Cheltenham Borough Council

2025 Air Quality Annual Status Report

June 2025

Document Control Sheet

Identification	
Client	Cheltenham Borough Council
Document Title	Cheltenham Borough Council 2025 Air Quality Annual Status Report (ASR)
Bureau Veritas Job No.	AIR25669106

Contact Details		
Company Name	Bureau Veritas UK Limited	Cheltenham Borough Council
Contact Name	Hannah Pearson	Gareth Jones
Position	Senior Air Quality Consultant	Senior Environmental Health Officer
Address	2nd Floor, Atlantic House, Atlas Business Park, Wythenshawe, Manchester, M22 5PR	Cheltenham Borough Council, Municipal Offices, Cheltenham, Gl51 9SA
Telephone	07890 909227	07836 510830
E-Mail	hannah.pearson@bureauveritas.com	Gareth.jones@cheltenham.gov.uk

	Name	Role	Signature
Prepared By	Callum Danby	Air Quality Consultant	
Approved By	Hannah Pearson	Senior Air Quality Consultant	

CHELTENHAM
BOROUGH COUNCIL

2025 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environemnt Act 1995

Local Air Quality Management, as amended by the Environment Act 2021

Date: June 2025

Information	Cheltenham Borough Council Details
Local Authority Officer	Gareth Jones
Department	Environmental Protection
Address	Cheltenham Borough Council, Municipal Offices, Cheltenham, GL51 9SA
Telephone	07836 510830
E-mail	Gareth.jones@cheltenham.gov.uk
Report Reference Number	25669106_Cheltenham_2025_ASR
Date	June 2025

Local Responsibility and Commitment

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

- Gareth Jones – Senior Environmental Health Officer.

This ASR has been approved by:

- Councillor Victoria Atherstone – Cabinet Member for Safety and Communities

This ASR has been signed off by a Director of Public Health.

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

Cheltenham Borough Council,

Municipal Offices,

Cheltenham,

GL51 9SA

envhealth@cheltenham.gov.uk

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.

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Low-income communities are also disproportionately impacted by poor air quality, exacerbating health and social inequalities.

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.

The main source of air pollution within Cheltenham is the road traffic emissions from major A roads, such as the A4013 (Princess Elizabeth Way), A40 (London Road / Gloucester Road), A4019 (Tewkesbury Road / Swindon Road), A435 (Evesham Road / Cirencester Road), High Street and A46 (Bath Road). These roads form the main part of the arterial highway network within Cheltenham and therefore experience a high volume of traffic and

often become heavily congested. As a result, vehicles are frequently stopping and starting along these roads, which in turn leads to elevated pollutant concentrations.

In response to these elevated concentrations exceeding the annual objectives of NO_2 in some areas, Cheltenham Borough Council declared an air quality management area (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.

Nitrogen Dioxide (NO_2):

During 2024, concentrations of NO_2 were recorded passively via a diffusion tube network of 44 sites, and automatically via a continuous analyser. All passive and automatic monitoring sites reported NO_2 annual mean concentrations lower than 10% below the Air Quality Objective of 40 µg/m^3 in 2024 (i.e. under 36 µg/m^3). The maximum NO_2 annual mean concentration at a diffusion tube site in 2024 was 30.4 µg/m^3 (Site 5), which is located inside the AQMA. This is a slight reduction from the maximum NO_2 annual mean concentration recorded inside the AQMA in the previous reporting year (32.4 µg/m^3). This decrease is part of a wider year-on-year decrease that has been observed inside the AQMA since 2022. The concentrations inside the AQMA have therefore been below the 40 µg/m^3 annual objective for five consecutive years and, as a result, Cheltenham Borough Council are currently in the process of revoking the AQMA. Outside of the AQMA, the maximum NO_2 annual mean concentration at a diffusion tube site in 2024 was 27.1 µg/m^3, which is a reduction from the 29.8 µg/m^3 recorded in 2023. Of the 40 sites that were part of the diffusion tube network in both 2023 and 2024, the NO_2 annual mean concentration decreased at all sites except one (Site 13), where the concentration remained stable. This downward trend in NO_2 annual mean concentrations observed across the entire diffusion tube network, highlights the improvement in the concentration of NO_2 across Cheltenham during 2024. At the automatic monitoring site on Swindon Road (CM1), the NO_2 annual mean concentration in 2024 was 23.4 µg/m^3, which as observed in the diffusion tube network, is a year-on-year reduction in concentration since 2022. The monitoring data indicates that the NO_2 concentration in Cheltenham has improved during 2024, to the extent that the AQMA can be revoked and that there are no new hotspot areas of concern.

As no diffusion tube site reported an NO_2 concentration in excess of 60 µg/m^3, it can be inferred that the 1-hour Air Quality Objective of 200 µg/m^3 was not exceeded at any location during 2024. Likewise, at the automatic monitoring site on Swindon Road, the maximum hourly mean concentration in 2024 was 95.8 µg/m^3, reiterating that the 1-hour objective of 200 µg/m^3 was not exceeded on any occasion in 2024.

Particulate Matter (PM_{10} / $PM_{2.5}$):

Durning 2024, concentrations of PM_{10} and $PM_{2.5}$ were concurrently measured via an automatic monitoring site on Gloucester Road (CM2). The concentration recorded at this site in 2024 was lower for both PM_{10} and $PM_{2.5}$ than in the previous reporting year, indicating a slight improvement in the concentration of particulate matter. The 2024 concentration of PM_{10} was 15.1 µg/m^3 compared to 17.0 µg/m^3 in 2023. Likewise, the $PM_{2.5}$ concentration in 2024 was 8.7 µg/m^3, in comparison to 9.6 µg/m^3 in 2023. From the monitoring data, it is evident that the concentrations of PM_{10} and $PM_{2.5}$ remain low in Cheltenham, and there has been a gradual improvement in concentrations recorded in the first two years that the automatic monitoring station has been operational.

Actions to Improve Air Quality

Whilst air quality has improved significantly across the borough in recent decades, leading to the revocation of the AQMA, Cheltenham Borough Council are continuing to implement a range of measures to ensure concentrations remain low to protect people and the environment. Cheltenham Borough Council's 2024 AQAP outlines these key actions, which are predominantly centred around reducing emissions from road traffic. This is because approximately 70% of the total NO_x concentration within the AQMA are caused by road traffic emissions. The actions are 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

Due to the decision to revoke the AQMA, the 2024 AQAP is to be replaced with an air quality strategy. This is in accordance with Section 1.41 of TG(22):

"It is recommended that local authorities in England who have not had to designate AQMAs and produce AQAPs draw up a local Air Quality Strategy".

Cheltenham Borough Council are currently in the process of developing the revised air quality strategy, with an estimate for completion being the end of 2025. An update on the air quality strategy will be provided in the next update of this report in 2026.

Conclusion and Priorities

During 2024, the NO_2 annul 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. This demonstrates that the NO_2 concentrations have improved sufficiently to revoke the AQMA and that there are no new hotspot areas of concern. The AQMA has been compliant with the annual mean objective for five consecutive years and, as a result, Cheltenham Borough Council are currently revoking the AQMA.

The PM_{10} and $PM_{2.5}$ concentrations recorded in 2024 indicate that the particulate matter concentrations across the borough have improved since 2023 and continue to remain low. There was also no exceedance of the 24-hour mean objective of 50 µg/m^3 for PM_{10}, as the maximum daily concentration recorded at the automatic monitoring station on Gloucester Road was 39.5 µg/m^3.

Despite the positive improvements in air quality, Cheltenham Borough Council continue to implement a range of measures to ensure pollution levels remain low. During the current reporting year, Cheltenham Borough Council's top three measures are:

- Produce an Air Quality Strategy to replace the AQAP, following the revocation of the AQMA;
- Review boundaries of the smoke control areas (SCAs) and declare any new / amend existing boundaries as necessary;
- Promote anti-idling campaigns to reduce emissions from vehicle traffic.

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, copies of previous ASRs, and information on SCAs.

Information on a range of sustainable travel options available across Gloucestershire are available on the Think Travel Website. This provides the public with a range of local walking maps, cycle routes, public transport journey planners, and information on park and ride facilities, car sharing and electrical vehicles.

The public can also help address air quality issues by engaging with the consultation on the AQS (once developed) and on the revised SCA boundaries (once reviewed). These consultations are to be launched by Cheltenham Borough Council in 2026.

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 2024. 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 shown 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.

During 2024, Cheltenham Borough Council had 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 at:

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

The extent of the AQMA is shown in Figure 2.1, with the details provided in Table 2.1.

Figure 2.1 – Extent of Cheltenham Borough Council AQMA

Cheltenham Borough Council are currently in the process of revoking the AQMA, due to compliance with the Air Quality Objective over the last five years (2020 – 2024). However, as the AQMA was still effective during the monitoring period that this report relates to (2024), reference to the AQMA has still been included throughout. The Cheltenham Borough Council AQMA will no longer be acknowledged in the new updated version of this report in 2026.

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 the junction of Gloucester Road and Tewkesbury Road to the junction of Burton Street; Poole Way; and Swindon Road from the junction of Poole Way to St. Georges Street.	No	46.4 µg/m^3	30.4 µg/m^3	5 years	AQAP 2024	AQAP 2024

☒ **Cheltenham Borough Council confirm the information on UK-Air regarding their AQMA 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. **The Council have considered the comments made during the previous appraisal. This is commended and the Council are encouraged to continue this approach for future ASRs.**
   - The appraisal comments of the 2024 ASR have been considered in the development of the 2025 ASR.
2. **The Council have continued to provide clear evidence of several key actions to improve air quality which have been completed during the current reporting year. In addition, the Council have clearly listed their priorities for the coming year. This is commended and indicative of good practice.**
   - Any actions completed during 2024 are outlined within this report, along with any priorities for the current year.
3. **The Council have provided excellent mapping of all monitoring locations within the Borough and included AQMA boundaries, which is commended.**
   - Maps of the monitoring locations are split between geographical area, and an overview map of all monitoring locations within the Cheltenham boundary is included within the 2025 ASR.
4. **Extensive trend graphs and analysis have been provided for all monitoring data, which is welcomed.**
   - Trend graphs have been provided for all monitoring data, with an extra trend graph included for the AQMA to show the downward trend in concentrations to support to decision of revoking the AQMA.
5. **An additional passive diffusion tube monitoring location was commissioned in 2023, as was a new monitoring station on Gloucester Road to monitor PM_{10} and $PM_{2.5}$ concentrations. This is welcomed, and the Council should continue to regularly review their monitoring network to identify any potential new hotspots.**
   - Cheltenham Borough Council continue to review the monitoring network, and in 2024 five sites were removed from the network and four new sites established. This demonstrates Cheltenham Borough Council's commitment to ensuring that monitoring is undertaken in the most appropriate location.

6. **The Council should update Table B.1 to include all diffusion tube monitoring locations, as it currently is missing Diffusion Tube IDs 46 and 47.**
   - Table B.1 has been checked for inconsistencies in this report, to ensure that all diffusion tube IDs listed in Table A.1 are included in Table B.1.
7. **Defra recommends that Directors of Public Health approve draft ASRs. Sign-off is not a requirement, however collaboration and consultations with those who have responsibility for Public Health is expected to increase support for measures to improve air quality, with co-benefits for all. The Council have stated that the ASR has been sent to the director of Public Health and is awaiting comments, which is welcomed.**
   - This ASR has been signed off by the Director of Public Health.
8. **The Council should ensure that the report refers to 2023 rather than 2022 in all sections, for example with the 'NO_2 Fall-off with Distance from the Road' sub-section.**
   - The 2025 ASR has been checked for any inconsistencies in the monitoring year referred to.

Cheltenham Borough Council has taken forward a number of direct measures during the current reporting year of 2024 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Eleven measures are included within Table 2.2, with the type of measure and the progress Cheltenham Borough Council have made during the reporting year of 2024 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2. More detail on these measures can be found in the newly adopted 2024 AQAP.

Cheltenham Borough Council completed a number of measures during 2024. These include the following:

- **Expansion of Arle Court Park & Ride:** Installation of 100 EV Charging Points / free to use secure cycle storage lockers, with a bus service to Cheltenham town centre every 15 minutes. It opened on 29th July 2024 and is now called a 'transport hub' instead of a 'park and ride' as it is effectively also a 'bike and ride', 'scoot and ride' and a 'walk and ride', and now also allows long-distance coaches to stop, allowing lots of connections to locations around the UK on services that would have otherwise sailed by on the M5. The Arle Court Transport Hub is located just off the Golden Valley Junction of the M5.

- **Installation of EV Charging Points:** A total of 42 EV charging points have now been installed across the borough.
- **Monitoring at NHS Sites:** Monitoring at key NHS sites is now in operation, with the installation of new diffusion tube sites in the network at the start of 2024.

Cheltenham Borough Council are to continue progressing the following measures during the current reporting year of 2025:

- **Installation of EV Charing Points:** Continue to progress with the installation of the planned 28 EV charging points across the borough.
- **Develop Emissions Policy for Private Hire Vehicles:** Continue to develop the policy to implement the Cabinet Member Customer & Regulatory Services' ambition to move the taxi fleet to EVs by 2026/2027. The policy is to be designed to phase out the few remaining Euro 4, then Euro 5 and Euro 6, before converting to EV.
- **Investigate Differential Parking Charges:** Cheltenham Borough Council are to work with Gloucestershire County Councils to investigate the possibility of amending parking charges for electric and hybrid vehicles.
- **Raise Awareness in Schools:** The Air Quality Educations Project Officer is to continue to work with schools to increase the awareness of air quality issues and, more importantly, actions that can be taken to reduce the level of pollution across the borough. In the first two years of the Air Quality Educations Project Officers' role, over 5,000 school pupils within Cheltenham have been engaged with.

Over the course of 2025, Cheltenham Borough Council's main priorities are:

- **Develop an Air Quality Strategy:** Following the revocation of the AQMA and the AQAP being no longer applicable, an AQS is to be developed. This is expected to be produced by the end of the year, and released for public consultation in early 2026. As part of the AQS, Cheltenham Borough Council are to continue to investigate setting a more ambitious annual mean target for NO_2, beyond the initial 30 $\mu g/m^3$ which has already been achieved.
- **Review Smoke Control Areas:** Cheltenham Borough Council are to review the existing boundaries of the SCAs and amend as necessary. The review of the SCAs is scheduled to be reviewed by the Cabinet in late 2025.
- **Promote Anti-Idling Campaigns:** Due to the strong contribution of road traffic emissions to pollutant concentrations in Cheltenham, anti-idling campaigns are to be promoted via Cheltenham Borough Council's air quality website, and through the

work of the Air Quality Educations Project Officer. This is intended to raise awareness and, therefore, result in less idling across the borough.

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	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	**Develop Air Quality Strategy**	**Policy Guidance and Development Control**	**Air Quality Planning and Policy Guidance**	**2025**	**2026**	**Cheltenham Borough Council**	**Cheltenham Borough Council**	**Not Funded**	**£10k - £50k**	**Implementation**	**Reduction in pollutants to new target.**	**Concentrations comply with new target limit.**	**Development of Air Quality Strategy.**	**-**
2	**Review Smoke Control Areas**	**Policy Guidance and Development Control**	**Other Policy**	**2025**	**2026**	**Cheltenham Borough Council**	**Cheltenham Borough Council**	**Not Funded**	**< £10k**	**Implementation**	**Number of Smoke Control Areas.**	**Pollutant concentrations remaining low in Smoke Control Areas / number of penalties issued.**	**Review of existing Smoke Control Areas scheduled with Cabinet.**	**-**
3	**Promote Anti-Idling Campaigns**	**Traffic Management**	**Anti-Idling Enforcement**	**2025**	**2026**	**Cheltenham Borough Council**	**Cheltenham Borough Council**	**Not Funded**	**< £10k**	**Implementation**	**Reduction in pollutants to new target.**	**Engagement rates of campaigns.**	**Promoted via Council website.**	**-**
4	Low Emission Bus Fleet	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2014 – 2016	Ongoing	Cheltenham Borough Council Bus Operators	Bus Operators	Partially Funded	TBC by GCC	Implementation	< 0.5%	Bus fleet data.	All Stagecoach vehicles are powered by Euro V and increasingly Euro VI 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 VI compliant.
5	Promotion of Greener Vehicles	Promoting Low Emission Transport	Promoting Alternative Refuelling Infrastructure to Promote Low Emission Vehicles	2013 – 2015	Ongoing	Cheltenham Borough Council. Gloucestershire County Council	Gloucestershire County Council	Partially Funded	TBC by GCC	Implementation	< 0.5%	Chare point usage data.	42 EV charging points installed across the borough / 100 EV charging points installed at the 'Arle Court Transport Hub'.	Cheltenham Borough Council and Gloucestershire County Council continue to encourage EV usage through the installation of charging points on-street and in car parks. The possibility of differential parking charges for electric and hybrid vehicles is also being explored.
6	'Twenty is Plenty'	Promoting Low Emission Transport	Other	2015 – 2017	Ongoing	Cheltenham Borough Council	Cheltenham Borough Council	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' (2020) report. The report was also issued to Gloucestershire County Council 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".
7	Air Quality Information	Public Information	Via the Internet	2015 – 2016	Ongoing	Cheltenham Borough Council	Cheltenham Borough Council	Not Funded	£10k - £50k	Planning	< 0.1%	Hit counter on website.	Working with Gloucestershire County Council to develop a county-wide air quality information / data website.	Currently going through approval.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
8	Promotion of Workplace Travel Plans	Promoting Travel Alternatives	Workplace Travel Planning	2015	Ongoing	Cheltenham Borough Council	Cheltenham Borough Council	Not Funded	£10k - £50k	Planning	< 0.1%	Whether or not a travel plan is implemented.	Cheltenham Borough Council have undertaken a survey with LiftShare to explore opportunities for staff to use more sustainable modes of travel for their commute. The Cycle2Work scheme has also been introduced. A staff travel survey has been undertaken to get baseline data on mode of transport.	The results of these surveys will be used to encourage businesses within Cheltenham to develop and implement similar travel plans.
9	Traffic Light Appraisal	Traffic Management	Strategic Highways Improvements, Reprioritising Road Space away from Cars, including Access Management, Selective Vehicle Priority, Bus Priority and High Vehicle Occupancy Lanes.	2015 – 2017	Ongoing	Gloucestershire County Council	Gloucestershire County Council	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 helps keep traffic moving in the area. Gloucestershire County Council 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.
10	Bus and Taxi Quality Partnership	Promoting Low Emission Transport	Public Vehicle Procurement – Prioritising Uptake of Low Emission Vehicles	2016	Ongoing	Gloucestershire County Council	Gloucestershire County Council	TBC by GCC	TBC by GCC	TBC by GCC	-	Anecdotal	Gradual uptake as there has been a recent requirement for taxis to be updates for accessibility, rather than air quality issues.	No specific partnerships but buses and taxis are prohibited from idling at bus stops and taxi ranks in town.
11	Green Planting	Other	Other	2014 – 2016	Ongoing	Cheltenham Borough Council	Cheltenham Borough Council	Partially Funded	£50k - £100k	Implementation	< 0.1%	Number of urban planning applications with green planting schemes adopted.	Works completed in High Street in 2021. Additional works required due to plants not thriving.	Cheltenham Borough Council are delivering the Habitat Cheltenham Biodiversity projects.

Table 2.3 – Progress on Air Quality Action Plan Measures

Measure No.	Measure	Comments / Potential Barriers to Implementation (as of April 2025)
1	England with Royal Mail to move towards low emission fleet.	Royal Mail have declined to engage or voluntarily use cleaner vehicles for their Cheltenham-based fleet.
2	Publish air quality monitoring results using low-cost AQ Mesh sensors on accessible website.	AQ Mesh sensors are being phased out due to reliability issues.
3	Expand the existing Arle Court Park and Ride	Now designated as a 'Travel Hub', has been completed and in regular use, including by an expanding number of long-distance coach services.
4	Public Health Awareness Campaigns as part of 'Air Quality Communication Strategy' around exceedances in AQMA.	Levels in AQMA now not exceeding limits, so attention being shifted to $PM_{2.5}$.
5	Investigate setting an annual mean target objective of 30 $\mu g/m^3$, instead of the National Objective of 40 $\mu g/m^3$.	Initial target met, more ambitious target to be considered as part of the Air Quality Strategy.
6	Investigate setting targets for PM_{10} and $PM_{2.5}$ in line with WHO guidance, and emerging DEFRA requirements.	Targets for PM_{10} and $PM_{2.5}$ being met at monitoring location.
7	Phase out around 500 Euro V and older taxis to replace with Euro VI vehicles.	Voluntary uptake continuing.
8	Develop partnership for last mile delivery in town centre by sustainable transport.	Gloucestershire County Council obtained DEFRA grand funding for a related project, which is now being pursued with NHS partnership.
9	Offer more EV charging points in the street surrounding the AQMA.	42 EV charging points installed on-street across the borough, with another 28 planned.
10	Extend the existing priority parking areas for Electric Vehicles within parking areas of AQMA.	There are no existing priority parking areas for EVs in AQMA and EV chargers are unlikely to be installed in Cheltenham Borough Council car parks due to issues with local power network.
11	Adopt a Cheltenham Air Quality Strategy. Consider inclusion of measures from Clean Air Cheltenham's document and other community sources.	Comprehensive Air Quality Strategy will be developed after revocation of AQMA.
12	Review the Smoke Control Areas	Cheltenham Borough Council has not made any decision on changing the existing Smoke Control Areas.
13	Expand monitoring for PM_{10} and $PM_{2.5}$.	Real-time monitoring of PM_{10} and $PM_{2.5}$ now operating at Gloucester Road.
14	Produce a biodiversity supplementary planning document.	A tree strategy and nature biodiversity supplementary planning document is being developed by the planning policy team in conjunction with the recently recruited ecology officer.
15	Emissions policy for private hire vehicles.	Cheltenham Borough Council are in the process of developing the policy to implement the Cabinet Member Customer & Regulatory Services' ambition to move the taxi fleet to EVs by 2026 / 2027. This policy will need to address the gradual phasing out of petrol and diesel vehicles, starting with Euro 4s and then eventually Euro 5 and Euro 6 to EVs over this period. Vehicle replacements will need to be Euro 6 as a minimum before converting to EV.
16	Apply variable parking charges to incentivise use of EVs and Hybrids.	Cheltenham Borough Council and Gloucestershire County Councils will continue to investigate the potential for differential parking charges for electric and hybrid vehicles on-street and in car parks.

17	Implement junction improvements / traffic light changes in vicinity of AQMA.	All scheduled work now complete.
18	Engage with local NHS trust to raise awareness of the effects of exposure to poor air quality where limits are exceeded.	Monitoring of air quality at key NHS sites now in operation. Regular liaison with NHS to discuss results. Considering ways to highlight air quality issues in GP surgeries.
19	Improve data around AQMA (and beyond): A) Commission a study to understand purpose of car trips (including start / end points) through the AQMA. B) Single person or multiple occupancy survey. C) How car parking generates trips through the AQMA.	Declined, due to costs.
20	Develop strategic routes; consider closure of certain town centre roads to certain vehicle types.	Not taken further at this time.
21	Install EV charging points at taxi ranks.	In drafting the AQAP, it was highlighted that a very small number of taxis are currently electric or hybrid; the emphasis in recent years has been on making the taxis accessible to users with disabilities and so resources may be limited to update parts of the fleet immediately. Possible liaison with Gloucestershire County Council planning more EV at taxi ranks, Cheltenham Borough Council to be responsible for EVs in car parks. Planning to seek funding on the basis that we want taxi rank infrastructure in place by 2026 / 2027.
22	Deliver a schools air quality project – Education and Awareness Campaign	In post. Engaged with over 3,000 pupils in first year.
23	‘Twenty is Plenty’	Not within Cheltenham Borough Council remit. This has been referenced in Gloucestershire County Council Road Safety Policy.
24	Promote a ‘No Idling’ policy.	Powers to issue Fixed Penalty Notices (FPN) to idling vehicles now delegate to staff, but ineffective due to low fines and enforcement issues.
25	Increase car sharing in AQMA.	Parish Lift, Carshare Gloucestershire available via Gloucestershire County Council.
26	Investigate delivery consolidation opportunities including Golden Valley Development to reduce deliveries through AQMA.	AQMA levels now compliant, so this is not a priority.
27	Promote Workplace Travel Plans	‘Cycle to Work’ scheme in place at Cheltenham Borough Council.
28	Promote cycling and upgrade of infrastructure in line with Severn Cycling and Walking Infrastructure Plan	Cheltenham to Bishop’s Cleeve cycleway extension work continuing, scheduled for completion late 2025. Will form part of Gloucestershire Cycle Spine running from Stroud to Bishop’s Cleeve.
29	Install rapid charging points for electric vehicles.	Gloucestershire County Council car parks have installed: 100 no. 7kW EV charging points and 4 rapid EV charging points at Arle Court Travel Hub. 10 no. 7kW EV charging points at St George’s Road car park.
30	Implement alternative fuel sources for business fleet within the Council.	HVO in use for fleet through DLO partner organisation. Some electric vehicles in use, but some older diesels also remain.
31	Create car-free zones / emissions charging zones.	Not being considered further at this time.

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[1], 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 installed a new automatic monitoring station to monitor $PM_{2.5}$ on Gloucester Road in November 2022. In the first two full years of operation, the annual mean concentrations recorded in 2023 and 2024 were 9.6 µg/m^3 and 8.7 µg/m^3, respectively. These recorded concentrations shown an initial downward trend in $PM_{2.5}$ and are below the annual mean target set by the Fine Particulate Matter (England) Regulations 2023 of 10 µg/m^3, that is not to be exceeded by the end of 2040.

$PM_{2.5}$ Background Concentrations:

The Defra background maps[2] for Cheltenham Borough Council in 2024 suggest that the annual average $PM_{2.5}$ concentration at 46 locations (1km x 1km grid square resolution) across the borough is 6.9 µg/m^3, whilst the maximum and minimum $PM_{2.5}$ concentration at a given location is 7.5 µg/m^3 and 6.2 µg/m^3, respectively. The data from the background maps and the automatic monitoring station combined, indicate that the concentration of $PM_{2.5}$ throughout Cheltenham is relatively low. However, Cheltenham Borough Council are to continue to implement measures to further reduce the concentration of $PM_{2.5}$, due to the impact exposure to such pollutant (even at low levels) has on public health.

Impact of $PM_{2.5}$ on Public Health:

According to the Public Health Outcomes Framework[3] developed by Public Health England, the fraction of adult mortality attributable to $PM_{2.5}$ in Cheltenham is 4.5%, which

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

[2] Defra. Data Archive – Background Mapping Data for Local Authorities (2021), November 2024.

[3] Public Health England. Public Health Outcomes Framework.

is slightly lower than the average for the whole of England (5.2%). Whilst such values indicate that $PM_{2.5}$ is not as significant issue as in other areas of the country, it still highlights that $PM_{2.5}$ poses a risk to public health. Therefore, Cheltenham Borough Council will continue to implement measures that will further reduce the impact of $PM_{2.5}$.

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 a number of SCAs declared within Cheltenham. However, a cabinet review of the existing SCAs within the borough is scheduled for late 2025. An update on the outcome of this review will be provided in the next update of this report in 2026.

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

This section sets out the monitoring undertaken within 2024 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 2020 and 2024 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 2024. Table A.1 in Appendix A shows the details of the automatic monitoring sites. These are located on Gloucester Road (PM_{10} / $PM_{2.5}$) and Swindon Road (NO_2), 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.

There was no change to the automatic monitoring network in 2024, from that in the previous reporting year. 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 44 sites during 2024, including one triplicate site. Relative to the previous reporting year, the diffusion tube network reduced by one site overall (45 sites in 2023), through the removal of five sites and the additional of four new sites. The changes are as follows:

- **Sites removed in 2024:** 3, 39, 42, 45 and 46.
- **Sites added in 2024:** 47, 48, 49 and 50.

Maps showing the location of the monitoring sites are provided in Appendix D, with the details provided in Table A.2. 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.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentration 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).

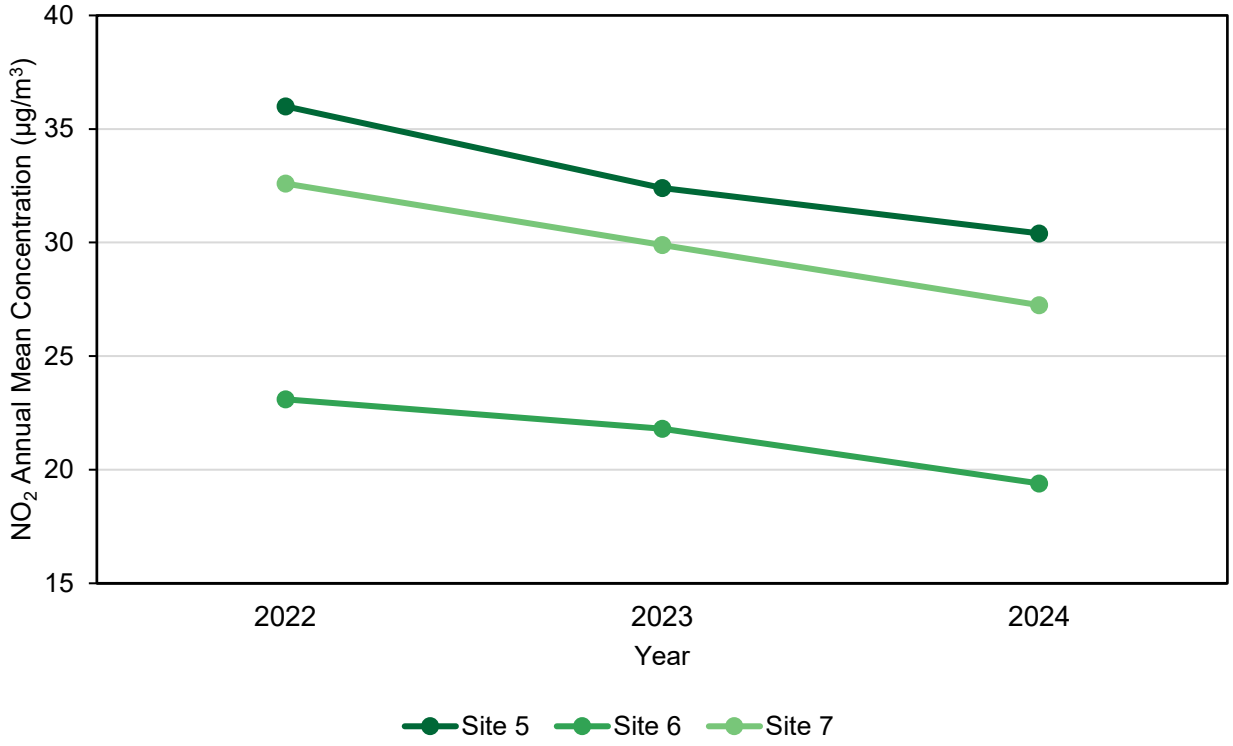
For diffusion tubes, the full 2024 dataset of monthly mean NO_2 values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant. The 2024 monitoring results for NO_2 are split between sites that are inside the AQMA and sites that are outside of the AQMA below.

Inside the Cheltenham AQMA:

During 2024, no site within the Cheltenham AQMA reported an NO_2 annual mean concentration within 10% of the annual mean objective of 40 µg/m^3 (i.e. above 36 µg/m^3). The maximum NO_2 annual mean concentration within the AQMA was 30.4 µg/m^3 (Site 5), which is a slight decrease from the 32.4 µg/m^3 reported in the previous year. The maximum annual mean concentration reported within the AQMA has continued to fall each year from 36.0 µg/m^3 in 2022 to 30.4 µg/m^3 in 2024. The other two diffusion tubes within the AQMA (Site 6 and 7) have also reported year-on-year decreases in NO_2 since 2022, indicating a continued improvement in air quality within the AQMA. This downward trend in NO_2 concentrations within the AQMA is illustrated in Figure 3.1.

Section 3.57 of TG(22) states “the revocation of an AQMA should be considered following three consecutive years of annual mean NO_2 concentrations being lower than 36 µg/m^3 (i.e. within 10% of the annual mean NO_2 objective)”. Therefore, despite the NO_2 annual mean concentration in 2022 being 36.0 µg/m^3, the downward trend in concentrations that has been observed demonstrates continual compliance with the objective. As a result, Cheltenham Borough Council are in the process of revoking the Cheltenham AQMA.

Figure 3.1 – NO_2 Concentrations in the Cheltenham AQMA



Outside the Cheltenham AQMA:

During 2024, the maximum NO_2 annual mean concentration at a site outside of the Cheltenham AQMA was 27.1 µg/m^3 (Site 4), which is a decreased from the maximum NO_2 annual mean concentration in the previous reporting year (29.8 µg/m^3). Of the 40 sites that were part of the diffusion tube network in both 2023 and 2024, the NO_2 annual mean concentration decreased at all sites except one (Site 13), where the concentration remained stable. The greatest decrease was observed at Site 12, where the annual mean concentration of NO_2 reduced by 3.2 µg/m^3 between 2023 and 2024. This downward trend in NO_2 annual mean concentrations observed across the entire diffusion tube network, highlights an improvement in the concentration of NO_2 across Cheltenham in 2024.

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 200 µg/m^3, not to be exceeded more than 18 times per year. In 2024, this hourly objective was not exceeded on any occasion as the maximum hourly mean concentration recorded by the Swindon Road automatic monitoring site was 95.8 µg/m^3 (15th January, 5pm). Additionally, as outlined in LAQM TG(22), a diffusion tube annual mean concentration greater than 60 µg/m^3 can be used as a proxy for an exceedance of the 1-hour mean objective. However, as no single diffusion tube site recorded an annual mean NO_2 concentration above 60 µg/m^3, it can be suggested that the 200 µg/m^3 1-hour objective was not breached at any site in 2024.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40 µg/m^3.

The annual mean PM_{10} concentration reported at the automatic monitoring station on Gloucester Road was 15.1 µg/m^3, which is significantly below the annual mean objective of 40 µg/m^3. This reported concentration is a decrease from that of the previous reporting year (17.0 µg/m^3), highlighting an improvement in the concentration of PM_{10} in Cheltenham during 2024.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50 µg/m^3, not to be exceeded more than 35 times per year.

In 2024, the PM_{10} daily mean objective was not exceeded on any occasion, with a maximum 24-hour concentration reported of 39.5 µg/m^3 (24th January). This is the same as in 2023 where the daily mean objective of 50 µg/m^3 was not exceeded.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

The annual mean $PM_{2.5}$ concentration reported at the automatic monitoring station on Gloucester Road was 8.7 µg/m^3. This is a decrease of 0.9 µg/m^3 from the $PM_{2.5}$ annual mean concentration reported in 2023 (9.6 µg/m^3), indicating a slight improvement in the concentration of $PM_{2.5}$ in Cheltenham during 2024.

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? (1)	Monitoring Technique	Distance to Relevant Exposure (m) (2)	Distance to kerb of nearest road (m) (1)	Inlet Height (m)
CM1	Swindon Road	Kerbside	394760	222878	NO_2	No	-	Chemiluminescent	0.0	2.4	1.3
CM2	Gloucester Road	Roadside	392269	222007	PM_{10}, $PM_{2.5}$	No	-	BAM	28.0	2.2	1.4

Notes:

(1) N/A if not applicable

(2) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

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
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 - Cheltenham AQMA	0.0	1.8	No	2.9
6	48 Swindon Road	Roadside	394635	222928	NO_2	Yes - Cheltenham AQMA	2.0	2.2	No	3.3
7	New Rutland Court	Roadside	394738	222888	NO_2	Yes - Cheltenham AQMA	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

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)
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
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

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)
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
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
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
47	St Pauls Med Centre	Roadside	394443	223072	NO_2	No	13.2	2.5	No	2.8
48	CGH - Casualty	Kerbside	395079	221696	NO_2	No	13.5	0.3	No	2.4
49	CGH - West Block Outpatients	Roadside	395072	221524	NO_2	No	0.3	14.5	No	2.4
50	Prestbury Rd Surgery	Suburban	396294	223573	NO_2	No	6.4	3.4	No	2.5
51	Gardeners Lane School	Roadside	394034	223525	NO_2	No	2.4	3.0	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 2024 (%) (2)	2020	2021	2022	2023	2024
CM1	394760	222878	Kerbside	95.6	95.6	24.7	25.3	27.0	25.3	23.4

☒ **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 2024.**

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 – Annual Mean NO_2 Concentrations (Automatic)

