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HALLAM LAND MANAGEMENT

LAND AT NEWARK, SUTTON-IN-ASHFIELD

AIR QUALITY ASSESSMENT

JUNE 2022

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DATE ISSUED:	**23rd June 2022**
JOB NUMBER:	**ST19319**
REPORT NUMBER:	**003**
VERSION:	**V0.1**
STATUS:	**FINAL**

HALLAM LAND MANAGEMENT

LAND AT NEWARK, SUTTON-IN-ASHFIELD

AIR QUALITY ASSESSMENT

JUNE 2022

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EXECUTIVE SUMMARY

An air quality assessment has been undertaken to support an outline planning application for a proposed residential development comprised of 300 residential units and associated infrastructure on Land at Newark Road, Sutton-in-Ashfield. This report supersedes the Land at Newark Road, Sutton in Ashfield Air Quality Assessment Report that was prepared by Wardell Armstrong LLP in 2017 to accompany the 2017 outline planning application (planning ref. no. V/2017/0565).

The assessment considers dust and fine particulate matter during the construction phase, and road traffic emissions during the operational phase.

During the construction phase of the development, the risk of dust soiling effects is classed as high for earthworks and construction activities and low for trackout. The risk of human health effects is classed as low for earthworks, construction and trackout. Mitigation measures based on best practice guidance are proposed to reduce any potential impacts.

For the operational phase assessment, annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations have been modelled at fifteen existing receptor locations using the most recent Emission Factor Toolkit available from DEFRA (v11.0).

The operational phase assessment concludes that the development will result in concentrations of NO_2, PM_{10} and $PM_{2.5}$ remaining below the air quality objectives/target values, both without and with the development for the proposed 2032 Opening/Future Year. The impact of the development is predicted to be negligible at all fifteen existing sensitive receptors that were assessed. Air quality effects are therefore considered to be 'not significant'.

The assessment demonstrates that the proposed development will not lead to an unacceptable risk from air pollution, or to any breach in national objectives. Therefore, there are no material reasons in relation to air quality why the proposed scheme should not proceed, subject to appropriate planning conditions.

1 INTRODUCTION

1.1 Background

1.1.1 Wardell Armstrong LLP has been commissioned to undertake an air quality assessment for a residential development comprised of 300 residential units and associated infrastructure over an area of 20 hectares (ha), at land south of Newark Road, Sutton-in-Ashfield. This report supersedes the Land off Newark Road, Sutton in Ashfield Air Quality Assessment Report (Wardell Armstrong 2017) that was prepared to accompany the 2017 outline planning application (planning reference number V/2017/0565). The purpose of this report is to update the air quality assessment to reflect current traffic flows at the site, as well as changes to planning policy and assessment guidance that have occurred since the original report was prepared.

1.1.2 The proposed development site is bordered by the B6022 Newark Road to the north, with industrial units beyond. To the east the site is bordered by the B6139 Coxmoor Road and open land beyond. To the south, the site is bordered by open land and a residential property with further residential properties beyond and open land to the southwest. Access to the proposed development site will be from Newark Road, to the north.

1.1.3 This report details the results of the air quality assessment undertaken in support of an outline planning application for the proposed residential development. The assessment considers dust and fine particulate matter associated with the construction phase of the proposed development, and the potential air quality impacts of the additional road traffic generated by the proposed development site. Air pollutant concentrations are considered at fifteen existing sensitive receptor locations in the surrounding area as well as at two proposed receptor locations within the site.

2 LEGISLATION AND POLICY CONTEXT

2.1 Relevant Air Quality Legislation and Guidance

2.1.1 The air quality assessment has been undertaken in accordance with the following legislation and guidance:

- EU Ambient Air Quality Directive 2008/50/EC (i.e., the CAFE Directive);
- The Environment Act 1995;
- Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007;
- The Air Quality Standards Regulations 2010;
- Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(16), April 2021;
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework, July 2021; and
- Department for Communities and Local Government, Planning Practice Guidance: Air Quality, November 2019.

2.1.2 Further details of these documents are included in **Appendix A**.

2.2 Assessment Criteria

2.2.1 The relevant air quality objectives and limit values for this assessment are included within Table 1.

Table 1: Air Quality Objectives and Limit Values Relevant to the Assessment*

Pollutant	Objective/Limit Value	Averaging Period	Obligation
Nitrogen Dioxide (NO_2)	200µg/m^3, not to be exceeded more than 18 times a year	1-hour mean	All local authorities
	40µg/m^3	Annual mean	All local authorities
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	England, Wales and Northern Ireland
	40µg/m^3	Annual mean	England, Wales and Northern Ireland
Particulate Matter ($PM_{2.5}$)	Limit Value of 25µg/m^3	Annual mean	England, Wales and Northern Ireland
**In accordance with the Air Quality Standards Regulations 2010*			

2.2.2 Further details of where these objectives and limit values apply are detailed in **Appendix A**.

3 ASSESSMENT METHODOLOGY

3.1 Construction Phase Assessment

3.1.1 To assess the impacts associated with dust and fine particulate matter releases during the construction phase of the development, an assessment has been undertaken in accordance with guidance from the Institute of Air Quality Management (IAQM)[1]. Further details of the construction assessment methodology are provided in **Appendix B**.

3.1.2 The closest sensitive human receptors to where construction phase activities will take place are residential and are detailed in Table 3.

Table 3: Existing Sensitive Receptors Considered in the Construction Phase Assessment

Receptor	Direction from the Site	Approximate Distance from the Site Boundary (m)
Existing residential property along Searby Road	West	35m at closest point
Existing residential property along Coxmoor Road	South-East	<10m at closest point
Existing residential properties along Newark Road	North-West	50m at closest point

3.1.3 There are no designated statutory ecological receptors located within 50m of the boundary of the development site and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from any of the site entrances. It is, therefore, not necessary to consider the potential for ecological effects in this assessment.

3.1.4 The criteria used to assess the construction impact of the proposed development, and the associated significance of effects, at existing sensitive receptors are included in **Appendix B**.

3.2 Operational Phase Assessment

3.2.1 The air dispersion model ADMS-Roads (CERC, Version 5.0.1) has been used to assess the impacts associated with road traffic emissions during the operational phase

[1] Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, June 2016

assessment. The impacts have been assessed in accordance with guidance from Environmental Protection UK (EPUK) and the IAQM[2]. Further details of the modelling and assessment methodology are provided in **Appendix C**.

3.2.2 NO_2, PM_{10} and $PM_{2.5}$ concentrations have been predicted at existing receptors as these are the pollutants considered most likely to exceed the objectives and limit values.

3.2.3 Pollutant concentrations have also been predicted for proposed receptors within the development site, to assess onsite air quality for future residents of the development.

3.2.4 Air dispersion modelling has been carried out to estimate pollutant concentrations, due to road traffic emissions, for three assessment scenarios as follows:

- **Scenario 1:** 2019 Base and Verification Year, the most recent year for which traffic flow information and meteorological data are available;
- **Scenario 2:** 2032 Opening/Future Year, without the proposed development in place; and
- **Scenario 3:** 2032 Opening/Future Year, without the proposed development in place.

Existing Sensitive Receptors

3.2.5 A number of representative existing sensitive receptors (identified as ESR 1 to ESR 15) have been selected for consideration in the air quality assessment. These have been chosen based on their sensitivity and their proximity to roads which will be affected by development generated traffic.

