



**STROUD  
DISTRICT  
COUNCIL**  
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## 2024 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995  
Local Air Quality Management, as amended by the  
Environment Act 2021

Date: June 2024

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## Executive Summary: Air Quality in Our Area

### Air Quality in Stroud District

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year<sup>1</sup>.

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution<sup>2</sup>.

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

**Table ES 1 - Description of Key Pollutants**

Pollutant	Description
Nitrogen Dioxide (NO <sub>2</sub> )	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO <sub>2</sub> )	Sulphur dioxide (SO <sub>2</sub> ) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM <sub>10</sub> and PM <sub>2.5</sub> )	<p>Particulate matter is everything in the air that is not a gas.</p> <p>Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes.</p> <p>PM<sub>10</sub> refers to particles under 10 micrometres. Fine particulate matter or PM<sub>2.5</sub> are particles under 2.5 micrometres.</p>

<sup>1</sup> UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

The most significant influence on air quality within Stroud district is road traffic emissions and the main pollutant of concern from road traffic is nitrogen dioxide (NO<sub>2</sub>). Stroud District Council locates diffusion tubes across its District to measure NO<sub>2</sub> concentrations. The tubes are replaced monthly and then sent away for analysis.

In 2023, measured concentrations of NO<sub>2</sub> were within UK Air Quality Standards (i.e., legal limits) at all monitored locations in the district. Furthermore, our latest data shows that air quality is improving. For example, in 2023, measured concentrations of NO<sub>2</sub> were lower than last year's data (2022) at all sites. Air quality is also improving across much of the UK, where road traffic is the major source of emissions, due to the replacement of older, "dirtier" vehicles with those with "cleaner" engines, including electric vehicles. As such, these results are in line with national trends.

Due to the requirement to monitor PM<sub>2.5</sub>, as a result of the Environment Act 2021, Stroud District Council has been investigating options available to it in order to fulfil its duties. Stroud District Council has been working with neighbouring authorities as part of a Gloucestershire-wide network co-ordinated by Gloucestershire County Council to develop a strategy for monitoring and reporting particulate data, as well as ensuring the availability of data to the public.

## Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan<sup>3</sup> sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter (PM<sub>2.5</sub>), the pollutant of most harm to human health. The Air Quality Strategy<sup>4</sup> provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

Stroud District Council attended the national air quality symposium in which provided a strategic and technical insight into the requirements of the Environment Act 2021, the

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<sup>3</sup> Defra. Environmental Improvement Plan 2023, January 2023

<sup>4</sup> Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

Environmental Improvement Plan and the National Air Quality Strategy. This then informed a gap analysis based on regulatory requirements and expectations and subsequently, a briefing for the Environment Committee, which will lead to a service-level action plan.

The Road to Zero<sup>5</sup> details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel, and the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

The Environmental Health team worked alongside the Climate Change team to engage local community leaders and representatives into positive action to improve local air quality and generate discussion. Stroud District Council also managed to recently re-establish relationships with the County Council after a County Climate Change & Air Quality Officer was appointed.

Stroud District Council undertakes diffusion tube monitoring for Schools Streets trials. This forms part of county-wide monitoring of closed streets where schools are located, for ThinkTravel. Information from this is to be used to support the promotion of anti-idling initiatives across Gloucestershire. Discussions also began with a local college to deliver a PM2.5 monitoring programme using wearable-monitors, which would link to the student's curriculum. In addition, the Council signed up as an official supporter of Clean Air Night.

## Conclusions and Priorities

In 2023, none of the 40 NO<sub>2</sub> monitoring locations exceeded the annual Air Quality Objective of 40 µg/m<sup>3</sup> and none were within 10% of the objective (36.0µg/m<sup>3</sup>). Of the 34 monitors which were active in 2022 and 2023, all reported decreases in NO<sub>2</sub> concentrations in 2023, and the average decrease was 3.8 µg.m<sup>-3</sup>. As such, it can be concluded that air quality improved in Stroud District in 2023.

Looking forward, Stroud District Council is working closely with neighbouring local authorities and Gloucestershire County Council on providing a digital solution to make air quality and related health data available to the public. In addition, Stroud District Council has been working with Gloucestershire County Council and other neighbouring authorities

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<sup>5</sup> DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

to explore options for monitoring particulates; particularly PM<sub>2.5</sub>, with a view to meeting long-term and short-term air quality targets to reduce PM<sub>2.5</sub> in ambient air.

## Local Engagement and How to get Involved

Stroud District Council engages with decision makers and the public through several forums. Gloucestershire Pollution Group is made up of environmental protection professionals from each of the local authorities within Gloucestershire, as well as air quality representatives from Gloucestershire County Council (GCC) and the Environment Agency. This forum allows officers to share good practice and ideas for improving air quality.

Stroud District Council is engaged with the Air Quality and Behaviour Change group. This group is made up of professionals and electoral representatives from across Gloucestershire. The group published the Gloucestershire Air Quality and Health Strategy, and has developed an [online tool to facilitate a co-ordinated approach to the monitoring and reporting of pollution across Gloucestershire](#). A district wide strategy is also under development.

Stroud District Council provides support to a Community Liaison Group set up to research air quality issues associated with an energy from waste facility operating in the Stroud district. The group is made up of local electoral representatives, Environment Agency representatives, representatives from the operator as well as members of the public.

There is significant interest in air quality issues across Stroud District and this is reflected in the political composition of the Council. Councillors actively engage in a whole range of environmental issues, including air quality. Officers regularly brief the Council's Environment Committee on air quality in the district.

The public can help to improve air quality across the district by reducing unnecessary vehicular travel. Additionally, burning household and garden waste is a particular issue in the District so, disposal of these wastes by alternative means would be beneficial.

Copies of the latest air quality report for Stroud District can be found on the Council's website at <https://www.stroud.gov.uk/environment/environmental-health/pollution-and-nuisance/air-quality>.

Queries relating to air quality should be directed to the Environmental Protection team at Stroud District Council.

## Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Stroud District Council with the support and agreement of the following officers and consultants:

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Harley Parfitt – [Greenavon Air Quality Consultants](#)

This ASR has not been signed off by a Director of Public Health, or the Public Health Manager.

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# 1 Local Air Quality Management

This report provides an overview of air quality in Stroud District during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Stroud 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 18 months. The AQAP should specify how air quality targets will be achieved and maintained and provide dates by which measures will be carried out.

Stroud District Council currently does not have any declared AQMAs.

Stroud are working towards the goals of the [Gloucestershire Air Quality and Health Strategy](#) and a district level Air Quality Strategy, to meet LAQM requirements, is under development.

## 2.2 Progress and Impact of Measures to address Air Quality in Stroud District

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

*The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports:*

*1. There is good quality discussion on the effects of PM2.5 within the district and the measures that the council are implementing to reduce the effects of PM2.5. This approach is encouraged for future reports.*

*2. There is good quality discussion on the recorded 2022 annual NO2 annual mean concentrations including listing the monitoring sites that have shown slight increases or decreases in the recorded NO2 annual mean concentrations. This allows the reader to see if air quality is getting better or worse in terms of NO2 at each monitoring site and is encouraged for future reports.*

*3. There is good quality discussion on the measures that are expected to be completed in the next reporting year, and the priorities for the council in the coming year.*

*4. The maps shown in Figures D.1 and D.2 could be made clearer as the map is quite zoomed out and the circles used to show the monitoring locations are quite large, so it is not particularly clear where precisely each monitoring location is. This should be remedied in future reports by including figures in Appendix D which is zoomed in at particular locations where there are monitoring sites close to each other so the precise location of each monitoring site can be seen more clearly.*

*5. Not all sections of Table 2.2 have been filled in and the funding status of the majority of measures included in Table 2.2 is not clear. This should be rectified in future reports.*

*6. In section 'QA/QC of Diffusion Tube Monitoring' within Appendix C, the 2021 Diffusion Tube Monitoring Calendar is referenced instead of the 2022 calendar. This should be rectified in future reports by referring to the correct Diffusion Tube Monitoring Calendar in this section.*

The Defra comments have been addressed in this ASR, with all maps updated and the funding status of measures updated in this document.

Stroud District Council has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2:1. Ten measures are included within Table 2:1, with the type of measure and the progress Stroud District Council have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2:1.

Stroud District Council has made recent progress towards improving air quality by:

- Continuing to decarbonise its fleet and estates
- Has an award-winning retrofit programme for its housing stock.
- Leading the countywide Warm and Well partnership.
- Ongoing regulation of industry through environmental permitting.
- Supporting the continuation of anti-idling initiatives around schools as part of the Gloucestershire Air Quality and Health Strategy

Stroud District Council's priorities for the coming year are to develop a district level Air Quality Strategy, for LAQM purposes, as well as continue to work towards the goals of the County wide strategy. It is also likely that Stroud will receive funding to implement particulate monitors in the district, to expand the extent of particulate monitoring across the County.

Stroud District Council worked to implement these measures in partnership with the following stakeholders during 2023:

- Neighbouring local authorities
- Gloucestershire County Council

Progress on delivering strategic and operational improvements in air quality have been slower than anticipated due to a vacant post and officer illness, and this is an ongoing challenge.

Stroud District Council anticipates that the measures stated above and in Table 2:1 will help improve air quality across Stroud.

