

VALE OF WHITE HORSE DISTRICT COUNCIL LOCAL PLAN 2031: PART 2 EVIDENCE BASE – CUMULATIVE IMPACT OF PLANNED GROWTH ON THE AIR QUALITY MANAGEMENT AREAS

Air Quality Report

Prepared for: Vale of White Horse District Council

SLR Ref: 427.09221.00001
Version No: v01
November 2018



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CONTENTS

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	2
1.1 Background	2
1.2 Scope	4
1.3 Structure of Technical Note	5
2.0 MARCHAM AQMA	6
2.1 Background	6
2.2 Baseline Air Quality	6
2.3 Future Air Quality	8
3.0 ABINGDON AQMA	12
3.1 Background	12
3.2 Baseline Air Quality	13
3.3 Future Air Quality	15
4.0 BOTLEY AQMA	19
4.1 Background	19
4.2 Baseline Air Quality	19
4.3 Future Air Quality	20
5.0 MITIGATION	ERROR! BOOKMARK NOT DEFINED.

DOCUMENT REFERENCES

TABLES

Table 2-1 Passive Diffusion Tube Monitoring Results	7
Table 2-2 Background Concentrations for the Site (Grid Square x445500, y196500)	8
Table 2-3 Predicted Daily Traffic Flows Though Marcham AQMA	9
Table 3-1 NO ₂ Monitoring Results: The Masons, 39 Stert Street, Abingdon	13
Table 3-2 Passive Diffusion Tube Monitoring Results	13
Table 3-3 Background Concentrations for the Site (Grid Square x449500, y197500)	15
Table 3-4 Predicted Daily Traffic Flows Though Abingdon AQMA	16
Table 4-1 Passive Diffusion Tube Monitoring Results	20
Table 4-2 Background Concentrations for the Site (Grid Square x448500, y205500)	21
Table 4-3 Predicted Daily Traffic Flows Though Botley AQMA	21

FIGURES

Figure 2-1 Map Showing the Marcham AQMA and Air Quality Monitoring Locations.....	6
Figure 3-1 Map Showing the Abingdon AQMA and Air Quality Monitoring Locations.....	12
Figure 3-2 Further Air Quality Monitoring Locations Outside of Abingdon AQMA	15
Figure 4-1 Map Showing the Botley AQMA and Air Quality Monitoring Locations	19

Executive Summary

This report considers the likely cumulative impacts of air quality from relevant sites identified within the Local Plan 2031: Part 2 (LPP2) and provides an assessment of the air quality impacts on the Abingdon, Botley and Marcham Air Quality Management Areas (AQMA's).

The report specifically addresses the questions raised by the Planning Inspector, Mr David Reed, presiding over the Examination into the Local Plan 2031: Part 2 set out in his post hearing letter dated 30 October 2018:

1. Reference to the analysis on the Abingdon AQMA being based solely on comments from the VoWHDC Environmental Health team, and
2. That the traffic distribution from the Dalton Barracks site, as traffic data set out in the RPS report relating to the Marcham AQMA was unclear.

In relation to point 1:

The approach to considering impacts on air quality in Abingdon has taken account of several factors:

- i. There has been compliance with the annual mean Air Quality Objective (AQO) for NO₂ in Abingdon, which is confirmed by monitoring data and as such VoWHDC are giving consideration to revoking the AQMA
- ii. Emissions of nitrogen oxides from vehicles in the UK are expected to reduce over time. The Defra 2017 emissions factor toolkit shows a reduction of 61 % between 2017 and 2030 that would further limit impact on air quality
- iii. Planned highway infrastructure mitigation, including the construction of the upgrade to the Lodge Hill A34 Interchange at Abingdon, which is now fully funded and expected to be completed before the end of 2021, i.e. prior to the commencement of the larger LPP2 sites and that is expected to improve traffic flows through Abingdon
- iv. Assessment of likely impacts of relevant LPP2 sites shows that only Dalton Barracks would require further consideration, in terms of the 500 AADT criteria, however the predicted AADT would in reality be split between several routes and so extremely unlikely to exceed the threshold for any individual route
- v. Potential air quality impacts will also be considered in detail at planning application stage in accordance with Development Policy 26 and national guidance. DP26 provides a comprehensive framework for considering air quality impacts.

In relation to point 2:

The traffic distribution data in Annual Average Daily Traffic (AADT) format for the Dalton Barracks site has been provided by Glanville's who are the transport consultants acting for the site promoter, following consultation with Oxfordshire County Council. This data is consistent across the Transport Delivery Report (HEAR PC 03.4) and this Air Quality Report. The additional work undertaken, as set out in the Transport Delivery Report, and the consistency across the Transport and Air Quality Reports, in relation to traffic distribution for Dalton Barracks, does therefore address the Planning Inspectors specific question on this matter.

The conclusions from the RPS report and this Air Quality Report relating to relevant LPP2 sites on air quality are that these impacts can be considered to be 'negligible'.

1.0 INTRODUCTION

SLR Consulting Ltd (SLR) has been commissioned by the Vale of White Horse District Council (VoWHDC) to consider the likely cumulative impact of air quality resulting from relevant development sites identified within the Local Plan Part 2 (LPP2). Specifically, this Air Quality Report provides an assessment of the air quality impacts on the Abingdon, Botley, and Marcham Air Quality Management Areas (AQMA) appropriate for this stage of the Local Plan process. It also details how any adverse effects will be mitigated and as such, seeks to address the questions identified by the Planning Inspector.

SLR Consulting Ltd has been asked to lead this work given that they are also acting for the Site Promoter of the Dalton Barracks proposed allocation, which is the main proposed allocation within LPP2, and hence have access to relevant data. This work has been carried out with reference to previous work undertaken by RPS, who prepared an assessment relating to the Marcham AQMA (HEAR 04.5)¹.

1.1 Background

The VoWHDC Local Plan 2031: Part 2 (LPP2) is currently at an advanced stage following Examination in Public (EIP). The Inspector, Mr. David Reed, issued a post hearing letter on 30th October 2018.