3.2.6 Details of the receptors considered are provided in Table 4, and their locations are shown on drawing ST19319-003.

Table 4: Existing Sensitive Receptors Considered in Operational Phase Assessment

Receptor	Address	Grid Reference		Receptor Type
		Easting	Northing	
ESR 1	Newark Road	451387	358512	Residential
ESR 2	Cauldwell Road	451631	358606	Residential
ESR 3	Coxmoor Road	451943	358131	Residential

[2] Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

Table 4: Existing Sensitive Receptors Considered in Operational Phase Assessment				
Receptor	Address	Grid Reference		Receptor Type
		Easting	Northing	
ESR 4	Newark Road	451294	358447	Residential
ESR 5	Kirkby Folly Road	450977	358232	Residential
ESR 6	Low Moor Road	450638	357644	Residential
ESR 7	Clare Road	449689	357781	School
ESR 8	Low Moor Road	450607	357052	Residential
ESR 9	Taylor Crescent	449997	358182	Residential
ESR 10	Derby Road	452297	356177	Residential
ESR 11		451946	355801	Residential
ESR 12	Diamond Avenue	451898	355742	Residential
ESR 13	Derby Road	450968	354591	Residential
ESR 14	Station Road	450188	358514	Residential
ESR 15		450524	358436	Residential

3.2.7 The criteria used to assess the operational impact of the proposed development, and the associated significance of effects, at existing sensitive receptors are included in **Appendix C**.

Proposed Sensitive Receptors

3.2.8 Two proposed sensitive receptors (referred to as PSR 1 and PSR 2) have been selected within the proposed development site. These receptors are considered to be representative of the proposed residential areas which will be closest to the main existing and future sources of pollution. In this case, the main sources are considered to be vehicle emissions from the Site Access Road, Newark Road and Coxmoor Road.

3.2.9 Pollutant concentrations at the proposed receptors have been predicted for scenario 3 only. It is only necessary to consider the 'with development' scenarios for the proposed receptors as they will not experience any 'without development' conditions. It is not therefore necessary to consider the changes in pollutant concentrations at the proposed receptors.

3.2.10 Details of the proposed sensitive receptors are provided in Table 5, and their locations are shown on drawing ST19319-003.

Table 5: Proposed Sensitive Receptors Considered in the Operational Phase Assessment

Receptor Point	Location	Grid Reference	
		Easting	Northing
PSR 1	Location on the north-western corner of the proposed development site facing onto Newark Road	451467	358478
PSR 2	Location on the north-eastern corner of the proposed development site facing onto Newark Road	451548	358542

3.3 Limitations and Uncertainties

3.3.1 Air quality assessments make use of official sources of information (i.e., vehicle emission factors and background concentrations) which have historically been considered to be overly optimistic. Monitoring data collected by the UK Government and local authorities shows that annual mean NO_2 concentrations have remained higher than previously expected (especially in roadside locations). This was widely thought to be due to the lower-than-expected decline in NO_x emissions from diesel vehicles (even as new Euro standards have been introduced), coupled with an overall increase in the number of diesel vehicles on the road.

3.3.2 The vehicle emission factors used in this assessment are from Defra's latest Emission Factor Toolkit (EFT v11.0)[3], which was released in November 2021 and is the most up-to-date version available.

3.3.3 A position statement was produced by the IAQM in 2018 which dealt specifically with the use of EFT v8.0 and the consideration of uncertainties in predicting future air quality[4]. The statement concluded that the approaches for dealing with this

[3] Defra Local Air Quality Management webpages (https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html)
[4] Institute of Air Quality Management, Dealing with Uncertainty in Vehicle NO_x Emissions within Air Quality Assessments v1.1, July 2018

uncertainty should be decided on a case-by-case basis, but may include the use of a sensitivity test in which it is assumed that NO_x emissions will not reduce as quickly over time as within the EFT.

3.3.4 A later study provided evidence that EFT v9.0 may be relied upon to predict the 'most likely' future emissions reductions, as long as model verification has been undertaken using monitored data from 2016 or later[5].

3.3.5 The IAQM has recently withdrawn their 2018 position statement on the consideration of uncertainties in predicting future air quality[6]. A growing body of evidence suggests that the latest COPERT vehicle emission factors used in EFT v9.0 (and later) reflect real-world NO_x emissions more accurately. As a result, the IAQM judge that "an exclusively vehicle emissions-based sensitivity test is no longer necessary". This is provided that the assessment has been verified using monitoring data from 2016 or later.

3.3.6 In accordance with Defra guidance, the air quality assessment has been carried out using EFT v11.0. As model verification has been undertaken, following the latest guidance from the IAQM, it is not considered necessary to carry out a sensitivity analysis. Further information on the vehicle emission factors used in the assessment are provided in **Appendix C**.

3.3.7 Several steps have been taken to ensure the model is as accurate and representative as possible. These comprise:

- Detailed traffic data has been obtained from the appointed transport consultants (ADC Infrastructure), following extensive consultation to ensure its appropriateness and robustness;
- The latest Defra LAQM tools have been incorporated into the assessment;
- Meteorological data, obtained from Nottingham meteorological recording station, has been incorporated into the assessment;
- An Ashfield District Council (ADC) operated diffusion tube monitoring location has been considered within the assessment to allow model verification to take place. Model verification factors have been applied to NO_x emissions, which are then input into the Defra NO_x to NO_2 calculator tool to predict total NO_2 concentrations at each receptor considered in the assessment; and

[5] Air Quality Consultants, Performance of Defra's Emission Factor Toolkit 2013 – 2019, February 2020
[6] Available on the Institute of Air Quality Management website (https://iaqm.co.uk/wp-content/uploads/2013/02/iaqm_uncertainty_vehicle_NOx_emission_withdrawn-02.pdf)

- Extensive detailed modelling of the roads included in the study area has been undertaken. Individual road lengths, widths and speeds have been reviewed in detail, as have the locations of the ESRs and diffusion tube locations in proximity to the roads to ensure all information is as accurate as possible.

4 BASELINE SITUATION

4.1 Ashfield District Council Local Air Quality Management

4.1.1 The proposed development site is located within the administrative area of Ashfield District Council (ADC), which is responsible for the management of local air quality.

4.1.2 A review of the 2020 ADC Annual Status Report (ASR) established that ADC has not currently declared any Air Quality Management Areas (AQMAs) within its administrative area. Therefore, the site is not located in a known area of poor air quality.

4.1.3 One roadside air quality monitoring location is situated in close proximity to the proposed development (REF: Tube 22). According to the 2020 ASR, this monitoring location recorded an annual mean, bias-adjusted, NO_2 concentration of 32.5µg/m^3 in 2019. This diffusion tube has been included in the model for verification purposes, further details of which are provided in **Appendix C.**

Background Air Pollutant Concentrations

4.1.4 The air quality assessment needs to take into account background concentrations upon which local, traffic derived pollution is superimposed.

4.1.5 As there are currently no representative NO_2, PM_{10} or $PM_{2.5}$ background monitoring locations in the vicinity of the proposed development site, background concentrations for these pollutants have been obtained from the 2018-based Defra default concentration maps, for the appropriate grid squares[7].

4.1.6 The background pollutant concentrations used in this assessment are detailed in Table 6.

Table 6: Background Pollutant Concentrations Used in the Air Quality Assessment

Receptors	Oxides of Nitrogen (NO_x)*	Nitrogen Dioxide (NO_2)	Particulates (PM_{10})	Particulates ($PM_{2.5}$)
2019 Annual Mean Concentrations (µg/m^3)				
ESR 1 to ESR 4 (451500, 356500)	20.42	14.79	13.66	8.34
ESR 5 & ESR 14 to ESR 15	22.72	16.25	13.56	8.63

[7] Accessed through the Defra Local Air Quality Management webpages (http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html)

