Blenheim Estate Homes

LAND EAST OF PARK VIEW, WOODSTOCK, OXFORDSHIRE

Air Quality Assessment

OCTOBER 2022

PUBLIC

FOREWORD

In June 2022, the air quality assessment presented herein was submitted to Cherwell District Council in support of the planning application (reference 22/01715/OUT) for the proposed development of Land East of Park View in Woodstock, Oxfordshire (also known as 'Land South of Perdiswell Farm') for up to 500 residential dwellings with associated access, open space, and infrastructure.

The assessment considered the potential impacts on nearby sensitive receptors associated with dust generating activities undertaken during the construction phase and potential impacts on air quality at sensitive (human and ecological) receptors associated with exhaust emissions from road traffic generated by the Proposed Development during its operation.

For the operational phase, the detailed dispersion model ADMS Roads was used to predict the changes in pollutant concentrations at the assessed sensitive receptors. The air quality assessment was completed in accordance with appropriate best practice guidance and the results of the detailed modelling were verified against local monitoring data (collated by Cherwell District Council, West Oxfordshire District Council and Oxford City Council). To inform the assessment, traffic data for the Proposed Development and local road network was provided by DTA, the project Transport Planning Consultants.

Following submission of the planning application, DTA received comments from the County Council's Highways Department in relation to the Transport Assessment (TA) including how the neighbouring Park View committed development (Park View was granted planning consent for 300 dwellings) was accounted for within the traffic data. At the time the TA was completed, Park View was only partially constructed and operational. The County Council were therefore concerned that the total trips that could be generated by Park View were not fully captured within the traffic surveys undertaken to inform the TA or appropriately accounted for within the growth factors applied to the baseline traffic flows. To ensure a robust assessment, the traffic data was updated to include all of the vehicle trips associated with Park View.

Consequently, it was therefore necessary to review the updated traffic data (summarised in Table A overleaf) to determine the nature and magnitude of the changes and the implications for the air quality assessment. The key findings are summarised below.

1. The 2019 traffic flows remain unchanged. Therefore, there would be no changes to the 'existing baseline' modelling results or the model verification calculations.
2. The are no changes to the number of new trips generated by the Proposed Development itself, or the composition of development traffic. As such, the change in pollutant concentrations (i.e. the magnitude of impact) due to the Proposed Development 'alone' would also remain unchanged.
3. The increase in committed development flows would uplift the total traffic flows on just over half of the modelled road links in the future assessment scenarios. Therefore, there would be a corresponding increase in total pollutant concentrations at nearby sensitive receptors and a small increase in 'cumulative' impacts at a number of assessment receptors. Whilst the increases in traffic flows are not insignificant (ranging from 66 to 940 vehicles per day) they are relatively small when considered in the context of total traffic flows on the affected road links, equating to an uplift of between 0.1% to 3.4% against the modelled future baseline (plus committed development) traffic flows.
4. The air quality assessment concluded that the Proposed Development will have a negligible impact on air quality at nearby sensitive human and ecological receptors, both alone and cumulatively with other committed development. For the human receptors, in the future assessment scenarios, total pollutant concentrations are predicted to be well below (<70%) of the relevant statutory health-based standards. Given how low the total pollutant concentrations are forecast to be, it is highly unlikely that the uplift in committed development flows, and therefore total traffic flows, would materially change the severity of the predicted impacts or the overall conclusions in relation to significance of effects.

5 With regard to the predicted air quality impacts on ecological receptors within 200m of the modelled road network, notably the Oxford Meadows Special Area of Conservation (SAC) and the Blenheim Park Site of Special Scientific Interest (SSSI), the increase in committed development trips would only increase the in-combination effect and total concentrations slightly as they represent a small proportion of all traffic growth between the two assessment years, and an even smaller proportion of total traffic flows on the identified road links within 200m of the ecological receptors. The air quality assessment concluded that whilst the Proposed Development, in-combination with other committed developments, may lead to an increase in nitrogen deposition, it is unlikely to restrict the ability to deliver the conservation objectives or to have an adverse effect on the integrity of the SAC. With respect to the SSSI, the most sensitive / qualifying features for which the SSSI has been designated are set back some distance from the roadside. Therefore, the increase in committed development trips are highly unlikely to have a material impact on the modelling results for the SSSI and the assessment conclusions would not change.

Based on the above, it is not considered necessary for the air quality assessment to be revisited using the revised traffic data, and the conclusions of the assessment remain valid.

Table A: Comparison of Assessed and Revised Committed Development Flows

Road Link	Road Name	Assessed Future Baseline Daily Traffic Flows	Assessed Committed Development Daily Flows	Revised Committed Development Daily Flows	Change in Committed Development Flows	Change as % of Future Base + Committed Daily Traffic Flows
1	A44 Oxford Road	17917	1135	1349	214	1.1%
2	A4095 Upper Campsfield Road North of Site Access	9650	789	855	66	0.6%
3	A4095 Upper Campsfield Road South of Site Access	9650	789	855	66	0.6%
4	A44 Woodstock Road	26097	1550	2490	940	3.4%
5	Cadogan Park/Princes Rise	1291	0	0	0	0.0%
6	Hensington Road	3211	0	0	0	0.0%
7	A4095 Bladon	12245	561	857	296	2.3%
8	A4095 Witney Road	10959	292	588	296	2.6%
9	Church Road	1914	282	282	0	0.0%
10	A4095 Woodgreen Road	15470	1514	1810	296	1.7%
11	A4095 Bridge Street	11911	536	536	0	0.0%
12	A4095 Mill Street	8097	354	354	0	0.0%
13	B4022 West End	14425	6	6	0	0.0%
14	B4022 Newland	13757	12	12	0	0.0%
15	A34 South	92882	0	333	333	0.4%
16	A44 Manor Road	13599	1135	1349	214	1.5%
17	A44 through Yarnton	26097	0	781	781	3.0%
18	A34 North	80301	0	86	86	0.1%
19	A4144 (into Oxford)	16053	0	163	163	1.0%
20	A40 (east)	40662	0	199	199	0.5%
21	A40 (west) towards Eynsham	29137	0	0	0	0.0%
22	A40 between A4144 and A4165	30143	0	199	199	0.7%
23	A44 north of the A40	35763	0	362	362	1.0%
24	A4165 North of the A40	23386	0	0	0	0.0%
25	A4165 South of the A40	16155	0	0	0	0.0%

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Blenheim Estate **Homes**

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Air Quality Assessment

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EXECUTIVE SUMMARY

WSP has been commissioned by Blenheim Estate Homes to undertake an air quality assessment to support the planning application for the proposed development of Land East of Park View, Woodstock for residential development comprising up to 500 residential dwellings and associated landscaping and access.

This report presents the findings of the assessment, which addresses the potential air quality impacts during both the construction and operational phases of the Proposed Development. For both phases the type, source and significance of potential impacts were identified, and the measures that should be employed to minimise these are proposed.

For the construction phase, an assessment of potential impacts associated with fugitive dust and fine particulate matter (PM_{10} and $PM_{2.5}$) emissions has been undertaken in line with the relevant Institute of Air Quality Management guidance. This identified that there is a Low to High Risk of dust soiling impacts and a Low Risk of increases in particulate matter concentrations due to construction activities. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and particulate matter releases would be significantly reduced. The residual effects of the construction phase on air quality are considered to be negligible.

For the operational phase, an assessment of the potential impacts associated with emissions from road traffic generated by the Proposed Development on air quality at nearby sensitive human receptors has been completed in line with published methodologies and technical guidance. The assessment utilised the detailed dispersion model ADMS Roads and local meteorological data to predict the impact of the Proposed Development on concentrations of relevant pollutants including nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$.

The results show that the Proposed Development, both alone and in-combination with other committed developments identified in the surrounding area, would cause a small increase in annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ at most assessment receptors. However, total pollutant concentrations are predicted to meet the respective UK Air Quality Strategy objectives at all human receptors with the Proposed Development in operation. According to the assessment significance criteria, the residual effects of the Proposed Development are therefore negligible for all pollutants considered. Furthermore, concentrations of NO_2, PM_{10} and $PM_{2.5}$ predicted within the development site itself are well below, and therefore meet, the respective objectives and therefore the site is considered suitable for the proposed end use (i.e. future site users/occupants are not anticipated to be exposed to poor air quality).

In addition, the air quality assessment has taken into account potential air quality impacts on sensitive ecological habitats and features within nearby designated sites due to the Proposed Development, both 'alone' and 'in-combination' with other projects or plans (as appropriate). The designated sites considered include the Blenheim Park Site of Special Scientific Interest (SSSI), the Oxford Meadows Special Area of Conservation (SAC) (including Pixey and Yarnton Meads SSSI, which forms a component part of the SAC), and Woodstock Water Meadows Local Wildlife Site.

The results show that, when considering the impact of the Proposed Development 'alone', the changes in annual mean nitrogen oxides (NO_x) concentrations, ammonia concentrations and nutrient nitrogen deposition, are predicted to be less than 1% of the respective critical levels and critical loads within the designated sites. At a small number of locations, exceedances of the 1%

critical load and/or critical level are predicted, however, these are limited to the boundary of the designation, nearest to the roadside. As such, the Proposed Development 'alone' is considered unlikely to have a significant effect on the qualifying features within the respective designated sites.

In relation to the in-combination effects, for the Oxford Meadows SAC (including the Pixey & Yarnton Meads SSSI), exceedances of the critical levels for NO_x and NH_3 and the critical loads for nitrogen deposition are predicted within 200m of the A40 and A34, and in-combination impacts of more than 1% of the respective critical levels/loads are also predicted. However, the Proposed Development itself contributes negligible amounts of these pollutants and the exceedances would occur regardless of the Proposed Development coming forward. The modelling results were shared with the Project Ecologists for evaluation. They concluded that road transport is responsible for only a small proportion of total nitrogen deposition at the SAC with agricultural practices (including livestock and fertiliser application) and non-agricultural waste making up a much greater proportion. Furthermore, the contribution of road traffic to nitrogen deposition is expected to decline over time, as a result of an increased uptake of newer, cleaner (low and zero emission) vehicles. As such they have concluded that whilst impacts greater than 1% are likely, given the relative contribution of road traffic to total nitrogen deposition rates within the SAC is very small, "*…the Proposed Development in-combination with other projects and plans is unlikely to prevent or significantly restrict the ability to deliver the conservation objectives for the site and, as such, the Proposed Development is considered unlikely to have an adverse effect on the integrity of the Oxford Meadows SAC*".

For the Blenheim Park SSSI, whilst the Proposed Development in-combination with other plans and projects is predicted to have an impact on annual mean NO_x concentrations, ammonia, and nitrogen deposition within the Blenheim Park SSSI, the increases are typically less than 1% of the relevant critical load or levels. Where the increases are predicted to be greater than 1%, they occur at locations where there are no qualifying / sensitive features present. Overall, the Project Ecologists have concluded that air pollution impacts on the SSSI will be negligible (i.e. not significant).

The results of the Air Quality Assessment demonstrate that the development proposal complies with national and local policy for air quality.

1. INTRODUCTION

1.1.1. WSP has been commissioned by Blenheim Estate Homes to carry out an assessment of the potential air quality impacts arising from the development proposals for Land East of Park View, Woodstock, Oxfordshire hereafter referred to as the 'Proposed Development' or 'Application Site'.

1.1.2. The Application Site lies within the administrative boundary of Cherwell District Council (CDC), although the boundary with West Oxfordshire District Council (WODC) lies immediately to the west. It covers an area of approximately 48.6ha of land and is situated to the southeast of Woodstock. The Application Site is bordered to the south by the A44 Oxford Road and to the east by Upper Campsfield Road. The Bladon roundabout, where the A44 meets the A4095, lies at the southern corner of the Application Site. London Oxford Airport also lies to the east of the Application Site and Upper Campsfield Road. To the west, another residential development (Park View) is currently under construction, beyond which is the built-up area of Woodstock.

1.1.3. The Application Site comprises arable agricultural land. The Client will submit an outline planning application (with all matters reserved except for means of access) for development of the Application Site for up to 500 residential dwellings, with a small community square and associated landscaping and access. The proposed built development will be towards the north east of the Application Site and sensitive receptors introduced by the development will therefore be set back from the A44 Oxford Road. Vehicular access to the Application Site will be via a new junction off the A4095 Upper Campsfield Road and a connection through to the Park View development to the west will be provided. The location of the Application Site is illustrated in **Figure 1** and a copy of the illustrative masterplan is provided in **Appendix A**.

1.1.4. This report presents the findings of an assessment of the potential air quality impacts of the Proposed Development during both the construction and operational phases. For both phases, the type, source and significance of potential impacts are identified, and the measures that should be employed to minimise these described.

1.1.5. A glossary of terms used in this report is provided in **Appendix B.**

2. LEGISLATION, POLICY & GUIDANCE

2.1. AIR QUALITY LEGISLATION & POLICY

2.1.1. A summary of the relevant air quality legislation and policy is provided below.

UK AIR QUALITY STRATEGY

2.1.2. The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)[1]. The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation[2].

2.1.3. The AQS also sets standards and objectives for nine key air pollutants to protect health, vegetation and ecosystems. These are benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3), and polycyclic aromatic hydrocarbons (PAHs).

2.1.4. The air quality standards are levels recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) with regards to current scientific knowledge about the effects of each pollutant on health and the environment.

2.1.5. The air quality objectives are policy-based targets set by the Government, which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

2.1.6. The AQS contains a framework for considering the effects of a finer group of particles known as '$PM_{2.5}$' as there is increasing evidence that this size of particles can be more closely associated with observed adverse health effects than PM_{10}. However, there is no statutory objective given in the AQS for $PM_{2.5}$.

AIR QUALITY REGULATIONS

2.1.7. Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000[3] and the Air Quality (England) (Amendment) Regulations 2002[4] for the purpose of Local Air Quality Management (LAQM).

2.1.8. These Regulations require that likely exceedances of the AQS objectives are assessed in relation to:

"…the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present…"

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[1] Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2)

[2] The UK formally left the EU on 31st January 2020 and new air quality legislation for the UK will be brought forward in due course. The Air Quality (Miscellaneous Amendment and Revocation of Retained Direct EU Legislation) (EU Exit) Regulations 2018 (SI 2018/1407) (see Regulation 5) makes changes to retained direct EU legislation relating to air quality, to ensure that it continues to operate effectively.

[3] The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

[4] The Air Quality (England) (Amendment) Regulations 2002- Statutory Instrument 2002 No.3043

2.1.9. The Air Quality Standards Regulations 2010[5] transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as PM_{10}, $PM_{2.5}$ and NO_2. The limit values for NO_2 and PM_{10} are the same concentration levels as the relevant AQS objectives and the limit value for $PM_{2.5}$ is a concentration of 25µg/m^3. However, Regulation 2 of the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[6] updates the Air Quality Standards Regulations 2010 to include a limit value for $PM_{2.5}$ of 20µg/m^3 from 2020. At the time that the Air Quality Standards Regulations 2010 were made the limit value for this pollutant was under review by the European Commission.

