_2 concentrations were predicted at the ESRs for an anticipated completion year of 2030 for the 'Without Development' and 'With Development' scenarios.

5.2.4 The results are summarised in Table 7 below.

Table 7 - Calculated Annual Mean Concentrations of NO_2 for 2030 (µg/m³)

Receptor	Without Dev.	With Dev.	Change	Change as % of AQO	Long Term Average Concentration	Significance of Impact
R1	6.86	6.89	0.03	0.07	75% or Less of AQO	Negligible
R2	6.93	6.97	0.04	0.10	75% or Less of AQO	Negligible
R3	6.93	6.96	0.03	0.08	75% or Less of AQO	Negligible
R4	7.06	7.13	0.07	0.18	75% or Less of AQO	Negligible
R5	7.04	7.10	0.06	0.15	75% or Less of AQO	Negligible
R6	6.99	7.06	0.07	0.17	75% or Less of AQO	Negligible
R7	7.48	7.52	0.04	0.10	75% or Less of AQO	Negligible
R8	7.13	7.17	0.04	0.10	75% or Less of AQO	Negligible
R9	7.02	7.05	0.03	0.08	75% or Less of AQO	Negligible
R10	8.41	8.44	0.03	0.07	75% or Less of AQO	Negligible
R11	8.36	8.35	-0.01	-0.02	75% or Less of AQO	Negligible
R12	8.18	8.20	0.02	0.05	75% or Less of AQO	Negligible
R13	6.85	6.88	0.03	0.08	75% or Less of AQO	Negligible
R14	6.76	6.76	0.00	0.00	75% or Less of AQO	Negligible
R15	6.77	6.77	0.00	0.00	75% or Less of AQO	Negligible

5.2.5 As indicated in Table 7, predicted annual mean NO_2 concentrations were below the relevant AQO at all sensitive receptors in the modelled 2030 'Without Development' and 'With Development' scenarios.

5.2.6 Based on the extent of predicted population exposure to the impacts on annual mean NO_2 concentrations and the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean NO_2 concentrations is considered to be **negligible** overall, with the resulting effect **not significant**.

1-Hour Mean

5.2.7 As provided within LAQM.TG22, a study carried out on behalf of Defra and the Devolved Administrations identified that exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60µg/m^3. Analysis of data in more recent years has shown local authorities should continue to use this assumption, where NO_2 1-hour mean monitoring data are not available. The risk of non-compliance with the 1-hour mean objective, where up to 18 exceedances of a 1-hour mean concentration of 200µg/m^3 are allowed in a calendar year, is therefore considered likely when the annual mean concentration is greater than 60µg/m^3 but unlikely when not. This approach has been adopted for this assessment.

5.2.8 The annual mean NO_2 concentrations predicted by the model were all below 60µg/m^3, and therefore, hourly mean NO_2 concentrations are unlikely to cause a breach of the hourly mean AQS objective. The impact of the Proposed Development on hourly mean NO_2 concentrations at sensitive receptors is considered to be **negligible**, with the resulting effect considered to be **not significant**.

Particulate Matter (PM_{10})

Annual Mean

5.2.9 Annual mean PM_{10} concentrations were predicted at the sensitive receptors for an anticipated opening year of 2030 for the 'Without Development' and 'With Development' scenarios. These are summarised in Table 8.

Table 8 - Calculated Annual Mean Concentrations of PM_{10} for 2030 (µg/m³)						
Receptor	**Without Dev.**	**With Dev.**	**Change**	**Change as % of AQO**	**Long Term Average Concentration**	**Significance of Impact**
R1	10.68	10.69	0.01	0.02	75% or Less of AQO	Negligible
R2	10.70	10.71	0.01	0.03	75% or Less of AQO	Negligible
R3	10.70	10.71	0.01	0.03	75% or Less of AQO	Negligible
R4	10.74	10.76	0.02	0.05	75% or Less of AQO	Negligible
R5	10.74	10.75	0.01	0.02	75% or Less of AQO	Negligible
R6	10.72	10.74	0.02	0.05	75% or Less of AQO	Negligible
R7	10.87	10.89	0.02	0.05	75% or Less of AQO	Negligible
R8	10.77	10.78	0.01	0.02	75% or Less of AQO	Negligible
R9	10.73	10.74	0.01	0.02	75% or Less of AQO	Negligible
R10	11.17	11.18	0.01	0.02	75% or Less of AQO	Negligible
R11	11.14	11.14	0.00	0.00	75% or Less of AQO	Negligible
R12	11.09	11.10	0.01	0.02	75% or Less of AQO	Negligible
R13	10.68	10.69	0.01	0.02	75% or Less of AQO	Negligible
R14	10.65	10.65	0.00	0.00	75% or Less of AQO	Negligible
R15	10.66	10.66	0.00	0.00	75% or Less of AQO	Negligible

5.2.10 As indicated in Table 8, predicted annual mean PM_{10} concentrations were below the relevant AQO at all sensitive receptors.

