

6 Air Quality & Odour

6.1 Introduction

6.1.1 This chapter assesses the likely significant effects of the Proposed Development in terms of air quality. The chapter is supported by the following appendices:

- Appendix 6.1 Air Quality Policy
- Appendix 6.2 Dust Risk Assessment Methodology
- Appendix 6.3 Dispersion Modelling Methodology

6.1.2 The Proposed Development would not give rise to any significant odour impacts and associated effects during either construction or operation. Significant odour effects are unlikely and have been scoped out of the assessment. This accords with the review of the proposed scope set out in the pre-application enquiry in August 2025 and agreed with WBC where odour was excluded from the scope to be considered.

6.1.3 The chapter describes: the assessment methodology, the current and future baseline conditions at the Site and in the surrounding area, the likely significant environmental effects, the mitigation measures required to prevent, reduce or offset any significant adverse effects, the likely residual effects after these measures have been employed and the cumulative effects associated with the Proposed Development at Arborfield alongside other committed schemes.

Legislation and Policy Context

6.1.4 The assessment has been informed by the following legislation, policies and published guidance:

6.1.5 International Legislation including:

- The European Air Quality Framework Directive and Daughter Directives^{i, ii} which set out a series of limit values for the protection of human health

6.1.6 National Legislation and Policy including:

- The Environment Actⁱⁱⁱ and Part IV of the Environment Act 1995 (as amended)^{iv}
- Air Quality Standards (Amendment) Regulations 2016^v, which amended the Standard Regulations 2010^{vi}
- Regulation 2 of the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020/1313 ("Environment EU Exit Regulations 2020")^{vii}
- Clean Air Strategy^{viii}
- National Planning Policy Framework (NPPF)^{ix} and Planning Practice Guidance (PPG)^x
- Environmental Improvement Plan 2023^{xi} and the updated Environmental Improvement Plan 2025^{xii}
- Environmental Targets (Fine Particulate Matter) (England) Regulations 2023^{xiii}

6.1.7 Regional Policy

- Wokingham Borough Council Local Plan Core Strategy^{xiv}, in particular Policy CP1 on Sustainable Development.
- Wokingham Borough Managing Development Delivery Plan^{xv}
- Wokingham Borough Emerging Local Plan Update 2023-2040 Proposed Submission Plan^{xvi}, in particular Policy C1 on Active and sustainable transport and accessibility and Policy HC6 on Air pollution and air quality.
- Sustainable Design and Construction Supplementary Planning Document^{xvii}
- Wokingham Borough Council Air Quality Action Plan^{xviii}

6.1.8 National guidance and industry standards, including:

- Air Quality Strategy for England, Scotland, Wales and Northern Ireland, and updated Air Quality Strategy for England^{xix} which implements the European Union's Directives and sets out the air quality objectives (AQOs) and government policy on achieving these objectives^{xx}
- Local Air Quality Management Technical Guidance 2022 (LAQM.TG(22))^{xxi}, which provides advice as to where the national AQOs apply and support to local authorities in carrying out their duties under the Environment Act 1995 and subsequent regulations
- Institute of Air Quality Management (IAQM) guidance on Land-Use Planning and Development Control: Planning for Air Quality^{xxii}
- IAQM guidance on the Assessment of Dust from Demolition and Construction^{xxiii}

6.1.9 Further details of the relevant guidance are included in Appendix 6.1 Air Quality Policy.

6.2 Assessment methodology

Assessment Scope

6.2.1 The main air pollutants of concern covered in this assessment are dust and particulate matter with an aerodynamic diameter of less than 10 µm (PM₁₀), typically generated during construction activities and from industrial sources, and nitrogen dioxide (NO₂), PM₁₀ and particulate matter with an aerodynamic diameter of less than 2.5 µm (PM_{2.5}), typically generated by road traffic and combustion engine emissions.

6.2.2 Consideration has been given to the following potential impacts and associated likely effects of the Proposed Development on local air quality during construction:

- Proposed Development works dust impacts and associated effects on ecological receptors, human health and amenity as per the IAQM Dust Guidance^{xxiv}.
- Proposed Development demolition and construction traffic emission effects on ecological and human health receptors as per the IAQM Guidance^{xxv}.

6.2.3 Consideration has been given to the following potential air quality impacts and associated likely effects during operation:

- Operational traffic emissions, in-combination with other cumulative schemes, and the associated effects on human health receptors both on- and off-Site as per the IAQM Guidance^{xxvi}; and
- Site suitability for Proposed Development.

6.2.4 The following potential impacts have been scoped out of the assessment on the basis that significant effects are considered unlikely to occur:

- During construction, vehicle movements associated with access would vary over the course of the construction programme, with short periods of peak heavy-duty vehicle (HDVs) movements mainly associated with excavation works and the delivery of materials. The estimated maximum number of construction annual average daily traffic (AADT) would be 190 vehicles, of which 44 would be heavy duty vehicles (HDVs), which is below the threshold of daily movements outside an Air Quality Management Area (AQMA) for an assessment to be necessary according to IAQM guidance. The construction traffic is expected to access the Site via Langley Common Road and travelling west via Observer Way. Therefore, no construction traffic would be expected to travel east towards the Wokingham AQMA, located approximately 4.5 km northeast of the Site. Vehicle movements associated with construction are typically significantly lower than the number of vehicle movements associated with the completed development activities, which have been taken into account in this assessment. A Construction Environmental Management Plan (CEMP) will outline measures to control and minimise the risk of adverse effects from construction activities (see Chapter 3 – Proposed Development). The CEMP will be submitted to the Local Authority for its approval. The CEMP will consider HDV and other construction traffic movements, including details of routing and times of day of movements. HDV access will be prevented or minimised, where possible, on traffic sensitive roads, residential streets, congested roads or unsuitable junctions. Accordingly, the effects of construction related vehicle emissions would be negligible and not significant and has not been considered further in this assessment;
- The impact of the Proposed Development's operational traffic emissions on Wokingham AQMA has been scoped out of the assessment as the traffic level increase associated with the Proposed Development as it passes through the AQMA will be below the 100 AADT threshold that would give rise to significant effects. Most development-related trips are unlikely to pass through the AQMA, as the location of key services, employment areas, and the train station are located to the west of Wokingham, which can be accessed without routing through the AQMA, as detailed in Chapter 11 Transport and Access.
- For ecological receptors, the recommended criteria for an assessment of road traffic emissions to be undertaken is a change in traffic of more than 1,000 light duty vehicles (LDV) per day or 250 HDVs (development alone or in-combination with other cumulative developments) on a road within 200m of a designated habitat site. A number of designated sites have been identified within 5 km of the Site: Longmoor Bog Site of Special Scientific Interest (SSSI) and Local Nature Reserve (LNR), located approximately 570 m southeast of the Site and adjacent to a small area of ancient

woodland, with additional patches of ancient woodland located within Arborfield Green; Bramshill SSSI, located approximately 3.4 km southwest; Thames Basin Heaths Special Protection Area (SPA), located approximately 3.4 km southwest; and Heath Lake SSSI, located approximately 4 km southeast. The Proposed Development's operational phase is predicted to generate a maximum of 1154 AADT on Baston Road which will distribute along the road network as follows: 232 AADT LDVs along Biggs Lane (east of Princess Marina Drive), 288 AADT LDVs on Langley Common Road (east of Biggs Lane), and 275 AADT LDVs on Langley Common Road (west of Biggs Lane). Therefore, no increases in traffic flows of more than 1,000 LDVs or 250 HDVs (from the development alone or in combination with other cumulative developments) have been predicted on roads within 200 m of Longmoor Bog SSSI and LNR or other designated sites. The air quality effects of the Proposed Development on these designated sites is considered to be not significant and have therefore been scoped out of this assessment.

- The impacts of the Proposed Development's Energy and Sustainability Strategy on air quality has been scoped out of the assessment because the Proposed Development currently anticipates the use of electric energy solutions and renewable energy generation and therefore no significant air pollutant emissions would be expected.
- The impact of other existing air pollutant emission sources, such as impacts from the operation of nearby existing industrial activities has been scoped out of the assessment as no significant emissions sources were identified in the proximity of the Site.

