



***Stratford-on-Avon District Council  
Annual Status Report 2021***

*Bureau Veritas*

*July 2021*





***Move Forward with Confidence***

## Document Control Sheet

Identification	
<b>Client</b>	Stratford-on-Avon District Council
<b>Document Title</b>	2021 Annual Status Report
<b>Bureau Veritas Ref No.</b>	10803172/UK/v2.0

Contact Details		
<b>Company Name</b>	Bureau Veritas UK Limited	Stratford-on-Avon District Council
<b>Contact Name</b>	Hannah Smith	Jacqueline Dicker
<b>Position</b>	Principal Consultant	Environmental Health
<b>Address</b>	66 Prescott Street London E1 8HG	Elizabeth House Church Street Stratford Upon Avon Warwickshire CV37 6HX

Configuration				
Version	Date	Author	Reason for Issue/Summary of Changes	Status
V1.0	29/06/2021	A Smith	Draft for comment	Draft
V2.0	06/07/2021	A Smith	Final issue following comments	Final

	Name	Job Title	Signature
<b>Prepared By</b>	A Smith	Graduate Consultant	
<b>Approved By</b>	H Smith	Principal Consultant	

Commercial In Confidence

© Bureau Veritas UK Limited

The copyright in this work is vested in Bureau Veritas UK Limited, and the information contained herein is confidential. This work, either in whole or in part, may not be reproduced or disclosed to others or used for any purpose, other than for internal client evaluation, without Bureau Veritas' prior written approval.

Bureau Veritas UK Limited, Registered in England & Wales, Company Number: 01758622  
Registered Office: Suite 206 Fort Dunlop, Fort Parkway, Birmingham B24 9FD

### Disclaimer

This Report was completed by Bureau Veritas on the basis of a defined programme of work and terms and conditions agreed with the Client. Bureau Veritas confirms that in preparing this Report it has exercised all reasonable skill and care taking into account the project objectives, the agreed scope of works, prevailing site conditions and the degree of manpower and resources allocated to the project.

Bureau Veritas accepts no responsibility to any parties whatsoever, following the issue of the Report, for any matters arising outside the agreed scope of the works.

This Report is issued in confidence to the Client and Bureau Veritas has no responsibility to any third parties to whom this Report may be circulated, in part or in full, and any such parties rely on the contents of the report solely at their own risk.

Unless specifically assigned or transferred within the terms of the agreement, the consultant asserts and retains all Copyright, and other Intellectual Property Rights, in and over the Report and its contents.

Any questions or matters arising from this Report should be addressed in the first instance to the Project Manager.



# 2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995  
Local Air Quality Management

Date: July, 2021

<b>Information</b>	<b>Stratford-on-Avon District Council Details</b>
<b>Local Authority Officer</b>	Jacqueline Dicker
<b>Department</b>	Environmental Health
<b>Address</b>	Elizabeth House Church Street Stratford Upon Avon Warwickshire CV37 6HX
<b>Telephone</b>	01789 267575
<b>E-mail</b>	<a href="mailto:jacqueline.dicker@stratford-dc.gov.uk">jacqueline.dicker@stratford-dc.gov.uk</a>
<b>Report Reference Number</b>	10803172/UK/v2.0
<b>Date</b>	July 2021

## Executive Summary: Air Quality in Our Area

### Air Quality in Stratford-on-Avon District 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<sup>1,2</sup>.

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

During 2020, no monitoring locations reported an exceedance of the annual mean NO<sub>2</sub> AQS objective (40µg/m<sup>3</sup>), nor were any within 10% of the objective. The maximum reported concentration was 27.0µg/m<sup>3</sup>, reported at Studley 12 which is a new monitoring site commissioned in 2020.

Where monitoring data is available for more than one year, annual mean NO<sub>2</sub> concentrations have shown a decrease compared to what was reported in previous years. In particular, the decrease seen in annual mean NO<sub>2</sub> 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<sub>2</sub> concentrations have been gradually decreasing, or largely remaining stable (and below 40µg/m<sup>3</sup>).

Irrespective of the impacts of COVID-19, there have been more than 5 years where no exceedances of the annual mean objective have been reported in the Stratford-upon-Avon

---

<sup>1</sup> Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

<sup>2</sup> Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

<sup>3</sup> Defra. Air quality appraisal: damage cost guidance, July 2020

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

AQMA. The Council are therefore considering revoking this AQMA. In order to further support this the monitoring network has been reviewed annually to confirm there are no potential areas of exceedances.

Annual mean NO<sub>2</sub> concentrations in the Studley AQMA have now been compliant for 3 years (inclusive of 2020), however it is preferred that a review of the 2021 data is carried out prior to beginning to consider revoking this AQMA. This is because 2020 has been an atypical year and it is unknown if this large decrease is a short-term impact, but also one site (Studley 4) was reporting concentrations within 10% of the AQS objective during 2018 and 2019. Therefore, there is uncertainty with whether compliance within this AQMA will be maintained in future years.

## 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<sup>5</sup> sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero<sup>6</sup> 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 (AQMA) are designated due to elevated concentrations heavily influenced by transport emissions.

The Council had the intention to progress the draft Air Quality Action Plan (AQAP) for the Studley AQMA during 2020, allowing for public consultation to take place. However, due to the COVID-19 pandemic, the Environmental Health Department had to shift much of its focus to responding to the pandemic and therefore was not able to progress with the AQAP as intended. This has also meant many of the measures to be developed and progressed have also been delayed.

---

<sup>5</sup> Defra. Clean Air Strategy, 2019

<sup>6</sup> DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

The Council continues to be a member of the Coventry and Warwickshire Air Quality Alliance (AQA), which was established in December 2015. The Alliance's intention is to take collaborative and collective action against poor air quality, whereby officers from Environmental Health, Transport, Planning and Public Health departments meet with representatives from Public Health England to work towards the development of a shared document repository and forum for exchange of information and ideas. The Alliance's work programme includes joint support for Active Travel/Healthy Travel Choice campaigns linked with national initiatives; joint work on transport projects (e.g. cycle network bids) and the sharing of planning guidance related to Air Quality. The aim is to create a common approach to planning across Coventry and Warwickshire.

Following on from the adoption of the Air Quality and Planning Guidance in 2019, the Council has now fully adopted the Climate Change Supplementary Planning Document. This includes a chapter on reducing the need to travel by personal car which will have positive impacts on both CO<sub>2</sub> and NO<sub>2</sub> emissions.

Additionally, the Council continues to review its monitoring network, by deploying new monitoring sites in areas where it is expected that NO<sub>2</sub> concentrations are likely to be elevated.

## Conclusions and Priorities

The priorities for the Council in addressing and managing air quality within Stratford-on-Avon District Council in the coming year includes:

- Finalising the draft AQAP and associated measures for the Studley AQMA so that public consultation can take place;
- Revoke the Stratford-upon-Avon AQMA;
- Continue to monitor NO<sub>2</sub> within the current AQMAs, so any future changes in NO<sub>2</sub> concentration can be observed;
- Continue to review the monitoring network and deploy new monitoring sites in areas where elevated NO<sub>2</sub> concentrations could potentially be; and
- Work together with developers to improve sustainable transport links serving new developments and promote the inclusion of electric charging points for electric/hybrid vehicles at new development sites.