**Table 2:1 – Progress on Measures to Improve Air Quality**

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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	Gloucestershire Local Transport Plan 2020 - 2041	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2020	2041	SDC and County Council	County Council/Government	No	Partially Funded	£1 million - £10 million	Implementation	Reduced vehicle emissions	NOx	Implementation ongoing	Lengthy timescale
2	Connecting Places Strategy - Stroud	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2020	2041	SDC and County Council	County Council	No	Partially Funded	£500k - £1 million	Implementation	Reduced vehicle emissions	NOx	Implementation ongoing	Lengthy timescale
3	Gloucestershire Air Quality and Health Strategy	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2022	2025	SDC and County Council	SDC and County Council	No	Not Funded	£10k - 50k	Planning	Reduced emissions	PM	Still in planning	Cost
4	Gloucestershire Air Quality and Health Strategy	Promoting Low Emission Transport	Other	2022	Ongoing	SDC and County Council	SDC and County Council	No	Not Funded	<£10k	Planning	Reduced vehicle emissions	NOx	Still in planning	
5	Gloucestershire Air Quality and Health Strategy	Traffic management	Anti-idling enforcement	2022	Ongoing	SDC and County Council	SDC and County Council	No	Not Funded	£10k - 50k	Planning	Reduced vehicle emissions	NOx	Still in planning	Public and schools' engagement
6	Gloucestershire Air Quality and Health Strategy	Public information	Via the internet	2022	Ongoing	SDC and County Council	SDC and County Council	No	Not Funded	<£10k -	Planning	Reduced vehicle emissions	NOx	Still in planning	
7	Extension of Cotswold Canals	Promoting Travel Alternatives	Promote use of rail and inland waterways	2022	2028	SDC and charity	SDC and heritage lottery fund	No	Funded	£1 million - £10 million	Implementation	Reduced vehicle emissions	NOx	Implementation ongoing ( <a href="#">See progress</a> )	Lengthy timescale
8	SDC carbon neutral commitment by 2030	Other	Other	2019	2030	SDC	SDC	No	Partially Funded	£1 million - £10 million	Implementation	Carbon Neutral	CO <sub>2</sub>	Implementation ongoing	Lengthy timescale
9	Improve air quality	Environmental Permits	Measures to reduce pollution through IPPC Permits going beyond BAT	Ongoing	Ongoing	SDC	Stroud Budget	No	Funded	£10k - 50k	Implementation	Reduced emissions	Number of complaints/ changes to permits	Implementation ongoing	Staffing and resource
10	Reducing transport carbon emissions	Promoting low emission transport	Taxi emission incentives	Ongoing	Ongoing	Gloucestershire local authorities	Grants/ County Council/ Stroud	No	Not Funded	£50k - £100k	Planning	Reduced emissions	Taxi fleet emission class	Still in planning	Cost

## 2.3 PM<sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), 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.

Stroud District Council is taking the following measures to address PM<sub>2.5</sub>.

Across the local authorities in Gloucestershire, monitoring of particulate matter is patchy. As a result, and because of the negative impact of particulate matter on health, Stroud District Council has been working with Gloucestershire County Council and the other neighbouring authorities to explore options for monitoring particulates; particularly PM<sub>2.5</sub>. To achieve this, Gloucestershire County Council's Sustainability team has led on creating a bidding process to access funds for air quality monitoring of particulate matter and projects in line with Gloucestershire's Air Quality and Health Strategy.

Gloucestershire's Air Quality and Health Strategy identified the need to engage the public in monitoring as this will contribute to a better understanding of air quality. Currently, the public has limited access to data on air quality throughout Gloucestershire, so a [digital solution \(through a countywide website\) to make air quality and related health data available to the public has been developed](#). The website will be interactive and provide a visual interpretation of data, in addition to breaking down air quality into simple chunks of information.

To improve the understanding of the relationship between air quality and health, the aim is to integrate air quality data with other data sources, such as health outcomes, healthcare activity, road traffic information, road safety information and, policy and planning decisions. It is hoped that in making data available for members of the public to use, they can then make informed decisions to protect themselves and also to reduce negative impacts on air quality as a result of their own actions.

Stroud District Council has dedicated webpages relating to the legal responsibilities around [bonfires](#), smoke control from [domestic sources](#) and how issues can be [reported](#).

The Public Health team at Gloucestershire County Council has led the development of the Gloucestershire Health Protection Strategy

(<https://www.gloucestershire.gov.uk/media/iutps5ee/hp-wgll-review-jan-2024.pdf>); of

which air quality is a key outcome. The links between air quality and health outcomes is accessed through the Public Health Outcomes Framework. Specifically, the fraction of mortality that is attributable to particulate air pollution indicator (new method), 2021. This indicator identifies that Stroud district's fraction of mortality attributable to particulate air pollution is 5.2%. This is 0.1% worse than the Southwest average, at 5.1%, and 0.3% better than the national average at 5.5%.

Monitoring of particulates is no longer undertaken in Stroud district. In previous years, Stroud District Council has been able to report particulate monitoring undertaken in the district using equipment supplied by a Community Liaison Group. Unfortunately, in 2022 that equipment fell into disrepair and so particulate monitoring is no longer possible. Based on previous years' measurements, particulate concentrations appeared to show a downward trend.



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

This section sets out the monitoring undertaken within 2023 by Stroud District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

### 3.1 Summary of Monitoring Undertaken

#### 3.1.1 Automatic Monitoring Sites

Stroud District Council did not undertake any automatic (continuous) monitoring during 2023.

#### 3.1.2 Non-Automatic Monitoring Sites

Stroud District Council undertook non-automatic (i.e. passive) monitoring of NO<sub>2</sub> at 40 sites during 2023. Table A.1 in Appendix A presents the details of the non-automatic sites.

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.

Air Quality monitoring ceased at six locations at the end of 2022, after annual mean concentrations were found to be well-below the relevant annual mean AQS. The tubes and the final 2022 recordings are presented below:

- **DT40**: London Road, Stroud - 24.8 µg/m<sup>3</sup>
- **DT42**: Russell Street, Stroud - 19.4 µg/m<sup>3</sup>
- **DT66**: Fullers Close, Eastington - 16.6 µg/m<sup>3</sup>
- **DT67**: The Cross, Eastington - 13.9 µg/m<sup>3</sup>
- **DT68**: Haw Street, Wotton-Under-Edge - 15.6 µg/m<sup>3</sup>
- **DT70**: Slad Road/Springfield Road, Stroud - 17.9 µg/m<sup>3</sup>

Air Quality monitoring began at the following locations in 2023:

- **DT71** Knapp Lane, Brimscombe
- **DT72:** 54, Slad Road, Stroud
- **DT73:** Edward Way, Berkeley
- **DT74:** A38, Opposite Whitminster Hotel
- **DT75:** Bracelands, Eastcombe
- **DT76:** Highwood Court, Nortonwood, Nailsworth

## 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 and [Error! Reference source not found.](#) in Appendix A compare the ratified and 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 2023 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 2023, none of the 40 monitoring locations exceeded the annual air quality objective of 40µg/m<sup>3</sup> and none were within 10% of the objective (36.0µg/m<sup>3</sup>). The highest concentration was recorded at DT27 (STROUD – BOWBRIDGE), where an annual mean concentration 27.3% below the 40 µg/m<sup>3</sup> objective was recorded.

Over the past five years, with the exception of 2021 (when it was considered that increased concentrations of NO<sub>2</sub> may have occurred as a result of the gradual release of commuters and motorists from restrictions imposed during the Covid pandemic), there has

been a general downward trend in NO<sub>2</sub> concentrations. In 2023, this trend has continued and all monitoring locations (with data for both 2022 and 2023) reported a decrease in 2023 when compared to 2022. Whilst there is a difference in the ‘bias adjustment factor’ used in 2022 (0.85) and 2023 (0.79), this pattern is the same even if the same bias adjustment factors are used for 2022 and 2023 (see Table 3.1). When using 2022’s bias adjustment factor (0.85) on 2023 results, all but one monitor (DT 27 STROUD – BOWBRIDGE) reported a decrease in concentrations, suggesting the improvement in air quality seen in 2023 is robust.

**Table 3:1: Comparison of 2022 and 2023 Data**

Diffusion Tube ID	Site name	2022 mean concentration (µg/m <sup>3</sup> ) (0.85 bias adjustment factor)	2023 mean concentration (µg/m <sup>3</sup> ) (0.79 bias adjustment factor)	Mean concentration change (µg/m <sup>3</sup> )	2023 mean concentration (µg/m <sup>3</sup> ) (0.85 bias adjustment factor)	Mean concentration change (µg/m <sup>3</sup> ) (0.85 bias adjustment factor)
25	PAINSWICK - HIGH ST LIGHTS	25.8	20.4	-5.4	21.9	-3.9
26	PAINSWICK - TRAFFIC CAMERA	26.1	22.1	-4.0	23.8	-2.3
27	STROUD - BOWBRIDGE	29.9	29.1	-0.8	31.3	1.4
28	SIGNAL HOUSE, DUDBRIDGE	28.6	22.7	-5.9	24.4	-4.2
29	STROUD - 1, SIGNAL HOUSE	32.4	26.7	-5.7	28.7	-3.7
30	STROUD - 2, SIGNAL HOUSE	29.3	24.1	-5.2	26.0	-3.3
31	STROUD - 3, SIGNAL HOUSE	28.0	23.7	-4.3	25.5	-2.5

