Gloucester City Council

Transforming Your City

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: August 2024

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Report Reference Number	0112A
Date	June 2024

Executive Summary: Air Quality in Our Area

Air Quality in Gloucester City

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[1].

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[2].

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_2)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO_2)	Sulphur dioxide (SO_2) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. 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. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

[1] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

Gloucester is a small city of approximately 150,000 inhabitants situated on the eastern bank of the River Severn, between the Cotswolds to the east and the Forest of Dean to the west.

The key pollutants of concern in Gloucester are nitrogen dioxide (NO_2) and fine particulates ($PM_{2.5}$ and PM_{10}), with road traffic emissions being the principal local emission source. There are several major roads in Gloucester, notably the A40, A417, A430 and the A38 that connect Gloucester City with the strategic highway in Gloucestershire. The M5 motorway demarcates the city's eastern border and is a major emission source.

Gloucester City Council has a network of passive diffusion tubes across the city, measuring NO_2 at 24 locations during 2023. Gloucester City Council does not currently carry out monitoring for PM_{10} or $PM_{2.5}$.

Air pollution levels in Gloucester are generally acceptable and in 2023, there were no recorded exceedances of the UK Air Quality Objectives. Furthermore, there is a long-term trend showing a decline in concentrations of NO_2. For example, in 2023, annual mean concentrations of NO_2 were generally lower than those measured at the same sites in 2022, and lower than all measurements from 2019. Measured concentrations were, at some locations, lower in 2020, likely as a result of the Covid-19 pandemic and associated lockdowns.

Air quality is 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 historic exceedances of the of the 40µg/m^3 annual mean objective for NO_2, three Air Quality Management Areas (AQMAs) (i.e. known pollutant hotspots) have been declared in Gloucester. These are:

- Barton Street AQMA (in the city centre) declared in 2005.
- Priory Road AQMA (on the A417) also declared in 2005.
- Painswick Road AQMA (in the city centre, consisting of a section of the B4073 between the railway line and the A38) declared in 2007.

Gloucester City Council has implemented an Air Quality Action Plan (AQAP) that details the actions they are taking to reduce pollution concentrations in the AQMAs and across the district. All AQMAs have been compliant with the objectives for at least, the last four years and as such, Gloucester City Council have employed Greenavon Air Quality

Consultants to carry out a detailed air quality assessment to investigate whether there is sufficient evidence to revoke these AQMAs.

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[3] 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 ($PM_{2.5}$), the most harmful pollutant to human health. The Air Quality Strategy[4] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero[5] 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.

Gloucester City Council prepared a new Air Quality Action Plan in 2023, which is due to go out for public consultation imminently. As part of the AQAP development, a review of the current AQMAs has been completed and stakeholder workshops were held in 2023 to inform new air quality improvement measures. The draft of the revised AQAP has now been completed and has gone through County Council Public Health and District Council consultation. There was a delay in public consultation as Gloucester City Council had to wait for the publication of the County Council's Climate Action Plan and the two pre-election periods.

[3] Defra. Environmental Improvement Plan 2023, January 2023

[4] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

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

The measures from the 2023 Gloucester Air Quality Action Plan are included within this document, along with the progress that has been made on implementation to date. A brief summary of core actions are as follows:

- Highways improvements.
- Vehicle restrictions on key highways
- The development of cycle lanes
- Encouraging Stagecoach to buy new vehicles for bus services.
- A city-wide anti-idling campaign
- Implementation of a fleet recognition scheme
- Low emission vehicle procurement
- Scooter/ cycle rental schemes
- Supplementary planning guidance for developers
- The provision of electric vehicle charging infrastructure
- The promotion of active travel
- Raising public awareness about air quality; and
- Specific initiatives focusing on schools.

Going forward, Gloucester City Council and Gloucestershire County Council aim to work closer together on air quality, and particularly towards the goals of the Gloucestershire County Council Air Quality and Health strategy. The strategy aims to improve air quality across the county and reduce the impact of air pollution on human health and the environment.

The District Air Quality Group (DAQG) has recently restarted meeting and as part of the DAQG, Gloucestershire County Council will aim to discuss public health air quality responses to any local plan and neighbourhood development plans as and when they are in consultation.

Conclusions and Priorities

In 2023, no exceedances of the NO_2 annual mean objective were recorded within or outside existing AQMAs. Furthermore, there has been at least four years since an exceedance of the annual mean objective, in any AQMA, was measured. There are, however, no safe levels of some pollutants and as such, Gloucester City Council is committed to minimising pollution concentrations across the city.

The following actions are key priorities for Gloucester City Council in 2024:

- Carry out detailed air quality modelling to re-assess whether any of the AQMAs could be amended or revoked.
- Adopt the new Air Quality Action Plan if all AQMAs are not revoked.
- Continue to review the monitoring locations across the city, particularly in vicinity of new development and highly sensitive uses.
- Support Gloucestershire County Council deliver the Air Quality and Health Strategy.
- Review into the Smoke Control zone

Gloucester City Council anticipate that these measures will further contribute to achieving compliance with the NO_2 annual mean objective within the existing AQMAs, as well as contributing to an improved understanding of pollution across the city.

Local Engagement and How to get Involved

The public can engage with Gloucester City Council via their website which contains further local information on the following:

- Air quality monitoring;
- Declared AQMAs;
- Government grants for workplace and domestic property electric vehicle charge points; and
- Open fires and wood burning stoves.

In addition, Gloucestershire County Council host the Think Travel website which provides further information about the sustainable travel options available across the county of Gloucestershire, such as:

- Local walking maps;
- Cycle routes;
- Public transport journey planner
- Park & Ride facilities;
- Eco driving;
- Car sharing; and
- Electric vehicles

Road vehicles are the principal source of many pollutants in urban areas, including in Gloucester. As such, before using your car, ask yourself:

- Do I really need to make this journey?
- Could I walk or cycle instead of taking the car?

- Could I take a bus, or train or carpool?
- Are the levels of air pollution already too high today?

If you must drive:

- Drive smoothly. You'll save fuel (and money), and your engine will also pollute less.
- Don't rev your engine unnecessarily.
- Maintain your car. Keep the engine properly maintained and the tyres at the right pressure; and
- Turn off the engine when your car is stationary.

At home:

- Buy water-based or low-solvent paints, varnishes, glues and wood preservatives;
- Avoid burning solid fuels (wood, coal and charcoal), where possible;
- Avoid lighting bonfires;
- Only burn dry material and never burn household waste, especially plastic, rubber, foam or paint;
- Levels of pollution can be quite high on bonfire night and other events/festivals with bonfires, and sensitive people, including people with respiratory conditions, may notice some effects;
- However, exposure can be considerably reduced by remaining indoors and keeping windows closed;
- Be aware of internal sources of pollution (e.g. candles, cleaning products and gas stoves) and make sure that your home is sufficiently ventilated when using these products,

Further information on the health effects of air pollution can be found on the Government's website.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Gloucester City Council with the support and agreement of the following officers and departments:

- Community Wellbeing
- Gloucestershire County Council Public Health and climate change teams
- Harley Parfitt (External Consultant: Greenavon Air Quality Consultants)

This ASR has been approved by:

Gloucestershire County Council Directory of public Health – Siobhan Farmer

Signature:

Cabinet Member for the Environment (with responsibility for Community Wellbeing)

Signature: 

If you have any comments on this ASR please send them to community Wellbeing at:

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1 Local Air Quality Management

This report provides an overview of air quality in Gloucester City Council 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 Gloucester City 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. A new AQAP will be adopted, following a 4-week period of public consultation in 2024.

A summary of AQMAs declared by Gloucester City Council can be found in Table 2.1. The table presents a description of the three AQMAs that are currently designated within Gloucester City Council. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean

A detailed air quality assessment has been commissioned to investigate whether the Gloucester City Council AQMAs can be revoked. Revocation of all, or some of the AQMAs will likely progress in 2024, if there is sufficient evidence that NO_2 concentrations are now below the relevant standards

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Painswick Road AQMA	5/10/2007	NO2 Annual Mean	An area encompassing a number of properties on either side of Painswick Road, Gloucester.	No	48 µg/m^3	26.5 µg/m^3	>5	AQAP 2008 (2011 Review) + 2023 AQAP	Adopted: https://www.gloucester.gov.uk/media/jjcbgnok/gloucester-city-aqap-2011.pdf New: https://democracy.gloucester.gov.uk/documents/s60864/AQAP%20report%202024.pdf
Barton Street AQMA	8/8/2005	NO2 Annual Mean	An area encompassing Barton Street, Gloucester from its junction with Trier Way/Bruton Way to the northwest and Upton	No	47 µg/m^3	32.6 µg/m^3	4	AQAP 2008 (2011 Review) + 2023 AQAP	Adopted: https://www.gloucester.gov.uk/media/jjcbgnok/gloucester-city-aqap-2011.pdf New: https://democracy.gloucester.gov.uk/documents/s60864/AQAP%20report%202024.pdf

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
			Street to the southeast.						
Priory Road AQMA	8/8/2005	NO2 Annual Mean	An area encompassing the junction of St Oswalds Road and Priory Road.	No	48 µg/m^3	33.0 µg/m^3	4	AQAP 2008 (2011 Review) + 2023 AQAP	Adopted: https://www.gloucester.gov.uk/media/jjcbgnok/gloucester-city-aqap-2011.pdf New: https://democracy.gloucester.gov.uk/documents/s60864/AQAP%20report%202024.pdf

☒ **Gloucester City Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

☒ **Gloucester City Council confirm that all current AQAPs have been submitted to Defra**

2.2 Progress and Impact of Measures to address Air Quality in Gloucester City

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. Missing data was observed in some of the cells within the AQAP and annualisation tables. Please ensure reasons are given for missing data.*
>
> *2. On page 12, there is a reference sourcing error. Ensure in the next report that all references get pulled through before submitting the report."*

Furthermore, the appraisal noted:

> *"Gloucester City Council (GCC) has three AQMA's located at Painswick Road, Barton Street and Priory Road. All AQMA's declared have been compliant with the air quality objectives for the past three years, consecutively, and as such, should be considered for revocation. Painswick Road in particular, has been compliant for more than 5 years, therefore plans to revoke this AQMA must be put in place. Please ensure that you have a local air quality strategy (AQS) prepared."*

Gloucester City Council are undertaking the required detailed assessment to ascertain whether all these AQMAs can be revoked. Furthermore, Gloucester City Council are working towards the goals of the Gloucester County Council Air Quality and Health Strategy.

Gloucester City 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 2.2. Thirteen measures, reflective of the measures from the new AQAP, are included within Table 2.2. Table 2.2 includes the type of measure, as well as the progress Gloucester City Council have made during the reporting year of 2023. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

Gloucester City Council does not expect any of the thirteen measures to be completed in over the course of the next reporting year, as they are all ongoing measures. Regardless, the following milestones relating to air quality management are expected before the next Air Quality Status report:

- Carry out detailed air quality modelling to re-assess whether any of the AQMAs could be amended or revoked.
- Continue to review the monitoring locations across the city, particularly in vicinity of new development and highly sensitive uses.
- Adopt the revised AQAP, if there any areas of non-compliance/ or risk of non-compliance.

Gloucester City Council worked to implement improvements in air quality in partnership with the following stakeholders during 2023:

- Gloucestershire County Council
- Gloucester City Climate change manager
- Planning team

The principal challenges and barriers to implementation that Gloucester City Council anticipates facing relate to funding and resourcing pressures.

Gloucester City Council anticipates that the measures stated above and in Table 2.2 will improve air quality across Gloucester, including in the current AQMAs.

Table 2.2 – 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	Continue to explore improvements within all AQMAs; highways infrastructure based. Feasibility to be completed in terms of options available.	Transport Planning and Infrastructure	Other	TBC	TBC	City Council / County Council	TBC	NO	TBC	£100k - £500k	Planning	Moderate	Less congestion and reduction in NO_2 concentration in AQMAs.	Ongoing	Possible to present a number of options to the community to gain feedback. Improvements based upon; cycle lanes, one-way system, lane closure.
2	Vehicle restrictions to be enforced on the B4073	Traffic Management	Other	TBC	TBC	City Council / County Council	TBC	NO	TBC	£50k - £100k	Planning	Low	Reduction in NO_2 concentration along Painswick Road.	Ongoing	Explore restricting the size of vehicles travelling down Barton Street. If this is used as a cut through rather than travelling on Metz Way it would stop larger, more polluting vehicles travelling through the AQMA.
3	Development of cycle lanes, both temporary and permanent.	Transport Planning and Infrastructure	Cycle network	Completed	Completed/ TBC	City Council / County Council/ Cheltenham BC	Completed for London Road/ Cycle Spine ongoing	No	Completed for London Road/ Cycle Spine ongoing	£100k - £500k	Implementation	Moderate	Number of users.	Ongoing	Using the London Road example identify additional areas where lane closure may be feasible. Running several trials to check feasibility and uptake. A permanent cycle route from Gloucester to Cheltenham is under construction.
4	Collaborating with bus operators (Stagecoach).	Transport Planning and Infrastructure	Other	Ongoing	Ongoing	City Council / County Council	Ongoing	NO	Ongoing	£100k - £500k	Implementation	Moderate	Engagement with bus operators.	Ongoing	1) Upgrades to fleet; vehicle replacement and retrofitting. 2) Routing of buses; efficiency of service and least polluting vehicles in high NO2 concentration areas. Also the option to apply to refuse fleet if the council believe

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
															this to be a viable option.
5	Develop and enforce a City wide anti-idling campaign.	Traffic Management	Anti-idling enforcement	TBC	TBC	City Council / County Council	TBC	NO	TBC	£10k - 50k	Planning	Low	Increased awareness.	Ongoing	Reducing vehicle idling at identified points within the city; taxi ranks, train station, bus stops and outside schools.
6	Implementation of a fleet recognition scheme.	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	TBC	TBC	City Council / County Council	TBC	NO	TBC	< £10k	Planning	Low	Number of users.	Ongoing	A scheme such as ECO Stars can be aimed at bus, coach, HGVs and taxis within the City. A scheme should raise awareness among operators of commercial vehicles of the important role they can play in helping to improve local air quality, through improved fleet environmental performance.

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
7	Procurement of low emission vehicles	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	Complete	On Hold	City Council / County Council	In progress	NO	In progress	£100k - £500k	Implementation	Moderate	Number of users.	Ongoing	Inclusive of a salary sacrifice scheme to promote LEV take-up within council staff - tax breaks etc. In progress- Tusker soon to be launched.
8	Scooter/cycle rental.	Promoting Travel Alternatives	Prootion of cycling	Continued	Ongoing	City Council / County Council / Cheltenham Borough Council	Continued	NO	Continued	£50k - £100k	Implementation	Moderate	Number of users.	Ongoing	Trial of e-scooters and E cargo bikes currently being undertaken within Gloucester and Cheltenham. Liaise with county upon results of trial and feasibility to develop into a permanent travel option. Understood that trial went well and there is the possibility of transferring to a cycle scheme.
9	Provide supplementary planning guidance to developers	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	TBC	Ongoing	City Council / County Council	TBC	NO	TBC	< £10k	Planning	Low	Engagement between EHOs and developers.	Ongoing	Guidance to be refined from discussions around requirement for baseline monitoring /