In paragraph 13 (ii) of this letter, the Inspector requested further assessment of the potential cumulative impacts and effects on air quality, as follows:

(ii) Assessment of cumulative air quality implications

There are Air Quality Management Areas (AQMAs) relatively close to Dalton Barracks at central Abingdon and Marcham with a third further away at Botley, all three of which arise from elevated levels of nitrogen dioxide due to road traffic emissions. Air quality issues may therefore arise from the traffic generated by development at Dalton Barracks and the other allocations in the LPP2. Air quality concerns in relation to the Marcham allocation were discussed at the hearings and the note I requested (HEAR04.5) seeks to address the cumulative impact of all the LPP2 allocations on the Marcham and Abingdon AQMAs. However, the analysis in relation to Abingdon appears to be solely based on comments from the Council's Environmental Health team and the basis of the Dalton Barracks traffic distribution used by the supporting RPS report for Marcham is unclear. In neither case are the implications of a development of up to 4,500 dwellings at Dalton Barracks considered.

The evidence base in relation to air quality should therefore be revisited with the implications of traffic generation from both 1,200 and 4,500 dwellings on the Dalton Barracks site and the other LPP2 allocations assessed comprehensively in relation to the Abingdon, Marcham and, if necessary, Botley AQMAs. This should also explain how any adverse effects can be resolved and if any modifications are required to the plan.

It is noted that the Dalton Barracks site is now only being progressed as a 1,200 dwelling scheme in total, with consideration for any longer term growth a matter for a future Local Plan process.

¹ RPS, 22 August 2018, Vale of White Horse District Local Plan 2031: Part 2 Evidence Base – Cumulative Impact of Planned Growth on Air Quality in Marcham.

1.2 Policy Background

The National Planning Policy Framework (NPPF) is supported by Planning Practice Guidance (PPG) this sets out the information that may be required in an air quality assessment, making clear that “Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality”. It also provides examples of the types of measures to be considered. It states that “Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact”.

Examples of mitigation that can be included by the developer for each development include:

- The preparation of a Travel Plan for the development;
- the design and layout of development to increase sustainable transport options (Walking and Cycling);
- Inclusion of Electric Vehicle Charging infrastructure both on site and off site;
- Car Club provision or support to a local car club;
- using green infrastructure, in particular trees, to absorb dust and other pollutants;
- promoting infrastructure to promote modes of transport with low impact on air quality such as low emission busses; and
- Contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development.

More specifically to the VoWHDC Local Plan Part 2 contains Core Policy’s 12a,18a and 19a which support additional future transport schemes, these relate in particular to an identified need for air quality improvements and the wider Oxfordshire Public Transport Strategy. Furthermore Core Policy 34 relating to the A34 strategy recognises that the VoWHDC will continue to work with Highways England and the Oxfordshire County Council in planning for managing traffic on the A34, including addressing Air Quality impacts on this route.

The main policy on Air quality is Development Policy 26: Air Quality which states;

Development proposals that are likely to have an impact on local air quality, including those in, or within relative proximity to, existing or potential Air Quality Management Areas (AQMAs) will need to demonstrate measures / mitigation that are incorporated into the design to minimise any impacts associated with air quality.

Where sensitive development is proposed in areas of existing poor air quality and / or where significant development is proposed, an air quality assessment will be required.

The Council will require applicants to demonstrate that the development will minimise the impact on air quality, both during the construction process and lifetime of the completed development, either through a redesign of the development proposal or, where this is not possible or sufficient, through appropriate mitigation in accordance with current guidance.

Mitigation measures will need to demonstrate how the proposal would make a positive contribution towards the aims of the Council’s Air Quality Action Plan.

Mitigation measures will be secured either through a negotiation on a scheme, or via the use of a planning condition and / or planning obligation depending on the scale and nature of the development and its associated impacts on air quality.

1.3 Scope

The scope of assessment has been defined on the basis of discussion held with the VoWHDC and includes:

- determination of baseline air quality within the Abingdon-on-Thames, Botley, and Marcham AQMAs, using council monitoring data;
- identification of potential future air quality within the Abingdon-on-Thames, Botley, and Marcham AQMAs; and
- identification of possible mitigation measures.

The three AQMA's were declared by the VoWHDC due to exceedances of the nitrogen dioxide (NO₂) annual mean Air Quality Objective (AQO) of 40 µg/m³ at locations of relevant exposure (such as residential properties, for example). As such this report has focused on this air pollutant.

This report has been completed in line with current UK policy (National Planning Policy Framework), guidance (Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM), and DEFRA LAQM.TG (16)) and local planning guidance from VoWHDC.

This work has been carried out with reference to previous work undertaken by RPS, who prepared an assessment relating to the Marcham AQMA (HEAR 04.5)². This Report builds upon this to encompass the additional AQMAs within the VoWHDC and possible mitigation to alleviate possible air quality impacts.

The LPP2 development sites to be included for consideration in this report are:

- Dalton Barracks (1200 dwellings);
- south-east of Marcham (90 dwellings);
- east of Kingston Bagpuize (600 dwellings);
- north of East Hanney (80 dwellings); and
- north-east of East Hanney (50 dwellings).

This report considers the LPP2 sites located within the Abingdon-Oxford Fringe Sub-Area that relates most closely with the three AQMAs also located within this sub-area at Abingdon, Botley and Marcham. This sub-area is also where the agreed quantum of unmet housing need for Oxford to be addressed within the Vale will be met.

As such, Harwell Campus and North-West Grove have been excluded from this report. For Harwell Campus, this is due to its geographical remoteness to the three AQMA's. The Harwell Campus development is close to the higher order settlement at Didcot, offering a wide range of facilities, and to a wide range of employment sites across the Science Vale area, including the Campus itself. The development at North-West Grove has been excluded as it is not expected to come forward until towards the end of the plan period when the proposed highway mitigation, including improvements to Frilford Junction and the provision of a Marcham By-pass are expected to have been delivered.

² RPS, 22 August 2018, Vale of White Horse District Local Plan 2031: Part 2 Evidence Base – Cumulative Impact of Planned Growth on Air Quality in Marcham.

In particular, this report addresses the Planning Inspector's specific questions, namely:

1. reference to the analysis on the Abingdon AQMA being based solely on comments from the Council's Environmental Health team, and
2. that the traffic distribution for the Dalton Barracks site, as set out in the RPS report relating to the Marcham AQMA was unclear.

1.4 Structure of Report

This report has been split into 4 sections

- Section 1 introduction
- Section 2 consideration of impacts and effects on air quality within the Marcham AQMA
- Section 3 consideration of impacts and effects on air quality within the Abingdon on Thames AQMA, and
- Section 4 consideration of impacts and effects on air quality within the Botley AQMA

2.0 MARCHAM AQMA

2.1 Background

An AQMA was declared by the VoWHDC in 2015 in Marcham due to exceedances of the nitrogen dioxide (NO₂) annual mean Air Quality Objective (AQO) at locations of relevant exposure (such as residential properties, for example) in close proximity to the A415.

The VoWHDC states in the 2018 Air Quality Annual Status Report³ that “the issues also relate to the very close proximity of houses to the busy A415. This road suffers congestion issues because it is not wide enough to allow two large vehicles to pass in opposite directions. There are regular exceedances of NO₂ objectives at properties near the pinch point.” This can be seen in Figure 2-1 below.



Figure 2-1
Map Showing the Marcham AQMA and Air Quality Monitoring Locations

2.2 Baseline Air Quality

2.2.1 Passive Diffusion Tube Monitoring

Passive diffusion tube monitoring is undertaken by VoWHDC as part of their duties under the Local Air Quality Management (LAQM). The diffusion tubes are located in areas which are deemed to require further assessment of NO₂ concentrations.

The diffusion tube monitoring locations within or adjacent to the Marcham AQMA are presented below in Table 2-1 and shown above on Figure 2-1. Exceedances of the annual mean Air Quality Objective (AQO) of are highlighted in **bold**.

³ Vale of White Horse District Council, June 2018, 2018 Air Quality Annual Status Report (ASR)

Table 2-1
Passive Diffusion Tube Monitoring Results

Monitoring Location		Located within AQMA (Y/N)	NGR (m)		2015 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) ^(A)	2016 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) ^(A)	2017 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) ^(A)
			X	Y			
S29	22 Frilford Road ^(B)	Y	445331	196602	21.7	25.3	-
S30 (S15)	24 Mill Road ^(C)	N	445522	196470	10.5	13.5	10.8
S31 (S16)	10 Packhorse Lane ^(B)	Y	445552	196639	47.7	53.1	42.7
S32 (S17)	4 Frilford Road ^(B)	Y	445456	196623	38.7	44.8	37.8
S33 (S18)	4 Packhorse Lane ^(B)	Y	445528	196628	29.6	33.2	25.9
S34 (S19)	13 Packhorse Lane ^(B)	Y	445571	196675	38.0	40.4	34.8
S35 (S20)	Rafters B&B ^(B)	Y	445875	196657	36.5	36.9	30.6

Notes:

(A) Reproduced from the VoWHDC 2018 air quality annual status report. Bias corrected.

(B) Roadside site defined as 'A site sampling typically within one to five metres of the kerb of a busy road (although distance can be up to 15 m from the kerb in some cases)'.

(C) Urban background sites defined as 'An urban location from sources and therefore broadly representative of city-wide background conditions, e.g. urban residential areas'.

As shown in Table 2-1, monitoring results from 2015 to 2017 exceed the annual mean AQO for NO₂ (40 $\mu\text{g}/\text{m}^3$) at one location S31 (10 Packhorse Lane) located within the AQMA on the tight bend in the road. Two other locations, S32 and S34, both exceed the annual mean AQO for NO₂ in 2016 only. All other monitoring locations comply with the annual mean AQO for NO₂.

A large reduction in concentrations has been witnessed between 2016 and 2017 at all locations with the AQMA with only one location in excess of the annual mean AQO for NO₂.

2.3 Future Air Quality

2.3.1 DEFRA Modelled Background and Projections

Background pollutant concentration data on a 1km x 1km spatial resolution is provided by the Department for Environment Food and Rural Affairs (DEFRA) through the UK Air Information Resource (AIR) website and is routinely used to support LAQM and Air Quality Assessments.

Mapped background concentrations of NO₂ based upon the 2015 base year DEFRA update⁴ have been downloaded for the grid square containing the Marcham AQMA.

Background pollutant concentrations for 2017 (most recent year of VoWHDC diffusion tube data) and 2020, 2025 and 2030 (future years in 5-year increments) are displayed in Table 2-2 mapped background concentrations are not forecast by DEFRA beyond 2030.

Table 2-2
Background Concentrations for the Site (Grid Square x445500, y196500)

Pollutant	Mapped Background Concentration (µg/m ³)			
	2017	2020	2025	2030
NO ₂	8.57	7.61	6.42	5.72

The DEFRA background maps above show annual mean concentrations of NO₂ are predicted to decrease over the time period of the VoWHDC Local Plan. The total reduction in background NO₂ between 2017 and 2030 is 2.85µg/m³.

2.3.2 Predicted Traffic Flows in the Marcham AQMA

The five LPP2 development sites for consideration within this report are outlined below in Table 2-3, with the associated total Annual Average Daily Traffic (AADT) flows and the percentage of predicted traffic flow through the Marcham AQMA.

The below AADT flows contained in Table 2-3 have been reproduced from the RPS technical note⁵. The distribution data for the RPS assessment was based on data either provided directly by the site promoters or VOWH. This represents the best available evidence at the current time, although more detailed assessments would clearly be undertaken at the application stage in accordance with Development Policy 26 and national guidance.

The traffic distribution data in Annual Average Daily Traffic (AADT) format for the Dalton Barracks site has been provided by Glanville's who are the Transport consultants acting for the site promoter, following consultation with Oxfordshire County Council. This data is consistent across the Transport Delivery Report (HEAR PC 03.4) and this Air Quality Report. The additional work undertaken, as set out in the Transport Delivery Report, and the consistency across the Transport and Air Quality Reports, in relation to traffic distribution for Dalton

⁴ Background mapping data for local authorities – <http://uk-air.defra.gov.uk/data/laqm-background-home>, accessed November 2018.

⁵ RPS, 22 August 2018, Vale of White Horse District Local Plan 2031: Part 2 Evidence Base – Cumulative Impact of Planned Growth on Air Quality in Marcham. LPP2 Hearing Document number HEAR04.5 - http://www.whitehorsedc.gov.uk/java/support/dynamic_serve.jsp?ID=971389434&CODE=FC26DFC742386894ACAD52DD0640A657

Barracks does address the Planning Inspector's specific question on this matter, particularly that the traffic distribution for Dalton Barracks referred to in the RPS Report was unclear.

Table 2-3
Predicted Daily Traffic Flows Through Marcham AQMA

Site	Total Estimated a.m. Peak hour	Total Estimated p.m. Peak hour	Total Traffic from Site	% Distribution Via Marcham AQMA	Total Traffic Through Marcham AQMA
South-east of Marcham From 2019/20	-	-	409	9	38
North of east Hanney From 2020/21	39	38	325	20	65
North-East of East Hanney From 2020/21	29	34	293	20	59
East of Kingston Bagpuize with Southmoor From 2024/25	316	302	2824	38	1074
Dalton Barracks From 2024/25	-	-	5,195	6	312
Total					1,548

*Data provided by Site Promoters or VOWH (for East Hanney sites, based on comparable application sites in East Hanney)

The table above shows a net increase from the five LPP2 development sites of 1,548 AADT within the Marcham AQMA. It has been assumed that all development trips are light duty vehicles (LDVs), i.e. cars due to the residential nature of each of the development sites.

Guidance⁶—provided by Environmental Protection UK (EPUK) Institute of Air Quality Management (IAQM) modelling standards and guidance, states that a detailed assessment of potential air quality impacts should be undertaken if the following criteria are met on any link affected by a proposed development:

- change in 24-hour LDV flows of:
 - more than 100 AADT within or adjacent to an AQMA; or
 - more than 500 AADT elsewhere.

Two of the LPP2 developments would meet the 100 AADT AQMA criteria, East of Kingston Bagpuize with Southmoor and Dalton Barracks. LDV trips from the other LPP2 developments are below the threshold and therefore no further detailed assessment is required for those sites.

The EPUK and IAQM Guidance for proposed Developments with AADT below these thresholds states, ‘*the impacts [on air quality from LDV trips] can be considered to have insignificant effects*’.

2.3.3 Further Analysis

The VoWHDC has already completed further analysis of the potential impacts and effects on air quality that cumulative growth proposed in the LPP2 will have on the Marcham AQMA. This further analysis was completed by RPS as a technical note⁷, this work factored the results of a dispersion model completed for south-east of Marcham by the additional trip generation from the 4 additional LPP2 developments.

The assessment of ‘South-east of Marcham’ was completed for the development opening year of 2022, however it is recognised that the allocations at ‘Dalton Barracks’ and ‘East of Kingston Bagpuize with Southmoor’ will not begin to be delivered until 2024/25 and will not be fully operational until 2031. As such, basing the analysis on the 2022 dispersion model is considered to overestimate potential impacts.

To account for the overestimation in using the dispersion model for the year 2022 RPS has completed an adjustment to account for expected reductions in vehicle emission over the plan period, ‘*due to the progressive introduction of improved vehicle technologies and increasingly stringent limits on emissions*’. The note uses DEFRA’s 2017 emissions factor toolkit to provide emission factors up to 2030.

Results determined by RPS following the above methodology indicate that with all five developments in operation, the predicted annual-mean NO₂ concentrations at receptors are below the NO₂ AQO of 40 µg m³ in 2030.

Therefore, the air quality impacts predicted by RPS, can be considered to be ‘negligible’, using the EPUK IAQM descriptors adopted for this assessment.

2.3.4 Conclusion

The analysis completed by RPS following the above methodology determined the following conclusion:

⁶ EPUK and IAQM, ‘Land-Use Planning and Development Control: Planning for Air Quality’, v1.2 2017.

⁷ RPS, 22 August 2018, Vale of White Horse District Local Plan 2031: Part 2 Evidence Base – Cumulative Impact of Planned Growth on Air Quality in Marcham. LPP2 Hearing Document number HEAR04.5 - http://www.whitehorsedc.gov.uk/java/support/dynamic_serve.jsp?ID=971389434&CODE=FC26DFC742386894ACAD52DD0640A657

“High-level analysis has been undertaken to determine the likely increases in annual-mean NO₂ concentrations and the likely annual-mean NO₂ concentrations within the Marcham AQMA, once all five developments are operational.

Taking into account the geographical extent of the impacts predicted in this study, the overall impact of the development on the surrounding area as a whole is considered to be ‘negligible’, using the descriptors adopted for this assessment.

Using professional judgement, the resulting cumulative air quality effect is considered to be ‘not significant’ overall.”

Therefore, the air quality impacts predicted by RPS, can be considered to be ‘negligible’, using the Environmental Protection UK (EPUK) Institute of Air Quality Management (IAQM) modelling standards and guidance descriptors adopted for this assessment. Further to this the monitoring data, DEFRA background maps and emissions factors are all in agreement on a trend of continued reduction.

The traffic distribution data for Dalton Barracks has been considered in detail and is reported separately within the Transport Delivery Report (HEAR PC 03.4). The data is consistent across the Air Quality Reports prepared by both RPS and SLR.

Notwithstanding the findings of the RPS and SLR work, potential air quality impacts will be considered in detail at planning application stage in accordance with Local Plan Part 2 Development Policy 26 and national guidance. This policy provides a comprehensive framework for considering air quality impacts. Whilst individual schemes, in specific years, may identify impacts through the more detailed air quality assessment and modelling to support planning applications, current evidence indicates that any such impacts can be mitigated.

It should also be noted that the future construction of a Marcham By-pass would fundamentally alter the current road network. This major change in the road network would avoid the need for vehicles to travel through Marcham, passing by the AQMA, and therefore lead to a reduction in emissions. The VoWHDC consider that the construction of a Marcham By-pass would be expected to fully address any potential impacts associated with the Marcham AQMA. The VoWHDC are seeking to prioritise the delivery of this road during the plan period and currently consider that there is a high degree of confidence this scheme will be delivered alongside the proposed developments at ‘Dalton Barracks’ and ‘East of Kingston Bagpuize with Southmoor’.

3.0 ABINGDON AQMA

3.1 Background

An AQMA was declared by the VoWHDC in 2006 in Abingdon due to exceedances of the NO₂ annual mean AQO at locations of relevant exposure (i.e. residential properties, for example) in close proximity to the town centre and locations of congestion.

The VoWHDC states in the 2018 Air Quality Annual Status Report that: *"In Abingdon, problems relate to congestion in the town centre and poor dispersion of pollutants where roads are narrow with tall buildings on either side (a "canyon" effect). Since the AQMA was declared there have been improvements to traffic management and a reduction in NO₂ levels."*

The extent of the Abingdon AQMA can be seen below in Figure 3-1.



Figure 3-1
Map Showing the Abingdon AQMA and Air Quality Monitoring Locations

3.2 Baseline Air Quality

3.2.1 Automatic Air Quality Monitoring

The VoWHDC undertake automatic monitoring at one site within the administrative area. The Masons, 39 Stert Street, Abingdon (Masons) monitor is situated at NGR: x449790, y197180. The Masons monitor is classified as a 'Roadside' monitor, defined as 'A site sampling typically within one to five metres of the kerb of a busy road (although distance can be up to 15 m from the kerb in some cases)'.

Table 3-1
NO₂ Monitoring Results: The Masons, 39 Stert Street, Abingdon

Year	Annual Mean Concentration (µg/m ³)	Number of Hours >200µg/m ³	Data Capture (%)
2015	28	0	-
2016	30.4	0	98.9
2017	25	0	99.1

Table 3-1 illustrates that during recent years both the annual mean NO₂ AQO of 40µg/m³ and the 1-hour mean AQO (18 1-hour mean concentrations in excess of 200µg/m³ are permitted) have been complied with at The Masons, 39 Stert Street, Abingdon.

3.2.2 Passive Diffusion Tube Monitoring

Passive diffusion tube monitoring is undertaken by VoWHDC as part of their commitment to the LAQM. The diffusion tubes are located in areas which are deemed to require further assessment of NO₂ concentrations.

The diffusion tube monitoring locations within or adjacent to the Abingdon AQMA are presented below in Table 3-2 and shown on Figure 3-1. Exceedances of the annual mean AQO are highlighted in **bold**.

Table 3-2
Passive Diffusion Tube Monitoring Results

Monitoring Location		Located within AQMA (Y/N)	NGR (m)		2015 Annual Mean Concentration (µg/m ³) ^(A)	2016 Annual Mean Concentration (µg/m ³) ^(A)	2017 Annual Mean Concentration (µg/m ³) ^(A)
			X	Y			
S11/S12/S13 (S01/02/03)	Co-location, ^(B)	Y	449849	197169	28.0	30.0	24.4
S14	Stert Street ^(B)	Y	449802	197132	33.4	36.4	-
S15 (S04)	High Street ^(B)	Y	449632	197062	30.6	34.6	29.5
S16 (S05)	Ock Street Baptist Church ^(B)	Y	449452	197047	24.1	30.6	26.0

Monitoring Location		Located	NGR (m)		2015 Annual	2016 Annual	2017 Annual
S17	Bath Street ^(B)	Y	449585	197273	27.8	28.9	-
S18 (S06)	Stratton Way ^(B)	Y	449697	197343	35.1	36.6	33.3
S19	Banbury Court ^(D)	Y	449779	197356	25.3	28.9	-
S20 (S07)	The Vineyard ^(B)	Y	449926	197439	32.0	34.2	27.5
S21 (S08)	Turner Road ^(D)	N	448869	196180	13.6	16.6	13.8
S22 (S09)	Drayton Road LP 7 ^(C)	N	448791	196725	20.8	28.8	23.8
S23 (S10)	Ock Street Drama Club ^(C)	N	448828	196966	28.2	31.5	27.6
S24	Oct Street Wine Shop ^(C)	N	448907	196940	27.3	30.0	-
S25 (S11)	Marcham Road LP 5 ^(C)	N	448738	196967	37.6	40.3	34.5
S27 (S12)	97 Ock Street LP 12 ^(C)	N	449225	196992	28.9	30.8	25.4
S28	Mayott House Ock Street LP 13 ^(C)	N	449208	119972	29.3	24.4	-

Notes:

(A) Reproduced from the VoWHDC 2018 air quality annual status report. Bias corrected.

(B) Kerbside site, defined as 'A site typically within one meter of the kerb of a busy road'.

(C) Roadside site, defined as 'A site sampling typically within one to five metres of the kerb of a busy road (although distance can be up to 15 m from the kerb in some cases)'.

(D) Urban background sites defined as 'An urban location from sources and therefore broadly representative of city-wide background conditions, e.g. urban residential areas'.

As indicated in Table 3-2, all monitoring results from 2015 to 2017 are below the annual mean AQO for NO₂ (40 µg/m³) with the exception of monitoring location S25 in 2016. Monitor S25 is not located within the AQMA as detailed below on Figure 3-2 and the most recent NO₂ annual mean concentration is below the annual mean AQO.

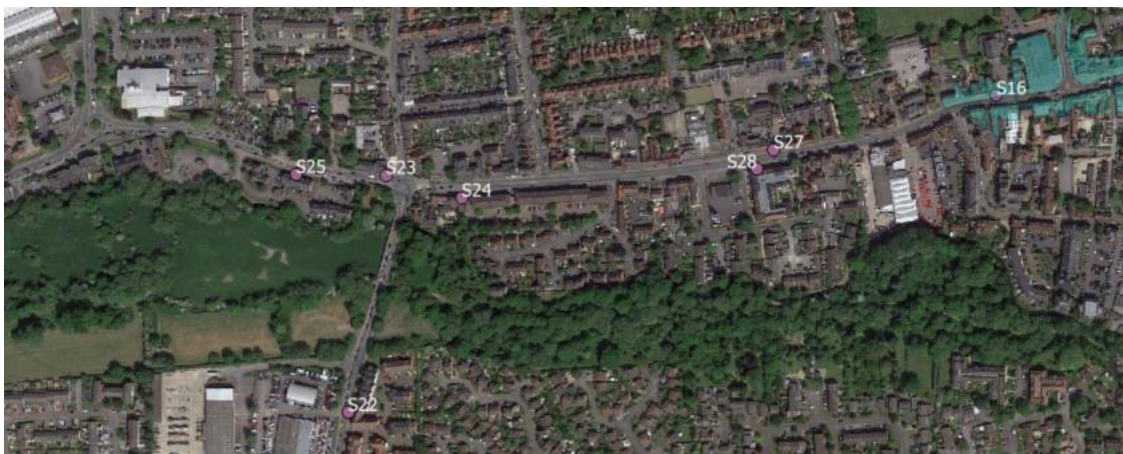


Figure 3-2
Further Air Quality Monitoring Locations Outside of Abingdon AQMA

3.3 Future Air Quality

3.3.1 DEFRA Modelled Background and Projections

Background pollutant concentration data on a 1km x 1km spatial resolution is provided by DEFRA through the UK Air Information Resource (AIR) website and is routinely used to support LAQM and Air Quality Assessments.