32	STROUD - 4, SIGNAL HOUSE	21.0	18.0	-3.0	19.4	-1.6
33	STROUD - 5, SIGNAL HOUSE	20.5	18.5	-2.0	19.9	-0.6
34	UPTON ST LEONARDS - 50, WOODLAND GREEN	16.2	14.0	-2.2	15.0	-1.2
35	TREVOSE, HARDWICKE	23.6	18.9	-4.7	20.4	-3.2
36	30, HUNTS GROVE DRIVE, HARDWICKE	12.0	9.7	-2.3	10.4	-1.6
37	THE LODGE, HARESFIELD	17.4	13.6	-3.8	14.6	-2.8
38	RODBOROUGH - BATH ROAD	26.6	22.2	-4.4	23.9	-2.7
45	MORETON HILL, STANDISH	7.6	6.6	-1.0	7.1	-0.5
46	STANDISH LANE, STANDISH	10.2	7.7	-2.5	8.3	-1.9
47	LITTLE HARESFIELD, STANDISH	10.2	8.0	-2.2	8.6	-1.6
48	HARESFIELD VILLAGE HALL	9.4	7.5	-1.9	8.1	-1.3
49	HARESFIELD BEACON	8.4	6.7	-1.7	7.2	-1.2
50	HILTMEAD LANE, HARESFIELD	15.3	11.2	-4.1	12.0	-3.3

51	HARDWICKE VILLAGE HALL	12.9	8.6	-4.3	9.2	-3.7
52	Merrywalks Bus Station, Stroud - Lamp Post 64	28.3	25.1	-3.2	27.0	-1.3
53	Merrywalks South, Stroud - Lamp Post 60	30.7	24.0	-6.7	25.8	-4.9
54	Cainscross Rd, Stroud - Junction with Gannicox Road	21.4	16.5	-4.9	17.7	-3.7
55	Locking Hill Surgery, Stroud	20.9	16.0	-4.9	17.2	-3.7
56	Beeches Green, Stroud - Lamp Post 76	32.1	24.3	-7.8	26.2	-5.9
57	A46 / Grove Cottages, Stroud	19.8	16.8	-3.0	18.1	-1.7
58	A46 Bath Road, Stroud	18.6	15.9	-2.7	17.2	-1.4
59	Station Forecourt, Stroud	15.5	12.3	-3.2	13.2	-2.3
60	Stroud Town Council Offices - 58, London Road, Stroud	24.9	19.5	-5.4	21.0	-3.9
61	Parliament Street/Cornhill/Nelson Street Mini Roundabout, Stroud	17.8	13.1	-4.7	14.1	-3.7

63	SILVER STREET, DURSLEY	26.3	20.9	-5.4	22.5	-3.8
65	KNOTGRASS WAY, HARDWICKE	17.4	15.3	-2.1	16.4	-1.0
69	ELSTUB LANE, CAM	9.0	7.0	-2.0	7.5	-1.5

It should be noted that highways works took place at Bowbridge crossroads and Cowcombe Hill between 7pm and 7am, between 12/09/2023 and 17/10/2023. Between this time the road was closed, which may have diverted traffic flows past DT27 causing elevated concentrations.

## 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)
25	PAINSWICK - HIGH ST LIGHTS	Kerbside	386686	209781	NO2	No	3.2	0.5	No	2.0
26	PAINSWICK - TRAFFIC CAMERA	Kerbside	386740	209821	NO2	No	1.0	0.5	No	2.4
27	STROUD - BOWBRIDGE	Roadside	385784	204367	NO2	No	1.9	1.3	No	2.4
28	SIGNAL HOUSE, DUDBRIDGE	Roadside	383652	204557	NO2	No	5.7	2.7	No	2.4
29	STROUD - 1, SIGNAL HOUSE	Kerbside	383657	204549	NO2	No	0.9	0.7	No	1.5
30	STROUD - 2, SIGNAL HOUSE	Roadside	383665	204553	NO2	No	0.0	3.9	No	2.4
31	STROUD - 3, SIGNAL HOUSE	Roadside	383666	204552	NO2	No	0.0	2.9	No	2.4
32	STROUD - 4, SIGNAL HOUSE	Roadside	383676	204544	NO2	No	0.0	8.0	No	2.4
33	STROUD - 5, SIGNAL HOUSE	Roadside	383672	204538	NO2	No	0.0	2.5	No	5.0
34	UPTON ST LEONARDS - 50,	Kerbside	386301	215294	NO2	No	8.0	0.5	No	2.4

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)
	WOODLAND GREEN									
35	TREVOSE, HARDWICKE	Roadside	380188	211951	NO2	No	21.7	4.7	No	2.4
36	30, HUNTS GROVE DRIVE, HARDWICKE	Kerbside	381140	212269	NO2	No	23.7	0.1	No	2.4
37	THE LODGE, HARESFIELD	Other	380232	210421	NO2	No	N/A	N/A	No	2.4
38	RODBOROUGH - BATH ROAD	Roadside	384448	204934	NO2	No	4.2	1.9	No	2.4
45	MORETON HILL, STANDISH	Rural	381872	206279	NO2	No	N/A	N/A	No	2.4
46	STANDISH LANE, STANDISH	Rural	379342	208604	NO2	No	N/A	1.2	No	2.4
47	LITTLE HARESFIELD, STANDISH	Rural	380374	209112	NO2	No	N/A	0.4	No	2.4
48	HARESFIELD VILLAGE HALL	Rural	381349	210005	NO2	No	7.0	0.2	No	2.4
49	HARESFIELD BEACON	Rural	382295	209217	NO2	No	N/A	0.2	No	2.4
50	HILTMEAD LANE, HARESFIELD	Rural	380110	211214	NO2	No	N/A	N/A	No	2.4
51	HARDWICKE VILLAGE HALL	Suburban	380217	212821	NO2	No	N/A	0.6	No	2.4



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)
52	Merrywalks Bus Station, Stroud - Lamp Post 64	Roadside	384991	205352	NO2	No	N/A	2.5	No	2.7
53	Merrywalks South, Stroud - Lamp Post 60	Roadside	384868	205260	NO2	No	N/A	1.5	No	2.8
54	Cainscross Rd, Stroud - Junction with Gannicox Road	Kerbside	384389	205185	NO2	No	9.5	1.8	No	3.0
55	Locking Hill Surgery, Stroud	Roadside	385145	205414	NO2	No	N/A	1.6	No	2.7
56	Beeches Green, Stroud - Lamp Post 76	Roadside	384934	205516	NO2	No	N/A	1.9	No	2.9
57	A46 / Grove Cottages, Stroud	Roadside	384669	206344	NO2	No	23.9	1.3	No	2.7
58	A46 Bath Road, Stroud	Roadside	384717	205057	NO2	No	N/A	2.9	No	3.1
59	Station Forecourt, Stroud	Kerbside	384973	205152	NO2	No	N/A	0.3	No	2.7
60	Stroud Town Council Offices - 58, London Road, Stroud	Kerbside	385112	205085	NO2	No	N/A	0.3	No	2.7
61	Parliament Street/Cornhill/Nelson Street Mini Roundabout, Stroud	Roadside	385282	205159	NO2	No	N/A	1.1	No	2.7
63	SILVER STREET, DURSLEY	Roadside	375642	198095	NO2	No	1.5	1.2	No	2.4

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)
65	KNOTGRASS WAY, HARDWICKE	Kerbside	381378	211760	NO2	No	9.5	0.4	No	2.4
69	ELSTUB LANE, CAM	Roadside	373974	200016	NO2	No	5.8	3.6	No	2.4
71	KNAPP LANE, BRIMSCOMBE	Roadside	387569	202197	NO2	No	N/A	1.5	No	2.0
72	54, SLAD ROAD, STROUD	Roadside	385561	205551	NO2	No	2.5	0.6	No	2.6
73	EDWARD WAY, BERKELEY	Kerbside	368740	199779	NO2	No	12.0	0.5	No	2.8
74	A38, OPPOSITE WHITMINSTER HOTEL	Roadside	377676	208067	NO2	No	20.0	1.1	No	2.3
75	BRACELANDS, EASTCOMBE	Kerbside	389117	204123	NO2	No	18.0	0.6	No	2.0
76	HIGHWOOD COURT, NORTONWOOD, NAILSWORTH	Roadside	383961	200073	NO2	No	5.0	1.8	No	2.6

**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: Automatic Monitoring (µg/m<sup>3</sup>)**

Site 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 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
25	386686	209781	Kerbside	83.3	82.7	31.8	25.9	26.6	25.8	20.4
26	386740	209821	Kerbside	100	100.0	25.5	23.6	24.0	26.1	22.1
27	385784	204367	Roadside	91.7	92.3	34.6	30.9	33.4	29.9	29.1
28	383652	204557	Roadside	83.3	82.7	31.4	25.8	28.9	28.6	22.7
29	383657	204549	Kerbside	91.7	92.3	35.4	29.8	34.7	32.4	26.7
30	383665	204553	Roadside	100	100.0	31.8	29.0	31.7	29.3	24.1
31	383666	204552	Roadside	83.3	82.7	33.1	28.6	30.7	28.0	23.7
32	383676	204544	Roadside	91.7	92.3	22.2	19.1	22.0	21.0	18.0
33	383672	204538	Roadside	75	75.0	23.5	20.0	22.5	20.5	18.5
34	386301	215294	Kerbside	100	100.0	18.7	16.7	16.6	16.2	14.0
35	380188	211951	Roadside	100	100.0	28.0	25.9	25.2	23.6	18.9
36	381140	212269	Kerbside	100	100.0	-	11.3	11.8	12.0	9.7
37	380232	210421	Other	100	100.0	19.2	15.3	17.4	17.4	13.6

