



Stratford on Avon District Council Annual Status Report 2020

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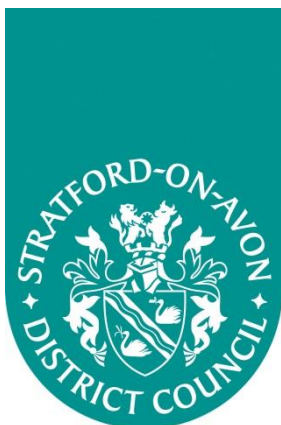
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2020 Air Quality Annual Status Report (ASR)

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

July 2020

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Executive Summary: Air Quality in Our Area

Air Quality in Stratford on Avon

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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

In 2019, there were no exceedances of the annual mean NO₂ AQS objective recorded by any of the monitoring sites currently in operation. There were two diffusion tube locations (Studley 4 and Birmingham Road 3) where the annual mean NO₂ concentration was within 10% of the objective. Studley 4 is located within the current Studley AQMA at a location of relevant exposure and this site has recorded an exceedance, or close to an exceedance, of the annual mean NO₂ AQS objective for the past 5 years. Birmingham Road 3, located within the Stratford-upon-Avon AQMA is not at a location representative of relevant exposure, following distance correction, the annual mean NO₂ concentration at the nearest relevant exposure site was 31.0µg/m³.

Within the Studley AQMA, where monitoring is available for more than one year, monitoring concentrations have reduced. The exception to this is at 'Studley 1' which increased slightly between 2018 to 2019.

Within the Stratford upon Avon, locations 'Birmingham Road 2', 'Birmingham Road 3', 'Guild Street' and 'Stratford Background' monitored lower concentrations in 2019 when compared to the 2018 monitored results. 'Grove Road 2' increased from 33.5µg/m³ to 34.3µg/m³.

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

As there have been no exceedances of annual mean NO₂ AQS objective in Stratford upon Avon AQMA in the last five years. The Council will consider revoking the AQMA as recommended by Defra.

Actions to Improve Air Quality

The Council is currently updating the Air Quality Action Plan (AQAP) for the Studley AQMA with an air quality steering group set up in 2018 to oversee the development and implementation. The meetings include representatives from the planning, public health, and transport to ensure that all relevant parties within the Council have an input into the AQAP. The AQAP is currently in draft form and has experienced delays due to the COVID-19 pandemic.

The Council is a member of the Coventry and Warwickshire Air Quality Alliance (AQA), which was established in December 2015 to take collaborative and collective action against poor air quality. 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.

Stratford on Avon District Council have developed a new Air Quality and Planning Guidance, published in July 2019, that is applicable to development within the District. Developers are required to put in place measures to minimise emissions from the development and, where necessary, offset the impact on the environment. During 2019, Stratford have been working with developers through the planning regime to promote the inclusion of electric charging points for electric/hybrid vehicles at new development sites.

As part of the consultation on the Climate Change Supplementary Planning document, measures are proposed to reduce the need to travel by personal car.

Conclusions and Priorities

The priorities for the Council in addressing the air quality in the coming year include:

- Updating the AQAP based on the dispersion modelling that has been undertaken for the Studley AQMA;
- Continue to monitor NO₂ within the current AQMAs, so any future changes in NO₂ concentration can be observed; 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 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 Stratford:

- 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.

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1 Local Air Quality Management

This report provides an overview of air quality in Stratford on Avon District Council during 2019. 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 can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMA) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMA declared by Stratford on Avon District Council can be found in Table 2-1. Further information related to declared or revoked AQMA, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=263.

Alternatively, see Appendix D: Maps of Monitoring Locations and AQMA, which provides for a map of air quality monitoring locations in relation to the AQMA.

As there have been no exceedances of annual mean NO₂ AQS objective in Stratford upon Avon AQMA in the last five years, the Council will consider revoking the AQMA.

The draft AQAP for the Studley AQMA is hoped to be updated and finalised this year but has met delays due to the COVID-19 pandemic.

Table 2-1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
Studley AQMA	Declared 23 rd February 2006	NO ₂ Annual Mean	Studley	A number of properties along a 200m stretch of Alcester Road from the junction with High Street.	NO	62	µg/m ³	37.6	µg/m ³	Action Plan	2008	Draft Air Quality Action Plan for Alcester Road Studley https://www.stratford.gov.uk/environment/air-quality-management.t.cfm
AQMA Stratford Upon Avon	Declared 21 st January 2010	NO ₂ Annual Mean	Stratford on Avon	An area encompassing most developed areas of Stratford Upon Avon and Tiddington.	NO	45	µg/m ³	37.1	µg/m ³	None	-	-

☒ Stratford on Avon District Council confirm the information on UK-Air regarding their AQMA(s) is up to date

2.2 Progress and Impact of Measures to address Air Quality in Stratford on Avon District Council

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

1. The Council should undertake their statutory obligations to publish their updated AQAP as soon as possible. This AQAP could benefit from including direct measures (where possible, e.g. traffic management measures), specific dates for planning-completion, and objective KPIs and reduction targets. This will help the Council to chart their progress. It is recommended that the AQAP also be appraised by DEFRA prior to publication. For further guidance please refer to LAQM Technical Guidance 2016 (TG16).
2. All AQMAs should be accompanied with an AQAP. The council are reminded that if the Stratford upon Avon AQMA did not require revoking, this AQMA would also require an AQAP as soon as possible.
3. 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.
4. 2020 ASR could be improved by including the calculations for distance corrections in the appendix.
5. In general, the report is well written and concise, address all the key points required from relevant standards.

