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Air Quality Assessment

Shortland Farm, Ash

Air Quality Assessment

Project: SHORTLAND FARM, ASH

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY
2. INTRODUCTION
3. PROJECT DESCRIPTION AND SITE CONTEXT
4. LEGISLATION AND PLANNING POLICY
5. ASSESSMENT METHODOLOGY
6. BASELINE CONDITIONS
7. CONSTRUCTION PHASE ASSESSMENT
8. OPERATIONAL PHASE ASSESSMENT – SITE SUITABILITY
9. OPERATIONAL PHASE ASSESSMENT – DEVELOPMENT IMPACTS
10. DAMAGE COST ASSESSMENT
11. CONCLUSIONS

APPENDIX 1 AIR QUALITY LEGISLATION AND POLICY

APPENDIX 2 WIND ROSE FOR FARNBOROUGH (2024)

APPENDIX 3 TRAFFIC DATA

APPENDIX 4 DISPERSION MODEL DETAILS

APPENDIX 5 OPERATIONAL PHASE SIGNIFICANCE CRITERIA

APPENDIX 6 RECOMMENDED CONSTRUCTION PHASE MITIGATION

APPENDIX 7 DISPERSION MODEL RESULTS

1. EXECUTIVE SUMMARY

- 1.1 This Air Quality Assessment (AQA) report has been prepared by Cass Allen to accompany an application for outline planning permission for the redevelopment of Land at Shortland Farm, Guildford Road, Ash, Guildford. The application is submitted on behalf of Gleeson Land Limited.
- 1.2 The site is not located within or near an existing Air Quality Management Area (AQMA), indicating that air quality in the vicinity is generally acceptable. Pollutant concentrations at the site are primarily influenced by vehicle emissions along the A323 Guildford Road and the local road network.
- 1.3 Potential construction phase dust soiling and particulate matter (PM: PM₁₀) health effects were assessed qualitatively, resulting in Medium and Low Risk levels being identified, respectively, in the absence of mitigation. Suitable best practice mitigation measures have been recommended, and no significant residual air quality impacts are expected.
- 1.4 A detailed atmospheric dispersion model was utilised to predict nitrogen dioxide (NO₂) and PM (PM₁₀ and PM_{2.5}) concentrations at relevant sensitive receptor locations within the study area during the operation of the development. The results indicate that pollutant concentrations at these locations will be below the relevant Air Quality Objectives (AQOs) during the operational phase, with no requirement for additional mitigation.
- 1.5 Furthermore, no significant cumulative impacts on local air quality are anticipated as a result of development-generated traffic combined with that of committed developments in the area. Accordingly, the overall effect of the development is considered 'not significant' for air quality with no requirement for additional mitigation.
- 1.6 In summary, it is our view that the site is suitable for the development in terms of air quality and that there are no air quality constraints with respect to planning consent.

2. INTRODUCTION

2.1 This AQA has been prepared by Cass Allen to accompany an application for outline planning permission for the redevelopment of Land at Shortland Farm, Guildford Road, Ash, Guildford. The application is submitted on behalf of Gleeson Land Limited.

2.2 During pre-application discussions, Guildford Borough Council (GBC) indicated that an AQA would be required to accompany the application if either existing air quality could impact the project, or the project could negatively affect air quality. Given the project's scale and nature, Cass Allen produced a high-level AQA in October 2025 (RP01-25458-R2), and received the following comments from the Environmental Health Officer (EHO):

... the AQA does not consider the cumulative impact of the proposed development and other committed developments in the area. The D&A clearly highlights several developments currently under construction or pending implementation. The cumulative impact needs to be considered and the AQA revised accordingly as cumulatively with this development adding to those already permitted, this could result in a detrimental impact to local air quality. If this results in a detailed assessment needing to be undertaken, this should also include a Damage Cost Assessment.

2.3 In order to address these comments, detailed dispersion modelling has been undertaken utilising traffic data inclusive of the following local committed developments:

- 23/P/01965 – Streamside, Harpers Road, Ash, GU12 6DB;
- 24/P/01158 – Land at Ash Manor, Ash Green Road, Ash, Guildford, GU12 6HH;
- 18/P/02308 – Land at May and Juniper Cottages, Ash Green Road, Guildford, GU12 6JH;
- 22/P/00477 – Land at Foreman Road, Ash; and
- 22/P/01083 – Orchard Farm, Harpers Road, Ash, Guildford, GU12 6DE.

2.4 A Damage Cost Calculation has also been included in Section 10, at the request of the GBC, to identify the monetary value of the environmental 'damage' associated with the proposal and determine the amount of mitigation that is appropriate to offset this cost.

2.5 The aim of the assessment is to consider air quality conditions, and their potential to influence the development in terms of its design, scale and layout, taking into account the following aspects:

- Dust and PM emissions generated by construction phase activities;
- Exhaust emissions from construction plant and traffic;
- The exposure of new sensitive receptors to elevated pollutant concentrations; and
- Emissions from traffic generated by the operation of the development.

2.6 Subsequently, where required, appropriate measures are identified to minimise the impacts.

2.7 This report contains technical terminology; a glossary of terms can be found at www.cassallen.co.uk/glossary.

3. PROJECT DESCRIPTION AND SITE CONTEXT

3.1 The proposal comprises:

Outline planning application with all matters except for the accesses from Guildford Road and Wyke Lane reserved for subsequent approval for the demolition of the existing buildings and hardstanding and the erection of:

- *up to 200 residential dwellings including affordable housing and plots of self-build plots (Class C3);*
- *green and blue infrastructure; and*
- *associated service and utility structures.*

3.2 As shown in Figure 1, the site currently comprises existing farm buildings at its centre, which are to be demolished, surrounded by fields. It is not located within or near an existing AQMA, indicating that air quality in the vicinity is generally acceptable. The site's northern and eastern boundaries are formed by the A323 Guildford Road and Wyke Lane, respectively, beyond which are existing residential areas. To the west of the site are further existing dwellings, a recreation ground and a preschool. All of these uses have the potential to be affected by construction and operational phase emissions generated by the development. To the south of the site are open fields.

3.3 The site is located northeast of 5 committed developments, the closest is located approximately 70m west of the site, and the furthest is located approximately 520m southwest of the site.

3.4 A Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC) have been identified to the northwest of the site, in the vicinity of a road with the potential to be affected by changes in traffic flows owing to the development. Accordingly, potential impacts to sensitive habitats here are considered in Section 5.