Site 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 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
38	384448	204934	Roadside	100	100.0	-	25.5	27.6	26.6	22.2
45	381872	206279	Rural	100	100.0	7.9	7.1	7.9	7.6	6.6
46	379342	208604	Rural	100	100.0	10.9	9.1	10.3	10.2	7.7
47	380374	209112	Rural	100	100.0	10.9	9.3	10.4	10.2	8.0
48	381349	210005	Rural	100	100.0	10.3	8.5	9.8	9.4	7.5
49	382295	209217	Rural	100	100.0	9.0	7.8	8.2	8.4	6.7
50	380110	211214	Rural	100	100.0	18.5	13.8	15.1	15.3	11.2
51	380217	212821	Suburban	100	100.0	13.1	11.5	12.4	12.9	8.6
52	384991	205352	Roadside	66.7	67.3	-	24.0	25.6	28.3	25.1
53	384868	205260	Roadside	83.3	82.7	-	29.7	30.3	30.7	24.0
54	384389	205185	Kerbside	83.3	82.7	-	20.1	21.4	21.4	16.5
55	385145	205414	Roadside	83.3	82.7	-	20.9	19.0	20.9	16.0
56	384934	205516	Roadside	83.3	82.7	-	29.0	31.6	32.1	24.3
57	384669	206344	Roadside	83.3	82.7	-	17.2	21.3	19.8	16.8

Site 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 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
58	384717	205057	Roadside	75	75.0	-	15.4	17.3	18.6	15.9
59	384973	205152	Kerbside	58.3	57.7	-	13.8	14.1	15.5	12.3
60	385112	205085	Kerbside	83.3	82.7	-	19.3	22.2	24.9	19.5
61	385282	205159	Roadside	75	75.0	-	14.3	14.6	17.8	13.1
63	375642	198095	Roadside	91.7	92.3	-	-	25.5	26.3	20.9
65	381378	211760	Kerbside	91.7	90.4	-	-	16.7	17.4	15.3
69	373974	200016	Roadside	100	100.0	-	-	-	9.0	7.0
71	387569	202197	Roadside	100	100.0	-	-	-	-	10.2
72	385561	205551	Roadside	91.7	92.3	-	-	-	-	13.1
73	368740	199779	Kerbside	100	100.0	-	-	-	-	8.8
74	377676	208067	Roadside	91.7	92.3	-	-	-	-	15.8
75	389117	204123	Kerbside	100	100.0	-	-	-	-	6.8
76	383961	200073	Roadside	75	75.0	-	-	-	-	12.4

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

- ☒ **Reported concentrations are those at the location of the monitoring site (annualised, as required), i.e. prior to any fall-off with distance correction**
- ☒ **Where exceedances of the NO<sub>2</sub> annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023**

**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**.

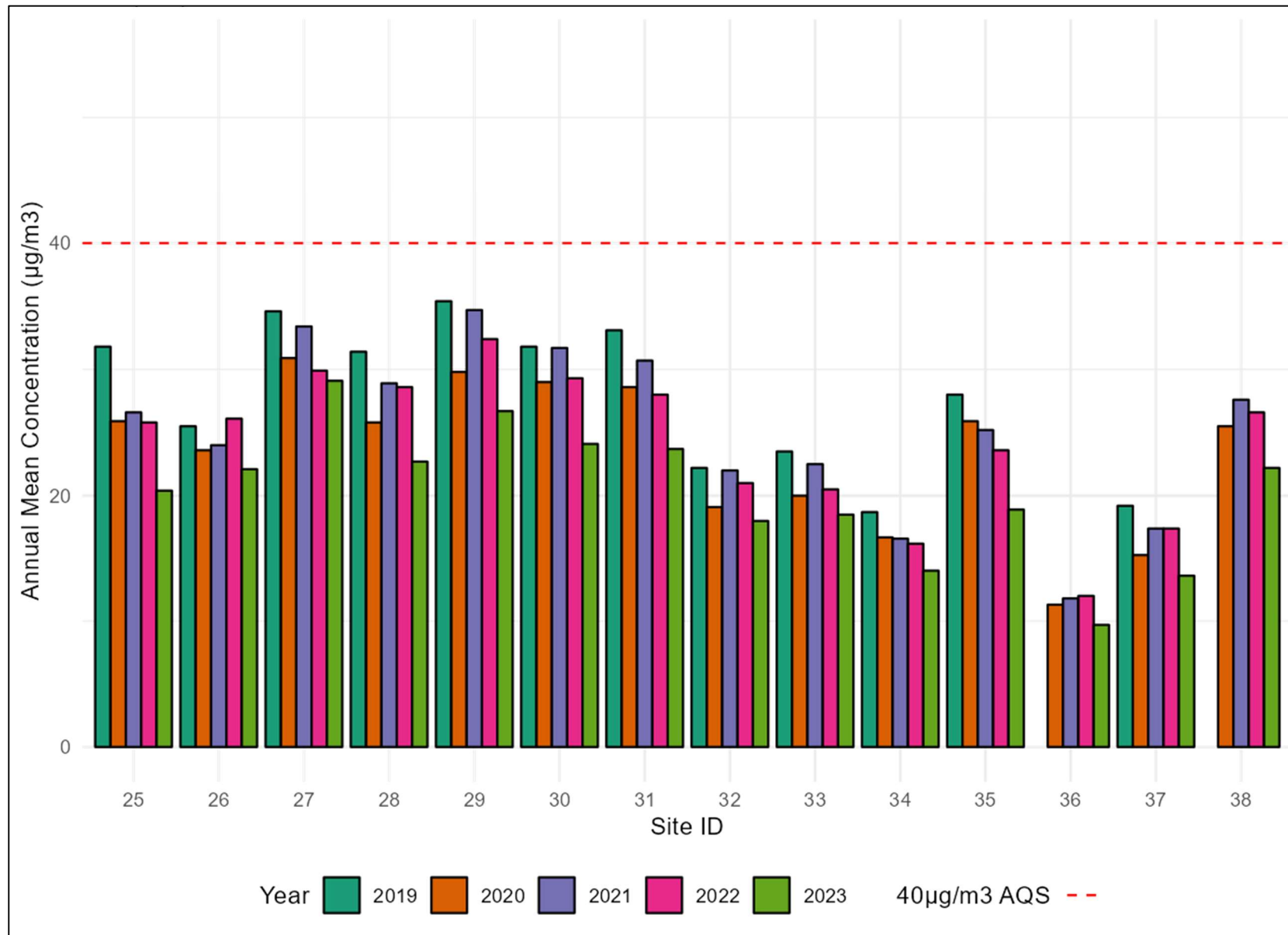
All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

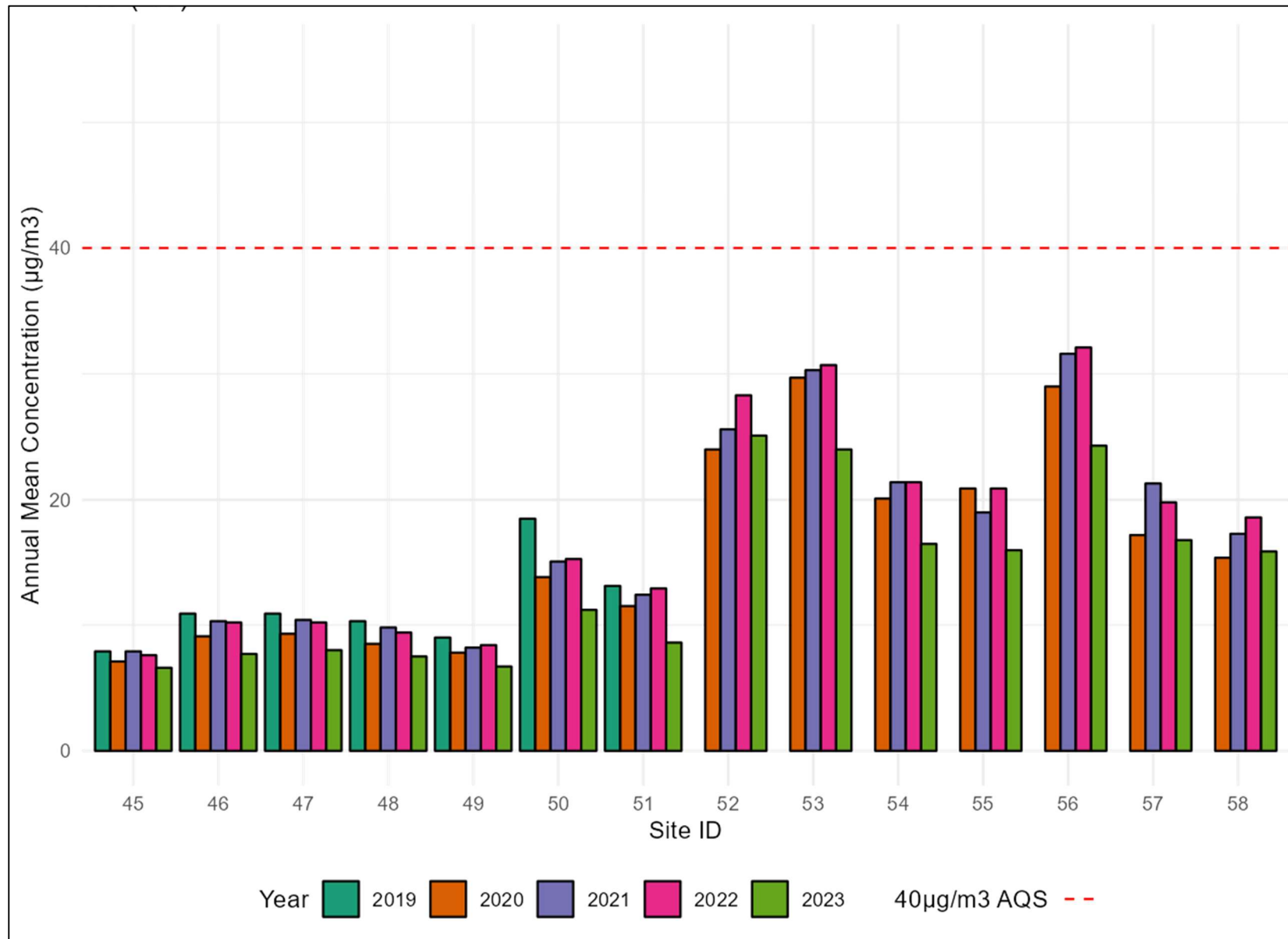
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(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**

