Broxbourne Borough Council

Annual Status Report 2021

Bureau Veritas

June 2021

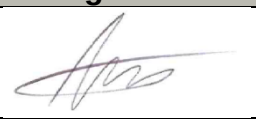
Move Forward with Confidence

Document Control Sheet

Identification	
Client	Broxbourne Borough Council
Document Title	2021 Annual Status Report
Bureau Veritas Ref No.	10882904/UK/v3.0

Contact Details		
Company Name	Bureau Veritas UK Limited	Broxbourne Borough Council
Contact Name	Hannah Smith	Craig Gent
Position	Principal Consultant	Environmental Health
Address	66 Prescot Street London E1 8HG	Borough Offices, Bishops' College, Churchgate, Cheshunt, Waltham Cross, Hertfordshire, EN8 9XB

Configuration				
Version	**Date**	**Author**	**Reason for Issue/Summary of Changes**	**Status**
V1.0	25/06/2021	A Smith	Draft for comment	Draft
V2.0	28/06/2021	A Smith	Updated Table 2.2	Final
V3.0	04/11/2021	A Smith	Previous years' (2016 – 2019) annual mean NO_2 concentrations mismatched for sites BB39, BB40, BB41, BB42, BB43, BB44, BB45 and BB46	Final

	Name	**Job Title**	**Signature**
Prepared By	A Smith	Graduate Consultant	
Approved By	H Smith	Principal Consultant	

2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June, 2021

Information	Broxbourne Borough Council Details
Local Authority Officer	Craig Gent
Department	Environmental Health
Address	Borough Offices, Bishops' College, Churchgate, Cheshunt, Waltham Cross, Hertfordshire, EN8 9XB
Telephone	01992 785 555
E-mail	envhealth@broxbourne.gov.uk
Report Reference Number	10882904/UK/v3.0
Date	October 2021

Executive Summary: Air Quality in Our Area

Air Quality in Broxbourne Borough Council

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

During 2020, only two monitoring locations reported an annual mean NO_2 concentration exceeding the AQS objective of 40µg/m^3. These were at BB05 (45.5µg/m^3), located within AQMA 1, and BB28 (43.2µg/m^3), located in AQMA 6. Alongside this, BB51 reported a concentration within 10% of the AQS objective (39.4µg/m^3). Despite this, none of these locations are at relevant exposure, therefore fall-off with distance calculations are required to predict the annual mean NO_2 concentration at the point of nearest relevant exposure. From doing this, neither of these sites were shown to be exceeding at the nearest relevant exposure – 35.5µg/m^3 (BB05), 32.2µg/m^3 (BB28), and 34.1µg/m^3 (BB51).

Where monitoring data is available for more than one-year, annual mean NO_2 concentrations have largely shown a decrease compared to what was reported in previous years. In particular, the decrease seen in annual mean NO_2 concentrations in 2020 can be largely attributed to the impacts of the COVID-19 pandemic. However, even without the inclusion of the 2020 data, monitoring across the district suggests that annual mean NO_2 concentrations have been gradually decreasing, or largely remaining stable. Although

[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

[3] Defra. Air quality appraisal: damage cost guidance, July 2020

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

COVID-19 has led to a reduction of annual mean NO_2 concentrations across much of the borough, previous years had a lesser decreasing trend. Therefore, no recommendations to revoke any AQMAs are provided as 2020 is believed to have been an atypical year and it is important to see whether the impacts of COVID-19 on air quality are long- or short-term.

No sites reported a concentration in excess of 60µg/m^3, and it is therefore believed that there was no risk of breaching the 1-hour NO_2 AQS objective in 2020.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Broxbourne Borough Council has commissioned Bureau Veritas in order to develop an Air Quality Action Plan (AQAP) for the existing Air Quality Management Areas (AQMA). This had previously been postponed due to the Council's attention focusing on the development and progression of the Local NO_2 Plan. Broxbourne Borough Council intends to have the AQAP progressed with a draft available for public consultation in late 2021/early 2022.

During 2020, Broxbourne Borough Council successfully revoked AQMA 7 following compliance being achieved for 5 years. In addition to this, the Broxbourne Local Plan 2018-2033 has been formally adopted, which includes "Policy EQ2: Air Quality", whilst also fully rolling out the Air Quality text alert system. There has also been the development

[5] Defra. Clean Air Strategy, 2019

[6] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

of a service level agreement between Broxbourne Borough Council and Yorkshire Energy Services for determining resident's eligibility for Grants for Insulation and Heating

Conclusions and Priorities

The priorities for Broxbourne Borough Council in addressing and managing air quality within Broxbourne in the coming year includes:

- Broxbourne Borough Council's anti-idling campaign, including involvement from 2 schools in Hoddesdon and Cheshunt;
- Installation of 15 EV charging points across the borough;
- Replacement of the Council's fleet of pool cars with fully electric vehicles;
- Progression of the Air Quality Planning Guidance Document; and
- Development of the Air Quality Action Plan.

Local Engagement and How to get Involved

Informing people about local air quality, in particular when pollution is elevated can help to protect those members of the community who are most sensitive to the health impacts associated with air pollution. Increasing public understanding of the sources and effects of air pollution can also motivate lifestyle changes which can help improve air quality, for example promoting sustainable travel as method of reducing air pollution.

Real-time monitoring data throughout Hertfordshire and Bedfordshire can be accessed via the Herts+Beds Air Quality Network. Free subscription to the Hertfordshire and Bedforshire Air Pollution Alert System can also be carried out on the website, whereby alert messages will be sent to registered users if the air pollution in their area is forecast or measured to be moderate, high, or very high (based upon the UK's Air Quality Banding System).

Further information on Air Quality within Broxbourne, but also the ability to submit a nuisance report, is available on the Broxbourne Borough Council website. Broxbourne Borough Council also operates a Twitter account, whereby live updates are frequently posted.

There are numerous simple measures which the public may adopt in order to improve the air quality around them. Such measures include:

- Making short trips and journeys on foot or by bike instead of by car, or using public transport;
- Car sharing with colleagues, or with other parents on the school run;
- Avoid Idling whilst your vehicle is stationary;
- Purchasing low-emission electric and/or hybrid vehicles, with government funding and grants available;
- Upgrading boilers to newest and most efficient gas condensing boilers with lowest NOx (and carbon) emissions;
- Conserving fuel efficiency of vehicles through ensuring correct tyre pressure is maintained;
- Ensuring your home is sufficiently insulated; and
- Installing sources of renewable energy such as solar panel electricity systems, also known as solar photovoltaics or wind turbines.

Table of Contents

Executive Summary: Air Quality in Our Area i

Air Quality in Broxbourne Borough Council i

Actions to Improve Air Quality ii

Conclusions and Priorities iii

Local Engagement and How to get Involved iii

1 Local Air Quality Management 1

2 Actions to Improve Air Quality 2

2.1 Air Quality Management Areas 2

2.2 Progress and Impact of Measures to address Air Quality in Broxbourne Borough Council 5

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations 10

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance 12

3.1 Summary of Monitoring Undertaken 12

3.1.1 Automatic Monitoring Sites 12

3.1.2 Non-Automatic Monitoring Sites 12

3.2 Individual Pollutants 13

3.2.1 Nitrogen Dioxide (NO_2) 13

Appendix A: Monitoring Results 16

Appendix B: Full Monthly Diffusion Tube Results for 2020 26

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC 28

New or Changed Sources Identified Within Broxbourne Borough Council During 2020 28

Additional Air Quality Works Undertaken by Broxbourne Borough Council During 2020 28

QA/QC of Diffusion Tube Monitoring 28

Diffusion Tube Annualisation 29

Diffusion Tube Bias Adjustment Factors 29

NO_2 Fall-off with Distance from the Road 30

Appendix D: Maps of Monitoring Locations and AQMAs 33

Appendix E: Summary of Air Quality Objectives in England 43

Appendix F: Impact of COVID-19 upon LAQM 44

Impacts of COVID-19 on Air Quality within Broxbourne Borough Council 45

Opportunities Presented by COVID-19 upon LAQM within Broxbourne Borough Council 45

Challenges and Constraints Imposed by COVID-19 upon LAQM within Broxbourne Borough Council 46

Glossary of Terms 48

References 49

Figures

Figure A.1 – Trends in Annual Mean NO_2 Concentrations in AQMAs 1, 4 and 5 23
Figure A.2 – Trends in Annual Mean NO_2 Concentrations in AQMA 6 24
Figure A.3 – Trends in Annual Mean NO_2 Concentrations Outside any AQMA 25
Figure D.1 – Map of Non-Automatic Monitoring Sites 33
Figure D.2 – Map of Non-Automatic Monitoring Sites BB19 and BB20 34
Figure D.3 – Map of Non-Automatic Monitoring Site BB25 35
Figure D.4 – Map of Non-Automatic Monitoring Sites in Broxbourne 36
Figure D.5 – Map of Non-Automatic Monitoring Sites in North Cheshunt 37
Figure D.6 – Map of Non-Automatic Monitoring Sites in South Cheshunt 38
Figure D.7 – Map of Non-Automatic Monitoring Sites in Hoddesdon 39
Figure D.8 – Map of Non-Automatic Monitoring Sites in Rye Park 40
Figure D.9 – Map of Non-Automatic Monitoring Sites in Waltham Cross 41
Figure D.10 – Map of Non-Automatic Monitoring Sites in Wormley 42

Tables

Table 2.1 – Declared Air Quality Management Areas 3
Table 2.2 – Progress on Measures to Improve Air Quality 8
Table 3.1 – Details of New and Removed Monitoring Locations in 2020 12
Table A.1 – Details of Non-Automatic Monitoring Sites 16
Table A.2 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring ($\mu g/m^3$) 20
Table B.1 – NO_2 2020 Diffusion Tube Results ($\mu g/m^3$) 26
Table C.1 – Bias Adjustment Factor 30
Table C.2 – Annualisation Summary (concentrations presented in $\mu g/m^3$) 31
Table C.3 – NO_2 Fall off With Distance Calculations (concentrations presented in $\mu g/m^3$) 32
Table E.1 – Air Quality Objectives in England 43
Table F.1 – Impact Matrix 47

1 Local Air Quality Management

This report provides an overview of air quality in Broxbourne Borough Council during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Broxbourne Borough Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Broxbourne Borough Council can be found in Table 2.1. The table presents a description of the 4 AQMAs that are currently designated within Broxbourne Borough Council. Appendix D: Maps of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. Information on the AQMAs within Broxbourne Borough Council can also be found on the UK-AIR website. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean; and
- NO_2 1-hour mean.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA 1 Arlington Crescent to Abbey Road	Declared 04/02/2004 Amended 10/03/2016	NO2 Annual Mean	Within a residential Cul-de- sac adjacent to the M25. The AQMA was further extended in March 2016 to include residential properties along Lodge Crescent, Abbey Rd and High Street.	YES	63µg/m^3	45.4µg/m^3	The Borough of Broxbourne's Single Air Quality Action Plan	N/A
AQMA 4 Eleanor Cross Road/Monarchs Way	Declared 10/03/2016	NO2 Annual Mean	An area encompassing residential properties on Abbey Rd, King's Rd and Queen's Rd and including the Monarch's Way and Eleanor Cross Rd roundabout.	NO	78µg/m^3	39.4µg/m^3	The Borough of Broxbourne's Single Air Quality Action Plan	N/A
AQMA 5 Monarchs Way/Winston Churchill Way	Declared 10/03/2016	NO2 Annual Mean	An area encompassing residential properties on Eleanor Rd, High Street, Sturlas Way and including the Monarch's Way and Winston Churchill Way roundabout.	NO	58µg/m^3	32.6µg/m^3	The Borough of Broxbourne's Single Air Quality Action Plan	N/A
AQMA 6 Great Cambridge Road (A10) & College Road	Declared 05/05/2017	NO2 1 Hour Mean	Encompassing dozens of residential properties and a school along the (A10) and College Rd, from Theobalds Lane junction up to the Brookfield	NO	Exceedances of the 60 µg/m3 Hourly Mean and the 40 µg/m3 Annual Mean	43.2µg/m^3	The Borough of Broxbourne's Single Air Quality Action Plan	N/A

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
			Centre (B156 Flyover and B156/A10 Slip Rd.					

☒ **Broxbourne Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date. The revocation order for AQMA 7 came into effect in December 2020. This has been submitted to the LAQM Portal Admin and is waiting to be reflected on UK-Air.**

☒ **Broxbourne Borough Council confirm that all current AQAPs have been submitted to Defra. Currently there is no AQAP, however this is being drafted.**

2.2 Progress and Impact of Measures to address Air Quality in Broxbourne Borough Council

Defra's appraisal of last year's ASR concluded that "report is well structured, detailed, and provides the information specified in the Guidance". Additional comments made are as follows:

1. *"The Council have provided a thorough report which contains the required content.*
2. *The Council intend to apply for revocation of AQMA 7 during 2020. The Council demonstrate continued compliance with the annual mean objective for NO_2 since 2015 and therefore this action is supported.*
3. *Exceedances of the annual mean objective for NO_2 persist in two of the council's AQMAs. Across AQMAs, 6 exceedances were recorded during 2019. Following distance-correction for relevant exposure, two exceedances persisted: BB05 (AQMA1) and BB28 (AQMA6).*
4. *QA/QC was detailed, with evidence provided for all procedures applied. Annualisation was required at one site (BB29). This has been carried out in accordance with the method prescribed in TG16 and supporting calculations have been provided. It would be useful if the Council could show full workings, including details of the monthly means for the automatic monitoring sites used to calculate the annualisation factor, for completeness.*
5. *The report indicates that current and future AQAP measures implemented by Broxbourne Borough Council may help to address $PM_{2.5}$ emissions, however discussion is limited. Furthermore, the report mentions but does not contain links to the Public Health Outcomes Frameworks. The Council are encouraged to include this in future reports, in addition to a discussion of historical trends, a comparison between Broxbourne Borough and England as a whole, and a comparison to neighbouring authorities. For further guidance, please refer to LAQM Technical Guidance TG16.*
6. *Limited progress on AQAP measures appears to have been made during 2019, however it is noted that the Council are currently developing a consolidated new AQAP for all AQMAs. It is evident that much of the Council's attention during 2019 was focussed on the targeted feasibility study and associated submission of an outline business case. Feedback following submission of the OBC requires that the council "begin to consider alternative non-charging measures that can bring forward*

compliance in the shortest possible time (without the type of unintended consequences discussed above) and submit revised proposals including timeline and expected costs by 1 July 2020 at the latest, with a view to delivering a revised Outline Business Case by 31 October 2020." Therefore, the Council have stated that they anticipate the further development of the AQAP will be postponed until 2021.

7. *The report should ideally contain one set of fully labelled maps showing monitoring locations and AQMA boundaries. The monitoring locations shown on the maps provided within Appendix D of the ASR are not labelled, and do not show AQMA boundaries. Whilst the site IDs are stated within each figure caption, the inclusion of these on the map itself would be preferred. The maps presented within section 2 of the ASR are labelled with AQMA boundaries shown, which is appropriate. However, these should ideally be presented within the appendix. It is recommended that the Council update their monitoring location maps to clearly demonstrate the extent monitoring network, both within and outside of their AQMAs. In future, one set of maps should be provided, which should be presented within Appendix D.*
8. *Trends are discussed and a robust comparison with air quality objectives is provided, however a graphical representation of the trends would be useful for visualising longer-term trends. This was raised following last year's appraisal, and therefore the inclusion of a trend graph in the Council's 2021 ASR would be welcomed, and strongly encouraged."*

The order to revoke AQMA 7 came into effect on December 2020 following compliance of the annual mean NO_2 AQS objective being achieved since 2015.

Broxbourne Borough Council will ensure that calculations for annualisation and any relevant information is included, where necessary. Additionally, the Council will ensure to include greater detail in relation to reducing $PM_{2.5}$ emissions and its impact on public health.

The development of the AQAP continues to have been postponed throughout 2020 whilst the Council has focused on the development and progression of the Local NO_2 Plan. Bureau Veritas have been commissioned to assist with the development of the AQAP following their extensive work with the Local NO_2 Plan and Targeted Feasibility Study. It is therefore expected that the AQAP will be progressed in 2021, with a draft being ready towards the end of the year/start of 2022.

Clearer figures of monitoring locations and the existing AQMA boundaries will be provided within this report. Furthermore, trend graphs will also be provided to assist with the visualisation of long-term trends.

Broxbourne Borough Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 21 measures are included within Table 2.2, with the type of measure and the progress Broxbourne Borough Council have made during the reporting year of 2020 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

Key completed measures are:

- Full roll out of the Air Quality text alert system;
- Revoking AQMA 7;
- Development of a service level agreement between Broxbourne Borough Council and Yorkshire Energy Services for determining resident's eligibility for Grants for Insulation and Heating; and
- Adoption of the Broxbourne Local Plan 2018 - 2033 which includes "Policy EQ2: Air Quality".

Broxbourne Borough Council expects the following measures to be completed over the course of the next reporting year:

- Broxbourne Borough Council's anti-idling campaign, including involvement from 2 schools in Hoddesdon and Cheshunt;
- Installation of 15 EV charging points across the borough;
- Replacement of the Council's fleet of pool cars with fully electric vehicles;
- Progression of the Air Quality Planning Guidance Document; and
- Development of the Air Quality Action Plan.

Broxbourne Borough Council's priorities for the coming year are largely to work alongside Bureau Veritas in order to get the draft AQAP published and begin public consultation, whilst progressing the other measures detailed in order to bring them to completion.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Disseminate up to date information about air quality.	Public Information	Via the Internet	-	-	Borough of Broxbourne	-	NO	Funded	-	Updated annually	N.A.	Number of visits to Broxbourne's air quality webpages and email and telephone queries.	Results of the No2 Diffusion tube network are updated annually on the air quality England website.	N.A.
2	Air Quality Action Plan	Other	Other	2017	2021	Borough of Broxbourne	-	NO	Funded	-	Planning	Reduced nitrogen dioxide	Updated Air Quality Action Plan	The single AQAP which was being developed further to the declarations of AQMAs 6 & 7 in May 2017, was postponed in 2018 following two Ministerial Directions which required the Council to develop a Targeted Feasibility Study and a Local Plan for Air Quality.	N.A.
3	Draft Air Quality Planning Guidance Document (SPD) (to support the Local Plan)	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2017	-	Borough of Broxbourne	-	NO	Funded	-	Planning	Reduced emissions of nitrogen dioxide	Updated Planning Guidance	Ongoing	The draft SPD was postponed in 2018 following the direction of time and resources towards the development of the Local Plan (Air Quality). The review of the necessity for a draft SPD was postponed in 2020 due to the additional demands upon service created in the wake of the Covid 19 Pandemic.
4	Replacement of Petrol/Diesel Pool Cars with EV	Promoting Low Emission Transport	Other	2021	2024	Local Authority	The Borough of Broxbourne	NO	Funded	£10k - 50k	Implementation	Reduced vehicle emissions	Number of Bookings made	Implementation on-going	N.A.
5	Installation of EV Car Charging Points within Council car parks	Transport Planning and Infrastructure	Other	2021	2021	Local Authority & Office for Low Emission Vehicles (OLEV)	Office for Low Emission Vehicles (OLEV)	NO	Funded	£50k - £100k	Implementation	Reduced vehicle emissions	Installation of three Charging Points at five locations including the Council offices, Waltham Cross High Street and Eleanor Cross Road in Waltham Cross, Newnham Parade and Windmill Lane in Cheshunt	Implementation on-going	Logistical & Engineering challenges
6	Development of a Service Level Agreement between the Borough of Broxbourne and Yorkshire Energy Services CIC T/A YES Energy Solutions in determining resident's eligibility for Grants for Insulation and Heating	Promoting Low Emission Plant	Other Policy	2020	2020	Borough of Broxbourne and YES Energy Solutions	Government's Energy Company Obligations (ECO) scheme.	NO	Funded	-	Implementation	Reduced emissions of nitrogen dioxide	Reduced nitrogen dioxide	Ongoing	N.A.
7	Anti-Idling Campaign	Other	Other	2020	2022	Local Authority & Local Schools	The Borough of Broxbourne	NO	Funded	< £10k	Aborted	Reduced vehicle emissions	Reduced nitrogen dioxide	Ongoing – confirmed involvement with a	The Borough of Broxbourne's Anti-Idling Campaign

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														school within Hoddesdon.	was postponed in 2020 and in the first half of 2021 due to the additional demands upon service created in the wake of the Covid 19 Pandemic. The Council anticipates a recommencement of the campaign in late 2021. Intended to involve 2 schools within Hoddesdon and Cheshunt, main focus is to persuade parents not to idle.

Notes:

Completed measures have been omitted from this table, information on these can be found in previous annual reports

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

$PM_{2.5}$ can penetrate deep into the lungs, irritate and corrode the alveolar wall, and consequently impair lung function. It is believed there may also be a relationship between exposure to $PM_{2.5}$ and the impact of respiratory viruses, such as COVID-19.

Currently there is no monitoring of $PM_{2.5}$ or PM_{10} completed within Broxbourne Borough Council, therefore no concentration values can be reported or estimated using the method as described in Box 7.7 of LAQM.TG(16), which provides a method for estimating $PM_{2.5}$ concentrations from PM_{10} measurements.

The current Defra background maps for Broxbourne (2018 reference year) show that all 2020 background concentrations of $PM_{2.5}$ are far below the recommended 2020 annual mean AQS objective for $PM_{2.5}$ of 25µg/m^3. The highest concentration is predicted to be 11.5µg/m^3 within the 1km x 1km grid square with the centroid grid reference of 535500, 200500. This is an area to the southwest of Cheshunt and includes a section of the M25 and junction 25, the A10, and some light industrial units. It is important to note that these estimations do not take into consideration any impacts as a result of the COVID-19 pandemic.

The Public Health Outcomes Framework data tool compiled by Public Health England quantifies the mortality burden of $PM_{2.5}$ within England on a county and local authority scale. The 2019 fraction of mortality attributable to $PM_{2.5}$ pollution (indicator D01) across England is 5.1%, and in contrast the fraction within Broxbourne is significantly above the national average at 5.9%. The regional average for the East of England is 5.5%. The 2019 fraction of mortality has been used as opposed to the 2020 fraction as the data has not been made available at the time of writing.

Measures to improve air quality often have shared wins with other public health indicators, a good example being the encouragement of active travel and commuting leading to increased physical activity and increased wellbeing.

LAQM.TG(16) Table A.1 Action toolbox presents a list of measures that can be implemented to help reduce concentrations of $PM_{2.5}$. Some of the actions carried out by Broxbourne Borough Council which are shown in Table 2.2, and will likely be updated and included within the forthcoming AQAP, focus on reducing traffic volumes, improving traffic flow, switching to alternative modes of transport, and promoting the uptake of alternative fuels. Although not designed specifically for the reduction of $PM_{2.5}$, improvements in NO_2 concentrations will lead to a net reduction of $PM_{2.5}$ concentrations from combustion-based sources where both pollutants arise.

The entire borough of Broxbourne is designated as a smoke control area. Smoke control areas are a defined geographical region within which smoke cannot be legally emitted from a chimney, unless using authorised fuels or using exempt appliances. The Council also provides guidance with regards to bonfires.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

This section sets out the monitoring undertaken within 2020 by Broxbourne Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Broxbourne Borough Council did not undertake any automatic monitoring during 2020.

3.1.2 Non-Automatic Monitoring Sites

Broxbourne Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 38 sites during 2020. Table A.1 in Appendix A presents the details of the non-automatic sites. No triplicate or duplicate sites are operated by Broxbourne Borough Council.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

Two sites have been removed, and two new sites were deployed in 2020. Although 'relocations', these should be considered as new sites. Table 3.1 displays the details of these, including a reasoning for their commissioning/decommissioning.

Table 3.1 – Details of New and Removed Monitoring Locations in 2020

Site ID	New or Removed?	Reasoning
BB21	Removed	Lamppost removed by Hertfordshire County Council following upgrade works
BB38	Removed	Relocated in the St Catherine's School playing field to develop understanding of impact of NO_2 in this area
BB51	New	To replace BB21 on the new lamppost

BB50	New	To replace BB38 to further develop understanding of the impact of NO_2 in St Catherine's School playing field

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.2 in Appendix A compares the adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Only one site in AQMA 1 reported an annual mean NO_2 concentration in excess of the annual mean NO_2 AQS objective (40µg/m^3) in 2020 – BB05, reporting a concentration of 45.4µg/m^3. This site, however, is not at relevant exposure. Once fall-off with distance correction calculations have been carried out, the nearest point of relevant exposure is estimated to have an annual mean concentration of 35.5µg/m^3, below the AQS objective. Both other sites (BB11 and BB48) also reported concentrations below the AQS objective, 30.3µg/m^3 and 25.5µg/m^3 respectively. At all monitoring locations within this AQMA, annual mean NO_2 concentrations have decreased from 2019 to 2020 and have been showing a steady decrease over the past 5 years. The decrease reported at BB05 and BB11 from 2019 to 2020 is however much larger than previous years.

One site is present within AQMA 4, BB51. The annual mean NO_2 concentration reported here in 2020 is just below the AQS objective – 39.4µg/m^3. This site is however not at a point of relevant exposure, and once fall-off with distance calculations have been calculated, there is an estimated annual mean NO_2 concentration of 34.1µg/m^3.

There were no reported exceedances of the annual mean NO_2 AQS objective in AQMA 5 during 2020. The maximum reported concentration is 32.6µg/m^3 at site BB49. There has now been 2 years of reported compliance within this AQMA, with BB49 reporting an exceedance in 2018. All sites within this AQMA have reported a lower annual mean NO_2 concentration than that which was reported in 2019. Concentrations reported at BB22 and BB49 have been decreasing steadily in previous years, however BB23 remains relatively stable with a slight increase (but below 40µg/m^3) and has only decreased in 2020.

Within AQMA 6, there was one reported exceedance of the annual mean NO_2 AQS objective in 2020. This was at BB28, which has repeatedly reported the highest exceeding concentrations in Broxbourne. The 2020 annual mean concentration for this location is 43.2µg/m^3. This site is not located at relevant exposure, and once fall-of with distance calculations had been carried out there is an estimated annual mean NO_2 concentration of 32.2µg/m^3 predicted at the nearest relevant receptor. All sites have reported a decrease in the annual mean NO_2 concentrations from 2019 to 2020, and have shown a gradual decrease over the past 5 years or remained relatively stable. In some cases, this decrease has been quite substantial – i.e. 18.6µg/m^3 at BB28.

For the monitoring locations outside any declared AQMA, no sites reported an annual mean NO_2 concentration greater than 40µg/m^3 in 2020. The maximum reported concentration was 33.5µg/m^3 at BB37. For the past 4 years, this site had reported a concentration greater than 40µg/m^3 however this is not at a point of relevant exposure. Where there is more than 1 years worth of monitoring data available, all sites reported a decrease in the annual mean NO_2 concentration from 2019 to 2020.

The decrease in annual mean NO_2 concentrations obeserved across Broxbourne are likely a result of the impacts of the COVID-19 pandemic, whereby the UK Government enforced numerous lockdowns, alongside provided guidelines for home working and staying local. It has been observed across much of the UK, in particular in urban areas, that there has been a significant decrease in traffic volumes for part of 2020, and a change in traffic patterns. This is discussed further in Appendix F, but it has been estimated that during the first lockdown, NO_2 concentrations decreased up to 30%. Regardless of this, NO_2 concentrations have been decreasing throughout Broxbourne for the past 5 years in most locations, however not at such a substantial rate as observed in 2020.

No passive monitoring sites reported an annual mean NO_2 concentration greater than 60µg/m^3 in 2020, therefore it can be assumed that there are no sites where there is likely

to be a risk of exceeding the 1-hour mean NO_2 AQS objective, as per guidance provided in LAQM.TG(16).

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
BB47	Turners Hill 2, Cheshunt	Kerbside	535924	202217	NO2	No	8.0	0.9	No	2.3
BB04	43 Winford Drive	Suburban	536954	206416	NO2	No	5.0	2.0	No	2.3
BB05	Arlington Crescent Waltham Cross	Roadside	536213	200020	NO2	Y - AQMA 1 Arlington Crescent to Abbey Road	15.5	8.0	No	1.6
BB07	Molesworth Hoddesdon	Suburban	537336	210497	NO2	No	9.0	1.0	No	2.3
BB09	100 Great Cambridge Rd	Roadside	535306	202351	NO2	Y - AQMA 6 Great Cambridge Road	12.4	3.5	No	2.3
BB10	Teresa Gardens Waltham Cross	Urban Background	535392	200128	NO2	No	5.0	69.0	No	2.3
BB11	35 High Street Waltham Cross	Roadside	536051	200090	NO2	Y - AQMA 1 Arlington Crescent to Abbey Road	6.5	7.8	No	2.3
BB12	15 High Rd Wormley	Roadside	536608	205769	NO2	No	12.5	2.0	No	2.3
BB16	10 Colthurst Gardens	Urban Background	538548	209565	NO2	No	7.0	1.0	No	2.3

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
BB48	Parkside, outside Greenwich Court (Flats 13-24), Waltham Cross	Urban Background	536214	200111	NO2	Y - AQMA 1 Arlington Crescent to Abbey Road	7.0	22.7	No	2.2
BB18	20 Mylne Close Cheshunt	Roadside	535505	203740	NO2	No	8.5	2.5	No	2.3
BB19	10 Great Stockwood Road	Suburban	532916	204110	NO2	No	11.0	1.5	No	2.3
BB20	1 The Chase Goffs Oak	Suburban	531955	203075	NO2	No	10.0	0.3	No	2.3
BB51	28 Eleanor Cross Road Waltham Cross	Kerbside	536265	200375	NO2	Y - AQMA 4 Eleanor Cross Road / Monarchs Way	4.6	2.5	No	1.8
BB22	Sturlas Way Waltham Cross	Roadside	535999	200747	NO2	Y - AQMA 5 Monarchs Way / Winston Churchill Way	3.0	3.0	No	2.3
BB23	Wickes Car Park	Other	536002	200692	NO2	Y - AQMA 5 Monarchs Way / Winston Churchill Way	13.0	20.0	No	2.4
BB49	Winston Churchill Way/High Street	Kerbside	536026	200819	NO2	Y - AQMA 5 Monarchs Way / Winston Churchill Way	11.0	0.7	No	2.3
BB25	Jones Road	Other	531543	200840	NO2	No	68.0	41.0	No	2.3

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
BB27	59 College Road, Cheshunt	Roadside	535730	202230	NO2	No	3.0	1.5	No	2.3
BB28	214 Cambridge Road, Cheshunt	Roadside	535459	202978	NO2	Y - AQMA 6 Great Cambridge Road	11.5	3.0	No	2.3
BB29	Brookfield Allotments, Halfhide Lane	Roadside	535893	204228	NO2	No	N.A.	2.0	No	2.3
BB30	Winnipeg Way, Turnford	Suburban	536014	204820	NO2	No	24.0	1.0	No	2.3
BB31	Wormley Sports Club, Church Lane	Rural	536033	205804	NO2	No	360.0	68.0	No	2.3
BB32	11 Baas Hill Close, Broxbourne	Suburban	536039	206764	NO2	No	14.0	1.0	No	2.3
BB33	High Leigh Farm, Box Lane	Roadside	536189	208837	NO2	No	22.0	4.0	No	1.0
BB34	Farm Close, Cheshunt	Roadside	535332	202039	NO2	Y - AQMA 6 Great Cambridge Road	5.8	16.0	No	2.3
BB35	86 College Road, Cheshunt	Roadside	535571	202271	NO2	Y - AQMA 6 Great Cambridge Road	10.0	3.5	No	2.3
BB36	Essex Rd at the rear of 6 Parrotts Field,	Roadside	537745	209049	NO2	No	15.0	2.0	No	2.4
BB37	Junction of Burford St/Dinant Link Rd	Kerbside	537460	209109	NO2	No	19.5	0.5	No	2.3

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
BB39	College Rd/Goffs Churchgate Academy, Cheshunt	Roadside	535107	202160	NO2	Y - AQMA 6 Great Cambridge Road	40.5	1.0	No	2.4
BB40	A10/College Rd Junction, Cheshunt	Roadside	535314	202244	NO2	Y - AQMA 6 Great Cambridge Road	6.5	2.0	No	2.3
BB41	37 Beltona Gardens, Cheshunt	Suburban	535910	203822	NO2	Y - AQMA 6 Great Cambridge Road	4.0	17.0	No	2.5
BB42	48 Hobbs Close, Cheshunt	Suburban	535516	202989	NO2	Y - AQMA 6 Great Cambridge Road	3.0	22.0	No	2.3
BB43	24 Westside, Turnford	Roadside	536434	205004	NO2	No	11.0	1.5	No	2.5
BB44	High Rd/Bell Lane Roundabout (163 High Rd) Broxbourne	Roadside	536673	206608	NO2	No	2.0	8.0	No	2.0
BB45	High Rd/Station Rd Junction, Broxbourne	Kerbside	536847	207237	NO2	No	5.0	0.5	No	2.0
BB46	High Rd/Springfields Junction, Broxbourne	Roadside	536883	207545	NO2	No	5.9	1.3	No	2.4
BB50	Playing Field, St Catherines School, Hoddesdon	Urban Centre	537646	208979	NO2	No	N/A	21.6	No	2.0

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
BB47	535924	202217	Kerbside	73.4	73.4	-	-	38.3	32.7	26.7
BB04	536954	206416	Suburban	73.4	73.4	20.0	18.9	18.2	18.6	13.8
BB05	536213	200020	Roadside	65.8	65.8	**60.7**	**65.6**	**58.9**	**57.0**	**45.4**
BB07	537336	210497	Suburban	65.8	65.8	21.0	20.5	19.4	18.0	14.8
BB09	535306	202351	Roadside	73.4	73.4	**54.3**	**50.7**	**47.4**	**43.8**	34.5
BB10	535392	200128	Urban Background	73.4	73.4	34.1	33.7	30.1	28.5	22.3
BB11	536051	200090	Roadside	73.4	73.4	**43.6**	**42.4**	**41.3**	39.2	30.3
BB12	536608	205769	Roadside	65.8	65.8	**40.2**	37.9	33.2	31.7	24.6
BB16	538548	209565	Urban Background	73.4	73.4	26.2	22.2	20.5	20.3	16.2
BB48	536214	200111	Urban Background	73.4	73.4	-	-	39.0	34.1	25.5
BB18	535505	203740	Roadside	73.4	73.4	20.2	19.6	18.3	17.4	13.3
BB19	532916	204110	Suburban	65.8	65.8	20.7	20.5	21.5	19.1	14.0
BB20	531955	203075	Suburban	56.2	56.2	20.7	20.5	19.3	18.5	14.0
BB51	536265	200375	Kerbside	73.4	73.4	-	-	-	-	39.4
BB22	535999	200747	Roadside	73.4	73.4	**41.2**	**42.6**	38.6	33.1	27.9
BB23	536002	200692	Other	73.4	73.4	29.5	34.8	31.8	31.9	22.4

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
BB49	536026	200819	Kerbside	65.8	65.8	**-**	**-**	**46.9**	37.3	32.6
BB25	531543	200840	Other	65.8	65.8	23.9	25.9	23.8	21.7	18.4
BB27	535730	202230	Roadside	73.4	73.4	37.4	38.6	37.0	33.6	24.8
BB28	535459	202978	Roadside	73.4	73.4	**73.3**	**71.2**	**63.3**	**61.8**	**43.2**
BB29	535893	204228	Roadside	63.8	63.8	**44.7**	37.2	35.2	27.7	22.7
BB30	536014	204820	Suburban	73.4	73.4	27.3	26.9	24.3	23.0	17.5
BB31	536033	205804	Rural	65.8	65.8	23.4	22.0	21.5	21.7	15.4
BB32	536039	206764	Suburban	73.4	73.4	23.8	21.7	21.9	21.9	15.6
BB33	536189	208837	Roadside	65.8	65.8	19.0	18.1	17.8	13.8	12.5
BB34	535332	202039	Roadside	65.8	65.8	36.6	37.7	34.5	30.6	25.0
BB35	535571	202271	Roadside	58.1	58.1	33.2	36.1	33.4	31.9	23.5
BB36	537745	209049	Roadside	49.9	49.9	**46.8**	39.6	34.7	31.4	26.4
BB37	537460	209109	Kerbside	65.8	65.8	**55.0**	**54.2**	**46.9**	**42.0**	33.5
BB39	535107	202160	Roadside	73.4	73.4	-	25.1	31.2	27.2	20.8
BB40	535314	202244	Roadside	73.4	73.4	-	42.0	48.6	42.5	33.7
BB41	535910	203822	Suburban	73.4	73.4	-	33.3	35.7	31.8	25.3
BB42	535516	202989	Suburban	65.8	65.8	-	32.7	33.8	30.4	23.9
BB43	536434	205004	Roadside	73.4	73.4	-	38.1	35.3	32.5	26.0
BB44	536673	206608	Roadside	65.8	65.8	-	27.0	30.3	27.1	21.5
BB45	536847	207237	Kerbside	57.5	57.5	-	26.0	30.2	26.4	21.4
BB46	536883	207545	Roadside	65.8	65.8	-	30.0	35.6	29.1	26.5

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
BB50	537646	208979	Urban Centre	58.1	58.1	-	-	-	-	18.6

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Diffusion tube data has been bias adjusted.**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations in AQMAs 1, 4 and 5

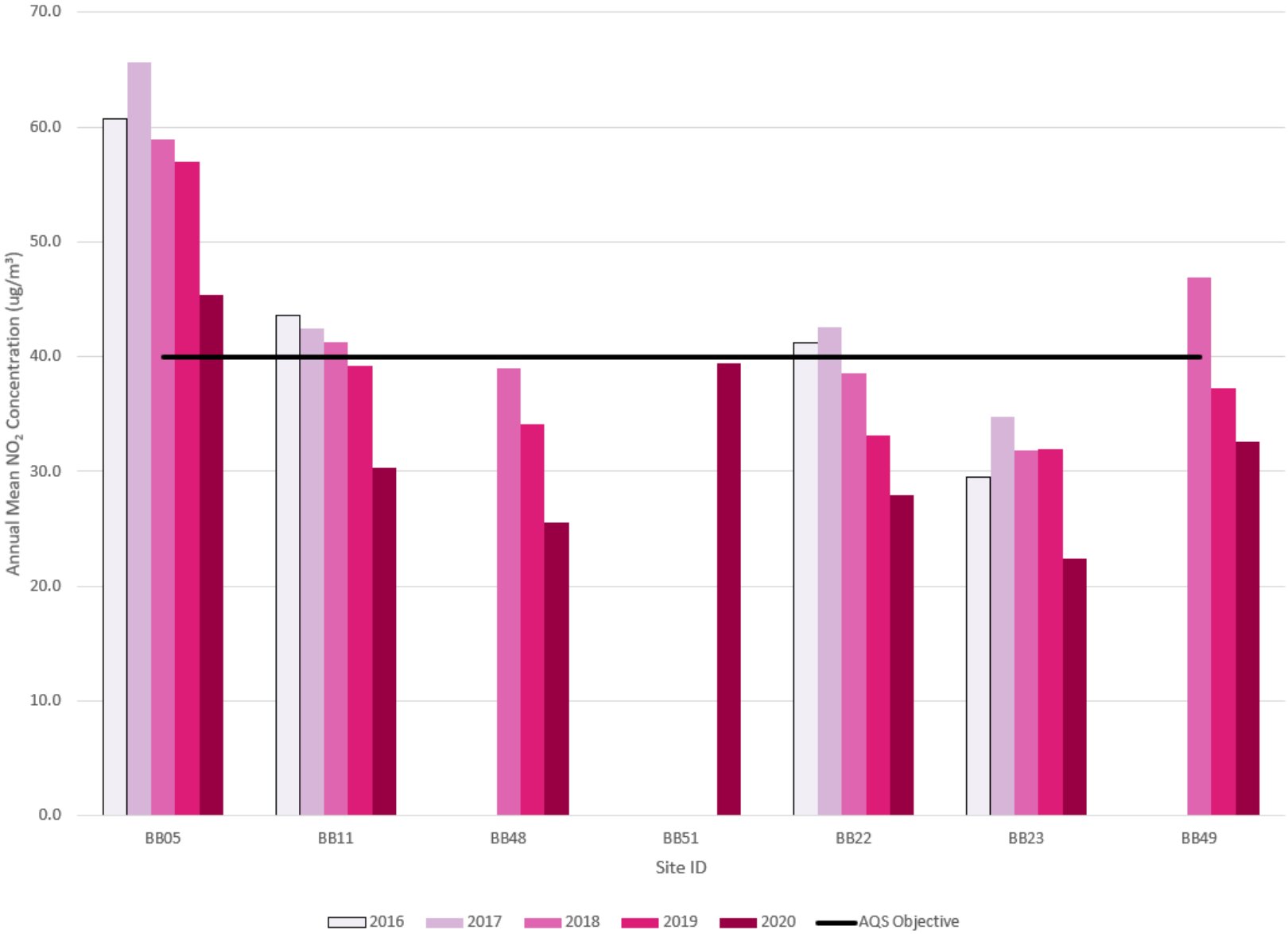


Figure A.2 – Trends in Annual Mean NO_2 Concentrations in AQMA 6

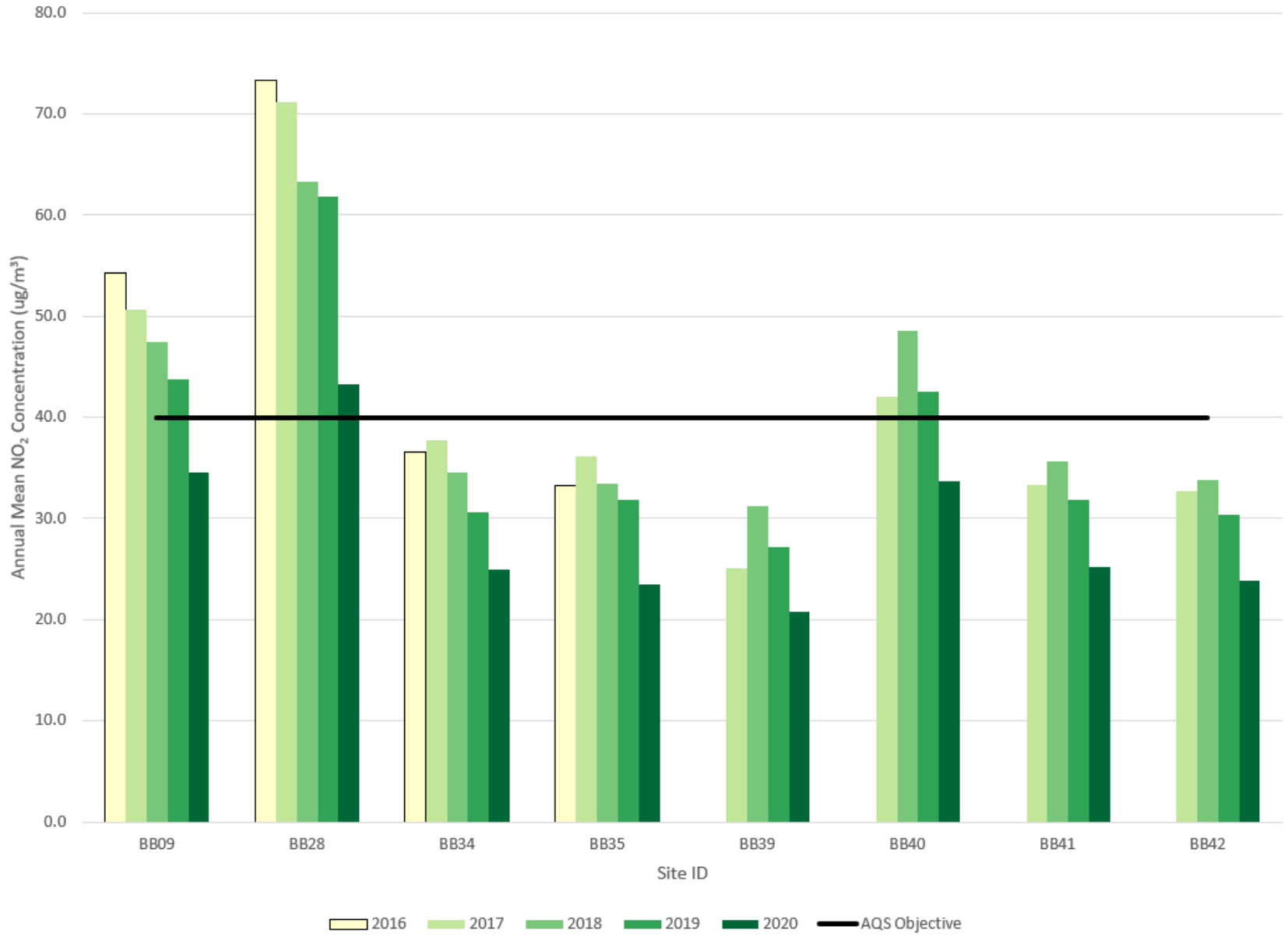
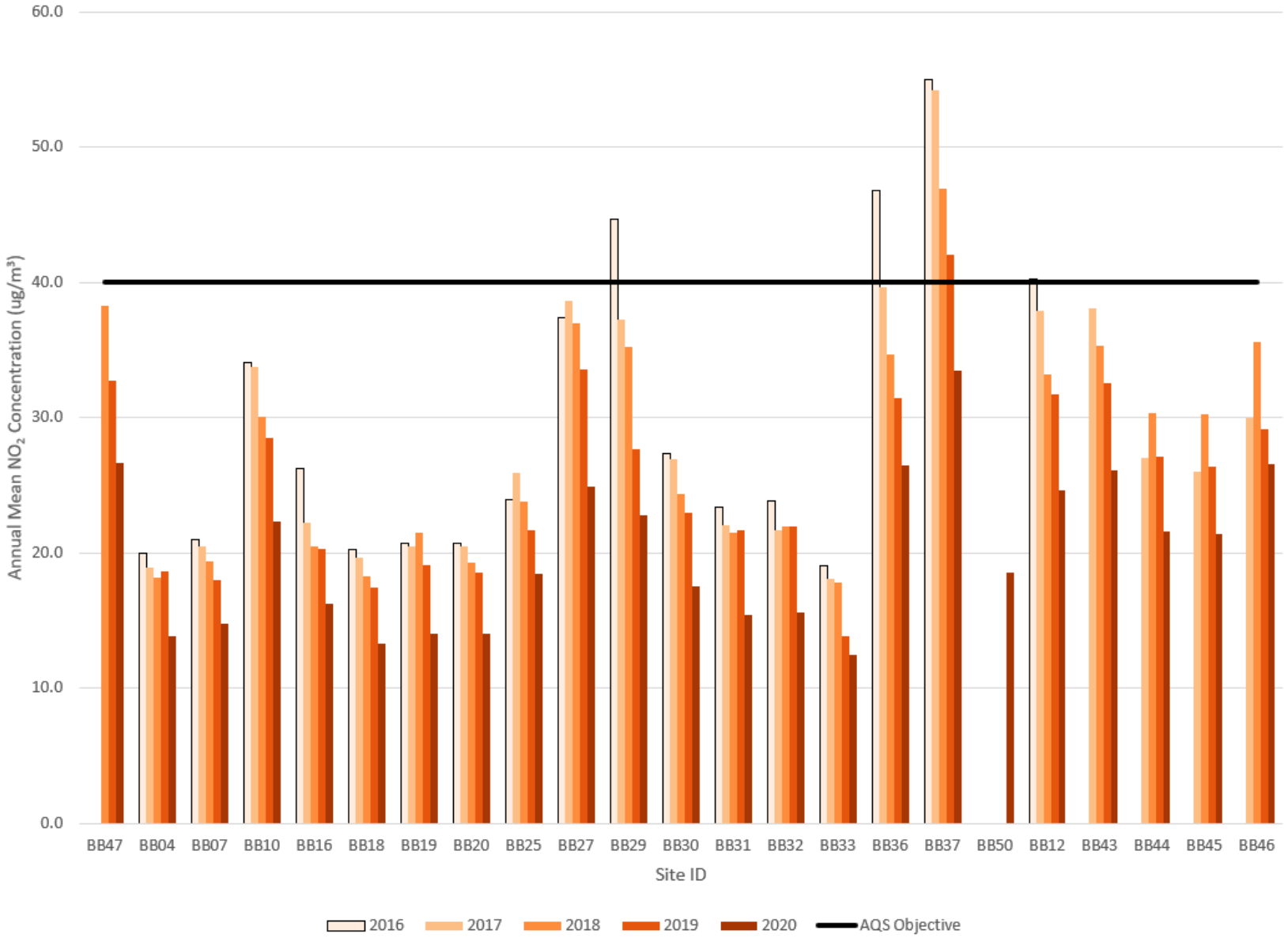


Figure A.3 – Trends in Annual Mean NO_2 Concentrations Outside any AQMA



Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
BB47	535924	202217	43.0	41.2		25.5		25.6	23.1	30.3	33.0	32.6	41.9		32.9	26.7	-	
BB04	536954	206416	27.4	21.4		11.9		11.0	9.7	11.6	14.7	18.1	27.7		17.1	13.8	-	
BB05	536213	200020	82.5	77.5				47.4	43.4	52.6	49.6	46.9	58.3		57.3	**45.4**	35.5	
BB07	537336	210497	28.0	23.4				11.1	9.3	13.0	16.4	18.2	29.8		18.7	14.8	-	
BB09	535306	202351	47.5	49.6		44.7		38.9	30.1	44.3	40.8	37.3	50.5		42.6	34.5	-	
BB10	535392	200128	39.9	40.8		18.3		18.1	20.1	21.4	25.0	27.0	37.6		27.6	22.3	-	
BB11	536051	200090	44.6	41.4		38.2		32.8	23.8	36.1	36.0	34.4	49.7		37.4	30.3	-	
BB12	536608	205769	35.5	37.8		21.9		23.7		31.5	32.9	31.1	45.4		32.5	24.6	-	
BB16	538548	209565	30.3	24.3		14.6		14.4	12.3	15.2	17.6	19.8	31.5		20.0	16.2	-	
BB48	536214	200111	46.0	40.8		25.6		24.9	22.4	29.6	29.1	32.4	32.6		31.5	25.5	-	
BB18	535505	203740	24.9	21.0		13.5		11.8	7.8	12.8	14.2	16.9	24.7		16.4	13.3	-	
BB19	532916	204110	23.9	21.4				12.4	10.7	14.1	15.2	16.5	27.5		17.7	14.0	-	
BB20	531955	203075	27.3	21.6				11.2	8.8	12.7	13.5		28.9		17.7	14.0	-	
BB51	536265	200375	60.1	58.5		39.2		38.0	37.5	44.5	50.1	48.8	60.7		48.6	39.4	34.1	
BB22	535999	200747	47.1	42.2		25.5		27.7	24.1	31.2	33.2	32.3	47.0		34.5	27.9	-	
BB23	536002	200692	37.9	35.4		19.6		20.9	19.1	23.9	27.0	26.8	38.0		27.6	22.4	-	
BB49	536026	200819	50.4	49.5				30.1	29.8	39.7	42.0	34.6	53.4		41.2	32.6	-	
BB25	531543	200840	33.0	30.4				17.7	15.9	19.9	19.6	23.8	25.7		23.3	18.4	-	
BB27	535730	202230	39.7	37.7		27.6		22.7	20.3	28.6	29.5	28.0	42.0		30.7	24.8	-	
BB28	535459	202978	65.4	50.8		54.1		48.9	44.6	49.6	55.1	47.9	63.7		53.3	**43.2**	32.2	
BB29	535893	204228	40.1	35.8		22.8		24.4	19.6		27.2	30.6	32.2		29.1	22.7	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
BB30	536014	204820	31.4	25.2		15.7		14.8	15.9	17.5	21.3	20.7	32.1		21.6	17.5	-	
BB31	536033	205804	27.6	23.2				12.8	14.0	13.6	17.6	19.8	26.8		19.4	15.4	-	
BB32	536039	206764	30.7	23.4		11.6		13.0	12.4	14.8	17.3	19.8	30.4		19.3	15.6	-	
BB33	536189	208837	22.4	17.9				10.6	9.2	12.2	13.7	15.2	24.6		15.7	12.5	-	
BB34	535332	202039	37.6	37.3				20.7	26.1	27.3	32.0	31.7	39.8		31.6	25.0	-	
BB35	535571	202271		33.3				20.1	20.5	24.8	28.6	29.4	38.7		27.9	23.5	-	
BB36	537745	209049	46.0						24.3	28.8	32.8	32.4	44.7		34.8	26.4	-	
BB37	537460	209109	49.4	50.3				31.6	35.5	37.4	42.0	40.6	51.4		42.3	33.5	-	
BB39	535107	202160	34.3	32.1		20.3		16.9	19.3	22.7	28.5	24.7	32.5		25.7	20.8	-	
BB40	535314	202244	57.0	43.4		35.9		33.8	31.1	43.5	41.4	37.5	50.9		41.6	33.7	-	
BB41	535910	203822	43.2	39.9		19.8		21.8	28.8	26.8	30.8	31.9	37.7		31.2	25.3	-	
BB42	535516	202989	38.7	37.3				21.1	26.9	24.8	30.7	29.2	32.6		30.2	23.9	-	
BB43	536434	205004	46.1	39.4		18.4		25.2	25.7	27.9	29.8	35.6	41.3		32.2	26.0	-	
BB44	536673	206608		32.8		20.0		20.0	18.1	22.4	25.0	28.3	36.8		25.4	21.5	-	
BB45	536847	207237				21.5		21.0	16.8	24.0	25.6	25.0	39.1		24.7	21.4	-	
BB46	536883	207545		39.8		22.5		23.1	24.3	31.3	34.4	31.9	43.3		31.3	26.5	-	
BB50	537646	208979	30.8	26.7					14.1	20.5	23.4	22.5	33.9		24.6	18.6	-	

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1**.

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column.**

☒ **Broxbourne Borough Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

New or Changed Sources Identified Within Broxbourne Borough Council During 2020

Broxbourne Borough Council has not identified any new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by Broxbourne Borough Council During 2020

Broxbourne Borough Council has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

Broxbourne Borough Council's diffusion tubes in 2020 were supplied and analysed by Gradko International Ltd., using the 20% Triethanolamine (TEA) in water preparation method. Gradko's laboratory is UKAS accredited, participating in the AIR-PT Scheme (a continuation of the Workplace Analysis Scheme for Proficiency (WASP)) for NO_2 tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations reported are of a high caliber. The lab follows the procedures set out in the Harmonisation Practical Guidance. In the latest available AIR-PT results, AIR PT AR036 (January – February 2020) and AIR PT AR040 (September – October 2020), Gradko scored 75%. No results are available between May and August 2020 as testing rounds were cancelled due to the COVID-19 pandemic. The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$.

All local authority co-location studies which use tubes supplied by Gradko with the 20% TEA in water preparation method in 2020 were rated as 'good', as shown by the precision summary results. This precision reflects the laboratory's performance and consistency in preparing and analysing the tubes, as well as the subsequent handling of the tubes in the

field. Tubes are considered to have a “good” precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more monitoring periods during a year is less than 20%.

Monitoring in 2020 had largely been completed in adherence with the 2020 Diffusion Tube Monitoring Calendar, whereby most changeovers were completed within ±2 days of the specified date. The only deviation from this was in March, May and December where no tubes were deployed for these monitoring periods. March was due to an incident with an officer which resulted in a loss of diffusion tubes, May was due to Gradko’s lab closures as a result of the COVID-19 pandemic, and December was due to the tubes not being collected as a result of officer sickness.

Diffusion Tube Annualisation

Annualisation is required for any site with data capture less than 75% but greater than 25%. As such, 19 sites operated by Broxbourne Borough Council required annualisation in 2020. This was conducted using the latest version of the Diffusion Tube Data Processing Tool (v1.1). These sites, alongside the details of the calculation method undertaken, are provided in Table C.2.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Broxbourne Borough Council have applied a national bias adjustment factor of 0.81 to the 2020 monitoring data. A summary of bias adjustment factors used Broxbourne Borough Council over the past five years is presented in Table C.1.

No co-location studies are carried out by Broxbourne Borough Council therefore only a national factor can be applied. The national factor for Gradko 20% TEA in water, as presented in the Diffusion Tube Bias Factors Spreadsheet v03_21, was 0.81 based on 18 studies.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.81
2019	National	03/20	0.93
2018	National	09/19	0.92
2017	National	03/18	0.89
2016	National	03/17	0.94

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

Fall-off with distance calculations were required at 3 sites where annual mean NO_2 concentrations were greater than 36µg/m^3, and the sites are not located at relevant exposure – BB05, BB51 and BB28. This was completed using the latest version of the Diffusion Tube Data Processing Tool (v1.1), and the output from this is presented in Table C.3.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor London Haringey Priory Park South AURN	Annualisation Factor Borehamwood Meadow Park AURN	Annualisation Factor London N Kensington AURN	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
BB05	0.9866	0.9662	0.9813	0.9781	57.3	56.0	
BB07	0.9866	0.9662	0.9813	0.9781	18.7	18.2	
BB12	0.9373	0.9286	0.9396	0.9352	32.5	30.4	
BB19	0.9866	0.9662	0.9813	0.9781	17.7	17.3	
BB20	0.9837	0.9604	0.9870	0.9770	17.7	17.3	
BB49	0.9866	0.9662	0.9813	0.9781	41.2	40.3	
BB25	0.9866	0.9662	0.9813	0.9781	23.3	22.7	
BB29	0.9641	0.9700	0.9624	0.9655	29.1	28.1	
BB31	0.9866	0.9662	0.9813	0.9781	19.4	19.0	
BB33	0.9866	0.9662	0.9813	0.9781	15.7	15.4	
BB34	0.9866	0.9662	0.9813	0.9781	31.6	30.9	
BB35	1.0484	1.0421	1.0324	1.0410	27.9	29.1	
BB36	0.9465	0.9159	0.9464	0.9362	34.8	32.6	
BB37	0.9866	0.9662	0.9813	0.9781	42.3	41.3	
BB42	0.9866	0.9662	0.9813	0.9781	30.2	29.5	
BB44	1.0499	1.0580	1.0298	1.0459	25.4	26.6	
BB45	1.0758	1.0791	1.0510	1.0686	24.7	26.4	
BB46	1.0499	1.0580	1.0298	1.0459	31.3	32.8	
BB50	0.9394	0.9187	0.9398	0.9326	24.6	22.9	

Table C.3 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
BB05	8.0	23.5	45.4	18.8	35.5	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*
BB51	2.5	7.1	39.4	18.8	34.1	
BB28	3.0	14.5	43.2	16.2	32.2	

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Map of Non-Automatic Monitoring Sites

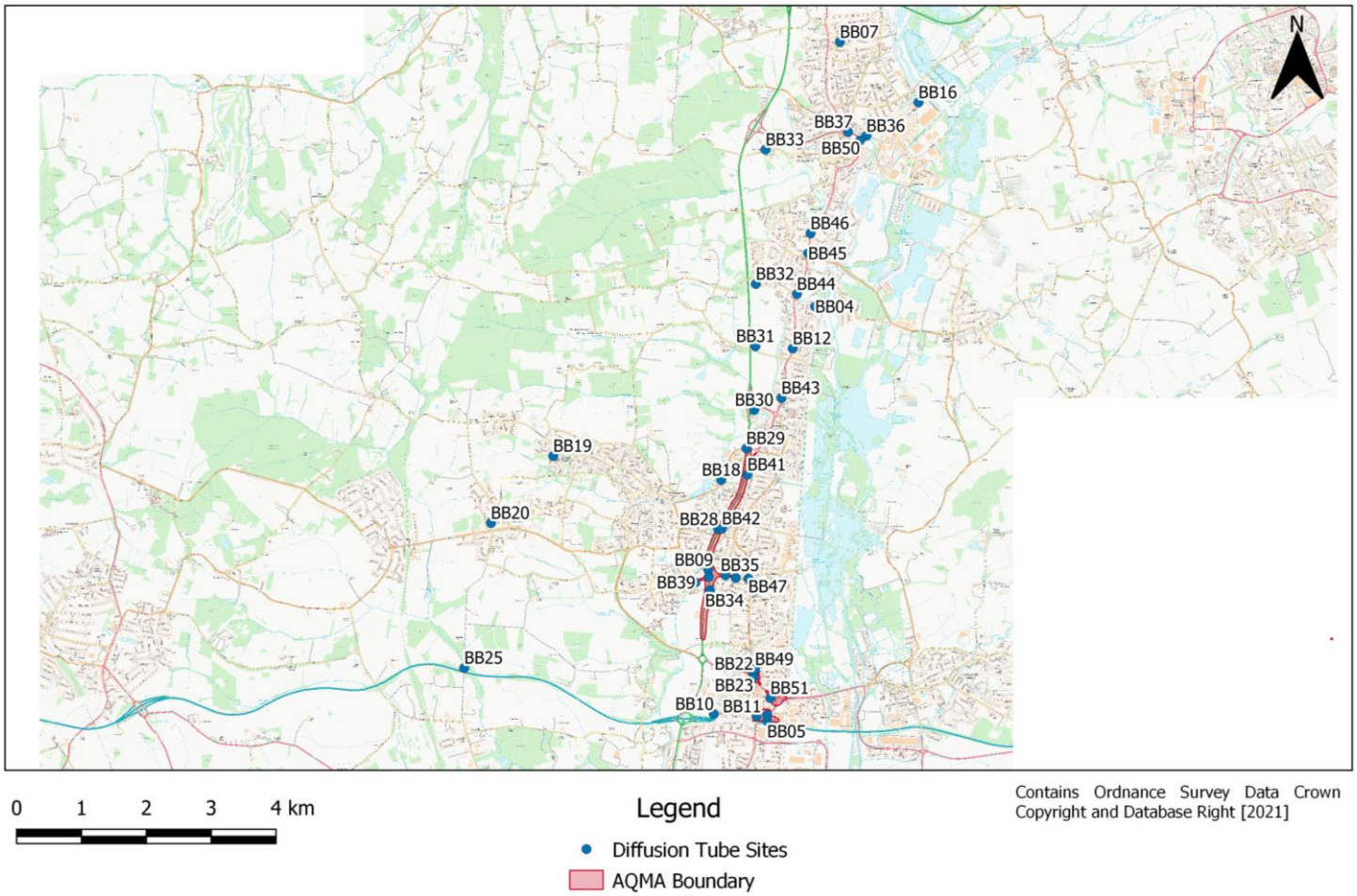


Figure D.2 – Map of Non-Automatic Monitoring Sites BB19 and BB20

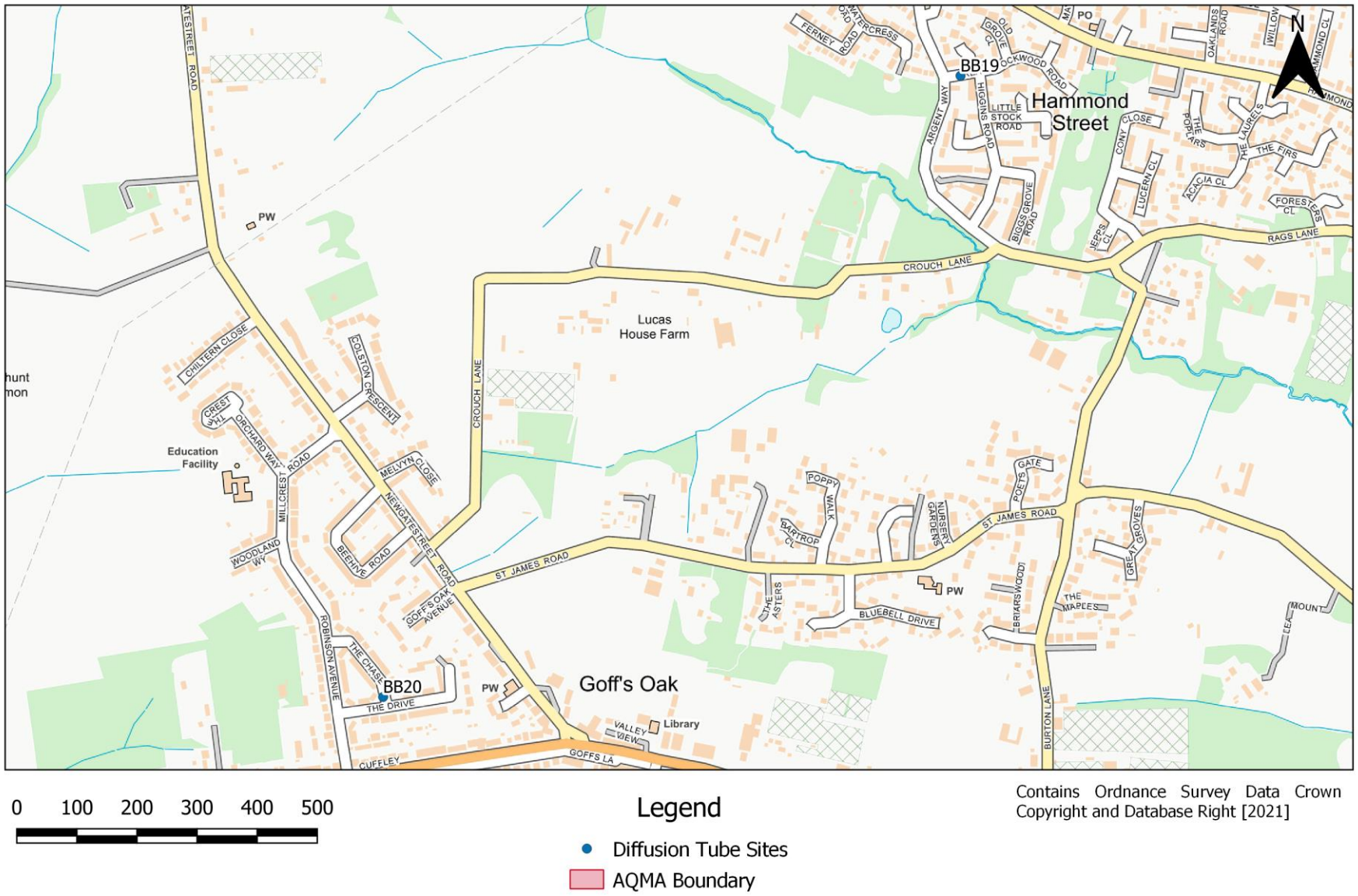


Figure D.3 – Map of Non-Automatic Monitoring Site BB25

Figure D.4 – Map of Non-Automatic Monitoring Sites in Broxbourne

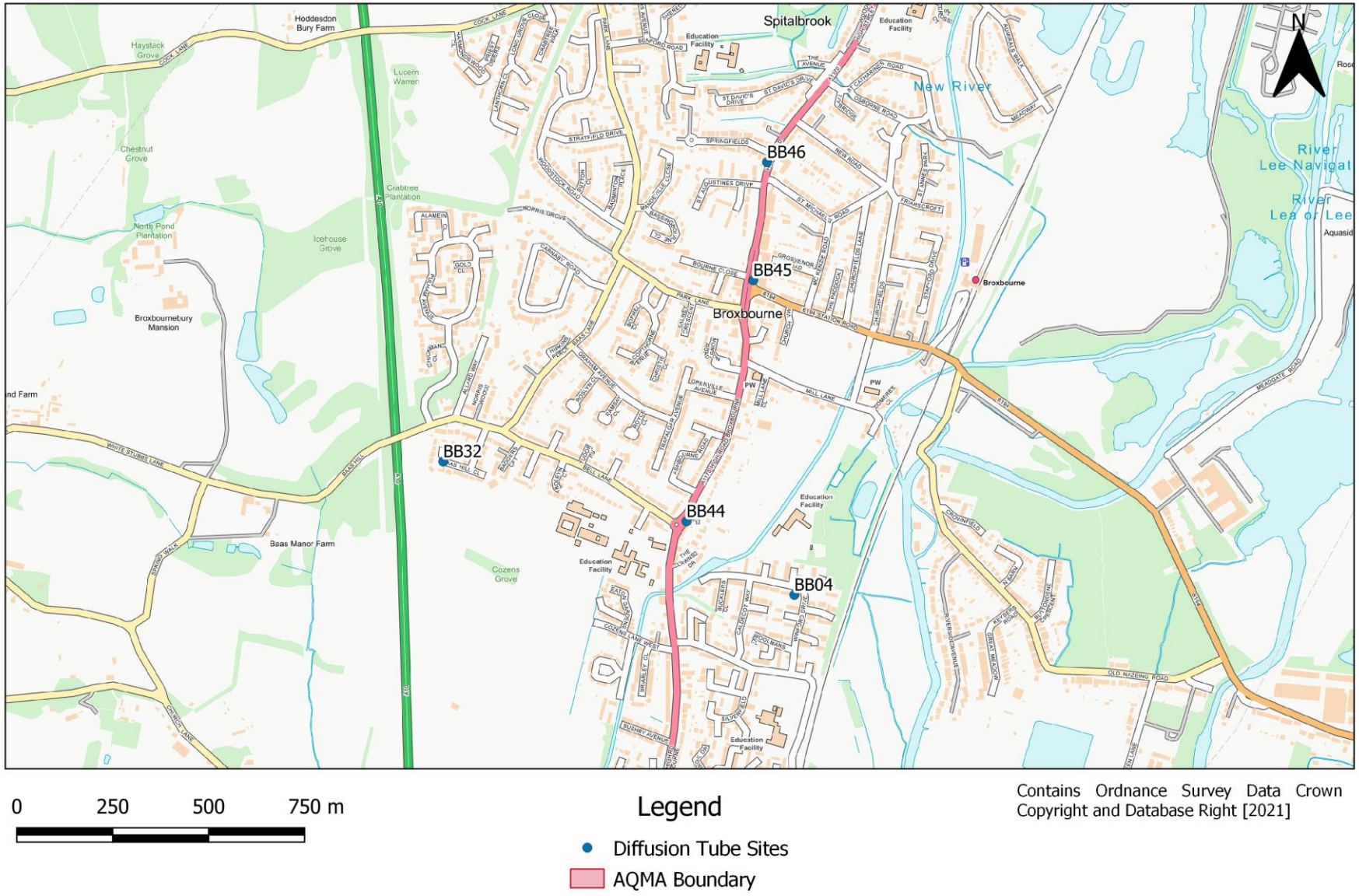


Figure D.5 – Map of Non-Automatic Monitoring Sites in North Cheshunt

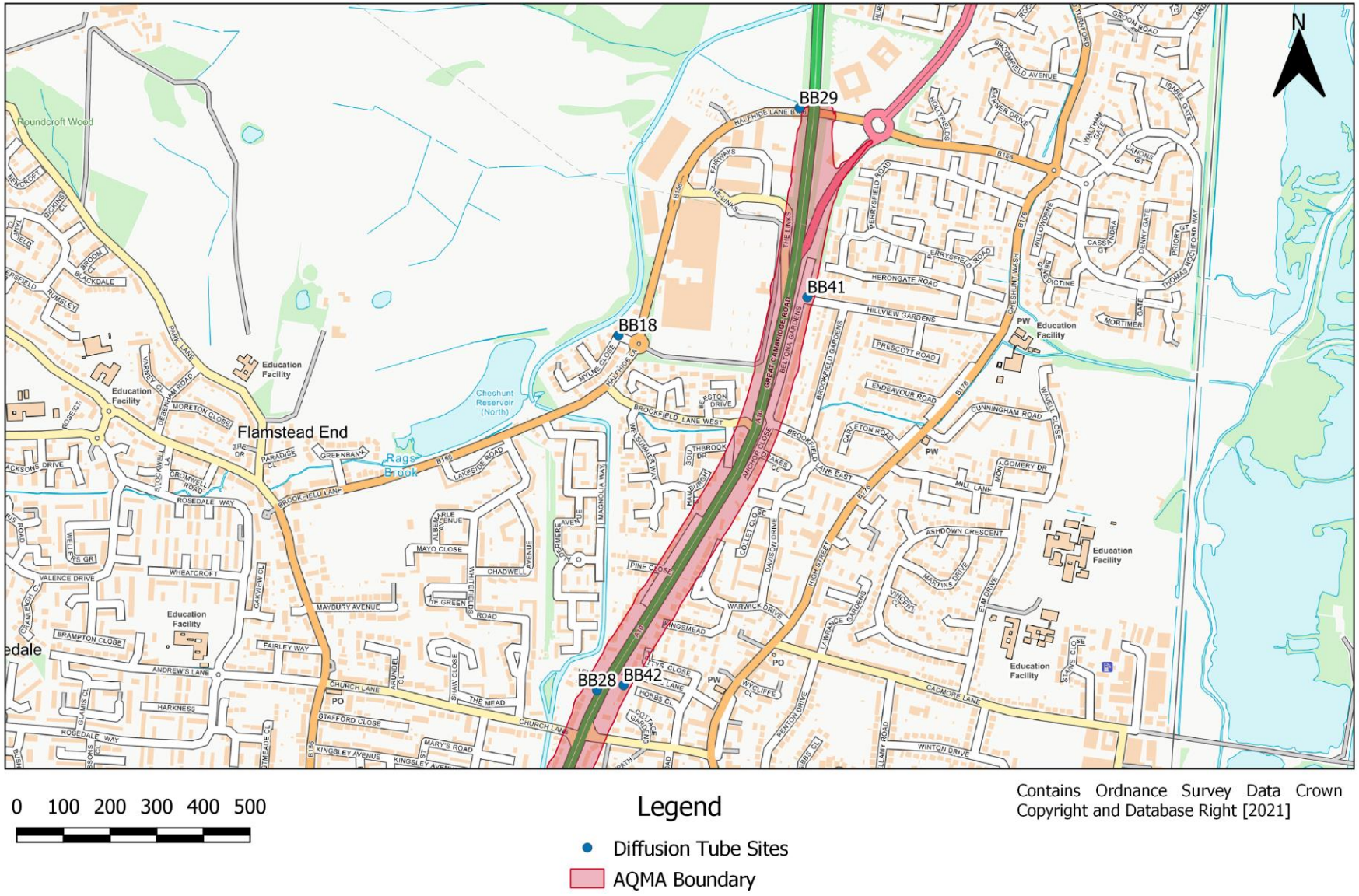


Figure D.6 – Map of Non-Automatic Monitoring Sites in South Cheshunt

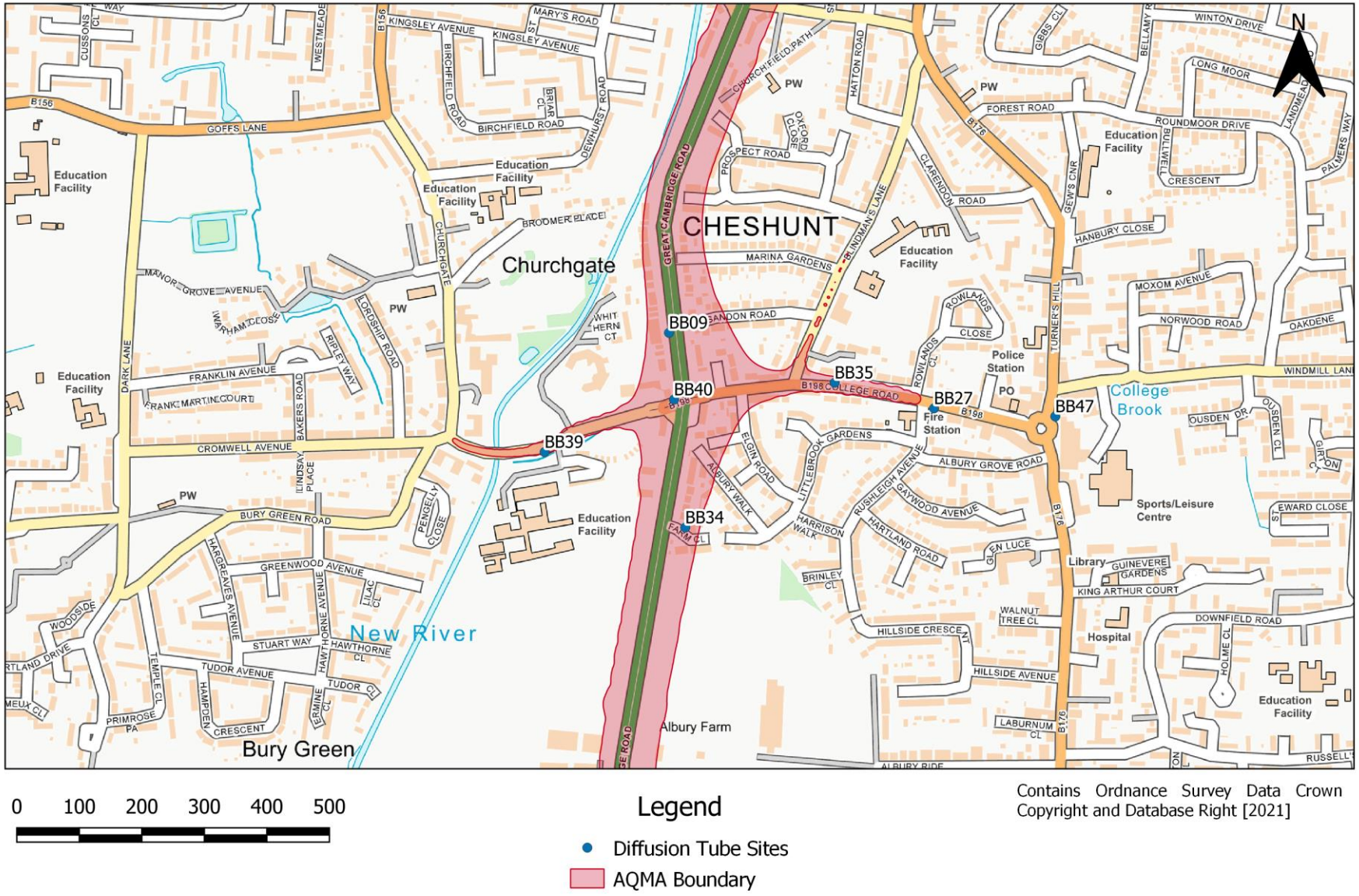


Figure D.7 – Map of Non-Automatic Monitoring Sites in Hoddesdon

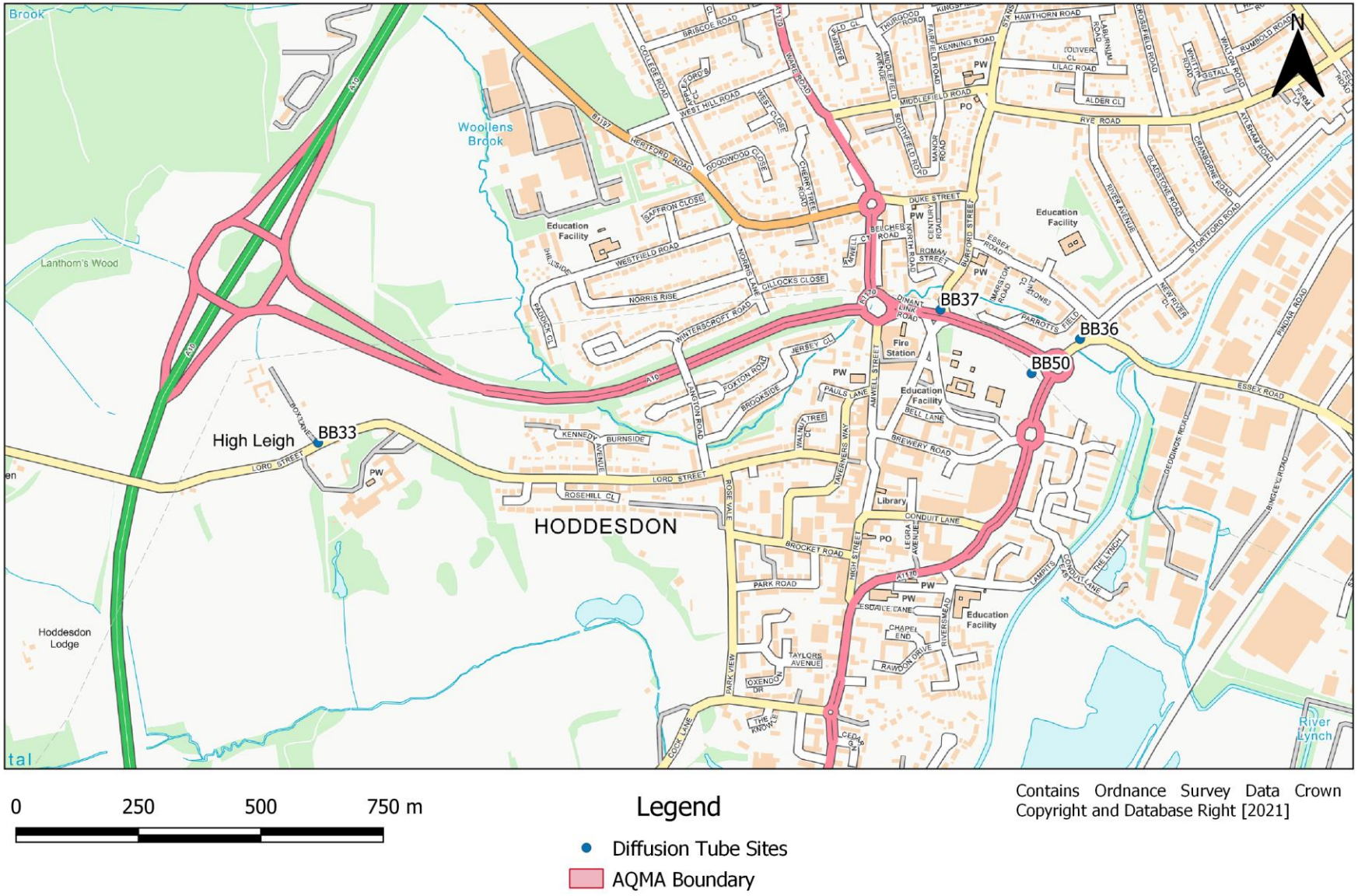


Figure D.8 – Map of Non-Automatic Monitoring Sites in Rye Park

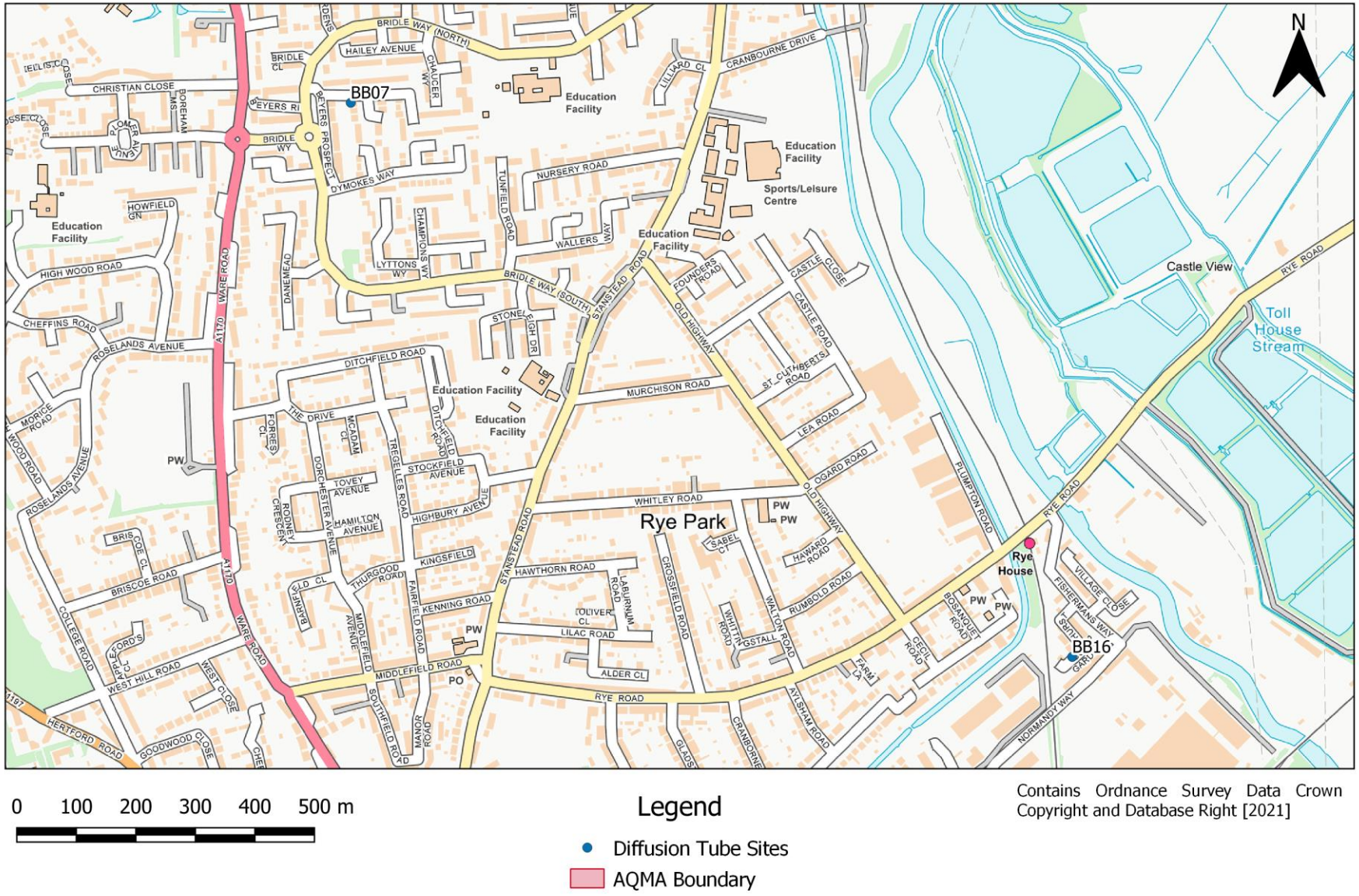


Figure D.9 – Map of Non-Automatic Monitoring Sites in Waltham Cross

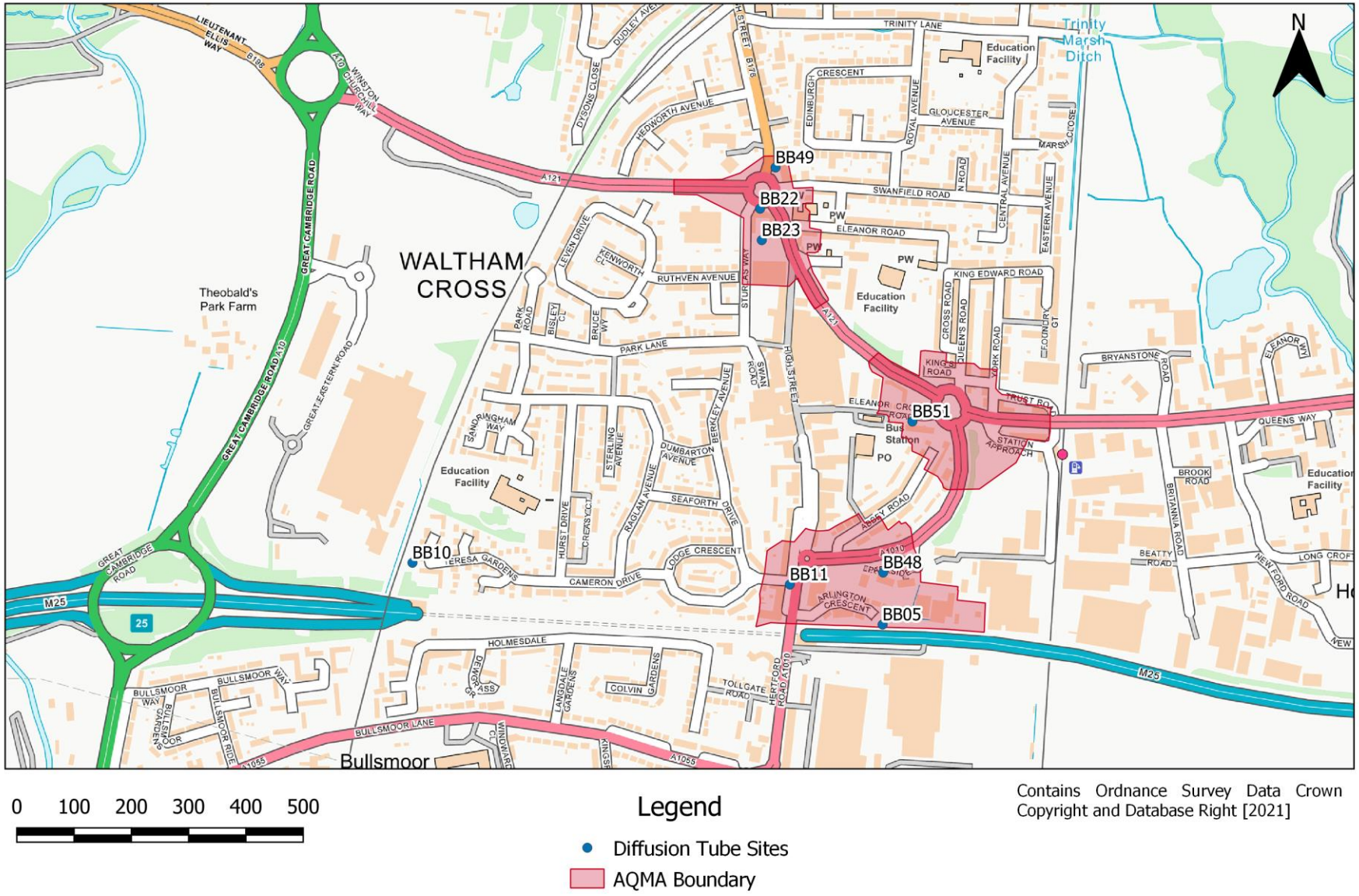
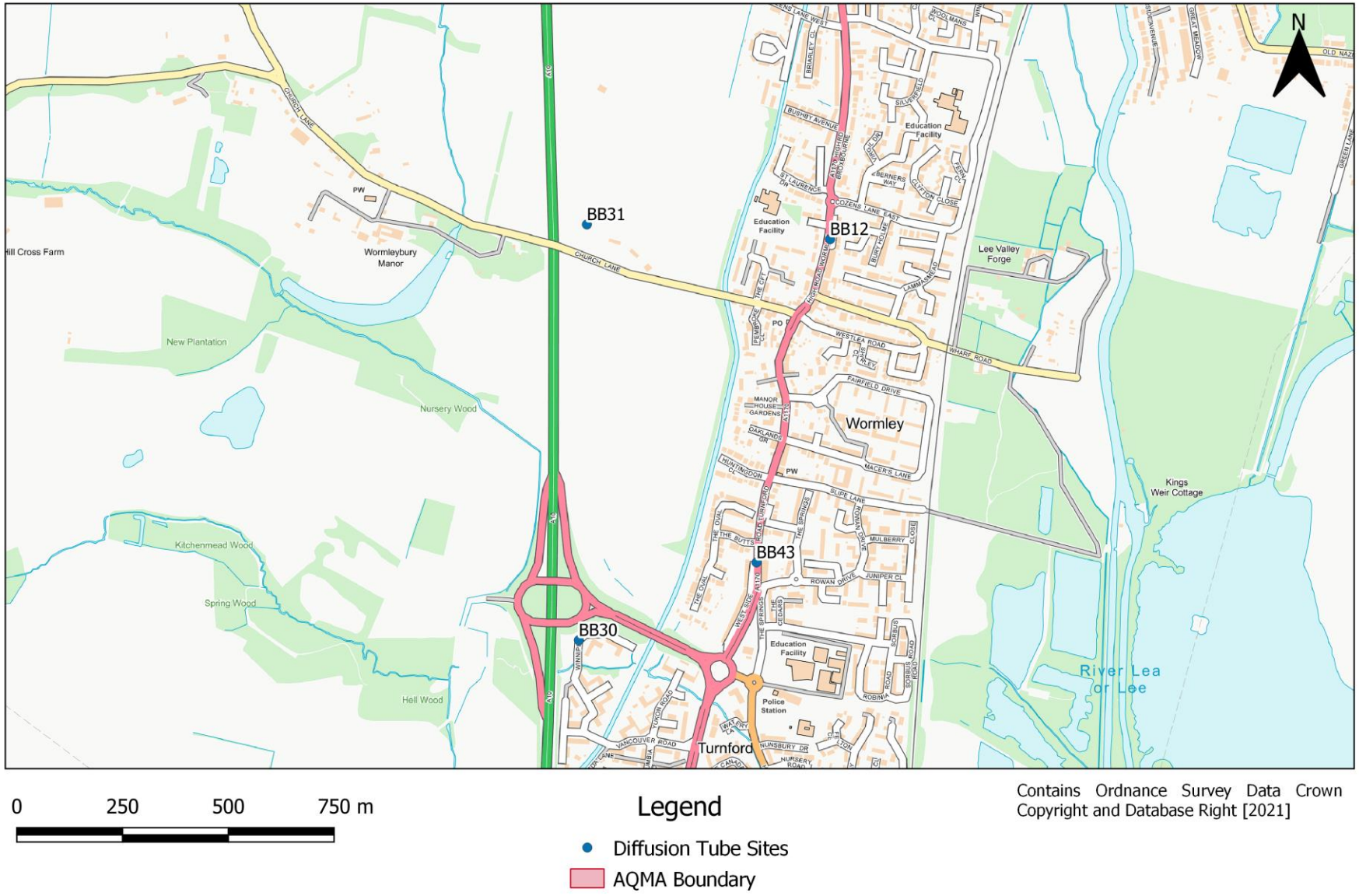


Figure D.10 – Map of Non-Automatic Monitoring Sites in Wormley



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO_2)	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM_{10})	40µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO_2)	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO_2)	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[7] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[8] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[9] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

[8] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[9] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Broxbourne Borough Council

Although specific traffic data is not available, traffic flows decreased throughout much of the Borough of Broxbourne in 2020 as was seen across the UK during lockdowns and with Government guidelines to work from home. This is reflected in the significant decrease in NO_2 concentrations reported across most of the monitoring sites in Broxbourne. A maximum decrease of 18.6µg/m^3 was reported at BB28, which has continuously reported the maximum annual mean NO_2 concentration over the past 5 years. On average across the entire borough, there was a decrease of 6.5µg/m^3, whereas in previous years this was 3.0µg/m^3 (2018-2019), 1.2µg/m^3 (2017-2018), and 0.7µg/m^3 (2016-2017).

Besides this, there were no other identifiable impacts as a consequence of COVID-19 upon air quality within Broxbourne Borough Council.

Opportunities Presented by COVID-19 upon LAQM within Broxbourne Borough Council

No LAQM related opportunities have arisen as a consequence of COVID-19 within Broxbourne Borough Council.

Challenges and Constraints Imposed by COVID-19 upon LAQM within Broxbourne Borough Council

Due to the COVID-19 pandemic, and associated lockdowns, Gradko International Ltd. closed their laboratory during the first lockdown. As a result, no tubes were able to be supplied or analysed in this time. Broxbourne Borough Council was therefore unable to deploy any diffusion tubes for the May monitoring period. Additionally, due to officer sickness with COVID-19 no tubes were able to be deployed in December. No sites required annualisation as a direct result of this as only 2 months' worth of data was missing due to COVID-19. **No Impact**

As with previous years, a national bias adjustment factor has been utilised to adjust the diffusion tube results for 2020. Within 2019 there were 27 co-location studies that were utilised to calculate the bias factor for the laboratory and preparation method used. For 2020, this number has reduced to 18 studies, which is 33% lower than that in 2019. There is therefore the potential for there to be a larger degree of uncertainty associated with the resultant annual mean NO_2 concentrations in 2020 than in previous years. **Medium Impact**

Table F.1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Broxbourne Borough Council Air Quality Reports – 2018, 2019, 2020 ASRs, available at: https://www.broxbourne.gov.uk/airquality
- Broxbourne Borough Council Local Plan 2018-2033, available at: https://ex.broxbourne.gov.uk/resident-planning-and-building-planning-policy/local-plan-2018-2033
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/21 V1 published in April 2021.