2.1.10. For many parts of the UK, the primary pollutants of concern are those relating to road traffic emissions and, to a lesser extent, heating and commercial sources. The key pollutants of concern with regards to human health are therefore typically NO_2, PM_{10} and $PM_{2.5}$.

2.1.11. The relevant standards and objectives applicable to these pollutants are presented in **Table 1**. For NO_2 and PM_{10}, there are both long-term (annual mean) and short-term (24-hour or 1-hour mean) standards. These periods reflect the varying impacts on health of differing levels of exposure to these pollutants.

Table 1 - Relevant Air Quality Objectives for the Protection of Human Health

Pollutant	Applies to	Objective / Limit Value	Measured as
Nitrogen dioxide (NO_2)	UK	40µg/m^3	Annual Mean
		200µg/m^3 not to be exceeded more than 18 times a year	1-hour Mean
Particulate Matter (PM_{10})	UK (except Scotland)	40µg/m^3	Annual Mean
		50µg/m^3 not to be exceeded more than 35 times a year	24-hour Mean
Particulate Matter ($PM_{2.5}$)	UK (except Scotland)	20µg/m^3	Annual Mean

2.1.12. The AQS also includes the following annual mean objective for concentrations of NO_x for the protection of vegetation and sensitive ecosystems. In addition, the United Nations Economic Commissions for Europe (UNECE) has adopted standards for daily mean NOx and ammonia, which are also summarised in **Table 2**.

[5] The Air Quality Standards Regulations 2010 - Statutory Instrument 2010 No. 1001

[6] The Environmental (Miscellaneous Amendments) (EU Exit) Regulations 2020 - Statutory Instrument 2020 No.1313

Table 2 - Relevant Air Quality Objectives / Standards for the Protection of Vegetation and Ecosystems

Pollutant	Objective / Standard	Measured as
Nitrogen Oxides (NO_x)	30µg/m^3	Annual mean
	75µg/m^3	Daily Mean (24-Hour)
Ammonia (NH_3)	3µg/m^3	Annual Mean

2.1.13. It should be noted that, when considering the effect of airborne pollutant concentrations on ecological receptors, the relevant assessment benchmark is referred to as the 'critical level'. For example, the AQS objective for annual mean NO_x concentrations of 30µg/m^3 is therefore referred to as the 'critical level' within this report.

NITROGEN DEPOSITION AND CRITICAL LOADS

2.1.14. In addition to the direct effect of exposure to pollutants in air, vegetation can also be affected by the deposition of pollutants and particles on the ground and directly on vegetation. Close to roads, the key pollutant of concern for sensitive ecological sites is likely to be deposition of nitrogen, which can result in a variety of effects depending on the habitats present (e.g. interfering with photosynthesis, increasing acidification, altering species composition etc).

2.1.15. When considering the effects of pollutants that are deposited from the air onto a surface, the relevant assessment benchmarks are known as 'Critical Loads'. Critical loads are defined as:

"…a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge"

2.1.16. In the UK, Critical Loads have been established for a wide range of habitat and vegetation types, reflecting the variation in ecosystem responses. Details of the Critical Loads relevant to a specific habitat or designated sites are available from the Air Pollution Information Systems (APIS) website[7]. For nitrogen, the Critical Loads (CLs) are typically expressed as kilograms of nitrogen per hectare per year (Kg N/ha/yr).

2.1.17. Further details on the Critical Loads relevant to this assessment are provided in Section 4.1 of this report.

ENVIRONMENT ACT 1995

2.1.18. Under Part IV of the Environment Act 1995, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives defined in the Regulations. Where the objectives are not likely to be achieved, an authority is required to designate an Air Quality Management Area (AQMA). For

[7] Air Pollution Information System. Available at: http://www.apis.ac.uk/

each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality standards in the future.

THE ENVIRONMENT ACT 2021

2.1.19. The Environment Act 2021 was published in November 2021 and provides a new framework for environmental protection within the UK. It aims to ensure that environmental standards are maintained and that improvements are achieved (specifically in relation to air quality, water, waste and resources, nature and biodiversity) and bridges the gaps in legislation resulting from the UK's departure from the EU.

2.1.20. The Environment Act 2021 does not replace the Environment Act 1995, but it does make amendments in order to strengthen environmental protections. In relation to air quality, The Environment Act 2021 includes a legally binding duty on Government to bring forward at least two new air quality targets into secondary legislation by 31 October 2022. Target objectives under consideration for air quality include:

- Reducing the annual mean concentrations of $PM_{2.5}$ in ambient air (as required by Clause 2); and
- Reducing population exposure to $PM_{2.5}$.

CLEAN AIR STRATEGY

2.1.21. Defra published the Government's Clean Air Strategy in 2019[8]. This sets out measures, which aim to reduce emissions from all sources of air pollution, making air healthier to breathe, protecting nature and boosting the economy. The Strategy also proposes tough new goals to cut public exposure to airborne particulate matter, as per the recommendation made by the WHO.

2.1.22. Furthermore, the Strategy confirms that the Government will set new legislation to 'create a stronger and a more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanism.' New enforcement powers will also be given at a national and local level, across all sectors of society.

ENVIRONMENTAL PROTECTION ACT 1990 - CONTROL OF DUST AND PARTICULATES ASSOCIATED WITH CONSTRUCTION

2.1.23. Section 79 of the Environmental Protection Act 1990 gives the following definitions of statutory nuisance relevant to dust and particles:

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

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

[8] Defra (January 2019) *Clean Air Strategy 2019*.

2.1.24. Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

2.1.25. There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

2.2. PLANNING POLICY

2.2.1. A summary of the national and local planning policy relevant to the Proposed Development and air quality is provided in the following sections.

NATIONAL PLANNING POLICY

National Planning Policy Framework

2.2.2. The Government's overall planning policies for England are described in the National Planning Policy Framework[9]. The core underpinning principle of the Framework is the presumption in favour of sustainable development, defined as:

"… meeting the needs of the present without compromising the ability of future generations to meet their own needs"

2.2.3. One of the three overarching objectives of the NPPF is that planning should '*contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*'

2.2.4. In relation to air quality, the following paragraphs in the document are relevant:

- Paragraph 55, which states '*Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition.*'
- Paragraph 104, which relates to the need to consider transport related issues at the earliest stages of plan making and development proposals, so that *'…c) opportunities to promote walking, cycling and public transport use are identified and pursued; d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains...'*.
- Paragraph 105, which states '*Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health.*;
- Paragraph 174, which states '*Planning policies and decisions should contribute to and enhance the natural and local environment by: …e) 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*

[9] Ministry of Housing, Communities and Local Government (June 2021) *National Planning Policy Framework*.

possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.;

- Paragraph 185, which states '*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*'
- Paragraph 186, which states '*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.*';
- Paragraph 188, which states '*The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.*'

LOCAL PLANNING POLICY

Cherwell Local Plan 2011-2031 (Part 1)

2.2.5. The Cherwell Local Plan 2011-2031 (Part 1)[10] was adopted in July 2015 and sets out the strategic planning policies for development and use of land within the district.

2.2.6. Policy PSD 1 'Presumption in Favour of Sustainable Development' states:

"When considering development proposals the Council will take a proactive approach to reflect the presumption in favour of sustainable development contained in the National Planning Policy Framework. The Council will always work proactively with applicants to jointly find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area…".

2.2.7. Policy ESD 3 'Sustainable Construction' outlines that all new developments will be expected to incorporate sustainable design and construction technology and to adopt high quality design and environmental standards and minimise waste and pollution and impacts on the external environment.

2.2.8. The Local Plan does include a policy (Policy ESD 9) which relates to the Protection of the Oxford Meadows SAC, however, this is specific to effects on water quality and not air quality and therefore is not applicable to this assessment.

[10] Cherwell District Council (July 2015) *Cherwell Local Plan 2011-2031 (Part 1)*

2.2.9. Policy ESD 10 relates to the 'Protection and Enhancement of Biodiversity and the Natural Environment' and outlines how developments that have effects on designated site or sites of local importance will not be permitted unless the effects can be appropriately mitigated. In relation to air quality, the policy states:

"Protection and enhancement of biodiversity and the natural environment will be achieved by the following:

… 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."

2.3. GUIDANCE

2.3.1. A summary of the publications referred to in the undertaking of this assessment is provided below.

Local Air Quality Management Review and Assessment Technical Guidance

2.3.2. The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their review and assessment work[11]. This guidance, referred to in this document as LAQM.TG16, has been used where appropriate in the assessment presented herein.

Land-use Planning & Development Control: Planning for Air Quality

2.3.3. Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance[12] that offers comprehensive advice on: when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and, the possible mitigation measures that may be implemented to minimise these impacts.

Guidance on the Assessment of Dust from Demolition and Construction

2.3.4. This document[13] published by the IAQM was produced to provide guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

National Planning Practice Guidance – Air Quality

2.3.5. This guidance[14] provides a number of guiding principles on how the planning process can take into account the impact of new development on air quality, and explains how much detail air quality assessments need to include for proposed developments, and how impacts on air quality can be mitigated. It also provides information on how air quality is taken into account by Local Authorities in

[11] Defra (2021) *Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG16*

[12] Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017) *Land Use Planning & Development Control: Planning for Air Quality*

[13] Institute of Air Quality Management (Version 1.1 Updated June 2016) *Guidance on the Assessment of Dust from Demolition and Construction*

[14] Ministry of Housing, Communities & Local Government (November 2019) *National Planning Practice Guidance*

both the wider planning context of Local Plans and neighbourhood planning, and in individual cases where air quality is a consideration in a planning decision.

Natural England's Internal Guidance on the Approach to advising competent authorities on the assessment of road traffic emissions under the Habitat Regulations

2.3.6. Natural England have produced an internal guidance document to assist its staff in advising competent authorities on the assessment of plans and projects that may generate road traffic emissions and therefore potentially impact upon European Sites, as required by the Habitat Regulations. This guidance has been made public to provide general information on the approach that should be taken, with specific advice given on the approach to screening. Whilst the guidance does not specifically cover nationally significant sites such as Sites of Special Scientific Interest (SSSIs), which are covered by a different regulatory framework, the general principles for air quality assessment are likely to be equally relevant to SSSIs and other designations.

A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites

2.3.7. This guidance document[15], published by the IAQM, essentially builds upon Natural England's guidance and provides targeted advice to air quality professionals on the assessment of air quality impacts associated with developments on designated sites. As for the Natural England guidance above, this document is primarily focussed on assessments required in support of Habitats Regulations Assessments and therefore relates to sites of European importance. However, the guidance can also be used to inform assessment of sites designated for their national and/or local importance.

[15] Institute of Air Quality Management (May 2020) *A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites*.

3. SCOPE & METHODOLOGY

3.1. SCOPE

3.1.1. The scope of the assessment includes consideration of the potential impacts on local air quality resulting from:

- Dust and particulate matter generated by on-site activities during the construction phase;
- Temporary increases in pollutant concentrations as a result of exhaust emissions arising from construction traffic and plant;
- Long-term changes in local pollutant concentrations due to exhaust emissions arising from traffic generated by the Proposed Development once operational;
- Long-term changes in local pollutant concentrations due to the cumulative impact of exhaust emissions arising from the road traffic generated by the Proposed Development in combination with other identified committed developments in and around Woodstock; and
- Likely exposure of new sensitive receptors introduced to the area as part of the Proposed Development to potentially poor air quality.

3.2. CONSULTATION

3.2.1. Consultation was undertaken with the Environmental Health Officer (EHO) for CDC to discuss the scope of the assessment and the methodology to be applied. The outcomes of the consultation were as follows:

- Acceptance of the proposed methodology.
- Confirmation that there are no authorised processes in the vicinity of the Application Site.

3.3. METHODOLOGY

DESK STUDY

3.3.1. To inform the assessment, a baseline desk-study has been undertaken. This included the following tasks:

- Review of CDC and WODC's latest Air Quality Annual Status Reports (ASRs)[16,17] and air quality data for the area surrounding the Application Site, including data from CDC, WODC and additional data from Oxford City Council[18] (OCC), a neighbouring authority to the south.
- Review of data from the Environment Agency (EA) website[19] and CDC and WODC's public registers for authorised processes (where available), to identify the presence of any industrial pollutant sources in the vicinity of the Application Site;
- Desk study of local mapping data to confirm the locations of nearby existing receptors that may be sensitive to changes in local air quality as a result of the Proposed Development. This

[16] Cherwell District Council (June 2020) 2020 Air Quality Annual Status Report (ASR)

[17] West Oxfordshire District Council (June 2021) 2021 Air Quality Annual Status Report (ASR) for West Oxfordshire District Council.

[18] Oxford City Council (June 2020) 2019 Air Quality Annual Status Report (ASR)

[19] https://data.gov.uk/dataset/cfd94301-a2f2-48a2-9915-e477ca6d8b7e/pollution-inventory

included consideration of data regarding ecological receptors available from the Government's MAGIC[20] website and the Air Pollution Information System (APIS) website[21];
- Review of the masterplan for the Proposed Development to establish the location of new sensitive receptors within the Application Site;
- Review of the development proposals and any construction phase information available from the Project Team;
- Consultation with the Project Ecologists (BSG Ecology); and
- Review of the traffic data provided by David Tucker Associates (DTA), the project Transport Planning Consultants.

In addition, assessment of the impact of the road traffic emissions associated with the Proposed Development on air quality (notably increases in annual mean NO_x concentrations, ammonia and nitrogen deposition) within designated ecological sites identified within the study area has been included within the assessment. Further details on the designated sites considered is provided later in this report but include the Blenheim Park SSSI, Oxford Meadows SSAC, the Pixey and Yarnton Meadows SSSI, which forms a component part of the Oxford Meadows SAC and covers much of the same area), and Woodstock Water Meadows Local Wildlife Site (LWS).

3.4. METHODOLOGY

CONSTRUCTION PHASE

Dust and Particulate Emissions from On-Site Construction Activities

3.4.1. Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust therefore, is unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause 'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

3.4.2. The smaller particles of dust (less than 10µm in aerodynamic diameter) are known as particulate matter (PM_{10}) and represent only a small proportion of total dust released; this includes a finer fraction, known as $PM_{2.5}$ (with an aerodynamic diameter less than 2.5µm). As these particles are at the smaller end of the size range of dust particles they remain suspended in the atmosphere for a longer period of time than the larger dust particles, and can therefore be transported by wind over a wider area.

3.4.3. PM_{10} and $PM_{2.5}$ are small enough to be drawn into the lungs during breathing, which in sensitive members of the public could have a potential impact on health. However, it is worth noting that, according to the IAQM guidance, the majority of fugitive particulate emissions arising from construction sites are expected to relate to the coarser fractions (i.e. $PM_{2.5-10}$) with just 10-15% expected to comprise $PM_{2.5}$. The IAQM guidance therefore focusses on PM_{10} for the purposes of assessment.