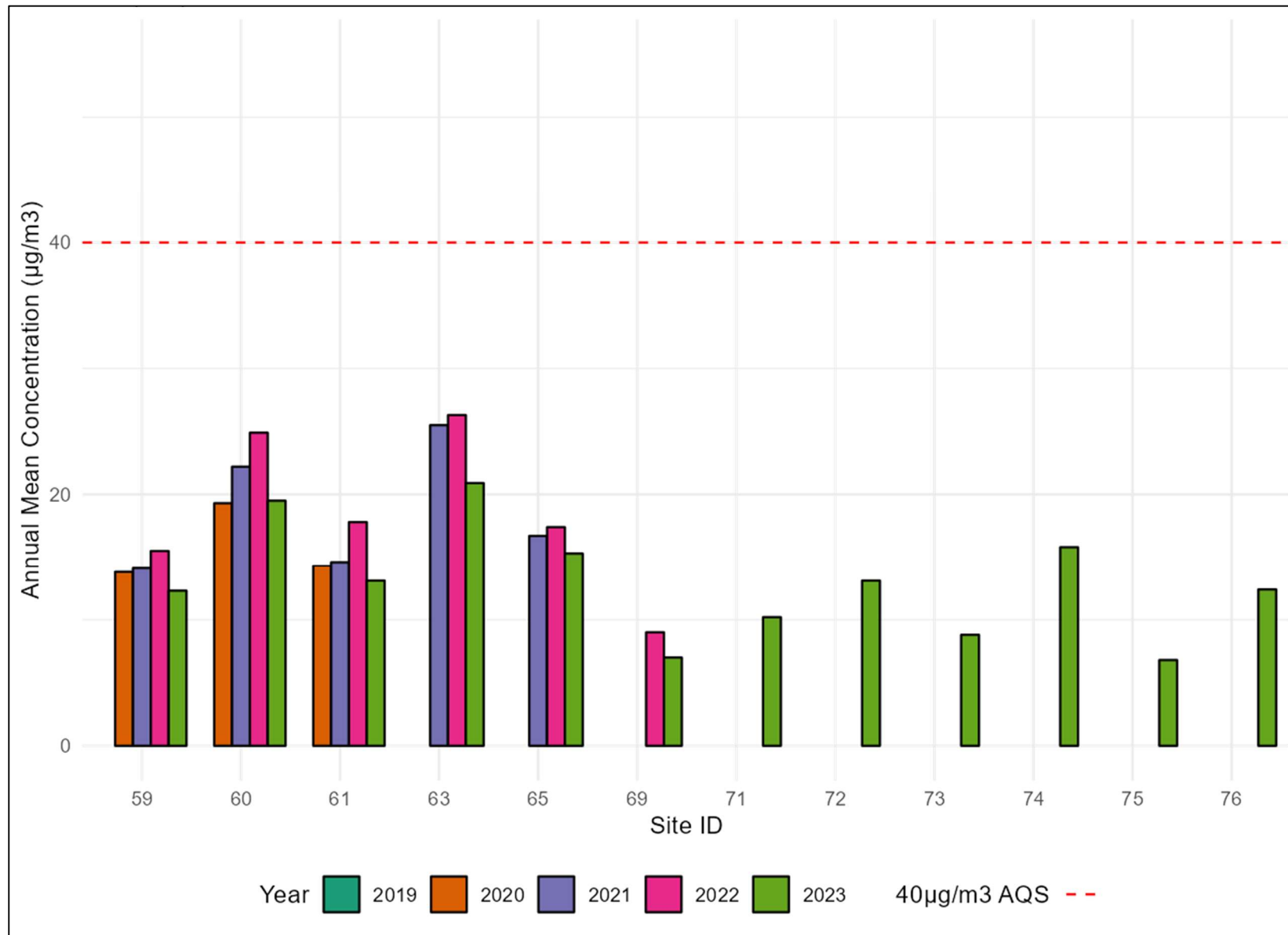


**Figure A.2 – Trends in Annual Mean NO<sub>2</sub> Concentrations**





**Figure A.3 – Trends in Annual Mean NO<sub>2</sub> Concentrations**



## Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO<sub>2</sub> 2023 Diffusion Tube Results (µg/m<sup>3</sup>)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.79	Annual Mean: Distance Corrected to Nearest Exposure	Comment
25	386686	209781	33.0	37.6	Missing	20.2	Missing	14.7	21.2	25.2	21.2	26.1	30.5	27.8	25.8	20.4	-	
26	386740	209821	29.4	35.8	25.6	26.4	22.2	17.5	24.7	21.6	30.4	31.5	39.6	31.1	28.0	22.1	-	
27	385784	204367	38.7	39.5	32.0	38.0	Missing	27.7	33.0	36.4	40.1	42.4	42.3	34.9	36.8	29.1	-	
28	383652	204557	Missing	35.7	Missing	34.5	33.1	25.1	25.6	22.1	27.5	27.4	28.0	28.2	28.7	22.7	-	
29	383657	204549	Missing	39.0	31.4	38.6	36.7	29.4	27.6	33.5	36.0	39.6	31.6	28.1	33.8	26.7	-	
30	383665	204553	33.3	33.7	25.7	31.7	35.5	24.0	25.0	28.7	32.5	33.9	34.1	28.4	30.5	24.1	-	
31	383666	204552	30.1	Missing	Missing	31.7	30.7	22.9	24.9	27.1	29.7	31.3	43.5	28.4	30.0	23.7	-	
32	383676	204544	27.5	36.7	20.3	18.7	25.9	17.2	18.0	19.1	20.3	23.5	23.5	Missing	22.8	18.0	-	
33	383672	204538	Missing	27.8	20.2	24.2	25.9	17.3	Missing	20.5	23.3	27.4	24.3	Missing	23.4	18.5	-	
34	386301	215294	23.1	23.7	17.3	15.3	14.2	10.3	13.3	14.6	13.1	16.3	34.7	16.0	17.7	14.0	-	
35	380188	211951	28.3	30.0	22.5	21.2	19.4	15.7	24.4	26.0	30.1	27.3	16.1	26.7	24.0	18.9	-	
36	381140	212269	17.7	18.3	11.4	9.6	7.6	5.6	8.4	10.0	10.4	13.8	22.7	11.5	12.2	9.7	-	
37	380232	210421	19.8	20.4	19.7	18.6	13.6	11.3	12.8	15.0	17.9	18.7	24.7	13.3	17.2	13.6	-	
38	384448	204934	36.4	34.2	22.5	27.9	22.2	20.6	21.6	24.5	27.1	32.9	40.7	26.4	28.1	22.2	-	
45	381872	206279	11.5	10.7	9.9	5.6	4.5	4.1	7.9	5.5	6.8	9.6	15.9	7.5	8.3	6.6	-	
46	379342	208604	13.9	15.7	8.3	8.0	7.5	5.5	7.0	8.6	9.3	10.9	15.1	7.5	9.8	7.7	-	
47	380374	209112	14.7	12.8	9.0	8.1	7.8	6.3	7.4	9.4	10.2	12.6	15.9	7.8	10.2	8.0	-	
48	381349	210005	12.9	12.7	9.1	8.1	6.9	6.7	7.3	7.5	9.0	11.4	14.1	8.1	9.5	7.5	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.79	Annual Mean: Distance Corrected to Nearest Exposure	Comment
49	382295	209217	10.2	10.4	8.1	7.1	6.2	5.5	7.7	6.9	8.4	10.2	13.0	7.6	8.4	6.7	-	
50	380110	211214	17.5	19.1	15.0	15.8	11.2	9.8	10.3	11.5	14.7	16.7	18.2	10.0	14.1	11.2	-	
51	380217	212821	15.1	16.1	11.7	11.0	7.4	5.6	8.1	9.3	10.9	13.2	14.5	7.3	10.9	8.6	-	
52	384991	205352	Missing	Not Done	Not Done	28.0	24.5	27.2	26.9	25.7	Missing	36.2	27.3	25.5	27.7	25.1	-	
53	384868	205260	40.3	Not Done	Not Done	32.6	18.6	30.3	31.3	18.4	32.9	34.5	30.9	33.6	30.3	24.0	-	
54	384389	205185	28.8	Not Done	Not Done	20.4	17.6	19.9	15.4	14.5	23.1	26.6	25.6	16.6	20.9	16.5	-	
55	385145	205414	28.1	Not Done	Not Done	17.9	11.2	21.0	19.3	13.8	22.5	23.3	22.2	22.9	20.2	16.0	-	
56	384934	205516	35.0	Not Done	Not Done	34.0	28.5	35.9	29.9	25.4	36.6	21.1	30.9	30.6	30.8	24.3	-	
57	384669	206344	24.1	Not Done	Not Done	19.3	14.6	22.2	13.1	15.3	20.9	38.5	26.8	18.3	21.3	16.8	-	
58	384717	205057	26.3	Not Done	Not Done	20.6	18.8	20.9	19.0	14.0	18.6	22.5	21.0	Missing	20.2	15.9	-	
59	384973	205152	23.1	Not Done	Not Done	15.6	7.6	15.7	12.5	Missing	Missing	14.0	21.0	Missing	15.7	12.3	-	
60	385112	205085	30.8	Not Done	Not Done	27.6	17.1	24.9	20.3	18.2	28.2	28.5	26.8	24.7	24.7	19.5	-	
61	385282	205159	24.0	Not Done	Not Done	15.7	12.0	16.2	11.7	13.0	15.9	20.9	19.4	Missing	16.6	13.1	-	
63	375642	198095	34.0	37.8	28.5	Missing	19.0	17.5	21.0	20.9	24.9	29.9	32.6	25.3	26.5	20.9	-	
65	381378	211760	22.7	23.1	15.3	16.7	12.1	10.2	16.8	16.9	18.8	40.7	Missing	19.3	19.3	15.3	-	
69	373974	200016	13.4	13.9	8.7	7.4	5.3	4.8	7.0	4.6	8.4	11.0	14.8	6.7	8.8	7.0	-	
71	387569	202197	23.4	15.5	12.7	12.4	8.7	9.0	9.5	9.3	11.8	14.4	17.7	10.8	12.9	10.2	-	
72	385561	205551	Missing	22.8	15.8	17.2	13.5	12.7	16.0	13.5	16.9	19.6	15.9	18.0	16.5	13.1	-	
73	368740	199779	15.5	12.3	9.9	15.1	8.0	5.4	8.7	9.2	10.6	14.2	15.8	8.8	11.1	8.8	-	
74	377676	208067	Missing	28.9	21.8	21.0	18.5	16.5	14.2	17.0	18.7	25.0	22.9	15.0	19.9	15.8	-	
75	389117	204123	12.2	9.8	8.2	7.7	5.5	4.8	7.3	5.7	7.7	8.9	18.7	7.1	8.6	6.8	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.79	Annual Mean: Distance Corrected to Nearest Exposure	Comment
76	383961	200073	23.9	11.8	Missing	9.3	19.0	5.2	Missing	7.7	9.9	31.4	22.7	Missing	15.7	12.4	-	