The draft AQAP for Studley is currently in draft format but has been delayed due to ongoing pressures surrounding Covid-19. Public consultation will be undertaken once the AQAP has been made available. The measures to be developed within the new AQAP will take on board the feedback provided by Defra in regards to including specific dates for planning-completion, objective KPIs and reduction targets in order to evaluate the ongoing progress of the AQAP.

Due to continual compliance with the annual mean NO₂ AQS objective by all monitoring within the Stratford-upon-Avon AQMA, the Council will consider revoking the AQMA within 2020.

The current monitoring network was reviewed during 2019 with an additional eight NO₂ diffusion tubes being deployed, four diffusion tubes were relocated and four were removed. This is summarised in Table 2.1 below.

Table 2-2 Changes in Diffusion Tube Monitoring Network

2018 Tube location	Removed, Relocated or New	Reason	2019 tube ID (if applicable)
Greenhill Street	Relocated	Previously located in front of the traffic queue - new location is behind the first vehicle to capture vehicle exhausts	Greenhill Street 2
Wood Street	Relocated	Consistently below Air Quality Objective (AQO). Moved to location near bus stops due to concerns from local residents	Wood Street 2
Studley 3	Relocated	Moved from lamppost on pavement to house façade to assess actual NO ₂ levels at receptor	Studley 9
Henley High Street	Relocated to Warwick Road	Well below AQO	Henley 2
Alcester Road	Removed	Well below AQO	
Shipston Road New	Removed	Well below AQO	
Birmingham Road 1	Removed	Consistently below AQO	
Studley 7	Removed	Well below AQO	
Gyratory	New	Identified as a location at high risk of exceedance in study for South Wester Relief Road	
Birmingham Road 4	New	B'ham Road 3 consistently high - additional monitoring location to identify whether high levels persisted over a larger stretch of the road	
Birmingham Road 5	New		
Birmingham Road 6	New		
Grove Road 3	New	Identified high traffic road - Grove Road 2 consistently high, this location chosen to see if NO ₂ levels extremely localised or also affect receptors on other side of the road	
Arden Street	New	Identified high traffic road linking Birmingham Road with Alcester Road and Evesham Road	
Studley 8	New	To gather further data within Studley AQMA	
Studley 10	New	To gather further data within Studley AQMA	

Stratford on Avon District Council has taken forward a number of direct measures during the current reporting year of 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2-3.

Whilst the measures stated above and in Table 2-3 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 AQO.

Stratford on Avon District Council anticipates that further additional measures to be developed as part of the updated AQAP, and to be included in subsequent years reporting to achieve compliance and enable the revocation of Studley AQMA.

Table 2-3 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Implementation of AQ SPD	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Stratford on Avon District Council	Complete	Ongoing	N/A	N/A	Implementation ongoing	TBD	Documents being used to require appropriate AQ assessment and mitigation as part of development control process. Reports required on 4 no. sites during 2019
2	Adoption of Developer Requirements SPD including AQ chapter (Part R)	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Stratford on Avon District Council	Complete	Adopted July 2019	N/A	N/A	Completed	Adopted July 2019	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	Warwickshire County Council Public Health	Complete	Ongoing	N/A	N/A	Implementation ongoing	Ongoing	None Identified
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	Stratford on Avon District Council	Complete	Due to be adopted July 2020	N/A	N/A	Consultation completed Feb 2020	Due to be adopted July 2020	Ongoing COVID pandemic may delay completion.

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.

Currently there is no monitoring of PM_{2.5} or PM₁₀ completed within Stratford on Avon District Council, therefore no concentration values can be reported or estimated using the method as described in Box 7.7 of LAQM.TG(16).

The current Defra background maps for Stratford (2017 based⁴) show that all background concentrations of PM_{2.5} are far below the 2020 annual mean AQS objective for PM_{2.5} of 25µg/m³. The highest concentration is predicted to be 11.1µg/m³ within the 1 x 1km grid square with the centroid grid reference of (435500, 255500). This is an area to the east of Stratford on Avon District near B4100, which is located to the east of the industrial estate area that may lead to the higher PM_{2.5} concentration.

The Public Health Outcomes Framework data tool⁵ compiled by Public Health England quantifies the mortality burden of PM_{2.5} within England on a county and local authority scale. The 2018 fraction of mortality attributable to PM_{2.5} pollution across England is 5.2%, and in contrast the fraction within Stratford on Avon District Council is slightly lower than the National average at 4.7%.

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}.

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.

⁴ Defra Background Mapping data for local authorities (2017-based), available online at <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=20135>

⁵ Public Health Outcomes Framework, Public Health England. data tool available online at <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/0/qid/1000043/pat/6/par/E12000005/ati/101/are/E07000221>

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

3.1 Summary of Monitoring Undertaken

This section sets out what monitoring has taken place and how it compares with objectives.

3.1.1 Automatic Monitoring Sites

Stratford on Avon District Council does not undertake automatic (continuous) monitoring.

3.1.2 Non-Automatic Monitoring Sites

Stratford on Avon District Council undertook non-automatic (passive) monitoring of NO₂ at 25 sites during 2019. Table A.1 in Appendix A shows the details of the sites.

The changes to the diffusion tube monitoring networks in 2019 are shown in Table 2.2 above.

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.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³. Note that the concentration data presented in Table A.2 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 2019 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.

In 2019, there were no monitored exceedances of the annual mean NO₂. There were two diffusion tube locations where the annual mean concentrations were within 10% of the annual mean objective. These two sites were 'Studley 4' and 'Birmingham Road 3'. 'Studley 4' is located within the current Studley AQMA and this site has recorded an exceedance, or close to an exceedance, of the annual mean NO₂ AQS objective for the past 5 years. In the last five years, concentrations at 'Studley 4' have been the highest recorded within the monitoring network for the past five years. The diffusion tube at this site is located at the façade of a building where the relevant exposure is located on the first floor. Therefore, no distance correction is required for this location.