Table 6: Background Pollutant Concentrations Used in the Air Quality Assessment				
Receptors	**Oxides of Nitrogen (NO_x)***	**Nitrogen Dioxide (NO_2)**	**Particulates (PM_{10})**	**Particulates ($PM_{2.5}$)**
(450500, 358500)				
ESR 6 (450500, 357500)	20.00	14.51	12.61	8.11
ESR 7 (449500, 357500)	19.96	14.56	13.39	8.38
ESR 8 (450500, 357500)	20.00	14.51	12.61	8.11
ESR 9 (449500, 358500)	19.94	14.52	12.53	8.23
ESR 10 (452500, 356500)	14.67	11.07	15.42	8.50
ESR 11 to ESR 12 (451500, 355500)	15.55	11.67	13.85	8.26
ESR 13 (450500, 354500)	16.77	12.49	13.83	8.43
2032 Annual Mean Concentrations (µg/m³)				
ESR 1 to ESR 4 & PSR 1 to PSR 2 (451500, 356500)	15.23	11.35	12.73	7.59
ESR 5 & ESR 14 to ESR 15 (450500, 358500)	16.64	12.29	12.68	7.88
ESR 6 (450500, 357500)	15.05	11.23	11.65	7.34
ESR 7 (449500, 357500)	14.24	10.71	12.44	7.63
ESR 8 (450500, 357500)	15.05	11.23	11.65	7.34
ESR 9 (449500, 358500)	14.66	10.99	11.54	7.46
ESR 10 (452500, 356500)	10.31	7.98	14.51	7.78
ESR 11 to ESR 12 (451500, 355500)	10.96	8.44	12.92	7.53
ESR 13 (450500, 354500)	11.89	9.09	12.87	7.67

4.2 Modelled Baseline Concentrations at Existing Sensitive Receptors

4.2.1 The baseline assessment (i.e., scenarios 1 and 2) has been carried out for the existing sensitive receptors in accordance with Defra guidance (i.e., using EFT v.11.0). The adjusted NO_2 and unadjusted PM_{10} and $PM_{2.5}$ concentrations are detailed in Table 7.

Table 7: Predicted NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 1 and 2						
Receptor	Calculated Annual Mean Concentrations (µg/m³)					
	Scenario 1: 2019 Base Year			Scenario 2: 2032 Opening/Future Year, without the proposed development		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
ESR 1	20.44	14.39	8.77	13.39	13.50	8.02
ESR 2	22.13	14.48	8.83	13.98	13.58	8.06
ESR 3	22.29	14.64	8.91	13.95	13.74	8.15
ESR 4	19.56	14.29	8.71	13.07	13.40	7.96
ESR 5	21.6	14.33	9.07	14.20	13.50	8.33
ESR 6	19.49	13.27	8.49	12.97	12.35	7.72
ESR 7	17.15	13.75	8.58	11.58	12.81	7.83
ESR 8	19.87	13.38	8.55	13.10	12.47	7.79
ESR 9	22.60	13.72	8.92	13.72	12.79	8.14
ESR 10	16.11	16.07	8.87	9.70	15.18	8.14
ESR 11	18.59	14.59	8.70	10.87	13.68	7.95
ESR 12	16.92	14.47	8.63	10.23	13.56	7.88
ESR 13	17.58	14.50	8.82	10.80	13.57	8.05
ESR 14	22.22	14.31	9.07	14.40	13.47	8.32
ESR 15	19.85	14.01	8.89	13.52	13.16	8.15

4.2.2 The results show that the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the relevant objective and limit values in the 2019 Base Year and the 2032 Opening/Future Year, without proposed development scenarios.

5 IMPACT ASSESSMENT

5.1 Construction Phase Assessment

Step 2 – Impact Assessment

5.1.1 In accordance with the IAQM guidance, the main activities to be considered during the construction phase of a proposed development are demolition, earthworks, construction and trackout.

5.1.2 There are no proposed demolition activities associated within the development site. Demolition activities are, therefore, not considered within this assessment.

5.1.3 Earthworks cover the processes of soil-stripping, ground-levelling, excavation and landscaping. Construction activities will focus on the proposed buildings, access roads and car parking areas. Trackout is defined as the transport of dust and dirt by vehicles travelling from a construction site on to the public road network. This may occur through the spillage of dusty materials onto road surfaces or through the transportation of dirt by vehicles that have travelled over muddy ground on the site. This dust and dirt can then be deposited and re-suspended by other vehicles.

Step 2A

5.1.4 Step 2A of the assessment defines the potential dust emission magnitude from earthworks, construction and trackout in the absence of site-specific mitigation.

5.1.5 Examples of the criteria for the dust emission classes are detailed in **Appendix B**. The results of this step are detailed in Table 8.

Step 2B

5.1.6 Step 2B of the construction phase dust assessment defines the sensitivity of the area, taking into account the significance criteria detailed in **Appendix B**, for earthworks, construction and trackout. The sensitivity of the area to each activity is assessed for potential dust soiling, human health effects and ecological effects (where applicable).

5.1.7 For earthworks and construction, there are currently between 10 and 100 residential receptors within 20m of where these activities may take place, which is assumed to be the site boundary for the purposes of this assessment.

5.1.8 The routing of construction vehicles is unknown at this stage. Therefore, for the purpose of this assessment, worst case routing scenarios have been assumed for assessment of potential trackout impacts at nearby receptors.

5.1.9 As a result, for trackout, there are between 1 and 10 residential receptors within 20m of where trackout may occur for a distance of up to 100m from the site entrance.

Step 2C

5.1.10 Step 2C of the construction phase dust assessment defines the risk of impacts from each activity, by combining the dust emission magnitude with the sensitivity of the surrounding area.

5.1.11 The risk of dust impacts from each activity, with no mitigation in place, has been assessed in accordance with the criteria detailed in **Appendix B**. The results of this step are detailed in Table 8.

Summary of Step 2

5.1.12 Table 8 details the results of Step 2 of the construction phase assessment for human receptors.

Table 8: Construction Phase Dust Assessment for Human Receptors

	Activity			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Step 2A				
Dust Emission Magnitude	N/A	Large[a]	Large[b]	Medium[c]
Step 2B				
Sensitivity of Closest Receptors	N/A	High	High	High
Sensitivity of Area to Dust Soiling Effects	N/A	High	High	Low
Sensitivity of Area to Human Health Effects	N/A	Low[d]	Low[d]	Low[d]
Step 2C				
Dust Risk: Dust Soiling	N/A	High Risk	High Risk	Low Risk
Dust Risk: Human Health	N/A	Low Risk	Low Risk	Low Risk

a. Total site area estimated to be more than 10,000m²

b. Total building volume estimated to be > 100,000m³ with potentially dusty construction materials

c. Number of construction phase vehicles estimated to be between 10 and 50 movements per day

d. Background annual mean PM_{10} concentration is taken from the LAQM Defra default concentration maps, for the appropriate grid square for 2022

Step 3 – Mitigation

5.1.13 During the construction phase, the implementation of effective mitigation measures will substantially reduce the potential for nuisance dust and fine particulate matter to be generated.

5.1.14 Step 2C of the assessment has identified that the risk of dust soiling and human health effects is not negligible for all the activities and therefore site-specific mitigation will need to be implemented to ensure dust effects from these activities will be not significant.

Recommendations for Site-Specific Mitigation

5.1.15 Specific mitigation relating to dust control may be in the form of construction best practices or could include a dust management plan. Recommendations for mitigation within the IAQM guidance include:

- Re-vegetation of earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Protection of surfaces and exposed material from winds until disturbed areas are sealed and stable;
- Dampening down of exposed stored materials, which will be stored as far from sensitive receptors as possible;
- Ensuring 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;
- Avoiding activities that generate large amounts of dust during windy conditions;
- Ensuring 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;
- Avoiding dry sweeping of large areas;
- Using 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;
- Ensuring vehicles entering and leaving the site are covered to prevent escape of materials during transport;

- Implementing a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- Minimising of vehicle movements and limitation of vehicle speeds – the slower the vehicle speeds, the lower the dust generation;
- Ensuring there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever the site size and layout permits; and
- Access gates to be located at least 10m from receptors, where possible.

5.1.16 All dust and air quality complaints should be recorded, and appropriate measures be taken to identify causes and reduce emissions in a timely manner. Exceptional incidents which cause dust and/or emissions, and the action taken to resolve the situation, should be recorded in a logbook and made available to ADC on request.

5.1.17 It is recognised that the final design solutions will be developed with the input of the Contractor to maximise construction efficiencies, to use modern construction techniques and sustainable materials and to incorporate the particular skills and experience offered by the appointed contractor.