[20] Multi-Agency Geographic Information for the Countryside (MAGIC) website. Available at: https://magic.defra.gov.uk/

[21] Air Pollution Information System (APIS). Available at: http://www.apis.ac.uk/

3.4.4. An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken using: the relevant assessment methodology published by the IAQM; the available information for this phase of the Proposed Development provided by the Client and Project Team; and, professional judgement.

3.4.5. The IAQM methodology assesses the risk of potential dust and PM_{10} impacts from the following four key sources:

- Demolition;
- Earthworks;
- General construction activities; and
- Track-out[22].

3.4.6. It takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined.

3.4.7. A summary of the IAQM assessment methodology is provided in **Appendix C**.

Exhaust Emissions from Construction Traffic and Plant

3.4.8. In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Application Site and in the vicinity of the Application Site itself. As information on the number of vehicles and plant associated with the construction phase was not available at the time of writing, a qualitative assessment of their impact on local air quality has been undertaken using professional judgement and by considering the following:

- The number and type of construction traffic and plant likely to be generated by this phase of the Proposed Development;
- The number and proximity of sensitive receptors to the Application Site and along the likely routes to be used by construction vehicles; and
- The likely duration of the construction phase and the nature of the construction activities undertaken.

OPERATIONAL PHASE

Assessment of Impacts on Human Health

3.4.9. Once operational, the Proposed Development will generate additional road traffic movements on the local road network. Exhaust emissions of NO_2, PM_{10} and $PM_{2.5}$ from these vehicles will contribute to local pollution concentrations in the areas near to the Application Site and adjacent to those road links used by development related traffic.

Road Traffic Dispersion Modelling

3.4.10. For the prediction of impacts due to emissions arising from road traffic during the operation of the Proposed Development, the dispersion model ADMS Roads (version 5.0.0.1) has been used. This

[22] Track-out is the transportation of dust and dirt outside of the construction site onto the public road network where it can be deposited onto the road surface and then resuspended by vehicles travelling on the roads. Material may be transported out of the site either on the wheels of construction vehicles, after travelling on muddy ground and site haul roads, or from the vehicles carrying materials and dusty loads.

model uses detailed information regarding traffic flows on the local road network, surface roughness, and local meteorological conditions to predict pollutant concentrations at specific receptor locations, as determined by the user.

3.4.11. For the assessment, the following scenarios were modelled:

- 2019 – Model Verification and Assessment Baseline;
- 2034 – Without Proposed Development + Committed Development;
- 2034 – With Proposed Development + Committed Development

3.4.12. 2019 is the most recent year for which suitable air quality monitoring data and meteorological data are available to enable verification of the model results, and so this year has been used as the baseline year for this assessment. 2034 is the anticipated completion year for the Proposed Development.

3.4.13. Given the level of development proposed in the wider area (see Paragraph 3.4.19) a sensitivity test, considering the cumulative increase of the Proposed Development in addition to the committed developments identified within Paragraph 3.4.19 was also included. Therefore, the following scenario was also modelled, for comparison against the 2034 'with Proposed Development' scenario.

- 2034 – Without Proposed Development and without Committed Development (Future Baseline)

Traffic Data

3.4.14. Traffic data for use in the assessment was provided by DTA. Traffic data was provided as Annual Average Daily Traffic (AADT) flows, vehicle speeds (km/h) and the percentage of Heavy Duty Vehicles (HDVs) for the local road network in all assessment years considered.

3.4.15. Traffic speeds were reduced at junctions in line with guidance provided in LAQM.TG16 and using professional judgement.

3.4.16. Traffic data was provided for all roads covered by the Transport Assessment and supplemented with data from the Department for Transport's (DfT's) national database to extend the study area into Oxford, to enable consideration of the Oxford AQMA and the Oxford Meadows SAC.

3.4.17. A summary of the traffic data and pollutant emission factors used in the assessment can be found in **Appendix D**.

3.4.18. The traffic flows for the 'Without Proposed Development + Committed Development' scenario includes flows for a number of committed and/or reasonably foreseeable developments in the locality of the Application Site but does not include any contribution to road traffic from the Proposed Development itself. The traffic flows for the 'With Proposed Development + Committed Development' scenario includes contributions to road traffic from the Proposed Development itself and the nearby committed / reasonably foreseeable developments. The traffic flows for the 'Without Proposed Development and without Committed Development' scenario, includes flows for a future baseline but does not include any contribution from the identified committed/reasonably foreseeable development or from the Proposed Development itself.

3.4.19. Traffic flows from the following committed developments have been included in the relevant scenarios:

- Land at Hill Rise, Woodstock

- Land at Banbury Road, Woodstock
- Land North of Witney Road, Long Hanborough.
- Land at Myrtle Farm, Long Hanborough: 50 dwellings.
- East Witney Strategic Development Area (application reference: 20/02654/OUT): 450 dwellings.
- North Witney Strategic Development Area.

3.4.20. In addition, TEMPro growth factors have been applied to the existing baseline traffic flows to account for further 'background' traffic growth on the local road network over and above those committed developments identified in Paragraph 3.4.19.

Vehicle Emission Factors

3.4.21. Vehicle emission factors for use in the assessment have been obtained using the Emissions Factors Toolkit (EFT) version 11.0 (published in November 2021) available on the Defra website[23]. The EFT allows for the calculation of emission factors arising from road traffic for all years between 2018 and 2050. However, the emissions for the period 2031 to 2050 are a recent addition, following an update in 2021, and are provided for use in climate assessments and appraisals only. As such, 2019 emissions factors have therefore been adopted for the baseline/verification scenarios and 2030 emission factors have been adopted for the 2034 assessment scenarios. This will also ensure consistency with the remaining LAQM tools provided by Defra (such as the background maps) which only provide forecasts up to 2030.

3.4.22. A summary of the emissions factors used in the assessment is also provided in **Appendix D.**

Meteorological data

3.4.23. Meteorological data, such as wind speed and direction, is used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model was obtained from the Met Office observing station at Brize Norton for 2019. This station is considered to provide representative data for the assessment.

Selection of Background Concentrations

3.4.24. Background pollutant concentrations used in the assessment have been taken from the national maps provided on the Defra website[24], where background concentrations of those pollutants included within the AQS have been mapped at a grid resolution of 1x1km for the whole of the UK. Estimated concentrations are available for all years between 2018 and 2030. Inherent within the maps is the assumption that background concentrations will improve (i.e. reduce) over time, in line with the predicted reduction in vehicle emissions and emissions from other sources. As for the EFT, 2019 backgrounds have been adopted for the baseline / verification scenario, and 2030 values for the 2034 assessment scenarios.

3.4.25. It should be noted that for NO_x and PM_{10}, the background maps present both the 'total' estimated background concentrations and the individual contributions from a range of emission sources (for example, motorways, aircraft, domestic heating etc.). When detailed modelling of an individual sector is required as part of an air quality assessment, the respective contribution can be subtracted from the overall background estimate to avoid the potential for 'double-counting'. For this

[23] https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

[24] https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

assessment, the traffic data includes the majority of the main A-Roads within the grid squares that make up the study area and the A34 trunk road within Oxford, therefore contributions from these sectors have been removed from the background concentrations where appropriate.

3.4.26. A summary of the background concentrations is provided in Section 4 of this report.

Model Verification and Processing of Results

3.4.27. The ADMS Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the Proposed Development.

3.4.28. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor, to gain greater confidence in the final results, and was carried out following the methodology specified in Chapter 7, Section 4, of LAQM.TG16.

3.4.29. As noted previously, the study area for the assessment comprises the area in and around Woodstock, Witney and part of Oxford. Given the variations in the settings of the diffusion tubes between these locations, the applicable background concentrations and the limitations associated with the traffic data, use of a single verification was not considered appropriate. Therefore, for NO_x, four separate verification factors have been calculated and applied to the model outputs for each assessment receptors, taking into account the local conditions and primary pollutant source at each receptor locations. In summary, the following factors have been used:

- For locations within the Witney AQMA and within a street canyon – 2.20;
- For locations in and around Witney, not within a street canyon – 1.87;
- For locations within Oxford – 1.16; and
- For all other locations in and around Woodstock and Bladon – 1.70.

3.4.30. Further details of the verification factor calculations are presented in **Appendix E.**

3.4.31. Following the application of the appropriate verification factor to the modelled road-NO_x outputs, annual mean NO_2 concentrations were subsequently calculated using the latest NO_x to NO_2 calculator (version 7.1, released April 2019) provided by Defra[25].

3.4.32. As local roadside monitoring data are not available for PM_{10} or $PM_{2.5}$, the modelled road-PM_{10} and road-$PM_{2.5}$ components have been adjusted by the verification factor obtained for NO_x before adding to the appropriate background concentration.

3.4.33. The number of days with PM_{10} concentrations greater than 50µg/m^3 was then estimated using the relationship with the annual mean concentration described in LAQM.TG16.

3.4.34. LAQM.TG16 advises that exceedances of the 1 hour mean NO_2 objective are unlikely to occur where annual mean concentrations are below 60µg/m^3, and it provides guidance on the approach that should be taken if either measured or predicted annual mean NO_2 concentrations are 60µg/m^3 or above.

[25] https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

3.4.35. Once processed, the predicted concentrations were compared against the relevant AQS objective levels for NO_2, PM_{10} and $PM_{2.5}$ set out in **Table 1**.

ASSESSMENT OF IMPACTS ON ECOLOGICAL RECEPTORS

3.4.36. The impact of the Proposed Development on annual mean NO_x concentrations and on levels of nitrogen deposition within the identified designated sites has been assessed with reference to the methodologies outlined in the IAQM[15] and Natural England guidance as appropriate.

Dispersion Modelling of NO_x Concentrations

3.4.37. As mentioned in Paragraph 2.1.12, objectives/standards exist for both daily mean and annual mean NOx concentrations. However, as noted within the IAQM guidance[15], the '*UNECE Working Group on Effects strongly recommend the use of annual mean value, as the long term effects of NO_x are thought to be more significant than the short term effects'.* Therefore, the 24-hour mean NO_x concentrations have not been calculated and assessment is based on annual mean concentrations only.

3.4.38. To calculate the annual mean NO_x concentrations in the above designated sites, a series of receptor points were arranged at 10m intervals along a 200m transect from the boundary of the designated site nearest to the affected road link into the designated site. The ADMS-Roads model was then used to predict the road-NO_x concentration at each of these receptors for the existing baseline and future 'without' and 'with' development scenarios. Following application of the relevant verification factor (as discussed in Paragraph 3.4.29), the adjusted modelled road-NO_x concentrations were then added to the relevant sector-removed background NO_x concentrations from the Defra background maps to give total annual mean NO_x concentrations, for comparison against the annual mean objective for this pollutant.

Calculation of Nitrogen Deposition

3.4.39. As total nitrogen deposition can be significantly influenced by emissions of ammonia (NH_3) from road traffic, when running the ecological models, in addition to the NO_x emission rates from the EFT (as described in Paragraph 3.4.21), emissions of NH_3 were also included within the modelling. The NH_3 emission rates were calculated using Air Quality Consultants Ltd's 'Calculator for Road Emissions of Ammonia' (CREAM V1A)[26], which works in a similar way to the EFT, and takes into account fleet composition data and projections from the National Atmospheric Emissions Inventory (NAEI) to estimate NH_3 emissions for all years between 2013 and 2035. However, where the EFT forecasts reducing NO_x emissions in future years, CREAM reflects how the changing vehicle fleet (and use of Selective Catalytic Reduction (SCR) technologies in diesel vehicles) may increase NH_3 emissions from road traffic in future years.

3.4.40. Background nitrogen deposition rates and NH_3 concentrations for the designated sites were obtained from the APIS website, where deposition rates have been mapped for the whole of the UK at a grid resolution of 5x5km grid squares. Deposition rates are currently available for a three-year averaging period (2017-2019). The nutrient nitrogen deposition rates and NH_3 concentrations were then factored forward to 2030 (for consistency with the wider assessment and approach for the EFT

[26] Air Quality Consultants (2020) Calculator for Road Emissions of Ammonia CREAM V1A

and Defra background concentrations) based on the trend data provided within the Joint Nature Conservation Committee (JNCC) Nitrogen Futures report[27], which suggests there will be:

- A reduction in Nutrient Nitrogen Deposition rates of 1.04% per year; and
- An increase in NH_3 concentrations of 0.08% per year.

3.4.41. Further details on the background and deposition rates used in the assessment are provided in Section 4 of this report.

3.4.42. To calculate the predicted total nitrogen deposition rates at each receptor point, the modelled road-NO_x concentrations were converted to road-NO_2 concentrations using Defra's NO_x to NO_2 calculator. The road-NO_2 contributions and NH_3 concentrations were then converted to a road dry nutrient nitrogen deposition rate using the conversion rates summarised below, which have been taken from the Environment Agency AQTAG[28] guidance, before being combined and added to the relevant background deposition rate.

- Nutrient Nitrogen Deposition:
  - For grassland and similar habitats: 0.0015 m/s
  - For forests / tall vegetation: 0.003 m/s
- NH_3 Deposition:
  - For grassland and similar habitats: 0.02 m/s
  - For forests and similar habitats: 0.03 m/s

3.4.43. The total deposition rates were then compared to the habitat specific Critical Loads for each designated site obtained from APIS, which are summarised in **Table 8** (Section 4.6of this report).

SELECTION OF SENSITIVE RECEPTORS

3.4.44. Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Proposed Development. These will include locations sensitive to an increase in dust deposition and PM_{10} exposure as a result of on-site construction activities, and locations sensitive to exposure to airborne pollutants emitted from the exhausts of construction and operational traffic associated with the Proposed Development

Construction Phase

3.4.45. The IAQM assessment is undertaken where there are:

- 'Human receptors' within 350m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or
- 'Ecological receptors' within 50m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

3.4.46. It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

[27] Joint Nature Conservation Committee (JNCC) (October 2020) JNCC Report No. 665 – Nitrogen Futures. Available at: https://data.jncc.gov.uk/data/04f4896c-7391-47c3-ba02-8278925a99c5/JNCC-Report-665-FINAL-WEB.pdf

[28] Environment Agency (2011) AQTAG06 Technical Guidance on detailed modelling approach for an appropriate assessment for emissions to air.

3.4.47. Human receptors have been identified within 350m of the Application Site boundary and have therefore been considered within the assessment. However, there are no ecological designated sites located within 50m of the proposed construction areas within the Site or within 50m of the roads to be used by construction traffic (up to 500m from the site access). Therefore, ecological receptors have not been considered any further within the construction phase assessment.

Operational Phase

Human Health Receptors

3.4.48. In terms of locations that are sensitive to pollutants emitted from engine exhausts, these will include places where members of the public are likely to be regularly present over the period of time prescribed in the AQS. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24-hour mean or annual mean) may be more appropriate. Box 1.1 of LAQM.TG16 provides examples of the locations where the air quality objectives should and should not apply.

3.4.49. To complete the assessment of operational phase impacts, a number of 'receptors' representative of locations of relevant public exposure were identified at which pollution concentrations were predicted. Receptors have been located adjacent to the roads that are likely to experience the greatest change in traffic flows or composition, and therefore NO_2 and particulate matter concentrations, due to the Proposed Development.

3.4.50. To complete the exposure assessment, pollution concentrations were also predicted at several locations of relevant exposure within the Site.

3.4.51. The locations of the assessment receptors are summarised in **Table 3** below and illustrated on **Figure 2** (for receptors within Witney and Long Hanborough) and **Figure 3** (for receptors within Woodstock and Oxford). All human health receptors have been modelled at a height of 1.5m (which represents average breathing height).

Table 3 - Receptor Locations Used in the Assessment

Receptor	Description/ Address	Grid Reference	
		X	Y
Existing Human Health Receptors			
1	124 Woodstock Road, Witney	436752	210897
2	71b Woodstock Road, Witney	436568	210748
3	52 Woodstock Road, Witney	436401	210667
4	55 Woodgreen, Witney	436039	210461
5	81 Woodgreen, Witney (AQMA)	435956	210363

Receptor	Description/ Address	Grid Reference	
		X	Y
6	1 Newland, Witney (AQMA)	435952	210354
7	8 Newland, Witney	435976	210317
8	46 Newland, Witney	436112	210255
9	4 West End Road, Witney (AQMA)	435911	210369
10	24 West End Road, Witney	435863	210431
11	31 Bridge Street, Witney (AQMA)	435858	210307
12	16 Bridge Street. Witney (AQMA)	435838	210268
13	12a Ladywell Close, North Leigh	439184	212776
14	Kiln Cottage, Witney Road	440507	213745
15	5 Acre Mews, Long Hanborough	441272	214143
16	10 Gessey Close, Long Hanborough	441120	214063
17	11a Witney Road, Long Hanborough	441477	214189
18	19 Main Road, Long Hanborough	441848	214152
19	2 Church Road, Long Hanborough	441838	214104
20	20 Main Road, Long Hanborough	441875	214115
21	166 Main Road, Long Hanborough	442743	214299
22	2 Main Road, Long Hanborough	443553	214371
23	Bladon House, Bladon	444257	214417
24	31 Park Street, Bladon	444803	214702
25	8 Park Street, Bladon	444830	214902
26	23 Grove Road, Bladon	444917	215077
27	92 Grove Road, Bladon	445236	215395
28	49 Bladon Road, Bladon	445655	215589
29	39 Bladon Road, Bladon	445736	215593
30	21 Upper Campsfield Road, Woodstock	445938	215740

Receptor	Description/ Address	Grid Reference	
		X	Y
31	The Firs Cottage, Woodstock	446356	216247
32	Littlecote, Oxford Road, Woodstock	445501	215990
33	33 Oxford Street, Woodstock	444986	216461
34	31 Oxfor Street, Woodstock	444972	216505
35	11 Oxford Street, Woodstock	444657	216658
36	42 Oxford Street, Woodstock	444571	216804
37	104 Oxford Street, Woodstock	444385	216873
38	75 Manor Road, Woodstock	444124	217175
39	Campsfield Farm Cottages, Woodstock	446493	215167
40	10 Woodstock Road East, Begbroke	447081	213982
41	142 Woodstock Road, Yarnton	447719	212770
42	1 Kings Row, Yarnton	448166	212354
43	75-77 Sunderland Avenue, Oxford (AQMA)	449776	210139
44	66 Sunderland Avenue, Oxford (AQMA)	449788	210166
45	378 (A4144) Woodstock Road, Oxford (AQMA)	449842	210040
46	2 Sunderland Avenue, Oxford (AQMA)	450379	210226
47	1 Sunderland Avenue, Oxford (AQMA)	450373	210185
48	470 (A4165) Banbury Road, Oxford (AQMA)	450447	210134
49	28 Sunderland Avenue (nr A40 North Way), Oxford (AQMA)	450154	210231
50	476 Banbury Road, Oxford (AQMA)	450427	210256
51	5 Elsfield Way, Oxford (AQMA)	450482	210226
52	396 (A44) Woodstock Road, Oxford (AQMA)	449687	210265
Proposed Human Health Receptors			
D1	Southern Application Site Boundary (Oxford Road)	445689	215825
D2	Southeastern Application Site Boundary (Oxford Road / Upper Campsfield Road)	445855	215731

Receptor	Description/ Address	Grid Reference	
		X	Y
D3	Eastern Application Site Boundary (Upper Campsfield Road)	446117	215977
D4	Development Area (near Access Road)	446073	216054
D5	Development Area (Central Area)	446202	216169

Ecological Receptors

3.4.52. In terms of ecological receptors, with the exception of Woodstock Water Meadows LWS, as described within Paragraph 3.4.37, concentrations were predicted at specific points along a 200m transect from the boundary next to the modelled road into each of the designated sites. Concentrations were predicted at ground level (0m). For the LWS, the ecologists have advised that the qualifying habitat (floodplain grazing marsh) is located approximately 170m from the A44. Therefore, concentrations have been predicted at distances of 170m, 180m, 190m and 200m only. Details of the transects are summarised in **Table 4** below. The locations of the modelled transects are also illustrated in **Figure 4** (Blenheim Park SSSI, Woodstock Water Meadows LWS) and **Figure 5** (Oxford Meadows SAC/Pixey and Yarnton Meads SSSI).

Table 4 – Ecological Receptor Locations Used in the Assessment

Receptor	Transect ID	Transect Start Point		Transect End Point	
		X	Y	X	Y
Blenheim Park SSSI	BP T1	444222	216923	444037	216847
	BP T2	444369	214481	444322	214675
	BP T3	444674	214594	444556	214755
	BP T4	444818	214781	444618	214781
Oxford Meadows SAC (and Pixey and Yarnton Meadows SSSI)	OM T1	448402	210611	448347	210419
	OM T2	447757	210702	447771	210503
	OM T3	448550	209999	448415	210146
	OM T4	448569	209980	448643	209912
	OM T5	448333	209747	448159	209847
	OM T6	448375	209725	448549	209627
	OM T7	448635	210116	448439	210156

Woodstock Water Meadows LWS	LWS T1	444391	217028	444419	217038

3.5. SIGNIFICANCE CRITERIA

CONSTRUCTION PHASE

3.5.1. The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity with appropriate mitigation measures in place. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be not significant.

3.5.2. For the assessment of the impact of exhaust emissions from plant used on-site and construction vehicles accessing and leaving the Application Site on local concentrations of NO_2 and particulate matter, the significance of residual effects have been determined using professional judgement and the principles outlined in the EPUK/IAQM guidance[12], which are described below.

OPERATIONAL PHASE

Human Health Receptors

3.5.3. The approach provided in the EPUK/IAQM guidance[12] has been used within this assessment to assist in describing the air quality effects of additional emissions from traffic generated by the Proposed Development once operational at existing human health receptors.

3.5.4. This guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level. This change is then examined in the context of the new total concentration and its relationship with the assessment criterion, as summarised in **Table 5.**

Table 5 - Impact Descriptors for Individual Receptors

Long term average concentration at receptors 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	Slight	Moderate
76-94% AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Notes

AQAL = Air Quality Assessment Level. For this assessment the AQALs relate to the objectives set out in Table 1.

Where the %change in concentrations is <0.5% of the relevant AQAL, the change is described as 'Negligible' regardless of the total concentration.

When defining the concentration as a percentage of the AQAL, the 'without scheme' concentration should be used where there is a decrease in pollutant concentration and the 'with scheme' concentration should be used where there is an increase.

Where concentrations increase, the impact is described as 'adverse', and where they decrease as 'beneficial'.

3.5.5. The EPUK/IAQM guidance[12] notes that the criteria in **Table 5** should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on the significance of effects, as other influences may need to be accounted for. The EPUK/IAQM[12] guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

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

3.5.6. The EPUK/IAQM guidance[12] states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the impacts. The guidance does not include criteria for determining the significance of the effect on hourly mean NO_2 concentrations or daily mean PM_{10} concentrations. The significance of effects of hourly mean NO_2 and daily mean PM_{10} concentrations arising from the operational phase have therefore been determined qualitatively using professional judgement and the principles described above.

3.5.7. The EPUK/IAQM[12] guidance also says that 'Where the air quality is such that an air quality objective at the building facade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.' This guidance has there been considered as part of the exposure assessment for future site users.

Ecological Receptors

3.5.8. It is the role of a suitably qualified ecologist, rather than an air quality specialist, to determine whether predicted impacts on air quality within a designated site would result in a significant effect on the habitats present within the site. However, screening criteria can be used by the air quality specialists to identify when predicted impacts are unlikely to result in significant effects, thereby not requiring further assessment or specific mitigation.

3.5.9. As per the Natural England and IAQM guidance, where the predicted change is ≤1% of the relevant Critical Level or Critical Load, the impacts can be considered 'not significant'. Where the predicted impacts are greater than 1%, this does not mean that the Proposed Development will give rise to significant adverse effects at the designated site. This 1% criteria is simply used as a trigger for identifying when the impacts will require further assessment. It is the responsibility of the ecologist to determine the overall significance of the impacts predicted. As such, following completion of the modelling exercise, the results have been shared with the Project Ecologist (BSG Ecology) who have assisted in the overall assessment of effects. A comprehensive summary of their conclusions

is provided within the Natural Heritage Technical Appendix to the Environmental Statement[29] and shadow Habitat Regulations Assessment (HRA)[30] submitted in support of the planning application.

3.6. LIMITATIONS & ASSUMPTIONS

3.6.1. The construction phase assessment is subject to the following limitations and assumptions:

- Limited details on the construction methods and programme were available at the time of writing, as such the assessment has been completed using professional judgement on the likely scale of activity, the sensitivity of the receiving environment, and experience of working on similar schemes.
- Receptor counts were estimated using GIS, Google Maps and Google Street View. Address Base data was not utilised within the assessment.

3.6.2. For the operational phase, the following limitations and assumptions apply:

- There are uncertainties associated with both measured and predicted concentrations. The model used in this assessment (ADMS-Roads) relies on input data (including predicted traffic flows), which also have uncertainties associated with them. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS Roads model will not take into account.
- Traffic data for use in the assessment was provided by DTA. In the calculation of traffic flows the transport consultants will have made assumptions regarding trip generation, traffic distribution, and growth rates for the local area etc.
- Traffic data was provided for all roads covered by the Transport Assessment. However, to enable consideration of the effect of the development generated traffic on the existing AQMA within Oxford and the Oxford Meadows SAC, the data was supplemented with data from the DfT's national database to extend the study area into Oxford. However, there are limitations associated with the use of the DfT data; notably that data is typically restricted to motorways, trunk roads and primary A roads and does not include minor roads, B roads, slip roads and roundabouts. Therefore, for the purposes of the assessment, receptors within the Oxford AQMA have typically been located away from significant junctions or roundabouts. Whilst this may mean that the receptors may not always represent the highest pollutant concentrations within the AQMA, they should still provide a reasonable indication of the potential impact of the Proposed Development on air quality within the AQMA.
- In order to reduce the uncertainty associated with predicted concentrations, model verification has been carried out following guidance set out in LAQM.TG16. As the model has been verified against local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.

[29] BSG Ecology (May 2022) Land East of Park View, Woodstock, Environmental Statement - Technical Appendix: Natural Heritage

[30] BSG Ecology (May 2022) Land East of Park View, Woodstock, Report to inform a Habitats Regulations Assessment

4. BASELINE CONDITIONS

4.1. CDC'S REVIEW AND ASSESSMENT OF AIR QUALITY

4.1.1. As part of its LAQM duties, CDC has identified that air quality within the district is generally good. However, areas of poor air quality have been identified and as such CDC has declared four AQMAs within the district due to exceedances of the UK Air Quality Strategy objective for annual mean concentrations of NO_2, primarily attributable to road traffic emissions. One of the AQMAs (in Banbury) has also been designated for hourly mean NO_2 concentrations.

4.1.2. CDC's 2020 ASR confirms that exceedances of the annual mean NO_2 objectives are still occurring within identified areas and therefore the AQMAs should be retained. However, the ASR also concludes that there has been an overall downward trend in NO_2 concentrations across the district.

4.1.3. The Application Site itself is not located within an AQMA. The nearest is AQMA No. 3, which covers an area around Bicester Road in Kidlington and is located 4.8km southeast of the Application Site. The remaining AQMAs are all located more than 10km from the Application Site (and are therefore unlikely to be affected by the Proposed Development).

4.1.4. In 2017, CDC published their AQAP[31] which sets out the actions that they will be taking to improve air quality within the AQMAs. These measures are primarily transport related, reflecting road traffic as the key pollutant source, and fall within the following key areas:

- Policy guidance and development control.
- Promoting low emission transport.
- Promoting travel alternatives to private vehicle use.
- Transport planning and infrastructure.
- Public information.

4.2. WODC'S REVIEW & ASSESSMENT OF AIR QUALITY

4.2.1. WODC has designated two AQMAs within its administrative area, in Witney and Chipping Norton respectively. Both AQMAs have been declared due to exceedances of the AQS objective for annual mean NO_2 concentrations. The Application Site is located more than 10km from both of these AQMAs, however, it is anticipated that some development traffic will route along the A4095 through Bladon and Long Hanborough and into Witney. Therefore, there is the potential for traffic associated with the Proposed Development to impact upon the Witney AQMA.

4.2.2. WODC's review and assessment work has also identified that the main air quality issues in WODC are related to vehicle density within relatively congested areas. The actions to improve air quality within WODC are primarily related to monitoring and data collection but also include cooperation and active liaison with neighbouring local authorities including: South Oxfordshire District Council, Vale of White Horse District Council, Cherwell District Council and Oxford City[32].

[31] Cherwell District Council (March 2017) *Air Quality Action Plan*

[32] https://oxfordshire.air-quality.info/local-air-quality-management

4.3. OXFORD CITY COUNCIL'S REVIEW & ASSESSMENT OF AIR QUALITY

4.3.1. Although the Application Site is located wholly within the administrative area of CDC, traffic associated with the Proposed Development may impact air quality within Oxford.

4.3.2. As part of their review and assessment work, Oxford City Council (OCC) has also identified road transport to be the primary source of pollution within their area and NO_2 as the key pollutant of concern. In 2010, OCC therefore declared a city-wide AQMA for exceedances of the AQS objective for annual mean NO_2 concentrations. This AQMA declaration remains in effect.

4.3.3. The Application Site is located approximately 5.8km northwest of the Oxford AQMA.

4.3.4. OCC will also be pursuing a range of measures to improve air quality across the city. Again, these are largely transport related and include, amongst others: adoption of a voluntary lower local air quality target of 30µg/m^3 for NO_2, introduction of a Zero Emission Zone (ZEZ) (with a pilot ZEZ introduced in February 2022, covering a small number of roads within the city centre) and delivery of 'Connecting Oxford' (a scheme that includes plans to introduce traffic restrictions, workplace parking levy, improved walking and cycling routes etc, to tackle areas affected by congestion and with poor public transport links).

4.4. LOCAL EMISSION SOURCES

4.4.1. The Application Site is located in an area where air quality is mainly influenced by emissions from road transport. Air quality within the Application Site itself will mainly be influenced by traffic using the A44 Oxford Road, to the south/southwest and the A4095 Upper Campsfield Road, which borders the Application Site to the east.

4.4.2. The Application Site is also located to the west of London Oxford Airport. Paragraph 7.16 of LAQM.TG16 provides screening criteria for determining when aircraft emissions are likely to be significant and require consideration. Although the Proposed Development would introduce new relevant exposure within 1km of the airport boundary, the passenger throughput for the airport is well below 10 million passengers per annum[33], and background NO_x concentrations relevant to the Application Site are below 25µg/m^3. Therefore, there is no requirement to specifically consider aircraft emissions within the assessment. However, the background concentrations and monitoring data used in the assessment will include a contribution from emissions generated by the Airport.

4.4.3. There are no significant industrial pollution sources in the immediate vicinity of the Application Site that are likely to have a significant influence on local air quality.

4.5. BACKGROUND AIR QUALITY DATA

4.5.1. **Table 6** summarises the background pollutant concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ that were utilised in the assessment.

4.5.2. For all pollutants, background concentrations are below, and therefore meet, the relevant objectives. Furthermore, background concentrations are predicted to reduce with time such that the 2030 concentrations are lower than those in 2019. The expected rate of reduction is greater for NO_x and NO_2 than the two particulate matter species.

[33] https://www.airportwatch.org.uk/recent-airport-figures/

Table 6 – Defra Background Concentrations used in the Assessment (µg/m^3)

Grid Square (Centred on O.S. Grid Ref.)	Applicable Receptors	Annual Mean Concentrations (µg/m^3)*							
		2019				2034			
		NO_x	NO_2	PM_{10}	$PM_{2.5}$	NO_x	NO_2	PM_{10}	$PM_{2.5}$
436500,210500	1-4,	11.1	8.6	14.7	10.0	8.25	6.47	13.6	9.1
435500,210500	5-7, 9-12	11.2	8.6	14.8	10.1	8.31	6.52	13.6	9.2
436500,210500	8	11.1	8.6	14.7	10.0	8.25	6.47	13.6	9.1
439500,212500	13	9.5	7.4	13.6	9.0	7.12	5.63	12.5	8.1
440500,213500	14	9.6	7.5	14.0	9.1	7.22	5.70	12.9	8.3
441500,214500	15-20	9.9	7.7	13.9	9.3	7.47	5.89	12.8	8.4
442500,214500	21	10.1	7.8	14.5	9.3	7.64	6.02	13.4	8.4
443500,214500	22	11.5	8.8	14.8	9.9	8.80	6.87	13.5	8.8
444500,214500	23-25, BPT2-T4	10.4	8.1	14.4	9.4	7.84	6.17	13.3	8.4
444500,215500	26	10.5	8.1	13.7	9.1	7.80	6.14	12.5	8.2
445500,215500	27-30	10.8	8.3	14.8	9.4	8.04	6.32	13.6	8.5
446500,216500	31, D4-D6	12.8	9.7	14.9	9.5	9.51	7.39	13.8	8.5
445500,215500	32, D1, D2	10.8	8.3	14.8	9.4	8.04	6.32	13.6	8.5
444500,216500	33-37, BPT1	11.2	8.6	13.7	9.2	8.52	6.67	12.5	8.3
444500,217500	38, LWST1	10.6	8.2	14.1	9.2	8.02	6.30	13.0	8.3
446500,215500	39, D3	13.0	9.9	14.6	9.4	9.66	7.50	13.5	8.5
447500,213500	40	13.2	10.0	15.3	9.9	9.92	7.69	14.1	9.0
447500,212500	41	13.5	10.2	15.4	10.0	10.14	7.85	14.2	9.1
448500,212500	42	15.8	11.8	15.3	10.0	11.96	9.13	14.1	9.0
449500,210500	43-45	19.3	14.2	17.2	10.9	13.02	9.89	16.0	10.0
450500,210500	46-51	16.7	12.4	15.7	10.5	12.06	9.21	14.5	9.6
449500,210500	52	19.3	14.2	17.2	10.9	13.02	9.89	16.0	10.0

Grid Square (Centred on O.S. Grid Ref.)	Applicable Receptors	Annual Mean Concentrations (µg/m^3)*							
		2019				2034			
		NO_x	NO_2	PM_{10}	$PM_{2.5}$	NO_x	NO_2	PM_{10}	$PM_{2.5}$
448500,210500	OMT1, OMT3, OMT7	17.6	13.0	n/a (ecological receptor not sensitive to particulate concentrations)		134	10.1	n/a (ecological receptor not sensitive to particulate concentrations)	
447500,210500	OMT2	15.6	11.6			11.9	9.1		
448500,209500	OMT4-OMT6	16.4	12.2			12.6	9.6		
*Adjusted for sector removal									

4.6. N DEPOSITION AND RELEVANT CRITICAL LOADS

4.6.1. The N deposition rates and relevant critical loads applicable to the designated sites are summarised in **Table 7**. These have been obtained using the Site Relevant Critical Load (SRCL) tool from APIS[34] for the grid squares in which the modelled transects are located.

Table 7 – Baseline Nitrogen Deposition and Critical Loads Relevant to the Assessment

Site	Relevant Habitat / Feature	Critical Load (kg N/ha/yr)	N Deposition (2017-2019) (kg N/ha/yr)	2030 N Dep (kg N/ha/yr)	Applicable Transect
Blenheim Park SSSI	Broad-leaved, mixed and yew woodland	15-20	29.6	26.4	BP T1 – T4
	Standing Open Water and Canals (the qualifying supporting habitat for the Great Crested Grebe and Gadwall)	20-30	11.1 to 12.1	9.9 to 10.8	BP T1 – T4
Oxford Meadows SAC	Lowland hay meadows	20-30	15.8	14.1	OMT4 - T6
			22.4	20.0	OMT1 – T3, T7
Pixey and Yarnton Meads SSSI	Neutral Grassland	20-30	22.4	20.0	OMT4 - T6
Woodstock Water Meadow LWS*	Floodplain Grazing Marsh	20-30	17.1	15.20	WM LWS T1

[34] APIS Site Relevant Critical Loads search function available at: http://www.apis.ac.uk/srcl

*Indicative values / assumed values

4.6.2. The data shows that current deposition rates within the Blenheim Park SSSI and Wytham Wood SSSI already exceed the Critical Load, upper and lower limits, for broad-leaved, mixed and yew woodland and are likely to do so for some time, regardless of the Proposed Development coming forward. It is assumed that the situation at the Eynsham Hall Park AW is likely to be similar.

4.6.3. With regards to the Oxford Meadows SAC and Pixey & Yarnton Mead SSSI, nitrogen deposition rates are more variable. According to APIS, nitrogen deposition rates are expected to be below the lower Critical Load across most of the SAC but are predicted to exceed the lower Critical Load within grid square 447500,212500 (which covers approximately 25% of the SAC), where Transects OMT1-T3 and T7 are located. However, deposition rates are expected to be within the upper Critical Load. For the Woodstock Water Meadow LWS and the Eynsham Hall Park AW, site specific data is not available. Therefore, indicative Critical Loads have been used based on APIS data for a comparable habitat or advice from the Project Ecologist.

4.7. NH_3 BASELINE CONCENTRATIONS

4.7.1. The baseline NH_3 concentrations for each of the grid squares in which the modelled transects are located are summarised in **Table 8**. These have also been obtained using the SRCL tool from APIS[7].

Table 8 – Baseline NH_3 Concentrations used in the Assessment

APIS Grid Square	Applicable Transect	2019 NH_3 Concentration ($\mu g/m^3$)	2030 NH_3 Concentration ($\mu g/m^3$)
442500,217500	BPT1, LWS T1	1.83	1.85
442500,212500	BPT2 - T4	1.96	1.98
447500,212500	OMT1 – T3, OMT7	2.72	2.74
447500,207500	OMT4 - T6,	1.74	1.76

4.7.2. The baseline NH_3 concentrations are below the Critical Level of $3\mu g/m^3$ within the designated sites, although it is noted that there are locations within the Oxford Meadows SAC where concentrations are elevated (and within 10% of the Critical Level).

4.8. LOCAL AUTHORITY AIR QUALITY MONITORING DATA

4.8.1. No automatic air quality monitoring is undertaken in the vicinity of the Application Site. However, CDC and WODC undertake monitoring for NO_2, using passive diffusion tubes, in and around Woodstock and within the wider study area (including Bladon, Witney, and Kidlington). Concentrations of NO_2 measured at these locations are summarised in **Table 9**. OCC also undertakes monitoring within their administrative area as part of their LAQM duties. Recent results from those monitoring sites located nearest to the modelled road network and the Oxford Meadows

SAC are also summarised in **Table 9.** The location of the monitoring sites are illustrated in **Figures 6** and **7.**

Table 9 – Nearby Local Air Quality Monitoring Data

ID	Description	Site Type	Distance to Site (km)	Within AQMA?	Annual Mean NO_2 Concentration ($\mu g/m^3$)*				
					2016	2017	2018	2019	2020
Cherwell District Council									
42	Benmead Rd, Kidlington	UB	3.5	No	13.5	12.6	13.4	13.8	16.2
40	Oxford Rd, Kidlington	R	3.6	No	30.5	28.8	28.9	24.7	24.2
41	Bramley Close, Kidlington	R	4.8	No	28.5	26.7	26.3	24.0	17.8
38, 39	Bicester Rd, Kidlington	R	4.8	AQMA No.3	**41.9**	**41.0**	37.9	33.6	24.0
43	Langford Lane, Kidlington	R	1.7	No	21.7	21.7	21.5	20.6	10.5
West Oxfordshire District Council									
NAS1	25 Bridge Street, Witney	R	>10km	Witney AQMA	**55.7**	**49.9**	**48.2**	**44.8**	36.8
NAS2	10 Bridge Street, Witney	R	>10km	Witney AQMA	-	**40.6**	**40.5**	37.1	27.5
NAS3	20 Bridge Street, Witney	R	>10km	Witney AQMA	**51.5**	**43.9**	**41.8**	**41.9**	32.2
NAS4	9 Mill Street, Witney	R	>10km	No	33.8	34.4	31.9	33.9	26.2
NAS5	4a West End, Witney	R	>10km	Witney AQMA	-	33.9	35.5	33.1	25.9
NAS6	Woodgreen Hill, Witney	R	>10km	Witney AQMA	-	33.9	34.4	35.5	26.6
NAS7	Newland, Witney	R	>10km	Witney AQMA	-	35.8	34.5	34.3	27.0
NAS 10	Park Street, Bladon	R	1.5	No	32.0	28.9	27.5	27.0	19.7
NAS 11	Health Lane, Bladon	Rural	1.5	No	12.5	10.4	10.0	9.0	7.5
NAS 12	Grove Road, Bladon	R	1.2	No	24.0	19.9	17.6	16.6	12.3

ID	Description	Site Type	Distance to Site (km)	Within AQMA?	Annual Mean NO_2 Concentration ($\mu g/m^3$)*				
					2016	2017	2018	2019	2020
NAS 13	3 Hensington Road, Woodstock (new from 1/1/2019)	UB	0.9	No	-	-	-	22.3	19.2
NAS 14	High Street Woodstock (new from 1/1/2019)	R	1.3	No	-	-	-	14.5	10.4
NAS 15	Rosamund Drive, Woodstock	UB	1.6	No	-	11.0	10.2	22.3	9.1
S10	Oxford Street (E). bus stop, Woodstock (discontinued)	R	1.0	No	26.0	23.1	26.4	-	-
S11	Oxford Street (W), bottom Woodstock (discontinued)	R	1.3	No	27.5	32.1	24.2	-	-
Oxford City Council									
DT25	Cutteslowe Rbt 3 Elsfield Rd	R	7.1	Oxford AQMA	**48**	35	35	35	26
DT26	Cutteslowe Rbt 3 Summers Placee	R	7.1	Oxford AQMA	**40**	**41**	**41**	**40**	31
DT27	Wolvercote Rbt 78 Sunderland Ave	R	6.8	Oxford AQMA	34	29	29	29	22
DT28	Wolvercote Rbt 51 Sunderland Ave	R	6.8	Oxford AQMA	32	26	27	26	22
DT29	Pear Tree P&R	R	6.2	Oxford AQMA	36	28	25	26	20
DT71	BP City Motors	R	6.7	Oxford AQMA	-	**41**	38	**40**	28
DT83	A44 Woodstock Rd	R	6.7	Oxford AQMA	-	-	-	**40**	30

* Data Source:s 2021 ASR for West Oxfordshire District Council, 2021 ASR for Cherwell District Council, 2021 ASR for Oxford City Council

Site Types: R = Roadside, UB – Urban Background

Concentrations exceeding the objective of $40\mu g/m^3$ are highlighted in **bold text**

4.8.2. The monitoring data indicate that annual mean NO_2 concentrations measured in the areas nearest to the Application Site (i.e. Woodstock and Bladon) and those locations outside of the existing Witney and Oxford AQMAs, are consistently below, and therefore meet, the statutory objective of 40µg/m^3.

4.8.3. Whilst exceedances of the objective are frequently occurring at a small number of locations within the Witney and Oxford AQMAs, these typically occur at roadside locations, near to busy or congested roads. Furthermore, the data shows that concentrations have either remained broadly stable or are decreasing (i.e. within the Oxford AQMA) or are indicative of an overall downward trend in concentrations (i.e. within the Witney AQMA).

4.8.4. It is noted that in 2020, a significant reduction in NO_2 concentrations was recorded at all monitoring sites compared to the previous year, such that the objective was met at all locations. However, this reduction is likely to be largely attributable to the influence of the travel restrictions and national lockdowns associated with the COVID-19 pandemic and not necessarily demonstrable of a long-term improvement in air quality. Without COVID-19, it is likely that monitored concentrations would have been higher in 2020 than those recorded.

4.8.5. As monitored annual mean NO_2 concentrations are all below 60µg/m^3, in accordance with LAQM.TG16, it can be assumed that hourly mean NO_2 concentrations will also be below the respective objective.

4.8.6. In relation to PM_{10} and $PM_{2.5}$, neither WODC nor CDC carry out monitoring of these pollutants within their areas. Whilst OCC does monitor particulate matter within the city centre, the monitors are located a considerable distance from the Application Site and modelled road network and therefore will not be representative of the modelled area. Nevertheless, monitoring data from these sites show PM_{10} and $PM_{2.5}$ concentrations are consistently well below, and therefore meet, the respective objectives (i.e., <50% of the objective).

4.9. SUMMARY

4.9.1. The Application Site is located in an area where the main influence on air quality will be emissions from road traffic, although the nearby airport will also contribute to local pollutant concentrations.

4.9.2. The background maps and recent monitoring data indicate that current pollutant concentrations at the Application Site are likely to meet the relevant AQS objectives. In the absence of the Proposed Development, it is anticipated that conditions within the Application Site would remain relatively unchanged.

4.9.3. The results of the dispersion modelling, as discussed in Section 5.2 of this report, indicate that current baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$ will be below, and therefore meet, the AQS objective at the majority of human assessment receptors considered. Exceedances are only predicted at receptors located within the existing AQMAs. In the future baseline scenario, concentrations of NO_2, PM_{10} and $PM_{2.5}$ are predicted to reduce such that they are predicted to meet the respective objectives at all human assessment receptors considered.

4.9.4. With regards to the ecological sites, current nitrogen deposition rates are already exceeding the upper and lower limits of the Critical Load for broad-leaved, mixed and yew woodland within the Blenheim Park SSSI and are likely to do so for some time, regardless of the presence of the Proposed Development. Nitrogen deposition levels are also exceeding the lower critical load for

lowland hay meadows across parts of the Oxford Meadows SAC and Pixey & Yarnton Mead SSSI but are below the upper critical load.

5. ASSESSMENT OF IMPACTS

5.1. CONSTRUCTION PHASE

DUST AND PM_{10} ARISING FROM ON-SITE ACTIVITIES

5.1.1. Construction activities that have the potential to generate and/or re-suspend dust and PM_{10} include:

- Site clearance and preparation;
- Preparation of temporary access/egress to the Application Site and haulage routes;
- Earthworks;
- Materials handling, storage, stockpiling, spillage and disposal;
- Movement of vehicles and construction traffic within the Application Site;
- Exhaust emissions from site plant;
- Construction of buildings, roads and areas of hardstanding alongside fabrication processes;
- Internal and external finishing and refurbishment; and
- Site landscaping after completion.

5.1.2. The majority of the releases are likely to occur during the 'working week', which is taken to be:

- Monday to Friday 07:30 to 18:00 hours;
- Saturdays 07:30 to 13:00 hours; and
- Sundays and Bank Holidays: Closed.

5.1.3. However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

ASSESSMENT OF POTENTIAL DUST EMISSION MAGNITUDE

5.1.4. The IAQM assessment methodology[13] has been used to determine the potential dust emission magnitude for the following four different dust and PM_{10} sources: demolition; earthworks; construction; and, trackout. The findings of the assessment are presented below.

Demolition

5.1.5. No demolition activities will occur at the Application Site as part of the construction phase of the Proposed Development. Therefore, consideration of the impact of this source on dust soiling and ambient PM_{10} is not required.

Earthworks

5.1.6. The total area of the Application Site is approximately 486,000m^2. However, the main development area is approximately 167,000m^2, which is greater than the IAQM criteria for 'large' sites of 10,000m^2. The soil type is assumed to be moderately dusty and the total material that will be moved is estimated to be between 20,000 and 100,000 tonnes. It is estimated that less than five heavy earth moving vehicles may be active at any one time. Overall, the potential dust emission magnitude is classed as 'large' for earthwork activities.

Construction

5.1.7. The Proposed Development includes the construction of up to 500 residential dwellings. The total volume of buildings to be constructed on the Application Site is estimated to be greater than

100,000m^3 and to comprise potentially dusty construction materials (i.e. traditional brick, concrete and timber frame). However, the build out rate is expected to be relatively slow, commencing in 2023 (subject to planning consent) and completing in 2034, with up to 50 dwellings constructed per year. However, adopting a conservative approach, the potential dust emission magnitude is classed as 'large' for construction activities.

Trackout

5.1.8. Detailed information regarding construction traffic is not currently available. Based on the scale of the development and the proposed build out rate, it is anticipated that the Application Site could generate between 10 and 50 HDV outward movements on any given day, although trip generation will be variable depending on the activities being undertaken. Although vehicles may travel over moderately dusty surface material and the unpaved road length could be greater than 100m, overall the potential dust emission magnitude for trackout is considered to be 'medium'.

5.1.9. **Table 10** provides a summary of the potential dust emission magnitude determined for each construction activity considered.

Table 10 - Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	N/A
Earthworks	Large
Construction Activities	Large
Trackout	Medium

Assessment of Sensitivity of the Study Area

5.1.10. **Figure 8** shows the area of the Application Site and all land uses within a 350m radius, in addition to the various intermediary distances considered in the IAQM guidance (i.e. 20m, 50m, 100m and 200m).

5.1.11. The key receptors within a 350m radius include:

- Residential properties located within the Park View development (currently under construction) and Littlecote, immediately west of the Application Site;
- Residential properties located on the edge of Woodstock and Hensington, between 200m and 350m west and northwest of the Application Site (including properties off Shipton Road, Princes Ride, Hedge End, Flemings Road, Crecy Walk, Churchill Gate, Meadow Walk, Blackberry Way);
- Marlborough Church of England School and Woodstock Open Air Pool, located c. 250m northwest of the Application Site);
- Peridswell House (and Farm), c. 50m north of the Application Site);
- Upper Campsfield Farm and c. 10-12 residential properties located off Upper Campsfield Farm to the east of the Application Site;
- Further residential properties located off the A4095 Bladon Road, to the south of the Application Site;
- Offices located at The Cowyards, c. 230m to the west; and

- Campsfield Wood and caravan park, located to the south of Woodstock Road.

5.1.12. Proposed residential properties that are completed and occupied whilst construction activities are still on-going elsewhere within the Application Site, will also be sensitive to associated releases of dust and particulates.

5.1.13. According to the IAQM, residential properties and schools would be considered 'high sensitivity' receptors for both dust and particulate matter. Places of work, where exposure would be short-term, are assumed to be 'medium sensitivity' for dust and 'low' to 'medium' sensitivity for PM_{10}.

5.1.14. A wind rose generated using the meteorological data used for the dispersion modelling of operational phase impacts is provided in **Appendix F**. This shows that the prevailing wind direction is from the west and south-west. Therefore, receptors located to the north and east of the Application Site are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase. Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source.

5.1.15. Currently, there are estimated to be less than 10 existing high-sensitivity receptors within 20m of the site boundary, between 10-100 high sensitivity receptors within 50m and >100 within 350m. Therefore, as per the IAQM guidance, the overall sensitivity of the surrounding area to dust soiling would typically be classed as 'medium'. However, taking into consideration that the Proposed Development will introduce new high sensitivity receptors into the site during the construction phase, and that these receptors are likely to be located within 50m of ongoing activities (and perhaps within 20m), adopting a precautionary approach, the overall sensitivity has been increased to 'high'.

5.1.16. With regards to the human health effects of PM_{10}, as detailed in **Table 6**, the background concentrations for this pollutant are less than 24µg/m^3. As there are less than 100 high sensitivity receptors within 20m of potential dust sources, the overall sensitivity of the surrounding area to changes in ambient PM_{10} is therefore classed as 'low'.

5.1.17. For track-out, the proposed access routes for construction traffic have yet to be agreed. However, it is anticipated that vehicles will access the Application Site via Upper Campsfield Road after travelling on the A44 Woodstock Road. There are less than five high sensitivity receptors located within 20m of the access roads up to 500m from the site access, and less than 10 high-sensitivity receptors within 50m. Therefore, the overall sensitivity of the area for track-out is classed as 'medium' for dust and 'low' for PM_{10}.

Risk of Impacts

5.1.18. The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. **Table 11** below provides a summary of the risk of dust impacts for the Proposed Development. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 11 - Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	High Risk	High risk	Low Risk

Human Health	N/A	Low Risk	Low Risk	Low Risk

Construction Vehicles & Plant

5.1.19. The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the site access. It is anticipated that construction traffic will access the Application Site via Upper Campsfield Road after travelling on the A44 Oxford Road / Woodstock Road.

5.1.20. The types of vehicles and the number of journeys / deliveries to the Application Site will vary from day to day depending upon the stage of works and the activities taking place. Detailed information relating to construction traffic is not currently available. It is estimated that construction HDV movements will range from 10 and 50 HDVs per day, depending on the activities being undertaken. Additional car and LDV movements will also be generated due to daily movements of site staff, small deliveries, equipment transfer etc. Detailed estimates for car and LDV movements are not currently available but are expected to be low in comparison to existing traffic levels on the local road network. They are also expected to be below the EPUK/IAQM screening criteria for locations outside of an AQMA (i.e. <100AADT for HDVs and <500AADT for cars/LDVs). Furthermore, construction traffic movements will be temporary for the duration of the construction works and will be variable throughout the duration of the construction phase; they are therefore unlikely to result in a long-term, permanent impact on local air quality.

5.1.21. Final details of the exact plant and equipment to be used on site will be determined by the appointed contractor. However, they are likely to comprise: excavators, dump trucks, asphalt spreaders; crane; cherry pickers, and piling machinery. The number of plant and their location within the site are likely to be variable over the construction period. The construction compound is likely to be located near the site entrance.

5.1.22. Based on the current local air quality in the area (as demonstrated by background concentrations in **Table 6** and the monitored NO_2 concentrations reported in **Table 9**), the proximity of sensitive receptors to the roads likely to be used by construction vehicles, and the likely numbers of construction vehicles and plant that will be used, the impacts are therefore considered to be of negligible significance, prior to mitigation.

5.2. OPERATIONAL PHASE

5.2.1. Full results of the dispersion modelling are presented in **Appendix G** and a summary is provided below.

HUMAN HEALTH RESULTS - PROPOSED DEVELOPMENT ONLY

Annual Mean NO_2 Concentrations

5.2.2. The AQS objective for annual mean NO_2 concentrations is 40µg/m^3. The results of the assessment show that in the 2019 baseline scenario, concentrations are predicted to meet the objective at the majority of assessment receptors considered. Concentrations are predicted to exceed the objective at seven of the existing receptors, with the highest concentration of 46.6µg/m^3 predicted at Receptor 6, a residential property on Newland Road, within the Witney AQMA. In fact, all of the exceedances are predicted at receptors within either the Witney AQMA or the Oxford AQMA.

5.2.3. These results are consistent with the conclusions of the Review and Assessment work undertaken by WODC and OCC, which concluded that exceedances of the objective for this pollutant may occur within their respective areas.

5.2.4. In the future assessment year of 2034, annual mean NO_2 concentrations are predicted to reduce from the 2019 baseline scenario and are predicted to meet the objective level at all assessment receptors, both with and without the Proposed Development in operation. The highest concentrations are again predicted at Receptor 6 (on Newland in Witney) and are 22.9µg/m^3 in the 'Without Proposed Development + Committed Development' scenario and 23.0µg/m^3 in the 'With Proposed Development + Committed Development' scenario.

5.2.5. Exhaust emissions from road traffic generated by the Proposed Development are predicted to increase NO_2 concentrations at 43 of the 52 existing assessment receptors; at the nine remaining assessment receptors, no discernible change in NO_2 concentrations is predicted (when considered to 1d.p.).

5.2.6. The largest predicted increase in NO_2 concentrations due to traffic generated by the development is 0.7µg/m^3 (~2% of the AQS objective) and is predicted at Receptor 30, which is a residential property on Upper Campsfield Road (southeast of the Application Site and north of the A44). However, total NO_2 concentrations at this receptor are <50% of the objective and therefore, in accordance with EPUK&IAQM criteria, the impact is classed as 'negligible'.

5.2.7. Of the other 42 receptors, the predicted increases range from 0.1µg/m^3 (<0.5% of the objective) to 0.4µg/m^3 (~1% of the objective). However, as total concentrations are less than 75% of the objective at all assessment receptors, the overall impact of the Proposed Development on annual mean NO_2 concentrations is classed as 'negligible'.

Hourly Mean NO_2 Concentrations

5.2.8. The annual mean NO_2 concentrations predicted by the model are below 60µg/m^3 at all assessment receptors. Therefore, hourly mean NO_2 concentrations are unlikely to cause a breach of the hourly mean AQS objective. The impact of the Proposed Development on hourly mean NO_2 concentrations at existing sensitive receptors is therefore considered to be 'negligible'.

Annual Mean PM_{10} Concentrations

5.2.9. The AQS objective for annual mean PM_{10} concentrations is 40µg/m^3. The results of the assessment show that in the 2019 baseline scenario, concentrations are predicted to meet the objective at all assessment receptors. The highest predicted concentration is 22.5µg/m^3 at Receptor 52, a residential receptor on the A44 Woodstock Road, within Oxford.

5.2.10. These results agree with the conclusions of the Review and Assessment work undertaken by WODC and OCC, which concluded that no AQMAs needed to be designated for this pollutant.

5.2.11. In 2034, predicted concentrations continue to meet the objective at all receptor locations. The highest concentrations are again predicted at Receptor 52 (A44 Woodstock Road) and are 21.8µg/m^3 in the 'Without Proposed Development + Committed Development' scenario and 21.9µg/m^3 in the 'With Proposed Development + Committed Development' scenario.

5.2.12. The largest predicted increase in PM_{10} concentrations due to traffic generated by the Proposed Development is 0.3µg/m^3 (equivalent to ~1% of the AQS objective) and is predicted at Receptors 30 (21 Upper Campsfield Road) and Receptor 39 (Campsfield Farm Cottages). However, as total

concentrations are <50% of the objective at these receptors, the impact of the Proposed Development on annual mean PM_{10} concentrations is classed as 'negligible'.

5.2.13. At a further 26 receptors, an increase of between 0.1µg/m^3 (<0.5% of the objective) and 0.2µg/m^3 (1% of the objective) is predicted. At all remaining assessment receptors, no discernible change in PM_{10} concentrations is predicted (when considered to 1d.p.). As the predicted impacts are all ≤1% of the objective and total concentrations are <50% of the objective, the impact of the Proposed Development on annual mean PM_{10} concentrations at these locations is also classed as 'negligible'.

Daily Mean PM_{10} Concentrations

5.2.14. The AQS objective for daily mean PM_{10} concentrations is 50µg/m^3 to be exceeded on no more than 35 days a year. The results of the dispersion modelling indicate that the objective will be met at all assessment receptors and in all assessment scenarios. The maximum number of days on which concentrations are predicted to exceed 50µg/m^3 is seven days in the 2019 baseline scenario, reducing to six days in the 2034 scenarios.

5.2.15. Exhaust emissions from traffic generated by the Proposed Development are not predicted to change the number of days experiencing concentrations greater than 50µg/m^3; the impact on daily mean PM_{10} concentrations is therefore 'negligible'.

Annual Mean $PM_{2.5}$ Concentrations

5.2.16. Predicted annual mean concentrations of $PM_{2.5}$ are all below the objective level of 20µg/m^3 in all assessment scenarios. In all scenarios, the highest concentrations are predicted at Receptor 12 (a residential property on Bridge Street), and are 14.1µg/m^3 in 2019, 13.6µg/m^3 in the future 'Without Proposed Development + Committed Development' scenario, and 13.7µg/m^3 in the 'With Proposed Development + Committed Development' scenario.

5.2.17. The highest predicted increase in $PM_{2.5}$ concentrations is 0.2µg/m^3 (1% of the objective) at Receptor 30 (21 Upper Campsfield Road). At all remaining assessment receptors, little or no discernible change (≤0.1µg/m^3) in $PM_{2.5}$ concentrations is predicted with the Proposed Development in operation. As the predicted increases are all ≤1% of the objective and total concentrations are <50% of the objective, based on the EPUK&IAQM guidance, the impact of the Proposed Development on annual mean $PM_{2.5}$ concentrations is classed as 'negligible'.

Exposure of Future Site Users

5.2.18. With regards to the receptors located within the Application Site itself, the results of the modelling show that predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are all well below, and are therefore predicted to meet, the relevant objectives at all proposed assessment receptors.

5.2.19. The highest predicted concentrations within the Application Site are 13.7µg/m^3 for annual mean NO_2 concentrations, 17.9µg/m^3 for annual mean PM_{10} concentrations, and 10.9µg/m^3 for annual mean $PM_{2.5}$ concentrations. The daily mean PM_{10} objective is also expected to be met as there is only one day on which daily mean PM_{10} concentrations are predicted to exceed 50µg/m^3.

5.2.20. Therefore, it can be concluded that the Application Site is suitable for the proposed end use and future site users will not be exposed to poor air quality.

CUMULATIVE IMPACT - PROPOSED DEVELOPMENT AND OTHER COMMITTED DEVELOPMENT

Annual Mean NO_2 Concentrations

5.2.21. As noted in the methodology section, the results for the future 'With Proposed Development + Committed Development' scenario were also considered against the 'future baseline' scenario (Without Proposed Development and without Committed Development), to provide an indication of the cumulative impact on air quality associated with the Proposed Development and those committed developments identified in Paragraph 3.4.19.

5.2.22. The largest predicted increase in annual mean NO_2 concentrations due to traffic generated by the proposed and committed developments is 1.0µg/m^3 (equivalent to 3% of the AQS objective) and is predicted at Receptor 30, a residential property on Upper Campsfield Road. For all remaining receptors, the increases range from 0.0µg/m^3 to 0.9µg/m^3.

5.2.23. As the predicted increases at all assessment receptors are ≤3% of the objective and total NO_2 concentrations are <75% of the objective, in accordance with EPUK&IAQM criteria, the cumulative impact of the Proposed Development and the identified committed developments on annual mean NO_2 concentrations is classed as 'negligible'.

Hourly Mean NO_2 Concentrations

5.2.24. The annual mean NO_2 concentrations predicted by the model are below 60µg/m^3 at all assessment receptors. Therefore, hourly mean NO_2 concentrations are unlikely to cause a breach of the hourly mean AQS objective. The cumulative impact of the Proposed Development and the identified committed developments on hourly mean NO_2 concentrations is therefore also considered to be 'negligible'.

Annual Mean PM_{10} Concentrations

5.2.25. The largest predicted increase in annual mean PM_{10} concentrations due to traffic generated by the Proposed Development in addition to the identified committed developments is 0.6µg/m^3 (equivalent to 1% of the AQS objective) and is predicted at Receptor 4, 55 Woodgreen in Witney. For all remaining receptors, the increases range from 0.0µg/m^3 to 0.5µg/m^3. However, as total concentrations at all receptors are <50% of the objective, the cumulative impact of the Proposed Development and the identified committed developments on annual mean PM_{10} concentrations is classed as 'negligible'.

Daily Mean PM_{10} Concentrations

5.2.26. For the most part, exhaust emissions from road traffic generated by the Proposed Development in-combination with the committed developments, are not predicted to change the number of days experiencing concentrations greater than 50µg/m^3. At a very small number of locations, an increase of only one day is predicted. However, the total number of days is only six days, which is still well below the objective of 35 days. Therefore, the cumulative impact on daily mean PM_{10} concentrations is considered to be 'negligible'.

Annual Mean $PM_{2.5}$ Concentrations

5.2.27. The largest predicted increase in $PM_{2.5}$ concentrations, due to the Proposed Development and the identified committed developments, is 0.3µg/m^3 at Receptors 1 and 4, off Woodstock Road and Wood Green in Witney. The predicted increases in $PM_{2.5}$ concentrations are ≤1% of the objective at

all receptors and the total concentrations are <75% of the objective. Therefore, in accordance with EPUK&IAQM criteria[12], the cumulative impact of the Proposed Development and the committed developments on annual mean $PM_{2.5}$ concentrations is classed as 'negligible'.

ECOLOGICAL RESULTS – DEVELOPMENT ONLY ('ALONE')

Annual Mean NO_x Concentrations

5.2.28. The critical level for annual mean NO_x concentrations for the protection of vegetation and ecosystems is 30µg/m^3.

Blenheim Park SSSI

5.2.29. In the 2019 scenario, the critical level is exceeded at the boundary of the Blenheim Park SSSI, however, it is not exceeded within the designated site itself. Furthermore, no exceedances are predicted in the future year scenarios.

Oxford Meadows SAC (including Pixey & Yarnton Meads SSSI)

5.2.30. With regards to the Oxford Meadows SAC (including Pixey & Yarnton Meads SSSI), concentrations are predicted to exceed the objective along transects OMT1 and OMT2, at distances of up to 30m (from the boundary of the designated site), in the 2019 scenario only. Again, no exceedances are predicted in the future year scenarios.

5.2.31. For transects OMT3, OMT4, OMT6 and OMT7, exceedances are predicted at most of the receptor points in the 2019 scenario and at distances up to 30m in the future year scenarios, however, these exceedances are predicted both with and without the Proposed Development in operation.

Woodstock Water Meadows LWS

5.2.32. The results of the modelling indicate that the critical level will be met at all assessed receptor points within the Woodstock Water Meadows LWS, in all assessment scenarios.

Summary

5.2.33. For the majority of receptor locations, the predicted increases in annual mean NO_x concentrations due to the Proposed Development are small (<0.3µg/m^3). At transects BPT2, BPT3 and OMT4, increases of 0.31µg/m^3 to 0.38µg/m^3 (equivalent to >1% of the critical level) are predicted at the first receptor points, which are located on the boundary of the designated sites (0m) nearest to the roadside. However, for all receptor points located within the designated sites, the predicted increases are <1% of the critical level. Therefore, it is unlikely qualifying features within the designated sites would be impacted.

5.2.34. Furthermore, as noted above, where concentrations exceed the critical level, these exceedances are predicted both with and without the Proposed Development in operation. The Proposed Development does not increase the distance within which any exceedances are predicted.

Ammonia (NH_3)

5.2.35. The critical level for NH_3 is 3µg/m^3. The results of the modelling indicate that the critical level will be met at nearly all receptor locations within the Blenheim Park SSSI and Woodstock Water Meadows LWS. In the 'with Development plus Committed Development' scenario, concentrations of 3.0µg/m^3 and 3.1µg/m^3 are predicted at BP T2 0m and BPT3 0m, however these receptors are located on the boundary of the designated site nearest the road.

5.2.36. Exceedances of the critical level are predicted at many of the receptor points within the Oxford Meadows SAC (and therefore the linked Pixey and Yarnton Meads SSSI). However, these exceedances are predicted both with and without the Proposed Development in operation. For the most part, the Proposed Development is predicted to cause little or no discernible increase in NH_3 concentrations. This highest predicted increase due to the Proposed Development alone is just 0.03µg/m^3 (equivalent to 1.1% of the critical level) at Receptor point OM T4 0m, which is located on the very boundary of the designated site at the point it is closest to the A34. As much of the SAC is set back further from the A34 than this receptor point, increases of this magnitude would not be expected elsewhere within the SAC.

5.2.37. Therefore, with the exception of the receptors located on the roadside boundary of the Blenheim Park SSSI (BPT2 0m and BPT3 0m) and one receptor on the roadside boundary of the SAC (OMT4 0m), the predicted NH_3 increases are all <1% of the critical level (for both grasslands and forest/tall vegetation, as appropriate).

Nitrogen Deposition

5.2.38. The N deposition rates and relevant critical loads applicable to the designated sites are summarised in **Table 7**.

Blenheim Park SSSI

5.2.39. In relation to the Blenheim Park SSSI, the existing baseline deposition rates for forests / tall vegetation already exceed the applicable critical load of 15-20kg N/ha/yr for Broadleaved, Mixed and Yew Woodland. Due to anticipated improvements in pollutant emissions, overall deposition rates are expected to reduce in the future, however it is anticipated that exceedances of the critical loads are likely to persist for some time. The results of the detailed modelling show that road traffic generated by the Proposed Development will not significantly increase nitrogen deposition within the SSSI. At BPT2 0m and BPT3 0m, increases of 0.3kg N/ha/yr (which equate to approximately 2% of the lower critical load) are predicted, however these receptors are located on the boundary of the designated site where it is understood no qualifying woodland features are present. For all receptors points located within the SSSI, the predicted increases are less than 1% of the lower critical load.

5.2.40. In relation to the deposition rates for short vegetation, they are expected to be below the lower critical load of 20kg N/ha/yr at all assessment receptors and in all assessment scenarios. As above, increases of 1% of the lower critical load are predicted at the very edge of the designated site but for all receptor points within the SSSI, the increases are less than 1% of the critical load.

Oxford Meadows SAC (including the Pixey and Yarnton Meads SSSI)

5.2.41. For the Oxford Meadows SAC, the Project Ecologists have confirmed that Lowland Hay Meadows are present within 200m of the A34 and the A40 and therefore the applicable critical load is 20-30kg N/ha/yr. The results of the modelling indicate that the lower critical load will be exceeded at the majority of receptors points, primarily due to elevated baseline deposition rates. At transects OMT3, OMT4, OMT6, and OMT7, deposition rates are also predicted to exceed the upper critical load at distances of 10m to 30m into the designation. However, these exceedances are predicted both with and without the Proposed Development in operation. The Proposed Development does not change the distance at which exceedances are predicted.

5.2.42. For transects OMT1 and OMT2, no discernible increases in nitrogen deposition rates are predicted due to the Proposed Development. At all remaining receptor transects, increases are predicted however they are all small and less than 1% of the lower critical load.

5.2.43. As Transects OMT1 to OMT7 are also located within the Pixey and Yarnton Meads SSSI and the applicable critical load is also 20-30kg N/ha/yr, the above conclusions for the SAC will also apply to this SSSI.

Woodstock Water Meadows LWS

5.2.44. Finally, for the Woodstock Water Meadow LWS, which is classed as a floodplain grazing marsh, a critical load range of 20 to 30kg N/ha/yr is considered appropriate. The results of the assessment indicate that deposition rates will be below the lower critical load in all assessment scenarios. Furthermore, no discernible change in deposition rates is predicted as a results of the Proposed Development.

ECOLOGICAL RESULTS – IN-COMBINATION EFFECTS

5.2.45. In line with current guidance, the in-combination effects at the Oxford Meadows SAC (which includes the linked Pixey and Yarnton Meads SSSI) and the Blenheim Park SSSI have also been considered and are summarised below. The results present a comparison between the 2034 'With Development' scenario against the 2019 baseline scenario, using the future year (2030) emissions factors for both scenarios.

Annual Mean NO_x Concentrations

Oxford Meadows SAC

5.2.46. The results of the modelling show that a change in annual mean NO_x concentrations equivalent to more than 1% of the critical level is predicted at most of the receptor points along each of the modelled transects, at distances of up to 200m within SAC. However, as noted above (Paragraph 5.2.30) at most receptor points, total NO_x concentrations remain below the critical level. Any exceedances are typically limited to the edge of the SAC nearest the A34. At Receptors OM T3 and OM T4 exceedances are predicted at distances of up to 30m within the SAC. However, it is worth noting that Transects OM T3 and OM T4 are located at the point where the SAC boundary is closest to the A34 (i.e. they start on two small spurs that project out at the road edge). The SAC boundary then steps back from the A34 such that the remainder of the SAC is typically set back at least 15-20m from the A34. Therefore, the area of the SAC exceeding the critical level is expected to be minimal.

Blenheim Park SSSI

5.2.47. The Proposed Development in-combination with other projects is predicted to increase annual mean NO_x concentrations by more than 1% of the critical level along Transects BP T1 to BP T4 at distances of between 60m to 120m of the boundary of the SSSI. The largest predicted increase is 1.4µg/m^3 at Receptor BP T3 0m, located on the boundary of the SSSI. However, no exceedances of the critical level are predicted within the Blenheim Park SSSI in any of the assessment scenarios.

Ammonia

Oxford Meadows SAC

5.2.48. The results of the modelling indicate that when considering the impact of the Proposed Development in-combination with the other projects, increases of more than 1% of the critical level for NH_3 are predicted at many of the receptor points within the SAC. The maximum change in predicted annual mean NH_3 concentrations (between the 2034 with Development scenario and the 2019 baseline year with 2030 emissions), is 1.0µg/m^3 at Receptor OM T4 0m, noting that of this increase, only 0.03µg/m^3 is due to the Proposed Development 'alone').

5.2.49. Exceedances of the critical level are predicted at a number of the receptor points within the Oxford Meadows SAC. For Transects OM T1, OM T2, OM T4 and OM T6, exceedances are predicted within the first 40m – 50m. For Transects OM T3 and OM T7 concentrations ≥3.0µg/m^3 are predicted at distances of up to 160m to 180m. For Transect OM T5, exceedances are only predicted within the first 10m of the SAC boundary. The total area of exceedance is therefore likely to represent only a small proportion of the total area of the SAC (estimated to be <5%).

Blenheim Park SSSI

5.2.50. The modelling results indicate that increases in NH_3 of more than 1% of the critical level are predicted at a small number of receptors points along each of the four transects within the Blenheim Park SSSI, typically at distances of between 0m and 30m of the site boundary. For all remaining receptor points, the predicted increases are <1% of the critical level (for both grassland and woodland habitats). Furthermore, no exceedances of the critical level are predicted.

Nitrogen Deposition

Oxford Meadows SAC

5.2.51. As noted previously, the lower critical load will (20kg N/ha/yr) be exceeded at most of the receptor points within the Oxford Meadows SAC, primarily due to elevated baseline deposition rates. The upper critical load (30kg N/ha/yr) is also predicted to be exceeded at a small number of receptor points within the SAC (limited to the first 10m to 20m of Transects OM T3 and OM T4 and the first 10m of OM T6).

5.2.52. The modelling results indicate that the Proposed Development in-combination with other projects will generate an increase in nutrient nitrogen deposition rates of more than 1% of the lower critical load at most of the receptor points within the SAC. The greatest increase is 5.74µg/m^3 at Receptor OM T4 0m. As noted above, this receptor is located at the boundary of the SAC nearest to the A34 road edge. As the remainder of the SAC is set back further from the A34 than this receptor point, increases of this magnitude are unlikely to occur elsewhere within the SAC.