Birmingham Road 3, within the Stratford-upon-Avon AQMA was commissioned in 2018, this location is not representative of relevant exposure. Therefore, distance correction is required to predict the annual mean at a point of relevant exposure. The NO₂ fall-off with distance calculator has been used to estimate the annual mean NO₂ concentration at the nearest relevant exposure. Following distance correction, the annual mean NO₂ concentration at a location of relevant exposure was 31.0µg/m³ in 2019.

Figure A.1 and Figure A.2 show the trends in annual mean NO₂ concentrations at the monitoring sites over the past five years. As the monitoring location has moved within Henley, it is not considered that a comparison of 2019 monitoring data with previous years would be representative. It should be noted that at the new location the monitored concentration in 2019 at 'Henley 2' was 31.63µg/m³. The 2018 monitored result at 'High Street 1' which was also located in Henley, was 30.7µg/m³.

Within the Studley AQMA, where monitoring is available for more than one year, monitoring concentrations have reduced. The exception to this is at 'Studley 1' which increased slightly from 2018 to 2019 from 31.0µg/m³ to 31.1µg/m³.

Within the Stratford upon Avon, locations 'Birmingham Road 2', 'Birmingham Road 3', 'Guild Street' and 'Stratford Background' monitored lower concentrations in 2019 when compared to the 2018 monitored results. 'Grove Road 2' increased slightly from 33.5µg/m³ to 34.3µg/m³.

During 2019 there were no sites where the NO₂ annual mean was greater than 60µg/m³, therefore in accordance with Defra LAQM.TG(16) there are no sites likely to be at risk of exceeding the 1-hour mean AQS objective.

Appendix A: Monitoring Results

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
Alcester Road 2	-	Roadside	419705	255022	NO ₂	YES	4.6	3	NO	2.5
Arden Street	-	Roadside	419752	255070	NO ₂	YES	1.5	3.2	NO	2.5
Birmingham Road 2	-	Roadside	419591	255881	NO ₂	YES	9	2	NO	2.2
Birmingham Road 3	-	Roadside	419816	255601	NO ₂	YES	3	1.5	NO	2.2
Birmingham Road 4	-	Roadside	419803	255660	NO ₂	YES	4.3	2.7	NO	2.5
Birmingham Road 5	-	Roadside	419875	255409	NO ₂	YES	2	3	NO	2.5
Birmingham Road 6	-	Roadside	419958	255241	NO ₂	YES	0.3	4.6	NO	2.5
Greenhill Street 2	-	Roadside	419777	255017	NO ₂	YES	0 (first floor)	2.7	NO	2
Grove Road 2	-	Roadside	419757	254918	NO ₂	YES	0	1.4	NO	2.5
Grove Road 3	-	Roadside	419762	254972	NO ₂	YES	0	3.4	NO	2
Guild Street	-	Roadside	420063	255174	NO ₂	YES	0	2.5	NO	2.5
Gyratory	-	Roadside	420528	255220	NO ₂	YES	0	6	NO	2.2
Henley 2	-	Roadside	415100	265516	NO ₂	NO	2.2	0.2	NO	2.2
Stratford Background	-	Roadside	418820	255117	NO ₂	YES	3	2	NO	2.2
Studley 1	-	Roadside	407300	263989	NO ₂	YES	0	2.5	NO	2.5
Studley 10	-	Roadside	407286	263820	NO ₂	YES	6	3	NO	2.2
Studley 2	-	Roadside	407301	263914	NO ₂	YES	0	1.4	NO	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
Studley 4	-	Roadside	407297	263850	NO ₂	YES	0	1.5	NO	2.5
Studley 5	-	Roadside	407328	263704	NO ₂	NO	0	3	NO	2
Studley 6	-	Roadside	407231	264034	NO ₂	NO	0	1.8	NO	2.2
Studley 8	-	Roadside	407277	264172	NO ₂	NO	0	5.5	NO	2
Studley 9	-	Roadside	407293	264032	NO ₂	YES	1	1.4	NO	2.5
Studley Background	-	Roadside	407270	263025	NO ₂	NO	5	2.3	NO	2.2
Tiddington Road	-	Roadside	420727	254826	NO ₂	YES	0	1.7	NO	2.2
Wood Street 2	-	Roadside	420028	254987	NO ₂	YES	18.5 (first floor)	4.4	NO	2

Notes:

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

(2) N/A if not applicable.

Table A.2 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2019 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
							2015	2016	2017	2018	2019
Alcester Road 2	Roadside	419705	255022	Diffusion Tube	83.3	83.3	-	-	-	-	35.0
Arden Street	Roadside	419752	255070	Diffusion Tube	91.7	91.7	-	-	-	-	30.2
Birmingham Road 2	Roadside	419591	255881	Diffusion Tube	100.0	100.0	-	-	-	30.5	30.3
Birmingham Road 3	Roadside	419816	255601	Diffusion Tube	100.0	100.0	-	-	-	37.2	37.1
Birmingham Road 4	Roadside	419803	255660	Diffusion Tube	100.0	100.0	-	-	-	-	26.8
Birmingham Road 5	Roadside	419875	255409	Diffusion Tube	83.3	83.3	-	-	-	-	27.3
Birmingham Road 6	Roadside	419958	255241	Diffusion Tube	100.0	100.0	-	-	-	-	29.5
Greenhill Street 2	Roadside	419777	255017	Diffusion Tube	100.0	100.0	-	-	-	-	30.6
Grove Road 2	Roadside	419757	254918	Diffusion Tube	83.3	83.3	35.4	36.1	33.2	33.5	34.3
Grove Road 3	Roadside	419762	254972	Diffusion Tube	91.7	91.7	-	-	-	-	26.0
Guild Street	Roadside	420063	255174	Diffusion Tube	100.0	100.0	30.5	28.3	27.7	29.5	28.7
Gyratory	Roadside	420528	255220	Diffusion Tube	91.7	91.7	-	-	-	-	28.6
Henley 2	Roadside	415100	265516	Diffusion Tube	83.3	83.3	-	-	-	-	31.6
Stratford Background	Roadside	418820	255117	Diffusion Tube	91.7	91.7	-	-	-	12.8	11.5
Studley 1	Roadside	407300	263989	Diffusion Tube	91.7	91.7	32.4	35.2	30.3	31	31.1
Studley 10	Roadside	407286	263820	Diffusion Tube	75.0	75.0	-	-	-	-	24.7
Studley 2	Roadside	407301	263914	Diffusion Tube	100.0	100.0	33.8	35.9	32.3	32.3	30.2
Studley 4	Roadside	407297	263850	Diffusion Tube	100.0	100.0	39.5	42.1	40.3	38	37.6