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
10	Installation of electric charging points within Council car parks throughout the city.	Promoting Low Emission Transport	Other	Under Consideration	TBC	City Council / County Council / Office for Zero Emission Vehicles	TBC	NO	TBC	£100k - £500k	Planning	Moderate	Number of charging points.	Ongoing	Draft policy in Local Plan - every household where it is feasible. Expand upon this to install within existing car parks, subsidise EV parking.
11	Travel planning / Behavioural Change Campaigns	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	Ongoing	Open Ended	City Council / County Council	TBC	NO	TBC	< £10k	Planning	Low	Number of plans implemented.	Ongoing	The measures that have been discussed within 3 and 4 should be moulded into a suite of works that can be developed and implemented over a set timeline. Would include Travel Plans / Journey Planning Promotion of sustainable / active travel Cycle to work schemes Family cycling schemes Working from home. Travel plans can be tailored to: Schools Job seekers Businesses Specific to geographical areas
12	Public Awareness / Information Accessibility	Public Information	Via the Internet	TBC	TBC	City Council / County Council	TBC	NO	TBC	< £10k	Planning	NA	Increased awareness.	Ongoing	Dovetailed with the measure above, the amount and the quality of information available to the general public should be increased. Emphasis on information on sustainable travel options. Air quality information

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
															database - central landing website that links to relevant information.
13	Schools Initiatives	Promoting Travel Alternatives	School Travel Plans	TBC	TBC	City Council / County Council	TBC	NO	TBC	< £10k	Planning	NA	Number of schools involved.	Ongoing	Specifically related to the schools within Gloucester. Again, a list of sub-measures should be detailed that can be developed and implemented over a set timeline. To consider: Anti-idling School streets / street closures Ongoing educational events Cycle and walking route planning

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[6], local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter ($PM_{2.5}$)). There is clear evidence that $PM_{2.5}$ (particulate matter smaller 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

A regional estimate of the fraction of mortality attributable to $PM_{2.5}$ has been estimated from work carried out by UK Health Security Agency (UKHSA) and the Office for Health Improvements and Disparities (OHID). UKHSA estimates 6.0% of all mortality was attributable with particulate air pollution in 2022. This is greater than both the Southwest (4.6%) and England's average (5.8%). This information is available from OHID's Public Health Data webpage.

Gloucester is currently prioritizing its efforts towards monitoring and decreasing NO_2 levels to meet the legal limits in their AQMAs. The initiatives aimed at reducing NO_2 levels in Gloucester will also have a positive impact on reducing the levels of PM_{10} and $PM_{2.5}$ since particulate matter is also linked to road traffic through direct emissions (exhaust emissions, brake and tyre wear and road abrasion) and secondary formation.

According to the Defra background mapped data for Gloucester, based on the reference year of 2018, all the 2023 background concentrations of $PM_{2.5}$ were significantly below the annual mean AQS objective of 20µg/m^3 for $PM_{2.5}$. The highest concentration, predicted to be 10.3µg/m^3, was found within a 1km x 1km grid square located south of the city centre with a centroid grid reference of 383500, 217500. It is worth noting that although this grid square slightly exceeds the UK's 2040 Air Quality Target of 10µg/m3, on average, levels of $PM_{2.5}$ in Gloucester remain within the 2040 target.

Although predicted background $PM_{2.5}$ levels are generally below the Air Quality Objective and 2040 target value, it is noted concentrations may be higher in close proximity to emissions sources, such as roads and industry. Secondary $PM_{2.5}$, of which some would be formed in-situ through reactions associated with local NO_X, makes up the greatest

[6] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

proportion of $PM_{2.5}$ in the city. Domestic emissions and industry and also a significant local source.

Gloucester has had a small smoke control area since the 1960's. The area includes the Cathedral, the Gaol and the County Council offices. Housing built before the area was designated is excluded from control, as it was expected that the area would be redeveloped. This has indeed taken place over the years, so that the only excluded housing today is in Priory Road, Mount Street and Pitt Street. Gloucester's smoke control order means you cannot emit smoke from a chimney unless you're burning an authorised fuel or using exempt appliances, for example burners or stoves. The aim is to prevent air pollution, particularly emissions of smoke and hence fine particulates (including $PM_{2.5}$). As such, the enforcement of the smoke control area is helping to minimise emissions of $PM_{2.5}$. The LAPPC/ Environmental Permitting regime and nuisance investigations associated with the 1990 Environmental Act are also tools that manage emissions of $PM_{2.5}$. The AQAP also includes measures that will address emissions from construction and the planning process, which will help to minimise concentrations in the city.

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

This section sets out the monitoring undertaken within 2023 by Gloucester City 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

Gloucester City Council did not undertake automatic (continuous) monitoring during 2023.

3.1.2 Non-Automatic Monitoring Sites

Table A.1 in Appendix A shows the details of the non-automatic monitoring 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.

Gloucester City Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 24 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.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 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.

Data capture for all the diffusion tubes was above 75% and therefore annualisation (short-term to long-term adjustment) has not been completed

The NO_2 results for 2023 have been bias adjusted using a national bias adjustment factor of 0.81. Full details of the annualisation, bias adjustment, and QA/QC monitoring procedures are provided in Appendix C.

Gloucester City Council have analysed the 2023 monitoring data, breaking down the analysis by AQMA, below.

- **Barton Street AQMA**

Monitored concentrations are presented in Table A.2 and Figure A.2. There are six diffusion tube locations within the Barton Street AQMA.

All measurements were below the annual mean air quality objective in 2023. The highest concentration, in 2023, was recorded at site 14 (32.6 µg/m^3). All measured annual mean concentrations have been at least 10% below the 40.0 µg/m^3 objective for four years.

Whilst the results of the detailed air quality assessment are pending, it is considered likely that this AQMA will be revoked

- **Priory Road AQMA**

Monitored concentrations are presented in Table A.2 and Figure A.3. There are three diffusion tube locations within the Priory Road AQMA.

All measurements were below the annual mean air quality objective in 2023. The highest concentration, in 2023, was recorded at site 24 (33.0 µg/m^3). All measured annual mean concentrations in Priory Road AQMA have been below the 40.0 µg/m^3 objective for at least three years. However, concentrations were within 10% of the annual objective (within

the uncertainty of diffusion tubes) as recently as 2021. Usually, Defra usually requires three years of measurements below 10% of the AQS to consider revocation.

As such, whilst Gloucester City Council are undertaking further work to investigate whether this AQMA could be amended or revoked, the evidence base will have to be strong for this AQMA to be revoked in 2024.

Site 27 is located at 38 Priory Road, just outside of the Priory Road AQMA. The concentration monitored at this site during 2021 was 17.2µg/m^3. This is well below the NO_2 annual mean objective, providing evidence to support the current boundary of the AQMA.

- **Painswick Road AQMA**

Monitored concentrations are presented in Table A.2 and Figure A.4.

There are three diffusion tube locations within the Painswick Road AQMA. All measurements were below the annual mean air quality objective in 2023. The highest concentration, in 2023, was recorded at site 8 (26.5 µg/m^3). All measured annual mean concentrations in Painswick Road AQMA have been at least 10% below the 40.0 µg/m^3 objective for at least five years.

As such, Gloucester City Council are confirming that this AQMA can be revoked, via detailed assessment.

- **Diffusion Tubes Outside of Existing AQMAs**

Monitored concentrations are presented in Table A.2 and Figure A.1.

There were 12 diffusion tube monitoring sites located outside of the existing AQMAs in 2023. Sites 27, 28, 29 and 30 were added in 2021. In April 2022, sites 31, 32 and 33 were added to monitor at schools and at a new block of flats.

All measurements were below the annual mean air quality objective in 2023. The highest concentration at a site outside of the AQMA was recorded at site 19 (27.6µg/m^3).

The sites outside of the AQMAs also measure concentrations at background sites, giving a good indication of average exposure across the city. The highest background measurement in 2023 was at site 21 (16.4µg/m^3).

The annual mean NO_2 concentrations across the city were not greater than 60µg/m^3 at and therefore, as per LAQM.TG(22) guidance, it is unlikely there were any exceedances of the NO_2 1-hour mean objective at any of the sites.

Due to all monitoring locations reporting concentrations below the annual mean objective, no further AQMAs need to be designated within Gloucester at the current time.

Appendix A: Monitoring Results

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
3	35 Buscombe Gardens	Roadside	387670	217250	NO2	No	0.0	26.8	No	2.6
5	97 Painswick Road	Roadside	384558	216946	NO2	Yes - Painswick Road	0.0	4.6	No	2.6
7	76 Painswick Road	Roadside	384490	217027	NO2	Yes - Painswick Road	0.0	3.5	No	2.7
8	88 Painswick Road	Roadside	384509	216998	NO2	Yes - Painswick Road	0.0	3.5	No	2.5
12	219A Barton Street (gutter) and (post)	Roadside	384000	217863	NO2	Yes - Barton Street	0.0	2.0	No	2.6
13	99 Barton Street	Roadside	383717	218094	NO2	Yes - Barton Street	0.0	2.0	No	2.5
14	124 Barton Street	Roadside	383726	218074	NO2	Yes - Barton Street	0.0	1.5	No	2.6
15	196 Barton Street (Lamppost)	Roadside	383989	217857	NO2	Yes - Barton Street	0.0	2.5	No	2.6
16	229 Barton Street Lamppost outside flat no. 7	Roadside	384340	217294	NO2	Yes - Barton Street	0.3	1.0	No	2.2

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
17	316 Barton Street	Roadside	384175	217501	NO2	Yes - Barton Street	0.0	2.3	No	2.6
18	79 Millbrook Street	Roadside	384190	218160	NO2	No	0.0	1.0	No	2.6
19	61 Barnwood Road	Roadside	385130	218585	NO2	No	0.0	5.0	No	2.6
20	53 Barnwood Road	Roadside	385113	218595	NO2	No	0.0	2.3	No	2.5
21	Elmbridge Road	Urban Background	385430	218870	NO2	No	9.5	101.6	No	2.6
23	46 Priory Road	Roadside	382898	219029	NO2	Yes - Priory Road	0.0	4.5	No	2.5
24	56 Priory Road	Roadside	382921	219034	NO2	Yes - Priory Road	0.0	4.4	No	2.5
25	66 Priory Road	Roadside	382950	219040	NO2	Yes - Priory Road	0.0	5.4	No	2.7
26	16 London Road	Roadside	383560	218775	NO2	No	30.0	2.7	No	2.5
27	38 Priory Road	Roadside	382818	218993	NO2	No	0.0	10.0	No	2.2
28	Sweetbriar Street	Urban Background	383639	219134	NO2	No	3.0	2.5	No	2.3
29	21 Paliamlent Street	Kerbside	383027	218253	NO2	No	10.0	0.5	No	2.2
30	Black Dog Way	Roadside	383483	218830	NO2	No	0.0	3.5	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
31	3 The Elms Church Road Longlevens	Urban Background	385366	219777	NO2	No	2.5	1.1	No	2.2
32	Tanners Hall Gouda Way	Roadside	383357	218909	NO2	No	0.0	4.5	No	2.2
33	Widden Primary School	Urban Background	383911	218195	NO2	No	6.5	1.1	No	2.0

Notes:

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

(2) N/A if not applicable.

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
3	387670	217250	Roadside	91.7	90.4	24.3	16.9	19.4	18.0	16.1
5	384558	216946	Roadside	83.3	82.7	27.3	21.6	25.4	22.7	22.2
7	384490	217027	Roadside	100	100.0	31.9	23.8	27.8	25.6	25.5
8	384509	216998	Roadside	100	100.0	34.2	27.9	29.9	26.3	26.5
12	384000	217863	Roadside	91.7	92.3	36.2	27.8	32.3	29.6	27.2
13	383717	218094	Roadside	91.7	92.3	37.2	31.7	30.9	28.3	29.0
14	383726	218074	Roadside	100	100.0	**43.9**	31.5	35.1	32.9	32.6
15	383989	217857	Roadside	100	100.0	39.7	30.1	32.5	29.0	30.6
16	384340	217294	Roadside	83.3	82.7	31.2	21.6	24.8	22.4	21.9
17	384175	217501	Roadside	83.3	82.7	35.5	26.1	29.9	23.7	27.3
18	384190	218160	Roadside	91.7	92.3	29.4	21.8	25.5	23.9	24.2
19	385130	218585	Roadside	83.3	84.6	34.1	25.8	29.8	24.9	27.6
20	385113	218595	Roadside	91.7	90.4	34.7	24.8	28.3	25.7	26.2

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
21	385430	218870	Urban Background	100	100.0	17.7	17.2	18.7	17.1	16.4
23	382898	219029	Roadside	100	100.0	**40.5**	29.5	34.1	31.1	28.4
24	382921	219034	Roadside	100	100.0	**43.0**	32.5	37.6	33.4	33.0
25	382950	219040	Roadside	100	100.0	**43.2**	31.9	35.1	33.2	30.8
26	383560	218775	Roadside	83.3	80.8	33.9	26.5	27.2	25.5	25.1
27	382818	218993	Roadside	91.7	92.3	-	-	25.1	20.7	17.2
28	383639	219134	Urban Background	75	75.0	-	-	14.0	13.6	12.9
29	383027	218253	Kerbside	100	100.0	-	-	21.4	19.3	18.9
30	383483	218830	Roadside	0	0.0	-	-	21.4	18.9	-
31	385366	219777	Urban Background	100	100.0	-	-	-	12.2	12.7
32	383357	218909	Roadside	100	100.0	-	-	-	19.9	19.6
33	383911	218195	Urban Background	83.3	82.7	-	-	-	13.0	13.2

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22**

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

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

Notes:

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

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

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

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.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_2 Concentrations (Outside AQMAs)

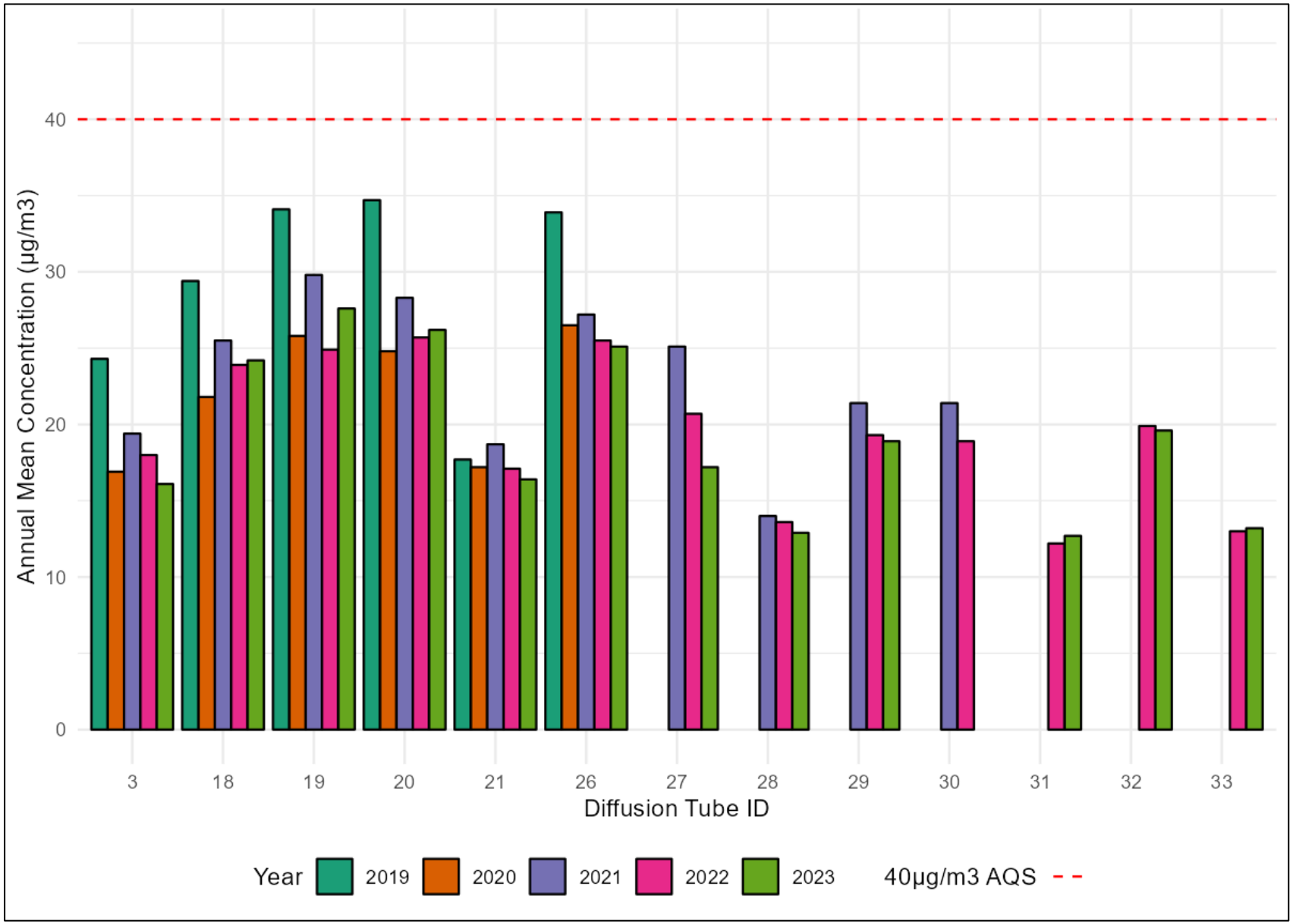


Figure A.2 – Trends in Annual Mean NO_2 Concentrations (Barton Street AQMA)

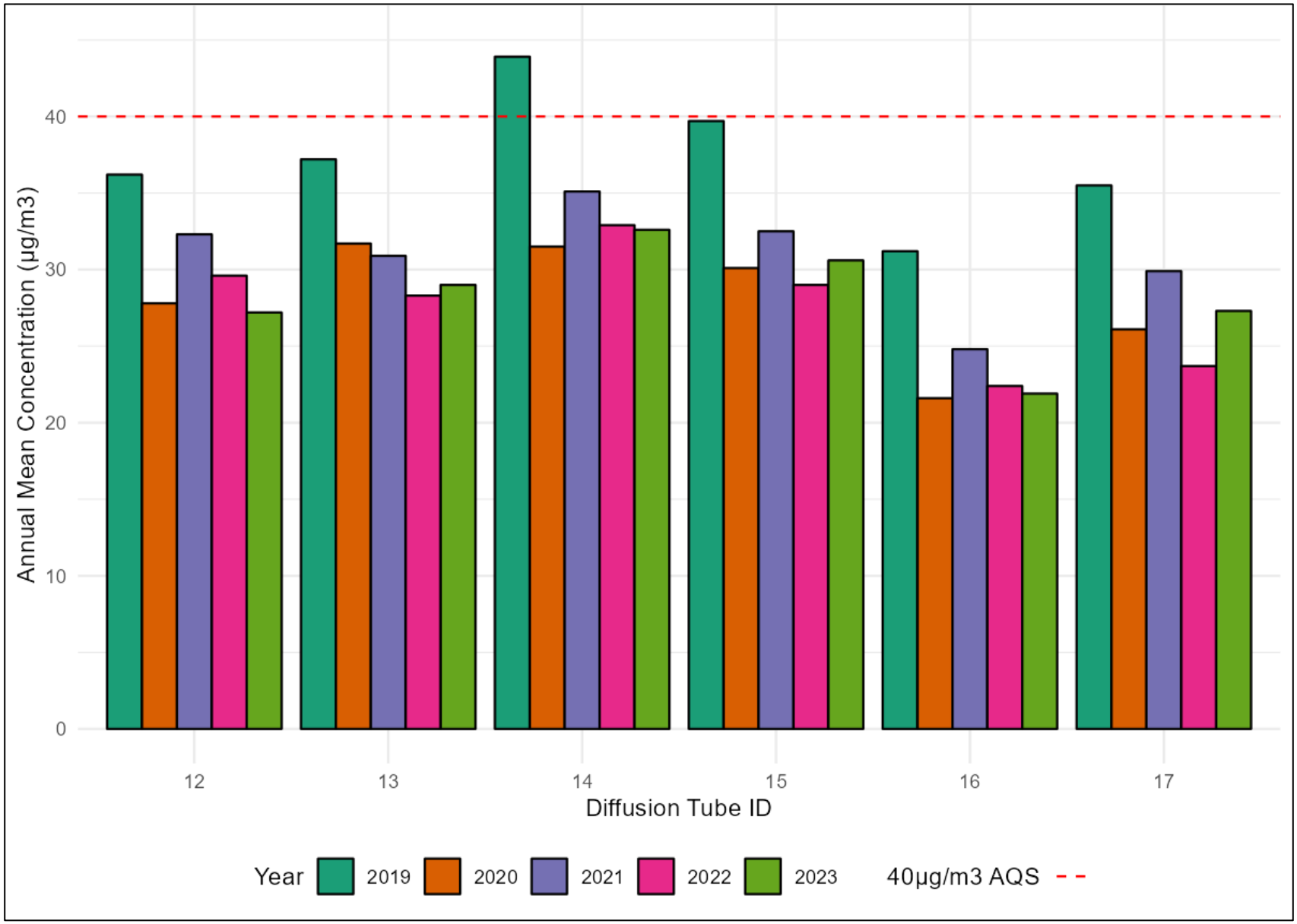


Figure A.3 – Trends in Annual Mean NO_2 Concentrations (Priory Road AQMA)

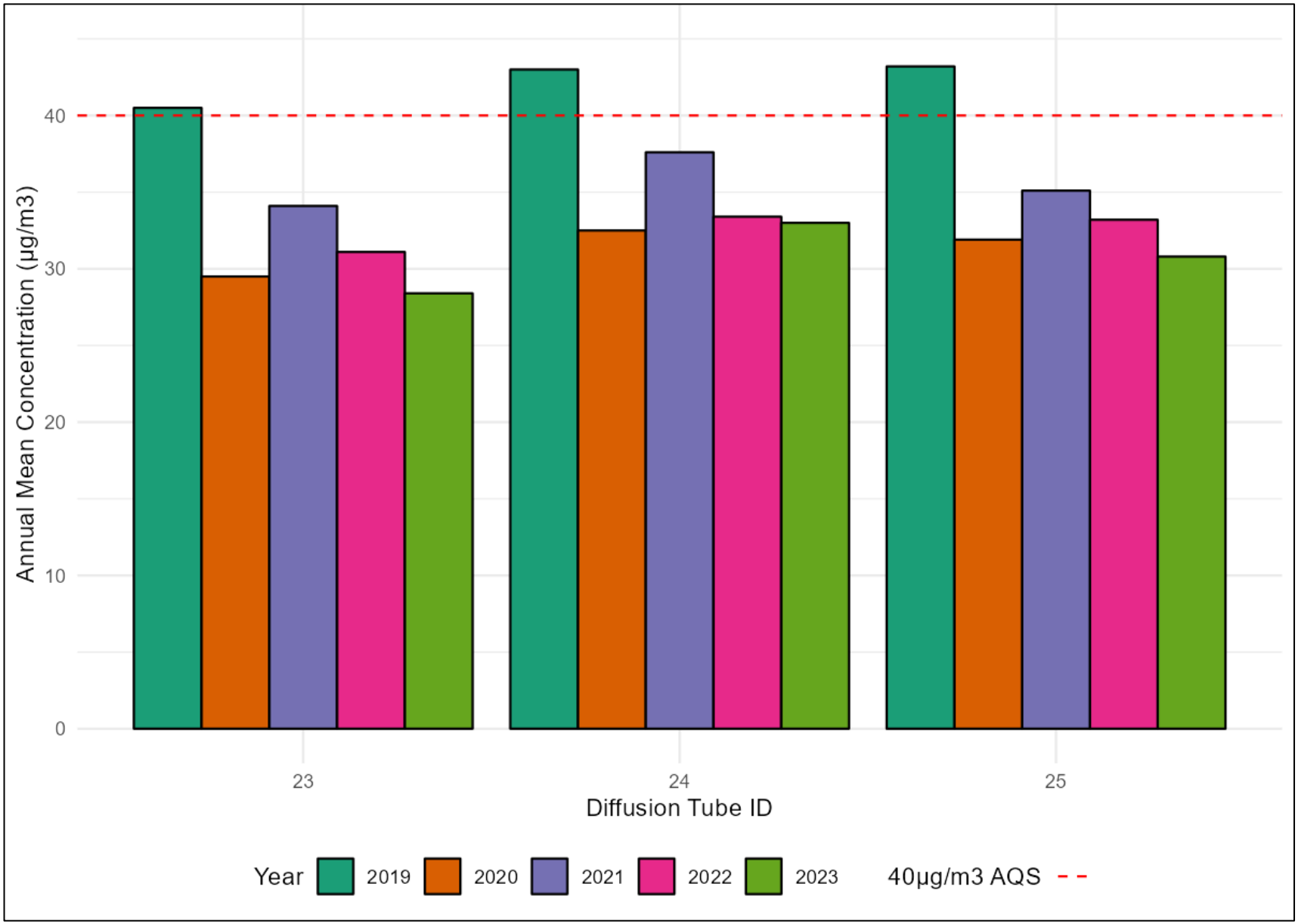
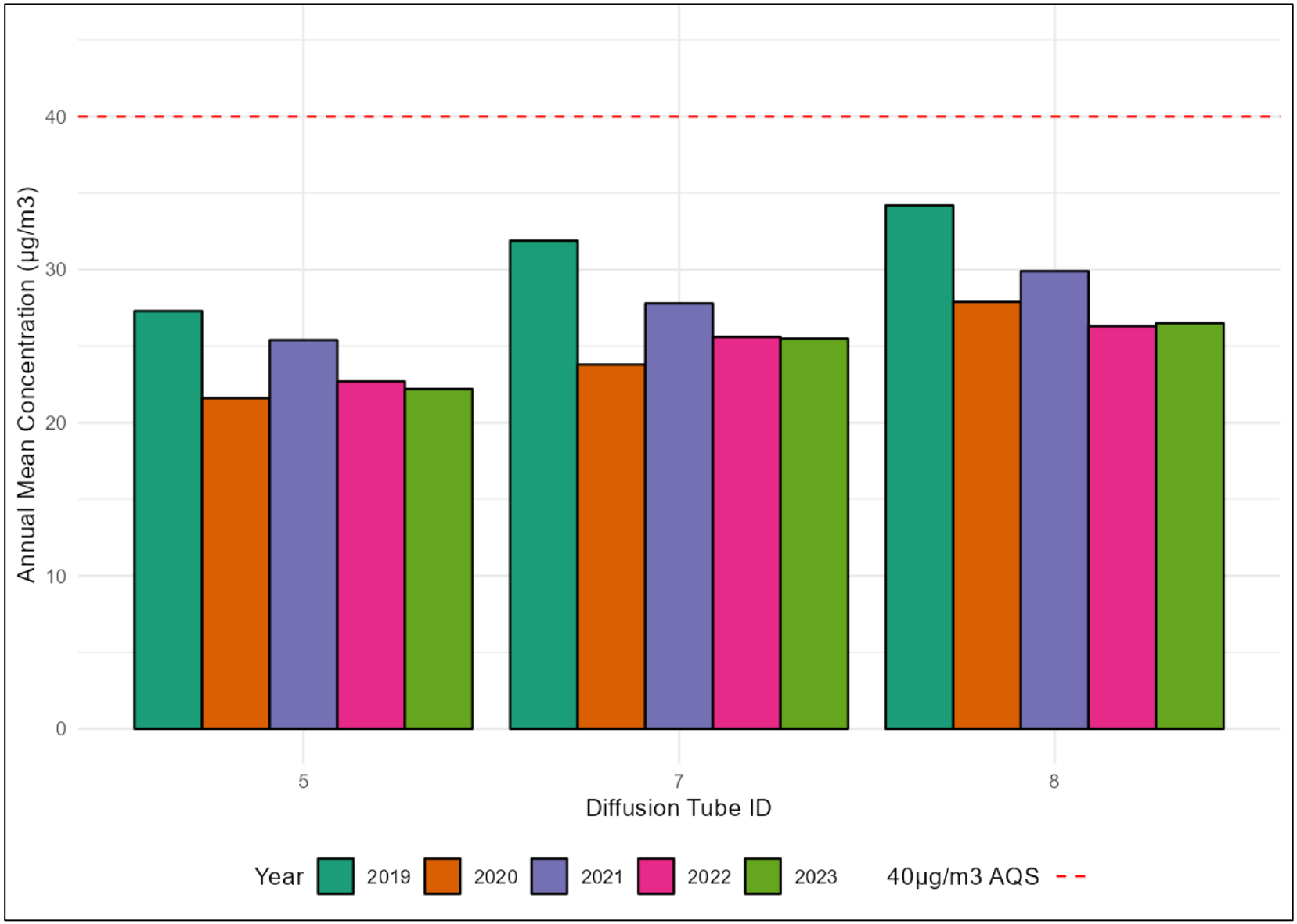


Figure A.4 – Trends in Annual Mean NO_2 Concentrations (Painswick Road AQMA)



Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO_2 2023 Diffusion Tube Results ($\mu g/m^3$)

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 0.81	Annual Mean: Distance Corrected to Nearest Exposure	Comment
3	387670	217250	24.8	25.8	21.2	21.4	16.8	16.7	14.8	18.9	21.2	21.6		15.7	19.9	16.1	-	
5	384558	216946	30.7			29.9	31.0	27.7	19.0	24.6	29.2	31.0	30.5	20.7	27.4	22.2	-	
7	384490	217027	41.0	40.5	31.1	31.3	23.0	25.2	26.2	27.3	32.4	34.0	37.3	27.9	31.4	25.5	-	
8	384509	216998	40.9	42.0	31.4	32.5	25.5	29.4	27.5	30.8	33.9	35.5	34.8	29.1	32.8	26.5	-	
12	384000	217863	40.3		33.3	41.2	31.6	35.5	25.6	32.7	33.4	29.2	39.6	26.9	33.6	27.2	-	
13	383717	218094	41.3	43.1	35.1	38.0	37.0	33.8		32.8	33.8	34.6	39.1	25.8	35.8	29.0	-	
14	383726	218074	49.8	47.3	37.6	40.0	36.0	35.4	33.4	36.3	42.6	41.5	46.2	36.9	40.2	32.6	-	
15	383989	217857	48.6	45.2	34.6	37.1	38.4	33.0	30.6	32.9	39.9	39.6	41.1	32.3	37.8	30.6	-	
16	384340	217294	32.9		27.2	30.8	26.1		15.4	23.6	27.2	34.0	33.0	20.5	27.1	21.9	-	
17	384175	217501	41.0	41.1			27.0	26.8	27.9	30.7	35.8	37.5	39.3	29.7	33.7	27.3	-	
18	384190	218160	36.8	37.4	27.7	30.5	28.4	27.5	19.0	23.9	28.8	30.7	37.6		29.8	24.2	-	
19	385130	218585	36.3	41.9	32.3	37.6	36.1	34.3		28.5	31.9	32.7	29.5		34.1	27.6	-	
20	385113	218595	38.1	40.0		36.2	31.5	30.9	24.2	28.2	33.5	34.5	35.5	23.4	32.4	26.2	-	
21	385430	218870	28.5	29.5	20.9	19.6	15.0	14.7	12.3	14.4	20.7	22.5	27.9	17.5	20.3	16.4	-	
23	382898	219029	34.5	41.9	36.1	38.8	35.8	33.4	26.4	31.9	37.6	38.4	37.4	27.9	35.0	28.4	-	
24	382921	219034	41.9	46.8	39.3	45.3	39.0	39.9	34.9	43.7	39.7	42.7	39.7	36.2	40.8	33.0	-	
25	382950	219040	46.6	48.2	39.7	43.5	38.2	40.4	20.2	35.3	29.1	41.8	40.7	32.6	38.0	30.8	-	
26	383560	218775	40.5	38.7	28.4	29.8	20.2		26.8	24.1	34.0	36.2		30.7	30.9	25.1	-	

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 0.81	Annual Mean: Distance Corrected to Nearest Exposure	Comment
27	382818	218993	27.3	29.0	21.2		19.1	19.7	11.1	17.7	21.2	23.8	27.6	15.6	21.2	17.2	-	
28	383639	219134	24.8	23.1	9.0	13.3			10.0	10.1		17.0	21.5	14.8	15.9	12.9	-	
29	383027	218253	30.6	30.4	23.1	24.6	19.9	19.1	14.9	20.8	23.2	26.1	28.5	18.3	23.3	18.9	-	
30	383483	218830														-	-	
31	385366	219777	25.0	23.6	14.8	13.2	9.9	9.5	10.4	10.6	15.3	17.9	22.9	14.9	15.7	12.7	-	
32	383357	218909	32.5	30.4	23.8	24.0	16.9	17.5	18.0	19.5	26.5	28.9	30.5	21.8	24.2	19.6	-	
33	383911	218195	26.3	23.7	17.5	4.7	12.7	11.9	10.3		15.1	17.6	23.8		16.4	13.2	-	

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

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

☒ **Gloucester City Council confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Gloucester City Council During 2023

Gloucester City Council has not identified any new major sources relating to air quality within the reporting year of 2023

Additional Air Quality Works Undertaken by Gloucester City Council During 2023

The AQAP workshops were carried out in 2023, which has informed the direction of the new AQAP.

QA/QC of Diffusion Tube Monitoring

Gloucester City Council's diffusion tubes are prepared and analysed by Gradko International Ltd. using the 20% TEA in water method. This laboratory takes part in the QA/QC Field Intercomparison, operated on behalf of Defra. Gradko International Ltd are a UKAS accredited laboratory.

The precision of 21 of the 23 local authority co-location studies in 2023 (who used the 20% TEA in water method) 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 Gradko's procedures.

Diffusion tube monitoring during 2023 was undertaken in line with the 2023 Diffusion Tube Monitoring Calendar.

Diffusion Tube Annualisation

As per LAQM.TG(22), annualisation is required for any site which has a data capture of less than 75%, but greater than 25%. All monitors had data capture of greater than 75% and therefore annualisation was not required.

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_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Gloucester City Council have applied a national bias adjustment factor of 0.81 to the 2023 monitoring data. A summary of bias adjustment factors used by Gloucester City Council over the past five years is presented in Table C.1.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.81
2022	National	03/23	0.83
2021	National	06/22	0.84
2020	National	03/21	0.81
2019	National	03/19	0.93

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/24

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2024
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.
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[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[5]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2023		Overall Factor[3] (23 studies)				Use		0.81

[1] For Casella Stanger/Bureau Veritas (NOT Bureau Veritas Labs) use Gradko 50% TEA in Acetone.
For Casella Seal/GMSS/Casella CRE/Bureau Veritas Labs/Eurofins/ use Environmental Scientific Groups.
From 2011 for Environmental Scientific Groups use ESG Glasgow.
From 2011 for Harwell Scientific Services use ESG Didcot.
For 2017 for SOCOTEC use ESG Didcot, as name changed mid year.
For 2018 SOCOTEC entered as Didcot and Glasgow. Glasgow analysis lab moved to Didcot mid 2018.
For Staffordshire CC SS/Staffordshire County Analyst use Staffordshire Scientific Services.
For Bodycote Health Sciences and Clyde Analytical Laboratories use Exova.
For Rotherham MBC use South Yorkshire Labs.
For Dundee CC use Tayside SS.
For Leicester Scientific Services use Staffordshire Scientific Services.
For South Yorkshire Air Quality Samplers use South Yorkshire Labs. As of January 2010 sampler body changed. As of April 2010 sampler cap changed.

NO_2 Fall-off with Distance from the Road

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

No diffusion tube NO_2 monitoring locations within Gloucester City Council required distance correction during 2023.

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

Figure D.1 – Map of Non-Automatic Monitoring Site (Painswick AQMA)

Figure D.2 – Map of Non-Automatic Monitoring Site (Barton Street AQMA)

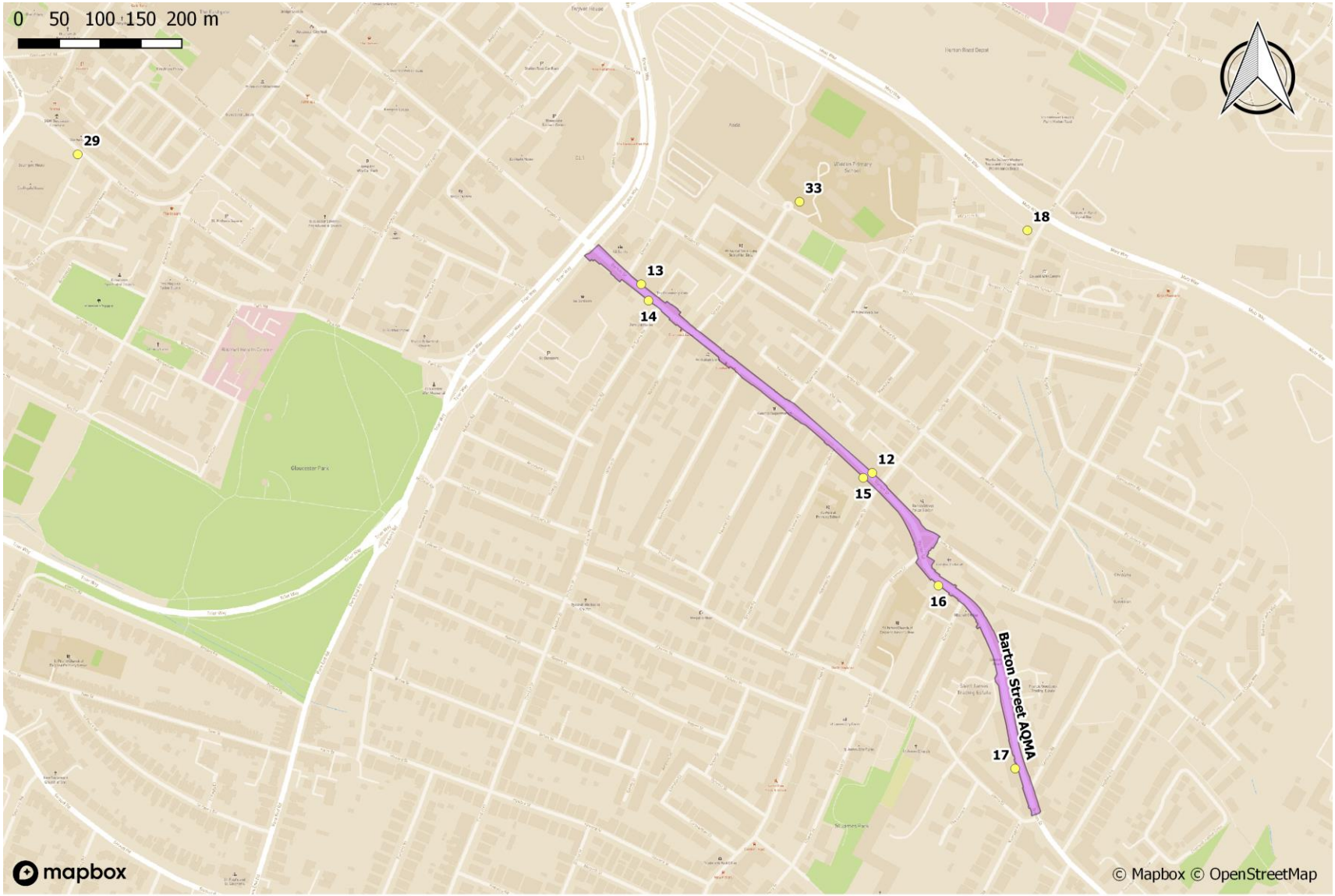


Figure D.3 – Map of Non-Automatic Monitoring Site (All Sites)

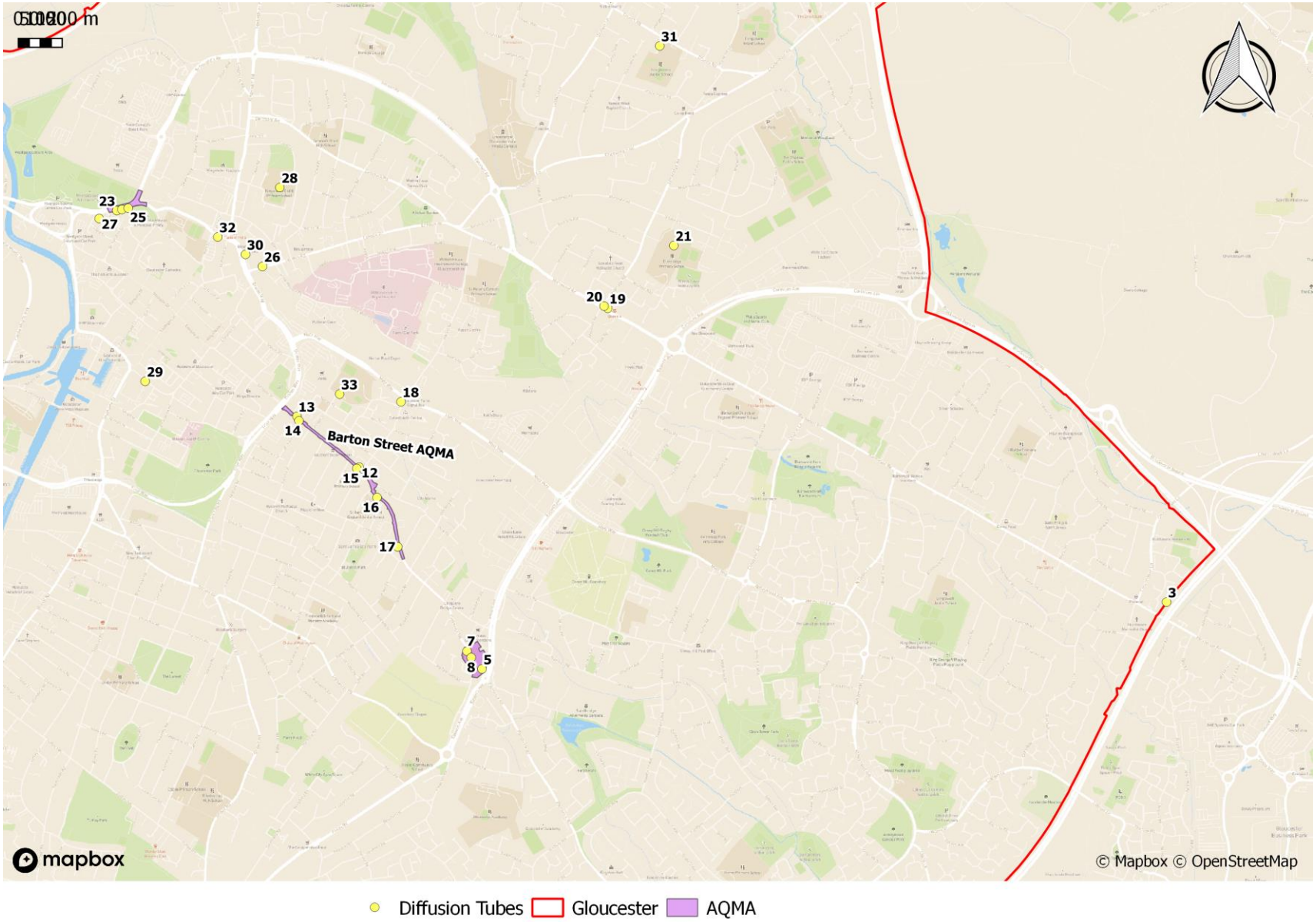
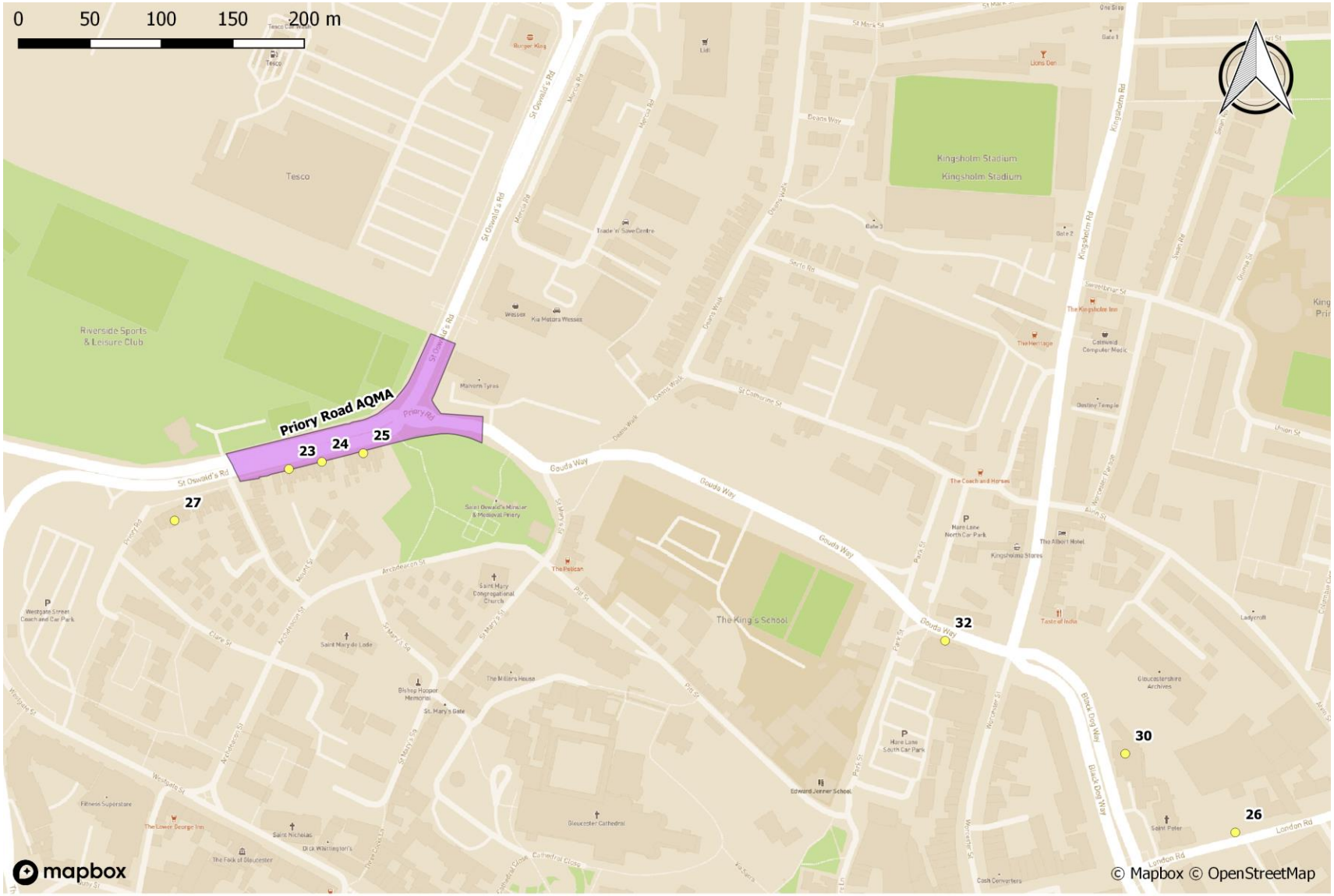


Figure D.4 – Map of Non-Automatic Monitoring Site (Priory Road AQMA)



Appendix E: Summary of Air Quality Objectives in England

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

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

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

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_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
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- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
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