Establishing Baseline Conditions

- 6.2.5 To establish baseline air quality within the study areas, monitoring data from the following sources was reviewed and assessed:
- Continuous and passive air quality monitoring conducted by Wokingham Borough Council (WBC) up to and including 2024^{xxvii}; and
 - National pollution maps published by Defra which cover the whole country on a 1x1 km grid^{xxviii}.
- 6.2.6 The dispersion model ADMS-Roads Urban has been used to estimate future baseline conditions within the construction and operational study areas.
- 6.2.7 The baseline has also been informed by 2024 traffic data, provided by the transport consultant, i-Transport (Chapter 11 Transport and Access).
- 6.2.8 No Site-specific monitoring study was undertaken at the Site as the baseline identified that good local air quality monitoring was available and considered representative of the study area.

During Construction Methodology

- 6.2.9 During construction, the main potential impacts would be dust annoyance and locally elevated concentrations of PM₁₀. These impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source. Separation distance is also an important factor as significant dust annoyance is usually limited to within a few hundred metres of its source. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.

6.2.10 The risk of dust emissions from construction activities is related to factors, including:

- The activities being undertaken and proximity to sensitive receptors;
- The duration of these activities;
- The size of the Site;
- The mitigation measures implemented; and
- Meteorological conditions.

6.2.11 The assessment has been carried out using the IAQM guidance methodology for determining the significance of construction dust on local air quality using a simple four step process:

- Screen the requirement for a more detailed assessment;
- Assess the risk of dust impacts;
- Determine any required Site-specific mitigation; and
- Define post mitigation effects and their significance.

6.2.12 The IAQM methodology on the assessment of the impacts of construction on air quality is detailed in Appendix 6.2 Dust Risk Assessment Methodology.

During Operation Methodology

6.2.13 The changes to air quality due to traffic emissions have been predicted using the ADMS-Roads Urban dispersion model^{xxix}. ADMS-Roads Urban is a comprehensive dispersion model that can be used to predict concentrations of pollutants in the vicinity of roads and small industrial sources. ADMS-Roads Urban has been extensively validated against both field and laboratory data sets and used for many years in support of planning applications for new residential/commercial developments like the Proposed Development. ADMS-Roads Urban provides an estimate of air quality both without and with a development, taking into account important input data such as background pollutant concentrations, meteorological data and traffic flows. The model parameters, input data, set up and validation process are detailed in Appendix 6.3 Air Quality Dispersion Modelling Methodology.

6.2.14 Traffic data used in the model were provided in annual average daily traffic format for input into ADMS-Roads Urban. The traffic data used in the model are presented in Appendix 6.3 Air Quality Dispersion Modelling Methodology. Traffic data are derived from a combination of 2024–2025 survey flows and 2040 strategic model outputs, which have not been fully aligned, resulting in some discrepancies in baseline coverage and HGV representation. For more information, please refer to Chapter 11 (Transport and Access).

Impact Assessment and Significance Criteria

Significance Criteria

6.2.15 The criteria used to assess whether an effect is significant, are set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the overall effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Air Quality Objectives

6.2.16 A summary of the air quality objectives (AQOs) relevant to the Proposed Development, as set out in the UK Air Quality Strategy and Air Quality Standards Regulations 2010 (as amended by the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020), is presented in Table 6.1 below.

Table 6.1 UK Air Quality Objectives for NO₂, PM₁₀ and target for PM_{2.5}

Pollutant	Concentration	Measured as
NO ₂	40 µg/m ³	Annual mean
	200 µg/m ³	Hourly mean not to be exceeded more than 18 times per year (99.8th percentile)
PM ₁₀	40 µg/m ³	Annual mean
	50 µg/m ³	24 hour mean not to be exceeded more than 35 times a year (90.4th percentile)
PM _{2.5}	20 µg/m ³	Annual mean

6.2.17 In January 2023, a legally binding PM_{2.5} Annual Mean Concentration Target (AMCT) and a legally binding Population Exposure Reduction Target (PERT) were prescribed in the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023^{xxx} pursuant to the Environment Act 2021. These statutory targets require that by 31 December 2040:

- Annual average of 10 µg/m³ not to be exceeded at any monitoring station.
- Population exposure at least 35% lower than in 2018.

6.2.18 The Environmental Improvement Plan^{xxxi} set interim targets to be met by 31 January 2028, specifically:

- An annual mean PM_{2.5} concentration target of 12 µg/m³.
- A 22% reduction in population exposure compared to 2018.

6.2.19 The 2025 Environmental Improvement Plan^{xxxii} updates and accelerates interim ambition by committing to achieve the following by December 2030:

- Annual mean PM_{2.5} concentration target of 10 µg/m³.
- A 30% reduction in population exposure compared to 2018.

6.2.20 As defined by the regulations, the AQOs for the protection of human health are applicable outside of buildings (or other natural or man-made structures above or below ground) and where members of the public are regularly present. AQOs do not apply in workplace locations, to internal air or where people are unlikely to be regularly exposed (i.e. centre of roadways). Guidance on where the AQOs should and should not apply is provided within LAQM.TG (22), as detailed in Table 6.2.

Table 6.2 Locations where the AQOs should and should not generally 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 façades 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.
24-hour mean	All locations where the annual mean objective would apply, together with hotels. 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.
1-hour mean	All locations where the annual mean and: 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations 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 where members of the public might reasonably expect to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

6.2.21 In this assessment, all AQOs apply to the sensitive proposed residential uses.

Assessment of Sensitivity of Receptors

Construction

6.2.22 This assessment has used the IAQM guidance definition of a sensitive receptor in relation to construction dust impacts as being any location where a person, property or ecological receptors may experience the adverse effects of airborne dust or dust soiling, or exposure to PM₁₀ over a time period relevant to the air quality objectives (as detailed in Table 6.1 and Table 6.2). The IAQM methodology on the assessment of the impacts of construction on air quality is detailed in Appendix 6.2 Dust Risk Assessment Methodology.

6.2.23 The overall sensitivity of the area for each of the four activities (demolition, construction, earthworks and trackout) to human health impacts is determined by the combination of annual average PM₁₀ concentrations, the number and sensitivity of the receptors with the distance from the source. The highest level of sensitivity should be recorded. Ecological receptors are defined as any sensitive habitat affected by dust soiling, through both direct and indirect effects.

6.2.24 During construction, sensitive human health receptors are all the properties and industrial/commercial uses within 250 m from the Site and designated protected areas identified within 50 m from the Site, as shown in Figure 6.1. It is recognised that not all relevant receptors are listed; however, the key sensitive receptors include:

- Residential properties at the southern boundary of the Site to the north and east of Biggs Lane;
- Farley Hill Primary School;
- Cumulative schemes within or in proximity of the Site; and
- Areas of Ancient Woodland, which sits next to the northern boundary of the Site (NE reference: 52839).

Operation

Existing Receptors

6.2.25 The Site is located in an edge-of-settlement semi urban area, with sensitive receptors located along the road network where an increase in traffic flows brought about by the Proposed Development is predicted. Sensitive receptors were chosen to reflect places where members of the public would receive relevant exposure to annual mean and hourly pollutant concentrations from vehicle emissions. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, where there is a combined effect of several road links.

6.2.26 There are no degrees of sensitivity for existing human receptors or future human receptors occupying the Proposed Development to poor air quality, rather, the assessment is based on whether or not members of the public are likely to be present for the proposed averaging period of the objective, as detailed in Table 6.1 and Table 6.2. The sensitivity of human receptors was accounted for in the definition of the AQO values and therefore all human receptors that represent exposure of the public are of equal sensitivity as any member of the public could be present at those locations. For consistency with EIA regulations and methodology, the existing human receptors or future human receptors occupying the Proposed Development are considered to be of high sensitivity.

6.2.27 The human receptors identified as being the worst-case locations sensitive to the Proposed Development during operation and which have been scoped-in to the assessment are summarised in Table 6.3 and displayed in Figure 6.2. The worst-case human receptors are representative of all sensitive human receptors within the study area.