Site ID	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2019 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
							2015	2016	2017	2018	2019
Studley 5	Roadside	407328	263704	Diffusion Tube	100.0	100.0	26.9	33.93	30.4	30.4	27.7
Studley 6	Roadside	407231	264034	Diffusion Tube	100.0	100.0	-	-	-	26	25.6
Studley 8	Roadside	407277	264172	Diffusion Tube	100.0	100.0	-	-	-	28.5	26.0
Studley 9	Roadside	407293	264032	Diffusion Tube	100.0	100.0	-	-	-	-	24.5
Studley Background	Roadside	407270	263025	Diffusion Tube	100.0	100.0	-	-	-	13.5	12.6
Tiddington Rd	Roadside	420727	254826	Diffusion Tube	91.7	91.7	37.7	38	34	33.7	33.3
Wood Street 2	Roadside	420028	254987	Diffusion Tube	100.0	100.0	-	-	-	-	28.5

☒ Diffusion tube data has been bias corrected

☒ Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(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%).

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.1 – Trends in Annual Mean NO₂ Concentrations: Stratford Upon Avon

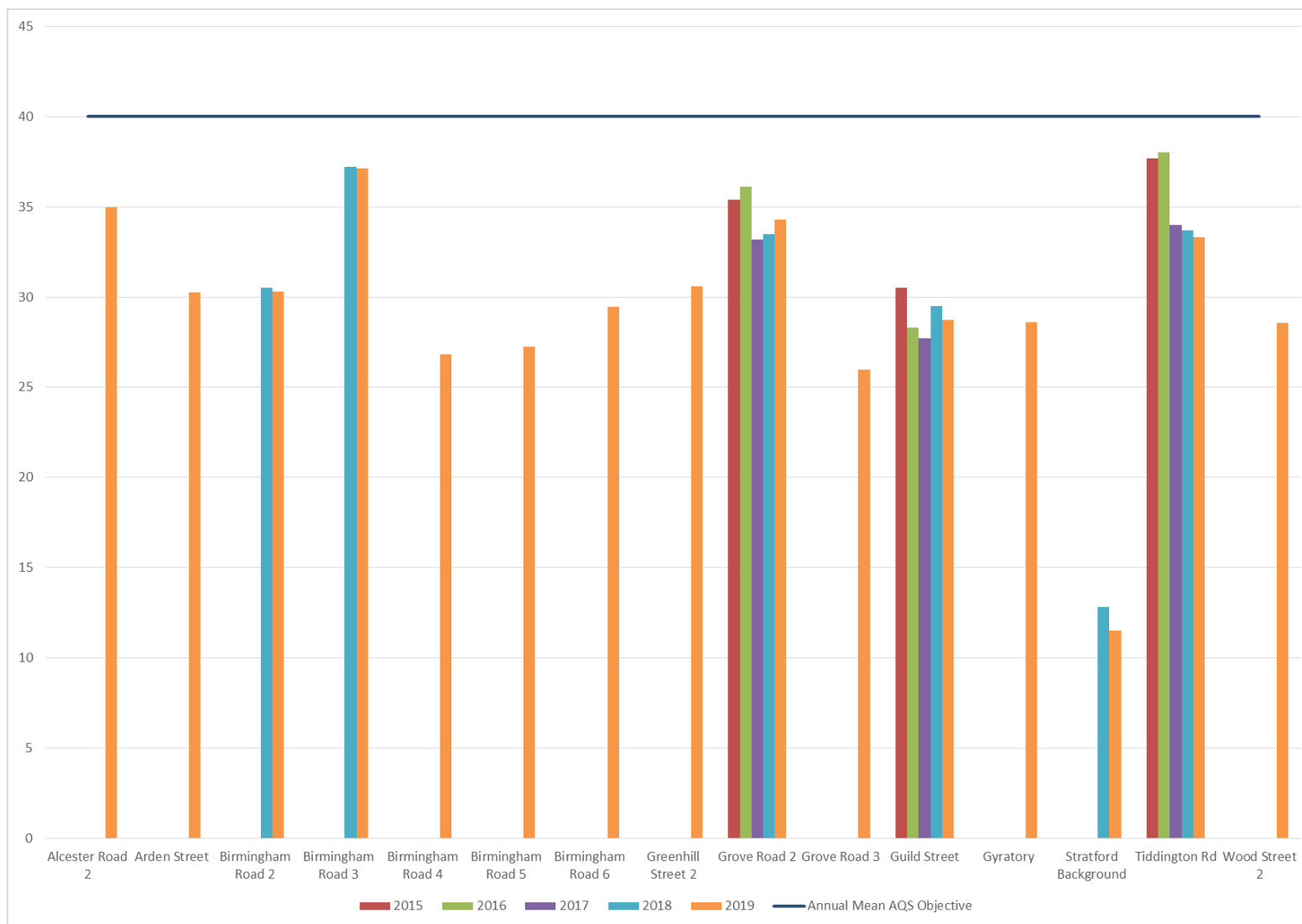
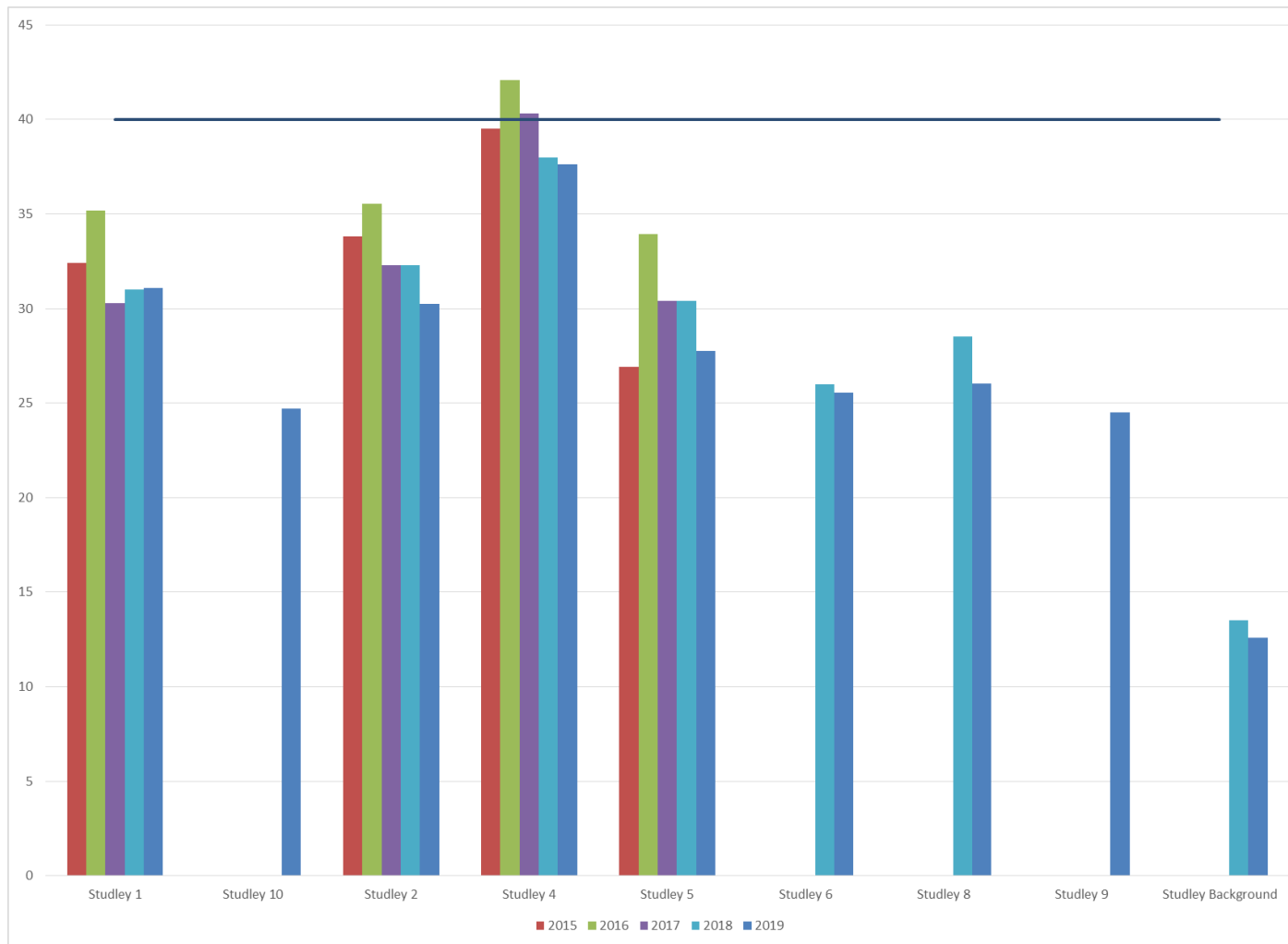


Figure A.2 – Trends in Annual Mean NO₂ Concentrations: Studley



Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO ₂ Mean Concentrations (µg/m ³)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.93) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
Alcester Road 2	419705	255022	46.9	43.8	34.1	-	37.9	32.6	36.8	32.5	36.6	41.1	-	33.5	37.6	35.0	-
Arden Street	419752	255070	-	35.1	30.0	37.8	30.6	30.3	28.5	23.7	33.4	36.2	43.8	28.4	32.5	30.2	-
Birmingham Road 2	419591	255881	44.0	33.3	26.6	36.3	31.5	30.6	27.2	26.5	30.8	31.1	39.4	33.6	32.6	30.3	-
Birmingham Road 3	419816	255601	52.2	43.7	31.9	45.7	39.8	36.8	33.1	31.1	37.2	38.6	53.9	34.9	39.9	37.1	31.0
Birmingham Road 4	419803	255660	38.6	34.8	24.1	32.3	26.3	23.5	22.0	21.5	27.0	26.9	40.2	28.6	28.8	26.8	-
Birmingham Road 5	419875	255409	40.1	33.4	23.6	-	32.4	-	26.8	19.8	31.1	31.0	30.2	24.8	29.3	27.3	-
Birmingham Road 6	419958	255241	42.4	37.6	28.2	27.5	26.5	28.8	27.2	27.2	30.9	32.0	39.7	32.1	31.7	29.5	-
Greenhill St 2	419777	255017	40.0	38.7	29.7	31.7	29.2	30.5	29.4	30.6	33.4	32.8	39.9	28.5	32.9	30.6	-
Grove Road 2	419757	254918	48.9	44.8	35.7	31.2	-	-	31.7	29.0	35.3	36.0	40.8	35.2	36.9	34.3	-
Grove Road 3	419762	254972	-	28.9	22.6	37.8	27.8	25.3	23.8	16.5	28.0	29.8	41.4	25.0	27.9	26.0	-
Guild St	420063	255174	43.0	34.6	27.2	33.7	28.5	26.8	22.7	20.5	32.0	32.2	43.3	26.4	30.9	28.7	-
Gyratory	420528	255220	38.0	31.4	27.6	38.7	26.6	26.0	22.2	-	26.8	29.8	41.4	29.8	30.8	28.6	-
Henley 2	415100	265516	42.4	41.0	33.1	-	29.0	-	26.1	26.2	33.8	32.3	46.8	29.4	34.0	31.6	-
Stratford Background	418820	255117	22.2	-	10.4	12.7	8.5	9.0	4.9	6.3	10.9	15.7	21.8	13.8	12.4	11.5	-