Figure 1 Site Location and Surrounding Area



4. LEGISLATION AND PLANNING POLICY

Air Quality Legislation

- 4.1 The wider air quality legislation underpinning national, regional and local planning policy, is summarised in Appendix 1.
- 4.2 The National AQOs and Air Quality Standards Regulations limit and target values for the UK are summarised in the Air Quality Strategy. These limits, for ten key air pollutants, are based on both European Union directives and World Health Organization (WHO) guidelines. They are periodically updated, informed by the latest scientific evidence, to protect public health, vegetation and ecosystems. The Local Air Quality Management (LAQM) regime requires local authorities to regularly evaluate the air quality in their areas based on these AQOs.
- 4.3 As a regional pollutant, many sources of PM_{2.5} are beyond local authority control therefore, it does not form part of the LAQM regime. However, long-term (2040) targets for ambient PM_{2.5} concentrations are set in 'The Environmental Targets (Fine Particulate Matter) (England) Regulations' (2023), and an interim (2028) target is published in the 'Environmental Improvement Plan' (2023). PM_{2.5} is a key air pollutant for health impacts, and local authorities must monitor progress towards meeting these reduced levels.
- 4.4 The National AQOs for the pollutants most associated with vehicle emissions, and therefore applicable to this assessment, are detailed in Table 1.

Table 1 UK National Air Quality Objectives

Pollutant	Objective	Averaging Period
Nitrogen Dioxide (NO ₂)	40µg/m ³	Annual mean
	200µg/m ³ not to be exceeded more than 18 times per year	1-hour mean
Particulate Matter (PM ₁₀)	40µg/m ³	Annual mean
	50µg/m ³ not to be exceeded more than 35 times per year	24-hour mean
Particulate Matter (PM _{2.5})	20µg/m ³	Annual mean

- 4.5 The above AQOs are typically applied where there is 'relevant exposure', i.e., where members of the public are likely to be present for the relevant averaging periods, or regularly exposed, and not in workplaces where relevant provisions concerning health and safety at work apply.

National Policy

- 4.6 Outline guidance for the assessment of air quality affecting new developments is given in the 'National Planning Policy Framework' (NPPF) (December 2024). Relevant sections in this case are included in Appendix 1.

Local Policy

- 4.7 The 'Guildford Borough Local Plan: Development Management Policies' document was adopted by GBC on 22 March 2023 and replaces most of the policies within the Guildford Local Plan (2003), including those relating to Air Quality. Within this document, Policy P9 is particularly relevant and states:

Policy P9: Air Quality and Air Quality Management Areas

- 1) *Development proposals should have regard to the need to improve air quality and reduce the effects of poor air quality.*
- 2) *Development proposals must not result in significant adverse impacts on sensitive receptors, including human health, sensitive habitats and any sites designated for their nature conservation value, from any sources of emissions to air.*
- 3) *Development proposals are required to include a detailed Air Quality Assessment, where:*
 - a) *major development is proposed and has the potential, including when combined with the cumulative effect of other approved developments and site allocations, to have significant adverse impacts on air quality;*
 - b) *the proposed development has the potential to result in significant adverse impacts and is within, and in close proximity to, a sensitive habitat, including any site designated for its nature conservation value;*
 - c) *development would introduce or intensify sensitive uses within an area that is known to experience existing poor air quality conditions, including an Air Quality Management Area (AQMA); and/or*
 - d) *the proposed development would be likely to result in the increase of air pollution levels within an Air Quality Management Area (AQMA).*
- 4) *Where an Air Quality Assessment identifies potential significant adverse impacts on sensitive receptors from any source of emissions to air, the applicant must submit an Emissions Mitigation Assessment, detailing the appropriate avoidance and mitigation measures that will be implemented to prevent significant adverse impacts on sensitive receptors, including future occupiers or users of the site, from any sources of emissions to air.*
- 5) *Proposed avoidance and mitigation measures are expected to follow the 'Air Quality, Avoidance and Mitigation Hierarchy' and be designed to maximise their ecological and aesthetic value.*
- ...
- 7) *A 'Verification Report' must be submitted to the Council and approved prior to the development's occupation or use, which demonstrates the agreed avoidance and mitigation measures have been implemented effectively.*
- 8) *Where required, planning obligations will be used to secure contributions to tackle poor air quality and/or for air quality monitoring.*
- 9) *Where there will be significant adverse impacts that cannot be effectively mitigated, the planning application will be refused.*

4.8 To address the requirements of the national and local policies, the following key air quality matters have been considered:

- Construction phase fugitive emissions of dust and PM impacts at existing receptors;
- Construction phase plant and vehicle emissions impacts at existing receptors;
- Operational phase vehicle emissions exposure at proposed receptors; and
- Operational phase vehicle emissions impacts at existing receptors.

5. ASSESSMENT METHODOLOGY

5.1 The scope and methodology for this assessment have been determined with regard to:

- Defra 'LAQM Technical Guidance' (May 2025) (LAQM.TG22);
- Natural England (NE) Guidance: 'Air pollution and development: advice for local authorities' (December 2025); and
- Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM), 'Land Use Planning & Development Control: Planning for Air Quality' (January 2017) (LUPDC).

5.2 Reference has also been made to other relevant technical guidance, where applicable.

Construction Phase

5.3 The assessment of potential air quality impacts during the construction phase has focused on the generation and dispersion of dust and PM₁₀ from onsite activities, following the IAQM 'Guidance on the Assessment of Dust from Demolition and Construction' (January 2024) methodology, summarised as follows:

- Step 1 - screen the need for an assessment: consider impacts to sensitive human and ecological receptors within 250m or 50m of the site boundary, respectively (indicated on Figure 2), and within 50m of a route used by construction vehicles up to 250m from the site entrance.
- Step 2A - estimate the dust emission magnitude for each of the main construction activities - demolition, earthworks, general construction, and trackout.
- Step 2B - determine the sensitivity of the receiving environment, through consideration of factors such as meteorological conditions, number of nearby receptors, their proximity and sensitivity. Other factors to consider are detailed in Box 9 of the guidance. A wind rose for nearby Farnborough meteorological station is included in Appendix 2.
- Step 2C - define the risk of impacts.
- Step 3 - identify site-specific mitigation requirements (in addition to basic project controls).

5.4 As indicated within the guidance, the use of professional judgment is necessary, due to the diverse range of projects that are subject to dust impact assessment, meaning that it is not possible to be prescriptive as to how to assess the impacts.

5.5 Exhaust emissions from construction vehicles and plant may also impact local air quality. The potential for significant effects resulting from these emissions has also been considered with reference to screening and significance criteria in LUPDC.

5.6 A review of the Multi-Agency Geographic Information for the Countryside (MAGIC) website did not identify any statutory designated ecological sites within the relevant screening distances, and therefore these have been excluded from the construction phase assessment.