Mapped background concentrations of NO₂ based upon the 2015 base year DEFRA update⁸ have been downloaded for the grid square containing the Abingdon AQMA.

Background pollutant concentrations for 2017 (most recent year of VoWHDC diffusion tube data) and 2020, 2025 and 2030 (future years in 5-year increments) are displayed in Table 3-3. Mapped background concentrations are not forecast by DEFRA beyond 2030.

Table 3-3
Background Concentrations for the Site (Grid Square x449500, y197500)

Pollutant	Mapped Background Concentration (µg/m ³)			
	2017	2020	2025	2030
NO ₂	12.6	11.2	9.42	8.43

The DEFRA background maps above show annual mean concentrations of NO₂ are predicted to decrease over the time period of the VoWHDC Local Plan. The total reduction in background NO₂ between 2017 and 2030 is 4.17µg/m³.

3.3.2 Predicted Traffic Flows in the Abingdon AQMA

The five LPP2 development sites for consideration within this report are outlined below in Table 3-4, with the associated total daily traffic flows and the predicted traffic flow through the Abingdon AQMA.

⁸ Background mapping data for local authorities – <http://uk-air.defra.gov.uk/data/laqm-background-home>, accessed November 2018.

The below AADT flows contained in Table 3-4 have come from two different sources. For Dalton Barracks the AADT data has been provided by the transport consultant for the site, Glanville's. The same detailed level of information has not yet been prepared by the site promoters for the other developments, and as such the SLR transport team, on behalf of the VoWHDC, prepared a high level traffic model.

This high level traffic model considered the traffic generation data for each site in line with 2011 'Journey to Work' origin-destination census data, to determine likely distribution to the wider network and provide a forecast of the additional traffic which would route via the AQMA.

Table 3-4
Predicted Daily Traffic Flows Though Abingdon AQMA

Site	Data Source	Total Estimated a.m. Peak hour	Total Estimated p.m. Peak hour	Total Traffic Site	Daily from	% Distribution Via Abingdon AQMA	Total Daily Traffic Through Abingdon AQMA
South-east of Marcham From 2019/20	VoWHDC (SLR transport)	-	-	409		28	114
North of east Hanney From 2020/21	VoWHDC (SLR)	39	38	325		13	43
North-East of East Hanney From 2020/21	VoWHDC (SLR transport)	29	34	293		13	39
East of Kingston Bagpuize with Southmoor From 2024/25	VoWHDC (SLR transport)	316	302	2824		9	254
Dalton Barracks From 2024/25	Glanville Transport Consultant for the project	-	-	5195		13	675
Total							1125

The table above shows a net increase from the five LPP2 development sites of 1,125 AADT within the Abingdon AQMA.

This is the total vehicle addition to the Abingdon AQMA area and is not broken down to individual roads. As there are three main routes through the Abingdon AQMA, the traffic increase on any one of these individual routes, would clearly be less than the overall total.

This increase would also be gradual as each development is completed and occupied by residents during the plan period. Based on South-East of Marcham being completed in 2022 and the East of Kingston Bagpuize with Southmoor and Dalton Barracks developments not being fully operational until 2031 there would be a 9-year period where traffic would be generated from the LPP2 sites.

Guidance⁹ provided by EPUK and IAQM, states that a detailed assessment of potential air quality impacts should be undertaken if the following criteria are met on any link affected by a proposed development:

- change in 24-hour LDV flows of:
 - more than 100 AADT within or adjacent to an AQMA; or
 - more than 500 AADT elsewhere.

Three of the LPP2 Developments would meet the 100 AADT AQMA criteria and only one Dalton Barracks would meet the 500 AADT criteria. The other LPP2 developments LDV trips are below the threshold and therefore no further detailed assessment is required.

3.3.3 Further Analysis

The revocation of the Abingdon AQMA would mean that only the 500 AADT criteria would apply to Abingdon. On this basis, only the Dalton Barracks site would require further consideration, with all other LPP2 developments LDV trips below the threshold and therefore no further detailed assessment would be required at this level. However, as the total AADT flow identified for Dalton Barracks would in reality be split between the separate routes through Abingdon, it is extremely unlikely these roads within the Abingdon AQMA will experience above 500 AADT on a single route.

On this basis, where roads witness an impact of less than 500 AADT, in accordance with the EPUK and IAQM Guidance, *'the impacts [on air quality from LDV trips] can be considered to have insignificant effects'*.

Potential air quality impacts will be considered in detail at planning application stage in accordance with Local Plan Part 2 Development Policy 26 and national guidance. This policy provides a comprehensive framework for considering air quality impacts. If for individual schemes, in specific years, impacts were identified through the more detailed air quality assessment and modelling to support planning applications, this would be investigated in more detail at this stage. Current evidence indicates that the 500 AADT threshold is extremely unlikely to apply and as such any impacts would be considered to be insignificant.

It should also be noted that the future construction of the upgrade to the Lodge Hill A34 Interchange at Abingdon, which is now fully funded and expected to be completed before the end of 2021, i.e. prior to the commencement of the larger LPP2 sites. This junction upgrade is expected to improve traffic flows through Abingdon, as clearly there will be an increase in route options, thus helping to reduce the reliance on Marcham Interchange.

⁹ EPUK and IAQM, 'Land-Use Planning and Development Control: Planning for Air Quality', v1.2 2017.

In addition to the assessment described above, it is also the case that in recent years, there has been compliance with the annual mean AQO for NO₂ in Abingdon, which has been confirmed by the monitoring data, and as such VoWHDC are giving consideration to revoking the Abingdon AQMA. The VoWHDC Environmental Health Officer has confirmed the expectation that the AQMA will be reviewed.

Emissions of nitrogen oxides from vehicles in the UK are also expected to reduce over time, due to the progressive introduction of improved vehicle technologies and increasingly stringent limits on emissions and Defra's 2017 emission factor toolkit provides emission factors up to 2030. The change between 2017 and 2030 emissions show a reduction of 61 % that would further limit any impact on air quality.

The above analysis addresses the Planning Inspector's question that consideration of the Abingdon AQMA relates solely to comments from the VoWHDC Environmental Health Officer. Whilst the revocation of the Abingdon AQMA would reduce the need for further consideration, analysis confirms not only that the 500 AADT is unlikely to be exceeded for the LPP2 sites, but that planned mitigation, along with falling emissions, further reduce any risks associated to air quality in Abingdon.

3.3.4 Conclusion

A review of the VoWHDCs local air quality monitoring data to assess the existing concentrations within the Abingdon AQMA, showed compliance with the annual mean AQO for NO₂. As such the AQMA in Abingdon is likely to be revoked prior to the developments within LPP2. Further to this the monitoring data, DEFRA background maps and emissions factors are all in agreement on a trend of continued reduction.

Only the Dalton Barracks site exceeds the 500 AADT criteria and so may require further consideration. However, the total AADT flow from Dalton Barracks would, in reality, be split between individual roads and on this basis, it is unlikely that any single road within the Abingdon AQMA would experience an additional 675 AADT with most being below the threshold.

Therefore, in accordance with the EPUK and IAQM Guidance, *'the impacts [on air quality from LDV trips] can be considered to have insignificant effects'*.

Nonetheless, air quality would also be considered in detail at the planning application stage in accordance with Development Policy 27 and national guidance.

4.0 BOTLEY AQMA

4.1 Background

An AQMA was declared by the VoWHDC in 2008 in Botley due to exceedances of the NO₂ annual mean AQO at locations of relevant exposure (i.e. residential properties, for example) in close proximity to the A34.

The VoWHDC states in the 2018 Air Quality Annual Status Report that: *“In Botley, the issues relate to the proximity of houses to a heavily trafficked primary route (the A34) which also suffers congestion issues, carries a high proportion of HGVs, and operates at above its design capacity. There are regular exceedances of the NO₂ annual objective at residential property close to the southbound carriageway.”*

The extent of the Botley AQMA can be seen below in Figure 4-1.



Figure 4-1
Map Showing the Botley AQMA and Air Quality Monitoring Locations

4.2 Baseline Air Quality

4.2.1 Passive Diffusion Tube Monitoring

Passive diffusion tube monitoring is undertaken by VoWHDC as part of their duties under LAQM. The diffusion tubes are located in areas which are deemed to require further assessment of NO₂ concentrations.

The diffusion tube monitoring locations within or adjacent to the Botley AQMA are presented below in Table 4-1 and shown on Figure 4-1. Exceedances of the annual mean AQO are highlighted in **bold**.

Table 4-1
Passive Diffusion Tube Monitoring Results

Monitoring Location		Located within AQMA (Y/N)	NGR (m)		2015 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) ^(A)	2016 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) ^(A)	2017 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) ^(A)
			X	Y			
S2	Southern Bypass ^(B)	Y	449108	205679	28.2	30.3	-
S3 (S21)	Stanley Close ^(B)	Y	448913	205813	48	53	46
S4 (S22)	Westminster Way ^(B)	Y	448866	205807	32	39	32

Notes:

(A) Reproduced from the VoWHDC 2018 air quality annual status report. Bias corrected.

(B) Roadside site, defined as 'A site sampling typically within one to five metres of the kerb of a busy road (although distance can be up to 15 m from the kerb in some cases)'.

As shown in Table 4-1, monitoring results from 2015 to 2017 exceed the annual mean AQO for NO₂ at one location S3 (1 Stanley Close) located in close proximity to the A34. All other monitoring locations comply with the annual mean AQO for NO₂.

A large reduction in concentrations has been witnessed between 2016 and 2017 at all locations with the AQMA with only one location in excess of the annual mean AQO for NO₂.

4.3 Future Air Quality

4.3.1 DEFRA Modelled Background and Projections

Background pollutant concentration data on a 1km x 1km spatial resolution is provided by DEFRA through the UK Air Information Resource (AIR) website and is routinely used to support LAQM and Air Quality Assessments.

Mapped background concentrations of NO₂ based upon the 2015 base year DEFRA update¹⁰ have been downloaded for the grid square containing the Botley AQMA.

Background pollutant concentrations for 2017 (most recent year of VoWHDC diffusion tube data) and 2020, 2025 and 2030 (future years in 5-year increments) are displayed in Table 4-2. Mapped background concentrations are not forecast by DEFRA beyond 2030.

¹⁰ Background mapping data for local authorities – <http://uk-air.defra.gov.uk/data/laqm-background-home>, accessed November 2018.

Table 4-2
Background Concentrations for the Site (Grid Square x448500, y205500)

Pollutant	Mapped Background Concentration ($\mu\text{g}/\text{m}^3$)			
	2017	2020	2025	2030
NO ₂	11.7	10.2	8.53	7.63

The DEFRA background maps above show annual mean concentrations of NO₂ are predicted to decrease over the time period of the VoWHDC Local Plan. The total reduction in background NO₂ between 2017 and 2030 is 4.07 $\mu\text{g}/\text{m}^3$.

4.3.2 Predicted Traffic Flows in the Botley AQMA

The five LPP2 development sites for consideration within this report are outlined below in Table 4-3 with the associated total daily traffic flows and the predicted traffic flow through the Botley AQMA.

The AADT flows contained in Table 4-3 has come from two different sources. For Dalton Barracks the AADT data has been provided by the transport consultant for the site, Glanville's. The same level of information has not been completed by the site promoters for the other development sites, as this level of detail would not typically be expected prior to the planning application stage, and as such the SLR transport team, on behalf of the VoWHDC, prepared a high level traffic model.

This high level traffic model considered the traffic generation data for each site in line with 2011 'Journey to Work' origin-destination census data (and other census data where necessary) to determine likely distribution to the wider network to provide a forecast of the additional traffic which would route via the AQMA areas.

Table 4-3
Predicted Daily Traffic Flows Through Botley AQMA

Site	Data Source	Total Estimated a.m. Peak hour	Total Estimated p.m. Peak hour	Total Traffic Site	Daily from Via Botley AQMA	Total Traffic Through Botley AQMA
South-east of Marcham From 2019/20	VoWHDC ((SLR transport)	-	-	409	19	78
North of east Hanney From 2020/21	VoWHDC (SLR transport)	39	38	325	23	74
North-East of East Hanney From 2020/21	VoWHDC (SLR transport)	29	34	293	23	67

East of Kingston Bagpuize with Southmoor From 2024/25	VoWHDC (SLR transport)	316	302	2824	5	127
Dalton Barracks From 2024/25	Glanville Transport Consultant for the project	-	-	5195	5	260
Total						606

The table above shows a net increase from the five LPP2 development sites of 606 AADT, within the Botley AQMA .

This increase will be gradual as each development is completed and occupied by residents. Based on South-East of Marcham being completed in 2022 and the East of Kingston Bagpuize with Southmoor and Dalton Barracks developments not being fully operational until 2031 there would be a 9-year period.

Guidance¹¹ provided by EPUK and IAQM, states that a detailed assessment of potential air quality impacts should be undertaken if the following criteria are met on any link affected by a proposed development:

- change in 24-hour LDV flows of:
 - more than 100 AADT within or adjacent to an AQMA; or
 - more than 500 AADT elsewhere.

Two of the LPP2 Developments would exceed the 100 AADT AQMA criteria, Dalton Barracks and East of Kingston Bagpuize with Southmoor. The other LPP2 developments LDV trips are below the 100 AADT threshold and therefore no further detailed assessment is required for these developments.

In accordance with the EPUK and IAQM Guidance, for any proposed developments below these thresholds it can be determined that, *'the impacts [on air quality from LDV trips] can be considered to have insignificant effects'*.

The Design Manual for Roads and Bridges (DMRB) (207/07) may be more appropriate for consideration on the A34 as a Major A road under Highways England control. The DMRB considers the following criterion to determine 'affected roads' which have the potential to impact upon ambient air quality at surrounding receptors:

- road alignment will change by 5m or more;
- daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more;
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more;

¹¹ EPUK and IAQM, 'Land-Use Planning and Development Control: Planning for Air Quality', v1.2 2017.

- daily average speed will change by 10km/hour or more; or
- peak hour speed will change by 20km/hour or more.

In accordance with the DMRB Guidance for any proposed developments below these thresholds it can be determined that, *'the impact of the scheme can be considered to be neutral in terms of local air quality and no further work is required'*.

4.3.3 Further Analysis

In recent years concentrations have shown a reduction in annual mean AQO for NO₂ in the Botley AQMA.

This is likely to continue as emissions of nitrogen oxides from vehicles in the UK are expected to reduce over time, due to the progressive introduction of improved vehicle technologies and increasingly stringent limits on emissions and Defra's 2017 emission factor toolkit provides emission factors up to 2030. The change between 2017 and 2030 emissions show a reduction of 60% this would limit any impact on air quality of future increases in vehicle numbers.

The current estimate from the Department for Transport for existing Traffic flows on the A34 through Botley is 69,695 AADT for all motor vehicles. The total additional AADT from LPP2 developments of 606 AADT represents less than 1% of the existing traffic flow on the A34.

With regard to the DMRB criteria, the predicted increase in traffic on the A34 road link is below the defined threshold (1,000 AADT combined LDV) for an 'affected road'. Therefore, in accordance with the DMRB Guidance, *'the impact of the scheme can be considered to be neutral in terms of local air quality and no further work is required'*.

4.3.4 Conclusion

Within the Botley AQMA in recent year concentrations have shown a reduction in annual mean AQO for NO₂. Further to this the DEFRA background maps and emissions factors are all in agreement on a trend of continued reduction.

On the A34 through Botley the total addition from LPP2 developments represents less than 1% of the existing traffic flow.

With regard to the DMRB criteria, the predicted increase in traffic on the A34 road link is below the defined threshold (1,000 AADT combined LDV HDV) for an 'affected road'. Therefore, in accordance with the DMRB Guidance, *'the impact of the scheme can be considered to be neutral in terms of local air quality and no further work is required'*.

In addition, potential air quality impacts will be considered in detail at planning application stage in accordance with Local Plan Part 2 Development Policy 26 and national guidance. This policy provides a comprehensive framework for considering air quality impacts.

As the A34 is part of the national strategic network and mitigation is a national consideration, the future delivery of the Oxford to Cambridge Expressway, expected to be delivered before end of plan period, and connect the A34 corridor close to Abingdon, to the M40 to the east of Oxford and to Cambridge, is expected to have a positive impact on the A34 corridor through Botley. Given the strategic level of this route at a national level, it is clearly beyond the control of VoWHDC.

EUROPEAN OFFICES

United Kingdom

AYLESBURY

T: +44 (0)1844 337380

BELFAST

T: +44 (0)28 9073 2493

BRADFORD-ON-AVON

T: +44 (0)1225 309400

BRISTOL

T: +44 (0)117 906 4280

CAMBRIDGE

T: + 44 (0)1223 813805

CARDIFF

T: +44 (0)29 2049 1010

CHELMSFORD

T: +44 (0)1245 392170

EDINBURGH

T: +44 (0)131 335 6830

EXETER

T: + 44 (0)1392 490152

GLASGOW

T: +44 (0)141 353 5037

GUILDFORD

T: +44 (0)1483 889800

LEEDS

T: +44 (0)113 258 0650

LONDON

T: +44 (0)203 691 5810

MAIDSTONE

T: +44 (0)1622 609242

MANCHESTER

T: +44 (0)161 872 7564

NEWCASTLE UPON TYNE

T: +44 (0)191 261 1966

NOTTINGHAM

T: +44 (0)115 964 7280

SHEFFIELD

T: +44 (0)114 245 5153

SHREWSBURY

T: +44 (0)1743 23 9250

STAFFORD

T: +44 (0)1785 241755

STIRLING

T: +44 (0)1786 239900

WORCESTER

T: +44 (0)1905 751310

Ireland

DUBLIN

T: + 353 (0)1 296 4667

France

GRENOBLE

T: +33 (0)4 76 70 93 41