12.0 AIR QUALITY

Introduction

12.1 This Chapter has been prepared by Mott MacDonald. This Chapter assesses the likely environmental effects of the construction and operation of the 'Proposed Development', on air quality.

12.2 A summary of relevant legislation and policies, along with a description of the methodology used to assess the likely environmental effects of the Proposed Development is provided within this Chapter. The baseline conditions are set out followed by a summary of the potential impacts and the design and mitigation measures. The assessment of likely significant effects is provided which considers relevant design and mitigation measures that would be implemented during the construction and operation of the Proposed Development.

12.3 The Proposed Development will require site preparation and construction works and will generate additional traffic on the local road network. In operation the Proposed Development will generate additional traffic, particularly during match days, as well as traffic associated with the hotel and wellbeing facilities amongst others. Therefore, there is the potential for significant changes to air quality in the vicinity of the Proposed Development, and the ES includes an assessment of the effect of these changes with respect to air quality. The assessment will consider:

- the impacts of dust soiling and effects on concentrations of course particulate matter (PM_{10}) during the construction period
- the impacts of emissions from road traffic generated by the development on concentrations of nitrogen dioxide (NO_2), course particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$) at sensitive receptors along the local road network during both construction and operation, and
- whether any additional mitigation measures will be required to address any significant air quality effects.

12.4 The assessment of air quality impacts has been carried out in accordance with best practice guidance issued by the Institute of Air Quality Management (IAQM) and Department for Food and Rural Affairs (Defra). The assessment will support other disciplines such as ecology and nature conservation and climate change by providing information to inform their assessments.

Legislation and Policy

12.5 The following legislation, policy and guidance documents have been used to inform the air quality assessment of the Proposed Development:

- The Air Quality Standards Regulations, 2010[i]
- The Air Quality Standards (Amendment) Regulation, 2016[ii]

- The Air Quality (amendment of Domestic Regulations) (EU Exit) Regulations, 2019[iii]
- Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[iv]
- Part IV of the Environment Act, 1995, as amended 2021[v]
- Air Quality (England) Regulations, 2000 (as amended)[vi]
- The Clean Air Strategy, 2019[vii]
- National Planning Policy Framework 2023[viii]
- National Planning Practice Guidance, 2019[ix]
- Air quality strategy: framework for local authority delivery (2023)[x]
- IAQM and Environmental Protection UK Land-Use Planning & Development Control:
- Planning for Air Quality, 2017[xi]
- IAQM Guidance on the assessment of dust from demolition and construction (2024)[xii]
- Defra's Local Air Quality Management Technical Guidance (LAQM TG22)[xiii]
- National Highway's Design Manual for Roads and Bridges (DMRB) LA 105 Air quality guidance[xiv]
- Cherwell District Council (CDC) Local Plan 2011-2031[xv]
- Oxford City Council (OCC) Local Plan 2016-2036[xvi]
- Vale of White Horse District Council (VWHDC) Local Plan 2031[xvii]

National Legislation

Air Quality Standards Regulations 2010

12.6 The Air Quality Standards Regulations 2010, Air Quality Standards (amendment) Regulations 2016, Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019, and Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 implement Directive 2008/50/EC on ambient air quality.

12.7 These pieces of legislation define limit values and timescales within which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing, or preventing harmful concentrations of air pollutants.

12.8 The limit values are presented in **Table 12.1** and **Table 12.2** and apply everywhere, with the exception of:

- Any locations situated within areas where members of the public do not have access and there is no fixed habitation.
- In accordance with Article 2(1) of the Air Quality Directive 2008/50/EC[xviii], on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply.
- On the carriageway of roads.

- On the central reservations of roads except where there is normally pedestrian access to the central reservation.

12.9 Defra assesses and reports on compliance with the limit values for each of the 43 zones and agglomerations across the UK. Zones and/or agglomerations achieve compliance when everywhere within the zone and/or agglomeration (except locations provided in the Directive) does not exceed the relevant limit value. The Proposed Development is located within the South East Zone. In July 2017, Defra published the 'Air Quality Plan for tackling roadside nitrogen dioxide concentrations in South East (UK0031)'[xix]. The plan presents general information regarding this zone, as well as details of NO_2 exceedances within the zone and details of local air quality measures that have been or will be implemented, or are being considered for implementation.

Part IV of the Environment Act 1995

12.10 Part IV of the Environment Act 1995 (as amended by Schedule 11 of the Environment Act 2021) requires that every local authority shall periodically carry out a review of air quality within its area, including predictions of likely future air quality. The air quality objectives specifically for use by local authorities in carrying out their air quality management duties are set out in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002. In most cases, the air quality objectives are set at the same pollutant concentrations as the limit values transposed in UK law, although compliance dates differ.

12.11 As part of the review of air quality, the relevant local authority must assess whether air quality objectives are being achieved or are likely to be achieved within the relevant periods, and identify the key sources of emissions responsible for the failure to achieve the objectives. Any parts of a local authority's area where the objectives are not being achieved or are not likely to be achieved within the relevant period, must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, the relevant local authority is under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

12.12 The Environment Act 1995 (as amended by Schedule 11 of the Environment Act 2021) requires the UK Government to produce a national Air Quality Strategy (AQS).

Statutory Nuisance

12.13 Section 79(1)(d) of the Environmental Protection Act (1990)[xx] defines one type of 'statutory nuisance' as "any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance". Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply

with an abatement notice is an offence. Best practicable means is a widely used defence by operators, if employed to prevent or to counteract the effects of the nuisance.

12.14 In the context of the Proposed Development, the main potential for nuisance of this nature will arise during the construction phase - potential sources being the clearance, earthworks, construction and landscaping processes.

12.15 The aforementioned regulations define the air quality limit values and air quality objectives for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants. For the assessment, baseline air quality concentrations are compared against the limit values and objectives to help identify the sensitivity of the area that the Proposed Development is situated in. The possible impact of changes in concentrations of air pollutants which could occur as a result of the Proposed Development are considered taking into account the existing baseline.

National Policy

Air Quality Strategy for England, Scotland, Wales & Northern Ireland

12.16 The Environment Act requires the UK Government to produce a national Air Quality Strategy (AQS). The AQS establishes the UK framework for air quality improvements. The measures agreed at the national and international level are the foundations on which the strategy is based. The first AQS, adopted in 1997, and its subsequent iterations has now been superseded as of 14 January 2019 with the Clean Air Strategy 2019 (CAS)[vii].

12.17 The CAS does not set legally binding objectives, but instead has targets for reducing total UK emissions of NOx and $PM_{2.5}$ from sectors such as road transport, domestic sources and construction plant (non-road mobile machinery).

12.18 Further to this, the UK Government has produced a draft revised AQS. The Government carried out consultation on the revised draft in April 2023, the responses to which will be used to help inform the final revised AQS due to be published later in 2023. The revised AQS will replace the 2007 strategy and compliment the CAS. The revised AQS will set out the actions the Government expects local authorities in England to take in support of achieving the Government's long-term air quality goals, including the two new $PM_{2.5}$ targets, which are as follows:

- an annual mean concentration target for $PM_{2.5}$ of 10 µg/m^3 at any monitoring station by 2040.
- a population exposure reduction target of 35% by 2040 compared to a 2018 baseline.

12.19 As well as this, the Environmental Improvement Plan 2023 for England records the legal targets and sets interim targets to be met by the end of January 2028. These targets are not legal thresholds but have been included for reference. They are:

- The highest annual mean concentration in the most recent full calendar year must not exceed 12 µg/m^3 of $PM_{2.5}$.
- Compared to 2018, the reduction in population exposure to $PM_{2.5}$ in the most recent full calendar year must be 22% or greater.

National Planning Policy Framework

12.20 The revised National Planning Policy Framework (NPPF) was published in December 2023 and sets out the Government's planning policy framework for England, including the Government's expectation for content and quality of planning applications and local plan policy.

12.21 With regard to air quality, the NPFF states that:

- Paragraph 180 *'Planning policies and decisions should contribute to and enhance the natural and local environment by: …preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality…'*
- Paragraph 192 *'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.'*

National Planning Practice Guidance

12.22 On 6 March 2014, the Department for Communities and Local Government published a National Planning Practice Guidance web-based resource which was last updated on 24 June 2021.

12.23 The National Planning Practice Guidance includes a dedicated section on air quality (last updated 1 November 2019). It notes that, for new planning applications, the local planning authority may require information on:

- 'the 'baseline' local air quality', including what would happen to air quality in the absence of the development;
- 'whether the Proposed Development could significantly change air quality during the construction and operational phases '(and the consequences of this for public health and biodiversity)'; and
- 'whether occupiers or users of the development could experience poor living conditions or health due to poor air quality'.

12.24 It also states the following in relation to determining whether air quality is relevant to a planning decision:

- *'Whether air quality is relevant to a planning decision will depend on the Proposed Development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the Proposed Development would be particularly sensitive to poor air quality in its vicinity'.*

25 Year Environment Plan

12.25 The Department for Environment, Food & Rural Affairs (Defra) "A Green Future: Our 25 Year Plan to Improve the Environment" (25 Year Environment Plan) (2018) is a policy paper published on 11 January 2018 setting out what Government will do to improve the environment, including restoring and safeguarding wildlife habitats. The first revision of the 25 Year Environment Plan 'Environmental Improvement Plan 2023' was published on 31 January 2023 and sets the two interim targets presented in Section 12.19 for $PM_{2.5}$ annual mean concentrations and population exposure.

12.26 The 25 Year Environment Plan sets out aims to achieve clean air by:

- *"Meeting legally binding targets to reduce emissions of five damaging air pollutants; this should halve the effects of air pollution on health by 2030".*
- *"Ending the sale of new conventional petrol and diesel cars and vans by [2030]" (The original deadline of 2040 has been brought forward).*
- *"Maintaining the continuous improvement in industrial emissions by building on existing good practice and the successful regulatory framework".*

12.27 The assessment has considered the targets set out for $PM_{2.5}$ within the assessment as set out in Section 12.19.

Air Quality Plan for Nitrogen Dioxide in the UK

12.28 The latest plan for tackling roadside NO_2 concentrations was published by the Department for Environment, Food and Rural Affairs (Defra) in July 2017 and details the government's plan to reduce NO_2 concentrations to within statutory limits within the shortest possible time. Within this plan, several named local authorities with exceedances of the NO_2 limit values are required to undertake a local assessment to consider the best options to achieve compliance with this limit value.

Local policy

12.29 The Proposed Development is located within Cherwell District Council (CDC). In addition to the local policies for CDC, policies for adjacent local authorities relevant for this assessment have also been presented in this section.

Cherwell District Local Plan

12.30 CDC's Local Plan 2011- 2031[xv] was adopted in December 2016 and sets out the spatial vision for the district and strategic policies for future development in the district. A review of The Cherwell Local Plan indicated the following policy in relation to air quality that is relevant to this assessment:

- Policy ESD 10 – Protection and Enhancement of Biodiversity and the Natural Environment

12.31 With regard to air quality, Policy ESD 10 (Protection and Enhancement of Biodiversity and the Natural Environment) states that *'Air quality assessments will [also] be required for development proposals that would be likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution.'*

12.32 In addition, Policy ESD 15 (The Character of the Built and Historic Environment) states that *'New development proposals should Integrate and enhance green infrastructure and incorporate biodiversity enhancement features where possible. Well-designed landscape schemes should be an integral part of development proposals to support improvements to biodiversity, the microclimate, and air pollution and provide attractive places that improve people's health and sense of vitality'.*

12.33 The Local Plan also retains Policy ENV 1 of the Adopted Local Plan 1996, which states that *'… development which is likely to cause materially detrimental levels of noise, vibration, smell, smoke, fumes or other type of environmental pollution will not normally be permitted'. Furthermore 'the Council will seek to ensure that the amenities of the environment, and in particular the amenities of residential properties, are not unduly affected by development proposals which may cause environmental pollution, including that caused by traffic generation'.*

12.34 The Cherwell Local Plan 2011 - 2031 (Part 1), A Partial Review of the Local Plan (LPPR) - Oxford's Unmet Housing Need[xxi] has been undertaken to address the additional need for housing in Oxfordshire. The Proposed Development will be adjacent to Policies PR6b, PR6c, PR7a, and PR7b of the plan.

Oxford City Council Local Plan

12.35 The Oxford City Council (OCC) Local Plan 2016 - 2036[xvi] was adopted in June 2020 and is a part of Oxford's Local Plan. It contains a vision for Oxford and contains policies against which all planning applications are judged. A review of The Oxford Core Strategy 2036 indicated the following policy in relation to air quality that is relevant to this assessment:

- Policy RE6: Air Quality;
- Policy RE7: Managing the Impact of Development
- Policy M2: Assessing and Managing Development.

Vale of White Horse Local Plan

12.36 The Vale of White Horse Local Plan 2031[xvii] was adopted in December 2016 and sets out a vision for development of buildings, infrastructure and in the Vale. Policies of relevance to air quality include:

- Core Policy 33: Promoting Sustainable Transport and Accessibility.

'The Council will work with Oxfordshire City Council and others to: …

vi. Promote and support improvements to the transport network that increase safety, improve air quality and/or make our towns and villages more attractive.'