5.2.11 Based on the extent of predicted population exposure to the impacts on annual mean PM_{10} concentrations and the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean PM_{10} concentrations is considered to be **negligible**, with the resulting effect **not significant**.

24-Hour Mean

5.2.12 To estimate potential exceedances of the PM_{10} 24-hour mean AQO, the following relationship can be used:

- No. 24-hour mean exceedances = -18.5 + 0.00145 x annual mean^3 + (206/annual mean)

5.2.13 Applying the above calculation to the predicted annual mean PM_{10} concentrations result in no predicted exceedances of the 24-hour mean AQO.

5.2.14 As such, the impacts of increased emissions associated with the operational phase of the Proposed Development are **negligible**.

Particulate Matter ($PM_{2.5}$)

Annual Mean

5.2.15 Annual mean $PM_{2.5}$ concentrations were predicted at the sensitive receptors for an opening year of 2030 for 'Without Development' and 'With Development' scenarios. These are summarised in Table 9.

Table 9 - Calculated Annual Mean Concentrations of $PM_{2.5}$ for 2030 (µg/m^3)

Receptor	Without Dev.	With Dev.	Change	Change as % of AQO	Long Term Average Concentration	Significance of Impact
R1	6.32	6.33	0.01	0.05	75% or Less of AQO	Negligible
R2	6.33	6.34	0.01	0.05	75% or Less of AQO	Negligible
R3	6.33	6.34	0.01	0.05	75% or Less of AQO	Negligible
R4	6.35	6.36	0.01	0.05	75% or Less of AQO	Negligible
R5	6.35	6.36	0.01	0.05	75% or Less of AQO	Negligible
R6	6.34	6.35	0.01	0.05	75% or Less of AQO	Negligible
R7	6.42	6.43	0.01	0.05	75% or Less of AQO	Negligible
R8	6.37	6.37	0.00	0.00	75% or Less of AQO	Negligible
R9	6.35	6.35	0.00	0.00	75% or Less of AQO	Negligible
R10	6.58	6.59	0.01	0.05	75% or Less of AQO	Negligible
R11	6.56	6.57	0.01	0.05	75% or Less of AQO	Negligible
R12	6.54	6.55	0.01	0.05	75% or Less of AQO	Negligible
R13	6.32	6.32	0.00	0.00	75% or Less of AQO	Negligible
R14	6.31	6.31	0.00	0.00	75% or Less of AQO	Negligible
R15	6.31	6.31	0.00	0.00	75% or Less of AQO	Negligible

5.2.16 As indicated in Table 9, predicted annual mean $PM_{2.5}$ concentrations were below the relevant AQO and national target value of 10µg/m^3 at all sensitive receptors.

5.2.17 Based on the extent of predicted population exposure to the impacts on annual mean $PM_{2.5}$ concentrations and the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean $PM_{2.5}$ concentrations is considered to be **negligible**, with the resulting effect **not significant**.

Summary

5.2.18 Predicted concentrations of all pollutants considered during both assessment scenarios for the operational phase, were below the relevant AQOs and target value for $PM_{2.5}$, without the risk of exceedance at sensitive existing receptor locations.

5.2.19 The IAQM guidance states that only if the impact is greater than slight, the effect is considered significant.

5.2.20 Impacts were predicted to be **negligible** for NO_2, PM_{10} and $PM_{2.5}$ at all sensitive receptors considered.

5.2.21 Overall, the effect is considered to be **not significant**, in accordance with the guidance.

6 MITIGATION AND RESIDUAL EFFECTS

6.1 Construction Phase

6.1.1 Based on the assessment results, mitigation will be required during the construction phase of the Proposed Development, commensurate with a **medium to high-risk** site.

6.1.2 The full suite of IAQM mitigation measures are detailed in Appendix 4, with those relevant to the scheme suitable for inclusion within the Construction Environmental Management Plan for the scheme.

Residual Effects

6.1.3 Following the application of the mitigation measures detailed in Appendix 4, and good site practice, the residual effects of dust and PM_{10} generated by construction activities are considered to be **not significant**.

6.1.4 The residual effects of emissions to air from construction vehicles and plant on local air quality are considered to be **not significant**.

6.2 Operational Phase

6.2.1 The changes in pollutant concentrations attributable to traffic emissions give rise to an overall **not significant** effect on local air quality at sensitive receptors. There is therefore no requirement to provide mitigation measures beyond those of good design and practice for the operational phase within the Air Quality Assessment report.

Residual Effects

6.2.2 No significant effects on air quality are anticipated at sensitive receptors.

6.2.3 Overall, the residual effects of the Proposed Development on air quality are considered to be **not significant** for NO_2, PM_{10} and $PM_{2.5}$, according to the EPUK/IAQM assessment criteria.