Operational Phase

- 5.7 Concentrations of NO₂, PM₁₀ and PM_{2.5} have been considered in the operational phase assessment as road traffic is a major source of these pollutants and their concentrations are often close to, or in exceedance of, the relevant AQOs in urban locations.

Development Impacts

- 5.8 LUPDC indicates the magnitude of change in traffic flows that is potentially significant, and therefore likely to require further assessment, as follows:
- 5.9 For roads distant from an AQMA:
- Light Duty Vehicle (LDV) flows of >500 Annual Average Daily Traffic (AADT);
 - Heavy Duty Vehicle (HDV) flows of >100 AADT; and/or
- 5.10 In locations where these thresholds are not exceeded, detailed assessment of air quality impacts is not normally required, and the resulting effect can be considered 'not significant'. These criteria were, therefore, used to inform the study area, in liaison with the project Transport Consultant (Mayer Brown Ltd).

Site Suitability

- 5.11 The development also has the potential to expose future users to elevated pollutant concentrations. As such, proposed receptors have been included in the operational phase assessment.

Modelled Human Receptors

- 5.12 Cambridge Environmental Research Consultants' (CERC) ADMS-Roads (version 5.1.0.2) atmospheric dispersion model has been used to predict pollutant concentrations both without and with the development in place at existing sensitive receptor (R) locations and with the development in place at proposed receptor (PR) locations, as detailed in Table 2.
- 5.13 PRs are located west and east of the site access road on the northern site boundary and on the northeastern corner of the site boundary, at ground floor level. This is considered conservative as, in reality, dwellings are proposed to be set back a minimum of 70m from the roadside.

Table 2 Modelled Receptor Locations

ID	Description	Grid Reference (OSGB)	Height (m)*
R1	169 Guildford Road	490597.6, 151216.9	1.5
R2	132 Guildford Road	490482.5, 151163.9	
R3	65 Guildford Road (Clover Close)	490204.0, 151090.0	
R4	56 Guildford Road (Clover Close)	490132.0, 151036.0	
R5	1 Guildford Road (Clover Close)	490093.0, 151012.0	
R6	4 Stonehill Road	490069.0, 150983.0	
R7	5 Stonehill Road	490090.0, 150987.0	
R8	4 Ash Hill Road	490061.0, 151169.0	

ID	Description	Grid Reference (OSGB)	Height (m)*
R9	9 Ash Hill Road	490042.3, 151098.9	
R10	64 Ash Hill Road	489807.4, 151373.0	
R11	71 Ash Hill Road	489775.1, 151366.9	
PR1	Northern site boundary, west of access road	490534.2, 151180.6	1.5
PR2	Northern site boundary, east of access road	490558.9, 151188.8	
PR3	Northeastern site boundary	490766.6, 151260.6	

* To represent the average adult breathing zone above floor level and to align with Defra national background modelling used within this assessment.

Ecological Receptors

- 5.14 A review of the MAGIC website identified 'Ash to Brookwood Heaths' SSSI and 'Thursley, Ash, Pirbright, and Chobham' SAC within the NE 200m screening distance of a road expected to carry development-generated traffic. As such, consideration should be given to any potential air quality impacts on this sensitive ecological receptor.
- 5.15 Previous screening guidance contained within the now superseded Design Manual for Roads and Bridges (DMRB) 'LA 105 Guidance Document' (June 2024) advised that air quality assessment for ecological receptors was typically triggered where development would result in an increase of 1,000 AADT or more on affected road links. Whilst this threshold no longer forms part of current formal guidance, it remains a useful contextual benchmark. Mayer Brown Ltd has determined that this development, along with the local committed developments, are forecast to increase traffic flows along Ash Hill Road by a combined total of 646 AADT which is below this historic screening level. Moreover, the development alone is only expected to contribute 383 AADT along this road.
- 5.16 Furthermore, the ecological area of interest is set back from Ash Hill Road by >100m, with the majority of the designation much further than this from the road, thereby significantly reducing the potential for direct roadside exposure effects, as a result of the dispersion and dilution distance afforded. On this basis, it is our view that detailed modelling of development-generated traffic would show a NO_x process contribution well below the 1% critical load screening criteria defined by NE Guidance and therefore, would not cause significant impacts at this receptor.

Modelling Scenarios

- 5.17 To assess the local air quality effects, the following scenarios have been modelled:
- 2024 – Model Verification;
 - 2029 – Anticipated Opening Year, Without Development; and
 - 2029 – Anticipated Opening Year, With Development + Committed Development.
- 5.18 The study area, including modelled road links and receptors, is shown in Figure 2 below.

- 5.19 Only the 'With Development' scenario included cumulative traffic generation from committed developments in the vicinity (23/01965; 24/01158; 18/02308; 22/00477; and 22/01083), allowing for a robust assessment of impacts from 'Without' to 'With' scenarios. Details of the traffic data used in the model are included in Appendix 3, and other model inputs such as emission factors, verification and adjustment, in Appendix 4.

PM_{2.5} Targets

- 5.20 Additionally, Defra's 'PM_{2.5} Targets: Interim Planning Guidance' (October 2024), prompts developers to consider:

1. *How has exposure to PM_{2.5} been considered when selecting the development site?*
2. *What actions and/or mitigations have been considered to reduce PM_{2.5} exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of PM_{2.5} and its precursors?*

- 5.21 Accordingly, these aspects are also considered in the operational phase assessment.

Significance Criteria

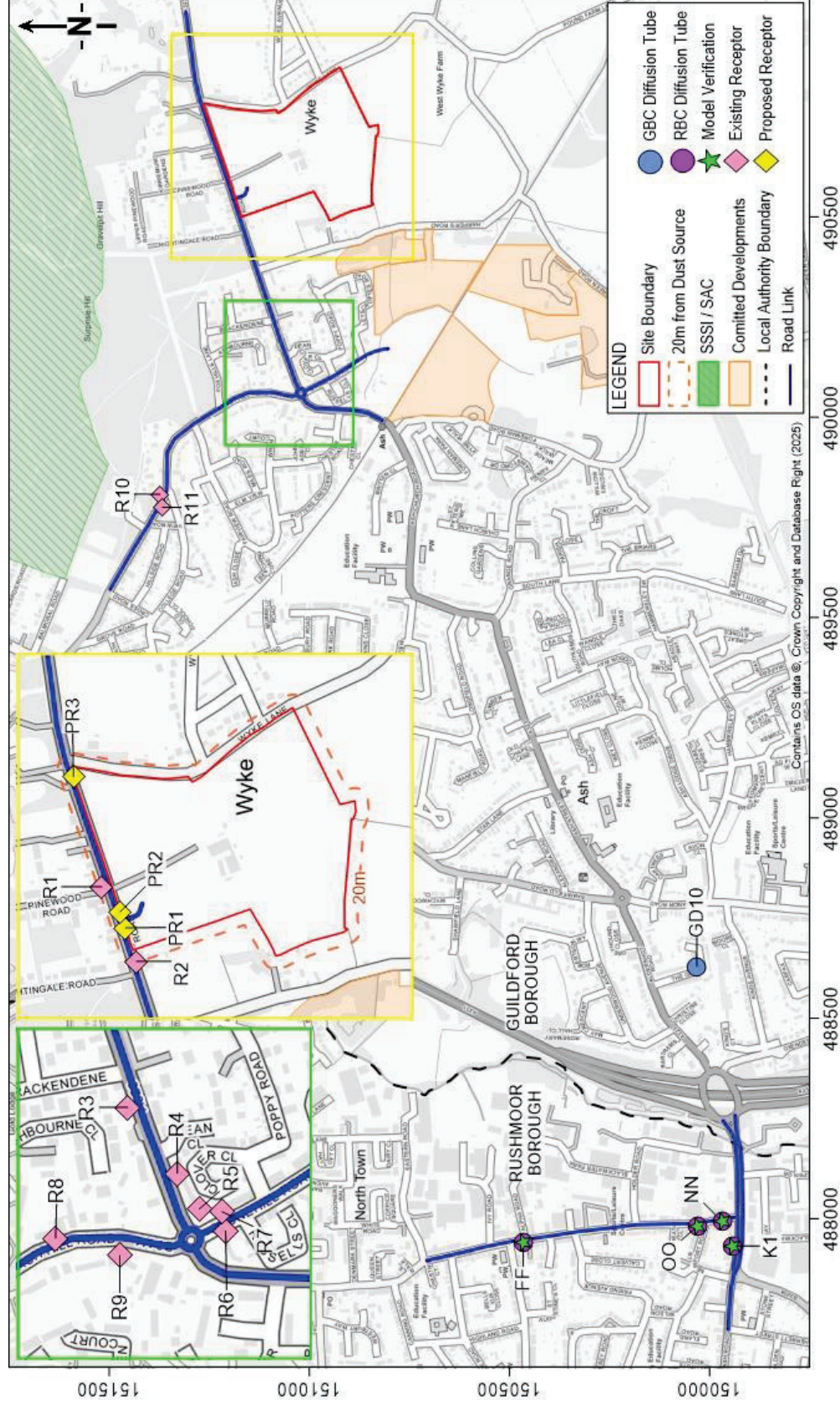
- 5.22 Significance criteria applicable to the assessment of vehicle emissions impacts have been derived from LUPDC. Where the 'without' and 'with' development pollutant concentrations are predicted at an individual receptor, the guidance recommends expressing the magnitude of incremental change as a proportion of the Air Quality Assessment Level (normally the applicable AQO).
- 5.23 LUPDC significance criteria applicable to the assessment of impacts at existing receptors are included in Appendix 5. It should be noted that, in line with LUPDC, *'the criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement... the objective is to identify situations where there is a possibility of a significant effect on local air quality.'*
- 5.24 For proposed receptors, predicted pollutant concentrations have been compared to the relevant AQOs to determine the potential for exceedance, and therefore, the suitability of the site for the proposed residential use.

Damage Cost Assessment

- 5.25 As outlined in Section 2, the EHO has requested that a damage cost calculation be undertaken to identify the environmental 'damage' costs associated with the proposal's total emissions and determine the amount (value) of mitigation (including intrinsic mitigation) that is appropriate to offset this cost. This has been undertaken following the Defra Interdepartmental Group on Costs and Benefits (IGCB) approach and the Defra 'Air quality appraisal: damage cost guidance' (December 2025), which utilises the following calculation:

Cost of Road Transport Emission Increase = $\sum$ [Estimated trip rate for 5 years × Emission rate per km travelled per vehicle type × Damage Costs]

Figure 2 Study Area



6. BASELINE CONDITIONS

- 6.1 Air quality conditions in the vicinity of the site have been reviewed to provide a baseline for consideration. The collected data are included in the tables below and were obtained from GBC, neighbouring Rushmoor Borough Council (RBC) and Defra. Monitoring locations are indicated on Figure 2.

Table 3 Monitored Concentrations Across Study Area – NO₂

ID	Location	Type	Distance to site (km)	Monitored Annual Mean (µg/m³)				
				2020	2021	2022	2023	2024
GBC								
GD10	The Garth	Urban Background	2.1	10.0	14.8	15.0	12.2	11.3
RBC								
FF	97-99 North Lane	Roadside	2.6	19.6	20.1	19.4	18.4	16.0
K1	201 Ash Road, Aldershot	Roadside	2.7	21.1	22.2	21.1	20.2	19.0
NN	Salvation Army Hall, North Ln	Roadside	2.7	-	-	-	22.0	21.3
OO	Vernon's Chemist, North Ln	Roadside	2.7	-	-	-	21.6	19.0

Note: Data obtained from GBC and RBC Air Quality Annual Status Reports (ASRs) (2025). 2020 / 2021 results are likely to be atypical due to COVID-19 travel restrictions.

- 6.2 As indicated in Table 3, annual mean NO₂ concentrations in the vicinity of the site were consistently 'well below' (defined by the IAQM as <75% of) the annual mean AQOs in the most recent monitoring years (where data were available). The general trend shows air quality conditions in the area improving over time, and this is further illustrated in Figure A.1 of the RBC ASR.

Table 4 Mapped Background Annual Mean Concentrations Across Study Area (µg/m³)

2024				2029			
*NO _x	NO ₂	PM ₁₀	PM _{2.5}	NO _x	NO ₂	PM ₁₀	PM _{2.5}
10.8 - 15.0	8.4 - 11.3	11.0 - 12.9	7.0 - 8.0	8.9 - 12.0	7.0 - 9.3	10.6 - 12.4	6.7 - 7.6

Note: Data obtained from <https://uk-air.defra.gov.uk/data/iaqm-background-home>. A range is given as the study area spans multiple grid squares. * Nitrogen oxides (nitric oxide (NO) & NO₂).

- 6.3 Whilst no monitoring of PM₁₀ or PM_{2.5} is undertaken by GBC or RBC, Defra-predicted annual mean background concentrations for 2024 and 2029 are well below the relevant AQOs and are expected to reduce further in future years. These background concentrations are later combined with roadside modelling results to provide total predicted concentrations at receptor locations.

7. CONSTRUCTION PHASE ASSESSMENT

- 7.1 Sensitive receptors were identified within the relevant IAQM screening distances, therefore, the assessment progressed to Step 2, which has been summarised in the tables below.