- 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.TG22
- Local bias adjustment factor used
- National bias adjustment factor used
- Where applicable, data has been distance corrected for relevant exposure in the final column
- Stroud District Council confirm that all 2023 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 Stroud District Council During 2023**

Stroud District Council has not identified any such new sources relating to air quality within the reporting year of 2023.

### **Additional Air Quality Works Undertaken by Stroud District Council During 2023**

Stroud District Council has not completed any additional works within the reporting year of 2023.

### **QA/QC of Diffusion Tube Monitoring**

In undertaking air quality monitoring in its District, Stroud District Council uses diffusion tubes provided by Somerset County Council / Somerset Scientific Services (SSS) that have been prepared in 20% TEA in water. To obtain laboratory accreditation to undertake the analysis of diffusion tubes, SSS participates in an external laboratory scheme called the Air & Stack Emissions Scheme. This is a proficiency testing scheme operated through the Laboratory of the Government Chemist (LGC). SSS is required to undertake four rounds of testing per year, which must be confirmed as accurate, before SSS can be ratified to undertake analysis.

SSS is also included in the annual field inter-comparison exercise from which the bias adjustment factor is obtained. The precision of the current 4 SSS co-location studies in 2023 detailed within the national bias adjustment factor spreadsheet (version 03/24) was 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%), adding to the confidence in the measurements and SSS procedures.

SSS analyses diffusion tubes using the colorimetry method. This method requires a solution to be added to the diffusion tubes so that the nitrite collected on the grids within the tubes is dissolved. The solution reacts with nitrite collected in the tube to produce a coloured compound. The intensity of the colour produced is then measured using

spectrophotometry and is calibrated against a set of standard nitrite solutions to identify the concentration of nitrite present in the sample. The concentration is then used to calculate the mass of nitrite collected by the tube from which an average ambient concentration of NO<sub>2</sub> is calculated for the exposure period.

Diffusion tube monitoring has been undertaken in accordance with the 2023 Diffusion Tube Monitoring Calendar.

### Diffusion Tube Annualisation

Two diffusion tube monitors within Stroud District recorded data capture of less than 75% and therefore it was necessary to annualise this data. Table C.1 shows the calculation for Annualisation.

**Table C.1 – Annualisation Summary (concentrations presented in µg/m<sup>3</sup>)**

Site ID	Annualisation Factor Swindon Walcot	Annualisation Factor Oxford St Ebbes	Annualisation Factor Bristol St Pauls	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
52	1.1671	1.1711	1.1072	1.1485	27.7	31.8
59	0.9536	1.0197	0.9982	0.9905	15.7	15.5

### Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 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.TG22 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<sub>x</sub>/NO<sub>2</sub> continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Stroud District Council have applied a national bias adjustment factor of 0.79 to the 2023 monitoring data. A summary of bias adjustment factors used by Stroud District Council over the past five years is presented in

Table C.2.

### Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.79
2022	National	06/23	0.85
2021	National	09/22	0.86
2020	National	09/21	0.85
2019	National	03/20	0.78

National Diffusion Tube Bias Adjustment Factor Spreadsheet			Spreadsheet Version Number: 03/24							
<p>Follow the steps below <b>in the correct order</b> to show the results of <b>relevant</b> co-location studies</p> <p>Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods</p> <p>Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet</p> <p>This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.</p> <p><a href="#">LAQM Helpdesk Website</a></p> <p>The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECDM and the National Physical Laboratory.</p> <p>Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.</p>										
<b>Step 1:</b>		<b>Step 2:</b>		<b>Step 3:</b>		<b>Step 4:</b>				
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		<p>Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution.</p> <p>Where there is more than one study, use the overall factor<sup>2</sup> shown in blue at the foot of the final column.</p>				
If a laboratory is not shown, we have no data for this laboratory.		If a preparation method is not shown, we have no data for this method at this laboratory.		If a year is not shown, we have no data <sup>2</sup>		If you have your own co-location study then see footnote <sup>4</sup> . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953				
Analysed By <sup>1</sup>	Method <sup>2</sup> <small>To verify your selection, choose (AO) from the pop-up list</small>	Year <sup>3</sup> <small>To verify your selection, choose (AO)</small>	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)
Glasgow Scientific Services	20% TEA in water	2023		<b>Overall Factor<sup>2</sup> (1 study)</b>				Use	0.74	
Gradko	20% TEA in water	2023		<b>Overall Factor<sup>2</sup> (23 studies)</b>				Use	0.81	
Milton Keynes Council	20% TEA in water	2023		<b>Overall Factor<sup>2</sup> (1 study)</b>				Use	0.72	
SOCOTEC Didcot	20% TEA in water	2023		<b>Overall Factor<sup>2</sup> (4 studies)</b>				Use	0.75	
SOCOTEC Glasgow	20% TEA in water	2023		<b>Overall Factor<sup>2</sup> (1 study)</b>				Use	0.72	
Somerset County Council	20% TEA in water	2023		<b>Overall Factor<sup>2</sup> (4 studies)</b>				Use	0.79	
Staffordshire Scientific Services	20% TEA in water	2023		<b>Overall Factor<sup>2</sup> (11 studies)</b>				Use	0.86	
Tapside Scientific Services	20% TEA in water	2023		<b>Overall Factor<sup>2</sup> (1 study)</b>				Use	0.68	

SSS only have submitted 4 studies for the 2023 Bias Adjustment Spreadsheet, compared to 14 in 2022. The bias adjustment spreadsheet notes that the bias adjustment factor reported for SSS is ‘different’ for 2023, compared to 2022. As fewer studies supported the National Bias Adjustment factor for SSS in 2023, there is a greater amount of uncertainty in its use. As such, some analysis has been carried out in the report to assess the ‘what if’ scenario that 2023 monitoring was also adjusted by the 2022 factor (0.85) – See Table 3.1.

### NO<sub>2</sub> Fall-off with Distance from the Road

Wherever possible, 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 has been 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 Stroud District required distance correction during 2023.

### **QA/QC of Automatic Monitoring**

Monitoring of particulates is no longer undertaken in Stroud district. Previously, Stroud District Council reported on particulate levels using equipment supplied by a Community Liaison Group interested in the impact of particulates following the construction and operation of an energy from waste plant. During 2022, the equipment unfortunately fell into disrepair so particulate monitoring was no longer possible.