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO ₂ Mean Concentrations (µg/m ³)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.93) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
Studley 1	407300	263989	-	36.4	25.4	40.2	33.2	34.1	31.2	23.8	36.6	34.6	46.5	25.9	33.4	31.1	-
Studley 10	407286	263820	34.5	31.2	-	25.7	-	-	24.2	17.9	24.2	23.6	34.3	23.6	26.6	24.7	-
Studley 2	407301	263914	39.2	42.3	28.4	29.1	29.4	29.4	30.2	24.4	31.4	34.6	42.9	28.9	32.5	30.2	-
Studley 4	407297	263850	48.3	48.0	30.8	49.7	39.0	41.2	36.0	26.1	41.0	41.2	52.3	32.2	40.5	37.6	-
Studley 5	407328	263704	37.4	34.1	28.9	38.3	28.7	27.4	29.5	18.6	27.6	27.9	34.1	25.5	29.8	27.7	-
Studley 6	407231	264034	34.3	33.4	26.8	30.6	24.1	24.2	22.6	20.6	25.8	26.3	36.1	25.2	27.5	25.6	-
Studley 8	407277	264172	33.8	34.5	23.5	34.2	26.7	25.5	22.6	20.4	25.7	27.4	36.0	25.5	28.0	26.0	-
Studley 9	407293	264032	34.5	29.5	24.0	27.5	26.8	23.7	23.7	21.2	26.4	25.0	30.0	23.9	26.3	24.5	-
Studley Background	407270	263025	23.8	18.2	11.4	14.0	9.7	7.6	8.5	6.7	12.2	14.4	22.7	13.0	13.5	12.6	-
Tiddington Rd	420727	254826	37.1	42.8	28.9	37.6	32.8	32.1	32.9	32.0	38.6	-	54.5	24.7	35.8	33.3	-
Wood St	420028	254987	44.1	31.3	27.5	39.2	28.4	29.2	24.2	20.8	28.3	30.2	39.1	26.0	30.7	28.5	-
Note: Distance correction has only been completed for the monitoring locations that are not representative of exposure with the annual mean concentrations were above 36µg/m ³ .																	

- ☐ Local bias adjustment factor used
☒ National bias adjustment factor used
☒ Annualisation has been conducted where data capture is <75%
☒ Where applicable, data has been distance corrected for relevant exposure

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure where the monitored concentration is within 10% of the AQO and not monitoring is not at a location representative of a receptor.

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

Diffusion Tube National Bias Adjustment Factors

The diffusion tubes for the year 2019 were supplied and analysed by Gradko International Limited, the tubes were prepared using the 20% Triethanolamine (TEA) in water preparation method. The national bias adjustment factor for Gradko 20% TEA in water is 0.93 (based on 27 studies, version 03/20) as derived from the national bias adjustment calculator⁶.

Discussion of Choice of Factor to Use

The diffusion tube data has been corrected using a bias adjustment factor, which is an estimate of the difference between diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring. LAQM.TG(16) 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/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

With regard to the application of a bias adjustment factor for diffusion tubes, the Defra Technical Guidance LAQM.TG(16) and the LAQM Helpdesk⁷ recommend the use of a local bias adjustment factor where available and relevant to diffusion tube sites. There is no co-location study locally; therefore, the national bias adjustment of 0.93 is used to correct diffusion tube monitoring.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes for 2019 were supplied and analysed by Gradko using the 20% TEA in water preparation method. All results have been bias adjusted where required before being presented in Table B.1. Gradko is a UKAS accredited laboratory and participates in the new AIR-PT Scheme (a continuation of the Workplace Analysis

⁶ National Diffusion Tube Bias Adjustment Factor Spreadsheet version 03/19 available at <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

⁷ [Laqm.defra.gov.uk](https://laqm.defra.gov.uk)

Scheme for Proficiency (WASP)) for NO₂ tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO₂ concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance In the latest available AIR-PT results, AIR-PT Rounds 24 to 34 (January 2018 to November 2019), AIR-PT Rounds 22 to 33 (September 2017 to August 2019), AIR-PT Rounds 21 to 31 (July 2017 to May 2019) and AIR-PT Rounds 19 to 30 (April 2017 to February 2019). Gradko has scored 100% on all results in 2019 apart from AirPT AR030 (Jan - Feb 2019) which scored 75%. The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$. All Local Authority co-location studies in 2019 were rated as 'good' (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%).