Table 5 Step 2A – Dust Emission Magnitude for Construction Activities

Activity	Magnitude	Explanation
Demolition	Small	Total building volume <12,000m ³ , principally hollow barn structures
Earthworks	Medium	Total site area 18,000-110,000m ³ , 5-10 heavy earth-moving vehicles active at once
Construction	Medium	Total building volume 12,000-75,000m ³
Trackout	Medium	20-50 outward HDV movements per day, >100m unpaved road length likely

Table 6 Step 2B – Sensitivity of the Area

Potential Impact	Details	Construction Activity			
		Demolition	Earthworks	Construction	Trackout
Dust Soiling: Amenity	1-10 receptors within 20m; *demolition only in central area	Low*	Medium	Medium	Medium
PM ₁₀ : Health	As above, and low background PM ₁₀ concentration	Low	Low	Low	Low

Table 7 Step 2C – Summary of Impact Risks to Define Site-Specific Mitigation

Potential Impact	Construction Activity			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible	Medium	Medium	Medium
Human Health	Negligible	Low	Low	Low

- 7.2 It should be noted that the prevailing winds are south-westerly (as shown in Appendix 2) and thus, locations to the north-east, downwind of the site, are most at risk of construction dust impacts. As a robust case, the development is considered Medium Risk for dust soiling effects and Low Risk for PM₁₀ health effects, in the absence of mitigation. Following implementation of the recommended mitigation measures for the relevant activities' risk levels in Appendix 6, it is anticipated that the residual effect of the construction phase will be not significant.
- 7.3 With regard to construction traffic, the construction phase flows are not expected to exceed the criteria detailed in paragraph 5.8 and therefore, significant residual effects are not anticipated.

8. OPERATIONAL PHASE ASSESSMENT – SITE SUITABILITY

- 8.1 To consider the suitability of the site for the proposed use, the potential for future occupants of the development to be exposed to exceedances of the relevant AQOs has been assessed. Modelled predicted pollutant concentrations at proposed receptors are detailed in Table 8.

Table 8 Predicted Pollutant Concentrations at the Development in 2029

Receptor	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)					
	NO ₂	% of AQO (40 $\mu\text{g}/\text{m}^3$)	PM ₁₀	% of AQO (40 $\mu\text{g}/\text{m}^3$)	PM _{2.5}	% of AQO (20 $\mu\text{g}/\text{m}^3$)
PR1	16.1	40.4	14.3	35.8	8.7	43.5
PR2	16.4	41.0	14.4	36.0	8.8	43.8
PR3	18.3	45.7	15.3	38.2	9.2	46.1

Note: Results are reported to the nearest 0.1 $\mu\text{g}/\text{m}^3$. Any apparent discrepancies are due to rounding.

- 8.2 The data in Table 8 show that pollutant concentrations were predicted to be below the relevant annual mean AQOs at all proposed receptor locations. The highest predicted NO₂, PM₁₀ and PM_{2.5} concentrations were 18.3 $\mu\text{g}/\text{m}^3$, 15.3 $\mu\text{g}/\text{m}^3$, and 9.2 $\mu\text{g}/\text{m}^3$ at receptor PR3, respectively.
- 8.3 The annual mean NO₂ concentrations predicted by the model were all below 60 $\mu\text{g}/\text{m}^3$. As indicated in LAQM.TG22, a breach of the hourly mean AQO for NO₂ is unlikely where this is the case. Equally, exceedances of the 24-hour mean AQO for PM₁₀ are not anticipated, as all predicted annual mean concentrations fall below the 32 $\mu\text{g}/\text{m}^3$ proxy value.
- 8.4 Accordingly, it is not anticipated that proposed receptors would be exposed to exceedances of the relevant AQOs; therefore, the site is considered suitable for the proposed use, with no requirement for additional mitigation.
- 8.5 In addition to the above, Defra guidance recommends consideration of how a development will reduce exposure to PM_{2.5}. In terms of selecting this development site, which is in an area where PM_{2.5} concentrations are expected to be well below the AQO and where there is no requirement to reduce exposure further, exposure to PM_{2.5} has been considered.

9. OPERATIONAL PHASE ASSESSMENT – DEVELOPMENT IMPACTS

- 9.1 Potential air quality impacts were determined by comparing the 'without development' and 'with development' concentrations at existing receptor locations. A summary of the worst-case impacts is provided in Table 9, with full model results detailed in Appendix 7.

Table 9 Worst-Case Predicted Operational Impacts at Existing Receptors in 2029

Pollutant	Receptor	Annual Mean Concentration (µg/m³)			Change (% AQO)	Impact Descriptor
		AQO	Without	With		
Highest Absolute Concentrations						
NO ₂	R1	40	16.2	16.6	0.9	Negligible
PM ₁₀		40	14.3	14.5	0.5	Negligible
PM _{2.5}		20	8.7	8.8	0.5	Negligible
Maximum Predicted Changes						
NO ₂	R1	40	16.2	16.6	0.9	Negligible
PM ₁₀		40	14.3	14.5	0.5	Negligible
PM _{2.5}		20	8.7	8.8	0.5	Negligible

Note: Results are reported to the nearest 0.1 $\mu\text{g}/\text{m}^3$. Any apparent discrepancies are due to rounding.

- 9.2 No existing receptors are expected to experience pollutant concentrations in excess of the relevant annual mean AQOs. Furthermore, the impact at all receptor locations is considered 'Negligible' in accordance with LUPDC.
- 9.3 As such, based on the extent of predicted population exposure to NO₂, PM₁₀ and PM_{2.5} impacts, the overall cumulative effect of development-generated traffic combined with that of committed developments in the area is considered 'not significant'.
- 9.4 Nonetheless, in addition to the above, Defra guidance recommends consideration of how a development will reduce emissions of PM_{2.5}. As outlined above, the effect of development-generated vehicle emissions on local air quality, including PM_{2.5} concentrations, is not expected to be significant. Additionally, the site has good public transport connections, with the bus stops along Guildford Road offering regular services to Ash and Guildford, and Ash Railway Station being approximately 650m on foot from the site, helping to reduce the requirement for private car trips and associated PM_{2.5} emissions. The development also proposes to incorporate comprehensive electric vehicle charging infrastructure as part of its energy and sustainability statement.

10. DAMAGE COST ASSESSMENT

10.1 The inputs and outputs of the damage cost calculation are shown in Table 10 and Table 11 below.

Table 10 Damage Cost Calculation Inputs

Input	Value
Development trip rate	905 AADT (0.77% HDV)
Average speed	20km/hr
Emissions year	2029
Area / road type	England (not London) – Urban (not London)
Link Length	1.2km – Total road link length with >500 AADT change
Defra road transport cost per tonne ('urban big')	NO _x : £17,655
2025 central damage cost	PM _{2.5} : £152,869
Development vehicle emissions from EFT (Defra Emissions Factors Toolkit v13.1)	NO _x : 0.060 tonnes/year PM _{2.5} : 0.008 tonnes/year

10.2 Defra's Damage Cost Guidance was utilised to calculate the monetary value of air quality 'damage' caused by the development, and consequent cost of mitigation required. Using the annual link emissions above and *Road Transport Urban Big* damage costs, the estimated emissions costs of NO_x and PM_{2.5} are shown in Table 11. This accounts for 2% uplift per year to reflect a higher willingness to pay for health.

Table 11 Damage Cost Calculation Outputs

Emissions Year	Calculated Cost by Pollutant	
	NO _x	PM _{2.5}
2029	£1,059.30	£1,146.52
2030	£1,080.49	£1,169.45
2031	£1,102.10	£1,192.84
2032	£1,124.14	£1,216.69
2033	£1,146.62	£1,241.03
Sub Total	£5,512.64	£5,966.52
Total Cost	£11,479.16	

10.3 The calculated emissions cost value in Table 11 gives an indication of the potential cost of the development to local air quality over a 5-year period. However, the development will include extensive measures intended to encourage the transition to more sustainable transport options and, therefore, minimise emissions during its operation. It is anticipated, therefore that this cost will be more than offset by intrinsic emissions mitigation measures to encourage the transition to more sustainable modes of transport, which include the following:

- *Utilising the onsite Public Right of Way (PROW) (and providing surface improvements) to create an exceptionally well connected and sustainable new development which can reach the train station on foot in 8 minutes or cycle in 3 minutes.*
- *Improvements to the pedestrian network, public transport infrastructure (including improvements to facilities at nearby bus stops), to encourage sustainable travel.*
- *Enhancements to both the Guildford Road / Wyke Lane and Guildford Road / Harpers Road junctions in the form of pedestrian facilities, dropped kerbs and tactile paving. Delivery of a new access junction providing vehicular and pedestrian facilities.*
- *Potential financial contribution to Guildford Road Cycle Network.*

11. CONCLUSIONS

- 11.1 This AQA was prepared by Cass Allen to accompany an application for outline planning permission for the redevelopment of land at Shortland Farm, Guildford Road, Ash, Guildford. The application is submitted on behalf of Gleeson Land Limited.
- 11.2 Potential construction phase dust soiling and PM₁₀ health effects were assessed qualitatively, resulting in Medium and Low Risk levels being identified, respectively, in the absence of mitigation. Suitable best practice mitigation measures have been recommended, and no significant residual air quality impacts are expected.
- 11.3 A detailed atmospheric dispersion model was utilised to predict NO₂, PM₁₀ and PM_{2.5} concentrations at relevant sensitive receptor locations within the study area during the operational phase. The results indicate that pollutant concentrations at existing and proposed sensitive receptors will be below the relevant AQOs during the operational phase.
- 11.4 Furthermore, no significant cumulative impacts on local air quality are anticipated as a result of development-generated traffic combined with that of committed developments in the area. Accordingly, the overall effect of the development is considered 'not significant' for air quality with no requirement for additional mitigation.
- 11.5 In summary, it is our view that the site is suitable for the development in terms of air quality and that there are no air quality constraints with respect to planning consent.

Appendix 1 Air Quality Legislation and Policy

Legislation

Defra and the Devolved Administrations (2007) - The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2):

The Air Quality Strategy provides a framework for reducing air pollution in the UK, with the aim of meeting the requirements of European Union (EU) legislation. This has been brought into UK law via the EU (Withdrawal) Act 2018 (as amended) and is referred to as 'retained EU law'.

The air quality standards set within the Air Quality Strategy are recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO), based on current scientific knowledge regarding the effects of each pollutant on health and the environment.

The AQOs are medium-term policy-based targets set by the government, taking into account economic efficiency, practicability, feasibility and timescales. Whilst some of the AQOs correspond with the EPAQS / WHO limits, others have a margin of tolerance, by specifying a number of permitted exceedances of the standard over a given period.

Many of the AQOs in the Air Quality Strategy have been made statutory in England via The Air Quality (England) Regulations, 2000, The Air Quality (England) Amendment Regulations, 2002 and The Air Quality Standards (Amendment) Regulations, 2016 – Statutory Instrument 2016 No. 1184.

Environmental Protection Act (1990):

Section 79 of the Environmental Protection Act 1990 defines statutory nuisance relevant to dust and particles as:

Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance...

Any accumulation or deposit which is prejudicial to health or a nuisance.

Furthermore, Section 80 states that where a statutory nuisance is shown to exist, the Local Authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the Local Authority may abate the nuisance and recover expenses. However, there are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist and nuisance is a subjective concept, its perception being highly dependent upon the existing conditions and the change which has occurred.

Environment Act (2021):

The Act mandates that local authorities review and document local air quality within their jurisdiction by way of staged appraisals and respond accordingly, with the aim of meeting the AQOs defined in the Regulations. There is a requirement for local authorities to identify relevant sources of emissions that are likely to be responsible for any failure to achieve the AQOs, or to identify relevant sources within neighbouring authorities' areas. Where the objective(s) are not likely to be achieved within the relevant period(s), the authority is required to designate an AQMA. For each AQMA the Local Authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality, in order to work towards achieving air quality standards in the future.

Defra (2019) Clean Air Strategy:

The UK Government's Clean Air Strategy sets out the comprehensive actions required to improve air quality, required from all parts of government and society.

The primary focus of previous iterations of the Clean Air Strategy has been NO₂, and its principal source – road traffic. The 2019 Strategy broadens the focus into other areas, including actions on clean growth and pollutant emissions from other sources such as industry, agriculture, and domestic wood-burning stoves.

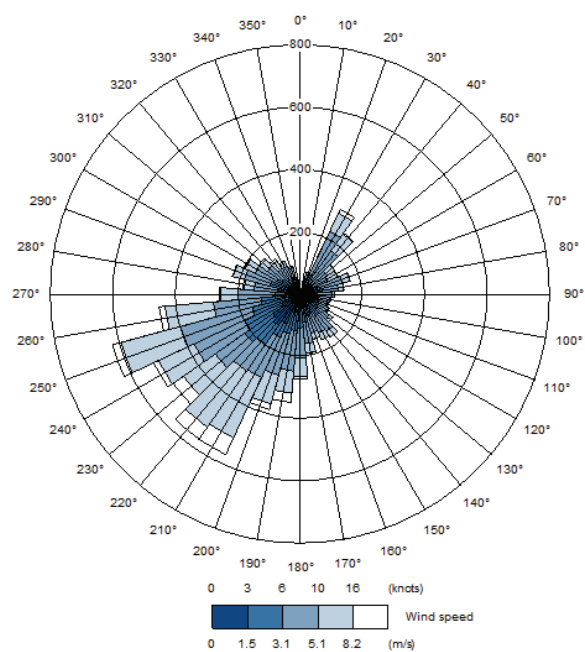
Policy

National

NPPF sections relevant to air quality are stated below for planning policy context:

110. *...Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health.*
187. *Planning policies and decisions should contribute to and enhance the natural and local environment by: ... preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of ... air ... pollution. Development should, wherever possible, help to improve local environmental conditions such as air ... quality.*
198. *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*
199. *Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.*
201. *The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.*

Appendix 2 Wind Rose for Farnborough (2024)



Appendix 3 Traffic Data

Traffic data for the dispersion model were obtained from Mayer Brown Ltd and supplemented by additional data from Department for Transport (DfT) Traffic Counts. Where necessary, traffic data were converted to the appropriate assessment years using a robust factor derived from Defra Trip End Model Presentation Program (TEMPro) (version 8.1).

Road Link Details – 2024 Model Verification

Link ID	Description	Road Type	Speed (km/h)
1	North Lane, south of Chestnut Close, north of Belle Vue Road	Urban (not London)	20
2	North Lane, south of Belle Vue Road, north of Pegasus Court		30
3	North Lane, south of Pegasus Court, north of Holder Road		20
4	North Lane, south of Holder Road, north of Heath Close		20
5	North Lane, south of Heath Close, north of Lower Newport Road / North Close		20
6	North Lane, south of Lower Newport Road / North Close, north of A323 Ash Road		15
7	A323 Ash Road (eastbound), east of Lower Farnham Road, west of North Lane		20
8	A323 Ash Road (westbound), east of Lower Farnham Road, west of Blackwater Way		30
9	A323 Ash Road (eastbound), east of North Lane, west of North Close		20
10	A323 Ash Road (eastbound), east of North Close, west of Ash Road / A331 / Aldershot Road / Oxenden Road roundabout		25
11	A323 Ash Road (westbound), east of Blackwater Way, west of Ash Road / A331 / Aldershot Road / Oxenden Road roundabout		25
12	A323 Ash Road, west of Lower Farnham Road, east of Herrett Street		20

Traffic Data – 2024 Model Verification

Link ID	Model Verification	
	AADT	%HDV
1	10,943	4.91
2	10,943	4.91
3	10,943	4.91
4	10,943	4.91
5	10,943	4.91
6	10,943	4.91
7	13,703	1.44
8	11,112	1.71
9	13,703	1.44
10	13,703	1.44
11	11,112	1.71
12	16,092	1.81

Road Link Details – 2029 Operational Phase

Link ID	Description	Road Type	Speed (km/h)
1	Site access	Urban (not London)	15
2	A323 Guildford Road, east of site access, west of Wyke Lane		20
3	A323 Guildford Road, west of site access, east of Nightingale Road		20
4	A323 Guildford Road, west of Nightingale Road, east of Dean Close		30
5	A323 Guildford Road, west of Dean Close, east of Guildford Road / Stonehill Road / Ash Hill Road Roundabout		10
6	Guildford Road / Stonehill Road / Ash Hill Road Roundabout		15
7	A323 Stonehill Road, south of Guildford Road / Stonehill Road / Ash Hill Road roundabout, north of Poppy Road		20
8	A323 Guildford Road, west of Guildford Road / Stonehill Road / Ash Hill Road roundabout, north of Chester Road		10
9	B3411 Ash Hill Road, north of Guildford Road / Stonehill Road / Ash Hill Road roundabout, roundabout approach		20
10	B3411 Ash Hill Road, north of Guildford Road / Stonehill Road / Ash Hill Road roundabout approach, east of Cross Road		30
11	A323 Guildford Road, east of Wyke Lane, west of Pirbright Road		45

Traffic Data – 2029 Operational Phase

Link ID	Without Development		With Development	
	AADT	%HDV	AADT	%HDV
1	-	-	905	0.77
2	15,558	9.46	16,268	9.05
3	15,558	9.46	16,449	9.00
4	15,558	9.46	16,449	9.00
5	15,558	9.46	16,449	9.00
6	11,230	9.42	11,934	8.92
7	8,873	8.95	9,363	8.53
8	8,649	9.54	9,296	8.93
9	8,649	9.54	9,296	8.93
10	8,649	9.54	9,296	8.93
11	15,558	9.46	16,268	9.05

Appendix 4 Dispersion Model Details

Model Details and Input Parameters

Parameter	Value
Emissions Factors	Defra Emissions Factors Toolkit v13.1 using the traffic data in Appendix 3
Emissions Year	2024 for verification, 2029 for future scenarios
Background Concentrations	Defra 2021 background maps – 2024 for verification, 2029 for future scenarios
Surface Roughness	Verification site – 0.7m; Meteorological Station – 0.2m Development site – 0.5m; Meteorological Station – 0.2m
Monin-Obukhov Length	Verification site – 30m; Meteorological Station – 10m Development site – 30m; Meteorological Station – 10m
Meteorological Data	Hourly sequential, Farnborough (2024)
Road-contribution Adjustment Factor	2.6 – see Model Verification, below
NO _x to NO ₂ conversion	Defra NO _x to NO ₂ Calculator v9.1 and Defra-mapped background concentrations
Street Canyon	Not applicable to this study area
Gradient	Not applicable to this study area