- Core Policy 34: A34 Strategy. This includes a commitment to:

'…develop an air quality monitoring framework associated with the A34 within the Vale of White Horse District to monitor any impact on the Oxford Meadows SAC'

- Core Policy 43: Natural Resources

'The Council encourages developers to make provision for the effective use of natural resources where applicable, including: …

vi. takes account of, and if located within an AQMA, is consistent with, the Council's Air Quality Action Plan'

Summary

12.37 This section has identified the legislation and policy framework relevant to this assessment. On the basis of the above, applicable air quality objectives and limit values for the Proposed Development are summarised in **Table 12.1** and **Table 12.2**, hereafter referred to as the air quality objectives.

Please note, the new PM2.5 air quality target set out in the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[xxii] is not a legally binding target until 2040 and therefore has not been included in **Table 12.1**.

Table 12.1 - Relevant Air Quality Objectives and Limit Values

Pollutant	Averaging Period	Concentration (µg/m^3)	Allowance	Attainment Date	
				Air Quality Objectives	Limit Values
NO_2	Annual	40	-	31 December 2005[(a)]	1 January 2010[(c)]
	1 Hour	200	18	31 December 2005[(a)]	1 January 2010[(c)]
Particulates (PM_{10})	Annual	40	-	31 December 2004[(a)]	1 January 2005[(c)]
	24 Hour	50	35	31 December 2004[(a)]	1 January 2005[(c)]
Particulates ($PM_{2.5}$)[(d)]	Annual	20	-	-	1 January 2020[(c)]
	Annual	25	-	2020[(b)]	

Notes:
[(a)] Air Quality (England) Regulations 2000 as amended
[(b)] Air Quality Strategy 2007
[(c)] EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe, as transposed into UK Law
[(d)] As the Air Quality Strategy 2007 and EU Directive 2008/50/EC have a different numerical standard for $PM_{2.5}$, the more stringent standard of 20µg/m^3 has been adopted for this assessment.

Table 12.2 - Relevant Air Quality Objectives and Limit Values for Ecological Receptors

Pollutant	Averaging Period	Concentration (µg/m^3)	Allowance	Attainment Date	
				Air Quality Objectives	Limit Values
Oxides of nitrogen (NOx) [(c)] [(d)]	Annual	30	-	31 December 2000[(a)]	19 July 2001[(b)]

Notes:
[(a)] Air Quality (England) Regulations 2000 as amended
[(b)] Air Quality Strategy 2007
[(c)] EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe, as transposed into UK Law
[(d)] Designated for the protection of vegetation and ecosystems and also referred to as the 'critical level' for NOx. The policy of the UK statutory nature conservation agencies is to apply the annual mean NOx criterion in internationally designated conservation sites and Site of Special Scientific Interest (SSSI) on a precautionary basis, as the limit value applies only to locations more than 20 kilometres from towns with more than 250,000 inhabitants or more than 5 kilometres from other built-up areas, industrial installations or motorways.

12.38 It should be noted that the UK air quality objectives only apply at locations where members of the public might reasonably be exposed to pollutants for the respective averaging periods. **Table 12.3**Error! Reference source not found. provides details of where the respective objectives should and should not apply, and therefore the types of receptors that are relevant to the assessment of air quality.

Table 12.3 - Locations at which the Air Quality Objectives Apply

Averaging Period	Where objectives should apply	Where objectives should not apply
Annual	All locations where members of the public might be regularly exposed.	Building façades of offices or other places of work where members of the public do

	Building façades of residential properties, schools, hospitals, care homes, etc.	not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24-Hour	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	All locations where the annual mean and 24-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 be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

Source: Local Air Quality Management-Technical Guidance (LAQM TG22[xiii])

Assessment Methodology and Significance Criteria

Consultation

12.39 A scoping report setting out our proposed methodology has been submitted for comment. A Scoping response from CDC, received on 29 September 2023 highlighted in item 6.17 that there were no comments on the proposals for Air Quality assessments. The OCC Public Health response sets out the requirement for an air quality assessment and/or dust management plan for the Proposed Development, with specific identification of sensitive receptors and mitigation measures. The air quality assessment presented in this chapter considers both construction and operational effects, identifying any necessary mitigation measures to reduce the effects from construction activities and identifying the worst case sensitive receptors, (i.e. those receptors likely to experience the largest changes or the highest emissions) from changes in traffic.

Construction

Construction Dust

12.40 Construction activities can result in temporary effects from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns in diameter; the most common impacts from dust emissions are soiling and increased ambient PM_{10} concentrations. Dust can arise from numerous construction activities such as concrete-batching, piling, sand blasting, wind erosion

on material stockpiles and earth-moving activities. It can be mechanically transported either by wind or through the movement of vehicles onto the public highway (transport of debris on vehicle wheels, or uncovered loads).

12.41 Guidance from the Institute of Air Quality Management (IAQM)[xii] recommends splitting the construction activities into four separate source categories and determining the dust risk associated with each of these individually. This assessment has determined the risk of each of the following source categories:

- Demolition
- Earthworks
- Construction
- Trackout (the transport of dust and dirt onto the public road network)

12.42 The risk of each source for dust effects is described as 'negligible', 'minor risk', 'moderate risk' or 'major risk' depending on the nature and scale of the construction activities, and the proximity of sensitive receptors to the construction activities or the Proposed Development boundary. The assessment is used to identify appropriate mitigation measures proportional to the level of risk, to reduce the effects such that they are not significant.

12.43 The assessment considers three separate effects from dust:

- Annoyance due to dust soiling
- Harm to ecological receptors
- The risk of health effects due to an increase in exposure to PM_{10}

12.44 Step 1 of the assessment applies screening criteria to the Proposed Development, which states that an assessment will normally be required where there is:

- A 'human receptor' within:
  - 250m of the Proposed Development boundary
  - 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the Proposed Development entrance(s)
- An 'ecological receptor' within:
  - 50m of the Proposed Development boundary; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the Proposed Development entrance(s)

12.45 To assess the likely dust risk, firstly the overall dust emission magnitude ('Low', 'Medium' or 'High') from each of the dust sources identified (demolition, earthworks, construction and trackout) is established in accordance with the criteria outlined in Table A 12.1, see **Appendix 12.1**.

12.46 The sensitivity of receptors is then defined (as 'High', 'Medium' or 'Low') for each dust effect (dust soiling, human health and ecosystem impacts) in accordance with the criteria presented within Table A 12.2, see **Appendix 12.1.**

12.47 The sensitivity of the surrounding area is determined for each activity using the matrices in Table A 12.3 to Table A 12.5, see **Appendix 12.1**. The sensitivity of the area is based on the distance of the source to the closest receptors, the receptor sensitivity, and in the case of PM_{10} effects, the local background concentration. The highest level of area sensitivity defined for each dust effect has been used in this assessment.

12.48 The final step of the assessment combines the dust emission magnitude and the sensitivity of the area, using the matrices presented within Table A 12.6 to Table A 12.9, see **Appendix 12.1,** to determine the dust risk categories for each activity for dust soiling and health effects.

12.49 The dust risk category defined for each dust source and effect is then used to determine appropriate site-specific mitigation measures to be adopted. It should be noted that in line with the recommendations of IAQM guidance, significance is only assigned to construction effects following mitigation.

12.50 Results of the construction dust assessment are presented in Sections 12.148 to 12.152.

Construction Site Plant

12.51 Construction requires the use of different equipment such as excavators, cranes and on-site generators. All construction plant has an energy demand resulting in direct emissions to air from exhausts. Guidance from the IAQM [xii] notes that effects from exhaust will likely not be significant. Given the small-scale and temporary nature of the construction plant and the implementation of best practice measures, effects of plant emissions on local air quality are considered of negligible significance relative to the surrounding road traffic contributions on the local road network. Construction plant emissions have therefore not been assessed further. However, mitigation measures to reduce the impacts on local air quality are presented in Section 12.174.

Construction Traffic

Scope of Assessment

12.52 Due to changes above the Environmental Protection UK (EPUK) and IAQM guidance screening criteria, a detailed construction traffic assessment has been scoped in. The construction traffic assessment of the Proposed Development has considered the change in pollutant concentrations

at human health and designated habitat receptors as a result of potential increases to traffic emissions.

Pollutants

12.53 In accordance with the IAQM 'Land-Use Planning & Development Control: Planning For Air Quality'[xi] guidance, the operation assessment on human health considers concentrations from NO_2, PM_{10} and $PM_{2.5}$.

12.54 For the assessment of designated habitats, emissions of NOx and ammonia (NH_3), as well as nitrogen deposition with ammonia have also been considered.

Model Verification

12.55 Model verification is a process by which checks are carried out to determine the performance of a dispersion model at a local level, primarily by comparison of modelled results with monitoring data. Differences between modelled and monitored data may occur as a result of uncertainties associated with a number of model inputs including:

- Traffic flows, speeds and vehicle splits;
- Emissions estimates;
- Background concentrations;
- Meteorological data; and
- Surface roughness length and terrain.

12.56 The verification process investigates uncertainties and minimises them either through informed refinement of model input parameters or production of an adjustment factor to be applied to model outputs.

12.57 Verification has been carried out using 2018 monitored results against 2018 baseline traffic data. There is extensive monitoring in the wider area, however only three roadside OCC diffusion tube sites were considered representative within the traffic data extents. Data from Brize Norton meteorological station in 2018 was used in the modelling, with all other inputs were as per the construction and operational assessment. It is noted however that 2023 traffic data has been made available for a recent update of assessment, following additional surveys carried out in September 2023. Further details of this recent update is discussed further within the Transport Chapter. As no local authority 2023 monitoring data is currently available at time of writing, no reassessment of model verification has been undertaken to account for this new traffic data. The 2018 adjustment factor of 1.13 has therefore been applied to modelled road NOx, PM_{10} and $PM_{2.5}$ contributions at all receptors. As a conservative approach, an additional sensitivity test has been undertaken using a

proxy adjustment factor of 1.5 to account for any potential rise in factor, as discussed further in **Appendix 12.7**.

12.58 Following the verification process, an overall Root Mean Square Error value of less than 10% is achieved, which is considered robust according to LAQM TG22[xiii]. On this basis, the modelled results are considered appropriate to allow a robust professional judgement of significance to be determined.

12.59 Further details of the verification process can be found in **Appendix 12.2.**

Traffic Data

12.60 Traffic data used within this assessment has been provided by Ridge and Partners LLP and have been derived from 2018 12-hour (07:00 to 19:00) Manual Classified Turning Counts (MCTCs) and 7-day or 14-day 24-hour Automatic Traffic Counters (ATC) at locations predicted to experience potential changes in flow as a result of the Proposed Development. The MCTC and ATC data include traffic counts that have been converted into 24-hour Annual Average Daily Traffic (AADTs) using a conversion factor. TEMPro growth factors have been used to uplift the traffic data to 2025 to account for the anticipated peak construction year. Additional vehicular trips resulting from the Proposed Development have been estimated following the methodology set out in the Transport Chapter and added to develop the 'With Development' scenario. 2023 derived traffic data has been made available for a recent update of assessment, following additional surveys carried out in September 2023. Regarding that construction traffic assessment, the 2018 derived data was found to be more conservative than the 2023 derived data and has therefore been used for the construction traffic assessment.

12.61 Speed data has been calculated based on 7 Day mean speeds. Speed data for A44 and A34 was not available, therefore speed limit data has been used. At junctions, speeds have been reduced in accordance with Defra LAQM TG22 guidance[xiii], which states:

"For a busy junction, assume that traffic approaching the junction slows to an average of 20 kilometres per hour… In general, these speeds are relevant for approach distances of approximately 25 metres. For other junctions (non-motorway) and roundabouts where some slowing of traffic occurs, you should assume that the speed is 10 kilometres per hour slower than the average free flowing speed''

12.62 A 'busy' junction is defined in the (LAQM TG22[xiii]) guidance as a road with over 10,000 vehicles per day. 'Non busy' junctions were identified as A4144 Woodstock Road (Link ID 13, in **Figure 12.1** within Volume 2); Banbury Road, south of the Cutteslowe Roundabout (Link ID 10, in **Figure 12.1** within Volume 2) and Godstow Road (Link ID 19, in **Figure 12.1** within Volume 2) and therefore

freeflow speeds have been reduced by 10 kilometres per hour. All remaining junctions have been classified as the 'busy' junctions and have therefore been reduced to 20 kilometres per hour.

12.63 EPUK and IAQM guidance indicates that, outside of an AQMA, an assessment of road traffic emissions is only likely to be required where it will generate an additional annual average flow of greater than 100 Heavy Duty Vehicles (HDVs) per day or greater than 500 Light Duty Vehicles (LDVs) 25 Annual Average Daily Traffic (AADT). Within or adjacent to an AQMA, this change is greater than 100 LDVs per day.

12.64 The Proposed Development is not located within an AQMA, however road links within the traffic data extents do fall within the bounds of the City of Oxford AQMA. For the assessment of construction traffic impacts, Frieze Way (Link ID 6, in **Figure 12.1** within Volume 2); A44 Woodstock Road (Link ID 12, in **Figure 12.1** within Volume 2) and A34 south of Peartree Roundabout (Link ID 17, in **Figure 12.1** within Volume 2) trigger for assessment. This defines the Affected Road Network (ARN) for the construction assessment.