Table 6.3 Summary of Operational Sensitive Existing Receptors Scoped into Assessment

Receptor	Location	X (m)	Y (m)	Type
Existing Receptors				
R1	Baston Road	476786	166198	Residential
R2	Baston Road	476782	166097	Residential
R3	Biggs Lane	476732	165995	Residential
R4	Biggs Lane	476677	166051	Residential
R5	Biggs Lane	476688	166096	Residential
R6	Princess Marina Drive	477028	165917	Residential
R7	Princess Marina Drive	477170	165921	Residential
R8	Princess Marina Drive	477356	165928	Residential
R9	Biggs Lane	477189	165767	Residential
R10	Princess Marina Drive	476872	165748	Residential
R11	Princess Marina Drive	476779	165688	Residential
R12	Baird Road	476585	166134	Residential
R13	Langley Common Road	476475	166124	Residential
R14	Eversley Road	476431	166246	Residential
R15	Langley Common Road	476943	166526	Residential
R16	Langley Common Road	477288	166717	Residential
R17	The Bull at Barkham	477960	166930	Commercial
R18	Barkham Road	478338	167166	Residential
R19	Bearwood Road	478338	167191	Residential
R20	The Bull at Barkham	477973	166930	Commercial

Site Suitability Receptors

6.2.28 To assess the Application Site's suitability for the Proposed Development, sensitive human receptor locations representative of the Proposed Development's residential uses were selected at the edge of the Proposed Development. These will be worst case locations next to main road links combined with the proposed Site accesses. The Proposed Development's sensitive human receptors are detailed in Table 6.4 and displayed in Figure 6.2.

Table 6.4 Summary of Operational Sensitive Future Site Receptors Scoped into Assessment

Receptor	Location	X (m)	Y (m)	Type
Future Receptors at Proposed Development				
FR1	Langley Common Road	476767	166313	Residential
FR2	Langley Common Road	476825	166377	Residential
FR3	Princess Marina Drive	477447	166016	Residential
FR4	Baston Road	476798	166224	Residential

Assessment of Impact Magnitude and Significance of Effects

Construction

- 6.2.29 The construction dust risk assessment is initially undertaken pre-mitigation to determine the risk of impacts in accordance with the IAQM guidance. The overall sensitivity of the area for each of the four activities (demolition, construction, earthworks and trackout) to dust soiling impacts is determined by the combination of the type, number and sensitivity of human receptors with the distance from the source, as detailed in Appendix 6.2 Dust Risk Assessment Methodology.
- 6.2.30 The scale of impact magnitude and significance of effects, for both the construction and operational phase assessment, follow the IAQM guidance the magnitude scale ranges.
- 6.2.31 The IAQM guidance recommends that no assessment of the significance of dust effects is made without mitigation in place, as mitigation is assumed to be secured by industry best practice, planning conditions, legal requirements or required by regulations. With appropriate mitigation in place, the effect of demolition and construction dust emission impacts on air quality is always assessed as not significant. The purpose of the demolition and construction dust assessment has therefore been to identify the appropriate level of mitigation to employ. The IAQM guidance states: *"For almost all construction, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be not significant"*.

Operation

- 6.2.32 Impact magnitude during operation of the Proposed Development has been assessed in accordance with the IAQM guidance.
- 6.2.33 The impact magnitude criteria in the IAQM guidance are summarised below in Table 6.5. The assessment is made up of two steps – firstly to assess the magnitude of change in concentration (between without and with development) relative to the AQO and secondly the percentage above / below the AQO based upon the total modelled concentration at a given location or receptor. These two values are then combined to obtain the impact descriptor.

Table 6.5 IAQM Impact Magnitude Criteria

Long term average concentration at receptor in assessment year	Percentage (%) Change in Concentration Relative to Annual Mean Air Quality Objective (AQO)			
	<1	2 – 5	6 – 10	>10
75 % or less of AQO	Negligible	Negligible	Minor	Moderate
76-94 % of AQO	Negligible	Minor	Moderate	Moderate
95-102 % of AQO	Minor	Moderate	Moderate	Substantial
103-109 % of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial
Notes: Where concentrations increase, the impact is described as adverse, and beneficial where it decreases. *% change rounded to nearest whole number. Where the % change is less than 0.5% the impact will be Negligible.				

6.2.34 Analysis of long-term monitoring data^{xxiii} suggests that if the annual mean NO₂ concentration is less than 60 µg/m³ then the one-hour mean NO₂ objective is unlikely to be exceeded where road transport is the main source of pollution; this concentration has been used in this assessment to screen whether the one-hour mean objective is likely to be achieved. Similar to NO₂, a PM₁₀ annual mean below 32 µg/m³ is used to screen whether the 24-hour PM₁₀ mean objective is likely to be achieved.

6.2.35 There is no official guidance in the UK on how to assess the significance of local air quality impacts on future proposed receptors introduced by a new development. The assessment of the Site suitability for the Site has been limited to predicting air quality at future receptors at the Application Site and the significance of this is based on whether the AQOs for each pollutant are exceeded or not.

6.2.36 This assessment, in accordance with the IAQM guidance, uses professional judgement to assess the overall significance of the effect on air quality while also taking into account the predicted impacts at the modelled receptor locations and “...will need to take into account such factors as:

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

6.2.37 The overall significance of the effect on local air quality is a binary judgement, i.e. the overall effect is either significant or it is not significant, and there are no degrees of significance of the overall effect. Moderate or major effects would be considered significant, whereas negligible or minor effects would not be considered significant.

Geographic Scope

6.2.38 The extent of the study areas for the Proposed Development’s construction and operation are presented on Figure 6.1 and Figure 6.2, respectively, while the modelled road network is presented in Appendix 6.3 Air Quality Dispersion Modelling Methodology.

Construction

- 6.2.39 The study area for the construction stage assessment is defined as up to 250m from the Site boundary, and within 50m on the roads used by construction vehicles up to 250m from the Application Site entrance, as per the IAQM guidance.

Operation

- 6.2.40 For the operational phase assessment, the study area is defined as roads within 200m of the Site and those roads which experience a significant increase in development traffic leading to potential adverse effects on local air quality, in line with the IAQM guidance criteria. The following criteria were used to define the operational phase study area:

- A change of LDVs flows of more than 500 AADT outside an Air Quality Management Area (AQMA); and
- A change of HDVs flows of more than 100 AADT outside an AQMA.

Temporal Scope

- 6.2.41 The air quality assessment considers the following temporal scenarios:

- 2024 Existing Baseline, using the latest available monitoring data. This scenario provides a robust baseline against which model predictions can be verified.
- Scenario 1: 2040 Future baseline without Arborfield Studios (providing local plan growth and distribution).
- Scenario 2: 2040 Future baseline with Arborfield Studios and Barkham Square (Without vehicle connection between Arborfield Studios and Barkham Square).

- 6.2.42 Although road traffic emissions are predicted to decline with time, to present a robust assessment and take account of uncertainties relating to future vehicle emissions, for the 2040 scenarios, emission factors and background concentrations for the planned first occupation year of 2028 have been combined with full Proposed Development traffic flows for 2040 to inform the air quality assessment. Traffic flows provided by the transport consultant include the cumulative traffic of nearby development activities.

Consultation

- 6.2.43 Consultation with the WBC's Residential & Environmental Team was undertaken in March 2025 to agree the approach to the assessment, and no objection was raised to the proposed methodology.

Assumptions and Limitations

- 6.2.44 There are many components that contribute to the uncertainty in predicted concentrations. Although the model has been extensively validated against field data sets and their use has gained wide acceptance throughout the UK, no computer-based model is able to totally replicate actual conditions as it is required to simplify real-world conditions into a series of algorithms. The model used in this assessment is also dependent upon several sources of data which will have inherent uncertainties associated with them. The model uncertainty has been estimated using the root mean square error and is presented in Appendix 6.3 Air Quality Dispersion Modelling Methodology.