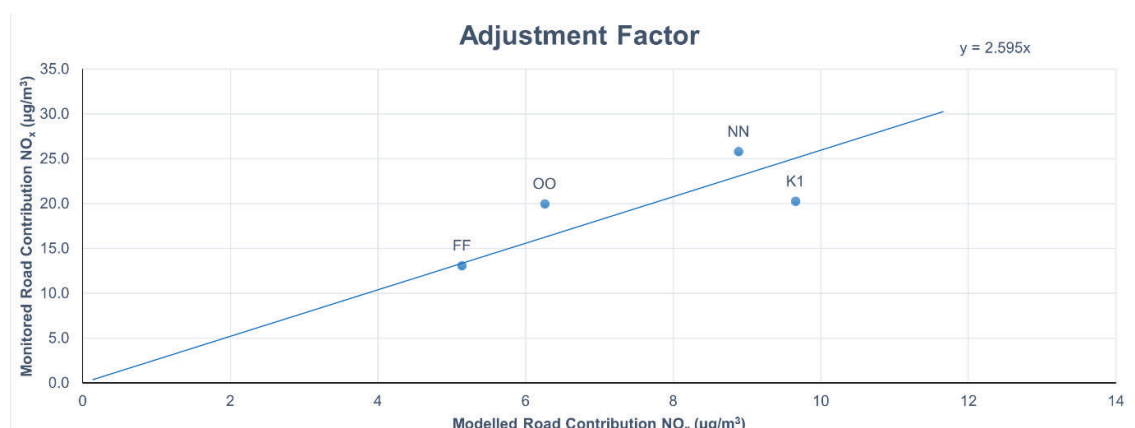
NO_x Model Verification

The model has been verified using the LAQM.TG22 methodology. The model has been used to predict 2024 annual mean road-NO_x contributions at roadside monitoring locations within the study area. The modelled road-NO_x concentrations have been compared with the measured road-NO_x utilising the Defra NO_x to NO₂ Calculator. As the model was shown to underpredict, this verification factor has been applied to the assessment results. Due to the lack of local PM monitoring data, the adjustment factor for NO₂ was also utilised for PM₁₀ and PM_{2.5}, following the LAQM.TG22 methodology.

Model Verification (all concentrations in µg/m³)

Monitor ID	Monitored NO ₂	Background NO ₂	Monitored Road NO _x	Modelled Road NO _x	Ratio
K1	19.0	9.8	20.3	9.7	2.098
FF	16.0	9.9	13.1	5.1	2.545
NN	21.3	9.8	25.8	8.9	2.903
OO	19.0	9.9	20.0	6.3	3.192

Comparison of Measured Road-NO_x with Modelled Road NO_x



Calculation of Model Uncertainty

To assess model uncertainty, the Root Mean Square Error (RMSE) of the above data was calculated to provide an estimate of the average error of the model. The overall weighted RMSE value calculated following model verification was 1.4µg/m³ (3.5%), which is within the acceptable range specified in LAQM.TG22.

Appendix 5 Operational Phase Significance Criteria

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

Notes:

- The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.
- The Table is only designed to be used with annual mean concentrations.
- Descriptors for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
- The total concentration categories reflect the degree of potential harm by reference to the AQO value. At exposure less than 75% of this value, i.e. 'well below', the degree of harm is likely to be small. As the exposure approaches and exceeds the AQO, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQO.
- It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQO. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQO, rather than being exactly equal to it.
- When defining the concentration as a percentage of the AQO, 'without scheme' concentration should be used where there is a decrease in pollutant concentration and the 'with scheme;' concentration where there is an increase. Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.
- LUPDC states that an assessment must reach a conclusion on the likely significance of the predicted effect. It should be noted that this is a binary judgement of either it is significant, or it is not significant.

Appendix 6 Recommended Construction Phase Mitigation

Highly Recommended Mitigation Measures for Medium-Risk Sites

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences onsite.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information, where applicable.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this Appendix. Further, 'desirable' measures from IAQM guidance should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM₁₀ continuous monitoring and/or visual inspections.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.
- Make complaints log available to the Local Authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on or offsite should be recorded, and the action taken to resolve the situation, in the logbook.

Monitoring

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues onsite when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences onsite or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Preparing and Maintaining the Site

- Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles onsite.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being reused onsite. If they are being reused onsite cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all vehicle operators switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
- Ensure an adequate water supply is available on the site for effective dust/PM suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes/conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available onsite to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Construction (Medium Risk)

- 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 make sure that appropriate additional control measures are in place.

Measures Specific to Trackout (Medium Risk)

- 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.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect onsite haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10m from receptors, where possible.

Appendix 7 Dispersion Model Results

Annual Mean NO₂ Impacts

Receptor	Without (µg/m ³)	With (µg/m ³)	With % of AQO	Change (µg/m ³)	Change (% AQO)	Impact Descriptor
R1	16.2	16.6	41.5	0.4	0.9	Negligible
R2	15.7	16.0	40.1	0.3	0.8	
R3	14.0	14.3	35.7	0.3	0.6	
R4	14.6	14.8	37.0	0.3	0.6	
R5	14.1	14.3	35.8	0.3	0.6	
R6	12.2	12.4	31.1	0.2	0.5	
R7	13.7	14.0	34.9	0.2	0.6	
R8	13.1	13.4	33.6	0.3	0.7	
R9	10.0	10.1	25.3	0.1	0.3	
R10	11.7	11.9	29.8	0.2	0.5	
R11	9.9	10.0	25.1	0.1	0.2	

Note: Results are reported to the nearest 0.1µg/m³. Any apparent discrepancies in results are due to rounding.

Annual Mean PM₁₀ Impacts

Receptor	Without (µg/m ³)	With (µg/m ³)	With % of AQO	Change (µg/m ³)	Change (% AQO)	Impact Descriptor
R1	14.3	14.5	36.2	0.2	0.5	Negligible
R2	14.2	14.4	36.0	0.2	0.4	
R3	13.6	13.8	34.4	0.1	0.4	
R4	12.8	12.9	32.4	0.1	0.3	
R5	12.9	13.0	32.5	0.1	0.3	
R6	12.7	12.8	32.0	0.1	0.2	
R7	13.4	13.5	33.8	0.1	0.3	
R8	13.4	13.5	33.8	0.2	0.4	
R9	11.6	11.7	29.2	0.1	0.1	
R10	13.1	13.2	33.1	0.1	0.3	
R11	12.2	12.3	30.8	0.1	0.2	

Note: Results are reported to the nearest 0.1µg/m³. Any apparent discrepancies in results are due to rounding.

Annual Mean PM_{2.5} Impacts

Receptor	Without (µg/m ³)	With (µg/m ³)	With % of AQO	Change (µg/m ³)	Change (% AQO)	Impact Descriptor
R1	8.7	8.8	43.9	0.1	0.5	Negligible
R2	8.7	8.7	43.7	0.1	0.5	
R3	8.3	8.4	42.0	0.1	0.4	
R4	7.9	8.0	39.9	0.1	0.3	
R5	7.9	8.0	40.0	0.1	0.3	

Receptor	Without (µg/m ³)	With (µg/m ³)	With % of AQO	Change (µg/m ³)	Change (% AQO)	Impact Descriptor
R6	7.6	7.7	38.3	<0.1	0.2	
R7	8.0	8.0	40.2	0.1	0.3	
R8	8.2	8.3	41.4	0.1	0.4	
R9	7.3	7.3	36.5	<0.1	0.2	
R10	8.2	8.3	41.3	0.1	0.3	
R11	7.7	7.8	38.9	<0.1	0.2	

Note: Results are reported to the nearest 0.1µg/m³. Any apparent discrepancies in results are due to rounding.



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