## Local Engagement and How to get Involved

As the main source of air pollution within Stratford-on-Avon is from transport sources, a way for the public to get involved with helping improving air quality within the area would be to look at alternatives to the way they travel.

The following are suggested alternatives to private travel that would help contribute to improving the air quality within the district of Stratford-on-Avon:

- Public transport – The use of the bus and train facilities, which in turn reduces pollutant concentration by reducing the number of vehicles on the road, this also helps to reduce congestion;
- Walk or cycle if your journey allows – From choosing to walk or cycle for your journey the number of vehicles is reduced and also there is the added benefit of keeping fit and healthy;
- Car/lift sharing – Where a number of individuals are making similar journeys, such as travelling to work or to school car sharing reduces the number of vehicles on the road and therefore the amount of emissions being released. This can be promoted via travel plans through the workplace and also within schools; and,
- Alternative fuel / more efficient vehicles – Choosing a vehicle that meets the specific needs of the owner, fully electric, hybrid fuel and more fuel-efficient cars are available and all have different levels benefits by reducing the amount of emissions being released.



## Table of Contents

<b>Executive Summary: Air Quality in Our Area</b> .....	<b>i</b>
Air Quality in Stratford-on-Avon District Council.....	i
Actions to Improve Air Quality .....	ii
Conclusions and Priorities .....	iii
Local Engagement and How to get Involved.....	iv
<b>1 Local Air Quality Management</b> .....	<b>1</b>
<b>2 Actions to Improve Air Quality</b> .....	<b>2</b>
2.1 Air Quality Management Areas .....	2
2.2 Progress and Impact of Measures to address Air Quality in Stratford-on-Avon .....	4
2.3 PM <sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations .....	8
<b>3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance</b> .....	<b>10</b>
3.1 Summary of Monitoring Undertaken.....	10
3.1.1 Automatic Monitoring Sites .....	10
3.1.2 Non-Automatic Monitoring Sites .....	10
3.2 Individual Pollutants.....	11
3.2.1 Nitrogen Dioxide (NO <sub>2</sub> ) .....	11
<b>Appendix A: Monitoring Results</b> .....	<b>13</b>
<b>Appendix B: Full Monthly Diffusion Tube Results for 2020</b> .....	<b>20</b>
<b>Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC</b> .....	<b>22</b>
New or Changed Sources Identified Within Stratford-on-Avon District Council During 2020.....	22
Additional Air Quality Works Undertaken by Stratford-on-Avon District Council During 2020.....	22
QA/QC of Diffusion Tube Monitoring .....	22
Diffusion Tube Annualisation.....	23
Diffusion Tube Bias Adjustment Factors .....	23
NO <sub>2</sub> Fall-off with Distance from the Road.....	25
<b>Appendix D: Maps of Monitoring Locations and AQMAs</b> .....	<b>26</b>
<b>Appendix E: Summary of Air Quality Objectives in England</b> .....	<b>28</b>
<b>Appendix F: Impact of COVID-19 upon LAQM</b> .....	<b>29</b>
Impacts of COVID-19 on Air Quality within Stratford-on-Avon District Council.....	30
Opportunities Presented by COVID-19 upon LAQM within Stratford-on-Avon District Council...	30
Challenges and Constraints Imposed by COVID-19 upon LAQM within Stratford-on-Avon District Council .....	30
<b>Glossary of Terms</b> .....	<b>33</b>
<b>References</b> .....	<b>34</b>

## Figures

Figure A.1 – Trends in Annual Mean NO <sub>2</sub> Concentrations – Stratford-upon-Avon .....	18
Figure A.2 – Trends in Annual Mean NO <sub>2</sub> Concentrations – Studley .....	19
Figure D.1 – Map of Monitoring Locations in Stratford-upon-Avon .....	26
Figure D.2 – Map of Monitoring Locations in Studley .....	27

## Tables

Table 2.1 – Declared Air Quality Management Areas .....	3
Table 2.2 – Progress on Measures to Improve Air Quality .....	7
Table 3.1 – List of New and Removed Passive Monitoring Locations .....	10
Table A.1 – Details of Non-Automatic Monitoring Sites .....	13
Table A.2 – Annual Mean NO <sub>2</sub> Monitoring Results: Non-Automatic Monitoring (µg/m <sup>3</sup> ) ....	15
Table B.1 – NO <sub>2</sub> 2020 Diffusion Tube Results (µg/m <sup>3</sup> ) .....	20
Table C.1 – Annualisation Summary (concentrations presented in µg/m <sup>3</sup> ) .....	23
Table C.2 – Bias Adjustment Factor .....	24
Table E.1 – Air Quality Objectives in England .....	28
Table F.1 – Impact Matrix .....	32

# 1 Local Air Quality Management

This report provides an overview of air quality in Stratford-on-Avon District Council during 2020. 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 Stratford-on-Avon District 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 Stratford-on-Avon District Council can be found in Table 2.1. The table presents a description of the 2 AQMAs that are currently designated within Stratford-on-Avon. Appendix D: Maps of Monitoring Locations and AQMAs provides maps of the AQMAs and also the air quality monitoring locations in relation to the AQMAs. Information on the AQMAs is also available on the [UK-AIR website](#). Both AQMAs have been declared for exceedances on the NO<sub>2</sub> annual mean AQS objective.

Stratford-on-Avon District Council propose to revoke the Stratford-upon-Avon AQMA as there have been no monitored exceedances for over 5 years within this AQMA. Although compliance was also achieved in 2020 and is likely in part due to the impacts of the COVID-19 pandemic, concentrations have been shown to be decreasing or remaining stable at the majority of locations. One site, Grove Road 2, had shown an increase in concentration from 2017-2019, but still remained below 40µg/m<sup>3</sup>. In line with the COVID-19 Supplementary Guidance, it is advised against considering revoking an AQMA based solely on 2020 data and must consider suitably robust long-term trends. Stratford-on-Avon District Council believes this to be the case with this AQMA, as the continued review of the monitoring network has been used to identify any potential NO<sub>2</sub> hotspots, and for at least 5 years there have not been any reported exceedance.

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
Studley AQMA	Declared 23rd February 2006	NO2 Annual Mean	A number of properties along a 200m stretch of Alcester Road from the junction with High Street.	NO	62µg/m <sup>3</sup>	27.0µg/m <sup>3</sup>	Action Plan, published 2008	<a href="#">Visit the AQAP for the Studley AQMA</a>
AQMA Stratford Upon Avon	Declared 21st January 2010	NO2 Annual Mean	An area encompassing most developed areas of Stratford Upon Avon and Tiddington.	NO	45µg/m <sup>3</sup>	26.1µg/m <sup>3</sup>	None currently published	-

- Stratford-on-Avon confirm the information on UK-Air regarding their AQMAs are up to date.
- Stratford-on-Avon confirm that all current AQAPs have been submitted to Defra.