5.2.53. Therefore, the area of the SAC within which increases of more than 1% of the lower critical load and exceedances of the lower critical load are predicted is expected to represent only a small proportion of the overall area of the SAC (i.e. estimated to be <10% of the total area).

Blenheim Park SSSI

5.2.54. The existing baseline deposition rates for woodlands / tall vegetation already exceed the applicable critical load of 15-20kg N/ha/yr for Broadleaved, Mixed and Yew Woodland and are likely to do so for some time. The results of the detailed modelling show that road traffic generated by the Proposed Development in-combination with other projects will increase nitrogen deposition rates at

all receptor points. For the most part the increases are less than 1% of the critical load although increases of >1% of the critical load are predicted at distances of 40m to 80m. However, the Project Ecologists have confirmed that there are no qualifying woodland features present within these distances.

5.2.55. In relation to the deposition rates for grasslands / short vegetation, in-combination increases of >1% of the critical load are predicted at each of the four transects at distances of between 10m and 40m. However, total deposition rates are predicted to be below the applicable lower critical load (20kg N/ha/yr) at all assessment receptors.

5.2.56. The Project Ecologists have also advised that the lake, for which the SSSI is partly designated, is located within 200m of the modelled road network. However, the lake is a eutrophic water body and is therefore unlikely to be harmed by an increase in nitrogen deposition. Summary

5.2.57. The modelling results have been passed to the Project Ecologists for consideration and evaluation. A comprehensive summary of their conclusions is provided within the Natural Heritage Technical Appendix to the Environmental Statement[29] and Shadow Habitat Regulations Assessment (HRA)[30] submitted in support of the planning application. However, a brief overview is provided below.

5.2.58. When considered 'alone', whilst the Proposed Development may increase NO_x concentrations, ammonia concentrations and nutrient nitrogen deposition at many of the receptor points within the identified designated sites, the increases are generally less than 1% of the respective critical levels / loads. Where increases equivalent to 1% of the critical level or load are predicted, these are generally limited to the roadside boundary of the designated sites. As such, the Proposed Development alone is considered unlikely to have a significant effect on the qualifying features of the respective designated sites.

5.2.59. In relation to the in-combination effects, for the Oxford Meadows SAC (including the Pixey and Yarnton Meads SSSI), exceedances of the critical levels for NO_x and NH_3 and the critical loads for nitrogen deposition are predicted within 200m of the A40 and A34, and in-combination impacts of more than 1% of the respective critical levels/loads are predicted. However, the Proposed Development itself contributes negligible amounts of these pollutants and exceedances would occur regardless of the Proposed Development coming forward.

5.2.60. The Project Ecologists concluded that road transport is responsible for only a small proportion of total nitrogen deposition at the Oxford Meadows SAC with agricultural practices (including livestock and fertiliser application) and non-agricultural waste making up a much greater proportion. Furthermore, the contribution of road traffic to nitrogen deposition is expected to decline over time, as a result of an increased uptake of newer, cleaner (low and zero emission) vehicles. As such they have concluded that whilst impacts greater than 1% are likely, given the relative contribution of road traffic to total nitrogen deposition rates within the SAC is very small, "*…the Proposed Development in-combination with other projects and plans is unlikely to prevent or significantly restrict the ability to deliver the conservation objectives for the site and such the Proposed Development is considered unlikely to have an adverse effect on the integrity of the Oxford Meadows SAC*". To achieve any conservation objectives, it is likely that the agricultural sources would need to be reduced.

5.2.61. Similarly, whilst the Proposed Development in-combination with other plans and projects is predicted to have an impact on annual mean NO_x concentrations, ammonia and nitrogen deposition within the Blenheim Park SSSI, the increases are typically less than 1% of the relevant critical load or levels. Where the increases are predicted to be greater than 1%, they occur at locations where there are no

qualifying / sensitive features present. Overall, the Project Ecologist have concluded that air pollution impacts on the SSSI will therefore be negligible (and not significant).

6. MITIGATION & RESIDUAL EFFECTS

6.1. CONSTRUCTION PHASE

6.1.1. Based on the assessment results, mitigation will be required. Recommended mitigation measures appropriate to the identified levels of risk are given below. These should be agreed with the local authority prior to commencement of works and implemented by the appointed contractor.

General Communication

- A stakeholder communications plan that includes community engagement before work commences on site should be developed and implemented.
- The name and contact details of person(s) accountable for air quality and dust issues should be displayed on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.

General Dust Management

- A Dust Management Plan (DMP), which may include measures to control other emissions, in addition to the dust and PM_{10} mitigation measures given in this report, should be developed and implemented, and approved by the Local Authority.

Site Management

- All dust and air quality complaints should be recorded and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in-place to avoid reoccurrence.
- The complaints log should be made available to the local authority on request.
- Any exceptional incidents that cause dust and/or air emissions, either on- or offsite should be recorded, and then the action taken to resolve the situation recorded in the log book.
- Regular liaison meetings with other high-risk construction sites within 500m of the site boundary should be held, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.

Monitoring

- Daily on-site and off-site visual inspections (up to 100m from the Site boundary) should be carried out for the duration of works to check for visible dust emissions near to the site boundary and deposition of dust or soiling of property (e.g. street furniture, cars, windowsills etc). The visual inspections should include site access routes, to ensure dust deposition associated with trackout is kept to a minimum. Inspections should be carried out by a trained and competent person.
- It is recommended that at least one visual inspection be undertaken per day. However, the frequency of site inspections should be increased when activities with a high potential to produce dust are being carried out and/or during prolonged dry or windy conditions.
- The outcomes of the surveys should be clearly recorded in a log that should be kept on site and made available to the local authority when requested. A record of any additional mitigation measures implemented to prevent or minimise dust and particulate emissions (e.g. the use of additional water sprays or dampening measures) should be included within the log. Remedial measures / cleaning of soiled surfaces should be carried out if necessary and recorded in the log.

- The Local Authority may request that site specific monitoring (such as dust deposition, dust flux, or real-time PM_{10} continuous monitoring) be undertaken during the construction period. Where this is required, the type and location of monitoring should be agreed with the Local Authority, along with the duration of the survey. A period of baseline monitoring may also be required, prior to the commencement of works.

Preparing and maintaining the site

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

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 Earthworks

- Where practicable, only remove the cover in small areas during work and not all at once.
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Stockpile surface areas should be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.
- Where practicable, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Application Site and the surroundings.
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction.

- During dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up.

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.
- Where possible, bulk cement and other fine powder materials should be delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials, it is recommended bags are sealed after use and stored appropriately to prevent dust.
- All construction plant and equipment should be maintained in good working order and not left running when not in use.

Measures Specific to Trackout

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Where practicable, implement a wheel washing system or use water sprays to dislodge any dust or mud accumulations on vehicles prior to leaving the Site.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site.
- Avoid dry sweeping of large areas, where possible.

Operating vehicle/machinery and sustainable travel

6.1.2. To minimise the effect of exhaust emissions associated with construction traffic and plant, the following measures should also be implemented:

- All construction plant and equipment should be maintained in good working order.
- Ensure all vehicle operators switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Identified routes for construction traffic should be agreed with the local authority prior to the commencement of works to reduce the likelihood of construction vehicles passing along sensitive roads.
- Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.
- Consideration should be given to the adoption of a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads as appropriate.
- Consideration should also be given to the implementation of a Construction Logistics Plan should be produced to manage the sustainable delivery of goods and materials.
- Similarly, a Travel Plan that supports and encourages sustainable travel during the construction phase should be considered.

RESIDUAL EFFECTS

6.1.3. The residual effects of dust and PM_{10} generated by construction activities following the application of the mitigation measures described above and good site practice will be not significant.

6.1.4. The residual effects of emissions to air from construction vehicles and plant on local air quality will also be not significant.

6.2. OPERATIONAL PHASE

MITIGATION

6.2.1. The results of the modelling show that pollutant concentrations are anticipated to meet the respective objectives at all existing and proposed sensitive receptors considered within the study area. The change in pollutant concentrations at these receptors attributable to development traffic is negligible, according to the assessment criteria. The greatest benefits with regards to air quality will therefore be through the promotion of sustainable travel choices and the implementation of travelling planning measures intended to reduce the number of vehicle trips generated by the Proposed Development.

6.2.2. The masterplan for the Proposed Development includes the following measures to enhance / improve pedestrian and cycling links with the surrounding area:

- Pedestrian and cycle links through the development, including onto the A44 Oxford Road and Bladon roundabout and to the Park View development to the west.
- Cycle parking provision, in accordance with local standards / policy.

6.2.3. In addition, a Residential Travel Plan will be developed for the Proposed Development which will include a range of measures to promote the use of public transport / sustainable transport choices by residents, which will in turn help to reduce the number of private and single-occupancy vehicle trips associated with the Proposed Development. It is anticipated that this will include measures such as:

- Provision of a Sustainable Travel Information Pack for all new households which will include:
  - Promotional material on the health benefits of regular exercise, including walking and cycling;
  - Information on local walking and cycling routes and public transport links;
  - Bus network map with details of bus numbers, hours of operation and frequency;
  - Bus and Rail timetables;
  - Map of bus stop locations;
  - Information on cycle training;
  - Links to relevant local travel planning websites/services; and
  - Promotion of car sharing / car-sharing schemes.
- Sustainable travel events, to be held annually for the duration of the Travel Plan (for example, Dr Bike sessions, community walks or bike rides, competitions etc).

6.2.4. Each household will be fitted with broadband connections to facilitate working and shopping from home (which will in turn reduce car travel, fuel consumption etc).

6.2.5. In addition, electric vehicle recharging points will be provided for every dwelling to encourage the use of low and zero emission vehicles.

RESIDUAL EFFECTS

6.2.6. The Proposed Development, both alone and in combination with the identified committed developments, is predicted to increase NO_2, PM_{10} and $PM_{2.5}$ concentrations at the majority of assessment receptors. These increases will be reduced by the implementation of the mitigation measures described above.

6.2.7. In the proposed completion year, concentrations are predicted to meet the statutory objectives at all existing assessment receptors, both with and without the Proposed Development in operation. Furthermore, concentrations are predicted to meet the respective objective at proposed receptors within the Application Site.

6.2.8. The residual effects of the Proposed Development on air quality will be 'not significant' for all pollutants.

7. CONCLUSIONS

7.1.1. An air quality assessment has been undertaken to assess the potential impact of the Proposed Development on air quality at nearby sensitive receptors and proposed receptors during the construction and operational phases. The assessment has also considered the cumulative impact of the Proposed Development and other committed developments in the wider area.

7.1.2. To inform the assessment, a desk study was undertaken to determine the existing baseline air quality conditions in the vicinity of the Application Site. This identified that the Proposed Development is located in an area where the primary influence on local air quality will be emissions from road traffic. CDC and the neighbouring authorities (WODC and OCC) have declared a number of AQMAs within their administrative areas due to exceedances of the AQS objective for annual mean NO_2 concentrations. None of these AQMAs are located in the immediate vicinity of the Application Site. Nearby monitoring data indicates pollutant concentrations at the Application Site are likely to be compliant with the relevant AQS objectives.

7.1.3. A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for this phase of the Proposed Development using the IAQM methodology[13]. This identified that there is a Low to High Risk of dust soiling impacts and a Low Risk of increases in particulate matter concentrations due to construction activities. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and PM_{10} releases would be significantly reduced. The residual effects of dust and PM_{10} generated by construction activities on air quality are therefore considered to be 'not significant'. The residual effects of emissions to air from construction vehicles and plant on local air quality are also considered to be 'not significant'.

7.1.4. A quantitative assessment of the potential impacts on local air quality arising from the Proposed Development during the operational phase has been undertaken using the detailed dispersion model ADMS Roads. The model was used to predict the changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations that would occur due to traffic generated by the Proposed Development, both alone and in combination with other identified committed developments. The assessment was completed in line with published methodologies and technical guidance. The results of the assessment showed that, once operational, the Proposed Development would have a negligible impact on air quality at all assessment receptors considered. The residual effects on local air quality are therefore considered to be 'not significant'.

7.1.5. Furthermore, pollutant concentrations predicted within the Application Site itself are well below, and therefore meet, the relevant AQS objective levels. It can therefore be concluded that future site users are not anticipated to be exposed to poor air quality and that the Application Site is suitable for the proposed residential use.

7.1.6. Finally, the assessment also considered the impact of the Proposed Development, both alone and in-combination with other projects (as appropriate), on annual mean NO_x concentrations, NH_3 concentrations and nutrient nitrogen deposition rates within a number of ecological designated sites located within 200m of the modelled road network, including the Blenheim Park SSSI, the Oxford Meadows SAC (and linked Pixey and Yarnton Meads SSSI), and the Woodstock Water Meadow LWS.

7.1.7. The modelling results were subsequently passed to the Project Ecologists for consideration and evaluation. The results showed that whilst the Proposed Development 'alone' may increase NO_x

concentrations, ammonia concentrations and nutrient nitrogen deposition at many of the receptor points within the identified designated sites, the increases are generally less than 1% of the respective critical levels / loads. Where increases greater than 1% of the critical level or load are predicted, these are generally limited to the roadside boundary of the designated sites. As such, the Proposed Development 'alone' is considered unlikely to have a significant effect on the qualifying features of the respective designated sites.

7.1.8. In relation to the in-combination effects, for the Oxford Meadows SAC, exceedances of the critical levels for NO_x and NH_3 and the critical loads for nitrogen deposition are predicted within 200m of the A40 and A34, and in-combination impacts of more than 1% of the respective critical levels/loads are also predicted. However, the Proposed Development itself contributes negligible amounts of these pollutants and the exceedances would occur regardless of the Proposed Development coming forward. The Project Ecologists have identified that road transport is responsible for only a small proportion of total nitrogen deposition with agricultural practices (including livestock and fertiliser application) and non-agricultural waste making up a much more significant proportion. Furthermore, the contribution of road traffic to nitrogen deposition is expected to decline over time, as a result newer, more efficient and cleaner vehicles. As such they have concluded that "*…the Proposed Development in-combination with other projects and pans is unlikely to prevent or significantly restrict the ability to deliver the conservation objectives for the site and such the Proposed Development is considered unlikely to have an adverse effect on the integrity of the Oxford Meadows SAC*".

7.1.9. Similarly, whilst the Proposed Development in-combination with other plans and projects is predicted to have an impact on annual mean NO_x concentrations, ammonia, and nitrogen deposition within the Blenheim Park SSSI, the increases are typically less than 1% of the relevant critical load or levels. Where the increases are predicted to be greater than 1%, they occur at locations where there are no qualifying / sensitive features present. Overall, the Project Ecologist have concluded that air pollution impacts on the SSSI will therefore be negligible and not significant.

7.1.10. Based on the assessment results, it is considered that the development proposals comply with national and local policy for air quality.