12.65 Traffic data used for the assessment of construction impacts are presented within Table A 12.15 of **Appendix 12.3**, respectively. Further information on the construction traffic data considered for this assessment are presented in Chapter 10 – Transport and Access.

Model Scenarios

12.66 The construction assessment has considered the following scenarios:

- DM scenario ('without' construction of Proposed Development) 2025 (worst-case construction year)
- DS scenario ('with' construction of Proposed Development) 2025

12.67 The air quality assessment has compared predicted concentrations against the air quality objectives and assessed compliance with the Air Quality Directive for the worst-case construction year of the Proposed Development. The construction year of the Proposed Development is expected to be a worst-case in 2025, as this is the maximum number of traffic movements (e.g. HDVs) are expected to occur.

Model Selection

12.68 This assessment has used a dispersion model called ADMS-Roads (version 5.0.1.3), a PC-based model of dispersion in the atmosphere of pollutants released from road traffic sources, produced and validated by Cambridge Environmental Research Consultants (CERC).

12.69 The dispersion model was built by digitising traffic model links and assigning road widths based on Open Source Aerial mapping.

Metrological Data

12.70 The most important meteorological parameters governing the atmospheric dispersion of emissions are wind direction, wind speed and atmospheric stability as described below:

- Wind direction determines the sector of the compass into which emissions are dispersed.
- Wind speed affects the distance which emissions travel over time and can affect dispersion by increasing the initial dilution of pollutants.
- Atmospheric stability is a measure of the turbulence of the air, and particularly of its vertical motion. It therefore affects the spread of the plume as it travels away from the source. ADMS uses a parameter known as the Monin-Obukhov length that, together with the wind speed, describes the stability of the atmosphere.

12.71 For meteorological data to be suitable for dispersion modelling purposes, a number of meteorological parameters need to be measured on an hourly basis. There are only a limited number of sites across the UK where the required meteorological measurements are made.

12.72 Data for 2018, 2021 and 2022 from Brize Norton meteorological station was used within the assessment, which is the closest station to the Proposed Development, located approximately 22 kilometres south-west. The meteorological station is considered representative of the modelled area due to its close proximity to the Proposed Development and being located on flat terrain. Wind roses are presented in **Figure 12.2** within Volume 2 and highlight predominant wind directions from the south-west, which are associated with the highest wind speeds. There are lower occurrences of wind from other directions and these tend to be associated with lower wind speeds.

Emission Factors

12.73 The Emission Factor Toolkit (EFT) (Version 12.0.1), released December 2023, has been used to provide emissions factors for use within the modelling. NOx and PM emission factors are taken from the European Environment Agency (EEA) COPERT 5.3 emission calculation tool, reflecting recent evidence on the real-world emission performance.

12.74 The assessment has applied emission factors and background concentrations which are representative of the construction year.

12.75 This is considered a worst-case scenario and conservative approach due to the uptake of cleaner, less polluting vehicles in the road traffic mix and the predicted future improvements in background concentrations.

NOx to NO_2 Relationship

12.76 Emission rates used within dispersion modelling are based on NOx to represent all nitrogen-oxygen species emitted in exhaust gases. The proportion of NO_2 is needed for comparison with the air quality objectives presented in **Table 12.1.**

12.77 In accordance with Defra's LAQM TG22 guidance[xiii], modelled road-traffic NOx has been converted to annual mean NO_2 using the Defra 'NOx to NO_2' calculator, assuming traffic mix 'all other urban UK traffic'.

Predicted Short-term Pollutant Concentrations

12.78 For all sensitive human health receptors assessed, annual mean concentrations of NO_2 have been presented. LAQM TG22[xiii] indicates that the hourly NO_2 air quality objective of 200 µg/m^3 (not to be exceeded more than 18 times per year) is unlikely to be exceeded at roadside locations where the annual mean concentration is less than 60 µg/m^3. Following this guideline, the hourly objective is not considered further within this assessment if the annual modelled mean NO_2 concentrations are found to be less than 60 µg/m^3.

12.79 The prediction of daily mean concentrations of PM_{10} is available as an output option within the ADMS-roads dispersion model for comparison against the short-term air quality objective. However, as the model output for annual mean concentrations is considered more accurate than the modelling of the daily mean, an empirical relationship has been used to determine daily mean PM_{10} concentrations. In accordance with LAQM TG22[xiii] the following formula has been used:

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

12.80 Based on this formula, an annual mean PM_{10} concentration of 32 µg/m^3 equates to 35 days at or above 50 µg/m^3.

Background Concentrations

12.81 Total air pollutant concentrations comprise a background and local component; both of which have to be independently considered for the air quality assessment. The background component is determined by regional, national and international emissions, and often represents a significant proportion of the total pollutant concentration. Background concentrations are modelled by Defra, see Section 12.140 for more details. The local component is affected by emissions from sources such as roads and chimney stacks, which are less well mixed locally, and add to the background concentration.

12.82 Only road traffic emission sources have been explicitly included within the dispersion model. Non-road traffic related emission sources, such as industrial and domestic emissions, are included in Defra's background concentration maps and have been accounted for within the assessment by assigning appropriate 'background' concentrations to modelled receptor locations in accordance with LAQM TG22 guidance[xiii].

12.83 A comparison between Defra background concentration data and monitored NO_2 concentrations (obtained from local authority diffusion tube monitoring and Defra's Automatic Urban and Rural Network (AURN) monitoring) has been undertaken at three urban background sites. The results from this comparison are presented below in **Table 12.4,** for monitoring locations see **Figure 12.7** in Volume 2. These sites are representative of air quality conditions across the study area and are therefore appropriate for the comparison.

Table 12.4 - Comparison of 2018 monitored background NO_2 concentrations and Defra background pollutant map data

Local Authority	Site ID	Monitoring type (Automatic/ Diffusion Tube)	Approximate distance from Proposed Development (km)	Defra Background Concentration 2022 (µg/m^3)	Monitored Concentration 2022 (µg/m^3)	Difference [A-B]/B*100 (%)
VWH	VS23	UB (DT)	6.3	10.4	9.0	16.1
VWH	VS43	UB (DT)	10.3	12.2	14.2	-13.9
OCC	TF1	UB (DT)	2.2	11.1	9.0	23.8

Note: UB means urban background.
DT means diffusion tube site.

12.84 **Table 12.4** shows that modelled Defra NO_2 background concentrations and monitored background concentrations are similar at all sites, with Defra backgrounds generally higher than monitored data. As such, no additional adjustment factor has been applied to the NOx, NO_2, PM_{10} and $PM_{2.5}$ background.

12.85 Further to this, where the study area modelled road links cover the majority of a background one kilometre grid square, 'in-grid' road sector emissions (i.e. 'motorway', 'trunk', 'primary' and/or 'minor' roads) have been removed from the background annual mean NOx and NO_2 concentration estimates using the Defra Sector Removal Tool Version v8.0[xxiii]. This process has been undertaken to avoid double counting of road traffic emissions, which have already been predicted from the detailed dispersion modelling undertaken for the Proposed Development. Where traffic data is available only for a limited number of road links (e.g. at the edge of the study area, or where 'minor' roads are not available), road emissions have not been removed from background concentrations as a conservative measure.

Human Health Receptors

12.86 The air quality objectives only apply in locations of relevant exposure. Therefore, receptors have been chosen following the advice from LAQM TG22[xiii] set out in **Table 12.3.** A total of five worst-case receptors were selected for the construction traffic assessment, consisting of residential properties, an education centre and a playing field. Using professional judgement, receptors were selected at locations likely to have the highest pollutant concentrations (such as those closest to the road or junction) or anticipated to experience highest level of change (next to roads within the ARN with the largest change in the traffic screening criteria). The human health receptors were modelled at a height of 1.5 metres, which is considered to be the representative of head height in accordance with best practice.

12.87 **Table 12.5** presents the location information for each human health receptor, and **Figure 12.1** within Volume 2 displays their location in relation to the construction road model extent, as defined in Section 12.64.

Table 12.5 – Proposed Development Construction Human Health Receptors

Receptor ID	Receptor name	Receptor type	British National Grid Coordinates		
			X	Y	Z
Ox_Con_1	Stratfield Brake Sports Ground	Playing fields[(a)]	449693	212044	1.5
Ox_Con_2	Residential property on Frieze Way	Residential	449282	211076	1.5
Ox_Con_3	Trax Education Centre, Red Barn Farm Cottage	Education Centre	449423	210725	1.5
Ox_Con_4	Residential property at Collett Drive	Residential	448785	210021	1.5
Ox_Con_5	Residential property at A44 Woodstock Road	Residential	449686	210274	1.5

Notes: [(a)] Short-term receptors

12.88 A review of approved developments in the area has also been undertaken for the assessment of construction traffic. The Oxford North (Northern Gateway) is identified adjacent to a Construction ARN link, as defined within Section 12.64. This development is adjacent to the Peartree Roundabout, between the A34 and A44 Woodstock Road and will consist of residential units, hotel and employment space. The Oxford North (Northern Gateway) has not been identified within **Table 12.5** as receptors Ox_Con_3 and Ox_Con_5 are already considered to be worst case for this link.

Ecological Receptors

12.89 Sensitive ecological designations located within 200 metres of roads affected by construction traffic have been considered in this assessment, in accordance with DMRB LA 105[14]. Ecological receptors have been placed within the designated habitats at 10 metres intervals along transects, up to 200

metres of the road. The receptors have been modelled at a height of 0 metres, to represent worst-case exposure.

12.90 As per DMRB LA 105[14], designated habitats considered in the assessment include Ramsar sites, Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs), local nature reserves (LNRs), local wildlife sites (LWS), nature improvement areas, Ancient Woodlands (AW) and veteran trees.

12.91 There are 14 transects across 13 sensitive designated habitats within 200 metres of the construction ARN of the Proposed Development, as defined in Section 12.64 and consist of three SSSI, one SAC, five AW and four LWS:

- Binsey Lane AW
- Botley Hill AW
- Canalside Meadow-Oxford Canal Marsh LWS
- Church Grove AW
- Duke's Meadow LWS
- Godstow Holt AW
- Godstow Road AW
- Linkside Lake LWS
- Oxford Meadows SAC
- Pixy and Yarnton Meads SSSI
- Stratfield Brake LWS (Transect 1 & 2)
- Wolvercote Meadows SSSI
- Wytham Woods SSSI

12.92 **Figure 12.3** within Volume 2 presents the location of the sensitive ecological receptors in relation to the construction road model extent.

Significance of Effect - Human Health

12.93 Guidance is available from a range of regulatory authorities and advisory bodies on how best to determine and present the significance of effects within an air quality assessment. It is generally considered good practice that, where possible, an assessment should communicate effects both numerically and descriptively.

12.94 Any description of an effect of a development is informed by numerical results; an element of professional judgement must also be involved. To ensure that the descriptions of effects used within the assessment are clear, consistent and in accordance with the latest guidance, definitions for the assessment of changes in air quality concentrations at individual human health receptors have been

adopted from the EPUK and IAQM guidance. **Table 12.6** provides impact descriptors for changes in pollutant concentrations as a result of the Proposed Development.

12.95 The magnitude of any concentration change identified must be considered in relation to the Air Quality Assessment Level (AQAL), which may be an air quality objective, regulatory limit or target value. The most important aspects to consider are the percentage of long-term average concentrations at the individual receptor in the assessment year in relation to the AQAL and the percentage of change in concentration in relation to the AQAL.

12.96 EPUK and IAQM recognises that professional judgement is required in the interpretation of air quality assessment significance. **Table 12.6** is intended as a tool to help interpret the results of the air quality assessment.

Table 12.6 - Effects descriptors for predicted change in annual mean concentrations at individual receptors

Long term average concentration at receptor in assessment year	**% Change in concentration relative to Air Quality Assessment Level (AQAL)**			
	>1	**2-5**	**6-10**	**>10**
75% or less of AQAL	Negligible	Negligible	Minor	**Moderate**
76-94% of AQAL	Negligible	Minor	**Moderate**	**Moderate**
95-102% of AQAL	Minor	**Moderate**	**Moderate**	**Major**
103-109% of AQAL	**Moderate**	**Moderate**	**Major**	**Major**
110% or more of AQAL	**Moderate**	**Major**	**Major**	**Major**

Source: Adapted from 'Land-Use Planning and Development Control: Planning for Air Quality' guidance produced by EPUK and the IAQM

Note: (a) AQAL = Air Quality Assessment Level i.e. 40µg/m^3 for annual mean NO_2. The table is only designed to be used with annual mean concentrations.
(b) Percentage pollutant concentrations are intended to be rounded to whole numbers. For example, the '<1%' category in this table includes all changes from 0.5% to 1.4% (equivalent to an annual mean NO_2 absolute concentration change of between 0.2µg/m^3 and 0.6µg/m^3). Changes of 0% (i.e. less than 0.5%) are described as negligible.
(c) When defining the concentration as a percentage of the AQAL, use the 'do minimum' concentrations where there is a decrease in pollutant concentration and the 'do something' concentration for an increase.
(d) Text in bold indicates that change is defined as significant.

12.97 For the purposes of this assessment, impacts of Moderate adverse or Moderate beneficial and above would be further considered using professional judgement to determine if the Proposed Development would cause a significant effect. The application of professional judgement would consider:

- The existing and future air quality in the absence of a 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.

Significance of Effect - Designated Habitats

12.98 For designated habitats, the determination of significant effects for nitrogen deposition has been undertaken in line with the flow chart at paragraph 2.98 of DMRB LA 105.[14]

12.99 In accordance with DMRB LA 105[14], if the change in nitrogen deposition with ammonia is greater than 0.4kg N/ha/yr for the Proposed Development, the competent expert for Biodiversity should review the air quality attribute target for the site to confirm whether it is 'restore' or 'maintain' and update the assessment if necessary.

12.100 The competent expert for Biodiversity should then conclude whether the changes in nitrogen deposition are likely to trigger a significant air quality effect, with reference to Table 21 in the published nitrogen deposition dose response report by Natural England [xxiv].

Assessment Assumptions and Limitations

12.101 The air quality modelling predictions are associated with an inherent level of uncertainty, primarily a result of:

- Uncertainties with model input parameters, such as surface roughness length and minimum Monin-Obukhov length.
- Uncertainties with traffic data.
- Uncertainties with vehicle emission predictions.
- Uncertainties with background air quality maps.
- Uncertainties with recorded meteorological data.
- Simplifications made in the model algorithms or post processing of the data that represent atmospheric dispersion or chemical reactions.

12.102 In order to best manage these uncertainties, the air quality assessment has been undertaken with model verification against the latest available monitoring data for 2018. The verification has been undertaken in line with LAQM TG22[xiii] produced by Defra. Model verification is a two-step process. Firstly, modelled concentrations are compared with monitored concentrations to identify any disparity. Where disparity occurs, the model inputs are revisited to identify any potential errors or opportunity for improvement of the model. Where disparity remains following the first step, model results can be adjusted to account for systematic bias. As highlighted in Section 12.57, verification of results in this assessment has been undertaken using 2018 derived traffic data and an adjustment factor of 1.13 applied to all results. An additional sensitivity test has been undertaken to account for any increases in adjustment factor, with the 2023 derived traffic data. A sensitivity test has been undertaken using a proxy factor of 1.5, as discussed further in **Appendix 12.7**.

12.103 2018 and 2023 derived traffic data is currently available for this assessment. As highlighted in Section 12.60, the construction traffic assessment has been undertaken using 2018 derived traffic flows and uplifted to reflect the earliest construction year of 2025. Whereas Section 12.113 highlights that the operational traffic assessment has been undertaken using the 2023 derived data and uplifted to reflect the Opening Year of 2026. A comparison of both data sets highlights that for the construction traffic assessment, traffic flows are more conservative from the 2018 derived dataset. Whereas for the operational traffic assessment, with the revised assumptions of the Proposed Development, the 2023 derived data is more conservative. For this reason, the construction traffic assessment and the operational traffic assessments are using different datasets, each representing a worst-case. Construction and operational traffic data used for this assessment are presented within Table A 12.15 of **Appendix 12.3** and Table A 12.16 of **Appendix 12.4** respectively.

Operation

Scope of Assessment

12.104 The operational assessment of the Proposed Development has considered the change in pollutant concentrations at human health and designated habitat receptors as a result of potential increases to traffic emissions.

12.105 For the operation assessment, the following have been scoped out from further assessment:

Onsite Energy Emissions

12.106 It is understood that the energy strategy for the Proposed Development concludes that air source heat pumps, powered by electricity from the National Grid, will be used to provide heat and hot water for the Proposed Development. Therefore, no assessment of pollutant emissions from energy sources has been undertaken.

Park and Ride Additional Emissions

12.107 It is predicted that six Park and Rides (P&R) in and around Oxford will be utilised on Match Days. The Proposed Development traffic team have used Home and Away fan data and mode share proportions to understand the levels of P&R demand for each site and what potential capacity constraints each P&R site has.

12.108 To understand potential home fan distribution and mode share of home supporter, postcode data from fans that have purchased a ticket within the last two years has been used within GIS software to understand the expected trip making patterns to and from the stadium. These numbers have

been used to develop a home fan mode share, whilst available mode share proportions for Away fans using Campaign for Better Transport, Door to turnstile research was used. These mode shares were subsequently applied to the designed capacity for home and away fans.

12.109 Using this data, the proportions of fans using each of the P&R sites based on the most likely route fans would take and the most local P&R site has been calculated, in conjunction with P&R capacity, the expected demand for each of the P&R sites surrounding Oxford was forecast. **Table 12.7** presents the predicted Proposed Development additional movements utilising the six P&Rs.

Table 12.7 – Summary of Park and Ride Movements

P&R Location	Proposed Development LDV AADT flows	In AQMA
Peartree P&R	179	Yes
Seacourt P&R	72	Yes
Redbridge P&R	148	Yes
Water Eaton P&R	262	No
Thornhill P&R	246	No
Eynsham P&R	76	No

12.110 In accordance with Section 12.63, the three P&Rs presented within **Table 12.7,** located outside the City of Oxford AQMA, do not have high enough flows to exceed the 500 LDV AADT to trigger for assessment. Of the remaining three P&Rs, Seacourt P&R is below the threshold for assessment for LDV AADT changes within an AQMA (100 LDV AADT change). The additional traffic movements associated with the Peartree P&R are captured within the operation detailed modelling presented within **Table 12.25 to Table 12.27**. As well as this, although Redbridge P&Rs does trigger for assessment against the within AQMA thresholds, there are no receptors located adjacent to the routes from the A34 to the P&Rs within the AQMA boundary. The P&Rs are therefore scoped out from further assessment.

Pollutants

12.111 The same methodology for the construction traffic assessment has been adopted.

Model Verification

12.112 The same methodology for the construction traffic assessment has been adopted.

Traffic Data

12.113 Traffic data used within this assessment has been provided by Ridge and Partners LLP and have been derived from 2023 12-hour (07:00 to 19:00) Manual Classified Turning Counts (MCTCs) and 7-

day or 14-day 24-hour Automatic Traffic Counters (ATC) at locations predicted to experience potential changes in flow as a result of the Proposed Development. The MCTC and ATC data include traffic counts that have been converted into 24-hour Annual Average Daily Traffic (AADTs) using a conversion factor. TEMPro growth factors have been used to uplift the traffic data to 2026 to account for the proposed opening year respectively. Additional vehicular trips resulting from the Proposed Development have been estimated following the methodology set out in the Transport Chapter and added to develop the 'With Development' scenario.

12.114 The Proposed Development is not located within an AQMA, however some of the road links within the traffic data extents do fall within the bounds of the City of Oxford AQMA. For the assessment of operational traffic impacts, A4260 Oxford Road (Link 1, in **Figure 12.4** within Volume 2); A4260 Frieze Way (Link 3, in **Figure 12.4** within Volume 2); A4165 Oxford Road (Link 4, in **Figure 12.4** within Volume 2); A44 Woodstock Road (Link 9, in **Figure 12.4** within Volume 2); A40 North Way (Link ID 8, in **Figure 12.4** within Volume 2); A40 Northern Bypass Road (Link ID 11, in **Figure 12.4** within Volume 2); A4165 Banbury Way north and south (Link IDs 6 and 8 respectively, in **Figure 12.4** within Volume 2) and A34 south of Peartree Roundabout (Link IDs 14, in **Figure 12.4** within Volume 2), all trigger for assessment in line with criteria detailed in Section 12.63. This defines the ARN for the operational assessment.

12.115 Traffic data used for the assessment of operational impacts are presented within Table A 12.16 of **Appendix 12.4**. Further information on the operational traffic data considered for this assessment are presented in the Transport Chapter 10.

Model Scenarios

12.116 This assessment has considered the following scenarios:

- DM scenario ('without' operation of Proposed Development) 2026 (opening year)
- DS scenario ('with' operation of Proposed Development) 2026

12.117 The air quality assessment has compared predicted concentrations against the air quality objectives and assessed compliance with the Air Quality Directive for the opening year of the Proposed Development only. The opening year of the Proposed Development is expected to be a worst-case in terms of air quality impacts, as noted in Section 2.89 of DMRB LA 105[xiv], due to background concentrations improving in future years. Air quality is predicted to improve in future years in response to the uptake of vehicles which meet more stringent emissions standards.

Model Selection

12.118 The same methodology for the construction traffic assessment has been adopted.

Meteorological Data

12.119 The same methodology for the construction traffic assessment has been adopted.

Emission Factors

12.120 The same methodology for the construction traffic assessment has been adopted.

NOx to NO_2 Relationship

12.121 The same methodology for the construction traffic assessment has been adopted.

Predicted Short-term Pollutant Concentrations

12.122 The same methodology for the construction traffic assessment has been adopted.

Background Concentrations

12.123 The same methodology for the construction traffic assessment has been adopted.

Human Health Receptors

12.124 The air quality objectives only apply in locations of relevant exposure. Therefore, receptors have been chosen following the advice from LAQM TG22[xiii] set out in **Table 12.3.** A total of 12 worst-case operational receptors were selected for the assessment, consisting of residential properties, an education centre and two playing fields. Using professional judgement, receptors were selected at locations likely to have the highest pollutant concentrations (such as those closest to the road or junction) or anticipated to experience highest level of change (next to roads within the operational ARN with the largest change in the traffic screening criteria). The human health receptors were modelled at a height of 1.5 metres, which is considered to be the representative of head height in accordance with best practice.

12.125 **Table 12.8** presents the location information for each operational human health receptor, and **Figure 12.4** within Volume 2 displays their location in relation to the operational road model extent, as defined in Section 12.114.

Table 12.8 – Proposed Development Operational Human Health Receptors

Receptor ID	Receptor name	Receptor type	British National Grid Coordinates		
			X	Y	Z
Ox_Op_1	Residential property at A4260 Oxford Rd	Residential	449824	212445	1.5

Ox_Op_2	Stratfield Brake Sports Ground	Playing field[(a)]	449693	212044	1.5
Ox_Op_3	Residential property at Oxford Rd	Residential	450225	211495	1.5
Ox_Op_4	Trax Education Centre, Red Barn Farm Cottage	Education Centre	449423	210725	1.5
Ox_Op_5	Residential property at 566 Banbury Road	Residential	450347	210775	1.5
Ox_Op_6	Oxford Hawks Hockey Club	Playing field[(a)]	450424	210788	1.5
Ox_Op_7	Approved development - Oxford North	Future Residential	449272	210319	1.5
Ox_Op_8	Residential property at 369A Woodstock Road	Residential	449686	210274	1.5
Ox_Op_9	Residential property on Sunderland Ave	Residential	450383	210230	1.5
Ox_Op_10	Residential property at 31 David Walter Cl	Residential	450655	210233	1.5
Ox_Op_11	Residential property at 11 Wyatt Road	Residential	450838	210173	1.5
Ox_Op_12	Residential property at 44 Collett Drive	Residential	448785	210021	1.5

Notes: [(a)] Short-term receptors

12.126 A review of approved developments in the area has also been undertaken for the assessment of operational traffic. The Land South West of St Frideswide Farm is identified adjacent to an Operational ARN link, as defined within Section 12.114. The Land South West of St Frideswide Farm is adjacent to the Banbury Road and consists of residential units and associated infrastructure. The Land South West of St Frideswide Farm has not been identified within **Table 12.8** as receptors Ox_Op_5 is already considered to be worst case for this link. Another approved development is located south of the Peartree Roundabout, adjacent to the A34, A44 Woodstock Road and A40 Northern Bypass Road. Receptors Ox_Op_4 and Ox_Op_8 already represent worst case receptors adjacent to A44 Woodstock Road. There were however no worst case receptors already identified adjacent to A40 Northern Bypass Road. **Table 12.8** includes receptor Ox_Op_7 to represent the Oxford North approved development on this route.

Ecological Receptors

12.127 Sensitive ecological designations located within 200 metres of roads affected by operational traffic have been considered in this assessment, in accordance with DMRB LA 105[xiv]. Ecological receptors have been placed within the designated habitats at 10 metres intervals along transects, up to 200 metres of the road. The receptors have been modelled at a height of 0 metres, to represent worst-case exposure.

12.128 As per Section 12.90, the assessment of designated habitats follows DMRB LA 105[xiv] guidance. There are 14 transects across 13 sensitive designated habitats within 200 metres of the construction

ARN of the Proposed Development, as defined in Section 12.64 and consist of three SSSI, one SAC, five AW and four LWS:

- Binsey Lane AW
- Botley Hill AW
- Canalside Meadow-Oxford Canal Marsh LWS
- Church Grove AW
- Duke's Meadow LWS
- Godstow Holt AW
- Godstow Road AW
- Linkside Lake LWS
- Oxford Meadows SAC
- Pixy and Yarnton Meads SSSI
- Stratfield Brake LWS (Transect 1 & 2)
- Wolvercote Meadows SSSI
- Wytham Woods SSSI

12.129 **Figure 12.5** within Volume 2 presents the location of the sensitive ecological receptors in relation to the operational road model extent.

Significance of Effect - Human Health

12.130 The same methodology for the construction traffic assessment has been adopted.

Significance of Effect - Designated Habitats

12.131 The same methodology for the construction traffic assessment has been adopted.

Baseline Conditions

Overview

12.132 Information on air quality in the UK can be obtained from a variety of sources including local authorities, national network monitoring sites and other published sources. For the purposes of this assessment, data has been obtained from Defra and CDC, OCC, and Vale of White Horse District Council (VWHDC).

12.133 The most recent year of representative monitoring data available from CDC, OCC and VWHDC is for 2022. Local authority data for the year 2022 is expected to be representative of 'normal' conditions, as it is not considered to have been affected by the coronavirus (Covid-19) pandemic. Therefore 2022 local authority data has been used to determine baseline conditions.

Air Quality Management Areas

12.134 CDC has declared four AQMAs in its administrative area, the closest of which is 'Cherwell District Council AQMA No.3', declared in 2014 for exceedances of the NO_2 annual mean objective. This AQMA is approximately 1.3km to the north of the Proposed Development. Cherwell District Council AQMA No.3 may be eligible for revocation in 12 to 24 months. The nearest AQMA is the City of Oxford AQMA approximately 740m south in the OCC administrative boundary. The AQMA's nearest to the Proposed Development are presented within **Figure 12.6** within Volume 2.

Local Authority Automatic Monitoring

12.135 CDC does not undertake any automatic monitoring within their administrative boundary. However, OCC and VWHDC undertook automatic monitoring at four locations in total in 2022. VWHDC only monitors NO_2, whereas OCC monitors NO_2, PM_{10} and $PM_{2.5}$. These automatic monitoring sites are located to the south of the Proposed Development and the monitoring results for the most recent available data is presented below in **Table 12.9 to Table 12.13** and in **Figure 12.7** within Volume 2.

Table 12.9: Annual Mean NO_2 Automatic Monitoring Results

Site ID	Site Type	Approx. Distance to Site (km)	National Grid Reference		Data Capture 2022 (%)	Annual mean concentration (µg/m³)				
			X	Y		2018	2019	2020	2021	2022
Oxford City Council										
CM1	Roadside	5.9	451359	206157	99.7	39	**42**	28	33	33
CM2	Roadside	5.9	451677	206272	99.6	38	**40**	26	30	31
CM3	Urban Background	6.6	451118	205353	99.6	15	16	11	11	12
Vale of White Horse District Council										
Abingdon CA	Roadside	14.7	449790	197180	95.54	28	22	16	17	18

Source: Annual Status Reports for Oxford City Council 2022; Vale of White Horse District Council 2023

Table 12.10: Hourly Mean NO_2 Automatic Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	Site Type	Approx. Distance to Site (km)	National Grid Reference		Data Capture 2022 (%)	Number of hourly mean concentrations >200 (µg/m³)				
			X	Y		2018	2019	2020	2021	2022
Oxford District Council										
CM1	Roadside	5.9	451359	206157	99.7	0	3	0	0	1
CM2	Roadside	5.9	451677	206272	99.6	0 (106)	2	1	0	0
CM3	Urban Background	6.6	451118	205353	99.6	0	0	0	0	0
Vale of White Horse District Council										
Abingdon CA	Roadside	14.7	449790	197180	95.54	0	0	0	0	0

Source: Annual Status Reports for Oxford City Council 2022; Vale of White Horse District Council 2023

Table 12.11: OCC Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Approx. Distance to Site (km)	National Grid Reference		Data Capture 2022 (%)	Annual mean concentration ($\mu g/m^3$)				
			X	Y		2018	2019	2020	2021	2022
CM2	Roadside	5.9	451677	206272	77.0	18.0	19.0	16.0	14.0	16.0
CM3	Urban Background	6.6	451118	205353	99.9	12.0	14.0	11.0	11.0	12.0

Source: Oxford City Council Annual Status Report 2022

Table 12.12: OCC 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50$\mu g/m^3$

Site ID	Site Type	Approx. Distance to Site (km)	National Grid Reference		Data Capture 2022 (%)	Number of daily mean concentrations >50 ($\mu g/m^3$)				
			X	Y		2018	2019	2020	2021	2022
CM2	Roadside	5.9	451677	206272	77.0	0 (30)	7	0	0	2
CM3	Urban Background	6.6	451118	205353	99.9	1	5	0	1	0

Source: Oxford City Council Annual Status Report 2022

Table 12.13: OCC Annual Mean $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Approx. Distance to Site (km)	National Grid Reference		Data Capture 2022 (%)	Annual mean concentration ($\mu g/m^3$)				
			X	Y		2018	2019	2020	2021	2022
CM2	Roadside	5.9	451677	206272	44.1	-	-	-	-	6.0
CM3	Urban Background	6.6	451118	205353	99.9	10.0	9.0	7.0	7.0	7.0

Source: Oxford City Council Annual Status Report 2022

Local Authority Diffusion Tube Monitoring

12.136 CDC undertakes NO_2 monitoring at 37 sites across the district. The nearest CDC non-automatic (passive) diffusion tube is 12.8km away from the Proposed Development boundary. OCC undertook passive monitoring of NO_2 at 126 sites in 2022, of which ten are within 2km of the Proposed Development. The VWHDC had 50 passive NO_2 monitoring network in 2021 and 12 of these are located within 8km of the Proposed Development.

12.137 **Table 12.14** locations of the monitoring site are presented in **Figure 12.7** within Volume 2.

12.138 The diffusion tube monitoring results show that there have been exceedances of the annual mean NO_2 objective at one of the CDC roadside monitoring sites between 2018 and 2022, with the most recent year which has an exceedance being 2019, at site ID 30. This monitor is located within an AQMA. The most recent five years of data show a general decline in concentrations since 2018. Concentrations of NO_2 recorded at all CDC sites in 2022 are well within the annual mean objective of 40$\mu g/m^3$.

Table 12.14: Local Authority NO_2 Monitoring Results

Site ID	Site Type	Approx Distance to Site (km)	National Grid Reference		Data Capture 2022 (%)	Annual mean concentration (µg/m³)				
			X	Y		2018	2019	2020	2021	2022
Cherwell District Council										
18	Kerbside	29.5	456937	223586	83	34.5	34.0	27.9	28.2	31.1
25	Roadside	12.9	457619	222535	76.4	28.9	24.7	26.0	21.6	22.5
26	Urban Background	13.2	458419	222334	100	13.4	13.8	18.4	11.8	11.1
27,28,29[(a)]	Kerbside	13.0	458006	222404	100	35	35.6	27.8	28.2	28.9
30[(a)]	Roadside	13.6	458274	222935	92.3	**41.9**	**41.5**	34.5	34.9	32.6
31[(a)]	Urban Background	13.1	458028	222471	100	17.2	17.0	12.3	12.5	13.4
32[(a)]	Urban Background	13.1	458028	222471	91.8	15.9	15.0	11.6	11.8	12.1
33[(a)]	Roadside	13.1	458028	222471	100	29.5	26.7	23.0	23.3	21.0
34	Roadside	13.3	458539	222381	100	25.7	23.6	19.6	19.8	20.8
35	Kerbside	14.8	458333	224432	91.8	38.6	31.7	25.1	25.5	23.4
36	Kerbside	14.5	457956	224362	91.8	31.6	32.1	25.0	25.3	26.8
37	Kerbside	12.8	459100	221190	100	37.6	35.6	27.6	27.9	27.9
Oxford City Council										
DT25	Roadside	1.7	450419	210256	100	35.0	35.0	26.0	28.0	25.0
DT26	Roadside	1.7	450389	210189	75	**41**.0	**40**.0	31.0	34.0	32.0
DT27	Roadside	1.6	449824	210198	100	29.0	29.0	22.0	22.0	20.0
DT28	Roadside	1.7	449856	210162	92	27.0	26.0	22.0	24.0	20.0
DT29	Roadside	1.1	449530	210734	100	25.0	26.0	20.0	21.0	21.0
DT71	Roadside	1.6	449617	210216	100	38.0	**40**.0	28.0	28.0	27.0
DT83	Roadside	1.6	449681	210263	100		**40**.0	30.0	32.0	30.0
TF1	Urban Background	2.2	447817	210695	67					9.0
TF3	Roadside	1.9	448247	210661	67					25.0
TF5	Roadside	2.0	449740	209866	67					14.0
TF37 *	Roadside	2.0	448688	210123	67					42.0
Vale of White Horse District Council										
VS21	Kerbside	6.1	448913	205813	100	**46.2**	44.3	27.8	29.4	32.2
VS22	Roadside	6.1	448866	205807	100	38.5	30.9	19.8	22.4	24.1

Site ID	Site Type	Approx Distance to Site (km)	National Grid Reference		Data Capture 2022 (%)	Annual mean concentration (µg/m³)				
			X	Y		2018	2019	2020	2021	2022
VS23	Urban Background	6.2	448403	205709	100	15.5	13.4	8.0	10.0	9.0
VS24	Roadside	6.2	449008	205729	100	38.2	34.7	21.9	23.1	-
VS25	Roadside	6.2	449003	205724	92.3	**87.5**	**80**	**50.9**	**55.1**	**53.7**
VS26	Roadside	6.1	448894	205826	100	37.9	35.2	22.3	24.7	25.5
VS27	Roadside	6.1	448917	205804	100	34.7	33.3	22.2	22.6	24.4
VS28	Roadside	6.1	448991	205745	100	35.5	31.4	20.0	21.7	21.9
VS29	Roadside	6.1	448946	205780	100	34.2	32.2	20.4	22.2	24.2
VS30	Roadside	6.1	448914	205798	100	**76.5**	**73.7**	**44.7**	**48.3**	**50.5**
VS43	Urban Background	10.3	452290	201912	100		10.2	11.1	13.3	14.2
NWCS2	Roadside	6.4	449404	205422	100			16.2	15.4	15.6
NWCS5	Roadside	5.7	448610	206289	84.6			12.8	18.6	16.2

Source: Cherwell District Council Annual Status Report 2023; Oxford City Council 2022; Vale of White Horse District Council 2023
Note: National bias adjustment factor applied is 0.76 for 2022 and 0.77 for 2021.
(a) Located within an AQMA
*Concentrations highlighted in **Bold** indicate an exceedance.*
** Indicates short-term exposure location*

12.139 CDC does not undertake any automatic monitoring and it is not possible to monitor short-term NO_2 concentrations using diffusion tubes; however, research[xxv] has concluded that exceedances of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations are below 60 µg/m³. Based on the monitoring data presented in **Table 12.14**, an exceedance of the short-term objective is unlikely to occur at any of the monitoring sites presented.

Future Baseline

Defra Projected Background Concentrations

12.140 Defra provides mapped future year projections of background pollution concentrations for NO_X, NO_2, PM_{10} and $PM_{2.5}$ for each 1km grid square across the UK for all years between 2018 to 2030[xxvi]. The maps include a breakdown of background concentrations by emission source, including road and industrial sources, which have been calibrated against 2018 (the baseline year) UK monitoring data.

12.141 **Table 12.15** presents the background concentrations across the 1km grid square containing the Proposed Development in the current year of 2024 and expected opening year of 2026. The

maximum background concentrations at the Proposed Development are all within the relevant objectives.

Table 12.15: Projected Background Concentrations (µg/m^3) of NOx, NO_2, PM_{10} and $PM_{2.5}$ Across Proposed Development

1km Grid Square Location (OS Grid Reference)		Background concentrations (µg/m^3)							
		2024				2026			
X	Y	NOx	NO_2	PM_{10}	$PM_{2.5}$	NOx	NO_2	PM_{10}	$PM_{2.5}$
449500	212500	13.6	10.3	14.4	9.5	12.8	9.7	14.3	9.4
449500	211500	16.8	12.5	16.6	10.1	15.5	11.6	16.4	10.0
450500	211500	13.4	110.2	15.0	9.3	12.5	9.6	14.9	9.2
450500 (a)	212500 (a)	14.6	11.1	16.7	10.1	13.5	10.3	16.5	10.0

Source: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

Note: (a) Location of the proposed development only crosses slightly into the OS grid reference. If results are significantly higher, ignore the results from the noted OS grid reference.

Pollution Climate Mapping Model

12.142 Defra uses the Pollution Climate Mapping (PCM) model[xxvii] to report compliance with the limit values. PCM model projections are available for all years from 2017 to 2030 and these are derived from the base year of 2018. In general, the model suggests NO_2 concentrations decline into the future, mainly in response to cleaner vehicles and technologies, and actions in Defra's Air Quality Action Plan. The most recent PCM model was published in 2020.

12.143 There is a PCM model link situated on the A4260 Oxford Road, Kidlington and Kidlington Roundabout (Main Road, Census ID 802037161), see **Figure 12.8** within Volume 2. The predicted concentrations on this link for 2024 and 2026 are 17.2µg/m^3 and 15.6µg/m^3 respectively, which are both well below the limit value. This link is located approximately 82m from the Proposed Development boundary and therefore concentrations are likely representative of concentrations at the Proposed Development. As such, the Proposed Development does not trigger for assessment on this road. Even considering the minor increases in traffic on this road, it is unlikely that it would result in an exceedance and create a non-compliance.

Summary

12.144 The baseline assessment indicates that there have been some exceedances of the long-term NO_2 objectives at one of the monitoring sites in the vicinity of the Proposed Development. However, no exceedances have been recorded in the past five years at representative locations.

12.145 The Defra predictions indicate that the background concentrations within the traffic data extent are unlikely to exceed the relevant objectives for all relevant pollutants.

12.146 Ambient pollutant concentrations of NO_2, PM_{10} and $PM_{2.5}$ are generally predicted to decrease into the future, due to uptake of cleaner vehicles and technologies; as such it is considered that air quality conditions at the Proposed Development and surrounds would improve and continue to meet the air quality objectives in future years.

Potential Effects

Overview

12.147 This section provides details of the likely effects predicted to occur from the construction and operation of the Proposed Development.

Construction

Construction Dust

12.148 Dust emissions from the Proposed Development will only occur during the construction and decommissioning phases and therefore all effects from the construction dust emissions are described as temporary. The magnitude descriptors that have been applied are presented in **Table 12.16** along with the justification for the selection.

Table 12.16: - Dust Emission Magnitude

Activity	Dust emission magnitude	Justification
Demolition	N/A	There is minimal demolition associated with the construction of the Proposed Development as existing land use is predominantly grassland and some woodland.
Earthworks	High	Although the total site area is between 18,000 m^2 and 110,000m^2, indicating a 'medium' dust emission magnitude in accordance with **Appendix 12.1**, the soil type in the area is classified as claystone/mudstone. This is a loamy to silty soil type which has the potential to become dry and dusty in the summer. The enabling works are expected to be undertaken in Autumn 2024. It is assumed that the entire area within the Proposed Development boundary will be affected by earthworks. As such, the dust emission magnitude from earthworks is considered to be 'high'.
Construction	High	The total volume of the stadium construction is greater than 92,000m^3. Materials of high potential for dust, such as brick and concrete, will be utilised. Therefore, a dust emission magnitude of 'high' has been assigned in accordance with **Appendix 12.1**.
Trackout	High	The unpaved road length is less than 50m as construction vehicle will make use of the existing public highway. However, the number of daily Heavy Duty Vehicle movements is expected to exceed 50 and as such the dust emission magnitude from trackout is considered to be 'high.

Source: Terminology for magnitude adapted from IAQM (2024) however conclusions remain unchanged.

12.149 In accordance with IAQM guidance set out in Section 12.40 to 12.49, the sensitivity of the area to dust soiling and health effects was determined through the identification of sensitive receptors within a given distance from dust emitting activities (as presented in Figure 12.9 and **Figure 12.10** within Volume 2) and background particulate levels which are expressed as annual mean PM_{10} concentrations. **Table 12.17** provides details of the sensitivity of the area based on nearby sensitive receptors, in line with the criteria detailed in Tables A 12.3 to 12.5 of **Appendix 12.1.**

Table 12.17 - Receptor Sensitivity of the Area to Dust Soiling and Health Effects of PM_{10}

Activity	Dust Soiling		Health Effects of PM_{10}		Ecological Impacts	
	Sensitivity of the Area	**Comment**	**Sensitivity of the Area**	**Comment**	**Sensitivity**	**Comment**
Demolition	N/A	There are between 10 and 100 high sensitivity receptors (residential properties) within 100 - 250m of the Proposed Development as well as between 1 to 10 medium sensitivity receptors (commercial properties). Additionally, there is a playing field, footpath and carpark within 100m of the Proposed Development. However, these are considered to have low sensitivity to dust soiling.	N/A	The maximum background annual mean PM_{10} concentration in 2024 for the Proposed Development is 16.7µg/m^3. There are between 10 to 100 high sensitivity receptors (residential properties) within 250m of the Proposed Development and at least 1 medium sensitivity receptor (commercial receptors).	N/A	There are no high or medium sensitivity receptors within 50m of the Proposed Development. There is at least one low sensitivity ecological receptor (locally designated wildlife site) within 20m of the Proposed Development boundary.
Earthworks	Low		Low		Low	
Construction	Low		Low		Low	
Trackout	Low	There is at least one low sensitivity receptor (farmland) identified within 20m of the trackout route used by construction vehicles up to 250m from the Proposed Development site entrance.	Low	The maximum background annual mean PM_{10} concentration in 2024 for the Proposed Development is 16.7µg/m^3. There are no high or medium sensitivity receptors (residential properties) within 50m of the route used by construction vehicles, but at least one low sensitivity receptor (farmland) within 20m of the trackout route up to 250m from the	Low	There is at least one low sensitivity ecological receptor (locally designated wildlife site) within 20m of the route used by construction vehicles, up to 250m from the Proposed Development site entrance.

				Proposed Development site entrance.		

12.150 The overall risks to receptors from dust soiling effects and human health effects are presented in **Table 12.18.** Risk is based on the criteria outlined in Table A. 12.6 to Table A. 12.9 in **Appendix 12.1.**

Table 12.18– Dust Risk Summary

Potential Impact	**Risk**			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust soiling	N/A	Minor Risk	Minor Risk	Minor Risk
Health effects	N/A	Minor Risk	Minor Risk	Minor Risk
Ecological	N/A	Minor Risk	Minor Risk	Minor Risk

Source: Terminology adapted from IAQM (2024) however conclusions remain unchanged.

12.151 **Table 12.18** shows the risk of dust soiling effects, and human health and ecological receptors without mitigation as 'Minor'.

12.152 Mitigation measures appropriate for the Proposed Development have been presented in Section 12.174. Such measures should be included within a Construction Environmental Management Plan (CEMP) to reduce the overall predicted risk.

Construction Traffic

12.153 A total of five human health receptors and 14 transects across 13 ecological designations were considered for the construction traffic assessment. These were identified at worst-case locations adjacent to the modelled roads within the construction ARN, discussed within Section 12.64.

12.154

Human Health

NO_2 Concentrations

12.155 **Table 12.19** presents the modelled annual mean NO_2 results for the Proposed Development from construction traffic.

Table 12.19 – Annual Mean NO_2 Predicted Pollutant Concentration (Including Backgrounds) and Significance from Construction Traffic

Receptor ID	Description	NO_2 Concentration ($\mu g/m^3$)		Change in concentration as a percentage of AQAL (%)	Significance
		DM 2025	DS 2025		
Ox_Con_1[(a)]	Stratfield Brake Sports Ground	-	11.0	-	-
Ox_Con_2	Residential property on Frieze Way	15.7	15.7	0.1	Negligible
Ox_Con_3	Trax Education Centre, Red Barn Farm Cottage	14.1	14.1	<0.1	Negligible
Ox_Con_4	Residential property at Collett Drive	13.2	13.2	<0.1	Negligible
Ox_Con_5	Residential property at A44 Woodstock Road	18.5	18.5	0.1	Negligible

Note: DM = Do-Minimum, without Proposed Development and DS = Do-Something, with Proposed Development Significance determined in accordance with Section 12.37.
(a) Annual mean objective not applicable at this receptor, therefore DS 2025 has only been presented for comparison with short-term objective of 60µg/m³

12.156 Modelled annual mean concentrations of NO_2 are well below the relevant objectives in both the DM and DS Proposed Development construction traffic scenarios. Concentrations within **Table 12.** are concluded to be of **'Negligible'** significance at all modelled receptors, as background concentrations are well below the objective and there is only a small increase in traffic flows on the existing road network. At all receptors, annual mean concentrations are below 60µg/m³ and therefore, as discussed within Section 12.78, the NO_2 hourly objective of 200µg/m³ not to be exceeded more than the allowable 18 times per year.

PM_{10} Concentrations

12.157 **Table 12.20** presents the modelled annual mean PM_{10} results for the Proposed Development from construction traffic.

Table 12.20 – Annual Mean PM10 Predicted Pollutant Concentration (Including Backgrounds) and Significance from Construction Traffic

Receptor ID	Description	PM_{10} Concentration ($\mu g/m^3$)		Change in concentration as a percentage of AQAL (%)	Significance
		DM 2025	DS 2025		
Ox_Con_1[(a)]	Stratfield Brake Sports Ground	-	14.6	-	-
Ox_Con_2	Residential property on Frieze Way	17.4	17.4	<0.1	Negligible
Ox_Con_3	Trax Education Centre, Red Barn Farm Cottage	17.3	17.3	<0.1	Negligible
Ox_Con_4	Residential property at Collett Drive	15.6	15.6	<0.1	Negligible

Ox_Con_5	Residential property at A44 Woodstock Road	18.8	18.8	<0.1	Negligible

Note: DM = Do-Minimum, without Proposed Development and DS = Do-Something, with Proposed Development Significance determined in accordance with Section 12.37.
(a) Annual mean objective not applicable at this receptor therefore DS 2025 has only been presented for comparison with short-term objective of 32µg/m^3

12.158 Modelled annual mean concentrations of PM_{10} are well below the relevant objectives in the DM and DS Proposed Development construction traffic scenarios. Changes in concentrations are concluded to be of **'Negligible'** significance at all modelled receptors. At all receptors, annual mean concentrations are below 32µg/m^3 and therefore, as discussed within Section 12.78, the PM_{10} hourly objective of 50µg/m^3 is not likely to be exceeded more than the allowable 35 times per year. Therefore, the Proposed Development's effect on daily PM_{10} is not significant.

$PM_{2.5}$ Concentrations

12.159 **Table 12.21** presents the modelled annual mean $PM_{2.5}$ results for the Proposed Development from construction traffic. Receptor Ox_Con_1 is not presented for $PM_{2.5}$ as there is no short-term objective for this pollutant and not a relevant annual mean exposure in accordance with **Table 12.3.**

Table 12.21 – Annual Mean $PM_{2.5}$ Predicted Pollutant Concentration (Including Backgrounds) and Significance from Construction Traffic

Receptor ID	Description	$PM_{2.5}$ Concentration (µg/m^3)		Change in concentration as a percentage of AQAL (%)	Significance
		DM 2025	DS 2025		
Ox_Con_2	Residential property on Frieze Way	10.6	10.6	<0.1	Negligible
Ox_Con_3	Trax Education Centre, Red Barn Farm Cottage	10.8	10.8	<0.1	Negligible
Ox_Con_4	Residential property at Collett Drive	9.8	9.8	<0.1	Negligible
Ox_Con_5	Residential property at A44 Woodstock Road	11.6	11.6	<0.1	Negligible

Note: DM = Do-Minimum, without Proposed Development and DS = Do-Something, with Proposed Development Significance determined in accordance with Section 12.37.

12.160 Modelled annual mean concentrations of $PM_{2.5}$ are well below the relevant objectives in the DM and DS Proposed Development construction traffic scenarios. Changes in concentrations are concluded to be of **'Negligible'** significance at all modelled receptors.

Designated Habitats

12.161 14 transects across 13 ecological designations have been identified within 200m of the roads screened in for the assessment of construction traffic of the Proposed Development. Details of the maximum predicted concentration at each designated habitat for nitrogen deposition and NOx critical levels are shown in **Table 12.22** and **Table 12.23**, respectively. The predicted concentrations for nitrogen deposition and NOx at each modelled transect point location can be seen in Table A 12.17 within **Appendix 12.5** and Table A 12.19 within **Appendix 12.6**, respectively.

12.162 **Table 12.22** highlights that the changes in nitrogen deposition with ammonia are less than 0.4 kg N/ha/yr at all ecological receptors and are concluded to be of **no significant impacts** at all modelled ecological receptors.

12.163 **Table12.23** highlights that ecological designated sites adjacent to the A34 are 'above standard' for NOx critical levels; however, the overall change is small and therefore **not significant.** The largest change in NOx concentrations is at the Stratfield Brake LWS transects, however overall concentrations are 'within standard' and therefore **not significant.**

Table 12.22 – Summary of worst case ecological receptors during construction (2025), with ammonia emissions

Designated site name	Receptor ID with greatest change in N deposition	Lower critical load (CL) (kg N/ha/yr)	Average background N deposition (kg N/ha/yr)	DM 2025 total N deposition (kg N/ha/yr)	DS 2025 total N deposition (kg N/ha/yr)	Change in N deposition (DS-DM) (kg N/ha/yr)	Potentially Significant
Stratfield Brake LWS (transect 1)	1ECO10	5	25.9	29.1	29.2	0.1	No
Stratfield Brake LWS (transect 2)	2ECO8	5	25.9	31.6	31.9	0.3	No
Canalside Meadow-Oxford Canal Marsh LWS	3ECO5	5	15	30.4	30.4	< 0.1	No
Duke's Meadow LWS	4ECO18	5	15.3	23.3	23.3	< 0.1	No
Oxford Meadows SAC	5ECO4	10	15.3	31.5	31.5	< 0.1	No
Pixy and Yarnton Meads SSSI	6ECO4	10	15.3	29.5	29.6	0.1	No
Wolvercote Meadows SSSI	7ECO14	10	14.9	24.4	24.5	0.1	No
Godstow Road AW	8ECO98	5	26.3	30.2	30.2	< 0.1	No
Godstow Holt AW	9ECO58	5	26.2	32.0	32.0	< 0.1	No
Botley Hill AW	10ECO197	5	26.2	27.4	27.4	< 0.1	No
Church Grove AW	11ECO106	5	26.2	29.8	29.8	< 0.1	No
Binsey Lane AW	12ECO79	5	26.2	30.8	30.8	< 0.1	No
Wytham Woods SSSI	13ECO44	15	26.2	30.1	30.2	0.1	No
Linkside Lake LWS	14ECO179	5	26.2	28.7	28.7	< 0.1	No

Table 12.23 – Summary of NOx critical levels for ecological receptors during construction

Designated site name	Receptor ID	NOx concentrations (µg/m^3)		Actual Change (µg/m^3)	Comparison against air quality standard	Potentially Significant
		2025 DM	2025 DS			
Stratfield Brake LWS (transect 1)	1ECO10	19.0	19.1	0.1	Within standard	No
Stratfield Brake LWS (transect 2)	2ECO8	22.0	22.3	0.3	Within standard	No
Canalside Meadow-Oxford Canal Marsh LWS	3ECO5	41.9	41.9	< 0.1	Above standard	No
Duke's Meadow LWS	4ECO18	30.1	30.1	< 0.1	Above standard	No
Oxford Meadows SAC	5ECO4	44.1	44.2	0.1	Above standard	No
Pixy and Yarnton Meads SSSI	6ECO3	40.9	41.0	0.1	Above standard	No
Wolvercote Meadows SSSI	7ECO14	31.4	31.5	0.1	Above standard	No
Godstow Road AW	8ECO98	18.0	18.1	0.1	Within standard	No
Godstow Holt AW	9ECO58	20.5	20.5	< 0.1	Within standard	No
Botley Hill AW	10ECO197	12.9	12.9	< 0.1	Within standard	No
Church Grove AW	11ECO106	15.6	15.6	< 0.1	Within standard	No
Binsey Lane AW	12ECO79	17.0	17.0	< 0.1	Within standard	No
Wytham Woods SSSI	13ECO44	16.2	16.2	< 0.1	Within standard	No
Linkside Lake LWS	14ECO179	15.7	15.7	< 0.1	Within standard	No

Operation

12.164 A total of 12 human health receptors and 14 transects across 13 ecological designations were considered for the operational traffic assessment. These were identified at worst-case locations adjacent to the modelled roads within the operational ARN, discussed in Section 12.114.

Human Health

NO_2 Concentrations

12.165 **Table 12.24** presents the modelled annual mean NO_2 results for the Proposed Development during operation.

Table 12.24 – Annual Mean NO_2 Predicted Pollutant Concentration (Including Backgrounds) and Significance During Operation

Receptor ID	Description	NO_2 Concentration (µg/m^3)			Significance
		DM 2026	DS 2026	Change in concentration as a percentage of AQAL (%)	
Ox_Op_1	Residential property at A4260 Oxford Rd	11.3	11.4	0.2	Negligible
Ox_Op_2[(a)]	Stratfield Brake Sports Ground	-	10.6	-	-
Ox_Op_3	Residential property at Oxford Rd	15.7	15.9	0.5	Negligible
Ox_Op_4	Trax Education Centre, Red Barn Farm Cottage	13.7	13.7	<0.1	Negligible
Ox_Op_5	Residential property at 566 Banbury Road	17.7	17.9	0.6	Negligible
Ox_Op_6[(a)]	Oxford Hawks Hockey Club	-	11.4	-	-
Ox_Op_7	Committed development - Oxford North	12.9	12.9	<0.1	Negligible
Ox_Op_8	Residential property at 369A Woodstock Road	17.0	17.1	0.1	Negligible
Ox_Op_9	Residential property on .Sunderland Ave	17.3	17.4	0.2	Negligible
Ox_Op_10	Residential property at 31 David Walter Cl	14.0	14.0	<0.1	Negligible

Receptor ID	Description	NO_2 Concentration (µg/m^3)			Significance
		DM 2026	DS 2026	Change in concentration as a percentage of AQAL (%)	
Ox_Op_11	Residential property at 11 Wyatt Road	13.2	13.2	<0.1	Negligible
Ox_Op_12	Residential property at 44 Collett Drive	13.1	13.1	<0.1	Negligible

Note: DM = Do-Minimum, without Proposed Development and DS = Do-Something, with Proposed Development
Significance determined in accordance with Section 12.37.
(a) Annual mean objective not applicable at this receptor, therefore DS 2026 has only been presented for comparison with short-term objective of 60µg/m^3

12.166 Modelled annual mean concentrations of NO_2 are well below the relevant objectives in both the DM and DS Proposed Development operation scenarios. Concentrations within **Table 12.** are concluded to be of **'Negligible'** significance at all modelled receptors, as background concentrations are well below the objective and there is only a small increase in traffic flows on the existing road network. At all receptors, annual mean concentrations are below 60µg/m^3 and therefore, as discussed within Section 12.78, the NO_2 hourly objective of 200µg/m^3 is not likely to be exceeded more than the allowable 18 times per year.

PM_{10} Concentrations

12.167 **Table 12.25** presents the modelled annual mean PM_{10} results for the Proposed Development during operation.

Table 12.25 – Annual Mean PM_{10} Predicted Pollutant Concentration (Including Backgrounds) and Significance During Operation

Receptor ID	Description	PM_{10} Concentration (µg/m^3)			Significance
		DM 2026	DS 2026	Change in concentration as a percentage of AQAL (%)	
Ox_Op_1	Residential property at A4260 Oxford Rd	14.9	15.0	0.2	Negligible
Ox_Op_2[(a)]	Stratfield Brake Sports Ground	-	14.6	-	-
Ox_Op_3	Residential property at Oxford Rd	17.3	17.3	<0.1	Negligible
Ox_Op_4	Trax Education Centre, Red Barn Farm Cottage	16.9	16.9	<0.1	Negligible
Ox_Op_5	Residential property at 566 Banbury Road	17.6	17.7	0.2	Negligible
Ox_Op_6[(a)]	Oxford Hawks Hockey Club	-	15.1	-	-

Receptor ID	Description	PM_{10} Concentration (µg/m^3)			Significance
		DM 2026	DS 2026	Change in concentration as a percentage of AQAL (%)	
Ox_Op_7	Committed development - Oxford North	17.1	17.1	<0.1	Negligible
Ox_Op_8	Residential property at 369A Woodstock Road	17.6	17.6	<0.1	Negligible
Ox_Op_9	Residential property on Sunderland Ave	17.1	17.1	<0.1	Negligible
Ox_Op_10	Residential property at 31 David Walter Cl	15.7	15.7	<0.1	Negligible
Ox_Op_11	Residential property at 11 Wyatt Road	15.5	15.5	<0.1	Negligible
Ox_Op_12	Residential property at 44 Collett Drive	15.5	15.5	<0.1	Negligible

Note: DM = Do-Minimum, without Proposed Development and DS = Do-Something, with Proposed Development
Significance determined in accordance with Section 12.37.
(a) Annual mean objective not applicable at this receptor therefore DS 2026 has only been presented for comparison with short-term objective of 32µg/m^3

12.168 Modelled annual mean concentrations of PM_{10} are well below the relevant objectives in the DM and DS Proposed Development operation scenarios. Changes in concentrations are concluded to be of **'Negligible'** significance at all modelled receptors. At all receptors, annual mean concentrations are below 32µg/m^3 and therefore, as discussed within Section 12.78, the PM_{10} hourly objective of 50µg/m^3 is not likely to be exceeded more than the allowable 35 times per year. Therefore, the Proposed Development's effect on daily PM_{10} is not significant.

$PM_{2.5}$ Concentrations

12.169 **Table 12.26** presents the modelled annual mean $PM_{2.5}$ results for the Proposed Development during operation. Receptors Ox_Op_2 and Ox_Op_6 are not presented for $PM_{2.5}$ as there is no short-term objective for this pollutant.

Table 12.26 – Annual Mean $PM_{2.5}$ Predicted Pollutant Concentration (Including Backgrounds) and Significance During Operation

Receptor ID	Description	$PM_{2.5}$ Concentration (µg/m^3)			Significance
		DM 2026	DS 2026	Change in concentration as a percentage of AQAL (%)	
Ox_Op_1	Residential property at A4260 Oxford Rd	9.7	9.8	0.5	Negligible
Ox_Op_3	Residential property at Oxford Rd	10.5	10.5	< 0.1	Negligible
Ox_Op_4	Trax Education Centre, Red Barn Farm Cottage	10.5	10.5	< 0.1	Negligible

Receptor ID	Description	$PM_{2.5}$ Concentration (µg/m^3)			Significance
		DM 2026	DS 2026	Change in concentration as a percentage of AQAL (%)	
Ox_Op_5	Residential property at 566 Banbury Road	11.2	11.3	0.5	Negligible
Ox_Op_7	Committed development - Oxford North	10.6	10.6	< 0.1	Negligible
Ox_Op_8	Residential property at 369A Woodstock Road	10.9	10.9	< 0.1	Negligible
Ox_Op_9	Residential property on Sunderland Ave	10.9	10.9	< 0.1	Negligible
Ox_Op_10	Residential property at 31 David Walter Cl	10.3	10.3	< 0.1	Negligible
Ox_Op_11	Residential property at 11 Wyatt Road	10.2	10.2	< 0.1	Negligible
Ox_Op_12	Residential property at 44 Collett Drive	9.7	9.7	< 0.1	Negligible

Note: DM = Do-Minimum, without Proposed Development and DS = Do-Something, with Proposed Development
Significance determined in accordance with Section 12.37.

12.170 Modelled annual mean concentrations of $PM_{2.5}$ are well below the relevant objectives in the DM and DS Proposed Development operation scenarios. Changes in concentrations are concluded to be of **'Negligible'** significance at all modelled receptors.

Designated Habitats

12.171 14 transects across 13 ecological designations have been identified within 200m of the screened in roads for the Proposed Development during operation. Details of the maximum predicted concentration at each designated habitat for nitrogen deposition and NOx critical levels are shown in **Table 12.27** and **Table 12.28**, respectively. The predicted concentrations for nitrogen deposition and NOx at each modelled transect point location can be seen in Within Table A 12.18 within **Appendix 12.5** and Table A 12.20 within **Appendix 12.6**, respectively.

12.172 **Table 12.27** highlights the changes in nitrogen deposition with ammonia are less than 0.4 kg N/ha/yr at all designated habitats, with the exception of two modelling points at Stratfield Brake LWS transect 2 which has an increase of 0.8 kg N/ha/yr and 0.4 kg N/ha/yr respectively. It is noted that even in the DM Scenario, the site already exceeds the lower critical load and the change is small in comparison. In accordance with DMRB LA 105 (see section 12.99), this change of greater than 0.4 kg N/ha/yr predicted at these two locations, has been reviewed by the Competent expert for Biodiversity and it is concluded to be **not significant**. See Chapter 8 for further discussion.

12.173 **Table 12.28** highlights that ecological designated sites adjacent to the A34 are 'above standard' for NOx critical levels; however, the overall change is small and therefore **not significant**. The largest change in NOx concentrations is at the Stratfield Brake LWS transects, which exceeds a change greater than 0.4 µg/m^3 however this site is 'within standard' and is therefore **not significant.**

Table 12.27 – Summary of worst case ecological receptors during operation (2026), with ammonia emissions

Designated site name	Receptor ID with greatest change in N deposition	Lower critical load (CL) (kg N/ha/yr)	Average background N deposition (kg N/ha/yr)	DM 2026 total N deposition (kg N/ha/yr)	DS 2026 total N deposition (kg N/ha/yr)	Change in N deposition (DS-DM) (kg N/ha/yr)	Potentially Significant
Stratfield Brake LWS (transect 1)	1ECO10	5	25.9	29.4	29.7	0.3	No
Stratfield Brake LWS (transect 2)	2ECO8	5	25.9	31.5	32.3	0.8	Yes
Stratfield Brake LWS (transect 2)	2ECO20	5	25.9	29.8	30.3	0.4	Yes
Canalside Meadow-Oxford Canal Marsh LWS	3ECO5	5	15.0	31.5	31.6	0.1	No
Duke's Meadow LWS	4ECO18	5	15.3	23.8	23.8	< 0.1	No
Oxford Meadows SAC	5ECO4	10	15.3	32.3	32.4	0.1	No
Pixy and Yarnton Meads SSSI	6ECO4	10	15.1	30.3	30.3	< 0.1	No
Wolvercote Meadows SSSI	7ECO14	10	14.9	24.9	25.0	0.1	No
Godstow Road AW	8ECO98	5	26.3	30.4	30.4	< 0.1	No
Godstow Holt AW	9ECO58	5	26.2	32.3	32.3	< 0.1	No
Botley Hill AW	10ECO197	5	26.2	27.4	27.4	< 0.1	No
Church Grove AW	11ECO106	5	26.2	29.9	30.0	0.1	No

Binsey Lane AW	12ECO79	5	26.2	31.0	31.0	< 0.1	No
Wytham Woods SSSI	13ECO44	15	26.2	30.3	30.4	0.1	No
Linkside Lake LWS	14ECO179	5	26.2	28.8	28.9	0.1	No

Table 12.28 - Summary of NOx critical levels for ecological receptors during operation

Designated site name	Receptor ID	NOx concentrations (µg/m³)		Actual Change (µg/m³)	Comparison against air quality standard	Potentially Significant
		2026 DM	2026 DS			
Stratfield Brake LWS (transect 1)	1ECO10	15.8	16.2	0.4	Within standard	No
Stratfield Brake LWS (transect 2)	2ECO8	18.2	19.0	0.8	Within standard	No
Canalside Meadow-Oxford Canal Marsh LWS	3ECO5	41.7	41.8	0.1	Above standard	No
Duke's Meadow LWS	4ECO18	29.7	29.8	0.1	Within standard	No
Oxford Meadows SAC	5ECO4	43.3	43.4	0.1	Above standard	No
Pixy and Yarnton Meads SSSI	6ECO4	40.2	40.3	0.1	Above standard	No
Wolvercote Meadows SSSI	7ECO14	30.9	30.9	< 0.1	Above standard	No
Godstow Road AW	8ECO98	17.8	17.8	< 0.1	Within standard	No
Godstow Holt AW	9ECO58	20.1	20.2	0.1	Within standard	No
Botley Hill AW	10ECO197	12.7	12.7	< 0.1	Within standard	No
Church Grove AW	11ECO106	15.4	15.4	< 0.1	Within standard	No

Designated site name	Receptor ID	NOx concentrations (µg/m^3)		Actual Change (µg/m^3)	Comparison against air quality standard	Potentially Significant
		2026 DM	2026 DS			
Binsey Lane AW	12ECO79	16.6	16.6	< 0.1	Within standard	No
Wytham Woods SSSI	13ECO44	15.9	15.9	< 0.1	Within standard	No
Linkside Lake LWS	14ECO179	15.4	15.4	< 0.1	Within standard	No

Mitigation Measures and Residual Effects

Mitigation

12.174 This section presents the proposed mitigation to reduce the potential effects predicted in the preceding sections of this report.