## Appendix D: Map(s) of Monitoring Locations and AQMAs

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

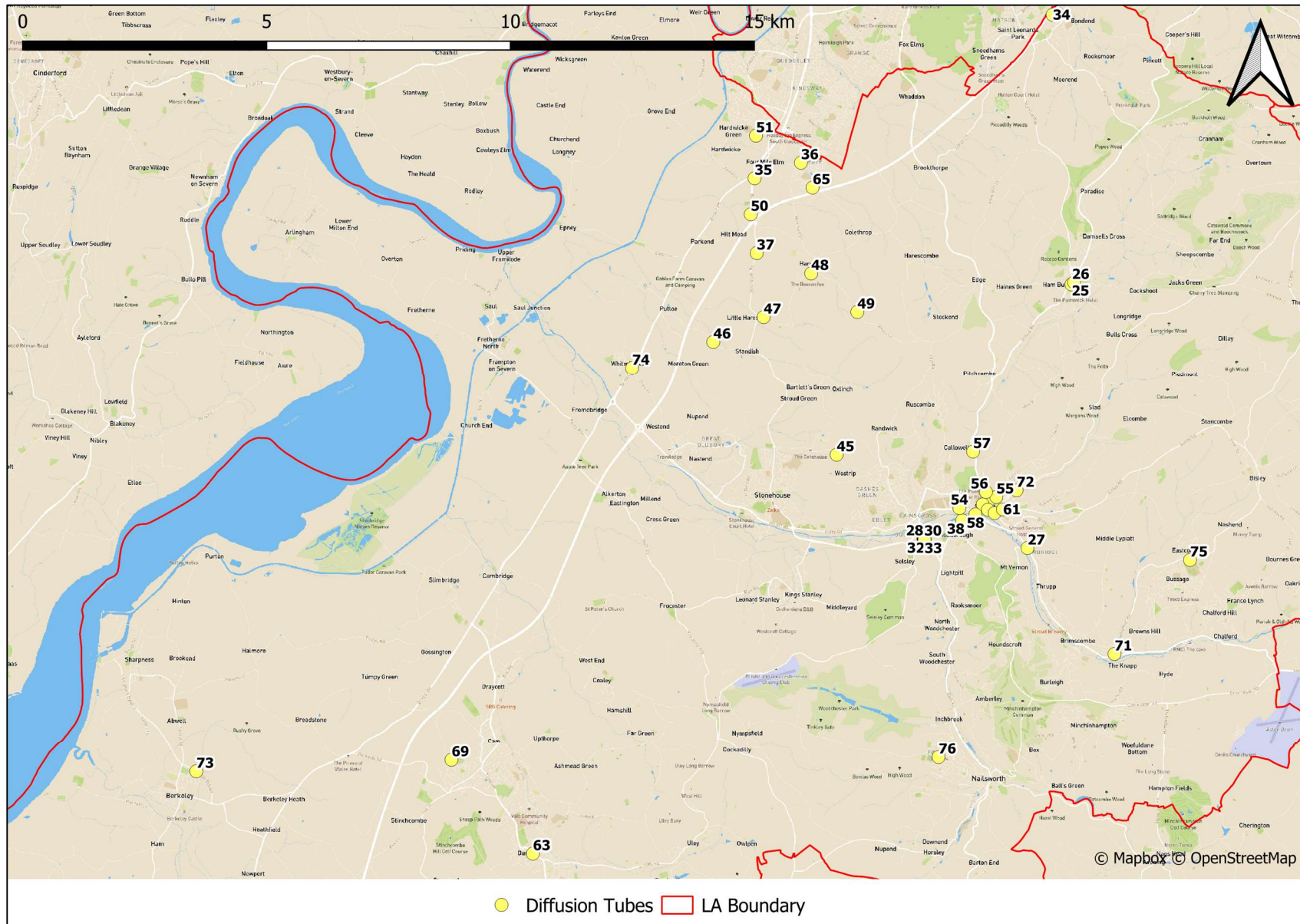


Figure D.2 – Map of Non-Automatic Monitoring Site (Stroud Town)

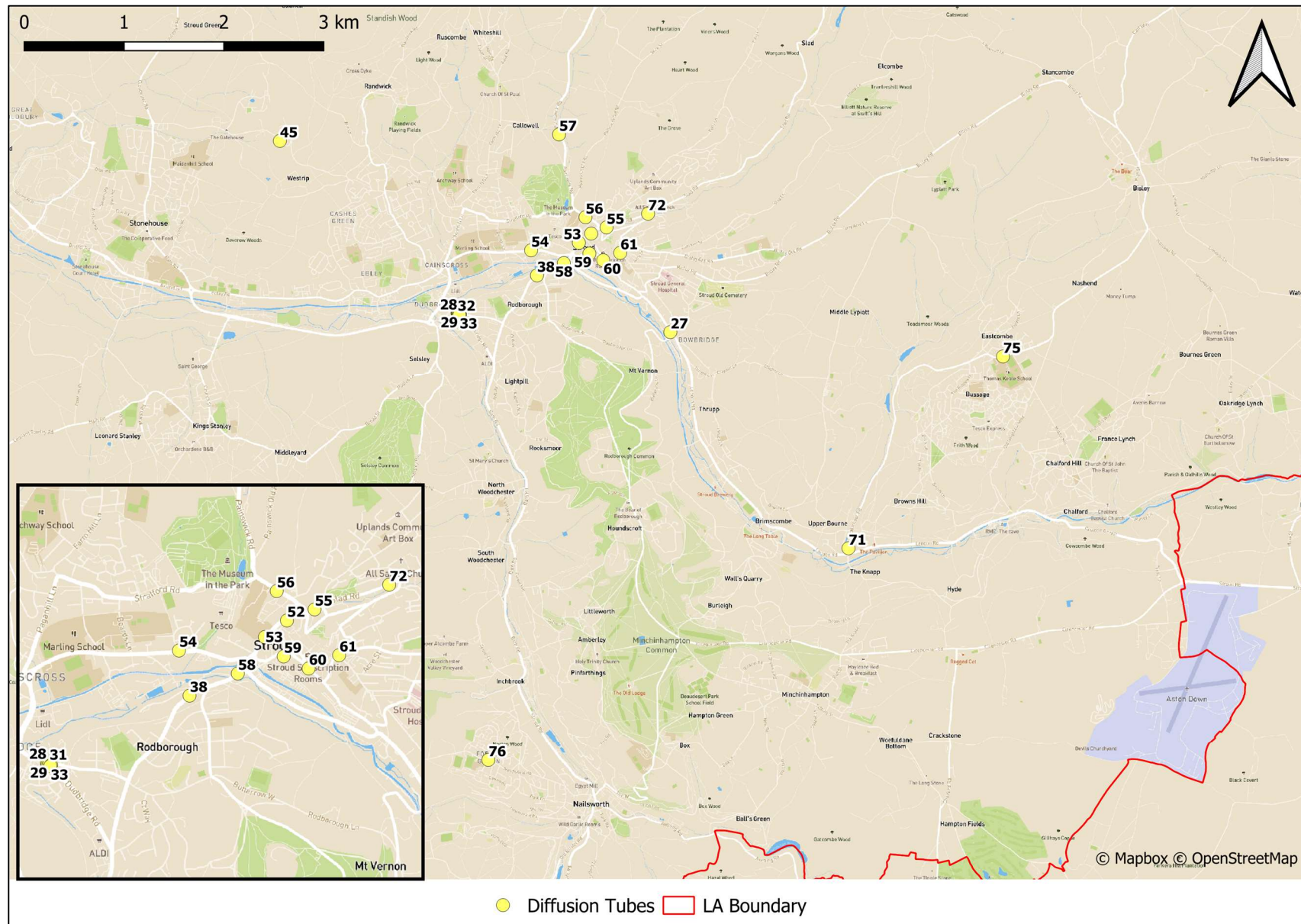


Figure D.3 – Map of Non-Automatic Monitoring Site (North Stroud District)