Step 4 – Residual Effects

5.1.18 Step 4 of the construction phase dust assessment has been undertaken to determine the significance of the dust effects arising from earthworks, construction and trackout associated with the proposed development.

5.1.19 The implementation of effective mitigation measures during the construction phase, such as those detailed in Step 3, will substantially reduce the potential for nuisance dust and fine particulate matter to be generated and any residual impact should be **not significant**.

5.2 Operational Phase Assessment

Existing Sensitive Receptor – Human Health

5.2.1 The impact assessment has been carried out for the representative existing sensitive receptors considered (i.e., ESR 1 to ESR 15) using EFT v11.0.

NO_2 Concentrations

5.2.2 Table 9 details the predicted NO_2 concentrations for the 2032 Opening/Future Year for both the without development and with development scenarios in accordance with Defra guidance (i.e., using EFT v11.0). The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 9: Predicted Adjusted NO_2 Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – EFT v11.0

Receptor	Calculated Annual Mean NO_2 Concentrations (µg/m^3)[a]				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact[b]
		Concentration	Percentage in Relation to AQAL		
ESR 1	13.39	13.45	<75%	<0.5%	**Negligible**
ESR 2	13.98	14.07	<75%	<0.5%	**Negligible**
ESR 3	13.95	14.02	<75%	<0.5%	**Negligible**
ESR 4	13.07	13.12	<75%	<0.5%	**Negligible**
ESR 5	14.20	14.23	<75%	<0.5%	**Negligible**
ESR 6	12.97	12.99	<75%	<0.5%	**Negligible**
ESR 7	11.58	11.58	<75%	<0.5%	**Negligible**
ESR 8	13.10	13.12	<75%	<0.5%	**Negligible**
ESR 9	13.72	13.72	<75%	<0.5%	**Negligible**
ESR 10	9.70	9.70	<75%	<0.5%	**Negligible**
ESR 11	10.87	10.88	<75%	<0.5%	**Negligible**
ESR 12	10.23	10.23	<75%	<0.5%	**Negligible**
ESR 13	10.80	10.81	<75%	<0.5%	**Negligible**
ESR 14	14.40	14.40	<75%	<0.5%	**Negligible**
ESR 15	13.52	13.53	<75%	<0.5%	**Negligible**

[a]NO_2 concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO_2 calculator, in accordance with LAQM.TG(16)

[b]Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible

PM_{10} Concentrations

5.2.3 Table 10 details the PM_{10} concentrations for the 2032 Opening/Future Year, for both the without development and with development scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 10: Predicted Unadjusted PM_{10} Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – EFT v11.0

Receptor	Calculated Annual Mean PM_{10} Concentrations (µg/m^3)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact[a]
		Concentration	Percentage in Relation to AQAL		
ESR 1	13.50	13.52	<75%	<0.5%	**Negligible**
ESR 2	13.58	13.61	<75%	<0.5%	**Negligible**
ESR 3	13.74	13.77	<75%	<0.5%	**Negligible**
ESR 4	13.40	13.42	<75%	<0.5%	**Negligible**
ESR 5	13.50	13.51	<75%	<0.5%	**Negligible**
ESR 6	12.35	12.36	<75%	<0.5%	**Negligible**
ESR 7	12.81	12.81	<75%	<0.5%	**Negligible**
ESR 8	12.47	12.48	<75%	<0.5%	**Negligible**
ESR 9	12.79	12.79	<75%	<0.5%	**Negligible**
ESR 10	15.18	15.19	<75%	<0.5%	**Negligible**
ESR 11	13.68	13.69	<75%	<0.5%	**Negligible**
ESR 12	13.56	13.56	<75%	<0.5%	**Negligible**
ESR 13	13.57	13.57	<75%	<0.5%	**Negligible**
ESR 14	13.47	13.47	<75%	<0.5%	**Negligible**
ESR 15	13.16	13.16	<75%	<0.5%	**Negligible**

[a]Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible

$PM_{2.5}$ Concentrations

5.2.4 Table 11 details the $PM_{2.5}$ concentrations for the 2032 Opening/Future Year, for both the without development and with development scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 11: Predicted Unadjusted $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3

Receptor	Calculated Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact[a]
		Concentration	Percentage in Relation to AQAL		
ESR 1	8.02	8.03	<75%	<0.5%	**Negligible**
ESR 2	8.06	8.08	<75%	<0.5%	**Negligible**
ESR 3	8.15	8.16	<75%	<0.5%	**Negligible**
ESR 4	7.96	7.97	<75%	<0.5%	**Negligible**
ESR 5	8.33	8.34	<75%	<0.5%	**Negligible**
ESR 6	7.72	7.72	<75%	<0.5%	**Negligible**
ESR 7	7.83	7.83	<75%	<0.5%	**Negligible**
ESR 8	7.79	7.79	<75%	<0.5%	**Negligible**
ESR 9	8.14	8.14	<75%	<0.5%	**Negligible**
ESR 10	8.14	8.15	<75%	<0.5%	**Negligible**
ESR 11	7.95	7.95	<75%	<0.5%	**Negligible**
ESR 12	7.88	7.88	<75%	<0.5%	**Negligible**
ESR 13	8.05	8.05	<75%	<0.5%	**Negligible**
ESR 14	8.32	8.32	<75%	<0.5%	**Negligible**
ESR 15	8.15	8.15	<75%	<0.5%	**Negligible**

[a]Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible

5.2.5 The results of the assessment show that all predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations, in all scenarios considered, are below the relevant objectives and limit values.

Proposed Sensitive Receptors

5.2.6 Pollutant concentrations have been modelled for the proposed sensitive receptors for the Scenario 3 (2032 Opening/Future Year, with the development in place), as detailed in Table 12.

Table 12: Predicted Adjusted NO_2 and Unadjusted PM_{10} and $PM_{2.5}$ Concentrations at the Proposed Sensitive Receptors for Scenario 3

Proposed Sensitive Receptor	Calculated Annual Mean Concentrations (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
PSR 1	16.88	13.31	7.91
PSR 2	17.28	13.45	7.99

5.2.7 All predicted pollutant concentrations are below the relevant objectives/limit value, at all proposed sensitive receptors considered.

Assessment of Significance for Human Receptors

5.2.8 The significance of the overall effects of the proposed development has been assessed in accordance with the EPUK/IAQM guidance. This assessment is based on professional judgement and details of the assessor's experience is included in **Appendix D**.

5.2.9 The assessment of significance has taken into account a number of factors, including:

- Baseline NO_2, PM_{10} and $PM_{2.5}$ concentrations in the 2019 Base Year are below the annual mean objective at all fifteen existing receptors considered;
- Baseline NO_2, PM_{10} and $PM_{2.5}$ concentrations in the 2032 Opening/Future Year, without proposed development scenario are below the relevant annual mean objectives at all fifteen existing sensitive receptors considered;
- The EFT v11.0 assessment predicts a negligible impact on NO_2, PM_{10} and $PM_{2.5}$ concentrations at all fifteen existing sensitive receptors considered;
- Predicted pollutant concentrations within the proposed development site are below the relevant annual mean objectives and limit value at both proposed sensitive receptors considered in the EFT v11.0 assessment.

5.2.10 Based on the above factors, in accordance with the EPUK/IAQM guidance, the overall effect of the proposed development on human receptors is considered to be **not significant**.

6 CONCLUSIONS

6.1 Construction Phase Assessment

6.1.1 The construction phase assessment has been undertaken to determine the risk and significance of dust and fine particulate matter effects from earthworks, construction and trackout associated with the proposed development, in accordance with guidance published by the IAQM.

6.1.2 With site specific mitigation measures in place, the significance of dust and fine particulate matter effects from earthworks, construction and trackout is considered to be **not significant**.

6.2 Operational Phase Assessment

Existing Sensitive Receptors

6.2.1 An air quality assessment has been undertaken using EFT v11.0, to consider the potential impact of development generated vehicle trips on air quality at fifteen existing sensitive human receptors.

6.2.2 Pollutant concentrations in 2032, with the development in place, are below the relevant annual mean objectives and limit values at the receptors considered.

6.2.3 The assessment predicts that the development will have a negligible impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all fifteen existing sensitive receptors considered in 2032. Pollutant concentrations are predicted to be below the air quality objectives in all scenarios considered.

6.2.4 Predicted pollutant concentrations within the development site are below the relevant annual mean objectives and limit value at all proposed receptors considered in the assessment.

6.2.5 The effect of the proposed development on human receptors is therefore considered to be **not significant.**

Recommendations for Mitigation

6.3 The impact of the proposed development is predicted to be not significant. However, mitigation measures will assist in reducing any potential impact and general best

practice measures in relation to air quality could be implemented. These could include the implementation of a green travel plan and provision of electric vehicle charging points.

6.4 Summary

6.4.1 The assessment demonstrates that the proposed development will accord with national planning policy and will not lead to an unacceptable risk from air pollution. There are no material reasons in relation to air quality why the proposed scheme should not proceed, subject to appropriate planning conditions.

APPENDICES

Appendix A: Air Quality Legislation and Guidance

National Air Quality Strategy

A.1 The Environment Act 1995 requires the UK government to prepare a national Air Quality Strategy. The first UK strategy was published in March 1997, setting out policies for the management of ambient air quality. This was subsequently updated in 2007[1].

A.2 The 2007 strategy establishes the framework for air quality management in England, Scotland, Wales and Northern Ireland. Air quality standards and objectives are set out for eight pollutants which may potentially occur at levels that give cause for concern. The strategy also provides details of the role that local authorities are required to take in working towards improvements in air quality, known as the Local Air Quality Management (LAQM) regime.

Air Quality Standards and Objectives

A.3 Air quality standards and objectives are set out in the strategy for the following pollutants: nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), lead (Pb), fine particulate matter (PM_{10}), benzene (C_6H_6), 1, 3–butadiene (C_4H_6) and ozone (O_3).

A.4 Objectives for each pollutant, except O_3, were first given statutory status in the Air Quality Regulations 2000[2] and Air Quality (Amendment) Regulations 2002[3]. These objectives are defined in the strategy as:

"the maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, within a specified timescale."

A.5 EU limit values, set out within the Ambient Air Quality Directive 2008/50/EC[4] (i.e. the CAFE Directive), were transposed into UK legislation on 11th June 2011 as The Air Quality Standards Regulations 2010. These are mostly the same as the air quality objectives in terms of concentrations; however, there are differences in determining how compliance is achieved. Although the UK is no longer part of the EU, no changes

[1] Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007
[2] The Air Quality Regulations 2000. SI No 928
[3] The Air Quality (Amendment) Regulations 2002
[4] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

have yet been made to the objectives and limit values used in the management and assessment of air quality.

A.6 Whilst there is no specific objective for $PM_{2.5}$ in England and Wales, a limit value of 25µg/m^3 is referred to in the regulations, which has been adopted for use in this assessment (as recommended by the LAQM Helpdesk). An objective has been set for $PM_{2.5}$ in Scotland since early 2016.

A.7 Examples of where these objectives and limit values apply are detailed in the Defra LAQM Technical Guidance document LAQM.TG(16)[5] and are included in Table A1.

Table A1: Examples of Where the Air Quality Objectives Should Apply

Averaging Period	Objectives Should Apply at:	Objectives Should Generally Not Apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes, etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean and 8-hour mean	All locations where the annual mean objectives would apply, together with hotels. Gardens of residential properties[a]	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour objectives apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend one hour or longer	Kerbside sites where public would not be expected to have regular access
15-minute mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer	

[5] Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(16), February 2018

Table A1: Examples of Where the Air Quality Objectives Should Apply		
Averaging Period	**Objectives Should Apply at:**	**Objectives Should Generally Not Apply at:**
[a] Such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied		

Local Air Quality Management

A.8 LAQM legislation in the Environment Act 1995 requires local authorities to conduct the periodic review and assessments of air quality. These aim to identify all those areas where the objectives are being, or are likely to be, exceeded. Where exceedances are likely to occur, local authorities are required to declare an Air Quality Management Area (AQMA).

A.9 LAQM.TG (16) presents a streamlined approach for LAQM in England and Scotland; however, Wales and Northern Ireland are still considering changes to LAQM and therefore work according to the previous regimes.

A.10 The Welsh Government amended the LAQM regime in Wales in 2017 by issuing new statutory policy guidance in order to bring the system into line with the Well-being of Future Generations (Wales) Act 2015[6]. This aims to achieve compliance with the national air quality objectives in specific hotspots and to reduce exposure to pollution more widely, so as to achieve the greatest public health benefit.

A.11 Local authorities in England are required to produce Annual Status Reports (ASRs), and in Scotland and Wales, Annual Progress Reports (APRs). These replace all other reports which previously had to be submitted including Updating and Screening Assessments, Progress Reports and Detailed Assessments (which would be produced to assist with an AQMA declaration).

A.12 Local authorities now have the option of a fast track AQMA declaration option. This allows more expert judgement to be used and removes the need for a Detailed Assessment where a local authority is confident of the outcome. Detailed Assessments should however still be used if there is any doubt.

A.13 As part of the UK Government's requirement to improve air quality, selected local authorities in England are also currently investigating the feasibility of setting up

[6] Well-being of Future Generations (Wales) Act 2015 (anaw 2)

Clean Air Zones (CAZs). These are areas where targeted action and co-ordinated resources aim to improve air quality within an urban setting, in order to achieve compliance with the EU limit values within the shortest possible time.

A.14 The first CAZs were implemented in Bath in March 2021, and in Birmingham in June 2021. In addition, the London Ultra Low Emission Zone (ULEZ) was expanded to incorporate the North and South Circular roads in October 2021. Charges apply to certain types of vehicles travelling within these areas, including buses, coaches, taxis, private hire vehicles and heavy-duty vehicles (HDVs). The Greater Manchester CAZ, due to be introduced from 30 May 2022, has been delayed until July 2022, the same time the Newcastle-upon-Tyne CAZ will be introduced.

National Planning Policy Framework

A.15 The National Planning Policy Framework (NPPF)[7], introduced in March 2012 and most recently updated in July 2021, requires that:

"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 AQMAs and CAZs, 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 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 AQMAs and CAZs is consistent with the local air quality action plan."

Planning Practice Guidance

A.16 The Planning Practice Guidance (PPG)[8], updated in November 2019, states that whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate 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

[7] Ministry of Housing, Communities and Local Government, National Planning Policy Framework, July 2021
[8] Department for Communities and Local Government. Planning Practice Guidance: Air Quality, November 2019

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).

A.17 Where a proposed development is anticipated to give rise to concerns about air quality, an appropriate assessment needs to be carried out. Where the assessment concludes that the proposed development (including mitigation) will not lead to an unacceptable risk from air pollution, prevent sustained compliance with national objectives or fail to comply with the requirements of the Habitats Regulations, then the local authority should proceed to decision with appropriate planning conditions and/or obligations.

Appendix B: Methodology for Construction Phase Assessment

Institute of Air Quality Management Guidance

B.1 The methodology for the construction phase dust assessment is set out in guidance from the Institute of Air Quality Management (IAQM)[9].

Step 1

B.2 Step 1 is to screen the requirement for a more detailed assessment. The guidance states that an assessment will normally be required where there are existing sensitive human receptors within 350m of the site boundary and/or within 100m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

B.3 With regards to ecological receptors, the guidance states that an assessment will normally be required where there are existing receptors within 50m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

B.4 Where any of these criteria are met, it is necessary to proceed to Step 2.

Step 2

B.5 Step 2 determines the potential risk of dust arising in sufficient quantities to cause annoyance and/or health or ecological impacts. The risk is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc);
- The duration of these activities;
- The size of the site;
- The meteorological conditions (wind speed, direction and rainfall);
- The proximity of receptors to the activity;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of receptors to dust.

B.6 The risk of dust impacts is determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based upon the following two factors (known as Step 2A and Step 2B).

[9] Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, June 2016

B.7 **Step 2A** assesses the scale and nature of the works which determines the potential dust emission magnitude as small, medium or large. Examples of how the magnitude may be defined are included in Table B1.

Table B1: Determining the Dust Emission Magnitude of Construction Phase Activities

Activity	Dust Emission Class		
	Large	**Medium**	**Small**
Demolition	Total building volume >50,000m^3; Potentially dusty construction material (e.g. concrete); On-site crushing and screening; Demolition activities >20m above ground level	Total building volume 20,000-50,000m^3; Potentially dusty construction material; Demolition activities 10-20m above ground level	Total building volume <20,000m^3; Construction material with low potential for dust release (e.g. metal cladding or timber)
Earthworks	Total site area >10,000m^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 >8m in height; Total material moved >100,000 tonnes	Total site area 2,500-10,000m^2; Moderately dusty soil type (e.g. silt); 5-10 heavy earth moving vehicles active at any one time; Formation of bunds 4-8m in height; Total material moved 20,000-100,000 tonnes	Total site area <2,500m^2; Soil type with large grain size (e.g. sand); <5 heavy earth moving vehicles active at any one time; Formation of bunds <4m in height; Total material moved <20,000 tonnes; Earthworks during wetter months
Construction	Total building volume >100,000m^3; On-site concrete batching; Sandblasting	Total building volume 25,000-100,000m^3; Potentially dusty construction material (e.g. concrete); On-site batching	Total building volume <25,000m^3; Construction material with a low potential for dust release (e.g. metal cladding or timber)
Trackout	>50 HDV (>3.5t) outward movements[a] in any one day[b]; Potentially dusty surface material (e.g. high clay content); Unpaved road length >100m	10-50 HDV (>3,5t) outward movements[a] in any one day[b]; Moderately dusty surface material (e.g. high clay content); Unpaved road length 50-100m	<10 HDV (>3.5t) outward movements[a] in any one day[b]; Surface material with low potential for dust release; Unpaved road length <50m

a. A vehicle movement is a one way journey i.e. from A to B, and excludes the return journey
b. HDV movements during a construction project may vary over its lifetime, and the number of movements is the maximum not the average

B.8 **Step 2B** considers the sensitivity of the area to dust impacts which is defined as low, medium or high. The sensitivity categories for different types of receptors are described in Table B2.

Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects

Sensitivity Category	Dust Soiling Effects	Health effects of PM_{10}	Ecological Effects
High	Users can reasonably expect to enjoy a high level of amenity; Appearance, aesthetics or value of a property would be diminished; Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car show rooms	Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM_{10}; Examples include residential properties, hospitals, schools, and residential care homes	Locations with an international or national designation and the designated features may be affected by dust soiling; Locations where there is a community of a particularly dust sensitive species; Examples include a Special Area of Conservation with dust sensitive features
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; People or property wouldn't reasonably be expected to be continuously present or regularly for extended periods of time; Examples include parks and places of work	Locations where people are exposed as workers and exposure is over a period of time relevant to the air quality objective for PM_{10}; Examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}	Locations 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; Examples include a Site of Special Scientific Interest with dust sensitive features

Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects			
Sensitivity Category	**Dust Soiling Effects**	**Health effects of PM_{10}**	**Ecological Effects**
Low	Enjoyment of amenity would not reasonably be expected; Property would not be diminished in appearance, aesthetics or value; People or property would be expected to be present only for limited periods of time; Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads	Locations where human exposure is transient; Examples include public footpaths, playing fields, parks and shopping streets	Locations with a local designation where the features may be affected by dust deposition; Examples include a Local Nature Reserve with dust sensitive features

B.9 Based on the sensitivity of individual receptors, the overall sensitivity of the area to dust soiling, human health and ecological effects is then determined using the criteria detailed in Tables B3 to B5, respectively.

Table B3: Sensitivity of the Area to Dust Soiling Effects on People and Property[ab]					
Receptor Sensitivity	**Number of Receptors**	**Distance from Source (m)[c]**			
		<20m	**<50m**	**<100m**	**<350m**
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

a. The sensitivity to the area should be derived for each of the four activities
b. Estimate the total number of receptors within the stated distance. Only the highest level of sensitivity from the table needs to be considered
c. For trackout, distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur for up to 500m from large sites, 200m from medium sites and 50m from small sites, measured from the site exit. The impact declines with distance from the site and it is only necessary to consider trackout impacts up to 50m from the edge of the road

Table B4: Sensitivity of the Area to Human Health Impacts[ab]							
Receptor Sensitivity	**Annual Mean PM_{10} Concentration[c]**	**Number of Receptors[d]**	**Distance from Source (m)[e]**				
			<20m	**<50m**	**<100m**	**<200m**	**<350m**
High	>32µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

a. *The sensitivity to the area should be derived for each of the four activities*
b. Estimate the total number of receptors within the stated distance. Only the highest level of sensitivity from the table needs to be considered
c. Most straightforwardly taken from the national background maps, but should also take account of local sources. The values are based on 32µg/m^3 being the annual mean concentration at which an exceedance of the 24-hour mean objective is likely in England, Wales and Northern Ireland. In Scotland, there is an annual mean objective of 18µg/m^3
d. In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties
e. For trackout, distances should be measured from the side of the roads used by construction traffic

Table B5: Sensitivity of the Area to Ecological Impacts[ab]		
Receptor Sensitivity	**Distance from the Source (m)[c]**	
	<20	**<50**
High	High	Medium
Medium	Medium	Low
Low	Low	Low

a. *The sensitivity to the area should be derived for each of the four activities*
b. Only the highest level of sensitivity from the table needs to be considered
c. For trackout, distances should be measured from the side of the roads used by construction traffic

B.10 These two factors are combined in **Step 2C** to determine the risk of dust impacts with no mitigation applied.

B.11 The risk of dust effects is determined for four types of construction phase activities, with each activity being considered separately. If a construction phase activity is not taking place on the site, then it does not need to be assessed. The four types of activities to be considered are:

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

B.12 The risk of dust being generated by demolition activities at the site is determined using the criteria in Table B6.

Table B6: Risk of Dust Impacts for Demolition			
Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

B.13 The risk of dust being generated by earthworks and construction at the site is determined using the criteria in Table B7.

Table B7: Risk of Dust Impacts for Earthworks and Construction			
Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

B.14 The risk of dust being generated by trackout at the site is determined using the criteria in Table B8.

Table B8: Risk of Dust Impacts for Trackout			
Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Step 3

B.15 Step 3 of the assessment determines the site-specific mitigation required for each of the activities, based on the risk determined in Step 2. Mitigation measures are detailed in guidance published by the Greater London Authority[10], recommended for use outside the capital by LAQM guidance, and the IAQM guidance document itself. Professional judgement should be used to determine the type and scale of mitigation measures required.

B.16 If the risk is classed as negligible, no mitigation measures beyond those required by legislation will be necessary.

Step 4

B.17 Step 4 assesses the residual effect, with mitigation measures in place, to determine whether or not these are significant.

[11] Greater London Authority, The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance, 2006

Professional Judgement

B.18 The IAQM guidance makes reference to the use of professional judgement when assessing the risks of dust and fine particulate matter from demolition and construction sites. Details of the experience of the personnel involved with the project are provided in **Appendix D**.

Appendix C: Methodology for Operational Phase Assessment

Air Dispersion Modelling Inputs

C.1 The air dispersion model ADMS-Roads (CERC, Version 5.0.1) has been used to assess the potential air quality impacts associated with development-generated road traffic emissions. This dispersion model is widely used and accepted for the purpose of undertaking assessments to support both planning and Environmental Permit applications.

Traffic Flow Data

C.2 The ADMS-Roads model requires the input of detailed road traffic flow data for those routes which may be affected by the proposed development. Traffic flow data has been provided for this project by ADC Infrastructure, the appointed transport consultants for the project. The study extent of the model is shown in Figure C.1.