6.2.4 Predicted concentrations of all pollutants considered, are below the relevant AQOs and target value without the risk of exceedance at sensitive receptors.

7 CONCLUSION

7.1.1 NJD Environmental Associates Ltd was instructed by BANKS Property to prepare an Air Quality Assessment, to inform a planning application for a proposed residential development located on land off Eastfield, Shepley.

7.1.2 A qualitative assessment of the potential impacts on local air quality from construction phase activities has been undertaken, in accordance with the relevant guidance document. This identified that there is a **medium to high risk** of dust soiling impacts and a **low risk** of increases in particulate matter concentrations, due to unmitigated construction activities. However, through good site practice and the implementation of the recommended mitigation measures, the effects of dust and PM_{10} releases would be significantly reduced. The residual effects of dust and PM_{10} generated by construction activities on air quality are therefore considered to be **not significant**.

7.1.3 The number of vehicular trips generated by the scheme will approach the IAQM criteria, and as such, a detailed dispersion modelling assessment was undertaken in accordance with the relevant guidance to determine the potential for traffic movements on the local road network, and those associated with the proposed scheme, to affect proposed and existing sensitive receptors.

7.1.4 The Proposed Development is expected to result in **negligible** impacts on NO_2, PM_{10} and $PM_{2.5}$ concentrations at the worst case ESRs, in closest proximity to the roads affected by the highest development flows.

7.1.5 Overall, the residual effects are predicted to be **not significant** in accordance with IAQM guidance and as such, the implementation of additional mitigation measures during the operational phase is not required.

7.1.6 Based on the results of this assessment, it is concluded that air quality should not be a prohibitive factor in the determination of this planning application.