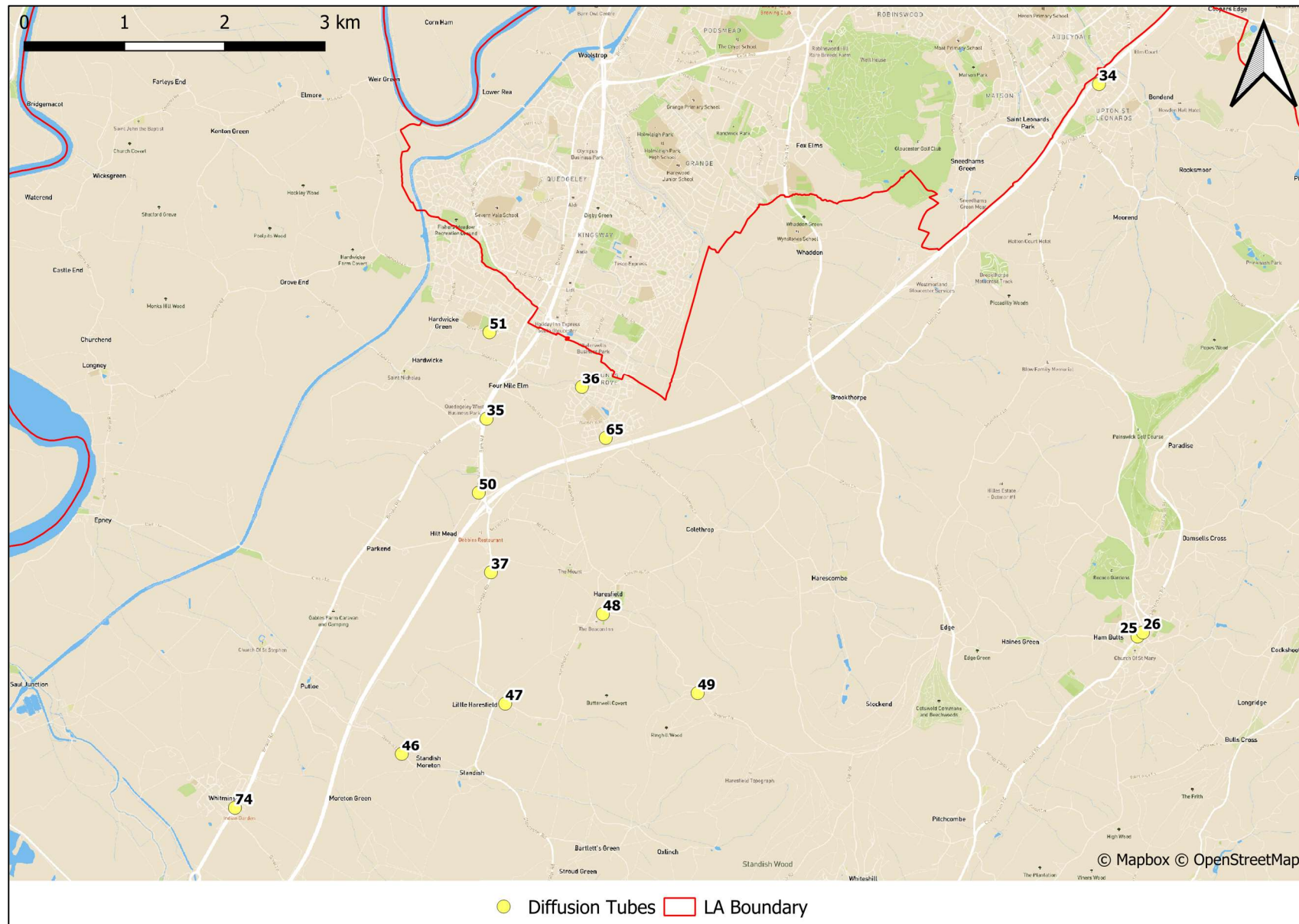
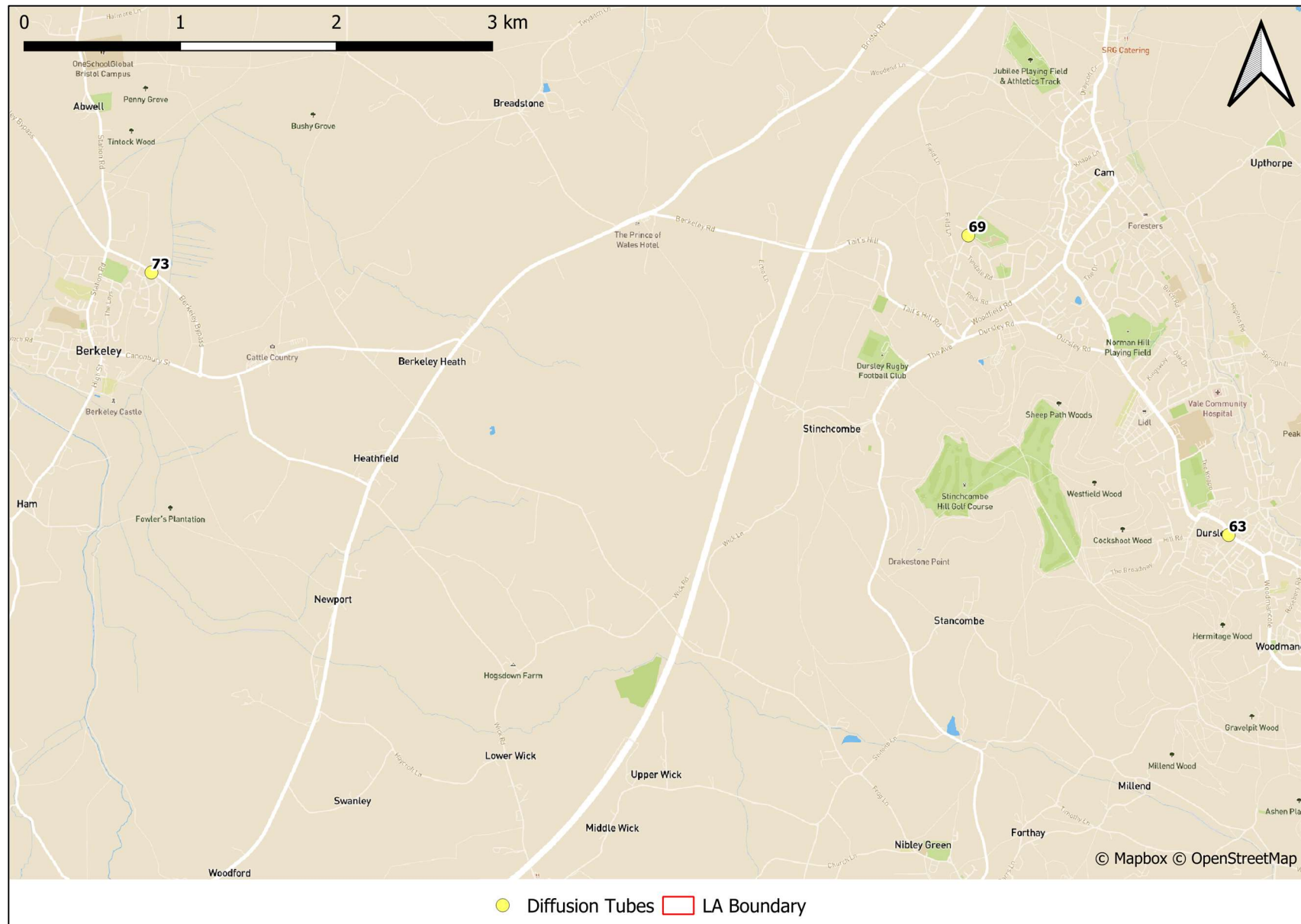
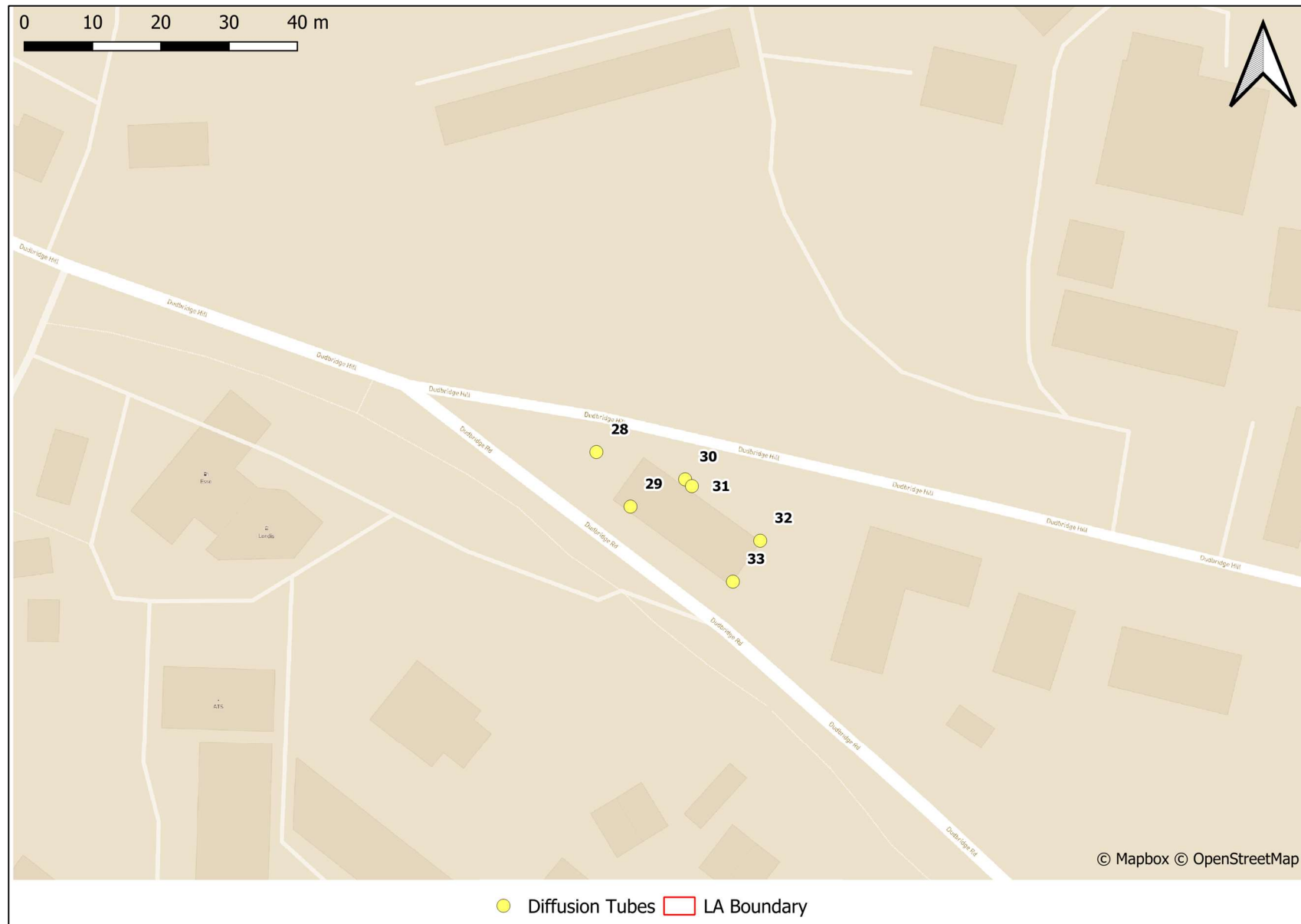


Figure D.4 – Map of Non-Automatic Monitoring Site (South Stroud District)



**Figure D.5 – Map of Non-Automatic Monitoring Site (Dudbridge)**



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

**Table E.1 – Air Quality Objectives in England<sup>6</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>6</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## 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 National Highways
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.TG22. August 2022. 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.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra