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GLADMAN DEVELOPMENTS LTD

LAND AT GROVE HOUSE, SELLINDGE

AIR QUALITY ASSESSMENT

OCTOBER 2023

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LAND AT GROVE HOUSE, SELLINDGE

AIR QUALITY ASSESSMENT

OCTOBER 2023

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APPENDICES

DRAWINGS	TITLE	SCALE
GM11858-001	Existing and Proposed Sensitive Receptor Locations	1:13,000

EXECUTIVE SUMMARY

A detailed air quality assessment of the potential impacts associated with a proposed residential development off Ashford Road, Sellindge (known as Land at Grove House) has been undertaken. From the information provided, it is our understanding that the proposals are for the construction of 55 residential dwellings with associated infrastructure.

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

During the construction phase, the risk of dust soiling effects is classed as medium for earthworks, construction, and trackout; the risk of human health effects is classed as low for earthworks, construction and trackout. Mitigation measures have been proposed to further reduce any potential impacts based on best practice guidance.

For the operational phase assessment, annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations have been modelled at 25 existing sensitive receptor locations and two proposed sensitive receptor locations, using the most recent Emission Factor Toolkit available from DEFRA (EFT v11.0). Predicted annual mean concentrations have been compared to the relevant air quality objectives and target level.

The operational phase assessment has concluded 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 2031 Opening/Future Year. The impact of the development is predicted to be negligible at all 25 existing sensitive receptors that were assessed. Air quality effects are therefore considered to be 'not significant'.

The assessment has demonstrated 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 by Gladman Developments Ltd, to undertake an air quality assessment to accompany a proposed development at Land off Ashford Road, Sellindge, known as Land at Grove House.

1.1.2 The proposed development site is located to the west of Sellindge and currently comprises open land. An existing residential dwelling known as Grove House is located in the eastern part of the site, which is excluded from the application boundary. To the north of the site lies the A20 Ashford Road, with the Dukes Head public house beyond. To the east, the site is bordered by Bulls Lane with residential dwellings beyond. To the south, the site is bordered by open land, with the M20 motorway and Ashford to Folkestone high speed railway line approximately 300m beyond. To the west of the site is open land, with existing commercial/agricultural premises beyond.

1.1.3 From the information provided, it is our understanding that the proposals are for the construction of 55 residential dwellings with associated infrastructure.

1.1.4 This report details the results of the air quality assessment undertaken to accompany a planning application for the proposed development. The report discusses the potential dust and fine particulate matter impacts associated with the construction phase, and an assessment of the potential air quality impacts of the additional road traffic generated by the proposed development.

1.1.5 Air pollutant concentrations are considered at 25 existing sensitive receptor locations in the vicinity of the proposed development, and also at two proposed receptor locations within the development site itself.

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:

- The Environment Act 1995, amended in 2021;
- 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(22), August 2022;
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework, July 2021;
- Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, August 2023;
- Department for Communities and Local Government, Planning Practice Guidance: Air Quality, November 2019; and
- The Kent and Medway Air Quality Partnership Air Quality Planning Guidance, December 2015

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

Table 1: Air Quality Objectives and Limit Values Relevant to the Assessment*			
Pollutant	**Objective/Limit Value**	**Averaging Period**	**Obligation**
Particulate Matter ($PM_{2.5}$)	Limit Value of 20µg/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 Consultation and Scope of Assessment

3.1.1 The assessment methodology was sent to Wai Tse, Environmental Protection Specialist at Folkestone and Hythe District Council (FHDC), via email correspondence, on the 24th July 2023.

3.1.2 Mr Tse confirmed that the proposed approach is acceptable on 11th August 2023 and requested that 2022 is used as the assessment base year.

3.1.3 A summary of the consultation undertaken is provided in Table 2.

Table 2: Summary of Consultation

Assessment Stage	Proposed Method	Response
Construction phase assessment to consider dust and fine particulate matter (PM_{10})	Qualitative assessment in accordance with Institute of Air Quality Management (IAQM) guidance	No objection to method
Operational phase assessment to consider nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$)	Detailed assessment using the ADMS-Roads atmospheric dispersion model, in accordance with Environmental Protection UK (EPUK)/IAQM guidance, and with all predicted concentrations compared to air quality objectives/limit values	
	2022 meteorological data from the Langdon Bay Meteorological Recording Station	
	Background concentrations from 2018 -based DEFRA default maps	
	Assessment undertaken using EFT v11.0 emission factors	
	Model verification using roadside diffusion tube DT7	
	A Damage Cost Calculation to be undertaken as per Folkestone & Hythe District Council Air Quality Technical Guidance	

3.2 Construction Phase Assessment

3.2.1 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**.

3.2.2 The closest sensitive human receptors to where construction phase activities will take place are detailed in Table 3. However, it should be noted that the assessment includes consideration of all sensitive receptors within 250m of the site boundary, in accordance with IAQM guidance.

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

Receptor	Direction from the Site	Approximate Distance from the Site Boundary (m)
Existing residential buildings along Ashford Road	Northwest and north	<20m at closest point
Grove House - existing residential dwelling to be retained	East	<20m at closest point
Existing residential buildings along Colemans Row/Herringate Farm Close/Potten Close	East	<20m at closest point
Existing commercial/industrial/residential buildings along Main Road and Ashford Road	West	80m at closest point

3.2.3 There are no ecological receptors, or potentially dust sensitive statutory designated habitat sites, within 50m of the site and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 200m from the site entrance(s). Ecological effects do not therefore need to be considered within this assessment.

3.2.4 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**.

3.3 Operational Phase Assessment

3.3.1 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 assessment. The impacts have been assessed in accordance with guidance from

[1] Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction (v2.1), August 2023

Environmental Protection UK (EPUK) and the IAQM[2]. Further details of the modelling and assessment methodology are provided in **Appendix C**.

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

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

- **Scenario 1:** 2022 Verification and Base Year, the most recent year for which traffic flow information, local monitored pollution data and meteorological data is available;
- **Scenario 2:** 2031 Opening/Future Year, without the proposed development in place but including committed developments;
- **Scenario 3:** 2031 Opening/Future Year, with the proposed development in place and including committed developments; and
- **Scenario 4:** 2031 Opening/Future Year, with the proposed development and the proposed Potten Farm development in place and including committed developments.

3.3.4 Scenario 4 contains the traffic movements with the proposed Potten Farm development, which is a proposed development comprised of 105 dwellings.

3.3.5 Ashley Helme Associates, the appointed transport consultant for the scheme, have confirmed that the Opening/Future Year scenarios above include the following committed developments:

Y14/0873/SH Land adjacent to the surgery, Main Road - this development is largely built out and occupied – traffic flows are adjusted to account for completion;

Y16/1122/SH Land near the Rhodes House, Main Road; and

Y19/0257/FH Otterpool Park - This development comprises a new Garden Town. The traffic assessment does not consider all traffic from that development and instead, the approach taken has been to estimate the level of traffic that will be generated by that site in 2031 (i.e. the Opening Year).

[2] Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2019

Existing Sensitive Receptors

3.3.6 A number of representative existing sensitive receptors (ESRs; identified as ESR 1 to ESR 25) 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.

3.3.7 Details of these receptors considered are provided in Table 4, and their locations are shown on drawing GM2932-001.

Table 4: Existing Sensitive Receptors Considered in Operational Phase Assessment

Receptor	Address	Grid Reference		Receptor Type
		Easting	Northing	
ESR 1	A20 Ashford Road, Sellindge	609987	138302	Residential
ESR 2	A20 Ashford Road, Sellindge	609961	138310	Residential
ESR 3	A20 Ashford Road, Sellindge	609866	138315	Residential
ESR 4	A20 Ashford Road, Sellindge	609715	138363	Residential
ESR 5	A20 Ashford Road, Sellindge	609681	138377	Residential
ESR 6	Sellindge Primary School, A20 Ashford Road	610282	138190	School
ESR 7	A20 Ashford Road, Sellindge	610035	138223	Residential
ESR 8	A20 Ashford Road, Sellindge	610131	138269	Residential
ESR 9	A20 Ashford Road, Sellindge	610333	138159	Residential
ESR 10	Swan Lane, Sellindge	610520	138036	Residential
ESR 11	Swan Lane, Sellindge	610529	138048	Residential
ESR 12	Swan Lane, Sellindge	610562	138119	Residential
ESR 13	Swan Lane, Sellindge	610664	138213	Residential
ESR 14	A20 Ashford Road, Sellindge	610519	138004	Residential
ESR 15	The Cygnets, Sellindge	610500	137985	Residential
ESR 16	A20 Ashford Road, Sellindge	610571	137981	Residential
ESR 17	A20 Ashford Road, Sellindge	610586	137962	Residential

Table 4: Existing Sensitive Receptors Considered in Operational Phase Assessment				
Receptor	Address	Grid Reference		Receptor Type
		Easting	Northing	
ESR 18	A20 Barrow Hill, Sellindge	610731	137617	Residential
ESR 19	A20 Barrow Hill, Sellindge	610728	137566	Residential
ESR 20	A20 Barrow Hill, Sellindge	610847	137189	Residential
ESR 21	A20 Barrow Hill, Sellindge	610859	137113	Residential
ESR 22	A20 Ashford Road, Sellindge	611033	136778	Residential
ESR 23	B2067 Otterpool Lane	611012	136533	Residential
ESR 24	A20 Ashford Road, Sellindge	611565	136659	Residential
ESR 25	A20 Ashford Road, Sellindge	611874	136638	Residential

3.3.8 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

3.3.9 A number of proposed sensitive receptors (referred to as PSR 1 to PSR 2) have been selected within the development site boundary. These receptors are considered to be representative of the proposed residential areas which will be closest to the main existing sources of pollution, as well as one receptor located in the centre of the site, away from any major roads (i.e. main sources of emissions). In this case, the main sources of emissions are considered to be vehicle emissions from Ashford Road and the Site Access Road.

3.3.10 Pollutant concentrations at the proposed receptors have been predicted for scenario 3 only (as detailed in paragraph 3.3.3). 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.

3.3.11 Details of the proposed sensitive receptors are provided in Table 5, and their locations are shown on drawing GM12932-001.

Table 5: Proposed Sensitive Receptors Considered in the Operational Phase Assessment			
Receptor Point	Location	Grid Reference	
		Easting	Northing
PSR 1	Representative of a residential dwelling situated along the A20	609936	138288
PSR 2	Representative of a residential dwelling situated along site entrance road	609876	138178

3.3.12 The predicted concentrations at the proposed receptors have been assessed against the air quality objectives and limit values detailed in Table 1.

3.4 Limitations and Uncertainties

3.4.1 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 over the past few years has shown that annual mean NO_2 concentrations 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.

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

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

[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

3.4.4 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].

3.4.5 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.

3.4.6 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**.

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

- Consultation has been undertaken with FHDC to confirm their agreement with the methodology used within the assessment;
- Detailed traffic data has been obtained from the appointed transport consultant;
- The latest Defra LAQM tools have been incorporated into the assessment following their release in November 2021;
- Meteorological data, obtained from Langdon Bay Meteorological Recording Station, has been incorporated into the assessment;
- Road widths and the location of ESRs in relation to each road have been measured in detail to ensure greater accuracy within the model; 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)

- One nearby Council-operated diffusion tube monitoring location (REF: DT7) has been considered within the assessment to allow model verification to take place. A model verification factor has been applied to NO_x concentrations, 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.

4 BASELINE SITUATION

4.1 Folkestone and Hythe District Council Local Air Quality Management

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

4.1.2 There are currently no AQMAs declared within the jurisdiction of FHDC, therefore, the site is not located in a known area of poor air quality.

4.1.3 The nearest FHDC monitoring location is DT7, which is approximately 3.4km from the site. This location monitored an annual mean NO_2 concentration of 14.9µg/m³ in 2022 and has been used in the model verification process.

4.2 Background Air Pollutant Concentrations

4.2.1 The air quality assessment needs to take into account background concentrations. As there are currently no representative background NO_2, PM_{10} or $PM_{2.5}$ monitoring locations in the vicinity of the proposed development site, background concentrations have been obtained from the 2018-based Defra default concentration maps for the appropriate grid square[7].

4.2.2 As the background maps are only provided for 2018-2030, 2030 background concentrations have been used for the 2031 Opening/Future Year.

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

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

Pollutant	Annual Mean Concentrations (µg/m³)			
	NOx *	NO_2*	PM_{10}*	$PM_{2.5}$*
2022 Base Year				
ESR 1 – 5 (609500, 138500)	11.85	9.12	14.42	8.94
ESR 6 – ESR 14 (610500, 138500)	10.68	8.26	14.27	8.79
ESR 15 – ESR 21 (610500, 137500)	9.28	7.23	16.64	9.72

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

ESR 22 – ESR 25 (611500, 136500)	10.34	8.01	13.28	8.36
2031 Opening/Future Year (2030 Concentrations Used)				
ESR 1 – 5; PSR 1 – PSR 2 (609500, 138500)	9.11	7.11	14.00	8.59
ESR 6 – ESR 14; PSR 1 (610500, 138500)	8.55	6.70	13.84	8.44
ESR 15 – ESR 21 (610500, 137500)	7.79	6.13	16.21	9.38
ESR 22 – ESR 25 (611500, 136500)	8.42	6.60	12.86	8.02

4.3 Modelled Baseline Concentrations at Existing Sensitive Receptors

4.3.1 The baseline assessment (i.e. scenarios 1 and 2) has been carried out for the existing sensitive receptors considered, in accordance with Defra guidance (i.e. using EFT v11.0). The adjusted NO_2 and unadjusted PM_{10} and $PM_{2.5}$ concentrations are detailed in Table 7.

Table 7: Predicted Adjusted NO_2 and Unadjusted 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: 2022 Base Year			Scenario 2: 2031 Opening/Future Year, Without Development but including committed developments		
	NO_2*	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
ESR 1	11.19	14.75	9.13	8.35	14.45	8.86
ESR 2	10.17	14.60	9.04	7.68	14.22	8.72
ESR 3	10.98	14.79	9.15	8.04	14.42	8.83
ESR 4	10.49	14.63	9.06	7.77	14.23	8.73
ESR 5	10.63	14.66	9.08	7.84	14.25	8.74
ESR 6	10.06	14.54	8.95	7.70	14.19	8.65
ESR 7	9.11	14.39	8.86	7.11	13.98	8.53
ESR 8	9.84	14.51	8.93	7.61	14.16	8.63

Table 7: Predicted Adjusted NO_2 and Unadjusted 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: 2022 Base Year			**Scenario 2: 2031 Opening/Future Year, Without Development but including committed developments**		
	NO_2*	**PM_{10}**	**$PM_{2.5}$**	**NO_2**	**PM_{10}**	**$PM_{2.5}$**
ESR 9	10.65	14.63	9.01	7.86	14.24	8.68
ESR 10	12.17	14.93	9.17	8.46	14.52	8.83
ESR 11	11.60	14.79	9.10	8.19	14.37	8.75
ESR 12	10.17	14.59	8.98	7.54	14.16	8.63
ESR 13	9.87	14.55	8.95	7.40	14.12	8.60
ESR 14	10.77	14.70	9.04	7.81	14.28	8.70
ESR 15	9.12	16.92	9.90	6.95	16.51	9.56
ESR 16	10.30	17.19	10.05	7.48	16.79	9.71
ESR 17	9.53	17.02	9.95	7.13	16.61	9.61
ESR 18	10.65	17.13	10.03	7.64	16.72	9.68
ESR 19	9.36	16.95	9.91	7.17	16.57	9.59
ESR 20	8.51	16.83	9.84	6.82	16.46	9.53
ESR 21	8.74	16.87	9.86	6.96	16.51	9.55
ESR 22	10.69	13.59	8.55	8.11	13.23	8.24
ESR 23	8.79	13.40	8.43	6.97	12.99	8.10
ESR 24	10.09	13.59	8.54	7.56	13.19	8.22
ESR 25	11.53	13.81	8.68	6.92	12.97	8.09
**NO_2 concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO_2 calculator[8] in accordance with LAQM.TG(22)*						

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

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

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 the proposed development are demolition earthworks, construction and trackout.

5.1.2 There are no demolition activities proposed, and so no further consideration is required.

5.1.3 Earthworks covers the processes of soil-stripping, ground-levelling, excavation and landscaping. Construction activities will focus on the proposed buildings, access roads 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 and human health effects.

5.1.7 For earthworks and construction, there are between 10 and 100 residential receptor locations within 20m of where these activities may take place.

5.1.8 For trackout, there are between 10 and 100 residential receptor locations within 20m of where trackout may occur, for a distance of up to 200m from the site access.

Step 2C

5.1.9 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.

5.1.10 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

5.1.11 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	Medium[a]	Medium[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	High
Sensitivity of Area to Human Health Effects	N/A	Low[d]	Low[d]	Low[d]
Step 2C				
Dust Risk: Dust Soiling	N/A	Medium Risk	Medium Risk	Medium Risk
Dust Risk: Human Health	N/A	Low Risk	Low Risk	Low Risk

a. Total site area estimated to be between 18,000m^2 and 110,000m^2

b. Total building volume estimated to be between 12,000m^3 and 75,000m^3

c. Number of construction phase vehicles estimated to be between 20 and 50 movements per day

Table 8: Construction Phase Dust Assessment for Human Receptors				
	Activity			
	Demolition	Earthworks	Construction	Trackout
d. Background annual mean PM_{10} concentration is taken from the LAQM Defra default concentration maps, for the appropriate grid square for 2023				

Step 3 – Mitigation

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

5.1.13 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

5.1.14 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-vegetate 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;
- 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;
- Avoidance of activities that generate large amounts of dust during windy conditions;
- 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;
- Avoid dry sweeping of large areas;

- 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;
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- Minimisation of vehicle movements and limitation of vehicle speeds – the slower the vehicle speeds, the lower the dust generation;
- Ensure 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.

5.1.15 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 log book and made available to FHDC on request.

5.1.16 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

5.1.17 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.

5.1.18 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 particulate matter to be generated and any residual impact should be **not significant**.

5.2 Operational Phase Assessment

Existing Sensitive Human Receptors

Impact Assessment - Proposed Development

5.2.1 The impact assessment has been carried out for the representative existing sensitive receptors considered (i.e. ESR 1 to ESR 25) using EFT v11.0.

5.2.2 Table 9 details the predicted NO_2 concentrations for the 2031 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 – Using the Emission Factor Toolkit 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	8.35	8.38	<75%	<0.5%	**Negligible**
ESR 2	7.68	7.69	<75%	<0.5%	**Negligible**
ESR 3	8.04	8.06	<75%	<0.5%	**Negligible**
ESR 4	7.77	7.78	<75%	<0.5%	**Negligible**
ESR 5	7.84	7.85	<75%	<0.5%	**Negligible**
ESR 6	7.70	7.72	<75%	<0.5%	**Negligible**
ESR 7	7.11	7.11	<75%	<0.5%	**Negligible**
ESR 8	7.61	7.62	<75%	<0.5%	**Negligible**
ESR 9	7.86	7.88	<75%	<0.5%	**Negligible**
ESR 10	8.46	8.55	<75%	<0.5%	**Negligible**
ESR 11	8.19	8.23	<75%	<0.5%	**Negligible**
ESR 12	7.54	7.55	<75%	<0.5%	**Negligible**
ESR 13	7.40	7.41	<75%	<0.5%	**Negligible**
ESR 14	7.81	7.87	<75%	<0.5%	**Negligible**
ESR 15	6.95	6.98	<75%	<0.5%	**Negligible**
ESR 16	7.48	7.58	<75%	<0.5%	**Negligible**
ESR 17	7.13	7.18	<75%	<0.5%	**Negligible**
ESR 18	7.64	7.79	<75%	<0.5%	**Negligible**
ESR 19	7.17	7.20	<75%	<0.5%	**Negligible**
ESR 20	6.82	6.83	<75%	<0.5%	**Negligible**

Table 9: Predicted Adjusted NO_2 Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean NO_2 Concentrations (µg/m³)[a]**				
	Without Development	**With Development**		**Concentration Change as Percentage of AQAL**	**Impact[b]**
		Concentration	**Percentage in Relation to AQAL**		
ESR 21	6.96	6.97	<75%	<0.5%	**Negligible**
ESR 22	8.11	8.13	<75%	<0.5%	**Negligible**
ESR 23	6.97	6.97	<75%	<0.5%	**Negligible**
ESR 24	7.56	7.58	<75%	<0.5%	**Negligible**
ESR 25	6.92	6.93	<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(22)
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

5.2.3 Table 10 details the PM_{10} concentrations for the 2031 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 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean PM_{10} Concentrations (µg/m³)**				
	Without Development	**With Development**		**Concentration Change as Percentage of AQAL**	**Impact[a]**
		Concentration	**Percentage in Relation to AQAL**		
ESR 1	14.45	14.46	<75%	<0.5%	**Negligible**
ESR 2	14.22	14.22	<75%	<0.5%	**Negligible**
ESR 3	14.42	14.43	<75%	<0.5%	**Negligible**
ESR 4	14.23	14.23	<75%	<0.5%	**Negligible**
ESR 5	14.25	14.26	<75%	<0.5%	**Negligible**
ESR 6	14.19	14.19	<75%	<0.5%	**Negligible**
ESR 7	13.98	13.98	<75%	<0.5%	**Negligible**
ESR 8	14.16	14.16	<75%	<0.5%	**Negligible**

Table 10: Predicted Unadjusted PM_{10} Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0

Receptor	Calculated Annual Mean PM_{10} Concentrations ($\mu g/m^3$)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact[a]
		Concentration	Percentage in Relation to AQAL		
ESR 9	14.24	14.25	<75%	<0.5%	**Negligible**
ESR 10	14.52	14.56	<75%	<0.5%	**Negligible**
ESR 11	14.37	14.39	<75%	<0.5%	**Negligible**
ESR 12	14.16	14.17	<75%	<0.5%	**Negligible**
ESR 13	14.12	14.12	<75%	<0.5%	**Negligible**
ESR 14	14.28	14.31	<75%	<0.5%	**Negligible**
ESR 15	16.51	16.52	<75%	<0.5%	**Negligible**
ESR 16	16.79	16.84	<75%	<0.5%	**Negligible**
ESR 17	16.61	16.63	<75%	<0.5%	**Negligible**
ESR 18	16.72	16.77	<75%	<0.5%	**Negligible**
ESR 19	16.57	16.58	<75%	<0.5%	**Negligible**
ESR 20	16.46	16.46	<75%	<0.5%	**Negligible**
ESR 21	16.51	16.51	<75%	<0.5%	**Negligible**
ESR 22	13.23	13.23	<75%	<0.5%	**Negligible**
ESR 23	12.99	12.99	<75%	<0.5%	**Negligible**
ESR 24	13.19	13.20	<75%	<0.5%	**Negligible**
ESR 25	12.97	12.97	<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

5.2.4 Table 11 details the $PM_{2.5}$ concentrations for the 2031 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 – Using the Emission Factor Toolkit v11.0

Receptor	Calculated Annual Mean $PM_{2.5}$ Concentrations (µg/m³)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact[a]
		Concentration	Percentage in Relation to AQAL		
ESR 1	8.86	8.87	<75%	<0.5%	**Negligible**
ESR 2	8.72	8.73	<75%	<0.5%	**Negligible**
ESR 3	8.83	8.84	<75%	<0.5%	**Negligible**
ESR 4	8.73	8.73	<75%	<0.5%	**Negligible**
ESR 5	8.74	8.75	<75%	<0.5%	**Negligible**
ESR 6	8.65	8.66	<75%	<0.5%	**Negligible**
ESR 7	8.53	8.53	<75%	<0.5%	**Negligible**
ESR 8	8.63	8.64	<75%	<0.5%	**Negligible**
ESR 9	8.68	8.69	<75%	<0.5%	**Negligible**
ESR 10	8.83	8.86	<75%	<0.5%	**Negligible**
ESR 11	8.75	8.76	<75%	<0.5%	**Negligible**
ESR 12	8.63	8.63	<75%	<0.5%	**Negligible**
ESR 13	8.60	8.61	<75%	<0.5%	**Negligible**
ESR 14	8.70	8.72	<75%	<0.5%	**Negligible**
ESR 15	9.56	9.56	<75%	<0.5%	**Negligible**
ESR 16	9.71	9.74	<75%	<0.5%	**Negligible**
ESR 17	9.61	9.63	<75%	<0.5%	**Negligible**
ESR 18	9.68	9.72	<75%	<0.5%	**Negligible**
ESR 19	9.59	9.60	<75%	<0.5%	**Negligible**
ESR 20	9.53	9.53	<75%	<0.5%	**Negligible**
ESR 21	9.55	9.56	<75%	<0.5%	**Negligible**
ESR 22	8.24	8.25	<75%	<0.5%	**Negligible**
ESR 23	8.10	8.10	<75%	<0.5%	**Negligible**
ESR 24	8.22	8.22	<75%	<0.5%	**Negligible**
ESR 25	8.09	8.09	<75%	<0.5%	**Negligible**

Table 11: Predicted Unadjusted $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean $PM_{2.5}$ Concentrations (µg/m³)**				
	Without Development	**With Development**		**Concentration Change as Percentage of AQAL**	**Impact[a]**
		Concentration	**Percentage in Relation to AQAL**		
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 in the 2031 Opening/Future Year 'With Development' scenario, all modelled pollutant concentrations are predicted to remain below the relevant annual mean objectives and limit values at the existing sensitive receptors considered. In accordance with the EPUK/IAQM guidance, all impacts as a result of the development are classed as negligible.

Proposed Sensitive Human Receptors

5.2.6 Pollutant concentrations have been modelled for proposed receptors for the 2031 Opening/Future Year 'With Development' scenario, in accordance with Defra guidance (i.e. using EFT v11.0), as detailed in Table 12.

Table 12: Predicted Adjusted NO_2, and Unadjusted PM_{10} and $PM_{2.5}$ Concentrations at Proposed Sensitive Receptors for Scenario 3 – Using Emission Factor Toolkit v11.0			
Proposed Sensitive Receptor	**Calculated Annual Mean Concentrations (µg/m³)**		
	NO_2	**PM_{10}**	**$PM_{2.5}$**
PSR 1	7.35	14.11	8.51
PSR 2	7.49	14.13	8.68

5.2.7 The results of the assessment show that the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations, in the 2031 Opening/Future Year 'With Development' scenario, are below the relevant objectives and limit values at the proposed sensitive receptor locations.

Impact Assessment - Proposed Development + Potten Farm Development

5.2.8 The impact assessment has been carried out for the representative existing sensitive receptors considered (i.e. ESR 1 to ESR 25) using EFT v11.0.

5.2.9 Table 13 details the predicted NO_2 concentrations for the 2031 Opening/Future Year, for both the 'Without Development' and 'With Development + Potten Farm 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 13: Predicted Adjusted NO_2 Concentrations at Existing Sensitive Receptors for Scenarios 2 and 4 – Using the Emission Factor Toolkit 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	8.35	8.41	<75%	<0.5%	**Negligible**
ESR 2	7.68	7.71	<75%	<0.5%	**Negligible**
ESR 3	8.04	8.10	<75%	<0.5%	**Negligible**
ESR 4	7.77	7.80	<75%	<0.5%	**Negligible**
ESR 5	7.84	7.87	<75%	<0.5%	**Negligible**
ESR 6	7.70	7.74	<75%	<0.5%	**Negligible**
ESR 7	7.11	7.12	<75%	<0.5%	**Negligible**
ESR 8	7.61	7.64	<75%	<0.5%	**Negligible**
ESR 9	7.86	7.91	<75%	<0.5%	**Negligible**
ESR 10	8.46	8.58	<75%	<0.5%	**Negligible**
ESR 11	8.19	8.26	<75%	<0.5%	**Negligible**
ESR 12	7.54	7.56	<75%	<0.5%	**Negligible**
ESR 13	7.40	7.42	<75%	<0.5%	**Negligible**
ESR 14	7.81	7.89	<75%	<0.5%	**Negligible**
ESR 15	6.95	6.98	<75%	<0.5%	**Negligible**
ESR 16	7.48	7.61	<75%	<0.5%	**Negligible**
ESR 17	7.13	7.20	<75%	<0.5%	**Negligible**
ESR 18	7.64	7.82	<75%	<0.5%	**Negligible**
ESR 19	7.17	7.22	<75%	<0.5%	**Negligible**
ESR 20	6.82	6.85	<75%	<0.5%	**Negligible**
ESR 21	6.96	7.00	<75%	<0.5%	**Negligible**

Table 13: Predicted Adjusted NO_2 Concentrations at Existing Sensitive Receptors for Scenarios 2 and 4 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean NO_2 Concentrations (µg/m³)[a]**				
	Without Development	**With Development**		**Concentration Change as Percentage of AQAL**	**Impact[b]**
		Concentration	**Percentage in Relation to AQAL**		
ESR 22	8.11	8.17	<75%	<0.5%	**Negligible**
ESR 23	6.97	6.98	<75%	<0.5%	**Negligible**
ESR 24	7.56	7.60	<75%	<0.5%	**Negligible**
ESR 25	6.92	6.94	<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(22)
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

5.2.10 Table 14 details the PM_{10} concentrations for the 2031 Opening/Future Year, for both the 'Without Development' and 'With Development + Potten Farm Development' scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 14: Predicted Unadjusted PM_{10} Concentrations at Existing Sensitive Receptors for Scenarios 2 and 4 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean PM_{10} Concentrations (µg/m³)**				
	Without Development	**With Development**		**Concentration Change as Percentage of AQAL**	**Impact[a]**
		Concentration	**Percentage in Relation to AQAL**		
ESR 1	14.45	14.47	<75%	<0.5%	**Negligible**
ESR 2	14.22	14.23	<75%	<0.5%	**Negligible**
ESR 3	14.42	14.45	<75%	<0.5%	**Negligible**
ESR 4	14.23	14.24	<75%	<0.5%	**Negligible**
ESR 5	14.25	14.26	<75%	<0.5%	**Negligible**
ESR 6	14.19	14.20	<75%	<0.5%	**Negligible**
ESR 7	13.98	13.98	<75%	<0.5%	**Negligible**
ESR 8	14.16	14.17	<75%	<0.5%	**Negligible**

Table 14: Predicted Unadjusted PM_{10} Concentrations at Existing Sensitive Receptors for Scenarios 2 and 4 – Using the Emission Factor Toolkit v11.0

Receptor	Calculated Annual Mean PM_{10} Concentrations ($\mu g/m^3$)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact[a]
		Concentration	Percentage in Relation to AQAL		
ESR 9	14.24	14.26	<75%	<0.5%	**Negligible**
ESR 10	14.52	14.58	<75%	<0.5%	**Negligible**
ESR 11	14.37	14.40	<75%	<0.5%	**Negligible**
ESR 12	14.16	14.17	<75%	<0.5%	**Negligible**
ESR 13	14.12	14.13	<75%	<0.5%	**Negligible**
ESR 14	14.28	14.32	<75%	<0.5%	**Negligible**
ESR 15	16.51	16.52	<75%	<0.5%	**Negligible**
ESR 16	16.79	16.85	<75%	<0.5%	**Negligible**
ESR 17	16.61	16.64	<75%	<0.5%	**Negligible**
ESR 18	16.72	16.78	<75%	<0.5%	**Negligible**
ESR 19	16.57	16.59	<75%	<0.5%	**Negligible**
ESR 20	16.46	16.47	<75%	<0.5%	**Negligible**
ESR 21	16.51	16.52	<75%	<0.5%	**Negligible**
ESR 22	13.23	13.24	<75%	<0.5%	**Negligible**
ESR 23	12.99	13.00	<75%	<0.5%	**Negligible**
ESR 24	13.19	13.21	<75%	<0.5%	**Negligible**
ESR 25	12.97	12.98	<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

5.2.11 Table 15 details the $PM_{2.5}$ concentrations for the 2031 Opening/Future Year, for both the 'Without Development' and 'With Development + Potten Farm Development' scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 15: Predicted Unadjusted $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 4 – Using the Emission Factor Toolkit v11.0

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	8.86	8.87	<75%	<0.5%	**Negligible**
ESR 2	8.72	8.73	<75%	<0.5%	**Negligible**
ESR 3	8.83	8.85	<75%	<0.5%	**Negligible**
ESR 4	8.73	8.74	<75%	<0.5%	**Negligible**
ESR 5	8.74	8.75	<75%	<0.5%	**Negligible**
ESR 6	8.65	8.66	<75%	<0.5%	**Negligible**
ESR 7	8.53	8.53	<75%	<0.5%	**Negligible**
ESR 8	8.63	8.64	<75%	<0.5%	**Negligible**
ESR 9	8.68	8.69	<75%	<0.5%	**Negligible**
ESR 10	8.83	8.86	<75%	<0.5%	**Negligible**
ESR 11	8.75	8.77	<75%	<0.5%	**Negligible**
ESR 12	8.63	8.63	<75%	<0.5%	**Negligible**
ESR 13	8.60	8.61	<75%	<0.5%	**Negligible**
ESR 14	8.70	8.72	<75%	<0.5%	**Negligible**
ESR 15	9.56	9.56	<75%	<0.5%	**Negligible**
ESR 16	9.71	9.75	<75%	<0.5%	**Negligible**
ESR 17	9.61	9.63	<75%	<0.5%	**Negligible**
ESR 18	9.68	9.72	<75%	<0.5%	**Negligible**
ESR 19	9.59	9.60	<75%	<0.5%	**Negligible**
ESR 20	9.53	9.53	<75%	<0.5%	**Negligible**
ESR 21	9.55	9.56	<75%	<0.5%	**Negligible**
ESR 22	8.24	8.25	<75%	<0.5%	**Negligible**
ESR 23	8.10	8.10	<75%	<0.5%	**Negligible**
ESR 24	8.22	8.22	<75%	<0.5%	**Negligible**
ESR 25	8.09	8.09	<75%	<0.5%	**Negligible**

Table 15: Predicted Unadjusted $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 4 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean $PM_{2.5}$ Concentrations (µg/m³)**				
	Without Development	**With Development**		**Concentration Change as Percentage of AQAL**	**Impact[a]**
		Concentration	**Percentage in Relation to AQAL**		
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					

5.2.12 The results of the assessment show that in the 2031 Opening/Future Year 'With Development + Potten Farm Development' scenario, all modelled pollutant concentrations are predicted to remain below the relevant annual mean objectives and limit values at the existing sensitive receptors considered. In accordance with the EPUK/IAQM guidance, all impacts as a result of the development are classed as **negligible**.

Proposed Sensitive Human Receptors

5.2.13 Pollutant concentrations have been modelled for proposed receptors for the 2031 Opening/Future Year 'With Development + Potten Farm Development' scenario, in accordance with Defra guidance (i.e. using EFT v11.0), as detailed in Table 16.

Table 16: Predicted Adjusted NO_2, and Unadjusted PM_{10} and $PM_{2.5}$ Concentrations at Proposed Sensitive Receptors for Scenario 3 – Using Emission Factor Toolkit v11.0			
Proposed Sensitive Receptor	**Calculated Annual Mean Concentrations (µg/m³)**		
	NO_2	**PM_{10}**	**$PM_{2.5}$**
PSR 1	7.78	14.28	8.75
PSR 2	7.50	14.13	8.67

5.2.14 The results of the assessment show that the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations, in the 2031 Opening/Future Year 'With Development + Potten Farm' scenario, are below the relevant objectives and limit values at the proposed sensitive receptor locations.

Assessment of Significance for Human Receptors

5.2.15 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**.

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

- Baseline pollutant concentrations in 2022 and 2031 are below the relevant annual mean objectives and limit values at all existing receptors considered;
- The assessment predicts a negligible impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all existing sensitive receptors considered, with the development in place;
- The assessment predicts a negligible impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all existing sensitive receptors considered, with the development and the Potten Farm development in place;
- NO_2, PM_{10} and $PM_{2.5}$ concentrations within the proposed development site are predicted to be below the relevant objectives and limit values, with the development in place; and
- NO_2, PM_{10} and $PM_{2.5}$ concentrations within the proposed development site are predicted to be below the relevant objectives and limit values, with the development and the Potten Farm development in place.

5.2.17 Based on the above factors, in accordance with the EPUK/IAQM guidance, the air quality effect of the proposed development is considered to be **not significant**.

Damage Cost Calculation and Recommendations for Mitigation

5.2.18 In accordance with the Kent and Medway Air Quality Partnership Planning Guidance[9], an air pollution damage cost assessment has been carried out.

5.2.19 The damage cost assessment provides a basis for quantifying a financial commitment required to offset potential development-generated emissions and is suggested for use within the IAQM/EPUK guidance. The air pollution damage cost assessment utilises the current DEFRA Emission Factor Toolkit (version 11.0),

[9] The Kent and Medway Air Quality Partnership Air Quality Planning Guidance, December 2015

available on the Defra website[10], to estimate the annual link emissions associated with the additional development generated vehicles over a 5-year period.

5.2.20 The damage cost calculation has been undertaken using the most recent guidance available from Defra[11] (March 2023), which includes updated damage cost values for both NO_X and $PM_{2.5}$ (as well a $PM_{2.5}$ damage cost to PM_{10} damage cost conversion factor). The total number of trips in a 24-hour period, generated by the proposed development, is included within the damage cost assessment to determine the transport related emissions. The damage cost calculation uses central damage cost values provided by Defra and applies these to the Opening Year (2031) of the proposed development. Full operation of the development is assumed in the Opening Year.

5.2.21 Consultation has been undertaken with Ashley Helme Associates, the appointed Transport Consultants for the scheme. The total trip generation for the proposed development in a 24-hour period is 325 vehicles with 1.7% HGVs.

5.2.22 The average trip length is assumed to be 10km and the average speed is 50kph. The calculation was undertaken for both NO_x PM_{10} emissions, as these are the pollutants identified in the Kent and Medway Air Quality Partnership Planning Guidance.

5.2.23 Table 12 of the Defra guidance gives a road transport sector central damage cost (2022 price) of £11,682/tonne for NO_x. Table 10 of the Defra guidance gives a road transport sector central damage cost (2022 price) of £84,548/tonne for $PM_{2.5}$. The $PM_{2.5}/PM_{10}$ conversion factor is provided as 0.622, which means that the road transport sector central damage cost (2022 price) PM_{10} is £52,589/tonne.

5.2.24 The EFT output (tonnes/annum) for each of the five assessed years is detailed in Table 17.

5.2.25 It should be noted that EFT v11.0 used in the emission mitigation assessment is able to accurately predict future pollutant concentrations up to 2030. Later years (2030-2050) should only be used for climate change assessments in accordance with advice from Defra. Therefore, as the Opening Year considered in the assessment is

[10] Defra Local Air Quality Management website, available at http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

[11] Defra Air Quality Appraisal: Damage Cost Guidance, available at https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance

2031, 2030 emission factors have been applied across all 5 years. This represents a robust approach.

Table 17: EFT Output (tonnes/annum)		
Year	**NO_x**	**PM_{10}**
2031 (2030 emission factors)	121.88648	38.66284
2032 (2030 emission factors)	121.88648	38.66284
2033 (2030 emission factors)	121.88648	38.66284
2034 (2030 emission factors)	121.88648	38.66284
2035 (2030 emission factors)	121.88648	38.66284

5.2.26 The emissions from Table 17 are then multiplied by the uplifted estimated sector costs. Table 18 details the road transport sector central cost for each assessed year, beginning with the estimated development Opening Year of 2031.

Table 18: Calculated Cost for Each Year (£)		
Year	**NO_x**	**PM_{10}**
2031	1423.88	2033.23
2032	1423.88	2033.23
2033	1423.88	2033.23
2034	1423.88	2033.23
2035	1423.88	2033.23

5.2.27 The total damage cost of both NO_x and PM_{10} for the proposed development over a five-year period is £17,286. The input data into the EFT for the damage cost calculation can be seen in Figure 1.

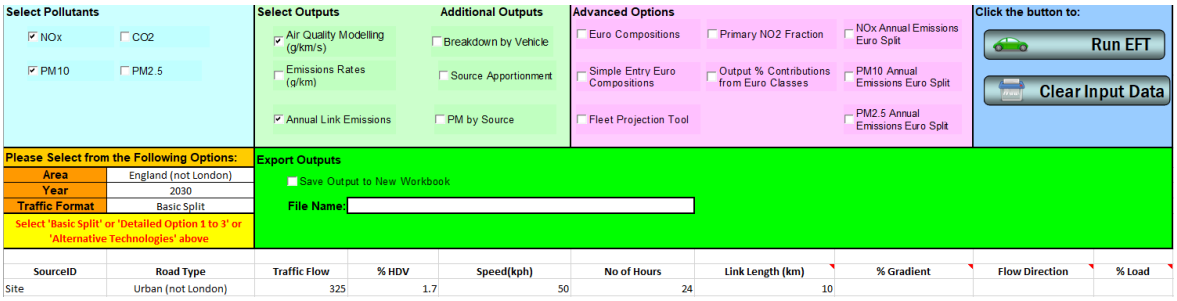


Figure 1: Damage Cost Calculation Inputs

Recommendations for Mitigation

5.2.28 The impact of the proposed development is predicted to be not significant for human receptors. However, mitigation measures will assist in reducing any potential impact and general best practice measures in relation to air quality could be implemented. The Kent and Medway Air Quality Partnership Planning Guidance stipulates these should include electric vehicle (EV) charging points and low NO_x boilers as a minimum. The development will therefore include:

- All gas fired boilers to meet a minimum standard of <40mgNO_x/kWh; and
- One active Electric Vehicle charging point per dwelling with dedicated parking.

5.2.29 In addition to this commitment, the result of the damage cost calculation shows the total damage cost of both NO_x and PM_{10} emissions for the proposed development over a five-year period is £17,286, based on a projected total new vehicle trip generation of 325 vehicles (expressed as AADT), with 1.7% HGVs. The Kent and Medway Air Quality Partnership Planning Guidance document suggests that the value determined by the damage cost calculation (£17,286) should be utilised on additional mitigation measures equivalent to this value. The mitigation measures should be agreed by Folkestone and Hythe District Council (FHDC) and should focus on mitigating elevations in NO_x and PM_{10} concentrations. Mitigation measures could include:

- The provision of a green travel plan;
- A car club provision within the development;
- Support given to local car club/EV car clubs; or
- A bike/e-bike hire scheme within the development.

6 CONCLUSIONS

6.1 Construction Phase

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 effects from earthworks, construction and trackout is considered to be **not significant**.

6.2 Operational Phase

Existing Sensitive Receptors

6.2.1 An air quality assessment has been undertaken to consider the potential impact of development generated vehicles on air quality at 25 existing sensitive human receptors.

6.2.2 The assessment has been undertaken in accordance with Defra guidance, by using the latest vehicle emission factors from EFT v11.0.

6.2.3 Pollutant concentrations in 2031, with the development in place, are below the relevant annual mean objectives and limit values at the receptors considered.

6.2.4 The assessment predicts that the development will have a negligible impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all 25 existing sensitive receptors considered in 2031. The effect of the proposed development on human receptors is therefore considered to be **not significant.**

Proposed Sensitive Receptors

6.2.5 The assessment has also predicted pollutant concentrations at two proposed receptors within the development site.

6.2.6 Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the annual mean air quality objective and limit value concentrations, for 2031, at the proposed sensitive receptors considered. Air quality effects within the site are, therefore, considered to be **not significant**.

Recommendations for Mitigation

6.2.7 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.

6.2.8 The Kent and Medway Air Quality Partnership Planning Guidance requires that an emissions mitigation (damage cost) assessment is undertaken for the proposed development. The damage cost calculation has used the central damage cost values for road transport which have been applied to the 2031 Opening Year of the proposed development onwards, for a total of five years, in accordance with Defra guidance.

6.2.9 Mitigation measures will include the provision of one EV charging point per dwelling with on plot parking and low NO_x boilers throughout the proposed development. The value obtained from the emissions mitigation assessment (£17,286) will be used to further mitigate elevations in NO_x and PM_{10} concentrations, as a result of development-generated traffic. Additional mitigation measures may include a green travel plan, a car club provision within the development or support given to local car club/EV car clubs or a bike/e-bike hire scheme. This is in accordance with the Kent and Medway Air Quality Partnership Planning Guidance.

6.3 Summary

6.3.1 The assessment has demonstrated that the proposed development will not lead to an unacceptable risk from air pollution, nor will it lead to any breach of national objectives as required by national policy. There are no material reasons in relation to air quality why the proposed scheme should not proceed.

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 20µg/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. The Environment Act 2021 sets out a requirement to establish a target objective for $PM_{2.5}$, however it is not known what this objective will be or when it will come into force.

A.7 Examples of where these objectives and limit values apply are detailed in the Defra LAQM Technical Guidance document LAQM.TG(22)[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

[5] Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(22), August 2022

Table A1: Examples of Where the Air Quality Objectives Should Apply		
Averaging Period	**Objectives Should Apply at:**	**Objectives Should Generally Not Apply at:**
15-minute mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer	
[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(22) presents a streamlined approach for LAQM in England and Scotland; however, Northern Ireland is still considering changes to LAQM and therefore works according to the previous regime.

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.

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

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 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. The Bristol CAZ became live in November 2022. The Newcastle-upon-Tyne and Gateshead CAZ became live in January 2023. The Sheffield CAZ became live in February 2023. 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 and is currently under review.

National Planning Policy Framework

A.15 The National Planning Policy Framework (NPPF)[7], introduced in March 2012 and most recently updated in September 2023, 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

[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

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 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 50m of the route(s) used by construction vehicles on the public highway, up to 250m 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 250m 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 (v2.1), August 2023

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 >75,000m^3; Potentially dusty construction material (e.g. concrete); On-site crushing and screening; Demolition activities >12m above ground level	Total building volume 12,000-75,000m^3; Potentially dusty construction material; Demolition activities 6-12m above ground level	Total building volume <12,000m^3; Construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6m above ground, demolition during wetter months
Earthworks	Total site area >110,000m^2; 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 >6m in height;	Total site area 18,000-110,000m^2; Moderately dusty soil type (e.g. silt); 5-10 heavy earth moving vehicles active at any one time; Formation of bunds 3-6m in height;	Total site area <18,000m^2; Soil type with large grain size (e.g. sand); <5 heavy earth moving vehicles active at any one time; Formation of bunds <4m in height;
Construction	Total building volume >75,000m^3; On-site concrete batching; Sandblasting	Total building volume 12,000-75,000m^3; Potentially dusty construction material (e.g. concrete); On-site concrete batching	Total building volume <12,000m^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	20-50 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	<20 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
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;	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

Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects			
Sensitivity Category	**Dust Soiling Effects**	**Health effects of PM_{10}**	**Ecological Effects**
	Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads		

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

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**
	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: Supplementary Planning Guidance, 2014

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 Ashley Helme Associates, the appointed transport consultants for the project. The study extent of the model is shown in Figure C.1.

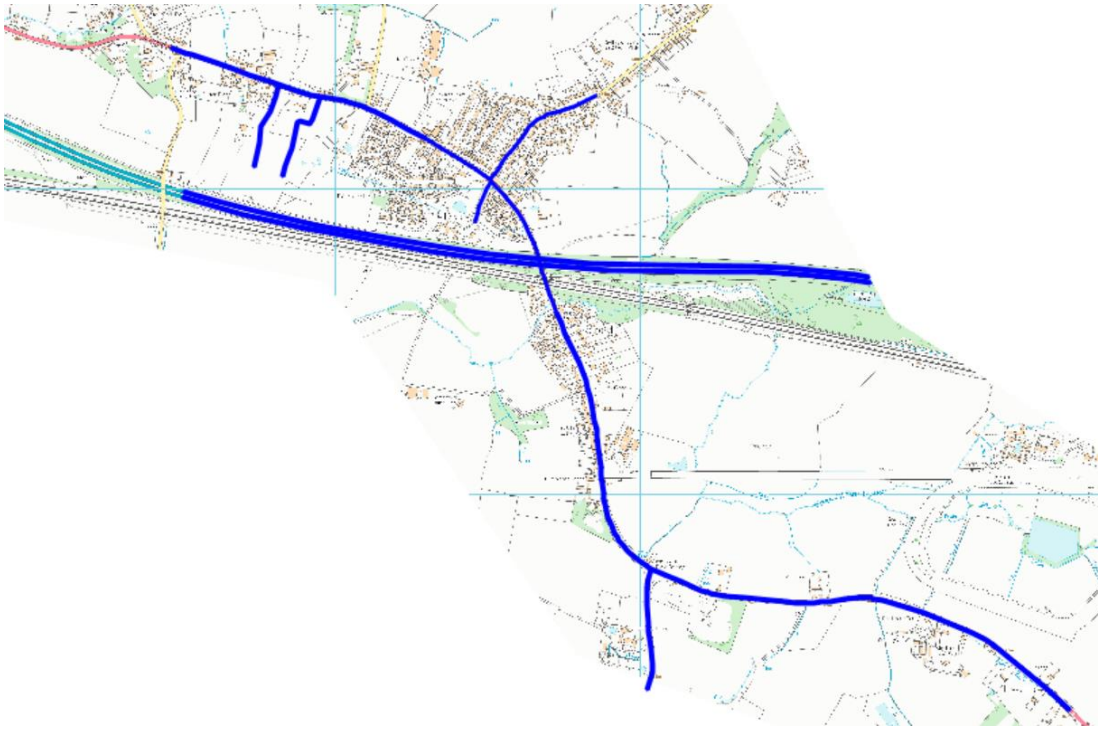


Figure C.1: Study Extent of Air Dispersion Model. The roads modelled in the assessment can be seen in blue (‘*Reproduced from Ordnance Survey Maps © Crown Copyright All Rights Reserved Licence No. 0100031673’)*

C.3 Data has been provided as 24-hour Annual Average Daily Traffic (AADT) flows, with heavy duty vehicle (HDV) percentages. No average speed information was available and therefore speed limits have been used, with a reduction to 20kph in locations where congestion or the slowing down of vehicles would be expected.

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

Table C1: 24-hour AADT traffic data used in the assessment

Link	Link Name	Scenario 1: 2022 Verification and Base Year		Scenario 2: 2031 Opening/Future Year, Without Development		Scenario 3: 2031 Opening/Future Year, With Development		Scenario 4: 2031 Opening/Future Year, With Development and Potten Farm Development	
		LDV	HDV	LDV	HDV	LDV	HDV	LDV	HDV
1	A20 Ashford Road (E)	6834	315	8214	361	8411	370	8399	387
2	Site Access	0	0	0	0	325	6	925	16
3	A20 Ashford Road (W)	6834	315	8214	361	8341	367	8204	378
4	A20 Ashford Road (E)	5034	232	8214	361	8341	367	8204	378
5	Site Access	0	0	0	0	0	0	0	0
6	A20 Ashford Road (W)	5034	232	8214	361	8341	367	8204	378
7	Swan Lane	3555	140	3770	143	3793	144	3691	146
8	A20 Ashford Road (E)	7492	386	9383	460	9558	468	9403	485
9	Unnamed Road	97	4	102	4	102	4	98	4
10	A20 Ashford Road (W)	8419	387	10317	454	10514	463	10410	479

Table C1: 24-hour AADT traffic data used in the assessment									
Link	**Link Name**	**Scenario 1: 2022 Verification and Base Year**		**Scenario 2: 2031 Opening/Future Year, Without Development**		**Scenario 3: 2031 Opening/Future Year, With Development**		**Scenario 4: 2031 Opening/Future Year, With Development and Potten Farm Development**	
		LDV	**HDV**	**LDV**	**HDV**	**LDV**	**HDV**	**LDV**	**HDV**
11	A20 Ashford Road (E)	8111	582	10160	681	10286	689	9818	705
12	B2067 Otterpool Lane	5356	582	6994	685	7043	690	6437	699
13	A20 Ashford Road (W)	6770	364	9735	496	9909	505	9718	522
14	A20 Ashford Road (N) - only used in Scenario 1 for verification	13848	994	N/A	N/A	N/A	N/A	N/A	N/A
15	A261 Hythe Road - only used in Scenario 1 for verification	4989	290	N/A	N/A	N/A	N/A	N/A	N/A
16	Stone Street - only used in Scenario 1 for verification	4974	76	N/A	N/A	N/A	N/A	N/A	N/A
17	A20 Ashford Road (W) - only used in Scenario 1 for verification	9499	781	N/A	N/A	N/A	N/A	N/A	N/A
18	M20 (south of Sellindge)	38282	13035	54776	13913	54776	13913	40863	13913

Vehicle Emission Factors

C.5 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.

C.6 As discussed in the section 3.4 of the report, in accordance with the latest guidance from the IAQM, a sensitivity analysis has not been undertaken as model verification has been undertaken using data from later than 2016[11].

C.7 As a result, vehicle emission factors from EFT v11.0 have been used for the assessment, with the appropriate year factors applied to the modelling scenarios.

Meteorological Data

C.8 The meteorological data used in the air quality modelling has been obtained from ADM Limited and is from the Langdon Bay Meteorological Recording Station, covering the period between 1st January and 31st December 2022.

C.9 The Langdon Bay Meteorological Recording Station is located approximately 25km east 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.10 The 2022 wind rose for the Langdon Bay Meteorological Recording Station is shown in Figure C2.

[11] 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)

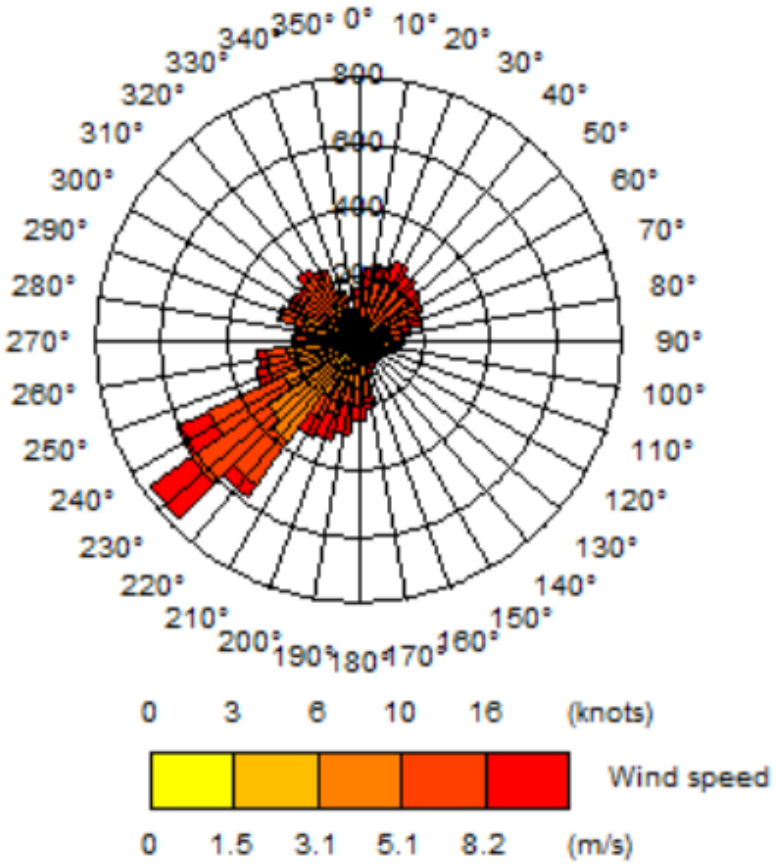


Figure C.2: 2022 Wind Rose for the Langdon Bay Meteorological Recording Station

Dispersion and Meteorological Site Characteristics

C.11 The characteristics for the dispersion site and meteorological sites, 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	0.3m	0.02m
Surface Albedo	0.23	0.23
Minimum Monin-Obukhov Length	30m	1m
Priestley-Taylor Parameter	1	1

NO_x to NO_2 Conversion

C.12 In accordance with the guidance within LAQM.TG(22), the ADMS-Roads model has been run to predict the road-contribution NO_x concentrations for each receptor location. These have then been converted to NO_2 concentrations using the Defra NO_x to NO_2 calculator[12].

Model Validation and Verification

C.13 LAQM.TG(22) 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.14 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.15 Following review of the 2022 Annual Status Report (ASR) for FHDC, it is understood there is one roadside air quality monitoring location in close proximity to the proposed development site (REF: DT7). Therefore, this diffusion tube have been used to verify the results of the model.

C.16 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.17 The monitoring data that has been used in the model verification procedure is detailed in Table C3.

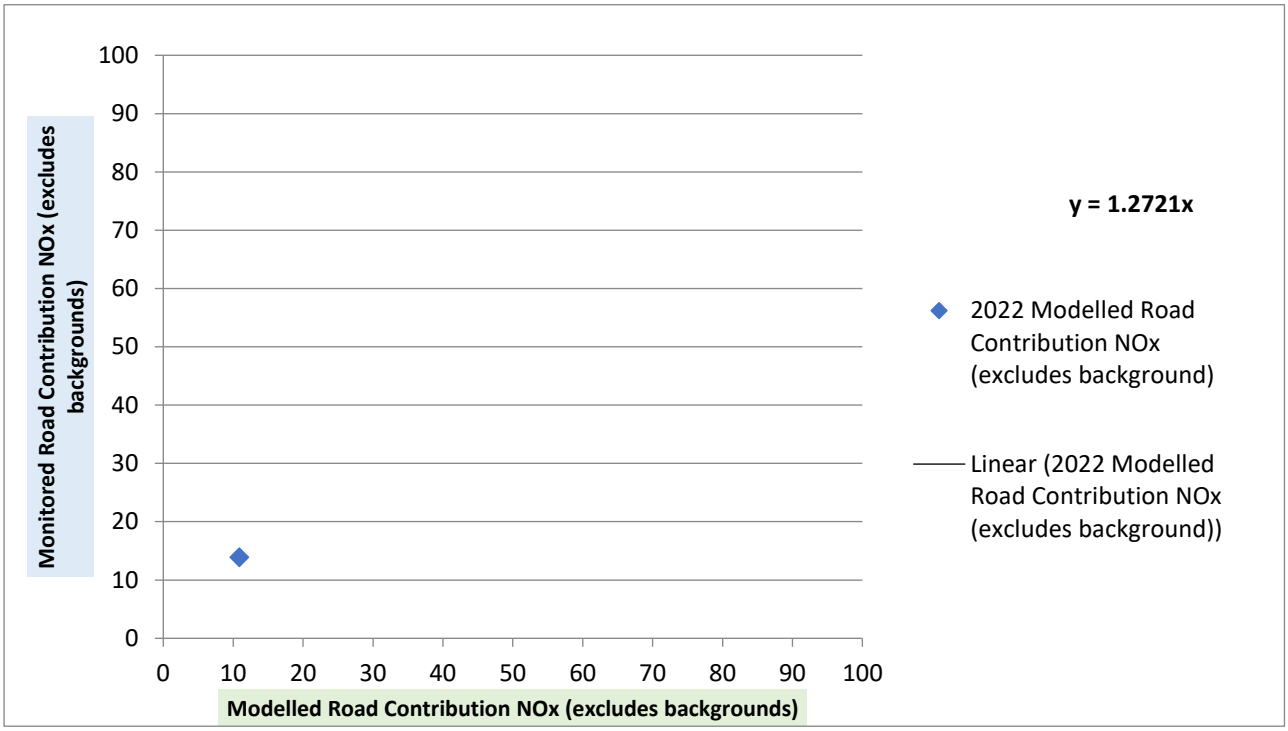
Table C3: NO_2 Monitoring Data Used for Verification Purposes

Monitoring Location Reference	Type	Approximate Grid Reference		2022 Bias Adjusted NO_2 Annual Average Concentration (µg/m³)
		Easting	Northing	
DT7	Roadside diffusion tube	622396	622396	15.9

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

C.18 The modelled road-contribution NO_x concentration for the diffusion tube has been compared against the measured road-contribution NO_x concentration for the same location. The measured concentrations have been derived using the Defra NO_x to NO_2 calculator, taking into account the background NO_x concentration for the local area.

C.19 The comparison is shown in the below graph. The equation of the trend line is based on linear regression through zero, which provides an overall adjustment factor of 1.2721.



C.20 This adjustment factor has been applied to the modelled road-contribution NO_x concentrations. The total NO_2 concentrations have 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.21 A final comparison has been made between the total measured NO_2 concentrations and total modelled NO_2 concentrations, 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 (%)**
DT7	15.9	15.9	0.0

C.22 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 location included within the model verification, in accordance with the guidance detailed in LAQM.TG(22).

C.23 The RMSE calculation following adjustment is detailed in Table C5.

Table C5: RMSE Calculation for Nitrogen Dioxide Concentrations				
Monitoring Location Reference	**After Verification**			
	Measured Total NO_2 Concentration ($\mu g/m^3$)	**Modelled Total NO_2 Concentration ($\mu g/m^3$)**	**Difference (%)**	**RMSE**
DT8	15.9	15.9	0.0%	**0.00**

C.24 LAQM.TG(22) states that *"ideally an RMSE value within 10% of the objective would be derived"*, although 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. 4µg/m^3) of the objective (i.e. 40µg/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.25 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM[13] with relation to the assessment of the air quality impacts of proposed developments and their significance.

C.26 The impact of a development is usually assessed at specific receptors, and takes into account 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.27 The impact descriptors for individual receptors are detailed in Table C6.

Table C6: 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.28 Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as either 'significant' or 'not significant'.

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

C.29 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:

- 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**
BCs (Hons), MSc, AMIEnvSc **Scientist (Air Quality)**

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).

Malcolm Walton **Technical Director**
BSc (Env Health) Dip (Acoustics & Noise Control)
MCIEH AMIOA

Malcolm holds a Bachelor of Science degree in Environmental Health and the Diploma in Acoustics and Noise Control. Malcolm is a Member of the Chartered Institute of Environmental Health and an Associate Member of the Institute of Acoustics. Malcolm joined Wardell Armstrong in September 2001 following 12 years working as an Environmental Health Officer in several local authorities, responsible for the enforcement of environmental legislation and in particular air pollution and noise nuisance.

Malcolm has experience in the technical co-ordination of environmental appraisal of large schemes to UK and international standards. Malcolm regularly carries out and co-ordinates noise and air quality assessment work associated with planning applications including EIA work and PPC permit application/compliance. He regularly acts as expert witness in planning inquiries in respect of noise, air quality and odour.

DRAWINGS

DO NOT SCALE FROM THIS DRAWING

KEY

- Approximate Site Boundary
- Existing Sensitive Receptor (ESR) Locations
- Proposed Sensitive Receptor (PR) Locations

REVISION	DETAILS	DATE	DR'N	CH'K'D	APP'D
A	FIRST ISSUE	12/23	AS	RS	MTW

CLIENT

GLADMAN DEVELOPMENTS LTD

PROJECT

GROVE HOUSE, SELLINDGE

DRAWING TITLE

EXISTING AND PROPOSED SENSITIVE RECEPTOR LOCATIONS

DRG No.	REV	SUIT.
GM12932-001	A	-

DRG SIZE	SCALE	DATE
A3	1:13000	December 2023

DRAWN	CHECKED BY	APPROVED BY
AS	RS	MTW

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