Cheltenham Borough Council

Air Quality Annual Status Report 2024

Bureau Veritas

June 2024

Move Forward with Confidence

Document Control Sheet

Identification	
Client	Cheltenham Borough Council
Document Title	Cheltenham Borough Council – 2024 Air Quality Annual Status Report
Bureau Veritas Ref No.	AIR21538539

Contact Details		
Company Name	Bureau Veritas UK Limited	Cheltenham Borough Council
Contact Name	Viral Patel	Gareth Jones
Position	Senior Air Quality Consultant	Senior Environmental Health Officer
Address	Atlantic House, Atlas Business Park, Wythenshawe, Manchester, M22 5PR	Cheltenham Borough Council, Municipal Offices, Cheltenham, GL51 9SA
Telephone	07790 771444	07836 510830
E-Mail	viral.patel@bureauveritas.com	gareth.jones@cheltenham.gov.uk
Website	www.bureauveritas.com	www.cheltenham.gov.uk

Configuration				
Version	**Date**	**Author**	**Reason for Issue/Summary of Changes**	**Status**
1.0	20/06/2024	C Danby	First Draft	Draft

	Name	Job Title	Signature
Prepared By	Callum Danby	Air Quality Consultant	
Approved By	Viral Patel	Senior Air Quality Consultant	

Bureau Veritas UK Limited
5th Floor, 100 Lower Thames,
London
EC3R 6DL

Telephone: +44 (0) 161 446 4600
Registered in England 1758622
www.bureauveritas.co.uk

Registered Office
Suite 206 Fort Dunlop
Fort Parkway
Birmingham B24 9FD

CHELTENHAM
BOROUGH COUNCIL

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

Information	Cheltenham Borough Council Details
Local Authority Officer	Gareth Jones
Department	Environmental Health
Address	Cheltenham Borough Council Municipal Offices Cheltenham GL51 9SA
Telephone	07836 510830
E-mail	Gareth.jones@cheltenham.gov.uk
Report Reference Number	Cheltenham_2024_ASR
Date	June 2024

Executive Summary: Air Quality in Our Area

Air Quality in Cheltenham

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

Air pollution within the borough is predominantly caused by road traffic emissions from major A roads, in particular the A4013 (Princess Elizabeth Way), A40 (Gloucester Road), A4019 (Tewkesbury Road / Swindon Road), A435 (London Road), A46 (High Street) and A46 (Bath Road). These roads experience high volumes of traffic as they form the main part of the arterial highway network within Cheltenham. Therefore, these roads have a tendency to become heavily congested, resulting in the stopping and starting of vehicles, which in turns leads to elevated pollutant concentrations.

An air quality management area (AQMA) has been declared in response to these elevated pollutant concentrations. Cheltenham Borough Council declared this AQMA in September 2020 following the revocation of the borough-wide AQMA. The AQMA is declared for exceedances of the NO_2 annual mean objective.

During 2023, concentrations of NO_2 were monitored passively via a diffusion tube network of 45 sites, and automatically via a continuous analyser. The automatic monitoring station and four diffusion tube sites (of which one is co-located with the continuous analyser) are located within the AQMA. When compared to the 44 sites that made up the diffusion tube network in the previous reporting year, the NO_2 annual mean concentration decreased at 95% of sites in 2023. No single diffusion tube site recorded an NO_2 annual mean concentration above the air quality objective of 40 µg/m^3, with the maximum concentration within and outside of the AQMA being 32.4 µg/m^3 and 28.8 µg/m^3, respectively. The NO_2 concentration within the AQMA was also measured via the automatic monitoring station, which recorded an NO_2 annual mean of 25.3 µg/m^3. However, despite all concentrations being below the objective in 2023, there have still been exceedances of the objective within the last five years, and concentrations within 10% of the objective last year. Therefore, there is insufficient monitoring evidence to support the revoking of the AQMA.

Concentrations of PM_{10} and $PM_{2.5}$ were also routinely monitored during 2023, via an automatic monitoring station on Gloucester Road. This monitoring station was installed in November 2022 and therefore, 2023 was the first year for which a complete dataset was available. The data indicated that the PM_{10} annual mean objective of 40 µg/m^3 was not exceeded in 2023, with an annual mean concentration of 17.0 µg/m^3 being recorded. The 24-hour objective for PM_{10} was also not exceeded in 2023. For $PM_{2.5}$, the annual mean concentration was recorded to be 9.6 µg/m^3, which is well below the current objective of 20 µg/m^3, and just slightly below the 2040 target of 10 µg/m^3 that is not to be exceeded at any monitoring station by 31st December 2040. The data therefore shows that there were no exceedances of either the PM_{10} or $PM_{2.5}$ objective within Cheltenham during 2023.

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 pollutant of most harm 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.

Cheltenham Borough Council's newly adopted 2024 AQAP focuses on a number of key actions that are being taken to tackle sources of air pollution. As road traffic emissions are accountable for approximately 70% of the total NO_x concentrations with the AQMA, these actions are designed to primarily target transport emissions. These actions can be categorised into five key priorities:

- Priority 1 – Transport;
- Priority 2 – Planning and Infrastructure;
- Priority 3 – Policy Guidance;
- Priority 4 – Public Health and Wellbeing Behavioural Change; and
- Priority 5 – Air Quality Monitoring.

[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

Conclusions and Priorities

During 2023, the NO_2 annual mean objective was not exceeded at any monitoring location both within and outside of the AQMA boundary. This is a continuing trend that has been observed across the borough since 2021. However, as there have been concentrations reported within 10% of the annual mean objective during this period, there is insufficient evidence to support revoking the AQMA. Cheltenham Borough Council will continue to monitor the NO_2 concentration within the AQMA, and if the monitoring data shows this observed trend to be continuing, the Council will consider revoking the AQMA in the coming years.

The PM_{10} and $PM_{2.5}$ annual mean objectives were also not exceeded in 2023. The concentration of these pollutants was measured via the new automatic monitoring station on Gloucester Road that was installed in November 2022.

Local Engagement and How to get Involved

The public can engage with air quality issues via Cheltenham Borough Council's dedicated Air Quality Website. This provides information on a range of air quality topics, such as the current monitoring locations, declared AQMAs, copies of previous ASRs, and information on smoke control areas.

The Think Travel Website provides information to the public on the range of sustainable travel options that are available across the county of Gloucestershire. These range from local walking maps, cycle routes, public transport journey planners, park and ride facilities, car sharing, to information on electrical vehicles.

Local Responsibilities and Commitment

This ASR was prepared by Bureau Veritas on behalf of Cheltenham Borough Council, with the support of the following officers and departments:

- Gareth Jones, Senior Environmental Health Officer.

This ASR has been approved by:

- Louis Krog, Head of Public Protection

This ASR has not been signed off by a Director of Public Health. The ASR has been sent to the Director of Public Health, and we await their comments.

If you have any comments on this ASR please send them to Environmental Protection at:

Municipal Offices, Promenade,

Cheltenham, GL50 9SA

envhealth@cheltenham.gov.uk

Table of Contents

List of Figures

List of Tables

1 Local Air Quality Management

This report provides an overview of air quality in Cheltenham 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 Cheltenham Borough Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table F.1 – Air Quality Objectives in England

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.

Cheltenham Borough Council currently have one AQMA declared for exceedances of the NO_2 annual mean objective. This AQMA, which was declared in 2020 to replace the borough-wide AQMA which was revoked in 2020, is described as:

"An area including properties with a façade fronting onto: High Street from Junction of Gloucester Road and Tewkesbury Road to Junction of Burton Street; Poole Way; and Swindon Road from junction of Poole Way to St Georges Street".

The extent of the AQMA is shown below in Figure 2.1, and details of the AQMA is described in Table 2.1.

Figure 2.1 – Cheltenham Borough Council AQMA 2020

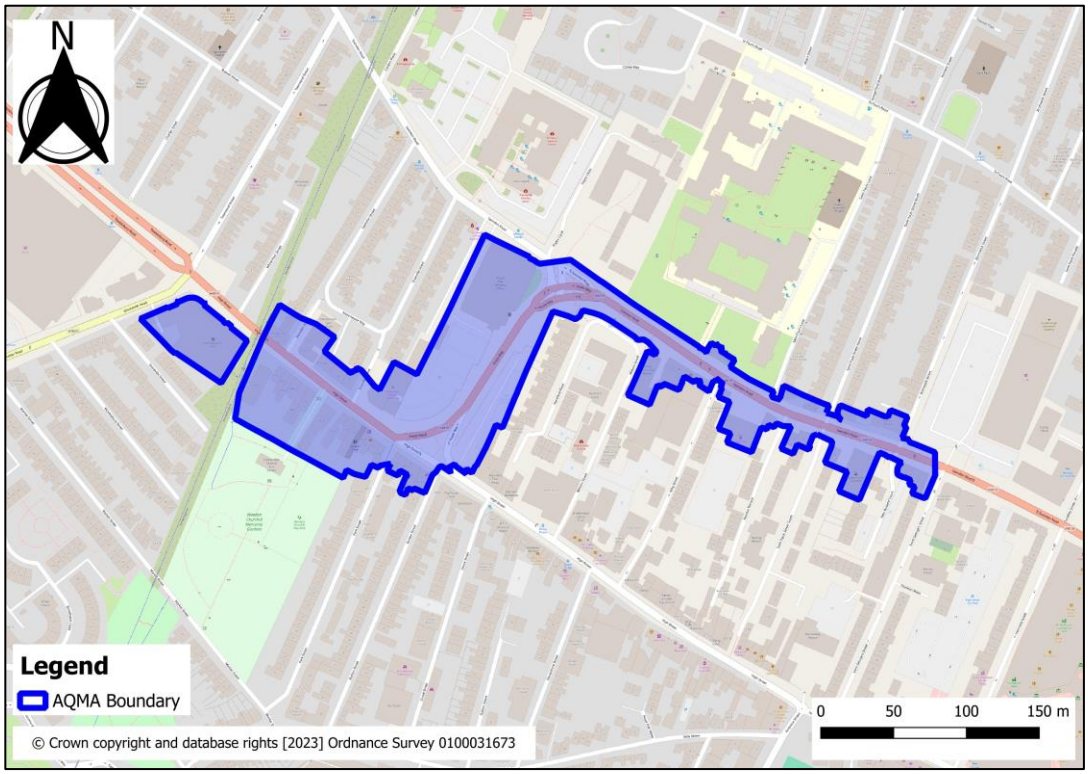


Table 2.1 – Declared Air Quality Management Areas

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
Cheltenham Borough Council AQMA 2020	15/09/2020	NO_2 Annual Mean	Includes properties with a façade fronting onto: High Street from junction of Gloucester Road and Tewkesbury Road to junction of Burton Street; Poole Way and Sindon Road from junction of Poole Way to St Georges Street.	No	46.4 µg/m^3	32.4 µg/m^3	3 Years	AQAP 2024	AQAP 2024

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

☒ **Cheltenham Borough Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Cheltenham

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

1. There is good discussion of annual mean concentration trends across the borough and the AQMA. Observed trends are also presented clearly, this is encouraged.
   - Trends within the AQMA and outside of the AQMA are presented in this report, to show how the concentrations within the AQMA differ from the concentrations across the borough as a whole.
2. The Council added five additional diffusion tube monitoring locations in 2022. This is welcomed.
   - The diffusion tube network was further expanded by one site in 2023, with the addition of a site at St. Pauls Medical Centre, as part of a collaborative project with the NHS.
3. The Public Health Outcomes Framework was mentioned, with specific reference to indicator D01 ('fraction of mortality attributable to particulate air pollution). In addition, a new monitoring station on Gloucester Road was added to monitor PM_{10} and $PM_{2.5}$ in November 2022. This is welcomed and the results for the new location should be included in next year's ASR.
   - Reference to the Public Health Outcomes Framework is made in this report, and the PM_{10}/$PM_{2.5}$ data from the new site on Gloucester Road has been included.
4. The Council has drafted a new Air Quality Action Plan (AQAP) which is currently under revision. This is welcomed and progress on the AQAP should be reported in next year's ASR.
   - The new AQAP has been formally adopted a link is provided to this document in Table 2.1 of this report.
5. In Table A.2, sites 8, 9 and 10 are marked as not being in AQMA. These are co-located with the automatic monitor CM1 which is in AQMA. The council are urged to correct this in the report.
   - The triplicate diffusion tube site that is co-located with the automatic analyser is marked as being within the AQMA in this report.
6. The Council has addressed comments from last year's ASR appraisal and made recommended changes in the report.
   - Comments from the 2023 ASR appraisal had been addressed in this report.

7. Robust and accurate QA/QC procedures were applied and there is clear reasoning and evidence for the calculation of a local bias adjustment factor.
    - QA/QC procedures of diffusion tube and automatic monitoring data are outlined in this, as well as evidence of calculating the local bias adjustment factor.

Cheltenham Borough 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. 17 measures are included within Table 2.2 – Progress on Measures to Improve Air Quality , with the type of measure and the progress Cheltenham Borough 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 2.2. More details on these measures can be found in the newly adopted 2024 AQAP.

Key completed measures are:

- Highways Improvements: A range of changes to the highways have taken place, such as the 2-way junction priority changes at Albion Street and Imperial Square, which facilitates easier access of traffic into town centre car parks. Upgrades have also taken place on traffic signals on St Margaret's Road/A4019 areas, which are now running on the new SCOOT system, helping to keep traffic flowing.
- Low Emission Bus Fleet: The current fleet of stagecoach buses are now fitted with a black box system, which promotes fuel-efficient driving and anti-idling.
- Workplace Travel Plans: A 'Cycle2Work' scheme was introduced in 2021 following a scoping exercise that was carried out with LiftShare, to explore opportunities for staff to use more sustainable modes of transport as part of their daily commute.

The following measures outline Cheltenham Borough Council's priorities for the coming years. These measures are predominantly derived from the newly adopted AQAP, and include the following:

- Promoting Low Emission Transport: Cheltenham Borough Council are working with companies such as Royal Mail to encourage the uptake of low emission vehicles. This is significant as the main access road to the Royal Mail depot (Swindon Road) passes through the AQMA. The uptake of low emission vehicles is also to be encouraged to the wider public by offering discounted parking permits for residents who have an electric vehicle (EV) within / around the AQMA. Cheltenham Borough Council intend to install more EV charging points to facilitate the uptake of EVs.

- Increasing Public Awareness: Cheltenham Borough Council are working with Gloucestershire County Council's 'behavioural experts' and marketing teams to raise awareness of the importance of air quality. In addition, there are plans to work with the NHS to raise awareness amongst the most vulnerable groups (i.e., children, the elderly and those with existing health conditions).
- Develop Understanding of Vehicle Movements: Cheltenham Borough Council will commission a study to understand the reasoning for vehicle movements through the AQMA.

It is hoped that the measures outlined will maintain compliance within the AQMA so that Cheltenham Borough Council can consider revoking the AQMA. An update on the possibility of revoking the AQMA will be provided in next year's ASR.

The measures in the newly adopted 2024 AQAP can be categorised under 5 priorities:

Priority 1 – Transport: Focusing on areas that Cheltenham Borough Council have direct control over (e.g. planning and procurement of outsourced functions) and areas where measures can be implemented via partnerships with Gloucestershire County Council and others.

Priority 2 – Planning and Infrastructure: Cheltenham Borough Council will work with both developers and partner organisations to ensure that infrastructure, services and community facilities are delivered in a sustainable manner, with the least potential negative impact on air quality.

Priority 3 – Policy Guidance: Existing strategies adopted by Cheltenham Borough Council and Gloucestershire County Council are key mechanisms to reduce emissions across the borough. To effectively reduce NO_2 concentrations, especially within the AQMA, the existing transport plans, freight services, climate change strategies and cycle strategies should be revised, taking into account the impact on air quality.

Priority 4 – Public Health and Wellbeing Behavioural Change: The most effective way to achieve a reduction in vehicle numbers is to change the attitudes and behaviour of people towards travel. This ranges from education/awareness raising to schemes which incentivise change.

Priority 5 – Air Quality Monitoring: Cheltenham Borough Council currently monitor air quality passively via a diffusion tube network consisting of 45 sites, and continuously via two automatic monitoring stations. This monitoring data is supplemented by a network of 10 low-cost sensors which provide indicative measurements to help identify hotspot areas

(i.e. areas where the air quality objective is exceeded or likely to be exceeded). In November 2022, a new monitoring station was installed on Gloucester Road (CM2) to monitor PM_{10} and $PM_{2.5}$, demonstrating Cheltenham Borough Council's dedication to continuously expanding the monitoring network.

In September 2023, Cheltenham Borough Council recruited an Air Quality Educations Project Officer. The officer's role is to deliver air quality education in schools, and to develop opportunities for air quality based education campaigns in the wider community. To date this has included delivering air quality education to 3,000 school age children, a high-profile street art project and on-bus advertising.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	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	Highways Improvements	Transport Planning and Infrastructure	Other	2016-18	2018	Gloucestershire County Council / Local Sustainable Transport Fund	GCC	TBC by GCC	TBC by GCC	TBC by GCC	Completed	1 – 2%	Reduction in through traffic and improved access to car parks.	Phase 3 completed Autumn 2017. 2-way junction priority changes at Albion Street and Imperial Square allowing traffic easier access to town centre car parks.	-
2	Low Emission Bus Fleet	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2014-16	Ongoing	Cheltenham Borough Council	Bus Operators	No	TBC by GCC	TBC by GCC	TBC by GCC	<0.5%	Bus fleet data.	All Stagecoach vehicles are powered by Euro V and increasingly Euro V1 engines. The current fleet of Stagecoach buses now have a black box system which monitors driving behaviour and promotes more fuel-efficient driving and anti-idling.	The main bus fleet company in Cheltenham and Gloucester has the most modern fleet in any area of the UK. Many buses are now Euro 6 compliant.
3	Promotion of Park & Ride	Alternatives to Private Vehicle Use	Bus Based Park & Ride	2014-16	2018	Gloucestershire County Council	GCC	TBC by GCC	TBC by GCC	TBC by GCC	TBC by GCC	0.1 – 1%	Reduced car travel into and out of Cheltenham.	Upgrade of Arle Court Park & Ride to Travel Hub to be completed Autumn 2024.	-
4	Promotion of Greener Vehicles	Promoting Low Emission Transport	Promoting Alternative Refueling Infrastructure to Promote Low Emission Vehicles	2013-15	Ongoing	Gloucestershire County Council	GCC	TBC by GCC	TBC by GCC	TBC by GCC	TBC by GCC	<0.5%	Charge point usage data.	EV charge points installed on numerous on-road parking areas (GCC) and currently being installed in multiple CBC car parks.	The Borough and County Councils continue to encourage EV usage through the installation of charging points in car parks or on-street. Cheltenham and Gloucestershire County Councils will also investigate the potential for differential parking charges for electric and hybrid vehicles in both car parks and on-street. The Borough currently provides EV charging at its car park charging points.
5	Twenty is Plenty	Promoting Low Emission Transport	Other	2015-17	Ongoing	Cheltenham Borough Council	CBC	No	Not Funded	£100k - £500k	Planning	<0.5%	Traffic count / speed data.	The Cabinet are awaiting better guidance on the benefits and implementation.	Assessed in the “Connecting Cheltenham” report (2020). The report was also issued to GCC to help inform their LTP as: “Introduce speed limits in accordance with their current national guidelines and prioritise them based on available evidence – including 20 mph zones”.
6	Increased Car Sharing	Alternatives to Private Vehicle Use	Car & Lift Sharing Schemes	2015	2016	Gloucestershire County Council	GCC	TBC by GCC	TBC by GCC	TBC by GCC	TBC by GCC	<0.5%	Traffic data count.	Parish Lift, Carshare Gloucestershire, available via Gloucestershire County Council.	‘Parish Lift’ a new community car sharing scheme was developed in 2016 to help support social inclusivity and rural accessibility across

Measure No.	Measure	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
															the Cotswolds Area of Outstanding Natural Beauty (AONB). The scheme complements the current Carshare Gloucestershire initiative and is being funded by Communities Connected, a Community Interest Company (CIC). Parish Lift is an online platform designed to help match registered users, whether they be drivers of people seeking a 'lift'.
7	Air Quality Information	Public Information	Via the Internet	2015-16	Ongoing	Cheltenham Borough Council	CBC	No	Not Funded	£10k - £50k	Planning	<0.1%	Hit counter on webpage.	Working with GCC to develop a county-wide AQ info / data site.	Currently going through approval.
8	Business Travel Grants	Promoting Low Emission Transport	Other	2014-15	2018	Gloucestershire County Council	GCC	TBC by GCC	TBC by GCC	TBC by GCC	Completed	<0.1%	Uptake of grants.	Grants no longer available under this scheme.	In 2016/17, 132 businesses (representing 2,205 staff) were contacted in the Cheltenham parking zone areas to raise awareness of parking enforcement and encourage a shift towards more sustainable modes of travel. 13 businesses (representing 14,865 staff) were engaged in a more intensive site assessment and awareness raising events promoting Thinktravel and sustainable modes.
9	Wayfinding Initiative	Promoting Travel Alternatives	Promotion of Cycling & Walking	2014-15	2017	Gloucestershire County Council	GCC	TBC by GCC	TBC by GCC	TBC by GCC	Completed	<0.1%	-	No further work since completion of this project.	Signage installed.
10	Promotion of Workplace Travel Plans	Promoting Travel Alternatives	Workplace Travel Planning	2015	Unknown	Cheltenham Borough Council	CBC	No	Funded	£10k - £50k	Planning	<0.1%	Whether or not a plan is implemented.	CBC carried out a scoping exercise in 2021 with LiftShare to explore opportunities for staff to use more sustainable modes of travel for their commute. The Cycle2Work scheme was introduced in 2021. A staff travel survey was conducted in September 2022 to get baseline data.	These will be used to encourage businesses in Cheltenham to develop and implement similar plans.
11	Air Quality Planning Policy	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2015	Unknown	Cheltenham Borough Council	CBC	No	Funded	<£10k	Completed	Unknown but potentially significant	Air Quality Planning Policy adopted.	Air quality is still a material consideration with planning and air quality impacts of all significant developments will be properly assessed and mitigation actions taken when necessary.	Although no specific policy on air quality is adopted as part of the Cheltenham Local Plan (2020), air quality is still a material consideration with planning.

Measure No.	Measure	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
12	Traffic Light Appraisal	Traffic Management	Strategic Highway Improvements, Re-prioritising Road Space away from Cars, including Access Management, Selective Vehicle Priority, Bus Priority, and High Vehicle Occupancy Lanes	2015-17	Ongoing	Gloucestershire County Council	GCC	TBC by GCC	TBC by GCC	TBC by GCC	TBC by GCC	Potentially significant in current areas of poor air quality.	Number of traffic lights removed and traffic count/ speed data.	Upgrades of some of the traffic signals have taken place on St Margaret's Road/ A4019 area. These are now running on the new scoot system which is helping to keep traffic moving in the area. GCC are also looking at air quality sensors in the locations, but there has been contractor delays on this.	MOVA is an intelligent traffic signal system, which over time can optimise traffic signals, reducing queues and congestion. These are currently being installed following routine upgrades to signal systems in Cheltenham.
13	Bus and Taxi Quality Partnership	Promoting Low Emission Transport	Public Vehicle Procurement – Prioritising Uptake of Low Emission Vehicles.	2016	Ongoing	Gloucestershire County Council	GCC	TBC by GCC	TBC by GCC	TBC by GCC	TBC by GCC	Unknown	Anecdotal.	Gradual uptake as there has been recent requirement for taxis to be updated for accessibility, rather than air quality issues.	No specific partnership but buses and taxis are not allowed to idle at bus stops and taxi ranks in town.
14	Green Planting	Traffic Management	Other	2014-16	Ongoing	Cheltenham Borough Council	CBC	No	Partially Funded	£50k - £100k	Implementation	<0.1%	Number of urban planning applications with green planting schemes adopted.	In 2021, works were completed in High Street. Further work required due to planting not thriving.	CBC are delivering the Habitat Cheltenham biodiversity projects.
15	Vehicle Management Signage	Traffic Management	Other	2014-18	Unknown	Cheltenham Borough Council	CBC	No	Not Funded	£50k - £100k	Aborted	<0.1%	Traffic count data.	Bids for funding have been aimed at other projects, so this has not been pursued.	-
16	Cycle Safety Improvements	Transport Planning and Infrastructure	Cycle Network	2014-16	Ongoing	Cheltenham Borough Council	CBC	No	Funded	£50k - £100k	Completed	<0.1%	Number of cyclists / accident & injury statistics.	Cross-county cycle routes being installed by GCC to link Cheltenham to Gloucester and beyond.	-
17	Installation of AQ Mesh Pods	Monitoring	Other	2020	Ongoing	Cheltenham Borough Council	CBC	No	Funded	£10k - £50k	Completed	-	Monitoring of $PM_{2.5}$ and NO_x at 9 sites within the borough, which will lead to a greater understanding of the distribution of pollutants, allowing more effective and targeted measures.	Results up to the end of 2023 are now available on CBC website, but there are still issues of accuracy and reliability.	Issues of reliability and accuracy are still affecting data from the Mesh Pods.

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.

$PM_{2.5}$ Monitoring:

Cheltenham Borough Council have recently installed a new automatic monitoring station on Gloucester Road to monitor $PM_{2.5}$. During the first full year of monitoring (2023), a $PM_{2.5}$ annual mean concentration of 9.6 µg/m^3 was recorded, which is slightly below the AQS objective of 10 µg/m^3 that is not to be exceeded at any monitoring station by 31st December 2040.

$PM_{2.5}$ Background Concentrations:

The current Defra 2023 background maps for Cheltenham Borough Council (2018 based)[7] show that all background concentrations of $PM_{2.5}$ are significantly below the current annual mean AQS objective of 25 µg/m^3. The highest background concentration is predicted to be 9.6 µg/m^3 within the grid square (1 km x 1 km) with the centroid grid reference 395500, 222500. This grid square encompasses the north-east of Cheltenham city centre, including part of the A46, which is a key arterial route, where the PM secondary fraction (formed of gaseous pollutants) constitutes as the key contributor to $PM_{2.5}$.

Smoke Control Areas:

Smoke control areas (SCAs) are designated zones in which it is an offence to emit smoke from a chimney of a building, from a furnace or from any fixed boiler. It is also an offence to acquire an unauthorised fuel for use within a SCA unless it is used within an exempt appliance (exempted from the controls which generally apply in SCAs). There are currently

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

[7] Defra Background Mapping (2018 Based). Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

a number of SCAs declared within Cheltenham. However, these are to be replaced with a revised SCA following the adoption of the 2024 AQAP.

Impact on Human Health:

The Public Health Outcomes Framework data tool[8], compiled by Public Health England quantifies the mortality burden of $PM_{2.5}$ within England on a county and local authority scale. The 2022 fraction of mortality attributable to $PM_{2.5}$ emissions within Cheltenham is 5.6%, which is slightly lower than the average for England as a whole (5.8%).

[8] Public Health England – Public Health Outcomes Framework. Available at: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/1/gid/1000043/pat/6/ati/501/are/E07000078/iid/93861/age/230/sex/4/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1/fip/0

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

This section sets out the monitoring undertaken within 2023 by Cheltenham Borough 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

Cheltenham Borough Council undertook automatic (continuous) monitoring at two sites during 2023. Table A.1 in Appendix A shows the details of the automatic monitoring sites. These are located on Gloucester Road and Swindon Road, with the monitoring station at the latter location being co-located with diffusion tubes to allow for a local bias adjustment factor to be calculated through a triplicate co-location study. Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Cheltenham Borough Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 45 sites during 2023, including one triplicate site, resulting in a total of 47 diffusion tubes being deployed across the borough each month. This is an increase of one site from 2022, as an additional site was added to the network at St. Paul's Medical Centre, as part of a collaborative project with the NHS. Table A.2 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.

During 2023, the diffusion tube network was well maintained, with an average data capture of approximately 97%. No single diffusion tube site had more than two months of data missing during the entire monitoring period for which the site was established.

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.3 and Table A.3 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 40 µg/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).

In comparison to the 44 sites that made up the diffusion tube monitoring network in 2022, the NO_2 annual mean concentration decreased at 42 sites in 2023, equating to a reduction in pollutant concentration at 95% of sites. The maximum decrease in NO_2 concentration between the two reporting years was 4.7 µg/m^3 (Tube ID: 12), located on Swindon Road, just beyond the extent of the current AQMA boundary. This is in contrast to the previous reporting year, where concentrations increased between 2021 and 2022 at 74% of sites.

Indeed, the diffusion tubes around the edge of the current AQMA boundary all showed decreases of 2.1 µg/m^3 (Tube ID: 3), 3.5 µg/m^3 (Tube ID: 4) and 4.7 µg/m^3 (Tube ID: 12), which is significantly greater than the average decrease that was observed across the entire diffusion tube network (1.8 µg/m^3). Therefore, the recent monitoring evidence suggests that there is no need to extend the current boundary for which the AQMA is designated.

Across the three diffusion tubes that are located within the AQMA, all sites recorded an NO_2 annual mean concentration below the air quality objective of 40 µg/m^3, with the maximum concentration recorded within the AQMA being 32.4 µg/m^3 (Tube ID: 5). Therefore, there was no diffusion tube monitoring site that recorded an NO_2 annual mean concentration within 10% of the objective. However, as there have still been exceedances of the objective within the last five years, and with concentrations still within 10% of the objective last year, there is insufficient monitoring evidence to support revoking the AQMA.

For diffusion tubes, the full 2023 dataset of monthly values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

The automatic monitoring site location on Swindon Road (CM1) recorded an NO_2 annual mean concentration of 25.3 µg/m^3, which is a decrease from the 27.0 µg/m^3 recorded in the previous reporting year. As the data capture of this automatic monitoring site was approximately 99%, the results are highly reflective of the NO_2 concentrations in 2023.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

In 2023, the NO_2 hourly mean objective of 200 µg/m^3 was not exceeded on any occasion, with the maximum NO_2 hourly mean being recorded as 105 µg/m^3 (CM1). Furthermore, as no single diffusion tube site recoded an annual mean NO^2 concentration above 60 µg/m^3, it can be suggested that the 1-hour mean objective was not likely to be breached at any site across the diffusion tube network within the borough.

3.2.2 Particulate Matter (PM_{10})

In November 2022, Cheltenham Borough Council installed a new continuous monitoring station on Gloucester Road (CM2) to monitor PM_{10} and $PM_{2.5}$. Therefore, 2023 was the first year in which this monitoring station was operational to provide a complete dataset for the calendar year.

The data from this site (CM2) indicates that the PM_{10} annual mean objective (40 µg/m^3), was not exceeded in 2023, with an annual mean PM_{10} concentration of 17.0 µg/m^3 being recorded. The 24-hour PM_{10} objective of 50 µg/m^3 not to be exceeded on more than 35 occasions was not breached once, with the maximum 24-hour mean PM_{10} concentration that was recorded at the site being 42.8 µg/m^3. The PM_{10} results from the automatic monitoring station on Gloucester Road (CM2) are presented in Table A.6 and Table A.7.

3.2.3 Particulate Matter ($PM_{2.5}$)

In 2023, the annual mean $PM_{2.5}$ concentration recorded at the automatic monitoring station on Gloucester Road (CM2) was 9.6 µg/m^3. This is just below the AQS objective of 10 µg/m^3 that is not to be exceeded at any monitoring station by 31st December 2040. The $PM_{2.5}$ results from this monitoring station are presented in Table A.8 of Appendix A.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Swindon Road	Kerbside	394760	222878	NO_2	No	Chemiluminescent	0	2.4	1.3
CM2	Gloucester Road	Roadside	392269	222007	PM_{10}, $PM_{2.5}$	No	BAM	28	2.2	1.4

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 – 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)
1	Ladies College	Roadside	394621	222215	NO_2	No	0.0	5.7	No	2.9
2	Gloucester Rd School	Kerbside	393906	222873	NO_2	No	12.5	0.3	No	2.9
3	Gloucester Rd / Stoneville St	Roadside	394180	222982	NO_2	No	1.6	1.9	No	2.9
4	2 Gloucester Road	Kerbside	394235	223055	NO_2	No	2.0	0.5	No	2.9
5	422 High St	Roadside	394350	222923	NO_2	Yes	0.0	1.8	No	2.9
6	48 Swindon Road	Roadside	394635	222928	NO_2	Yes	2.0	2.2	No	3.3
7	New Rutland Court	Roadside	394738	222888	NO_2	Yes	2.0	1.9	No	2.9
8, 9, 10	Co-location - 3	Roadside	394760	222878	NO_2	No	1.0	2.4	Yes	1.3
11	50 St Georges Street	Kerbside	394708	222763	NO_2	No	2.3	0.4	No	3.0
12	2 Swindon Road	Roadside	394830	222845	NO_2	No	1.0	2.1	No	2.9
13	22 St Pauls Road	Kerbside	394902	223004	NO_2	No	1.5	1.1	No	2.9
14	Elvis Villas	Roadside	394980	222735	NO_2	No	0.0	2.2	No	2.9
15	Portland Street	Kerbside	395110	222670	NO_2	No	1.0	1.6	No	3.1
16	Winchcombe St./Fairview 2022	Roadside	395210	222618	NO_2	No	1.0	3.2	No	3.1
17	54 Albion Street	Kerbside	395207	222465	NO_2	No	2.0	1.2	No	2.8
18	Berkeley Place	Roadside	395340	222071	NO_2	No	2.8	1.9	No	3.2
19	2 London Road	Roadside	395362	222000	NO_2	No	1.0	3.0	No	2.9
20	Sandford Park Alehouse	Roadside	395300	222027	NO_2	No	6.5	1.9	No	3.4
21	YMCA Shop - High St	Kerbside	395182	222183	NO_2	No	5.0	1.9	No	3.0
22	8a Bath Road	Roadside	395146	222149	NO_2	No	0.0	2.0	No	3.0
23	St Lukes College Road	Kerbside	395156	221866	NO_2	No	2.3	0.6	No	2.9
24	29 Cambray Place	Urban Background	395037	222222	NO_2	No	9.5	2.4	No	2.8
25	Boots Corner	Urban Centre	394954	222511	NO_2	No	2.1	3.3	No	2.8
26	Clarence Parade Alternative	Kerbside	394810	222439	NO_2	No	1.0	0.4	No	2.9
27	Princess Elizabeth Way North	Kerbside	393081	223643	NO_2	No	1.0	1.2	No	2.9

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)
28	Princess Elizabeth Way South 2022	Kerbside	392066	222540	NO_2	No	9.5	1.3	No	2.8
29	Hatherley Lane	Roadside	391178	221641	NO_2	No	0.0	3.7	No	2.8
30	Fiddlers Green Lane / Kempton Grove	Urban Background	391462	222662	NO_2	No	12.9	0.3	No	2.9
31	Telstar Way	Kerbside	391507	221978	NO_2	No	7.8	1.0	No	2.8
32	A40 PE Way Roundabout	Kerbside	391869	222084	NO_2	No	19.3	6.0	No	2.9
33	Gloucester Rd (Benhall)	Roadside	392267	222009	NO_2	No	22.0	4.0	No	2.4
34	264 Gloucester Road	Kerbside	393296	222170	NO_2	No	0.0	0.8	No	2.5
35	340 Gloucester Road	Roadside	392912	221862	NO_2	No	0.0	3.6	No	2.8
36	Norwood / Gratton Rd	Roadside	394473	220935	NO_2	No	5.8	1.5	No	3.0
37	51 Upper Norwood Street	Suburban	394492	220822	NO_2	No	3.1	1.5	No	2.9
38	81 London Road	Roadside	395660	221670	NO_2	No	0.0	4.7	No	2.7
39	Opp. Wokswagon London Rd	Roadside	395862	221424	NO_2	No	8.4	2.2	No	2.8
40	Prestbury High Street	Roadside	397009	223887	NO_2	No	0.0	1.8	No	2.8
41	54 Linden Ave	Suburban	396399	224044	NO_2	No	8.1	1.6	No	2.9
42	170 Prestbury Rd	Roadside	395980	223322	NO_2	No	1.3	1.7	No	2.9
43	Prestbury Rd / Portland Square	Kerbside	395394	222875	NO_2	No	2.7	0.8	No	2.8
44	16 Seneca Way	Suburban	394026	224231	NO_2	No	8.8	2.1	No	2.9
45	Warden Hill School	Suburban	393262	220358	NO_2	No	6.1	1.6	No	2.9
46	Farmfield Road	Suburban	393010	220347	NO_2	No	6.7	2.1	No	2.8
47	St Pauls Med Centre	Roadside	394443	223072	NO_2	No	13.2	2.5	No	2.9

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.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site 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
CM1	394760	222878	Kerbside	98.5	98.5	36.0	24.7	25.3	27.0	25.3

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

☒ **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_2 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 µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/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_2 – Automatic Monitoring (CM1)

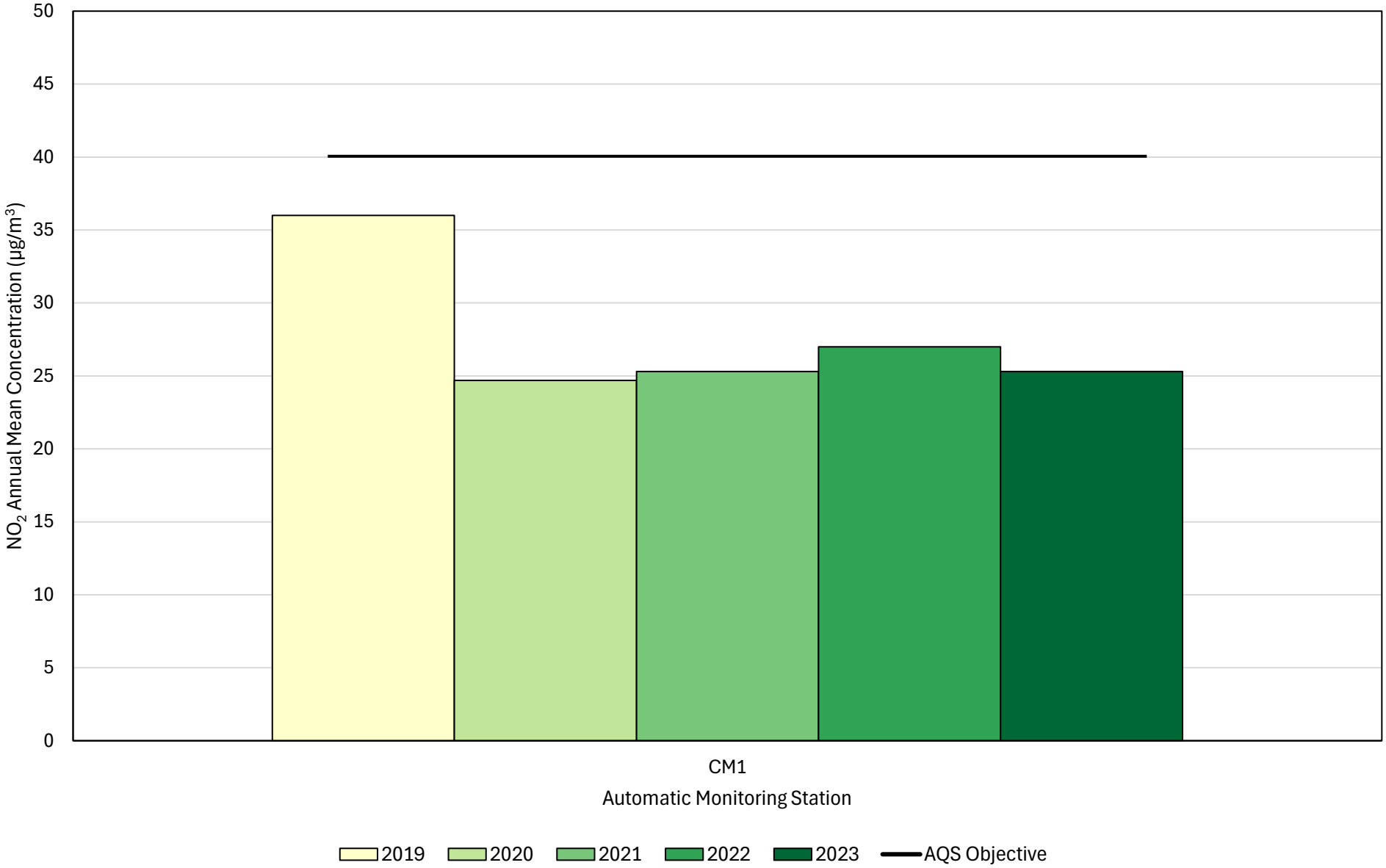


Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

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
1	394621	222215	Roadside	100	100.0	29.6	20.8	21.8	23.0	21.0
2	393906	222873	Kerbside	100	100.0	-	24.3	24.5	25.0	25.4
3	394180	222982	Roadside	100	100.0	-	25.3	26.8	28.3	26.2
4	394235	223055	Kerbside	100	100.0	43.1	32.3	31.5	33.3	29.8
5	394350	222923	Roadside	100	100.0	46.5	32.9	34.5	36.0	32.4
6	394635	222928	Roadside	100	100.0	-	21.5	23.1	23.1	21.8
7	394738	222888	Roadside	100	100.0	37.9	40.3	30.3	32.6	29.9
8, 9, 10	394760	222878	Roadside	100	100.0	32.9	35.1	24.8	27.2	25.5
11	394708	222763	Kerbside	92.1	92.1	31.6	21.5	22.4	23.5	21.1
12	394830	222845	Roadside	82.7	82.7	35.6	39.2	26.6	30.5	25.8
13	394902	223004	Kerbside	92.3	92.3	31.3	22.7	22.6	22.8	19.9
14	394980	222735	Roadside	100	100.0	-	24.5	25.0	27.1	23.8
15	395110	222670	Kerbside	100	100.0	32.6	34.1	24.1	25.5	22.6
16	395210	222618	Roadside	100	100.0	34.4	24.5	26.1	30.2	26.7
17	395207	222465	Kerbside	100	100.0	30.4	22.3	22.0	22.9	20.3
18	395340	222071	Roadside	92.1	92.1	-	19.1	20.2	19.5	18.8
19	395362	222000	Roadside	100	100.0	37.4	27.5	28.5	28.6	26.5
20	395300	222027	Roadside	100	100.0	-	27.7	28.2	27.4	25.2
21	395182	222183	Kerbside	100	100.0	28.5	20.3	23.1	23.1	21.2

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
22	395146	222149	Roadside	100	100.0	34.4	25.1	27.0	27.2	25.3
23	395156	221866	Kerbside	100	100.0	27.6	17.7	18.7	19.2	17.8
24	395037	222222	Urban Background	100	100.0	-	-	-	13.9	12.8
25	394954	222511	Urban Centre	100	100.0	-	20.3	23.5	24.9	22.2
26	394810	222439	Kerbside	100	100.0	31.6	22.1	22.8	23.9	21.3
27	393081	223643	Kerbside	100	100.0	38.2	31.2	31.3	30.8	29.2
28	392066	222540	Kerbside	100	100.0	33.7	24.7	25.3	21.1	18.6
29	391178	221641	Roadside	92.3	92.3	33.4	25.2	25.0	25.5	23.3
30	391462	222662	Urban Background	100	100.0	-	-	-	16.4	15.5
31	391507	221978	Kerbside	100	100.0	-	-	18.3	21.3	20.5
32	391869	222084	Kerbside	100	100.0	-	23.9	22.2	22.4	21.2
33	392267	222009	Roadside	92.1	92.1	-	21.6	22.1	22.5	21.8
34	393296	222170	Kerbside	100	100.0	30.6	33.4	23.6	25.0	24.7
35	392912	221862	Roadside	100	100.0	35.3	36.2	25.5	24.8	25.1
36	394473	220935	Roadside	100	100.0	-	16.9	17.8	17.0	16.1
37	394492	220822	Suburban	100	100.0	-	-	-	11.6	10.5
38	395660	221670	Roadside	90.4	90.4	37.3	37.6	28.4	29.3	26.1
39	395862	221424	Roadside	100	100.0	-	21.7	21.7	21.6	20.4
40	397009	223887	Roadside	100	100.0	-	-	22.9	24.6	22.4
41	396399	224044	Suburban	100	100.0	-	-	-	10.1	10.0

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
42	395980	223322	Roadside	100	100.0	-	14.8	15.8	15.6	15.0
43	395394	222875	Kerbside	100	100.0	-	23.6	22.8	23.9	21.9
44	394026	224231	Suburban	100	100.0	-	-	-	14.8	13.8
45	393262	220358	Suburban	100	100.0	-	-	10.3	11.0	10.3
46	393010	220347	Suburban	100	100.0	-	-	10.0	10.2	9.2
47	394443	223072	Roadside	100	42.5	-	-	-	-	20.9

☒ **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.2 – Trends in Annual Mean NO_2 – Diffusion Tubes (Within AQMA)

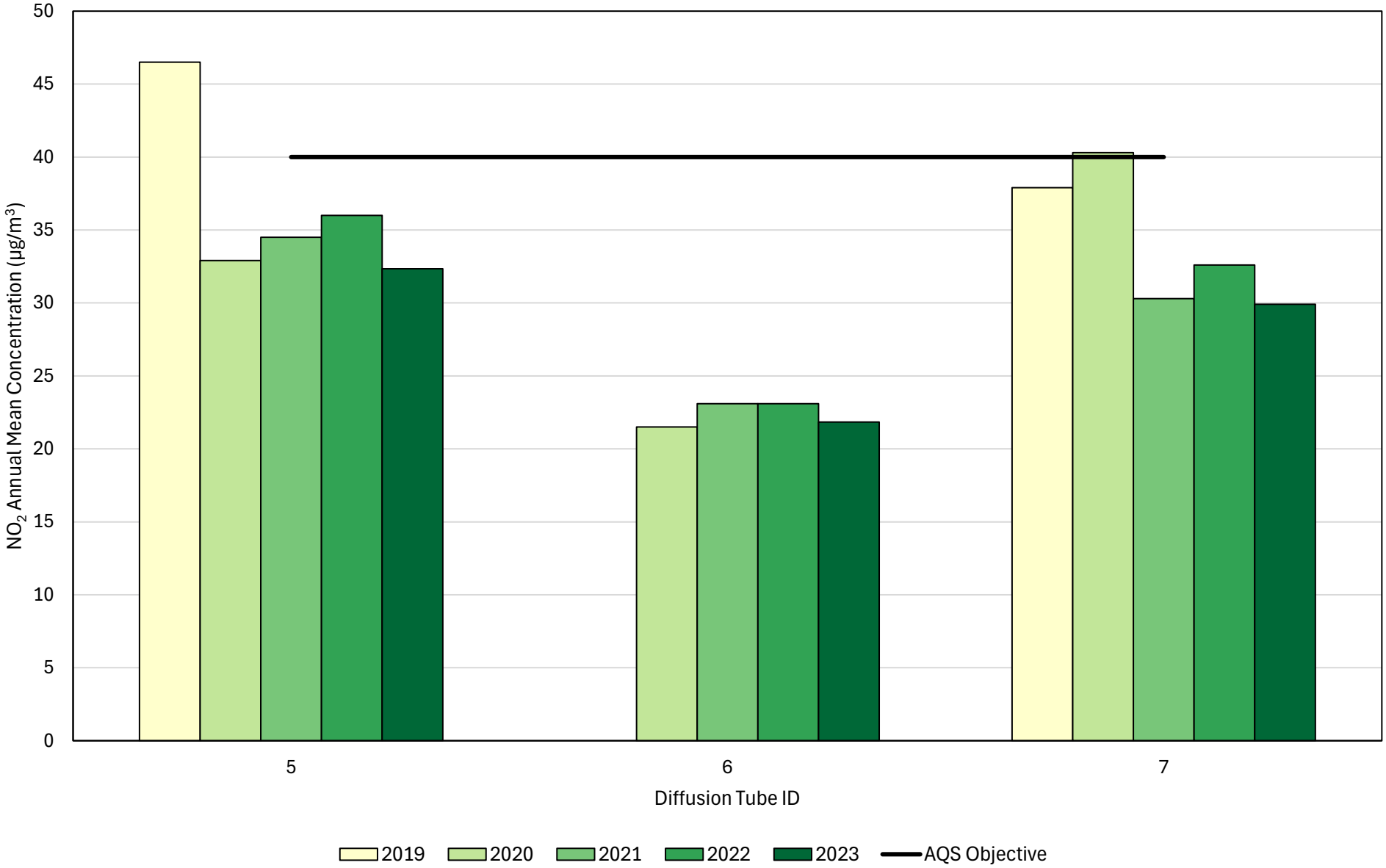


Figure A.3 – Trends in Annual Mean NO_2 – Diffusion Tubes (Sites 1 – 12)

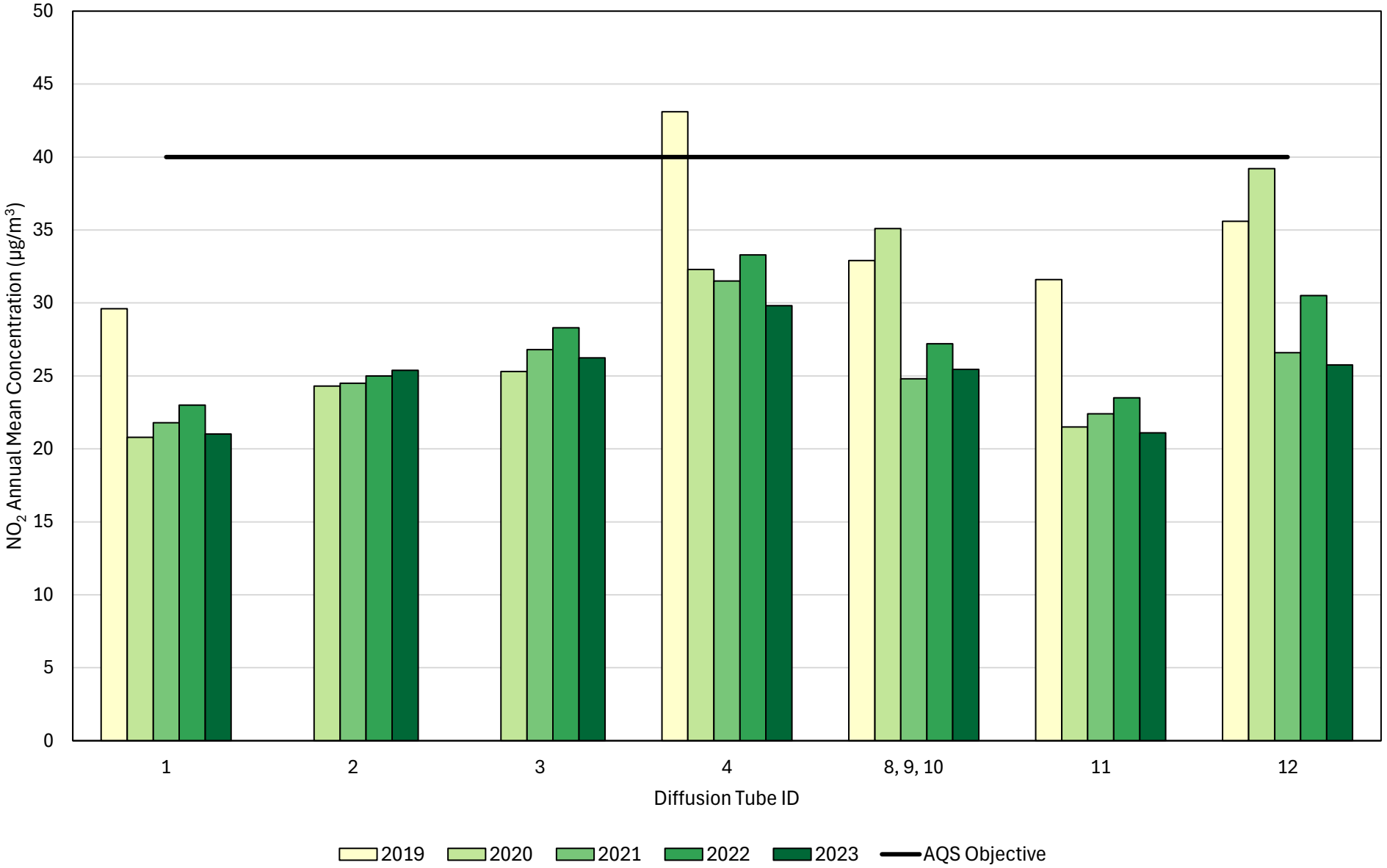


Figure A.4 – Trends in Annual Mean NO_2 – Diffusion Tubes (Sites 13 – 19)

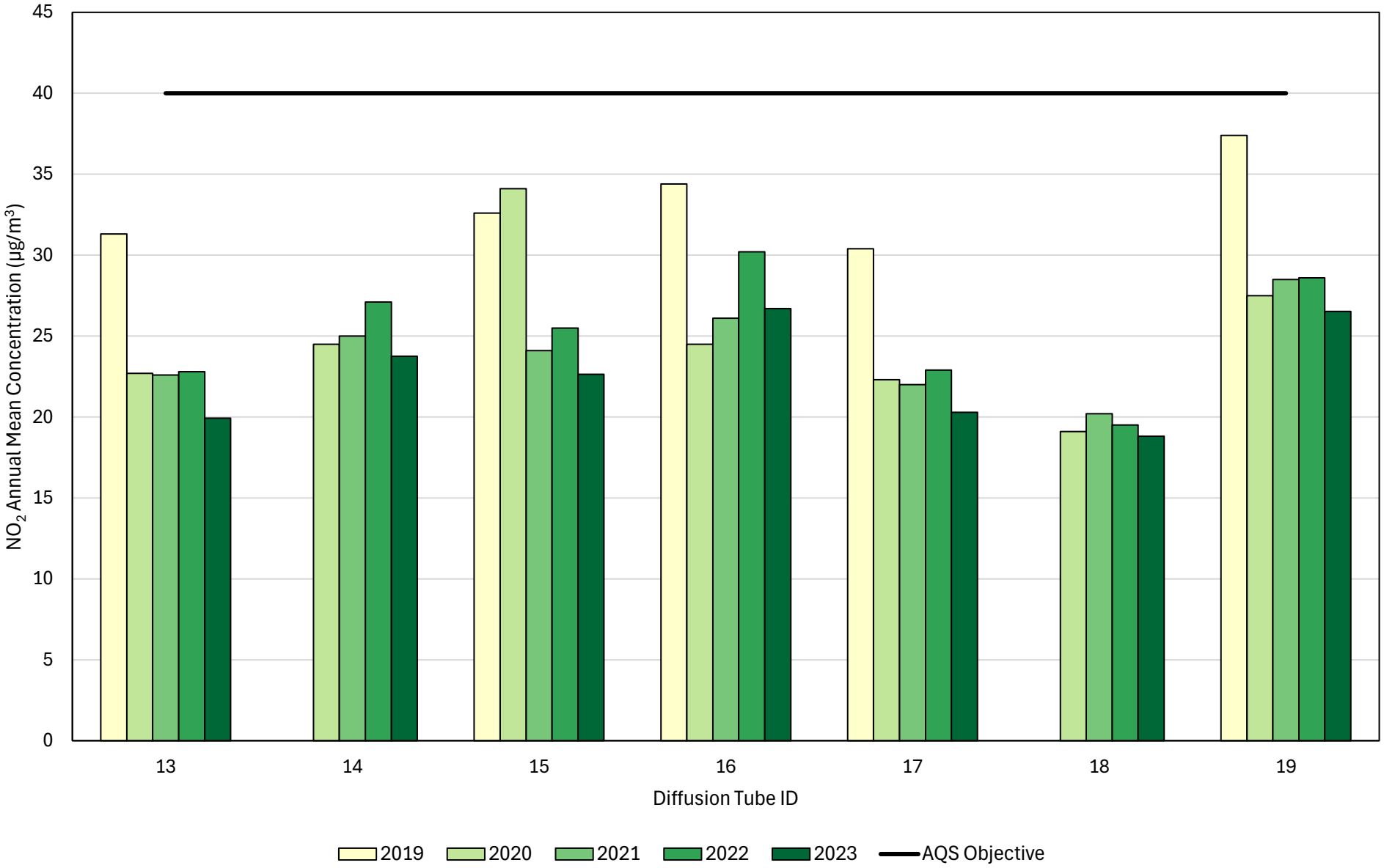


Figure A.5 – Trends in Annual Mean NO_2 – Diffusion Tubes (Sites 20 – 26)

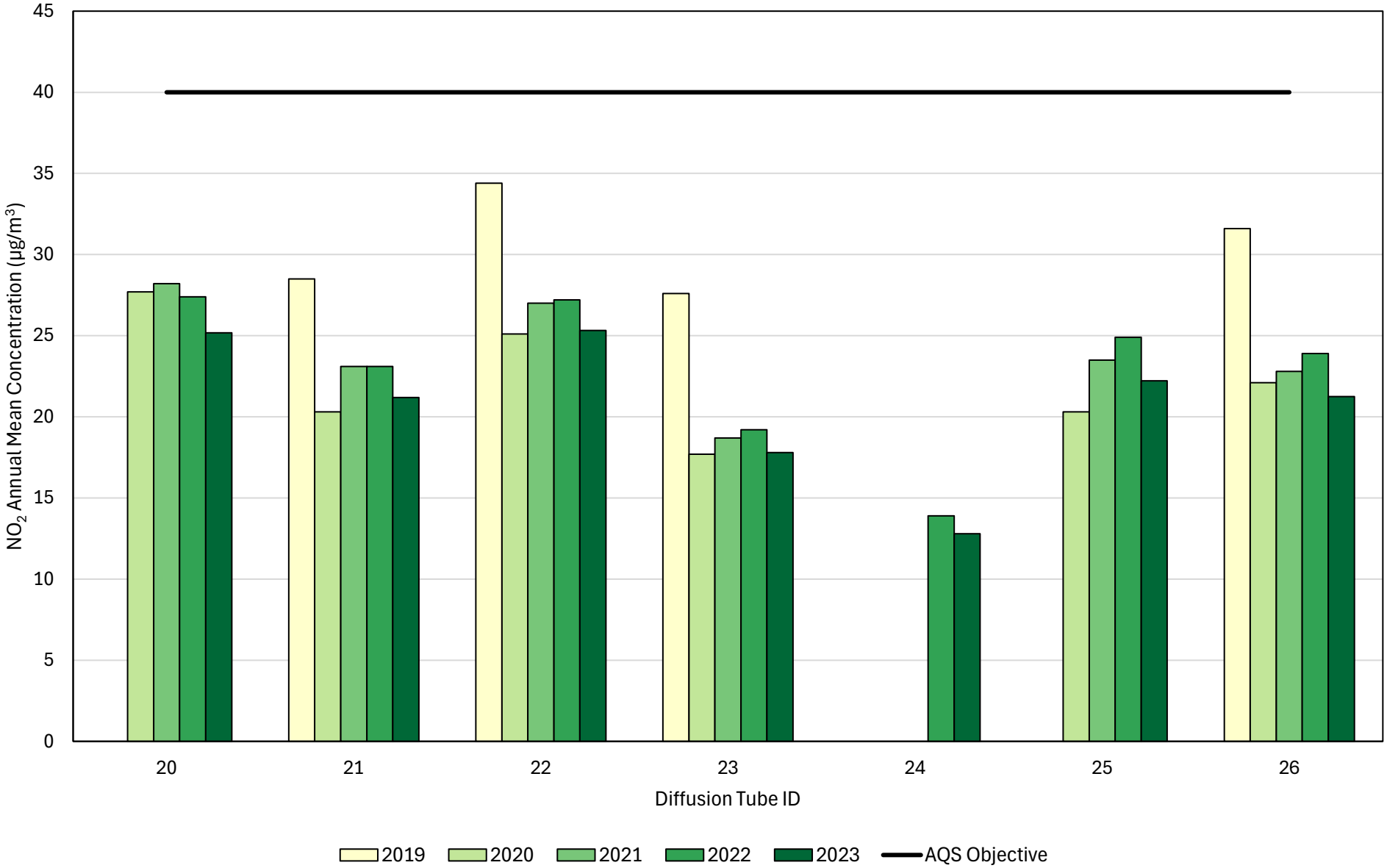


Figure A.6 – Trends in Annual Mean NO_2 – Diffusion Tubes (Sites 27 – 33)

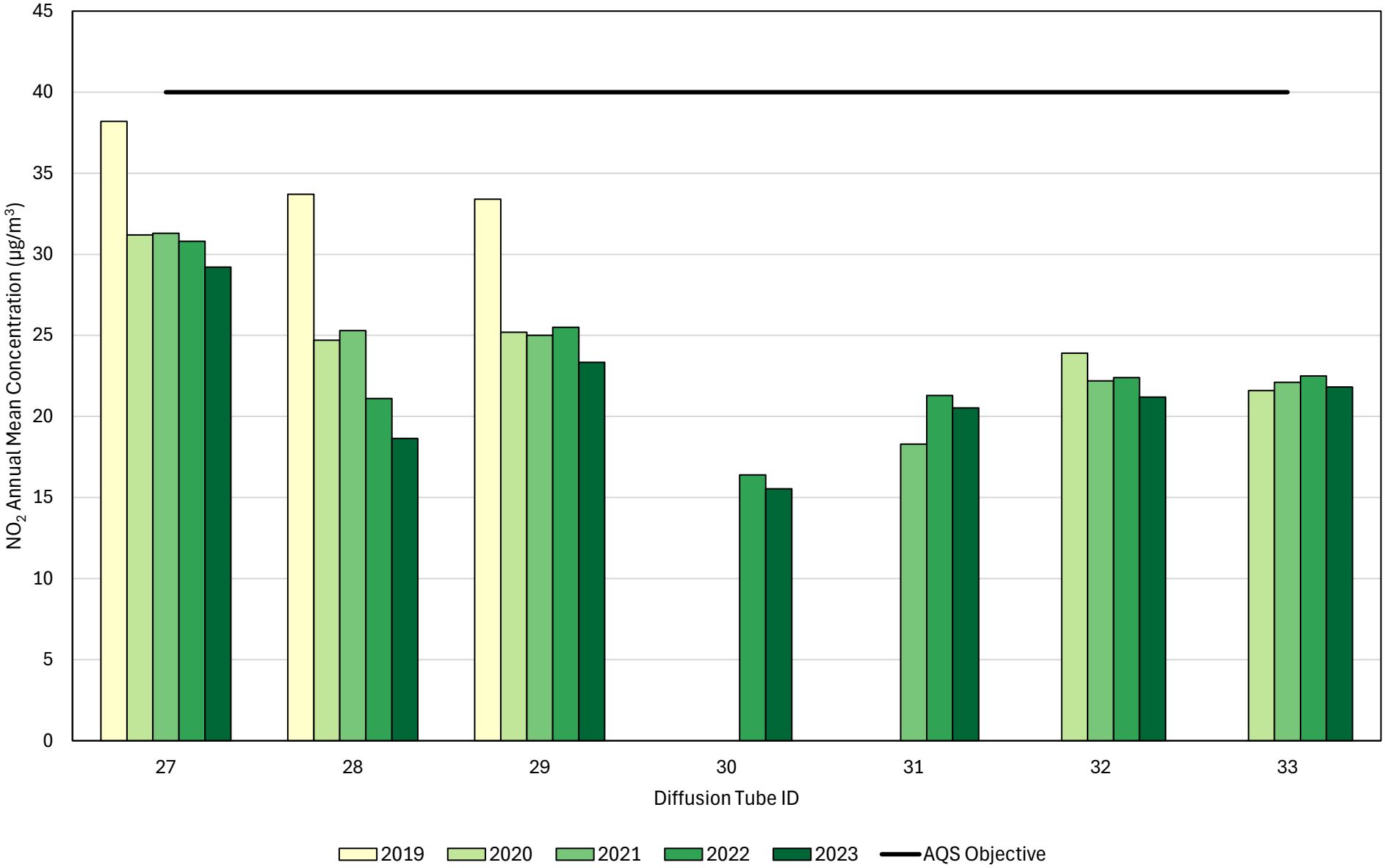


Figure A.7 – Trends in Annual Mean NO_2 – Diffusion Tubes (Sites 34 – 40)

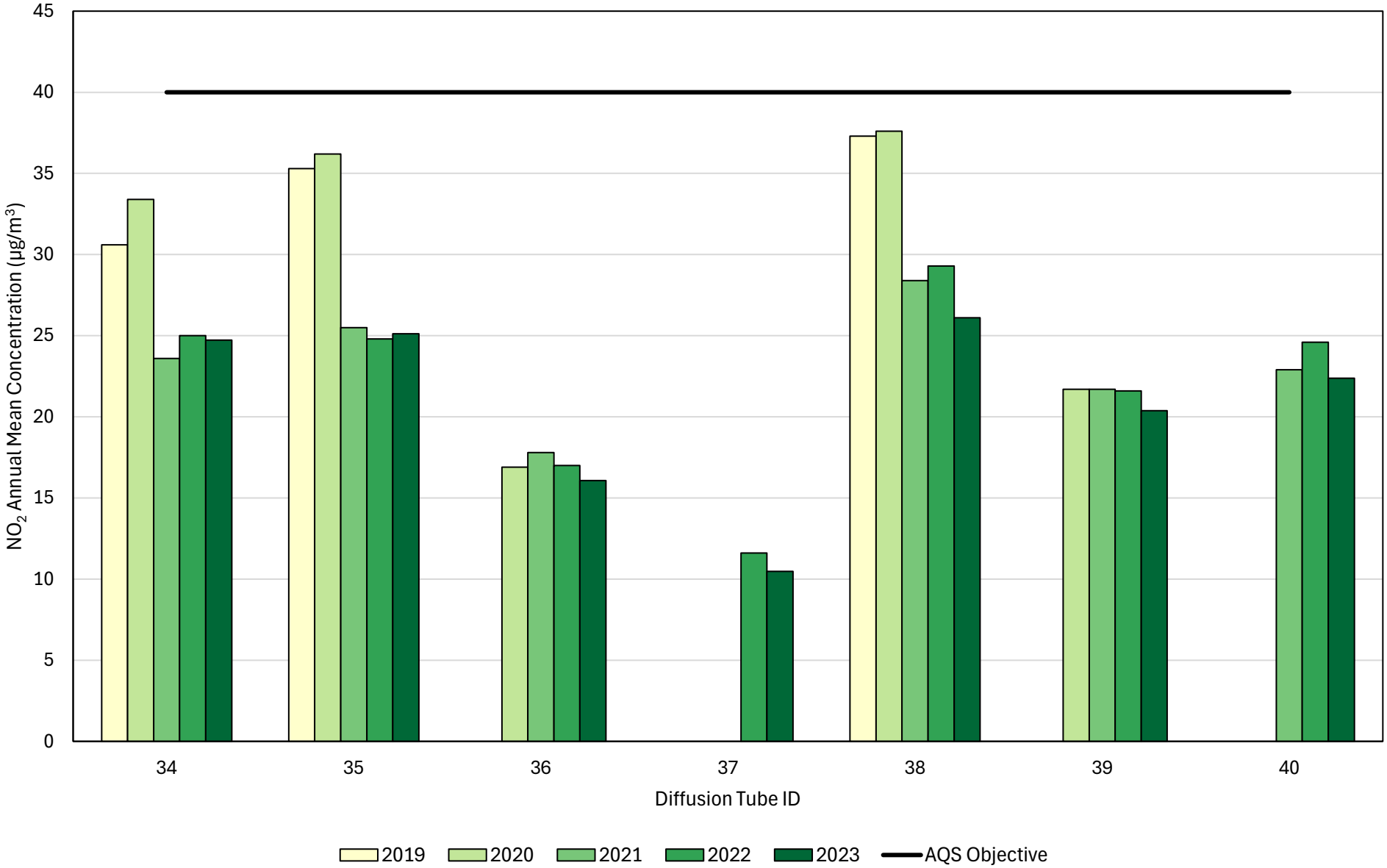


Figure A.8 – Trends in Annual Mean NO_2 – Diffusion Tubes (Sites 41 – 47)

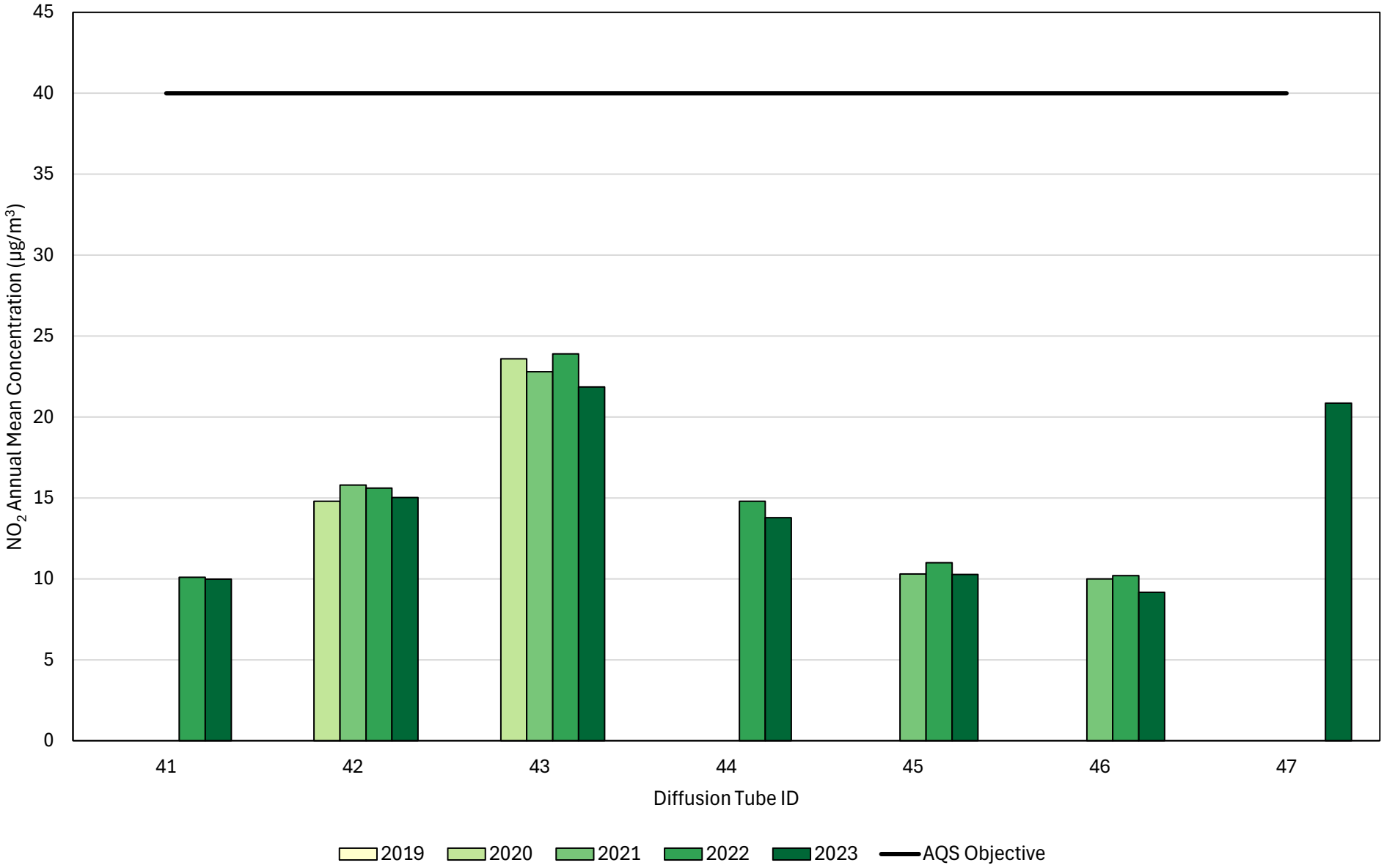


Table A.5 - 1-Hour NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site 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
CM1	394760	222878	Kerbside	98.5	98.5	0	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(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%).

Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site 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
CM2	392269	222007	Roadside	98.6	98.6	-	-	-	-	17.0

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

Notes:

The annual mean concentrations are presented as $\mu g/m^3$.

Exceedances of the PM_{10} annual mean objective of $40\mu g/m^3$ 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.

(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%).

Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, 24-Hour Means > 50 µg/m^3

Site 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
CM2	392269	222007	Roadside	98.6	98.6	**-**	**-**	-	-	0

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(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%).

Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site 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
CM2	392269	222007	Roadside	98.6	98.6	-	-	-	-	9.6

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

Notes:

The annual mean concentrations are presented as $\mu g/m^3$.

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.

(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%).

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 (0.89)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1	394621	222215	28.0	28.0	24.1	21.8	17.4	20.3	19.3	20.1	25.5	27.0	29.6	22.2	23.6	21.0		
2	393906	222873	38.9	35.2	28.3	25.1	23.4	24.3	23.6	23.4	29.4	30.5	34.1	26.2	28.5	25.4		
3	394180	222982	36.4	36.8	33.1	29.0	25.9	25.1	21.6	23.8	30.5	30.6	35.0	25.9	29.5	26.2		
4	394235	223055	40.4	41.1	35.8	33.0	25.2	23.6	28.9	27.9	37.0	37.4	40.0	31.6	33.5	29.8		
5	394350	222923	44.3	41.9	37.6	36.9	29.9	33.3	28.6	31.5	37.8	39.2	42.3	32.9	36.3	32.4		
6	394635	222928	31.1	37.4	23.7	25.1	21.9	18.7	16.0	20.4	24.3	27.0	29.8	19.1	24.5	21.8		
7	394738	222888	40.8	38.4	35.1	31.0	25.3	29.1	29.7	29.7	36.5	37.2	38.8	31.4	33.6	29.9		
8	394760	222878	33.6	33.4	29.0	28.6	22.8	25.6	-	25.0	30.8	29.4	32.5	25.2	-	-		Triplicate Site with 8, 9 and 10 - Annual data provided for 10 only
9	394760	222878	36.9	31.9	28.8	30.9	23.5	25.9	24.6	26.6	29.6	29.5	33.0	26.3	-	-		Triplicate Site with 8, 9 and 10 - Annual data provided for 10 only
10	394760	222878	32.5	33.0	29.4	28.3	23.1	25.4	23.6	26.4	31.1	31.2	32.5	25.7	28.6	25.5		Triplicate Site with 8, 9 and 10 - Annual data provided for 10 only
11	394708	222763	31.4	-	23.5	23.9	22.0	22.7	16.7	19.4	24.7	26.2	28.7	21.6	23.7	21.1		
12	394830	222845	-	32.1	29.5	32.1	25.0	-	22.7	25.1	31.5	31.8	35.9	23.7	28.9	25.8		
13	394902	223004	-	28.8	22.2	22.2	16.5	17.9	17.2	18.9	23.6	25.5	31.4	22.1	22.4	19.9		
14	394980	222735	32.0	32.2	27.6	27.6	21.0	19.5	20.7	23.9	29.0	29.2	31.5	26.0	26.7	23.8		
15	395110	222670	31.2	30.5	27.4	27.3	22.5	23.5	18.9	22.6	18.9	30.4	30.4	21.9	25.4	22.6		
16	395210	222618	37.9	35.4	30.5	30.3	27.4	28.2	21.9	26.4	30.7	30.7	34.3	26.2	30.0	26.7		
17	395207	222465	29.3	28.8	23.3	22.6	20.3	17.8	15.8	18.6	22.8	24.7	29.0	20.7	22.8	20.3		
18	395340	222071	27.2	26.3	20.6	20.5	18.3	17.7	13.0	16.9	20.5	23.7	27.8	-	21.1	18.8		
19	395362	222000	32.1	35.6	29.7	31.5	28.9	31.4	22.7	25.0	30.8	33.7	32.6	23.5	29.8	26.5		
20	395300	222027	35.6	32.7	27.2	26.5	20.8	23.8	24.1	25.0	29.7	31.3	34.8	27.9	28.3	25.2		
21	395182	222183	29.1	27.8	24.9	24.0	21.8	21.2	16.3	20.0	25.2	26.0	29.4	20.0	23.8	21.2		
22	395146	222149	31.8	31.7	29.4	30.1	23.5	26.9	22.3	24.4	31.0	32.3	32.2	25.7	28.5	25.3		
23	395156	221866	25.7	24.9	20.6	20.4	15.4	15.8	14.4	16.1	21.0	21.2	26.4	18.0	20.0	17.8		
24	395037	222222	25.3	19.1	14.7	12.9	9.3	8.5	8.7	10.2	12.4	15.7	21.7	14.0	14.4	12.8		
25	394954	222511	30.5	31.0	26.4	24.4	25.0	23.0	17.3	21.2	23.0	24.3	31.6	21.9	25.0	22.2		
26	394810	222439	30.9	30.3	25.2	22.9	22.2	22.3	18.8	20.3	24.3	25.5	31.7	12.3	23.9	21.3		

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 (0.89)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
27	393081	223643	40.3	40.3	32.8	32.5	29.4	30.6	25.7	27.2	36.2	34.7	36.3	27.7	32.8	29.2		
28	392066	222540	28.0	27.8	20.1	20.7	19.1	17.9	14.6	18.2	21.9	22.2	25.9	15.0	21.0	18.6		
29	391178	221641	32.9	33.6	24.6	-	25.0	23.1	19.4	23.5	26.8	26.9	32.5	20.2	26.2	23.3		
30	391462	222662	24.5	22.1	17.3	17.3	14.4	14.4	11.2	14.4	17.5	17.1	24.4	14.9	17.5	15.5		
31	391507	221978	32.4	29.2	22.8	21.0	15.8	16.8	18.1	18.8	25.3	26.5	29.6	20.5	23.1	20.5		
32	391869	222084	32.6	32.4	22.1	23.9	18.5	20.3	17.6	20.6	24.8	25.2	28.2	19.5	23.8	21.2		
33	392267	222009	31.6	28.7	23.9	22.1	17.1	18.9	20.0	20.9	27.2	27.9	31.3	-	24.5	21.8		
34	393296	222170	35.9	34.7	27.1	24.5	22.0	23.7	24.6	22.7	29.2	27.9	34.0	27.0	27.8	24.7		
35	392912	221862	34.4	36.0	28.3	27.4	23.4	22.7	21.4	22.9	31.1	31.1	35.4	24.6	28.2	25.1		
36	394473	220935	27.3	26.7	17.8	17.5	16.5	14.2	11.2	11.8	16.2	18.7	24.2	14.7	18.1	16.1		
37	394492	220822	20.0	18.4	12.0	10.4	8.6	7.1	6.5	8.0	9.2	11.6	19.3	10.2	11.8	10.5		
38	395660	221670	34.8	33.0	32.2	28.8	23.0	25.0	24.6	-	32.3	28.4	32.3	28.2	29.3	26.1		
39	395862	221424	29.2	29.4	24.1	22.2	17.7	17.9	15.5	17.6	25.7	25.3	28.5	21.6	22.9	20.4		
40	397009	223887	33.0	30.8	25.3	24.1	18.2	20.9	20.0	20.6	29.5	27.0	30.0	22.4	25.1	22.4		
41	396399	224044	19.9	16.1	10.7	9.4	6.6	6.3	6.4	7.1	10.4	12.0	18.2	11.4	11.2	10.0		
42	395980	223322	26.7	22.0	15.7	13.9	11.4	11.2	17.7	12.0	15.6	16.4	23.9	16.2	16.9	15.0		
43	395394	222875	35.7	30.2	24.3	24.6	20.9	21.1	10.5	20.1	28.2	26.8	30.0	22.3	24.6	21.9		
44	394026	224231	24.8	20.8	14.6	14.7	11.2	9.7	9.7	10.8	15.6	16.1	22.8	14.9	15.5	13.8		
45	393262	220358	19.0	17.1	11.8	8.6	8.5	7.2	7.0	10.1	11.2	11.5	17.3	9.1	11.5	10.3		
46	393010	220347	18.6	14.7	10.3	9.1	6.8	6.9	6.1	6.4	10.4	10.5	15.0	8.9	10.3	9.2		
47	394443	223072								19.4	24.0	24.6	29.2	20.4	23.5	20.9		

☒ **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.**

☒ **Cheltenham Borough 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 QA/QC

New or Changed Sources Identified Within Cheltenham During 2023

- M5 – Junction 10 Upgrade to All-Ways Access.
- New Housing Developments – West Cheltenham: 2,000 homes / North West Cheltenham: 4,000 homes.
- Golden Valley “Cyber Park” – Commercial development of high-tech industries in SW Cheltenham.

Additional Air Quality Works Undertaken by Cheltenham Borough Council During 2023

During 2023, Cheltenham Borough Council continued to develop an update to the 2014 AQAP, which has now been formally adopted. This new AQAP identifies five key priority areas for action: transport, planning and infrastructure, policy guidance, behavioural change, and air quality monitoring. These measures are to be put in place by Cheltenham Borough Council over the next five years, to continue to improve air quality in the borough.

As in the previous reporting year, Cheltenham Borough Council continued to deploy a network of AQ Mesh Pods. During 2023, this network consisted of 10 devices, which is an increase of one from the previous reporting year. This continued expansion highlights Cheltenham Borough Council’s continued commitment to identify areas where the air quality objective is exceeded, or is likely to be exceeded, and subsequently be acted upon. It should however be noted that whilst these AQ Mesh Pods can be used for identifying hotspot areas, they cannot be relied upon for compliance against the air quality objectives. Therefore, the data is instead to be used for indicative purposes only. The data from these AQ Mesh Pods during 2023 is presented in Appendix E.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes for the year 2023 were supplied and analysed by Gradko International, using the 20% TEA in water preparation method. Gradko International, a UKAS accredited laboratory, participate in the AIR-PT scheme for NO_2 diffusion tube analysis and Annual Field Intercomparison Exercise. These provide strict criteria relating to performance that participating laboratories must meet, ensuring that the reported NO_2 concentrations are of a high calibre. From the most recent set of AIR-PT results (AR058, July – August and AR059, September – October), in which Gradko scored 100% – the percentage score reflects the results deemed satisfactory based upon the z-score of ± 2.

Diffusion Tube Annualisation

For any site where data capture is below 75%, annualisation is to be performed. This is because section 7.196 of TG(22) states that:

"If data capture is below 75% for the year, then it is necessary to annualise the data… [as] the concentration varies throughout the year, and the instrument may have been operational for a period of above or below average concentrations".

During 2023, there was one diffusion tube site that required annualisation, owing to the fact that it was not introduced into the network until August (Diffusion Tube ID: 47). In order to complete the annualisation process, data has been taken from a number of background monitoring station that are part of the AURN – Oxford St Ebbes, Leominster and Swindon Walcot. This is in line with Box t-9 of TG(22), which states to annualise data:

"Identify two to four nearby, long-term, continuous monitoring sites, ideally those forming part of the national network. The data capture for each of these sites should be at least 85%. These sites should be background (Urban Background, Suburban or Rural) sites to avoid any very local effects that may occur at Urban Centre, Roadside or Kerbside sites, and should, wherever possible lie within a radius of about 50 miles".

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Oxford St Ebbes	Annualisation Factor Swindon Walcot	Annualisation Factor Leominster	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
DT 47	0.9572	1.0683	0.9634	0.9963	23.5	23.4

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.

Cheltenham Borough Council have applied a local bias adjustment factor of 0.89 to the 2023 monitoring data. A summary of bias adjustment factors used by Cheltenham Borough Council over the past five years is presented in Table C.2 – Bias Adjustment Factor . The calculation for the local bias adjustment applied to the 2023 data is presented in Table C.3.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	Local	-	0.89
2022	Local	-	0.94
2021	Local	-	0.89
2020	Local	-	0.89
2019	Local	-	0.99

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	12
Bias Factor A	0.89 (0.86 – 0.92)
Bias Factor B	13% (9% - 17%)
Diffusion Tube Mean (µg/m^3)	28.6
Mean CV (Precision)	2.7%
Automatic Mean (µg/m^3)	25.3
Data Capture	98%
Adjusted Tube Mean (µg/m^3)	25 (25 – 26)

Notes:

A single local bias adjustment factor has been used to bias adjust the 2023 diffusion tube results.

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 – NO2 2023 Diffusion Tube Results (µg/m3). No diffusion tube monitoring location within Cheltenham Borough Council required distance correction during 2023.

QA/QC of Automatic Monitoring

The automatic monitoring stations on Swindon Road (CM1) and Gloucester Road (CM2), are operated by and managed by Environ Technology (ET). The M200E NOx analyser is MCERTS approved, mirroring compliance with the European Committee for Standardisation (CEN) standard EN1421:2012, and measures NO_x, NO_2 and NO. The unit was installed in August 2011 and is visited on a monthly basis by ET for routine calibration and download of data. The data that is received is ratified by Geoff Broughton from Air Quality Data Management (AQDM), with concentration data provided every quarter. Raw values from the gaseous instruments are scaled into concentrations using the latest values derived from the manual and automatic concentrations.

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The PM_{10} and $PM_{2.5}$ monitoring station (CM2), was installed in November 2022 and is operated and managed by ET, who also visit the site for routine calibration and download of data. The data that is received is ratified by Geoff Broughton from Air Quality Data Management (AQDM), with concentration data provided every quarter. The PM_{10} concentrations may require scaling into Gravimetric Equivalent concentration units by Defra depending on the measurement technique. For example, the PM_{10} analyser is a Smart Heated BAM and so values are divided by 1.035.

Automatic Monitoring Annualisation

The two automatic monitoring stations within Cheltenham Borough Council both recorded data capture greater than 75% during 2023 (98.5% – CM1 and 98.6% – CM2). Therefore, the data from both of these monitoring stations did not require annualisation in 2023.

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Non-Automatic & Automatic Monitoring Sites (AQMA)

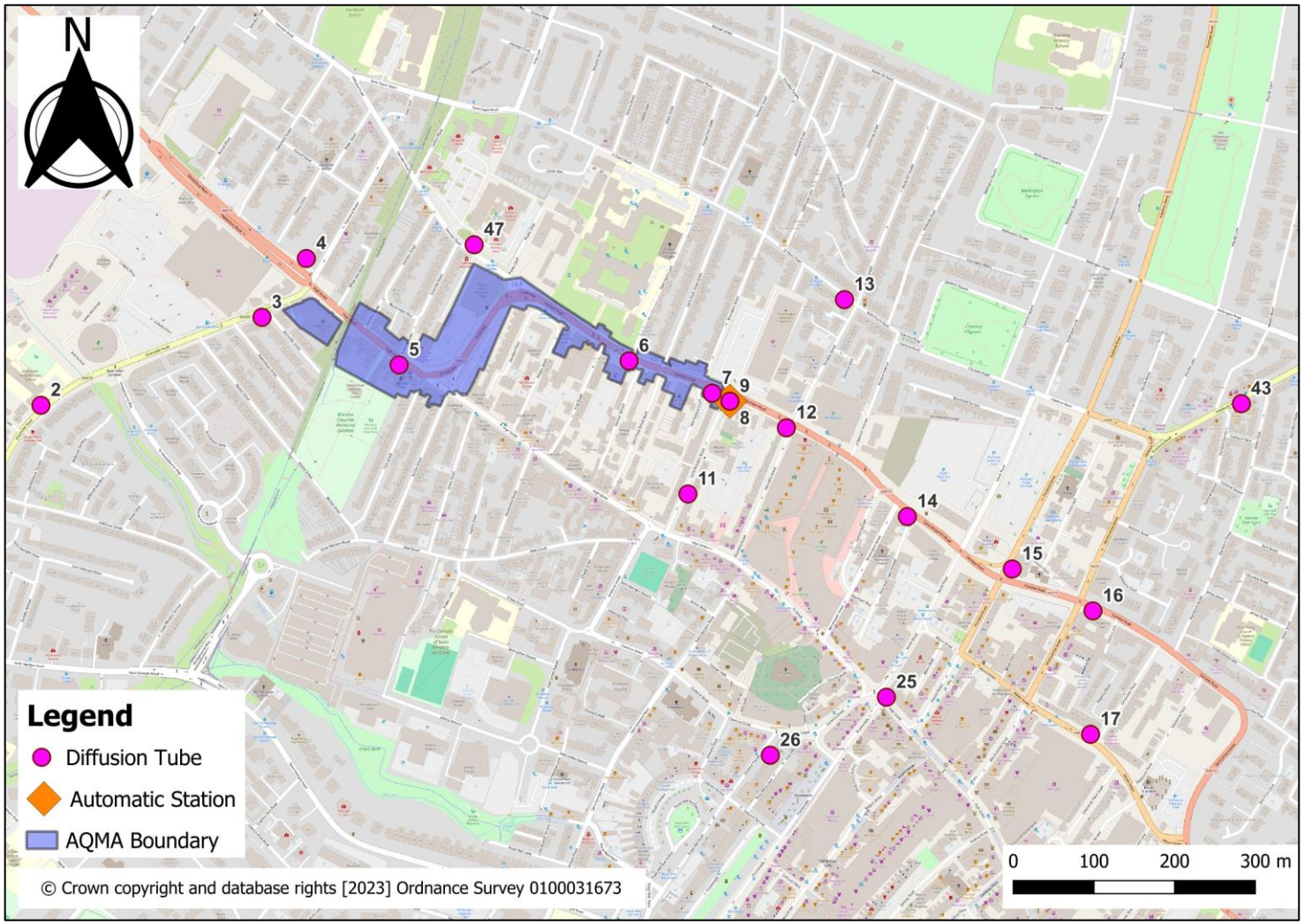


Figure D.2 – Non-Automatic Monitoring Sites (Cheltenham Centre)

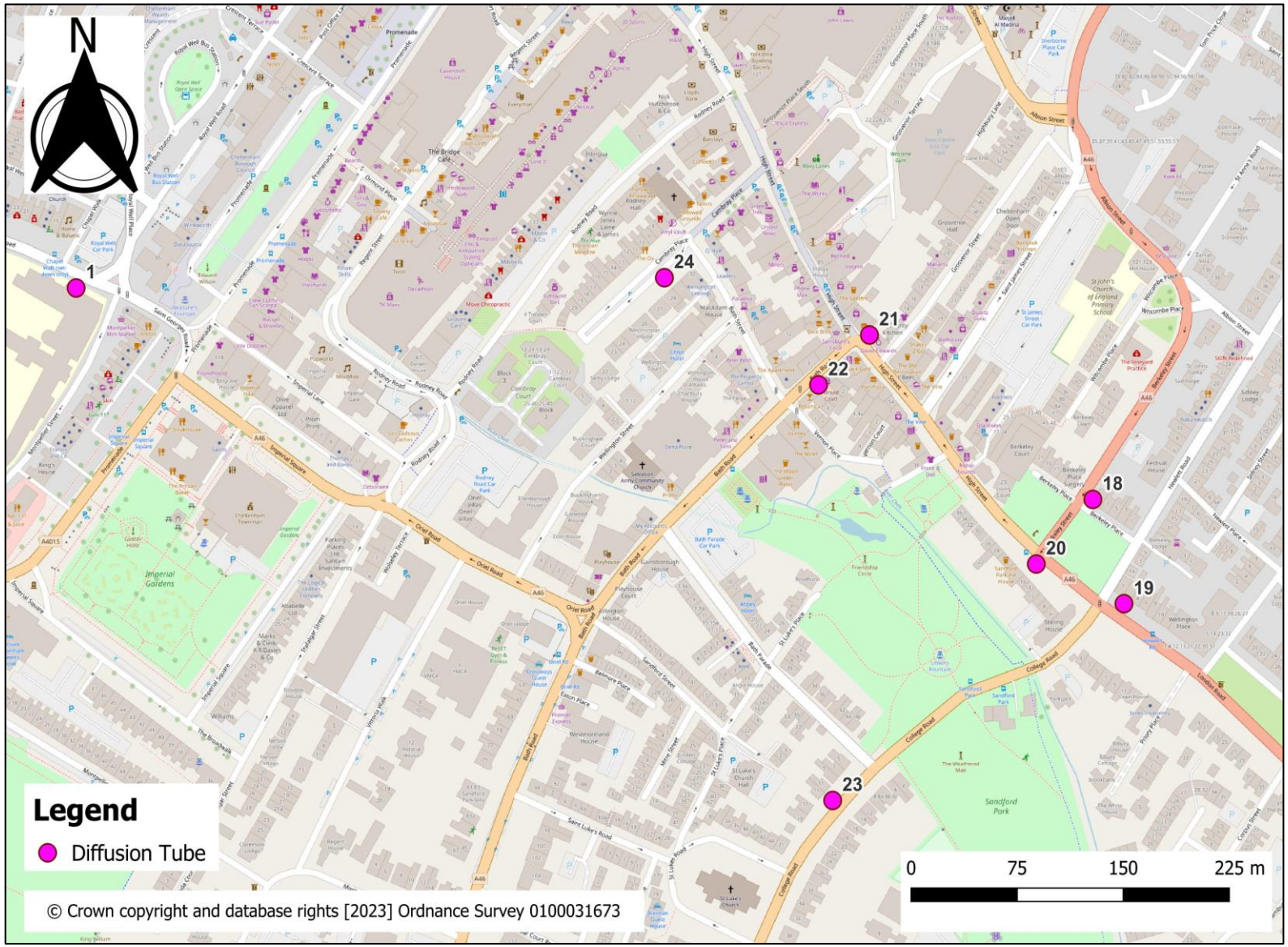


Figure D.3 – Non-Automatic Monitoring Sites (London Road)

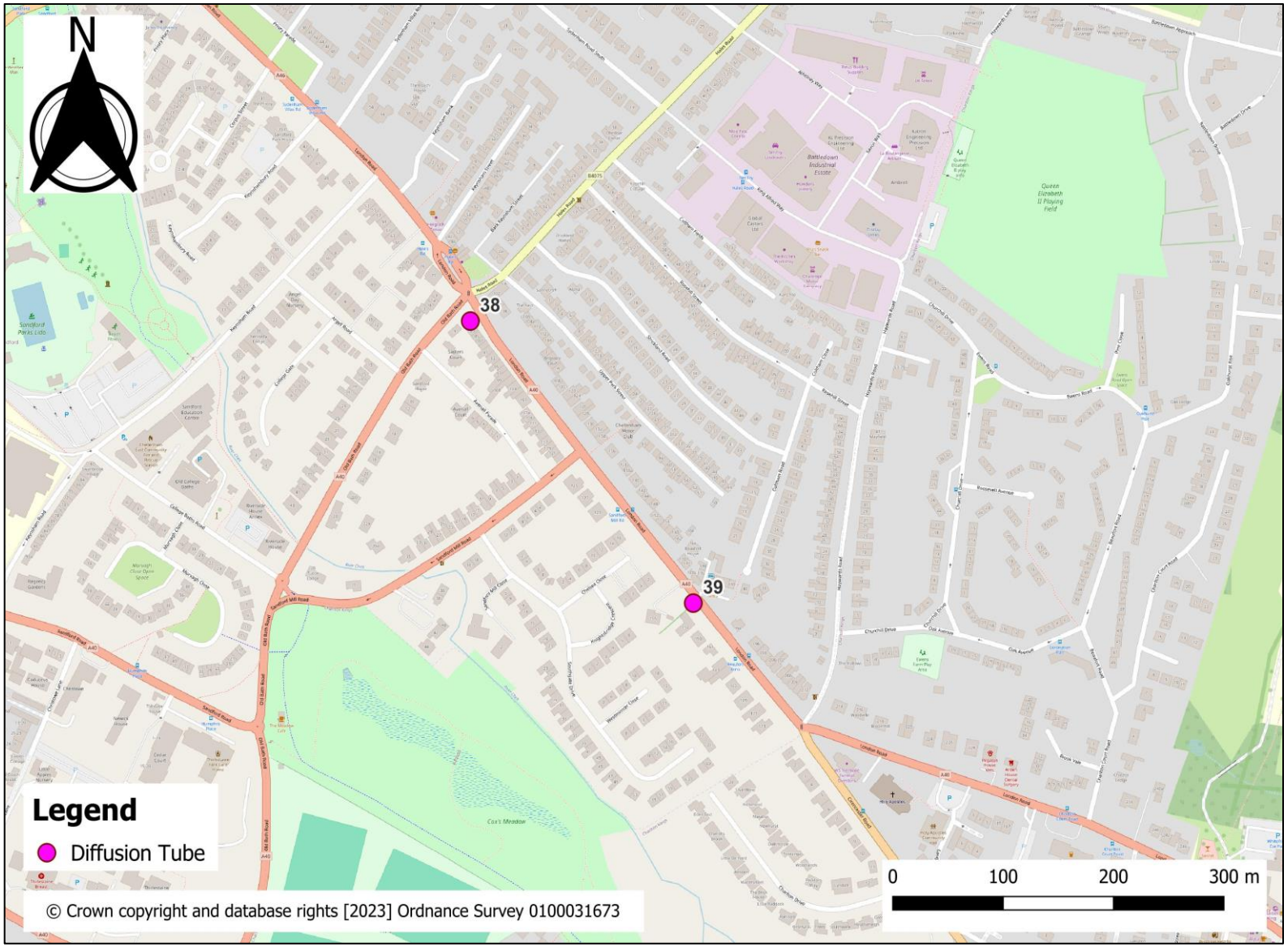


Figure D.4 – Non-Automatic Monitoring Sites (Leckhampton & Warden Hill)

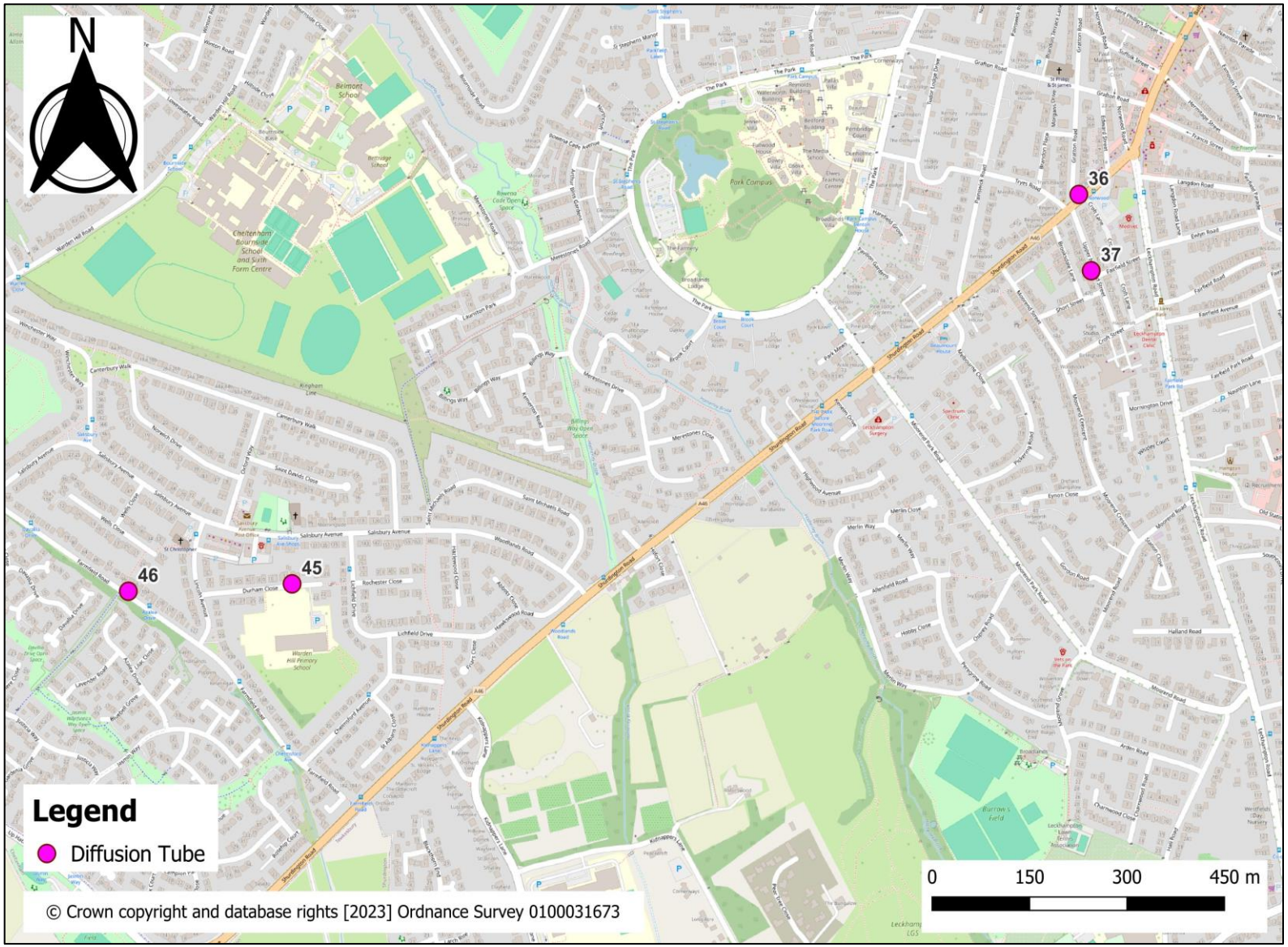


Figure D.5 – Non-Automatic & Automatic Monitoring Sites (Benhall & St Marks)

Figure D.6 – Non-Automatic Monitoring Sites (Princess Elizabeth Way & Seneca Way)

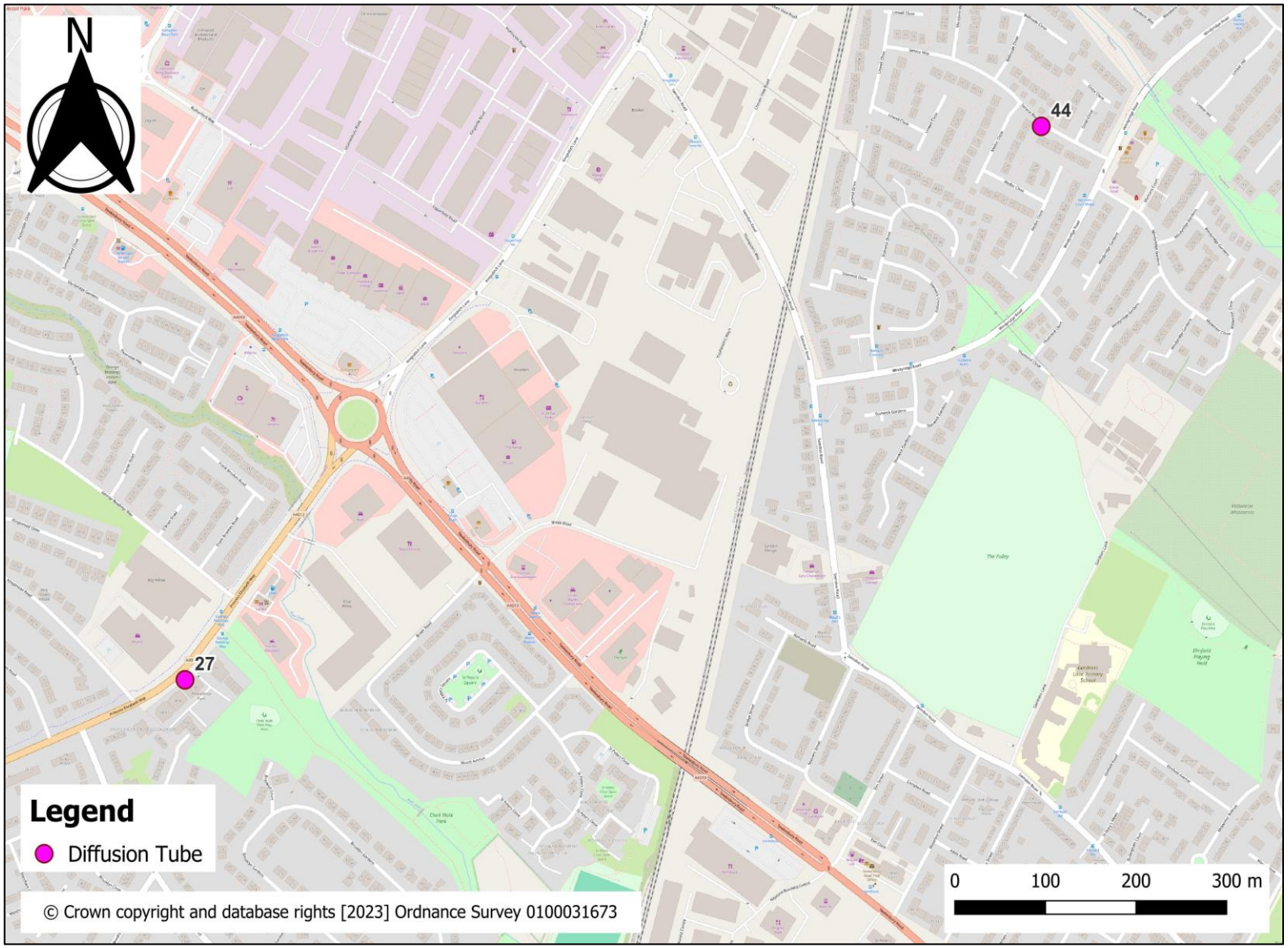
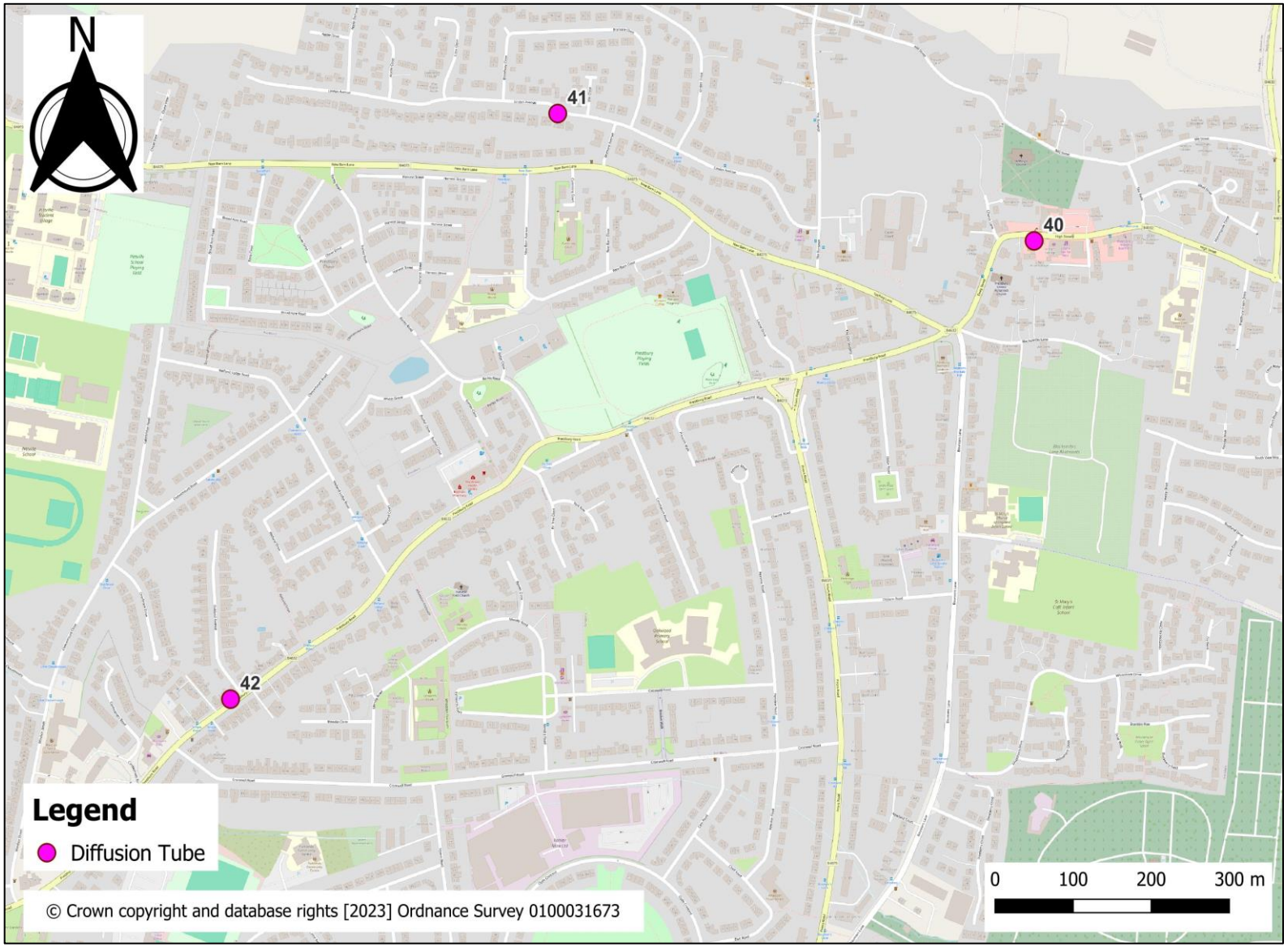


Figure D.7 – Non-Automatic Monitoring Sites (Cleevemount & Prestbury)



Appendix E: AQ Mesh Pod Data

Table E.1 – AQ Mesh Pod Data (2023 NO_2)

Pod ID	Location	NO_2 Annual Average (µg/m^3)
-	Swindon Road (CM1)	25.2
780150	Glos Rd Reference Station	36.2
788150	College Rd	30.2
796150	422 High Street	**40.3**
807150	St Pauls Medical Centre	29.3
845150	PE Way Roundabout	30.5
872150	Winchcombe Street	31.9
1373150	PE Way North	35.6
1931150	Glos Rd School	32.4
2102150	PE Way South	32.3

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

Appendix F: Summary of Air Quality Objectives in England

Table F.1 – Air Quality Objectives in England[9]

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

[9] 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
SCOOT	Split Cycle Offset Optimisation Technique

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.
- Cheltenham Borough Council Air Quality Annual Status Report. July 2023.