- 6.2.45 The assessment has relied on data provided by the WBC and Defra to characterise baseline conditions on the Site. It has been assumed that these data have been reported correctly and the instruments used have been calibrated.
- 6.2.46 The Proposed Development's traffic impacts have been assessed using predicted traffic flows provided by the Applicant's Transport Consultant, i-Transport, calculated based on the worst-case interpretation of the Proposed Development.
- 6.2.47 The air quality assessment for the baseline year (2024) has used 2024 air quality background data, 2024 air quality monitoring data, 2024 meteorological data and 2024 traffic data to verify the model. This was the latest year with full air quality monitoring results available.
- 6.2.48 Air quality at background and roadside locations is expected to improve in future years due to the gradual renewal of the vehicle fleet with less polluting and more efficient models. The modelling for the operational phase of the Proposed Development in future years has been based on emission factors and background concentrations for the planned opening year of 2028, whilst utilising traffic flows for 2040. As road traffic emissions are predicted to decline with time, this is considered to provide an appropriately conservative assessment taking into account the uncertainties regarding future vehicle emission factors.
- 6.2.49 It is recognised that the baseline may not list all receptors within the Study Areas, however it includes all identified receptors from the reviews undertaken and is considered representative of the baseline at the time of the desk-based assessment.

6.3 Baseline conditions

- 6.3.1 This section summarises the assessment of baseline air quality conditions without the Proposed Development proceeding. The main source of air pollutants currently at the Site is associated with traffic emissions from vehicles using the nearby road network.

Current Baseline

Local Air Quality Monitoring

- 6.3.2 Local authorities are required to periodically review and assess the current and future quality of air in their areas. WBC carries out monitoring of air quality at a number of locations within its area. A summary of the nearest monitoring locations is presented in Table 6.6 and displayed in Figure 6.3.

Table 6.6 Measured NO₂ concentrations

Site Name	Site Type	NO ₂ Annual Mean (µg/m ³)					
		2019	2020	2021	2022	2023	2024
WOK 805	Roadside	25	17.1	18.3	18.5	16.1	15.2
WOK 893	Roadside	-	18.5	20.4	20.4	17.3	16.4
WOK 895	Roadside	-	13.5	16.4	16.6	14.1	13.4
WOK 896	Roadside	-	-	14.9	16.6	13.5	13.5
AQO		40					

- 6.3.3 Measured NO₂ concentrations at the closest monitoring locations to the Site, positioned along Barkham Road approximately 4km northeast of the Site, have been well below the objectives between 2019-2024. Furthermore, since 2022 there has been a decreasing trend across the monitoring locations, which further suggests overtime there are unlikely to be exceedances of NO₂ concentrations within the study area.

Background Maps

- 6.3.4 Background concentrations are those levels that would be observed away from specific sources such as roads and industry. Defra provides modelled predictions of background concentrations of air pollutants over the whole of the UK with a grid resolution of 1km². These 2021 baseline, grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites.
- 6.3.5 Table 6.7 details the estimated NO₂, PM₁₀ and PM_{2.5} background levels within the study area for the baseline year 2024.

Table 6.7 Defra 2024 background mapping

Grid Reference Coordinates (x, y) (m)	Receptor	NO₂ (µg/m³)	PM₁₀ (µg/m³)	PM_{2.5} (µg/m³)
476500, 165500	R3, R10, R11	6.4	11.0	6.6
476500, 166500	R1, R2, R4, R5, R12 to R15, FR1, FR2, FR4	6.3	10.9	6.5
477500, 165500	R6 to R9	6.2	10.5	6.4
477500, 166500	R16, R17, R20, FR3	6.1	10.6	6.4
478500, 167500	R18 and R19	6.5	10.8	6.7
480500, 168500	Diffusion tubes used for model verification	7.9	11.5	7.2
AQO		40	40	20

- 6.3.6 The background concentrations are all well below the relevant AQOs and targets.
- 6.3.7 As NO₂, PM₁₀ and PM_{2.5} concentrations rapidly reduce on moving away from an emissions source, such as a road, some variation in NO₂, PM₁₀ and PM_{2.5} concentrations across the Site is expected. Concentrations of NO₂, PM₁₀ and PM_{2.5} at the Site are likely to be highest adjacent to the surrounding Langley Common Road, reducing gradually to values similar to background concentrations as distance from the road increases towards the centre of the Site.

Future Baseline

- 6.3.8 Concentrations of NO₂, PM₁₀ and PM_{2.5} at background and roadside locations are predicted to decrease in future years due to the gradual renewal of the road transport fleet with less polluting models and implementation of national and regional policies.
- 6.3.9 Background NO₂, PM₁₀ and PM_{2.5} concentration maps produced by Defra for the planned first occupation year of 2028 are provided in Table 6.8. Given that background concentrations of NO₂, PM₁₀ and PM_{2.5} are expected to decrease in future years, the 2028 concentrations of NO₂,

PM₁₀ and PM_{2.5} used in this assessment provide a worst-case estimate for the Proposed Development road traffic impacts.

Table 6.8 Defra 2028 background mapping

Grid Reference Coordinates (x, y) (m)	Receptor	NO₂ (µg/m³)	PM₁₀ (µg/m³)	PM_{2.5} (µg/m³)
476500, 165500	R3, R10, R11	5.2	10.5	6.1
476500, 166500	R1, R2, R4, R5, R12 to R15, FR1, FR2, FR4	5.2	10.3	6.1
477500, 165500	R6 to R9	5.2	9.9	5.9
477500, 166500	R16, R17, R20, FR3	5.0	10.0	5.9
478500, 167500	R18 and R19	5.3	10.2	6.2
480500, 168500	Diffusion tubes used for model verification	6.4	10.9	6.6
AQO/Target		40	40	20/12

6.3.10 The background concentrations presented in Table 6.8 are all well below the relevant AQOs and targets.

6.4 Inherent design mitigation

6.4.1 The potential impacts and significance of the effects on air quality, are characterised in the absence of mitigation measures, beyond those identified and described in Chapters 3 & 4 as embedded into the Proposed Development, for the construction and operational phases of the Proposed Development.

Construction Phase

6.4.2 The IAQM guidance recommends that no assessment of the significance of dust effects is made without mitigation in place, as mitigation is assumed to be secured by industry best practice, planning conditions, legal requirements or required by regulations. The purpose of the demolition and construction dust assessment, detailed in section 6.6, has therefore been to identify the appropriate level of mitigation to employ.

6.4.3 The development has been identified as a high-risk site as detailed in Section 6.6. A summary of the mitigation measures recommended in the IAQM guidance to reduce impacts from high-risk sites is found in Table 6.9.

6.4.4 The mitigation measures for both direct impacts and those from traffic would be detailed within the Site's Construction Management Plan (CMP), which would be secured by means of an appropriately worded planning condition and submitted to the local authority prior to works commencing on Site. The CMP would also include mitigation measures to minimise impacts from HDV traffic and non-road mobile machinery (NRMM) associated with the construction works on the Site.

Table 6.9 Recommended Dust Mitigation Measures for High-Risk Sites

Phase	Mitigation Measure
Communications	Display name and contact details of responsible person for dust issues on Site boundary in addition to head/regional office contact information. Display the head or regional office contact information.
Dust management plan	Develop and implement a Dust Management Plan (DMP) which would be included as part of the CEMP, to be approved by the Local Authority.
Site management	Record all complaints and incidents in a Site log. Take appropriate measures to reduce emissions in a timely manner, and record the measures taken within the log. Make the complaints log available to the Local Authority if requested. Record any exceptional dust incidents on or off Site. Hold regular liaison meetings with other high risk construction sites within 500m.
Monitoring	Undertake daily on and off Site visual inspections where there are nearby receptors. Carry out regular inspections to ensure compliance with the DMP and record results in the Site log book. Increase the frequency of inspections during activities with a high potential to create dust or in prolonged dry weather. Given that predicted PM₁₀ within the study area are well below the objective, exceedances of the PM₁₀ objectives at relevant receptors are unlikely and therefore a real-time monitoring programme is not considered to be required. However, the need to monitor dust deposition, dust flux, or real-time PM₁₀ continuous monitoring should be confirmed with the local authority.
Preparing and maintaining the Site	Enforce an on-Site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas. Use solid screens around dusty activities and around stockpiles. Avoid Site runoff of water and mud. Fully enclose the Site or specific operations where there is a high potential for dust production and the Site is active for an extensive period. Keep Site fencing barriers and scaffolding clean using wet methods. Remove dusty materials from Site as soon as possible. Minimise emissions from stockpiles by covering, seeding, fencing or damping down.
Operating vehicle/machinery and sustainable travel	Enforce an on-Site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas. Ensure vehicles switch off engines when stationary. Avoid use of diesel or petrol generators where possible. Produce a Construction Logistics Plan (CLP) to manage the sustainable delivery of goods and materials.