Figure C.1: Study Extent of Air Dispersion Model. The roads modelled in the assessment can be seen in blue (‘*Reproduced from Ordnance Survey Maps © Crown Copyright All Rights Reserved Licence No. 0100031673’)*

C.3 Average speed information was not provided, and so individual road speed limits have been applied to each road link. A reduction to 20kph has been applied to locations where congestion or the slowing down of vehicles would be expected.

C.4 The traffic flow data used in the air quality assessment is included in Table C1.

Committed Developments

C.5 The traffic data used within the assessment has incorporated the following committed developments:

- Land off Ashland Road West – outline application for up to 300 dwellings (application reference V/2020/0184), approved at appeal in December 2021 (reference APP/W3005/W/21/3274818);
- Hamilton Way – full application for an industrial unit, approved in March 2020 (application reference V/2019/0416); and
- Lindhurst – 1700 dwellings plus primary school, health centre, and commercial development (outline application 2010/0089/ST); reserved matters for Phase One infrastructure (2015/0045/ST); reserved matters for 95 dwellings (2016/0599/ST); reserved matters for 146 dwellings (reference 2017/0618/RES); reserved matters for 63 dwellings (2020/0435/RES); and reserved matters for Phase Two for 482 dwellings (2021/0489/RES to be determined).

Table C1: Traffic Data Used in Air Quality Assessment							
Link	**Link Name**	**Scenario 1: 2019 Base and Verification Year**		**Scenario 2: 2032 Opening/Future Year, With Development**		**Scenario 3: 2032 Opening/Future Year, Without Development**	
		LGV/hour	**HGV/hour**	**LGV/hour**	**HGV/hour**	**LGV/hour**	**HGV/hour**
1	Newark Road (east of site access)	783	18	881	21	921	21
2	Newark Road (west of site access)	783	18	881	21	908	21
3	Coxmoor Rd (north of Newark Rd)	877	16	988	19	1012	19
4	Coxmoor Rd (north of Hamilton Road)	451	8	508	9	517	9
5	Hamilton Rd (east of Coxmoor Road)	617	15	695	17	709	17
6	Coxmoor Road (south of Newark Rd)	500	11	563	12	579	12
7	A611 (south of Coxmoor Road)	789	24	888	27	893	27
8	A611 (south of B620)	730	33	822	37	826	37
9	A611 (south of A608)	1182	42	1331	47	1332	47
10	A608 (west of A611)	1556	61	1752	68	1754	68
11	Kirkby Folly Road (south of Newark Rd)	760	23	856	26	876	26
12	Low Moor Road (south of Penny Emma Way)	812	38	914	43	929	43
13	Penny Emma Way (west of Low Moor Road)	510	30	573	34	578	34
14	A38 (south of Penny Emma Way jct)	1256	91	1414	103	1417	103
15	A38 (north of Station Road)	1162	68	1309	76	1311	76
16	Station Road (east of A38)	298	16	335	17	340	17
17	A38 (south of Station Road)	1097	68	1235	76	1237	76
18	Station Road (west of A38)	492	12	554	13	554	13
19	Site Access Road	0	0	0	0	67	0

Vehicle Emission Factors

C.6 The air quality assessment has used vehicle emission factors calculated using the Emissions Factor Toolkit (EFT) version 11.0 released in November 2021. This is the most up-to-date version of the EFT currently available.

Meteorological Data

C.7 The meteorological data used in the air quality modelling has been obtained from ADM Limited and is from the Nottingham Meteorological Recording Station, covering the period between 1st January and 31st December 2019.

C.8 The Nottingham Meteorological Recording Station is located approximately 13.6 km south of the proposed development and is considered to be the most representative of the conditions at the proposed development, due to its relative location and similar altitude.

C.9 The 2019 wind rose for the Nottingham Meteorological Recording Station is shown in Figure C2.

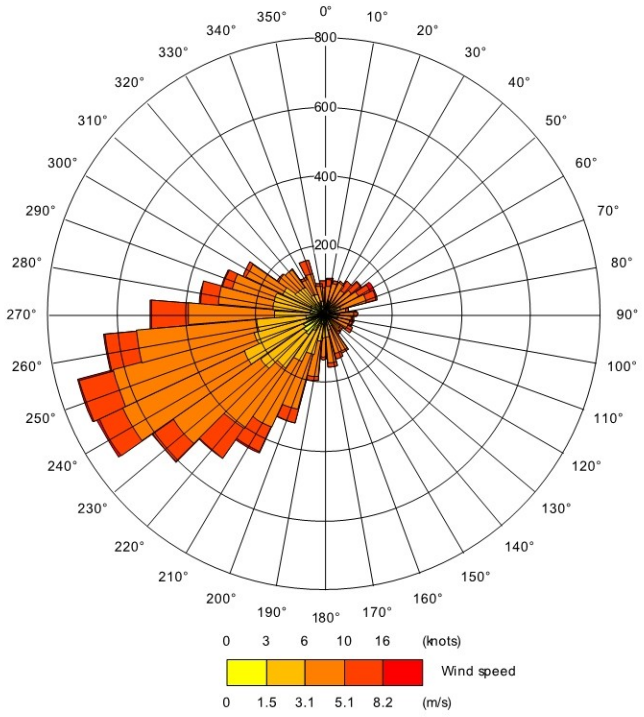


Figure C.2: 2019 Wind Rose for the Nottingham Meteorological Recording Station

Dispersion and Meteorological Site Characteristics

C.10 The characteristics for the dispersion site and meteorological site, included in the ADMS-Roads model, are detailed in Table C2.

Table C2: Dispersion and Meteorological Site Characteristics		
Setting	**Dispersion Site**	**Meteorological Site**
Surface Roughness	1.5m	0.005m
Surface Albedo	0.23	0.23
Minimum Monin-Obukhov Length	30m	1m
Priestley-Taylor Parameter	1	1

NO_x to NO_2 Conversion

C.11 In accordance with the guidance detailed within LAQM.TG (16), the ADMS-Roads model has been run to predict the road-contribution NO_x concentrations at each receptor location. These have then been converted to NO_2 concentrations using the Defra NO_x to NO_2 calculator[11].

Model Validation and Verification

C.12 LAQM.TG(16) refers to model validation as *"the general comparison of modelled results against monitoring data carried out by model developers"*. ADMS-Roads is widely accepted by regulatory authorities for use in this type of assessment.

C.13 Model verification is used to check the performance of the model at a local level. The verification of the ADMS-Roads air dispersion model is achieved by modelling concentration(s) at existing monitoring location(s) in the vicinity of the proposed development, and comparing the modelled concentration(s) with the measured concentration(s).

C.14 Following review of the 2020 Annual Status Report (ASR) for ADC, it is understood there is one roadside air quality monitoring location adjacent to roads with traffic data. This diffusion tube has therefore been used to verify the results of the model.

C.15 As no PM_{10} or $PM_{2.5}$ monitoring locations are situated along roads where traffic flow data is available, it has not been possible to carry out model verification for modelled PM_{10} or $PM_{2.5}$ concentrations.