Distance from Road Correction

In line with LAQM.TG(16) distance correction has been applied to NO₂ monitoring sites that have recorded an annual mean concentration above or within 10% of the annual mean objective. There are no exceedances of annual mean NO₂ AQS objective, and there are only two diffusion tube sites Birmingham Road 3 and Studley 4 within the NO₂ monitoring network that was within 10% of the NO₂ annual mean objective in 2019, Studley 4 is located at the relevant exposure but Birmingham Road 3 is not at a location representative of relevant exposure.

The NO₂ Fall-Off with Distance Calculator (v4.2) has been used to derive the NO₂ concentration at a location of relevant exposure for Birmingham Road 3; the results of the calculations are presented in Table C.1.

Table C.1– NO₂ Fall-Off With Distance Calculations

Site ID	Distance (m)		NO ₂ Annual Mean Concentration (µg/m ³)		
	Monitoring Site to Kerb	Receptor to Kerb	Background ⁸	Monitoring at Site	Predicted at Receptor
Birmingham Road 3	1.5	4.5	11.9	37.1	30.1

⁸ <https://uk-air.defra.gov.uk/data/laqm-background-home>

New Sources of Pollution

The following developments were approved which have the potential to increase pollution within the district.

Land West Of Bush Heath Lane, Harbury

Planning permission was granted for full planning permission for the change of use of agricultural land to cemetery with vehicular access from Temple End; and Outline planning permission for the erection of up to 120 dwellings and associated infrastructure with all matters reserved except for access (vehicular access proposed from Bush Heath Lane). An air quality assessment was supported as part of the application which concluded that effects would not be significant. Type 1, 2, and 3 mitigation measures were included as part of the scheme.

Land South Of The A46 West Of The Proposed Western Relief Road, Alcester Road, Stratford-upon-Avon

Planning permission was granted for a hybrid planning application comprising: Outline planning application with all matters reserved except for access for a mixed use business park comprising offices (B1a), research and development (B1b), light industry (B1c), general industrial (B2), storage and distribution (B8), car showrooms (sui generis) and bulky goods store (A1), caf   / amenity facilities (A1/A3), internal roads, car parking, service yards, pedestrian and cycle infrastructure and associated development; and full planning permission for new roundabout access from A46 and spine road, engineering operations comprising ground re-profiling, structural landscaping and associated development. An air quality assessment was supported as part of the application which concluded that effects would not be significant. Type 1, 2, and 3 mitigation measures were included as part of the scheme.

Bhs, Bridge Street, Stratford-upon-Avon

Planning permission was granted for change of use to Class C1 (Hotel) to provide 170 bedrooms and ancillary gym, restaurant, bar area. Separate Class A3/A4 restaurant (up to 817sqm) in the Listed Building. Works to include conversion; part demolition; part extension and rebuild, alterations and replacement windows and detailing etc. works and revisions to access arrangements and servicing and public realm areas;

and all associated ancillary works. no exceedances of NAQOs. No car park spaces as part of development

Stratford-upon-Avon Business And Technology Park Banbury Road Stratford-upon-Avon

Construction of 62no. dwellings (Use Class C3) with means of site access from Stratford Business and Technology Park onto Banbury Road including amenity space and all other necessary ancillary and enabling works. The development included a new pedestrian and cycleway, a new bus stop along with other Type 1 and 2 measures.

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – NO₂ Diffusion Tube Locations: Overview



Figure D.2 – NO₂ Diffusion Tube Locations: Stratford Upon Avon

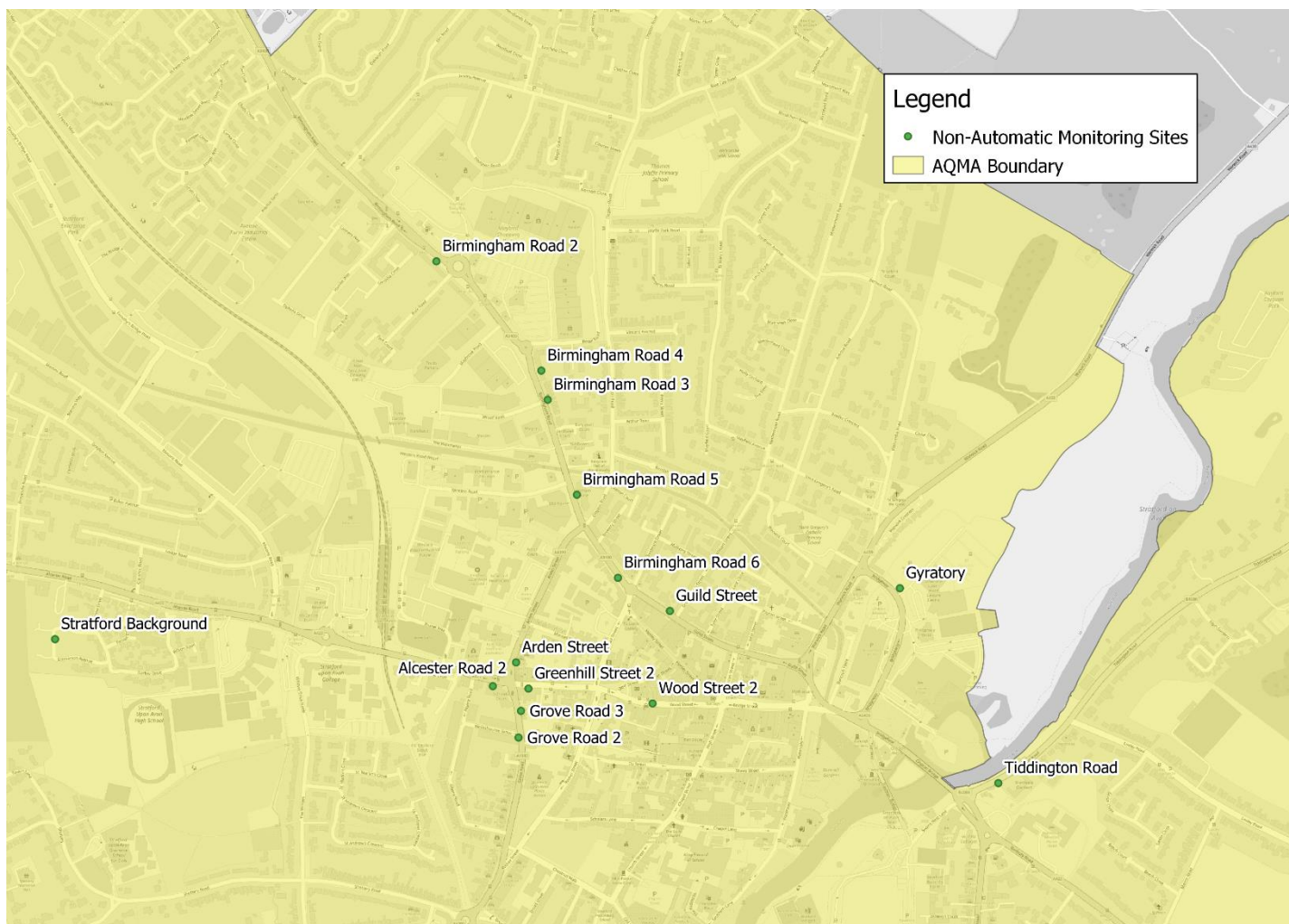
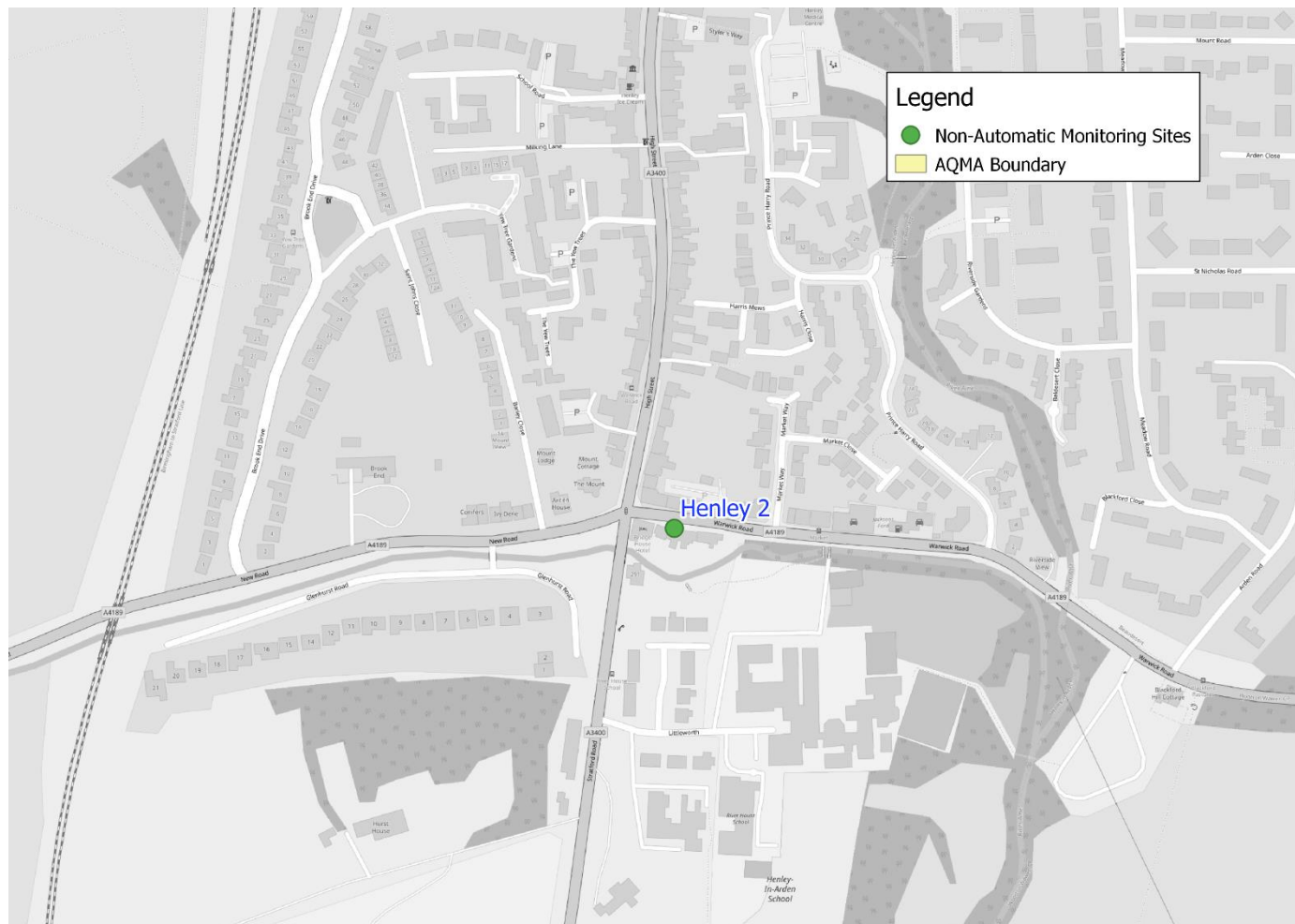


Figure D.3 – NO₂ Diffusion Tube Locations: Studley



Figure D.4 – NO₂ Diffusion Tube Locations: Henley



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁹	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM _{2.5})	25µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁹ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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	Air Quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) 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.TG(16). February 2018. 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.PG(16). 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 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 03/20 V1 published in April 2020.