Phase	Mitigation Measure
	Implement a Travel Plan that supports and encourages sustainable travel for staff working on Site.
Operations	Cutting, grinding or sawing equipment only to be used with suitable dust suppression equipment or techniques. Ensure adequate water supply for effective dust and particulate matter suppression. Use enclosed chutes, conveyors and covered skips. Minimise drop heights of materials. Ensure suitable cleaning material is available at all times to clean up spills.
Waste management	Avoid bonfires. Avoid explosive blasting using appropriate manual or mechanical techniques. Bag and remove any biological debris.
Measures specific to demolition	Soft strip buildings before demolition. Ensure effective water suppression during demolition. Avoid explosive blasting, using appropriate manual or mechanical alternatives. Bag and remove any biological debris or damp down such material before demolition.
Measures specific to construction	Ensure aggregates are stored in bunded areas and are not allowed to dry out. Avoid concrete scabbling where possible. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos. For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Measures specific to trackout	Use water-assisted dust sweepers to clean access and local roads where necessary. Avoid dry sweeping of large areas. Ensure vehicles entering and leaving the Site are appropriately covered where necessary. Inspections of haul roads to be recorded in Site log, including any remedial action taken. Implement a wheel washing system. Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the Site exit. Access gates to be located at least 10m from the receptors where possible.
Measures specific to earthworks	Re-vegetate earthworks and exposed areas / soil stockpiles to stabilise surfaces as soon as practicable. Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil. Only remove the cover in small areas during work and not all at once.

Operational Phase

6.4.5 As part of the Applicant's commitment to ensure an appropriate development response, the Applicant and the design team have developed a number of measures within the development proposals to ensure that the potential for adverse effects are avoided:

- A stand-alone Transport Assessment has been prepared, which considers the impacts of the development upon the surrounding transport networks and includes measures to minimise the reliance upon private car which are integrated into the design of the Proposed Development;
- An active travel strategy is part of the Transport Assessment and seeks to prioritise active travel both into and through the Site;
- Implementation of the Travel Plan during operation which includes Electric Vehicle (EV) charging infrastructure, improvements to walking and cycling infrastructure and provision of mobility hubs.
- The Proposed Development trip generation accounts for a 10% reduction in private vehicle trips to assist with WBC's Climate Action Plan target of reducing ICE vehicle mileage by increasing the use of sustainable travel modes;
- Multiple walking and cycling connections are proposed to link to existing routes to form a network through the Site connecting Baston Road, Bridle Road, Princess Marina Drive and Langley Common Road. These will connect to the wider greenway network across Arborfield Green to provide for safe and convenient travel on foot or by cycle
- The Proposed Development proposes a bus corridor along the main secondary street route of the development forming a loop road between Princess Marina Drive and Baston Road through the Site. The bus corridor will also uplift the accessibility to bus services for neighbouring development parcels on Princess Marina Drive, Oak Drive and Baston Road.
- An Energy and Sustainability Statement will accompany the application and demonstrate how the development will incorporate sustainable design. The statement demonstrates how the Proposed Development will meet the key policy objectives, and considers, where appropriate, a broad range of sustainability aspects relating to energy and CO₂ emissions.

6.5 Potential effects prior to additional mitigation

Construction Phase

6.5.1 During the construction of the Proposed Development, the key potential impacts likely to result in significant effects would be dust annoyance and locally elevated PM₁₀ concentrations from construction activities. These impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source. The main air quality impacts to arise during construction activities are:

- Amenity loss and annoyance resulting from dust deposition and soiling;
- Visible dust plumes, which are evidence of dust emissions; and

- Elevated PM₁₀ and PM_{2.5} concentrations, as a result of dust generating activities on Site.

6.5.2 The following activities have the potential to cause emissions of dust:

- Site preparation including delivery of construction material, erection of fences and barriers;
- Demolition of the existing Nailsea Junior FC club house on the Site;
- Earthworks including digging foundations and landscaping;
- Materials handling such as storage of material in stockpiles and spillage;
- Construction of the Proposed Development; and
- Disposal of waste materials off-Site.

6.5.3 Typically, the main cause of unmitigated dust generation on construction Sites is from demolition and vehicles using unpaved haul roads, and off-Site from the suspension of dust from mud deposited on local roads by construction traffic. The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor.

6.5.4 The area around the Site is predominantly farmland to the north and with adjacent residential areas mainly to the south of the Site. Using the evaluation criteria within the IAQM's Guidance, the potential dust emission magnitude has been identified for each stage of the Proposed Development assuming that the embedded measures within the CEMP would not be implemented to provide a worse case theoretical scenario in accordance with the IAQM guidance, as shown in Table 6.10.

Table 6.10 Dust Emission Magnitude

Activity	Dust Emission Magnitude	Justification
Demolition	Small	Existing buildings at the Site to be demolished. Total building volume <12,000 m ³ and demolition activities <6 m above ground.
Earthworks	Large	The total Site area >110,000 m ² and is on an area of dusty soil type (clay, loamey or clayey soils). >10 heavy earth moving vehicles active at any one time.
Construction	Large	Total building volume >75,000 m ³ , on Site concrete batching, sandblasting
Trackout	Large	>50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material unpaved road length > 100 m

6.5.5 The next stage of the process is to define the sensitivity of the assessment area to dust soiling and human health.

- Residential dwellings are “high” sensitivity receptors to dust soiling effects.
- Commercial and industrial Sites as well as short-term car parks are considered to be of “medium” sensitivity to dust soiling effects.
- Ecological receptors with a local designation, such as ancient woodland, where the features may be affected by dust deposition parks are considered to be of “low” sensitivity.

6.5.6 This process combines the sensitivity of the receptor with distance from the source to determine the overall sensitivity as summarised in Table 6.11 and shown in Figure 6.1.

Table 6.11 Sensitivity of the area to dust impacts

Sensitivity to Dust Soiling	Sensitivity to Human Health Impacts	Sensitivities of Receptors to Ecological Effects
High – 10 – 100 High sensitivity residential receptors within 20 m of the Site, which includes dwellings adjacent to the Application Site boundary	Low - Mapped PM ₁₀ background concentrations in the vicinity of the Site are below 24 µg/m ³ (Refer to Table 6.7). There are >10 high sensitivity receptors within 20 m of the Application Site.	Low - Areas of Ancient Woodland next to the northern Site boundary

6.5.7 The sensitivity of the area is High for sensitivities of people to dust soiling, due to the distance of the construction activities from human receptors, and due to the residential dwellings adjacent to the western boundary of the Site and cumulative schemes within the wider area. The sensitivity of the area is low for ecological receptors, due to the type of local designation features of the ancient woodland.

6.5.8 There are no nearby PM₁₀ monitoring Sites, but the estimated mapped background PM₁₀ concentration around the development Site is 10.9 µg/m³ in 2024, less than 50% of the objective level. Therefore, the risk to human health is considered Low.

Table 6.12 Summary of the dust risk impacts for the Proposed Development

Sensitivity of Surrounding Area to Impacts	Dust Emission Magnitude			
	Demolition (small)	Earthworks (large)	Construction (large)	Trackout (large)
Dust Soiling (High)	Medium	High	High	High
Human Health (Low)	Negligible	Low	Low	Low
Ecological (Low)	Negligible	Low	Low	Low

6.5.9 The overall maximum dust risk from the Proposed Development is predicted to be High Risk. This is due to the scale of operations and the sensitivity of receptors in the surrounding area. The highest risk category should be applied to determine which mitigation measures are applicable. Therefore, the general mitigation measures applicable to a high-risk Site should be applied.

6.5.10 Following best practice measures for High Risk sites will help to reduce the impact of the construction activities to an acceptable level. These measures are provided in Table 6.9 in Section 6.5. These should be included within the Outline Construction Management Plan (CMP). The inherent mitigation measures contained in the CMP will reduce the risk of impacts associated with dust soiling for human and ecological receptors and human health to negligible which will result in temporary **not significant (negligible adverse)** effects, in accordance with the IAQM guidance.