## 2.2 Progress and Impact of Measures to address Air Quality in Stratford-on-Avon

Defra's appraisal of last year's ASR concluded:

1. Robust and accurate QA/QC procedures were applied. Calculations for bias adjustment, annualisation and distance-correction factors were outlined.
2. The Council has included discussion and review of its AQMAs and clear table of the monitoring strategy in the district. We welcome the additional tubes to expand the monitoring network to provide data. This demonstrates the Council's proactive and dedicated approach to improving air quality across the area.
3. Comments from last year's ASR have been mentioned and addressed. This is welcomed, and we encourage this to continue in future ASRs.
4. However, the need for an updated AQAP was mentioned in last year's ASR appraisal, and we note that some progress has been made on this. The Council is encouraged to adopt the revised AQAP in the next reporting year.
5. It is recommended that the Stratford upon Avon AQMA be revoked as soon as possible. All monitoring sites indicate that concentrations are far below objective levels and have been for the past five years.
6. The Council has an extensive NO<sub>2</sub> monitoring strategy. Monitoring of other pollutants, while not compulsory, could be considered to better inform how to tackle PM<sub>2.5</sub> pollution particularly.
7. The Public Health Outcomes Frameworks was mentioned. The Council have referred specifically to indicator D01, which is the fraction of mortality attributable to particulate air pollution, and this is encouraged.
8. It is noted that there are some discrepancies in Table 2-3 (Progress on Measures to Improve Air Quality) between the report and the ASR table provided.
9. Council have provided a clear map of the diffusion tube monitoring network; trends are displayed and discussed in the report, this is welcomed.
10. Overall the report is detailed, concise and satisfies the criteria of relevant standards. The Council should continue their good and thorough work.

The existing monitoring network continues to be reviewed by Stratford-on-Avon District Council, and in 2020 12 monitoring locations were removed and 10 new monitoring locations were deployed. Details on this is provided in Section 3.1.2.

Stratford-on-Avon District Council has been unable to make significant progress on measures during the current reporting year of 2020 due to the Environmental Health Department's involvement in the response to the COVID-19 pandemic. This has meant that officer resources and priorities have had to temporarily shift away from progressing existing measures and developing any new measures as part of the draft AQAP for Studley. Despite this, details of all measures completed, in progress or planned are set out in Table 2.2. Four measures are included within Table 2.2, with the type of measure and the progress Stratford-on-Avon District 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.

More detail on these measures can be found in their respective Action Plans. Key completed measures are:

- Full adoption of the Climate Change SPD, which includes a chapter on reducing the need to travel by personal car which will have positive impacts on both CO<sub>2</sub> and NO<sub>2</sub> emissions.

Stratford-on-Avon District Council's priorities for the coming year are to revoke the Stratford-on-Avon AQMA, but to also publish the draft Studley AQAP so that public consultation on the action plan can take place. Measures to be developed will take on board the feedback provided by Defra in regards to including specific dates for planning and completion, objective KPIs and reduction targets in order to evaluate the ongoing progress of the AQAP.

The principal challenges and barriers to implementation that Stratford-on-Avon District Council anticipates facing is a lack of funding to progress measures, but also a lack / shift of resources in response to the COVID-19 pandemic. It is hoped that workload will balance out, however there may be some catch-up required in areas that have had focus taken away from them and as such may cause additional delays.

Whilst the measures stated in Table 2.2 will help to contribute towards further reduction of concentrations across the council area, Stratford-on-Avon District Council anticipates that further additional measures not yet prescribed will be required in subsequent years to

further reduce concentrations within the Studley AQMA to below 10% of the annual mean NO<sub>2</sub> AQS objective (36µg/m<sup>3</sup>), and are intended to be included in the associated AQAP.



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	Implementation of AQ SPD	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2019	2026	SDC	N/A	No	Not Funded	-	Planning	N/A	N/A	Implementation on-going	Changing of priorities/resourcing because of the COVID-19 pandemic
2	Adoption of Developer Requirements SPD including AQ chapter (Part R)	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	-	2019	Stratford on Avon District Council	N/A	No	Not funded	-	Completed	N/A	N/A	Fully adopted	-
3	Member of Coventry and Warwickshire Air Quality Alliance	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	-	2026	Warwickshire County Council Public Health.	N/A	No	Not funded	-	Implementation	N/A	N/A	Implementation on-going	Funding and changing of priorities/resourcing because of the COVID-19 pandemic
4	Consultation on Climate Change SPD (includes chapter on reducing the need to travel by personal car)	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2019	2020	Stratford on Avon District Council	N/A	No	Not funded	-	Completed	N/A	N/A	Fully adopted – July 2020	-

## 2.3 PM<sub>2.5</sub> – 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<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Currently, there is no monitoring of PM<sub>10</sub> or PM<sub>2.5</sub> undertaken within Stratford-on-Avon District Council. Therefore, no monitored or estimated concentrations can be reported on.

The current Defra 2020 [background maps](#) (based on 2018 monitored concentrations) for the Stratford-on-Avon District Council show that all background concentrations of PM<sub>2.5</sub> are far below the recommended December 2020 annual mean objective for PM<sub>2.5</sub>. The highest concentration is predicted to be 11.2µg/m<sup>3</sup> within the 1 x 1km grid square with the centroid grid reference of 435500, 255500. This is an area to the east of the District, near to the B4100 and located east of the Lighthorne Heath industrial area that may lead to higher PM<sub>2.5</sub> concentrations. 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<sub>2.5</sub> (indicator D01) within England on a county and local authority scale. The 2019 fraction of mortality attributable to PM<sub>2.5</sub> pollution across England is 5.1%, and in contrast the fraction within the Stratford-on-Avon District Council is below the national average at 4.8%. The regional average for the West Midlands is higher at 5.3%. 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.

LAQM.TG(16) Table A.1 Action toolbox presents a list of measures that can be implemented to help reduce concentrations of PM<sub>2.5</sub>. Measures which focus on improving vehicle flow, reducing car usage, and promoting the uptake of alternative fuels will likely lead to a reduction of both NO<sub>x</sub> and PM<sub>2.5</sub> emissions.

Where required, Stratford on Avon District Council will review any proposed actions to be implemented with the County Council Public Health team to consider the potential impact of the actions and whether any further action is required.

Although Stratford-on-Avon District Council does not have any smoke control areas, some guidance in relation to bonfires is provided on their [website](#). The Council will also respond to nuisance complaints where an individual may be affected by smoke from a bonfire.

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

This section sets out the monitoring undertaken within 2020 by Stratford-on-Avon District 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

Stratford-on-Avon did not undertake and automatic (continuous) monitoring during 2020.

#### 3.1.2 Non-Automatic Monitoring Sites

Stratford-on-Avon undertook non-automatic (i.e. passive) monitoring of NO<sub>2</sub> at 19 sites during 2020. Table A.1 in Appendix A presents the details of the non-automatic sites. Following a review of the monitoring network in 2020, 12 previous sites were removed, and 9 new sites were deployed. Details of these are shown in Table 3.1.

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.

**Table 3.1 – List of New and Removed Passive Monitoring Locations**

Tube ID	Removed or New	Reason
Studley 5	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Studley 6	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Studley 8	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Studley 9	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Studley 10	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Henley 2	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Guild Street	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Greenhill Street	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Greenhill Street 2	Removed	In a sheltered position (relocated to Greenhill Street 3)

Groove Road 3	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Arden Street	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Wood Street	Removed	Consistently reporting concentrations below the annual mean NO <sub>2</sub> AQS Objective
Studley 11	New	North of Studley 4 – positioned to gain further information on NO <sub>2</sub> hotspot
Studley 12	New	North of Studley 4 – positioned to gain further information on NO <sub>2</sub> hotspot
Alcester Road 3	New	To gain NO <sub>2</sub> concentration at property façade (Alcester 2 is positioned high)
Montague House	New	Near an area identified of frequently queuing traffic
Greenhill Street 3	New	Near an area identified for having frequently queuing traffic. Site replaces Greenhill Street 2, which was in a sheltered location with restricted airflow
Evesham Place	New	Near an area identified of frequently queuing traffic
Windsor Street	New	Near an area identified of frequently queuing traffic
Birmingham Road 7	New	Drainpipe on a property south of Birmingham 3
Birmingham Road 8	New	Drainpipe on a property north of Birmingham 3

## 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<sub>2</sub>)

Table A.2 in Appendix A compares the adjusted monitored NO<sub>2</sub> annual mean concentrations for the past five years with the air quality objective of 40µg/m<sup>3</sup>. 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.

All annual mean NO<sub>2</sub> concentrations reported in Stratford-on-Avon District Council are well below the annual mean NO<sub>2</sub> AQS objective of 40µg/m<sup>3</sup> in 2020. This is likely due to the impacts of the COVID-19 pandemic and the UK Government enforced lockdowns. As detailed in Appendix F, it has been estimated that during the first lockdown, NO<sub>2</sub> concentrations decreased by up to 30%.

Despite this, concentrations across the district have overall been observed to be decreasing gradually or remaining stable if below the AQS objective for the past 5 years (where more than one year's worth of data is available). This is particularly true for the majority of monitoring locations within the Stratford-upon-Avon AQMA, where reported NO<sub>2</sub> concentrations have continued to be below the AQS objective of 40µg/m<sup>3</sup> for at least 5 years.

The maximum reported annual mean NO<sub>2</sub> concentration within the Stratford-upon-Avon AQMA in 2020 is 26.1µg/m<sup>3</sup> at Alcester Road 2, whereby a decrease of 8.9µg/m<sup>3</sup> has been observed. In 2019, the maximum reported concentration within this AQMA was 37.1µg/m<sup>3</sup> at Birmingham Road 3. In 2020, this site is now reporting a concentration of 26.0µg/m<sup>3</sup>. There has been no exceedance of the annual mean NO<sub>2</sub> AQS objective within this AQMA for the past 6 years (when considering the 2020 ASR).

The maximum reported annual mean NO<sub>2</sub> concentration within the Studley AQMA in 2020 is 27.0µg/m<sup>3</sup>, at the new monitoring location Studley 12. In 2019, this was at the Studley 4 monitoring location where a concentration of 37.6µg/m<sup>3</sup> was reported. This site had an observed exceedance in 2016 and 2017, however reported concentrations have been decreasing since.

Fall-off with distance corrections have not been carried out at any site due to all monitoring locations reporting a concentration below 36µg/m<sup>3</sup>. Additionally, as no monitoring location has reported a concentration greater than 60µg/m<sup>3</sup> this indicates that there is unlikely to be any exceedances of the 1-hour mean objective.

## 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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
Studley Background	-	Roadside	407270	263025	NO <sub>2</sub>	No	5.0	2.3	No	2.2
Studley 1	-	Roadside	407300	263989	NO <sub>2</sub>	Y - Studley AQMA	0.0	2.5	No	2.5
Studley 2	-	Roadside	407301	263914	NO <sub>2</sub>	Y - Studley AQMA	0.0	1.4	No	2.5
Studley 4	-	Roadside	407297	263850	NO <sub>2</sub>	Y - Studley AQMA	0.0	1.5	No	2.5
Studley 11	-	Roadside	407297	263864	NO <sub>2</sub>	Y - Studley AQMA	2.8	0.0	No	2.3
Studley 12	-	Roadside	407297	263838	NO <sub>2</sub>	Y - Studley AQMA	1.5	2.0	No	1.8
Alcester Road 2	-	Roadside	419705	255022	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	4.6	3.0	No	2.5
Alcester Road 3	-	Roadside	419682	255029	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	0.0	7.2	No	1.8
Tiddington Rd	-	Roadside	420727	254826	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	0.0	1.7	No	2.2
Montague House	-	Roadside	420202	255101	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	3.8	2.5	No	2.0
Greenhill Street 3	-	Roadside	419794	255014	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	2.0	3.0	No	2.2

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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
Grove Road 2	-	Roadside	419757	254918	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	0.0	1.4	No	2.5
Evesham Place	-	Roadside	419685	254604	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	0.0	3.0	No	1.8
Arden Street 2	-	Roadside	419797	255178	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	2.0	2.2	No	2.0
Windsor Street	-	Roadside	419923	255076	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	0.0	5.0	No	1.8
Stratford Background	-	Roadside	418820	255117	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	3.0	2.0	No	2.2
Birmingham Road 3	-	Roadside	419816	255601	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	3.0	1.5	No	2.2
Birmingham Road 7	-	Roadside	419828	255576	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	0.0	7.0	No	1.7
Birmingham Road 8	-	Roadside	419813	255611	NO <sub>2</sub>	Y - Stratford Upon Avon AQMA (No 1)	0.0	7.0	No	1.7

**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<sub>2</sub> Monitoring Results: Non-Automatic Monitoring (µg/m<sup>3</sup>)**

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
Studley Background	407270	263025	Roadside	90.7	90.7	-	-	13.5	12.6	9.3
Studley 1	407300	263989	Roadside	90.7	90.7	35.2	30.3	31.0	31.1	22.9
Studley 2	407301	263914	Roadside	90.7	90.7	35.9	32.3	32.3	30.2	22.4
Studley 4	407297	263850	Roadside	90.7	90.7	<b>42.1</b>	<b>40.3</b>	38.0	37.6	26.7
Studley 11	407297	263864	Roadside	82.4	82.4	-	-	-	-	25.1
Studley 12	407297	263838	Roadside	90.7	90.7	-	-	-	-	27.0
Alcester Road 2	419705	255022	Roadside	80.8	80.8	-	-	-	35.0	26.1
Alcester Road 3	419682	255029	Roadside	22.3	22.3	-	-	-	-	20.4
Tiddington Rd	420727	254826	Roadside	90.7	90.7	38.0	34.0	33.7	33.3	22.5
Montague House	420202	255101	Roadside	90.7	90.7	-	-	-	-	16.9
Greenhill Street 3	419794	255014	Roadside	90.7	90.7	-	-	-	-	21.4
Grove Road 2	419757	254918	Roadside	82.4	82.4	36.1	33.2	33.5	34.3	23.6
Evesham Place	419685	254604	Roadside	90.7	90.7	-	-	-	-	17.7

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2020 (%) <sup>(2)</sup>	2016	2017	2018	2019	2020
Arden Street 2	419797	255178	Roadside	90.7	90.7	-	-	-	-	20.3
Windsor Street	419923	255076	Roadside	81.3	81.3	-	-	-	-	13.1
Stratford Background	418820	255117	Roadside	90.7	90.7	-	-	12.8	11.5	8.7
Birmingham Road 3	419816	255601	Roadside	90.7	90.7	-	-	37.2	37.1	26.0
Birmingham Road 7	419828	255576	Roadside	90.7	90.7	-	-	-	-	19.7
Birmingham Road 8	419813	255611	Roadside	90.7	90.7	-	-	-	-	19.9

**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  $\mu\text{g}/\text{m}^3$ .

Exceedances of the NO<sub>2</sub> annual mean objective of  $40\mu\text{g}/\text{m}^3$  are shown in **bold**.

NO<sub>2</sub> annual means exceeding  $60\mu\text{g}/\text{m}^3$ , indicating a potential exceedance of the NO<sub>2</sub> 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<sub>2</sub> Concentrations – Stratford-upon-Avon

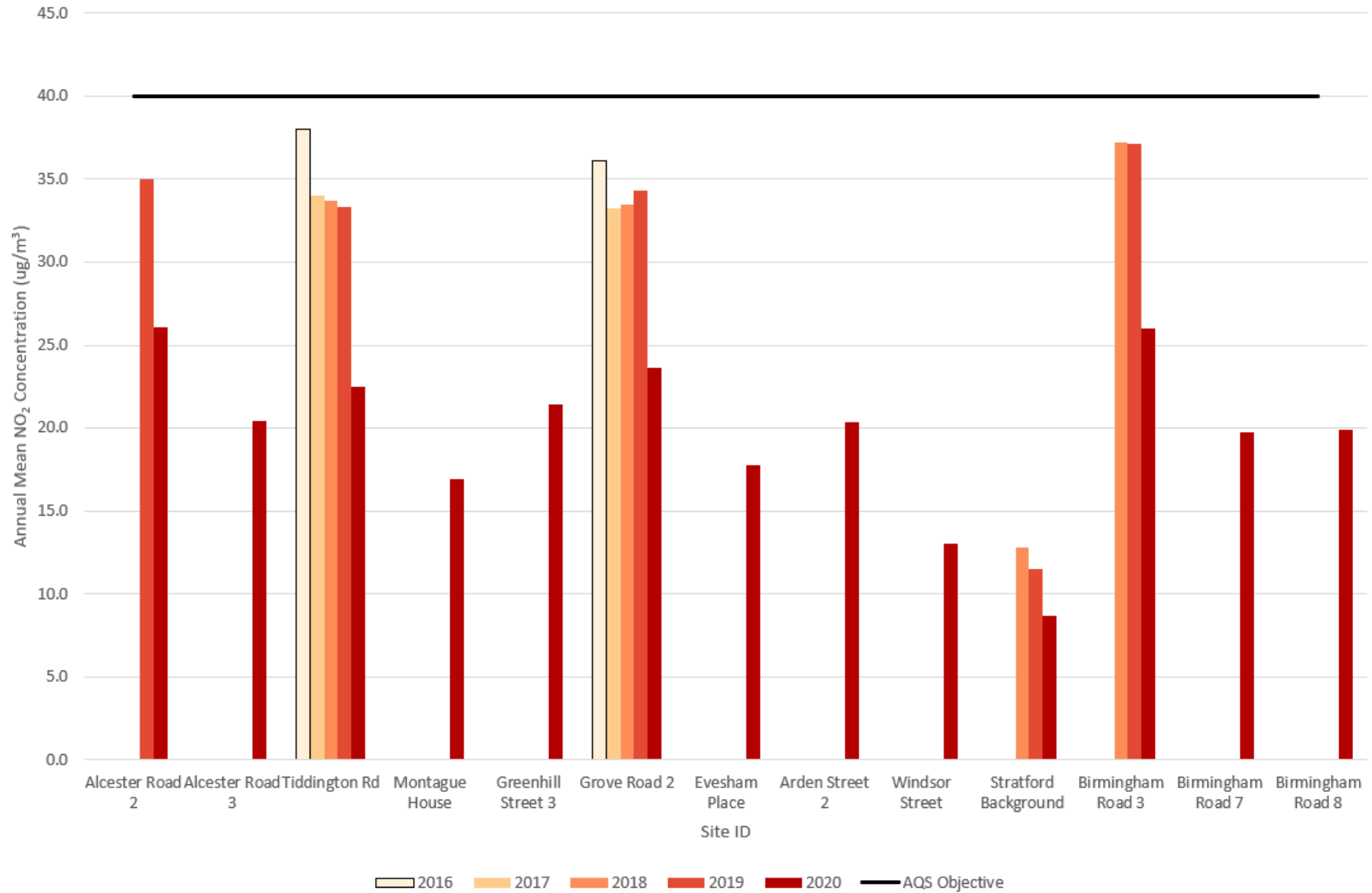
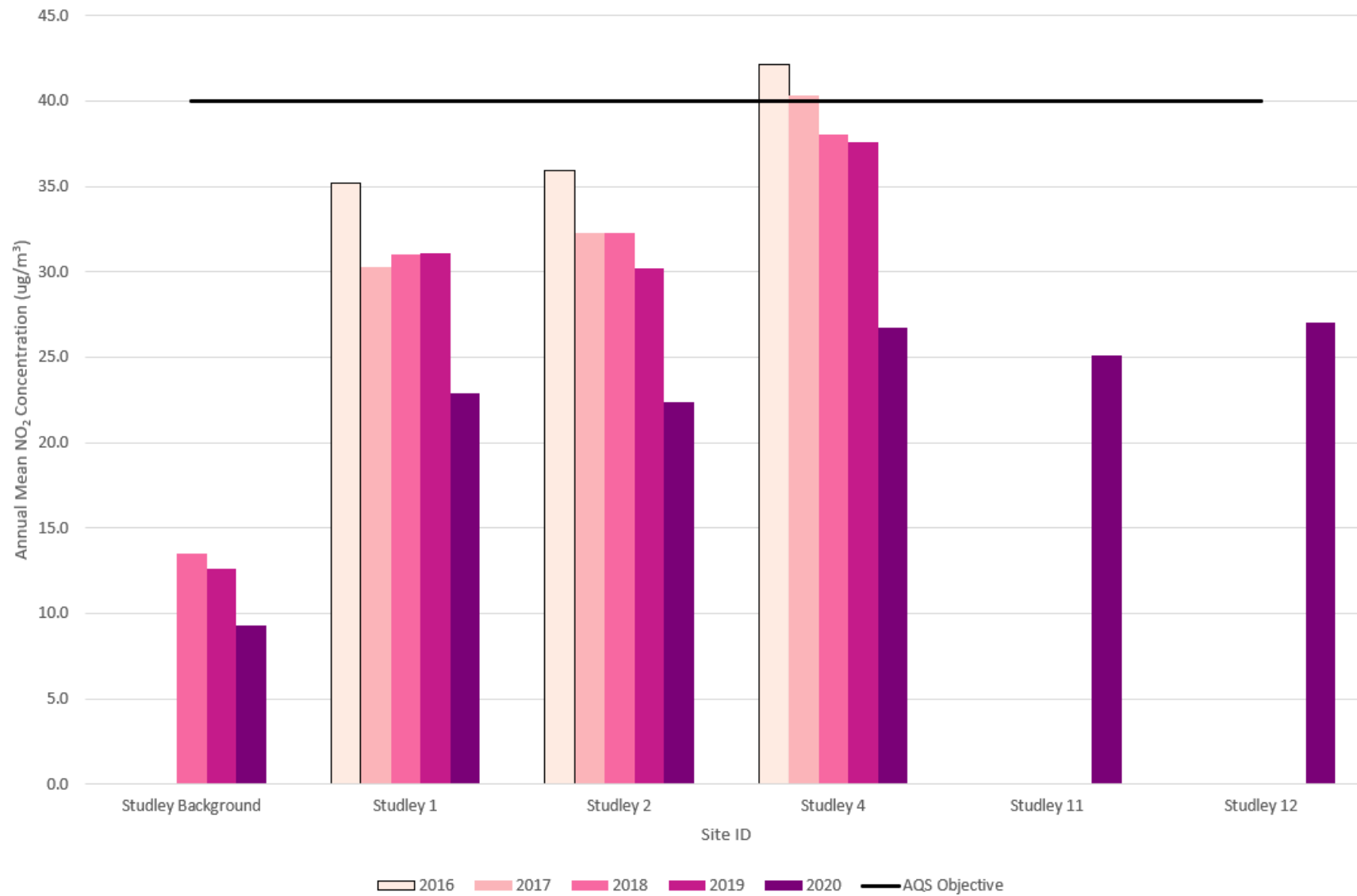


Figure A.2 – Trends in Annual Mean NO<sub>2</sub> Concentrations – Studley



## Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO<sub>2</sub> 2020 Diffusion Tube Results (µg/m<sup>3</sup>)

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
Studley Background	407270	263025	15.9	8.1	12.9	9.5		8.0	6.4	7.4	10.0	12.3	19.1	17.1	11.5	9.3		
Studley 1	407300	263989	33.7	22.7	27.4	24.0		27.6	20.0	29.7	31.4	29.0	33.1	32.0	28.2	22.9		
Studley 2	407301	263914	36.8	24.1	28.6	22.1		24.4	17.9	28.1	27.4	28.9	33.4	32.3	27.6	22.4		
Studley 4	407297	263850	40.6	29.7	36.8	28.4		31.0	21.7	30.1	33.6	33.1	39.1	39.2	33.0	26.7		
Studley 11	407297	263864	39.2	27.7	32.6	26.8		29.7	17.5	32.5		32.2	35.9	36.3	31.0	25.1		
Studley 12	407297	263838	41.8	27.7	37.1	29.5		30.1	22.2	33.4	37.1	30.3	39.3	38.8	33.4	27.0		
Alcester Road 2	419705	255022	38.6	35.5	31.2	24.0		31.3	27.0	33.8	35.9	29.7	34.6		32.2	26.1		
Alcester Road 3	419682	255029	34.4	31.8	26.9										31.0	20.4		
Tiddington Rd	420727	254826	38.9	30.1	26.2	16.7		26.0	21.6	29.0	29.9	26.1	30.3	30.3	27.7	22.5		
Montague House	420202	255101	29.5	22.7	21.1	13.9		15.8	13.5	19.1	20.7	21.8	26.1	25.9	20.9	16.9		
Greenhill Street 3	419794	255014	38.8	32.5	26.5	14.8		17.9	20.6	23.2	28.2	29.8	28.1	30.1	26.4	21.4		
Grove Road 2	419757	254918	46.2	37.2	27.5	14.7		22.8	25.6	29.5		28.3	28.8	31.3	29.2	23.6		
Evesham Place	419685	254604	29.3	26.8	21.7	12.5		17.6	18.9	19.3	22.7	22.2	25.6	24.4	21.9	17.7		
Arden Street 2	419797	255178	34.3	26.4	25.0	17.7		22.2	18.5	22.9	24.1	25.0	29.6	30.3	25.1	20.3		
Windsor Street	419923	255076	24.7	20.0	16.5	9.1		9.6	10.0	12.3	18.0		20.3	20.6	16.1	13.1		
Stratford Background	418820	255117	14.9	10.8	12.0	8.6		7.1	5.7	9.0	10.2	9.4	16.5	14.2	10.8	8.7		
Birmingham Road 3	419816	255601	42.8	32.2	33.3	25.7		31.0	26.1	22.1	38.4	27.1	36.6	37.9	32.1	26.0		
Birmingham Road 7	419828	255576	29.8	23.2	25.1	15.7		23.2	17.0	23.7	26.1	25.2	29.5	29.2	24.3	19.7		
Birmingham Road 8	419813	255611	29.7	21.1	22.6	18.4		22.6	16.2	35.7	25.1	22.3	29.6	26.8	24.6	19.9		

- All erroneous data has been removed from the NO<sub>2</sub> 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.
- ☒ Stratford-on-Avon District Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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 Stratford-on-Avon District Council During 2020

Stratford-on-Avon District Council has not identified any new sources relating to air quality within the reporting year of 2020.

### Additional Air Quality Works Undertaken by Stratford-on-Avon District Council During 2020

Stratford-on-Avon District Council has not completed any additional works within the reporting year of 2020.

### QA/QC of Diffusion Tube Monitoring

Stratford-on-Avon District Council's diffusion tubes were supplied and analysed by Gradko Internation Ltd during 2020, 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<sub>2</sub> tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO<sub>2</sub> 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  $\pm 2$  days of the specified date. The only deviation from this was in May, when no tubes were deployed for that monitoring period due to Gradko’s lab closures as a result of the COVID-19 pandemic. Additionally, Alcester 3 has low data capture in 2020 as the property it was situated on was undergoing renovations for the majority of the year. These have now been completed, and the monitoring location will be reinstated in 2021.

### Diffusion Tube Annualisation

Annualisation is required for any site with a data capture of less than 75%, but greater than 25%. One diffusion tube location required annualisation in 2020, Alcester 3. Annualisation was carried out using version 1.1 of the Diffusion Tube Data Processing Tool developed by Bureau Veritas on behalf of DEFRA and uses the most up-to-date processes as detailed in [LAQM.TG\(16\)](#). Details of the annualisation undertaken is provided in Table C.1.

**Table C.1 – Annualisation Summary (concentrations presented in  $\mu\text{g}/\text{m}^3$ )**

Diffusion Tube ID	Annualisation Factor Leamington Spa AURN	Annualisation Factor Coventry Allesley AURN	Annualisation Factor Birmingham Ladywood AURN	Average Annualisation Factor	Raw Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Annualised Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )
Alcester Road 3	0.7426	0.7895	0.9053	0.8125	31.0	25.2

### 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  $\text{NO}_x/\text{NO}_2$  continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Stratford-on-Avon District Council have applied a national bias adjustment factor of 0.81 (based on 18 studies) to the 2020 monitoring data. A summary of bias adjustment factors used by Stratford-on-Avon District Council over the past five years is presented in Table C.2.

**Table C.2 – 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	03/19	0.93
2017	National	03/18	0.89
2016	National	03/17	0.94

The national bias adjustment factors were taken from the [National Diffusion Tube Bias Adjustment Factor Spreadsheet](#) (v03\_21), and is shown in Figure C.1. This was applied as there are no co-location studies carried out within Stratford-on-Avon District Council.

**Figure C.1 – National Diffusion Tube Bias Adjustment Factor Spreadsheet version 03\_21**

National Diffusion Tube Bias Adjustment Factor Spreadsheet				Spreadsheet Version Number: 03/21						
Follow the steps below <b>in the correct order</b> to show the results of <b>relevant</b> co-location studies Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.						This spreadsheet will be updated at the end of June 2021 <a href="#">LAQM Helpdesk Website</a>				
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.				Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.						
Step 1:		Step 2:	Step 3:	Step 4:						
Select the Laboratory that Analyses Your Tubes from the Drop-Down List		Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.						
If a laboratory is not chosen, we have no data for this laboratory.		If a preparation method is not chosen, we have no data for this method at this laboratory.	If a year is not chosen, we have no data.	If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953						
Analysed By	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m <sup>3</sup> )	Automatic Monitor Mean Conc. (Cm) (µg/m <sup>3</sup> )	Bias (B)	Tube Precision <sup>4</sup>	Bias Adjustment Factor (A) (Cm/Dm)
Aberdeen Scientific Services	20% TEA in water	2020		<b>Overall Factor<sup>3</sup> (7 studies)</b>				Use	<b>0.77</b>	
Edinburgh Scientific Services	50% TEA in acetone	2020		<b>Overall Factor<sup>3</sup> (2 studies)</b>				Use	<b>0.88</b>	
Glasgow Scientific Services	20% TEA in water	2020		<b>Overall Factor<sup>3</sup> (10 studies)</b>				Use	<b>0.96</b>	
Gradko	20% TEA in water	2020		<b>Overall Factor<sup>3</sup> (18 studies)</b>				Use	<b>0.81</b>	
Gradko	50% TEA in acetone	2020		<b>Overall Factor<sup>3</sup> (14 studies)</b>				Use	<b>0.82</b>	
Lambeth Scientific Services	50% TEA in acetone	2020		<b>Overall Factor<sup>3</sup> (5 studies)</b>				Use	<b>0.96</b>	
Milton Keynes Council	20% TEA in water	2020		<b>Overall Factor<sup>3</sup> (4 studies)</b>				Use	<b>0.83</b>	
SOCOTEC Didcot	20% TEA in water	2020		<b>Overall Factor<sup>3</sup> (6 studies)</b>				Use	<b>0.74</b>	
SOCOTEC Didcot	50% TEA in acetone	2020		<b>Overall Factor<sup>3</sup> (22 studies)</b>				Use	<b>0.77</b>	
SOCOTEC Glasgow	20% TEA in water	2020		<b>Overall Factor<sup>3</sup> (1 study)</b>				Use	<b>0.79</b>	
SOCOTEC Glasgow	50% TEA in acetone	2020		<b>Overall Factor<sup>3</sup> (1 study)</b>				Use	<b>0.79</b>	
Somerset County Council	20% TEA in water	2020		<b>Overall Factor<sup>3</sup> (2 studies)</b>				Use	<b>0.76</b>	
South Yorkshire Air Quality Samplers	50% TEA in acetone	2020		<b>Overall Factor<sup>3</sup> (1 study)</b>				Use	<b>0.77</b>	
Staffordshire Scientific Services	20% TEA in water	2020		<b>Overall Factor<sup>3</sup> (15 studies)</b>				Use	<b>0.85</b>	
Tagside Scientific Services	20% TEA in water	2020		<b>Overall Factor<sup>3</sup> (1 study)</b>				Use	<b>0.75</b>	

## **NO<sub>2</sub> 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<sub>2</sub> concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO<sub>2</sub> fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO<sub>2</sub> concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO<sub>2</sub> monitoring locations within Stratford-on-Avon District Council required distance correction during 2020.

## Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Map of Monitoring Locations in Stratford-upon-Avon

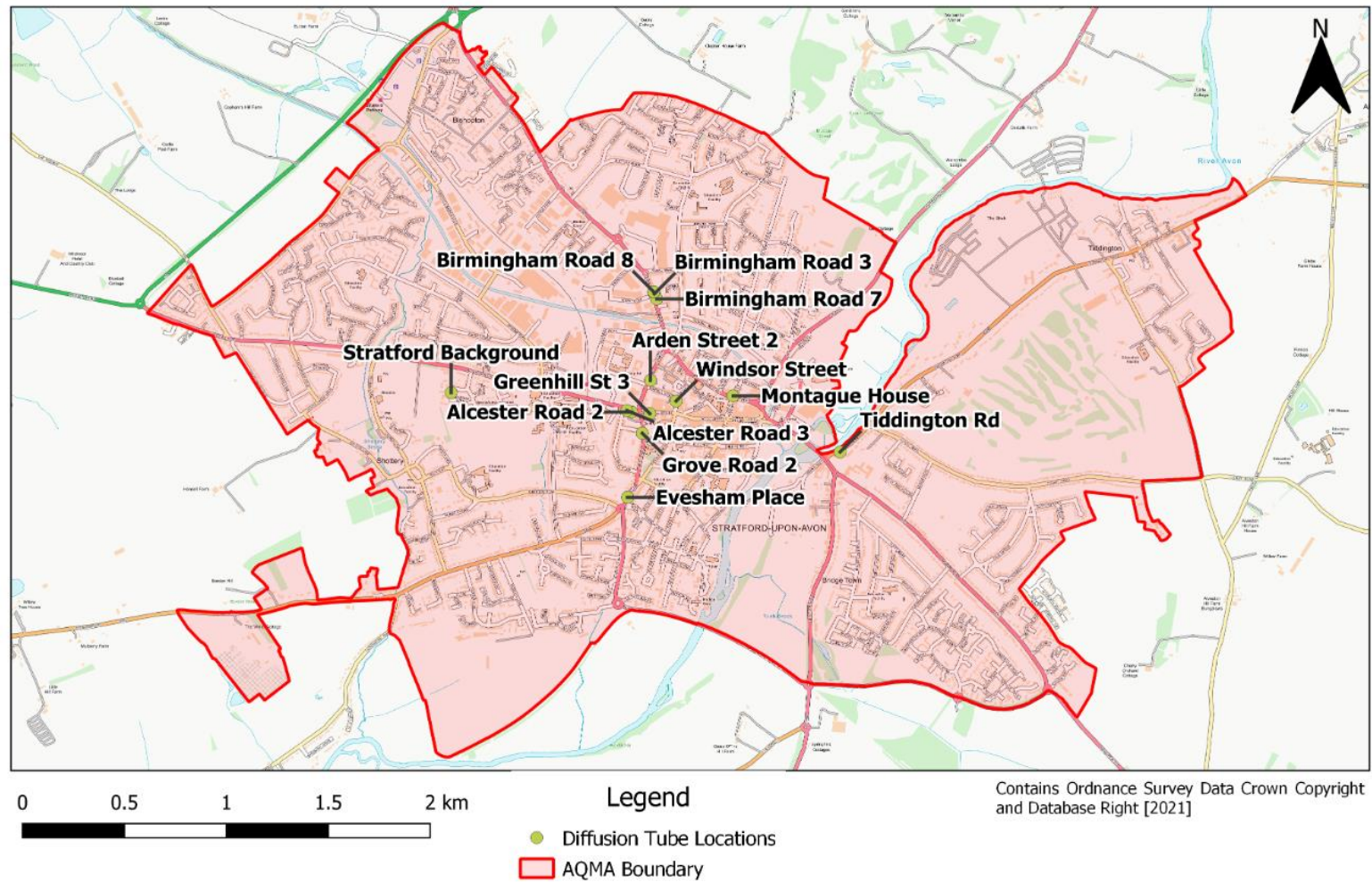
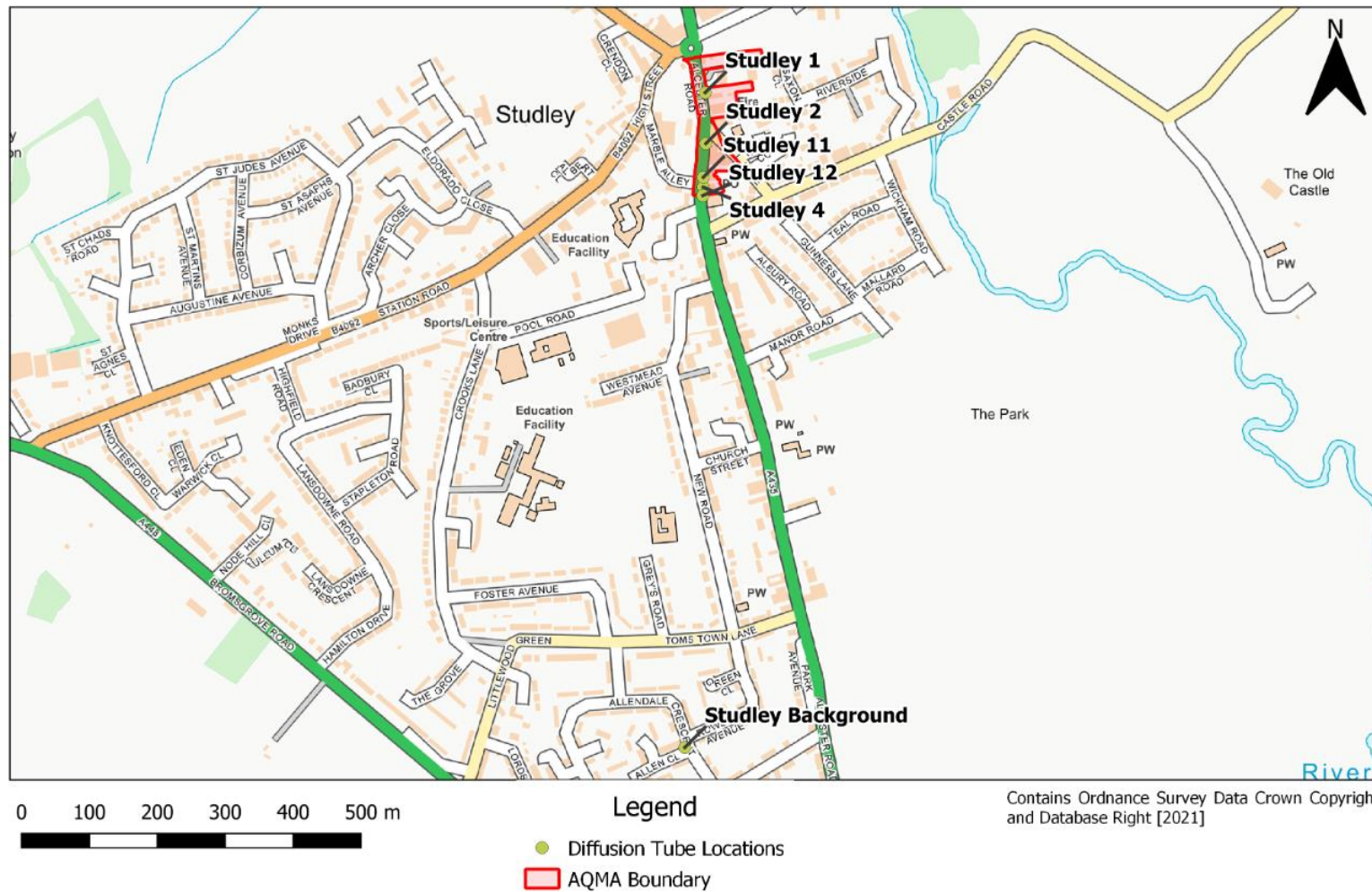


Figure D.2 – Map of Monitoring Locations in Studley



## Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England<sup>7</sup>

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO <sub>2</sub> )	40µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM <sub>10</sub> )	40µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO <sub>2</sub> )	125µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO <sub>2</sub> )	266µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>7</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## 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<sub>2</sub>) 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<sup>8</sup> 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<sub>x</sub>), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)<sup>9</sup> has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO<sub>2</sub> annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

---

<sup>8</sup> Prime Minister's Office, COVID-19 briefing on the 31<sup>st</sup> of May 2020

<sup>9</sup> 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 20 $\mu\text{g}/\text{m}^3$  if expressed relative to annual mean averages. During this period, changes in  $\text{PM}_{2.5}$  concentrations were less marked than those of  $\text{NO}_2$ .  $\text{PM}_{2.5}$  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  $\text{PM}_{2.5}$  concentrations during the initial lockdown period are of the order 2 to 5 $\mu\text{g}/\text{m}^3$  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 Stratford-on-Avon District Council**

Although traffic figures are not available, because of the UK Government's response to the COVID-19 pandemic and the subsequent lockdowns, traffic volumes had decreased throughout the district as there was guidance to work from home and to stay local where possible. This has been seen in the decrease of  $\text{NO}_2$  concentrations observed primarily in March, April and June compared to other months, but also the notable drop in annual mean  $\text{NO}_2$  concentrations compared to 2019.

Besides this, there were no other identifiable impacts as a consequence of COVID-19 upon air quality within Stratford-on-Avon.

## **Opportunities Presented by COVID-19 upon LAQM within Stratford-on-Avon District Council**

No LAQM related opportunities have arisen as a consequence of COVID-19 within Stratford-on-Avon.

## **Challenges and Constraints Imposed by COVID-19 upon LAQM within Stratford-on-Avon District Council**

The impacts on LAQM duties within Stratford-on-Avon District Council are as follows:

- Grako's laboratory closure in response to the COVID-19 pandemic meant that no tubes were supplied, and therefore not deployed for the May monitoring period.



Despite this, data capture for the majority of the monitoring locations remains to be greater than 75%. **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<sub>2</sub> concentrations in 2020 than in previous years. **Medium Impact**
- A draft AQAP is being developed for the Studley AQMA. However, owing to the reallocation of Council resources during 2020, the development and implementation of the AQAP and associated measures has been delayed. Current estimates are that the AQAP will be prepared in and sent out for draft consultation in the coming year. **Small to 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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	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.
- Stratford on Avon District Council, 2008 Draft Air Quality Action Plan.
- Stratford on Avon District Council 2020 Annual Status Report.
- Stratford on Avon District Council 2019 Annual Status Report.
- Stratford on Avon District Council 2018 Annual Status Report.
- Stratford on Avon District Council 2017 Annual Status Report.
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/21 V1 published in April 2021.