12.175 These measures should be incorporated into a Construction Environmental Management Plan (or equivalent) and it is the responsibility of the build contractor to ensure dust and emission control methods presented below are agreed with the Local Authority and implemented effectively.

Construction Dust

12.176 During construction and decommissioning phases, construction activities associated with the Proposed Development are predicted to have, at worst, a 'Minor' risk of dust soiling effects, human health and ecological from construction/decommissioning activities with no mitigation in place.

12.177 Best practice mitigation measures for the Proposed Development as outlined in IAQM guidance are presented below, based on the dust risk levels presented in **Table 12..**

Communications

- 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.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.

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 the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the logbook.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- 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 on site 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 PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Preparing and Maintaining the Site

- Plan 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 on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives 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 re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all vehicles 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.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).

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 on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and 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 on site 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

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

Measures specific to trackout

- 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.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Construction Traffic

12.178 Based on the findings in Section 12.153 to 12.163, no mitigation measures are required for the construction traffic associated with the Proposed Development.

Operation

12.179 Based on the findings in Section 12.164 to 12.173, no mitigation measures are required during the operation phase of the Proposed Development.

Residual Effects

12.180 This section presents the potential residual effects associated with the Proposed Development.

Construction Dust

12.181 It is considered that with an appropriate CEMP implemented, there would be **no significant effects** on air quality from construction dust. The aim of the measures set out in the CEMP would be to achieve zero complaints regarding dust during the construction phase of the Proposed Development. However, mitigation measures would be kept under review and, where appropriate, adjusted to deal with any complaints received from members of the public.

Construction Traffic

12.182 Since the results of the construction traffic assessment indicate that all of the human health receptors modelled experience pollutant concentrations within the relevant AQOs for all pollutants, the effect of the Proposed Development on air quality at human health receptors is assessed to be **not significant.**

12.183 Furthermore, the nitrogen deposition findings at the modelled designated habitats are also considered to be **not significant.**

Operation

12.184 As a result of the opening year indicating that all of the human health receptors considered are modelled to experience pollutant concentrations within the relevant AQOs for all pollutants, the effect of the Proposed Development on air quality at human health receptors is assessed to be **not significant.**

12.185 Furthermore, the nitrogen deposition findings at the modelled designated habitats are also considered to be **not significant.**

Cumulative Effects

12.186 Impacts on air quality during the construction and operational phase from the Proposed Development have the potential to result in adverse effects in-combination with other environmental factors, including:

- The combined effects of dust, noise and vibration, traffic and visual impacts during construction.
- The combined impact of changes in air pollutant concentrations and noise and vibration levels at human health receptors as a result of changes in road traffic flows during construction and operation of the Proposed Development.
- Impairment to normal ecological function at designated sites from increased dust soiling and nitrogen deposition resulting in other impacts on such features being exacerbated.

12.187 The air quality assessment does not assign a level of significance (only significant or not significant effects). However, for air quality, no significant residual effects have been identified. Therefore, no intra-project effects (i.e. between different environmental factors) have been identified.

12.188 In terms of inter-project effects (i.e. with other developments), no significant residual effects have been identified, meaning that as the assessment which was undertaken was inherently cumulative (because it included traffic flows associated with other committed developments) that no significant inter-project cumulative air quality effects have been identified. A review of the boundaries of approved developments within the traffic data extent has also been undertaken. Receptors identified within this assessment are representative of the boundaries of the approved developments and therefore inter-project effects are **not significant.**

Conclusions

12.189 This report provides an assessment of the following key effects associated with the construction and operational phase of the Proposed Development:

- Nuisance, health effects and/or loss of amenity caused by construction dust on sensitive receptors.
- Changes in pollutant concentrations caused by additional vehicles associated with the Proposed Development from construction traffic (2025).
- Changes in pollutant concentrations caused by additional vehicles associated with the Proposed Development during operation (2026).

12.190 A qualitative assessment of the construction dust effects predicted that the level of risk of dust creating nuisance and/or loss of amenity, PM_{10} leading to adverse health effects (without

mitigation) and risk for ecological receptors is predicted to be 'Minor' risk. However, following the appropriate mitigation measures listed in Section 12.174, dust effects are considered to be **not significant.**

12.191 The Proposed Development is not predicted to cause any exceedances of the annual mean NO_2, PM_{10} and $PM_{2.5}$ objectives at any of the modelled receptors during construction and operation. The assessment has also demonstrated that the short-term objectives for NO_2 and PM_{10} are not expected to be exceeded at modelled receptors. The change in local air quality caused by the Proposed Development is predicted to be of **'Negligible'** significance.

12.192 The change in nitrogen deposition with ammonia is less than 0.4 kg N/ha/yr at all ecological receptors during construction and all but two points during operation of the Proposed Development. In accordance with DMRB LA 105, this change of greater than 0.4 kg N/ha/yr predicted at these two locations, has been reviewed by the Competent expert for Biodiversity and it is concluded to be **not significant**. See Chapter 8 for further discussion.

12.193 The Proposed Development is not considered to conflict with any national, regional or local planning policy.

Table 12.30: Summary Table

Effect	Receptor (Sensitivity)	Magnitude	Nature/Level of Effect	Mitigation	Residual Effect
Construction Phase					
Introduction of dust emissions from construction activities.	Dust Soiling, health effects: High sensitivity Ecological effects: Low sensitivity (Stratfield Brake Local Wildlife Site)	High	Dust emissions from construction activities have a direct impact on sensitive receptors. These impacts are temporary and only relevant during the construction phase. Overall effect categorised as 'Minor Risk'.	Mitigation is recommended to minimise the impact of dust emissions from 'Minor'.	Negligible Not Significant
Changes in pollutant concentrations caused by additional traffic during construction of the	Long-term and short-term human health receptors: High sensitivity	Negligible	Impacts from construction traffic emissions on sensitive receptors are direct and temporary during the construction	No mitigation is required as there are no significant impacts with regard to air quality.	Negligible Not Significant

Effect	Receptor (Sensitivity)	Magnitude	Nature/Level of Effect	Mitigation	Residual Effect
Proposed Development.			phase of the Proposed Development. Impacts are categorised as not significant.		
	Designated Habitats: Low to High sensitivity (nine low sensitivity, LWS and AW sites and five high sensitivity, SSSI and SAC sites across 14 transects)	Negligible	The changes in nitrogen deposition with ammonia are less than 0.4 kg N/ha/yr at all ecological receptors and are concluded to be of no significant impacts at all modelled ecological receptors.	No mitigation is required as there are no significant impacts with regard to air quality.	Negligible Not Significant
Operational Phase					
Changes in pollutant concentrations caused by additional traffic during operation of the Proposed Development.	Long-term and short-term human health receptors: High sensitivity	Negligible	Impacts from operational traffic emissions on sensitive receptors are direct and temporary during the operational phase of the Proposed Development. Impacts are categorised as not significant.	No mitigation is required as there are no significant impacts with regard to air quality.	Negligible Not Significant
	Ecological Receptors: Low to High sensitivity across two transects	Negligible	The changes in nitrogen deposition with ammonia are less than 0.4 kg N/ha/yr at all but two ecological receptors. In accordance with DMRB LA 105, this change of greater than 0.4 kg N/ha/yr predicted at these two locations, has been reviewed by the	No mitigation is required as there are no significant impacts with regard to air quality.	Negligible Not Significant

Effect	Receptor (Sensitivity)	Magnitude	Nature/Level of Effect	Mitigation	Residual Effect
			Competent expert for Biodiversity and it is concluded to be not significant. See Chapter 8 for further discussion.		
Cumulative Effects					
Changes in pollutant concentrations caused by additional traffic during operation of the Proposed Development.	Residential Properties: High Sensitivity	Negligible	Impacts from operational traffic emissions on sensitive receptors are direct and temporary during the operational phase of the Proposed Development. Impacts are categorised as not significant.	No mitigation is required as there are no significant impacts with regard to air quality.	Negligible Not Significant

References

[i] Statutory Instrument (2010) The Air Quality Standards Regulations. No. 1001.
[ii] Statutory Instrument (2016) The Air Quality Standards (Amendment) Regulations. No. 1184.
[iii] Statutory Instrument (2019) Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations.
[iv] Statutory Instrument (2020) Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020. No. 1313.
[v] Department for Environment Food and Rural Affairs (2003) Part IV of the Environment Act 1995 Local Air Quality Management.
[vi] Statutory Instrument (2000) Air Quality (England) Regulations. No. 928.
[vii] Department for Environment Food and Rural Affairs (January 2019) The Clean Air Strategy.
[viii] Ministry of Housing, Communities and Local Government (September 2023) National Planning Policy Framework
[ix] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2016) National Planning Practice Guidance web-based resource [online] available at: https://www.gov.uk/government/collections/planning-practice-guidance (last accessed: September 2023).
[x] Department for Environment Food and Rural Affairs (April 2023) The United Kingdom National Air Quality Strategy: Framework for Local Authority Delivery.
[xi] Environmental Protection UK and Institute of Air Quality Management (2017) Land-Use Planning and Development Control: Planning for Air Quality.
[xii] Institute of Air Quality Management (2024) Guidance on the assessment of dust from demolition and construction Version 2.2.
[xiii] Department for Environment, Food and Rural Affairs and Devolved Administrations (2022). Local Air Quality Management – Technical Guidance LAQM.TG22.
[xiv] National Highways (2019) Design Manual for Roads and Bridges LA 105 Air quality.
[xv] Cherwell District Council (2015) The Cherwell Local Plan 2011 – 2031 Part 1 [online] available at: Adopted Cherwell Local Plan 2011-2031 Part 1 (incorporating Policy Bicester 13 re-adopted on 19 December 2016) | Cherwell District Council (last accessed September 2023).
[xvi] Oxford City Council (2020) – Oxford Local Plan 2036 [online] available at: Oxford Local Plan 2016-2036 | Oxford City Council (last accessed September 2023).
[xvii] Vale of White Horse District Council (2016) – Local Plan 2031 Part 1: Strategic Sites and Policies [online] available at: Local Plan 2031 - Vale of White Horse District Council (whitehorsedc.gov.uk) (last accessed September 2023).
[xviii] Air Quality Directive (2008) 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.
[xix] Department for Environment Food and Rural Affairs (July 2017) Air Quality Plan for tackling roadside nitrogen dioxide concentrations in South East (UK0031).
[xx] Parliament of the United Kingdom (1990) Environmental Protection Act 1990.
[xxi] The Cherwell Local Plan 2011 - 2031 (Part 1), Partial Review (LPPR) - Oxford's Unmet Housing Need, Adopted 7 September 2020.
[xxii] Statutory Instrument. (2023) The Environmental Targets (Fine Particulate Matter) (England) Regulation, No. 96
[xxiii] Department for Environment, Food and Rural Affairs (2020). NO2 Adjustment for NOx Sector Removal Tool [online] at https://laqm.defra.gov.uk/air-quality/air-quality-assessment/no2-adjustment-for-NOx-sector-removal-tool/ (last accessed October 2023)
[xxiv] Natural England Commissioned Report NECR210 (2016). Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance.
[xxv] D Laxen and B Marner (2023) Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites.
[xxvi] Department for Environment Food and Rural Affairs (2018) Background maps [online] available at: https://uk-air.defra.gov.uk/data/laqm-background-maps (last accessed September 2023).
[xxvii] Defra (2018) National Pollution Climate Mapping (PCM) modelled background concentrations [online] available at: data.gov.uk (last accessed August 2023)