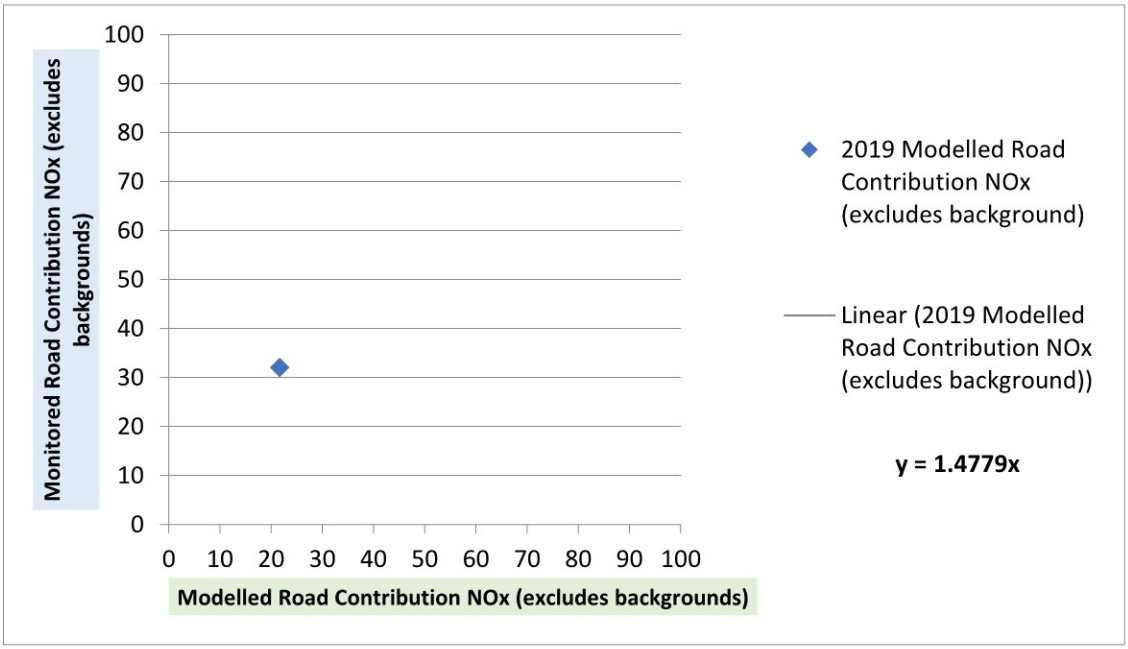
C.16 The monitoring data that has been used in the model verification procedure is detailed in Table C3.

[11] Defra Local Air Quality Management web pages (http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html)

Table C3: NO_2 Monitoring Data Used for Verification Purposes				
Monitoring Location Reference	Type	Approximate Grid Reference		2019 Bias Adjusted NO_2 Annual Average Concentration ($\mu g/m^3$)
		Easting	Northing	
Tube 22	Roadside Diffusion Tube	450259	358512	32.50

C.17 The modelled road-contribution NO_x concentrations for the diffusion tube has been compared against the measured road-contribution NO_x concentrations for the same locations. The measured concentration has been derived using the Defra NO_x to NO_2 calculator, taking into account the background NO_x concentration for the local area.

C.18 The comparison is shown in the graph below. The equation of the trend line is based on linear regression through zero, which provides an overall adjustment factor of 1.4779.



C.19 This adjustment factor has been applied to the modelled road-contribution NO_x concentrations. The total NO_2 concentration has been derived by combining the adjusted road-contribution NO_x concentration and background NO_2 concentration, using the Defra NO_x to NO_2 calculator.

C.20 A final comparison has been made between the total measured NO_2 concentration and total modelled NO_2 concentration, as shown in Table C4. Following adjustment, modelled concentrations are within 10% of measured concentrations.

Table C4: Comparison Between Measured and Monitored NO_2 Concentrations

Monitoring Location Reference	Measured Total NO_2 Concentration ($\mu g/m^3$)	Modelled Total NO_2 Concentration ($\mu g/m^3$)	Difference (%)
Tube 22	32.50	32.50	0.00

C.21 A Root Mean Square Error (RMSE) calculation has been undertaken as part of the model verification for NO_2 concentrations. This has been carried out for the monitoring locations included within the model verification, in accordance with the guidance detailed in LAQM.TG(16).

C.22 The RMSE calculation following adjustment is detailed in Table C5.

Table C5: RMSE Calculation for NO_2 Concentrations

Diffusion Tube Location	After Verification			
	Observed Value	Predicted Value	Difference	RMSE
Tube 22	32.50	32.50	0.00	**0.00**

C.23 LAQM.TG(16) states that *"ideally an RMSE value within 10% of the objective would be derived"*, a value of within 25% is considered acceptable.The results of the calculation show that following model verification, the RMSE value is within 10% (i.e. 4$\mu g/m^3$) of the objective (i.e. 40$\mu g/m^3$). Therefore, the model is considered to be performing to an acceptable standard.

Assessment Criteria

Assessing the Impact of a Proposed Development on Human Receptors

C.24 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM[12] with relation to the assessment of the air quality impacts of proposed developments and their significance.

C.25 The impact of a development is usually assessed at specific receptors, and considers both the long-term background concentrations, in relation to the relevant Air Quality Assessment Level (AQAL) at these receptors, and the change with the development in place.

C.26 The impact descriptors for individual receptors are detailed in Table C3.

Table C3: Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year*	Percentage Change in Concentration Relative to Air Quality Assessment Level (AQAL)*			
	1%	2-5%	6-10%	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

**Percentage pollutant concentrations have been rounded to whole numbers, to make it easier to assess the impact. Changes of 0% (i.e. less than 0.5% or 0.2µg/m^3) should be described as Negligible*

Determining the Significance of Effects

C.27 Impacts on air quality, whether adverse or beneficial, will have an effect on human receptors that can be judged as either 'significant' or 'not significant'.

C.28 Once the impact of the proposed development has been assessed for the individual impacts, the overall significance is determined using professional judgement. This takes into account a number of factors such as:

[12] Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

- The existing and future air quality in the absence of the development;
- The extent of the current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

Appendix D: Professional Experience of Assessors

D.1 The assessment of air quality impacts, and the significance of the associated effects, takes into account the professional judgement of the assessor. Details of the experience of the personnel involved with the project are provided below:

Rachael Stiles **Senior Environmental Scientist (Air Quality)**

BSc (Hons), MSc

The air quality assessment has been carried out by Rachael Stiles, Senior Air Quality Consultant at Wardell Armstrong. Rachael joined Wardell Armstrong in October 2021 but started her career as an air quality consultant in April 2018, after completing a BSc Physical Geography at Newcastle University and MSc in Sustainability (Environmental Consultancy and Project Management) at the University of Leeds.

Rachael has worked on a variety of transportation infrastructure projects and has developed technical experience in air quality monitoring, detailed air quality assessments using dispersion modelling software such as ADMS roads, as well as construction dust assessments to support planning assessments (including extensive experience in Environmental Impact Assessments).

Mark Dawson

BSc (Hons) MA (Env Law) Dip (Air Pollution Control), Dip (Acoustics & Noise Control) CEnv MIEnvSc MIOA MIAQM FRMetS

Technical Director – Service Lead Acoustics and Air Quality

Mark holds a Bachelor of Science degree in Geography, the Diploma in Air Pollution Control, the Diploma in Acoustics and Noise Control and Masters degree in Environmental Law and Policy. Mark is a Chartered Environmentalist and Member of the Institute of Environmental Sciences, Institute of Acoustics, Institute of Air Quality Management and Fellow of the Royal Meteorological Society.

Mark has over 30 years' experience in regulation and consultancy. Having given evidence to over forty planning inquiries, Mark is experienced in putting forward persuasive technical arguments in plain English. Mark is the service lead for acoustics and air quality at Wardell Armstrong.

He has extensive experience of managing commissions involving environmental impact assessment. He is involved in noise and air quality impact studies for mineral and waste operations and for residential, commercial, industrial and retail development. The majority of the work is carried out in support of planning applications and Mark has long experience of dealing with environmental health officers and planning officers.

DRAWINGS

KEY

- Site Boundary
- Existing Sensitive Receptors
- Proposed Sensitive Receptors

Notes:

Boundaries are indicative.

Aerial imagery shown for context purposes only.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

HALLAM LAND MANAGEMENT LIMITED

PROJECT

NEWARK ROAD

DRAWING TITLE

AIR QUALITY RECEPTOR LOCATION PLAN

DRG No.	REV
ST19319-003	A

DRG SIZE	SCALE	DATE
A3	1:17,500	22/06/2022

DRAWN BY	CHECKED BY	APPROVED BY
EF	RS	MW

wardell armstrong

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