FIGURES

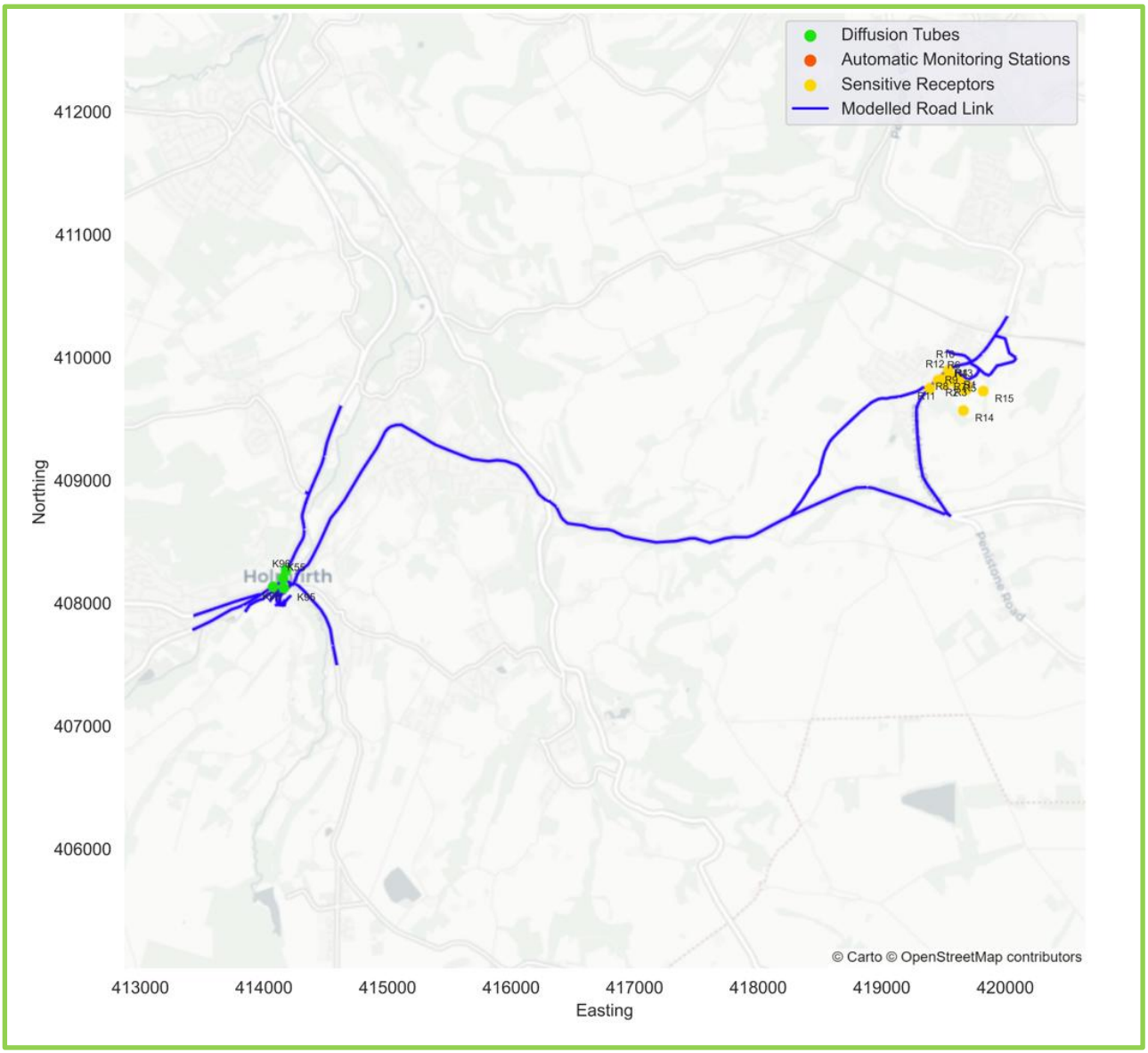


Figure 1 Assessment Extents

APPENDICES

Appendix 1 - IAQM Construction Phase Assessment Criteria

Table A1.1 - Potential Dust Emission Magnitude

Magnitude	Activity	IAQM Criteria
Large	Demolition	• >75,000m^3 building demolished • Potentially dusty material (e.g., concrete) • On-site crushing/screening • Demolition >12m above ground level
	Earthworks	• Total site area >110,000m^2 • Potentially dusty soil type, e.g., clay • >10 heavy earth moving vehicles active at any one time • Formation of bunds >6m in height
	Construction	• Total building volume >75,000m^3 • On site concrete batching • Sandblasting
	Trackout	• >50 HDV (>3.5t) outward movements in any one day • Potentially dusty surface material, e.g., high clay content • Unpaved road length >100m
Medium	Demolition	• 12,000 - 75,000m^3 building demolished • Potentially dusty material (e.g., concrete) • Demolition 6-12m above ground level
	Earthworks	• 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
	Construction	• Total building volume 12,000m^3 - 75,000m^3 • Potentially dusty construction material, e.g., concrete • On site concrete batching
	Trackout	• 20-50 HDV(>3.5t) outward movements in any one day • Moderately dusty surface material, e.g., high clay content • Unpaved road length 50m - 100m
Small	Demolition	• <12,000m^3 building demolished • Non-dusty material (e.g metal cladding) • Demolition <6m above ground level • Work during wetter months
	Earthworks	• 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 <3m in height
	Construction	• Total building volume <12,000 m^3 • Construction material with low potential for dust release, e.g., metal cladding or timber
	Trackout	• <20 HDV (>3.5t) outward movements in any one day • Surface material with low potential for dust release • Unpaved road length <50m

Table A1.2 - Factors to Consider - Sensitivity of the Area to Dust Soiling Effects

Receptor Sensitivity	Human Receptors	Ecological Receptors
High	• Users can expect enjoyment of a high level of amenity • The appearance, aesthetics or value of their property would be diminished by soiling • People or property reasonably expected to be present continuously, or at least regularly for extended periods, as part of the normal use of the land • Indicative examples include dwellings, museums, medium and long-term car parks and car showrooms	• Locations with an international or national designation and the designated features may be affected by dust soiling • Locations where there is a community of particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain • Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings
Medium	• 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 • The appearance, aesthetics or value of their property could be diminished by soiling • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal use of the land • Indicative examples include parks and places of work	• Location where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown • Locations with a national designation where the features may be affected by dust deposition • Indicative examples are a Site of Special Scientific Interest (SSSI) with dust sensitive features
Low	• The enjoyment of amenity would not reasonably be expected • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling • There is a 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 with a local designation where the features may be affected by dust deposition • Indicative example is a local nature reserve with dust sensitive features

Table A1.3 - Factors to Consider - Sensitivity of People to Health Effects of PM_{10}

Receptor Sensitivity	Human Receptors
High	• Locations where members of the public are exposed 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 8 hours or more in a day). • Indicative examples include residential properties. Hospitals and schools should also be considered as have equal sensitivity to residential areas for the purposes of this assessment.
Medium	• 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 8 hours or more in a day). • Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
Low	• Locations where human exposure is transient. • Indicative examples include public footpaths, playing fields, parks and shopping streets.

TABLE A1.4 - 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 A1.5 - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentrations	Number of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	>32µg/m^3 (>18 µg/m^3 in Scotland)	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Concentrations	Number of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	28-32µg/m³ (16-18 µg/m³ in Scotland	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28µg/m³ (14-16 µg/m³ in Scotland	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24µg/m³ (<14 µg/m³ in Scotland	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32µg/m³ (>18 µg/m³ in Scotland)	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32µg/m³ (16-18µg/m³ in Scotland)	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28µg/m³ (14-16µg/m³ in Scotland)	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24µg/m³ (<14µg/m³ in Scotland)	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low

Table A1.6 - Factors to Consider - Sensitivity of the Area to Ecological Impacts

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

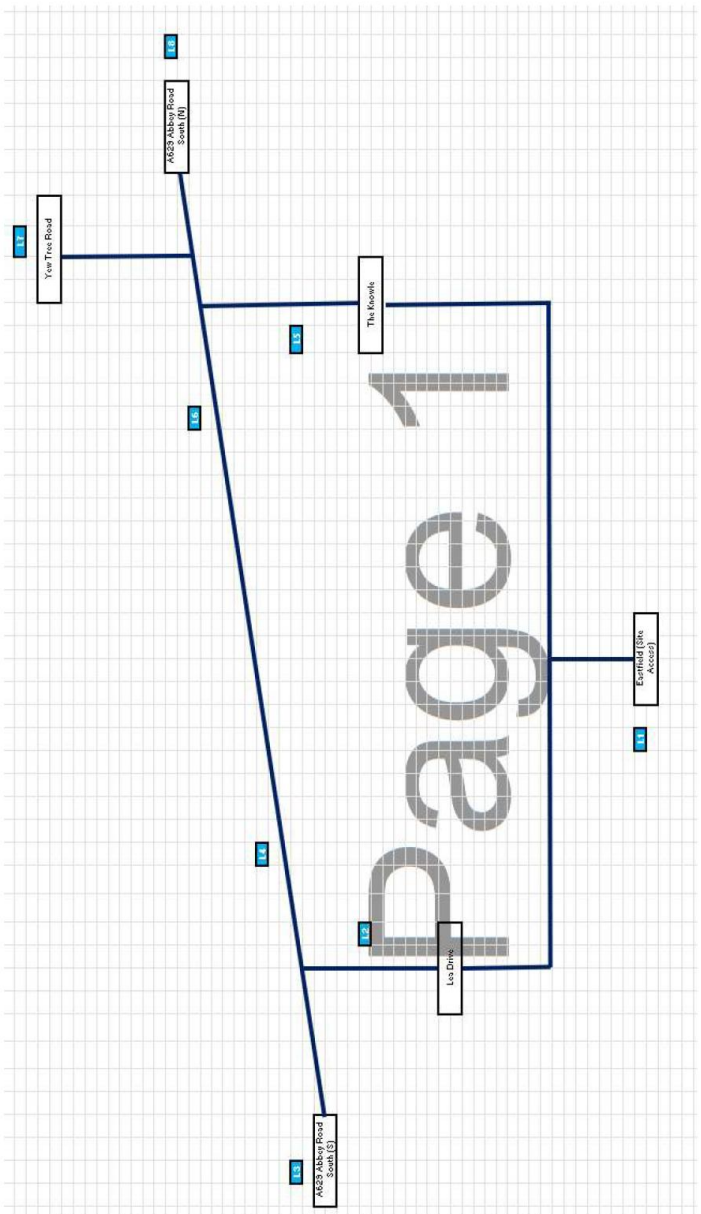
Table A1.7 - Risk of Dust Impacts

Sensitivity of 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
Earthworks and Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Appendix 2 - Model Input Parameters

Traffic Data

Link	Link Name	85% Speeds mph	Speed limit	2023 Base Year			2025 Base Year			2030 Future			Proposed Development			2030 Future + Development		
				AADT	HGV	HDV%	AADT	HGV	HDV%	AADT	HGV	HDV%	AADT	HGV	HDV%	AADT	HGV	HDV%
L1	Eastfield (Site Access)	-	30				-	-	-	-	-	-	494	0	0%	-	-	-
L2	Lea Drive	17		508	0	0%	510	0	0%	534	0	0%	346	0	0%	880	0	0%
L3	A629 West of Lea Drive	-	30	9233	886	10%	9270	890	10%	9699	931	10%	197	0	0%	9896	931	9%
L4	A629 East of Lea Drive	35		9044	886	10%	9080	890	10%	9500	931	10%	149	0	0%	9649	931	10%
L5	The Knowle	22		478	60	13%	480	60	13%	502	63	13%	147	0	0%	650	63	10%
L6	A629 West of The Knowle	33		8138	858	11%	8170	861	11%	8548	901	11%	149	0	0%	8697	901	10%
L7	Yew Tree Road		30	966	0	0%	970	0	0%	1015	0	0%	0	0	0%	1015	0	0%
L8	A629 East of The Knowle		30	8865	858	10%	8900	861	10%	9311	901	10%	296	0	0%	9608	901	9%



Page 1

Meteorology

Roughness Length z0:

Proposed Development Site: 0.5m

Meteorological site: 0.3m

Monin-Obukhov Length:

Proposed Development Site: 30m

Meteorological site: 30m

Model Verification

Monitoring Site	X	Y	Monitoring Result (Tube)	BG Nox	BG NO2	Modelled Roadside Nox (plt)	Roadside monitored NOx Road NOx mg m-3	Primary Adjusted Modelled Roadside NOx	Total NO2	Modelled Road Contribution NO2	Roadside Unadjusted Difference	Monitored Road Contribution NO2	Modelled Road Contribution NO2	Adjusted Total NO2	Difference	ID	Monitoring Result (Tube)	Secondary Adjusted Total NO2	Difference	Proportion of the AQO (%)
K55	414187	408263	23.20	9.92	7.74	33.48	35.27	32.13	21.98	14.23	5%	15.46	14.23	**21.97**	**5%**	K55	23.20	21.97	1.23	3.06%
K96	414163	408195	27.70	9.92	7.74	33.12	47.50	31.79	21.84	14.10	30%	19.96	14.10	**21.84**	**21%**	K96	27.70	21.84	5.86	14.64%
K95	414170	408118	20.60	9.92	7.74	33.14	28.68	31.81	21.85	14.11	-16%	12.86	14.11	**21.85**	**-6%**	K95	20.60	21.85	-1.25	-3.14%
K98	414083	408126	21.30	9.92	7.74	44.04	30.42	42.27	25.83	18.08	-45%	13.56	18.08	**25.82**	**-21%**	K98	21.30	25.82	-4.52	-11.31%
								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%
								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%
								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%
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								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%
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								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%
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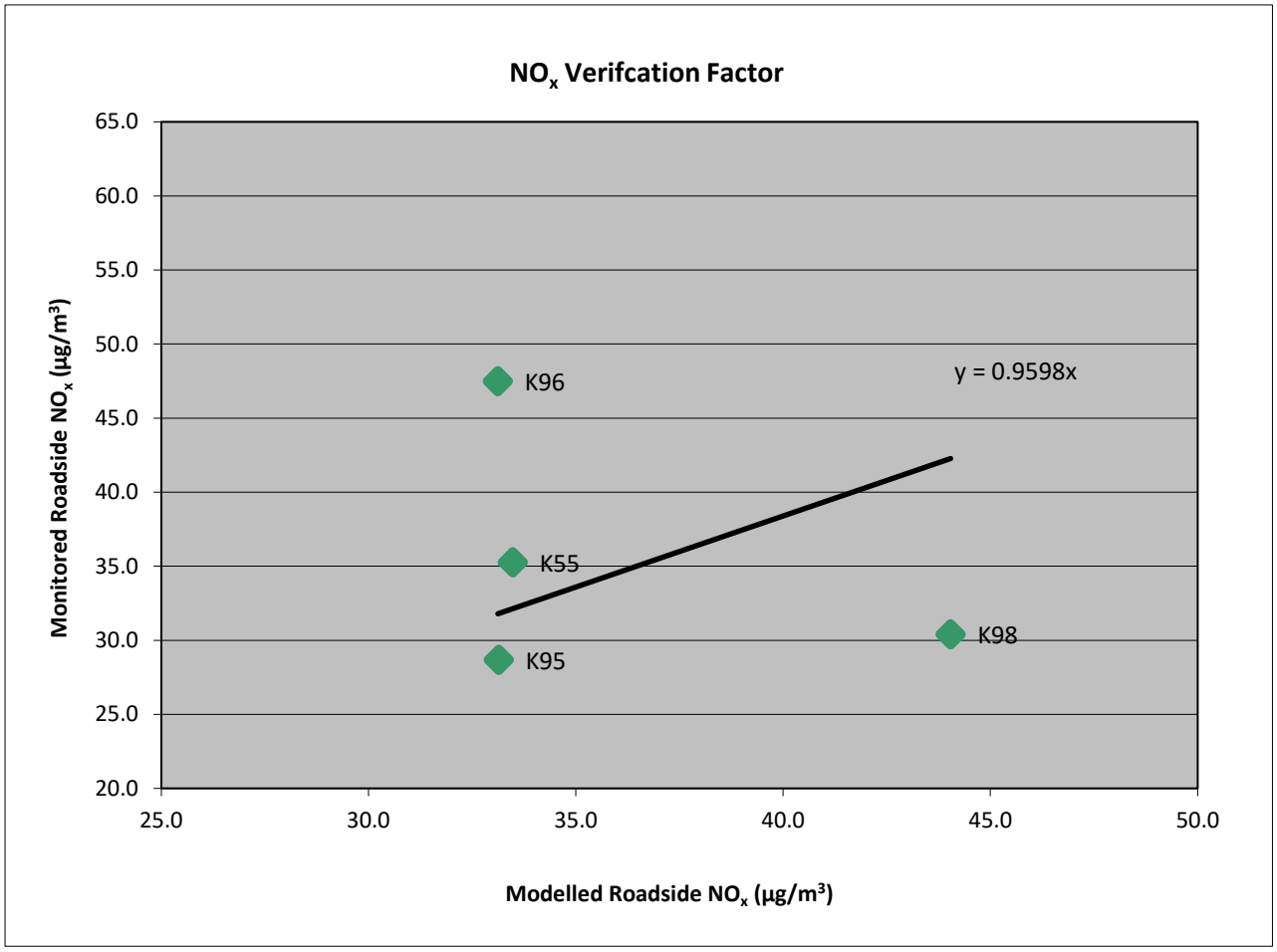
								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%
								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%
								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%
								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%
								0.00			#DIV/0!	0.00	0.00	**0.00**	**No Data**	0	0.00	0.00	0.00	0.00%

			Root Mean Square Error	**2.29**	**5.73%**
User Inputs	**0.9598**	0.9598	Fractional Bias	**0.01**	
Excel Calculations			Correlation Coefficient	**0.98**	

Figure A2.1 - Comparison of Measured Road-NOx with Unadjusted Modelled Road-NO_x



VERIFICATION FACTOR = 0.96

This verification factor was applied to the modelled road-NO_x outputs prior to conversion to annual mean NO_2 concentrations.

Particulate Matter (PM_{10} and $PM_{2.5}$)

There are no local PM_{10} or $PM_{2.5}$ monitoring data against which the model could be verified. Consequently, the verification factor determined above for adjusting the road-NO_x contribution has been applied to the predicted road-PM_{10} and road-$PM_{2.5}$ contributions, consistent with guidance set out in LAQM.TG22.

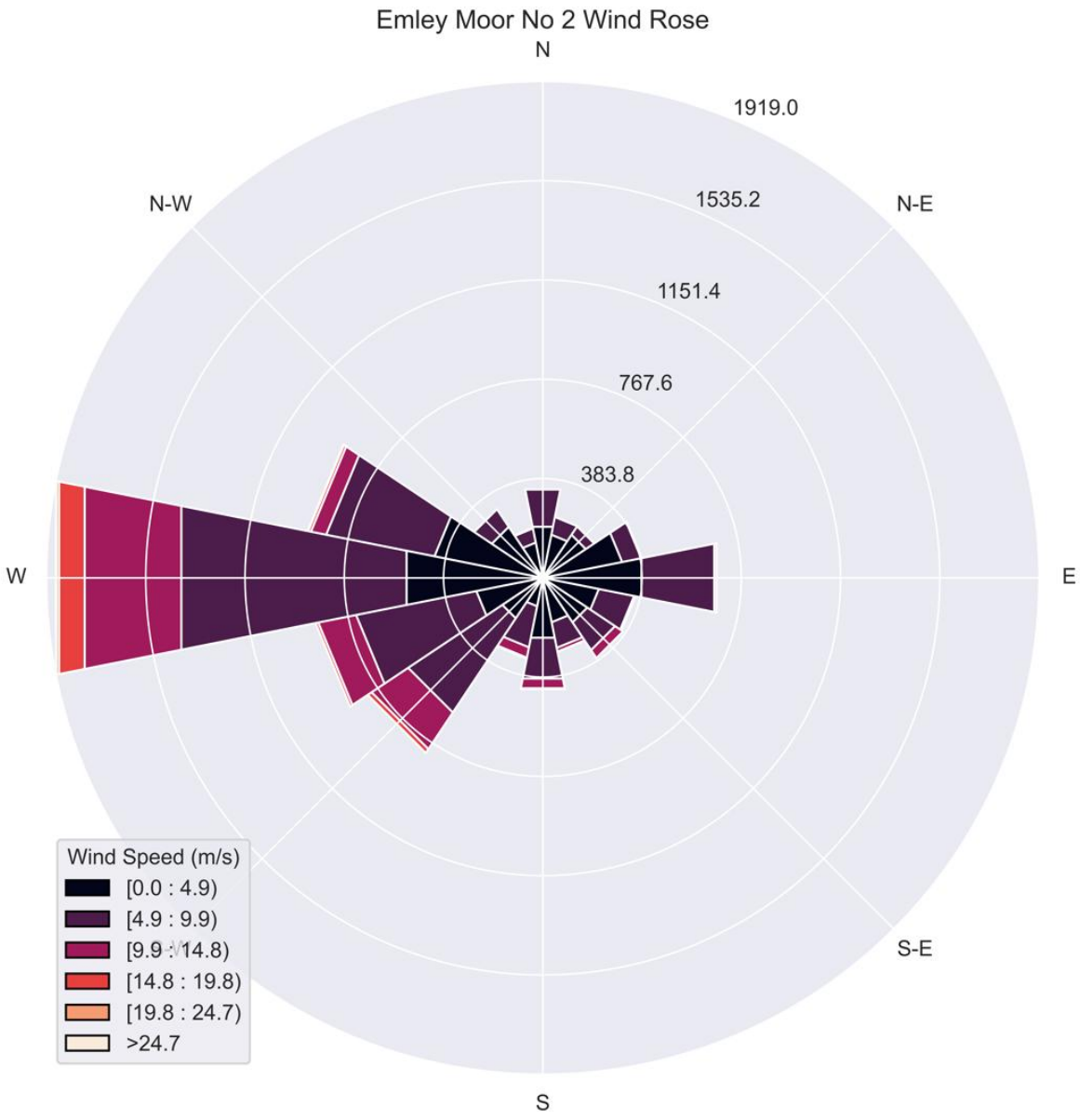
Model Uncertainty

The Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared.

If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements.

The overall weighted RMSE value calculated after verification was 2.29 (5.73%) and therefore, below 25%. The final predictions are considered to be acceptable.

Appendix 3 - Wind Rose for Emley Moor No 2 (2024)



Appendix 4 - IAQM Construction Phase Mitigation Measures

The mitigation measures have been divided into general measures applicable to all sites and measures applicable specifically to demolition, earthworks, construction and trackout, for consistency with the IAQM assessment methodology.

The following table details the mitigation required for high, medium and low risk sites.

It is noted that not all mitigation measures will be applicable to every site and development, however, all of those recommended by the IAQM have been provided for completeness. Professional judgement should therefore be used, taking into consideration the site location, scale and nature of the proposed works.

Based on the assessment results, mitigation will be required during the construction phase of the Proposed Development, commensurate with a medium to high-risk site. The columns have therefore been highlighted for ease.

Key to Table:

H Highly Recommended
D Desirable
N Not Required

Table A4.1 - IAQM Construction Phase Mitigation Measures

Mitigation Measure	Low Risk	Medium Risk	High Risk
Communication			
1. Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	N	**H**	H
2. 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	**H**	H
3. Display the head or regional office contact information.	H	**H**	H
4. Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, realtime PM_{10} continuous monitoring and/or visual inspections.	D	**H**	H

Mitigation Measure	Low Risk	Medium Risk	High Risk
Site Management			
5. 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	**H**	H
6. Make the complaints log available to the local authority when asked.	H	**H**	H
7. 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	**H**	H
8. Hold regular liaison meetings with other high risk construction sites within 500m 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.	N	N	H
Monitoring			
9. 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 100m of site boundary, with cleaning to be provided if necessary.	D	D	H
10. 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	**H**	H
11. 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	**H**	H
12. 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	**H**	H
Preparing and Maintaining the Site			
13. Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H	**H**	H
14. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	H	**H**	H
15. Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.	D	**H**	H
16. Avoid site runoff of water or mud.	H	**H**	H
17. Keep site fencing, barriers and scaffolding clean using wet methods.	D	**H**	H
18. 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.	D	**H**	H
19. Cover, seed or fence stockpiles to prevent wind whipping.	D	**H**	H
Operating Vehicle/Machinery and Sustainable Travel			
20. Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.	H	**H**	H
21. Ensure all vehicles switch off engines when stationary - no idling vehicles.	H	**H**	H
22. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H	**H**	H

Mitigation Measure	Low Risk	Medium Risk	High Risk
23. Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on 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).	D	D	H
24. Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	N	N	H
25. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	N	D	H
Operations			
26. 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	**H**	H
27. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate	H	**H**	H
28. Use enclosed chutes and conveyors and covered skips.	H	**H**	H
29. 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	**H**	H
30. 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.	D	**H**	H
Waste Management			
31. Avoid bonfires and burning of waste materials.	H	**H**	H
Measures Specific to Demolition			
32. Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	D	D	H
33. 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	**H**	H
34. Avoid explosive blasting, using appropriate manual or mechanical alternatives.	H	**H**	H
35. Bag and remove any biological debris or damp down such material before demolition	H	**H**	H
Measures Specific to Earthworks			
36. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	N	D	H
37. Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	N	D	H
38. Only remove the cover in small areas during work and not all at once.	N	D	H
Measures Specific to Construction			
39. Avoid scabbling (roughening of concrete surfaces) if possible.	D	D	**H**
40. 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.	D	H	**H**
41. 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.	N	D	**H**

Mitigation Measure	Low Risk	Medium Risk	High Risk
42. For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	N	D	D
Measures Specific to Trackout			
43. Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	D	**H**	H
44. Avoid dry sweeping of large areas.	D	**H**	H
45. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D	**H**	H
46. Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	N	**H**	H
47. Record all inspections of haul routes and any subsequent action in a site log book.	D	**H**	H
48. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	N	**H**	H
49. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D	**H**	H
50. 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.	N	**H**	H
51. Access gates to be located at least 10m from receptors where possible.	N	**H**	H

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