The risk of impacts for each construction activity of the Proposed Development in the absence of mitigation has been defined by combining the dust emission magnitude in Table 6.9 with the sensitivity assessment in Table 6.10 in accordance with the IAQM guidance, as shown in Table 6.12.

Operational Phase

Existing Human Health Receptors

6.5.11 The results of the dispersion modelling at existing receptors as a result of traffic generated for Scenario 1: 2040 Future baseline without Arborfield Studios (providing local plan growth and distribution) and for Scenario 2: 2040 Future baseline with Arborfield Studios and Barkham Square (Without vehicle connection between Arborfield Studios and Barkham Square) are detailed in Table 6.12 to Table 6.14.

Table 6.13 Predicted NO₂ Concentrations without and with the Proposed Development in place (µg/m³)

Receptor	Scenario 1 without the Development	Scenario 2 with the Development	% Change	Impact Magnitude	Significance of Effect
R1	7.1	7.4	0.8%	Negligible	Not Significant
R2	7.1	7.4	0.8%	Negligible	Not Significant
R3	6.9	7.0	0.3%	Negligible	Not Significant
R4	6.9	7.0	0.2%	Negligible	Not Significant
R5	8.2	8.3	0.3%	Negligible	Not Significant
R6	6.9	7.1	0.5%	Negligible	Not Significant
R7	6.2	6.3	0.3%	Negligible	Not Significant
R8	6.2	6.4	0.4%	Negligible	Not Significant
R9	6.9	7.0	0.2%	Negligible	Not Significant
R10	6.7	6.8	0.3%	Negligible	Not Significant
R11	7.1	7.3	0.5%	Negligible	Not Significant
R12	8.5	8.6	0.2%	Negligible	Not Significant
R13	13.5	13.6	0.3%	Negligible	Not Significant
R14	7.7	7.8	0.2%	Negligible	Not Significant
R15	8.5	8.6	0.2%	Negligible	Not Significant
R16	8.8	8.9	0.2%	Negligible	Not Significant
R17	10.3	10.4	0.2%	Negligible	Not Significant

Receptor	Scenario 1 without the Development	Scenario 2 with the Development	% Change	Impact Magnitude	Significance of Effect
R18	14.2	14.3	0.4%	Negligible	Not Significant
R19	18.4	18.6	0.4%	Negligible	Not Significant
R20	10.5	10.6	0.2%	Negligible	Not Significant
AQO	40		-		

Table 6.14 Predicted PM₁₀ Concentrations without and with the Proposed Development in place (µg/m³)

Receptor	Scenario 1 without the Development	Scenario 2 with the Development	% Change	Impact Magnitude	Significance of Effect
R1	11.2	11.4	0.4%	Negligible	Not Significant
R2	11.2	11.4	0.4%	Negligible	Not Significant
R3	11.2	11.3	0.1%	Negligible	Not Significant
R4	11.1	11.2	0.1%	Negligible	Not Significant
R5	11.8	11.9	0.2%	Negligible	Not Significant
R6	10.7	10.8	0.3%	Negligible	Not Significant
R7	10.4	10.5	0.2%	Negligible	Not Significant
R8	10.4	10.5	0.2%	Negligible	Not Significant
R9	10.8	10.8	0.1%	Negligible	Not Significant
R10	11.2	11.3	0.2%	Negligible	Not Significant
R11	11.4	11.5	0.2%	Negligible	Not Significant
R12	11.9	11.9	0.1%	Negligible	Not Significant
R13	14.1	14.1	0.1%	Negligible	Not Significant
R14	11.4	11.4	0.1%	Negligible	Not Significant
R15	12.0	12.0	0.1%	Negligible	Not Significant
R16	12.0	12.0	0.1%	Negligible	Not Significant
R17	12.4	12.4	0.1%	Negligible	Not Significant
R18	14.2	14.3	0.2%	Negligible	Not Significant
R19	16.2	16.2	0.2%	Negligible	Not Significant
R20	12.4	12.4	0.1%	Negligible	Not Significant
AQO	40		-		

Table 6.15 Predicted PM_{2.5} Concentrations without and with the Proposed Development in place (µg/m³)

Receptor	Scenario 1 without the Development	Scenario 2 with the Development	% Change	Impact Magnitude	Significance of Effect
R1	6.5	6.6	0.7%	Negligible	Not Significant
R2	6.5	6.6	0.7%	Negligible	Not Significant
R3	6.5	6.5	0.2%	Negligible	Not Significant
R4	6.5	6.5	0.2%	Negligible	Not Significant
R5	6.8	6.8	0.3%	Negligible	Not Significant
R6	6.3	6.4	0.5%	Negligible	Not Significant

Receptor	Scenario 1 without the Development	Scenario 2 with the Development	% Change	Impact Magnitude	Significance of Effect
R7	6.2	6.2	0.3%	Negligible	Not Significant
R8	6.2	6.2	0.3%	Negligible	Not Significant
R9	6.4	6.4	0.2%	Negligible	Not Significant
R10	6.5	6.5	0.3%	Negligible	Not Significant
R11	6.6	6.6	0.4%	Negligible	Not Significant
R12	6.8	6.9	0.1%	Negligible	Not Significant
R13	8.0	8.0	0.3%	Negligible	Not Significant
R14	6.6	6.6	0.1%	Negligible	Not Significant
R15	6.9	6.9	0.2%	Negligible	Not Significant
R16	6.9	7.0	0.2%	Negligible	Not Significant
R17	7.1	7.2	0.2%	Negligible	Not Significant
R18	8.2	8.3	0.3%	Negligible	Not Significant
R19	9.3	9.3	0.3%	Negligible	Not Significant
R20	7.2	7.2	0.2%	Negligible	Not Significant
AQO/ Target	12	-			

6.5.12 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations in 2040 (combined with 2028 background and emission factors) without and with the Proposed Development in place would be well below the relevant objectives at all assessed existing receptor locations.

6.5.13 The predicted annual mean NO₂ concentrations with the Proposed Development in place are well below 60 µg/m³, which indicates that the hourly mean objective is unlikely to be exceeded. None of the predicted annual mean PM₁₀ concentrations exceed 32 µg/m³ and therefore the 24-hour mean PM₁₀ objective is unlikely to be exceeded.

6.5.14 Overall, considering the conservative nature of the assessment, on combining 2028 emission factors and backgrounds with 2040 traffic data, and the IAQM criteria for assessing significance, the permanent effects on NO₂, PM₁₀ and PM_{2.5} concentrations will be **not significant (negligible adverse)** effects.

Site Suitability

6.5.15 Existing (or projected) air quality can also impact the occupants of the Proposed Development, through the introduction of new sensitive receptors into an area of potential poor air quality.

6.5.16 The results of the dispersion modelling at future Site receptors for Scenario 2: 2040 Future baseline with Arborfield Studios and Barkham Square (Without vehicle connection between Arborfield Studios and Barkham Square) are detailed in Table 6.15.

Table 6.16 Predicted NO₂, PM₁₀ and PM_{2.5} Concentrations at Proposed Development Receptors for Site Suitability (µg/m³)

Receptor	Scenario 2 with the Proposed Development (µg/m ³)		
	NO ₂	PM ₁₀	PM _{2.5}
FR1	9.1	12.2	7.0
FR2	11.0	13.3	7.6
FR3	5.7	10.3	6.1
FR4	7.1	11.2	6.5
AQO /Target	40	40	20/12

6.5.17 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations at the Proposed Development's receptors would be well below the relevant objectives. Air quality at the Site would therefore be suitable for the Proposed Development without the need for mitigation. The effects on NO₂, PM₁₀ and PM_{2.5} concentrations on future Site receptors will be a direct and permanent **negligible** effect, which is **not significant**.

6.6 Additional Mitigation

Construction Phase

6.6.1 With the embedded construction phase mitigation measures detailed in the CMP, the effect of demolition and construction dust emission impacts on air quality is always assessed as not significant. As such, no additional mitigation is required to reduce the direct effects of the Proposed Development demolition and construction activities.

Operational Phase

6.6.2 The effects of development traffic on local air quality based on the conservative assessment undertaken are judged to be not significant. No additional traffic mitigation is therefore required to reduce the direct effects of the Proposed Development on local air quality.

6.6.3 However, the Applicant and the design team have developed a number of design measures which will further ensure that the potential for adverse effects are avoided, as detailed in section 6.4.

6.7 Residual effects

Construction Phase

6.7.1 With appropriate inherent mitigation in place the residual effect of demolition and construction effects remain as reported, temporary, **negligible adverse** impacts which result in **not significant effects**.

Operational Phase

- 6.7.2 No additional mitigation is required in respect of the operation of the Proposed Development and the operational effects remain as reported at existing receptors, **negligible adverse** impact on air quality which is direct and permanent, but which is overall considered to be **not significant**.
- 6.7.3 Air quality objectives are expected to be met at future sensitive receptors during the operation of the Proposed Development and therefore result in a direct and permanent **negligible adverse** impacts which result in **not significant effects**.

6.8 Implications of Climate Change

- 6.8.1 Future climate projections for the UK, including the South East, indicate hotter, drier summers under UKCP18 scenarios, alongside reduced summer rainfall. These conditions may increase the sensitivity of the baseline environment to dust generation during dry periods, although the Proposed Development already includes appropriate controls and no change to the assessed significance of dust effects is anticipated.
- 6.8.2 UK climate projections also show that conditions conducive to wildfires are expected to become more frequent due to rising temperatures, lower humidity and drier ground surfaces. While wildfires remain relatively uncommon, any regional smoke events could temporarily affect background air quality in the wider area. However, these changes do not alter the conclusions of the assessment, and no additional mitigation is required.
- 6.8.3 Overall, climate change may influence future baseline variability, but no new significant air quality effects are predicted, and the previously assessed impacts remain valid.

6.9 Cumulative effects

- 6.9.1 This section summarises the cumulative effects of the Proposed Development in combination with the wider cumulative schemes identified in Chapter 5 - Approach to Assessment.
- 6.9.2 Due to the close proximity both geographically and temporally of the developments' impacts, any effects will be similar and in some cases identical between the developments.

Barkham Square

- 6.9.3 Barkham Square and the Proposed Development are anticipated to have overlapping construction programmes as well as being operational at the same time.

Construction Phase

- 6.9.4 During construction, potential cumulative demolition and construction effects could occur should construction activities at Barkham Square occur at the same time as the Proposed Development.
- 6.9.5 The overall cumulative dust risk emission of the Proposed Development alone or in combination with Barkham Square would remain at the maximum high risk level, due to the scale of operations of the development Sites and the number of sensitive receptors in the surrounding area. The IAQM's recommended mitigation measures for high risk would be applicable to both Sites, which will be incorporated into the developments' specific CMPs.

- 6.9.6 Significant cumulative effects are unlikely to occur as each scheme is anticipated to employ similar dust mitigation techniques such that the individual construction stage effects are **not significant**, alone or in combination. The inherent mitigation measures contained in the CMP will reduce the risk of impacts to **negligible** which will result in temporary **not significant (negligible adverse)** effects, in accordance with the IAQM guidance.

Operational Phase

- 6.9.7 Traffic data used in this assessment includes the cumulative schemes and Barkham Square, since it is not practicable to separate the impacts of road traffic from each of the developments sharing the local road network. Operational impacts and effects from road sources have only been assessed for the Proposed Development in combination with Barkham Square and other cumulative schemes. Cumulative effects during operation of the Proposed Development in combination with Barkham Square have been assessed in Section 6.2 as part of the potential effects of the Proposed Development and are considered to be **not significant**. The overall operation phase assessment has been presented in Section 6.2 and will not be repeated in this section.

Wider Committed Development

Construction Phase

- 6.9.8 During construction, potential cumulative demolition and construction effects could occur should construction of cumulative schemes occur at the same time as the Proposed Development and within 250 m from the Application Site, according to IAQM guidance. Significant cumulative effects are unlikely to occur as each scheme is anticipated to employ similar dust mitigation techniques such that the individual construction stage effects are **not significant**, alone or in combination.

Operational Phase

- 6.9.9 The traffic flows provided by the transport consultant include an overall increase of traffic flows based on the local plan growth and distribution and therefore includes potential cumulative schemes within the study area. Cumulative effects during operation of the Proposed Development have been assessed in Section 6.2 as part of the potential effects of the Proposed Development and are considered to be **not significant**. The assessment has been presented in Section 6.2 and will not be repeated in this section.

6.10 Summary

- 6.10.1 The potential impacts and likely effects of the Proposed Development on air quality and the suitability of the Site for the Proposed Development have been assessed. Potential sources of emissions have been identified and assessed in the context of existing air quality and the nature and location of receptors.
- 6.10.2 The main air pollutants of concern are dust and particulate matter with an aerodynamic diameter of less than 10 µm (PM₁₀), typically generated during demolition and construction activities and from industrial sources, and nitrogen dioxide (NO₂), PM₁₀ and particulate matter with an aerodynamic diameter of less than 2.5 µm (PM_{2.5}), typically generated by road traffic and combustion engine emissions.
- 6.10.3 The local air pollution sources are mainly related to road traffic associated with vehicles travelling along the local road network (Langley Common Road) close to the Site. The nearest

Air Quality Management Area, designated for Nitrogen Dioxide (NO₂) levels is at Wokingham approximately 4.5km northeast of the Site. Air quality monitoring data was obtained from Wokingham Borough Council monitoring Sites to establish the status of existing air quality. The data was used as the basis for air quality modelling and predictions.

- 6.10.4 Measured NO₂ concentrations at the closest monitoring locations positioned along Barkham Road approximately 4km east of the Site, have been well below the objectives between 2019-2024. Furthermore, since 2022 there has been a decreasing trend across the monitoring locations, which further suggests overtime there is unlikely to be exceedances of NO₂ concentrations within the study area. As concentrations fall-off rapidly on moving away from an emissions source, such as a main road, some variation in NO₂, PM₁₀ and PM_{2.5} concentrations across the Site is expected. Concentrations at the Site are likely to be highest closest to Langley Common Road reducing gradually to levels similar to background values as distance from the main road increases.
- 6.10.5 During construction of the Proposed Development, the key potential impacts likely to result in significant effects would be dust annoyance and locally elevated PM₁₀ concentrations from construction activities. These impacts have the potential to occur when dust generating activities coincide with dry, windy conditions and where sensitive receptors are located downwind of the dust source. The overall maximum dust risk from the Proposed Development's construction activities is predicted to be high. However, through the effective implementation of the Construction Environmental Management Plan (CEMP), which will include the Institute of Air Quality Management's (IAQM) mitigation measures for high dust risk sites recommended in this Chapter, the dust risk will result in temporary **negligible adverse (not significant)** effects.
- 6.10.6 The number of heavy-duty vehicles and the light duty vehicles generated during the construction works has been assessed. It is considered that emissions from this number of vehicles would result in temporary negligible effects on local air quality. However, additional mitigation would be provided through measures set out the CEMP in order to reduce these effects further.
- 6.10.7 During construction of the Proposed Development in combination with Barkham Square and other committed developments, the effects will be similar to those predicted for the Proposed Development on its own as combined they will remain to be of high magnitude dust risk. However, with the effective implementation of the development specific CEMPs (or equivalent), dust risk will result in temporary **negligible adverse (not significant)** cumulative effects.
- 6.10.8 During operation of the Proposed Development in combination with Barkham Square and other committed developments, the predicted NO₂, PM₁₀ and PM_{2.5} concentrations at the assessed receptors within the operational study area will be well below the relevant Air Quality Objectives (AQOs) with or without the Proposed Development in place. The changes in NO₂, PM₁₀ and PM_{2.5} annual mean concentrations will result in permanent **negligible adverse (not significant)** cumulative effects..
- 6.10.9 At the new residential receptors introduced by the Proposed Development air quality are predicted to meet all relevant air quality objectives and therefore the Proposed Development would not introduce new receptors into an area of poor air quality.

6.11 Assessor information

Table 6.17 Assessor Information

Chapter	Responsibility	Name	Qualifications	Assessor information
Air Quality	Aether	Ana Gomes	MSc Environmental Engineering MSc Environmental Sciences and Technology Member of the Institute of Air Quality Management and the Institution of Environmental Sciences	Ana has over 13 years' experience as an environmental professional with over 10 years' in the field of air quality. Ana has expertise in carrying out ambient air quality assessments for major development and infrastructure projects, with particular expertise in transport related emissions air quality modelling (using modelling software ADMS-Roads). She has produced many air quality environmental impact assessments (EIA) for large mixed-use developments, dust and odour nuisance assessments and carried out ambient monitoring surveys. Ana is also an experienced user of mapping software including ArcGIS.
Air Quality	Aether	Sam Putman	BSc (Hons) Environmental Sciences MRes Climate and Atmospheric Science	Sam is an assistant consultant at Aether with an academic background in Air Quality and Environmental Sciences. Sam has experience in completing Air Quality Assessments, also learning and becoming experienced in applying QGIS and Atmospheric Dispersion Modelling System (ADMS) to visualise and model the impacts of Air Quality. Additionally, Sam has also contributed to and independently completed Energy and Sustainability statements for larger developments. This reinforced Sam's understanding towards national and regional policies, measures and legislation towards Air Quality and Sustainability.

Table 6.18 Summary of effects

Receptor	Receptor sensitivity	Description of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction Phase					
Existing Off-Site Human Health and Amenity	High	Dust Soiling and PM ₁₀ due to demolition and construction works	Embedded mitigation part of the Construction Environmental Management Plan (CEMP)	Negligible Adverse	Not significant
Existing Off-Site Ecological receptors	Low	Dust Soiling and PM ₁₀ due to demolition and construction works	Embedded mitigation part of the Construction Environmental Management Plan (CEMP)	Negligible Adverse	Not significant
Existing Off-Site Human Health	High	NO ₂ , PM ₁₀ and PM _{2.5} due to vehicle emissions	Embedded mitigation part of the Construction Environmental Management Plan (CEMP)	Negligible Adverse	Not significant
Existing Off-Site Ecological receptors	Low	NO ₂ , PM ₁₀ and PM _{2.5} due to vehicle emissions	Embedded mitigation part of the Construction Environmental Management Plan (CEMP)	Negligible Adverse	Not significant
Operation Phase					
Existing Off-Site Human Health	High	NO ₂ , PM ₁₀ and PM _{2.5} effects due to vehicle emissions	None required	Negligible Adverse	Not significant
Future On-Site Human Health	High	NO ₂ , PM ₁₀ and PM _{2.5} effects due to local air quality	None required	Negligible Adverse	Not significant

6.12 Mitigation commitments Summary

Table 6.19 Summary for Securing Mitigation

Identified receptor	Type and purpose of additional mitigation measure (prevent, reduce, offset, enhance)	Means by which mitigation may be secured (e.g. planning condition / legal agreement)	Delivered by	Auditable by
Construction Phase				
Existing sensitive receptors within 250 m of the Application Site and future occupiers of earlier phases of the Proposed Development	Embedded mitigation part of the Construction Environmental Management Plan (CEMP)	Planning Condition	Contractor	LPA
Operation Phase				
Existing On and Off-Site Human Health	The effects of development traffic on local air quality are judged to be not significant. Nonetheless, the promotion of sustainable travel modes through the Travel Plan will help to reduce impacts on local air quality.	Planning Condition, Travel Plan monitoring	Applicant	LPA

6.13 References

- ⁱ 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.
- ⁱⁱ European Air Quality Directive 2004/107/EC. European Air Quality Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.
- ⁱⁱⁱ Secretary of State, 2021. The Environment Act Chapter 30. HMSO
- ^{iv} Secretary of State, The Environment Act 1995 part IV Air Quality. HMSO.
- ^v Secretary of State, 2016. Statutory Instrument 2016, No. 1184, The Air Quality Standards (Amendment) Regulations 2016. HMSO, London.
- ^{vi} Secretary of State, 2010. Statutory Instrument 2010, No. 1001, The Air Quality Standards Regulations 2010. HMSO, London.
- ^{vii} <https://www.legislation.gov.uk/ukxi/2020/1313/made>
- ^{viii} Secretary of State, The Environment Act 1995 part IV Air Quality. HMSO.
- ^{ix} Ministry of Housing, Communities and Local Government, 2026. National Planning Policy Framework. HMSO.
- ^x Ministry of Housing, Communities and Local Government, 2019. Planning Practice Guidance. Available from: <https://www.gov.uk/government/collections/planning-practice-guidance>
- ^{xi} Defra, 2023. Environmental Improvement Plan 2023. Available from: <https://www.gov.uk/government/publications/environmental-improvement-plan/environmental-improvement-plan-2023-executive-summary>
- ^{xii} Defra, 2025. Environmental Improvement Plan 2025. Available from: <https://www.gov.uk/government/publications/environmental-improvement-plan-2025/environmental-improvement-plan-eip-2025#chapter-2-environmental-quality>
- ^{xiii} <https://www.legislation.gov.uk/ukxi/2023/96/contents/made>
- ^{xiv} Wokingham Borough Council (January 2010) Core Strategy. <https://www.wokingham.gov.uk/planning-policy/adopted-development-plan/local-plans>
- ^{xv} Wokingham Borough Council (2014) Development Plan. Available at: <https://www.wokingham.gov.uk/sites/wokingham/files/2023-06/Adopted%20MDD.pdf>
- ^{xvi} Wokingham Borough Local Plan Update 2023 – 2040 Proposed Submission Plan. Available at: <https://www.wokingham.gov.uk/planning-policy/adopted-development-plan/local-plans>
- ^{xvii} Wokingham Borough Local Development Framework Sustainable Design and Construction Supplementary Planning Document. Available at [wokingham.gov.uk/planning-policy/adopted-planning-guidance](https://www.wokingham.gov.uk/planning-policy/adopted-planning-guidance)
- ^{xviii} Wokingham Borough Council Air Quality Action Plan. Available at <https://www.wokingham.gov.uk/sites/wokingham/files/2023-06/final%20action%20plan.pdf>
- ^{xix} <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england>
- ^{xx} Department of the Environment, Transport and the Regions in Partnership with the Welsh Office, Scottish Office and Department of the Environment for Northern Ireland, 2007. The Air Quality Strategy for England, Scotland, Wales, Northern Ireland. HMSO, London.
- ^{xxi} Defra, 2022. Local Air Quality Management Technical Guidance (England) 2022 (TG22). HMSO. <https://iaqm.defra.gov.uk/air-quality/featured/uk-regions-exc-london-technical-guidance/>
- ^{xxii} Moorcroft and Barrowcliffe et al., 2017. Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London. <http://iaqm.co.uk/guidance/>
- ^{xxiii} IAQM, 2024. Guidance on the Assessment of Dust from Demolition and Construction, V2.2, Institute of Air Quality Management, London. <http://iaqm.co.uk/guidance/>
- ^{xxiv} IAQM, 2024. Guidance on the Assessment of Dust from Demolition and Construction, V2.2, Institute of Air Quality Management, London. <http://iaqm.co.uk/guidance/>
- ^{xxv} Moorcroft and Barrowcliffe et al., 2017. Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London. <http://iaqm.co.uk/guidance/>
- ^{xxvi} IAQM, 2024. Guidance on the Assessment of Dust from Demolition and Construction, V2.2, Institute of Air Quality Management, London. <http://iaqm.co.uk/guidance/>
- ^{xxvii} Wokingham Borough Council, 2025 Air Quality Annual Status Report. June 2025.
- ^{xxviii} Department for the Environment, Food and Rural Affairs (Defra) (2024) 2021 Based Background Maps for NO_x, NO₂, PM₁₀ and PM_{2.5}.

^{xxix} [Moorcroft and Barrowcliffe et al., 2017. Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London. http://iaqm.co.uk/guidance/](http://iaqm.co.uk/guidance/)

^{xxx} Statutory Instrument 2023, No. 96, The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023.

^{xxxi} Defra, 2023. Environmental Improvement Plan 2023. Available from:
<https://www.gov.uk/government/publications/environmental-improvement-plan/environmental-improvement-plan-2023-executive-summary>

^{xxxii} Defra, 2025. Environmental Improvement Plan 2025. Available from:
<https://www.gov.uk/government/publications/environmental-improvement-plan-2025/environmental-improvement-plan-eip-2025#chapter-2-environmental-quality>

^{xxxiii} Defra, 2022. Local Air Quality Management Technical Guidance (England) 2022 (TG22). HMSO.