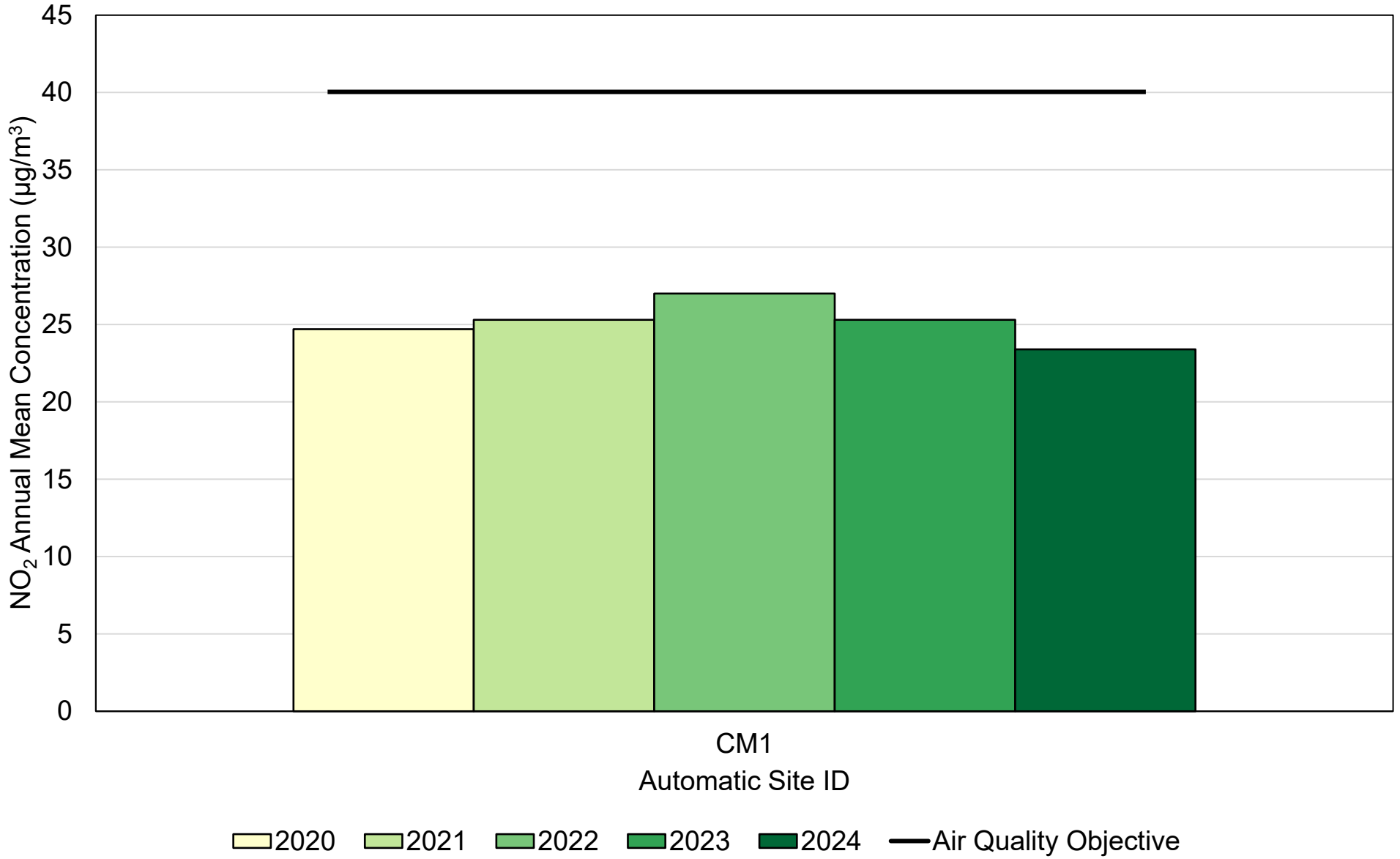


Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

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 2024 (%) (2)	2020	2021	2022	2023	2024
1	394621	222215	Roadside	100	100	20.8	21.8	23.0	21.0	19.2
2	393906	222873	Kerbside	100	100	24.3	24.5	25.0	25.4	23.2
4	394235	223055	Kerbside	100	100	32.3	31.5	33.3	29.8	27.1
5	394350	222923	Roadside	100	100	32.9	34.5	36.0	32.4	30.4
6	394635	222928	Roadside	100	100	21.5	23.1	23.1	21.8	19.4
7	394738	222888	Roadside	100	100	30.3	30.3	32.6	29.9	27.2
8, 9, 10	394760	222878	Roadside	100	100	35.1	24.8	27.2	25.5	23.5
11	394708	222763	Kerbside	100	100	21.5	22.4	23.5	21.1	19.3
12	394830	222845	Roadside	83.2	83.2	39.2	26.6	30.5	25.8	22.5
13	394902	223004	Kerbside	90.5	90.5	22.7	22.6	22.8	19.9	19.9
14	394980	222735	Roadside	100	100	24.5	25.0	27.1	23.8	22.1
15	395110	222670	Kerbside	100	100	34.1	24.1	25.5	22.6	21.8
16	395210	222618	Roadside	100	100	24.5	26.1	30.2	26.7	25.3
17	395207	222465	Kerbside	100	100	22.3	22.0	22.9	20.3	18.6
18	395340	222071	Roadside	90.8	90.8	19.1	20.2	19.5	18.8	17.4
19	395362	222000	Roadside	100	100	27.5	28.5	28.6	26.5	24.0
20	395300	222027	Roadside	100	100	27.7	28.2	27.4	25.2	23.6
21	395182	222183	Kerbside	100	100	20.3	23.1	23.1	21.2	19.9
22	395146	222149	Roadside	100	100	25.1	27.0	27.2	25.3	22.4
23	395156	221866	Kerbside	100	100	17.7	18.7	19.2	17.8	16.6
24	395037	222222	Urban Background	100	100	-	-	13.9	12.8	11.2
25	394954	222511	Urban Centre	100	100	20.3	23.5	24.9	22.2	20.6

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 2024 (%) (2)	2020	2021	2022	2023	2024
26	394810	222439	Kerbside	100	100	22.1	22.8	23.9	21.3	19.2
27	393081	223643	Kerbside	100	100	31.2	31.3	30.8	29.2	26.7
28	392066	222540	Kerbside	100	100	24.7	25.3	21.1	18.6	16.4
29	391178	221641	Roadside	100	100	25.2	25.0	25.5	23.3	21.5
30	391462	222662	Urban Background	100	100	-	-	16.4	15.5	14.2
31	391507	221978	Kerbside	100	100	-	18.3	21.3	20.5	18.1
32	391869	222084	Kerbside	83.2	83.2	23.9	22.2	22.4	21.2	19.1
33	392267	222009	Roadside	92.4	92.4	21.6	22.1	22.5	21.8	19.2
34	393296	222170	Kerbside	100	100	33.4	23.6	25.0	24.7	22.6
35	392912	221862	Roadside	100	100	36.2	25.5	24.8	25.1	23.0
36	394473	220935	Roadside	100	100	16.9	17.8	17.0	16.1	14.6
37	394492	220822	Suburban	100	100	-	-	11.6	10.5	9.3
38	395660	221670	Roadside	100	100	37.6	28.4	29.3	26.1	25.4
40	397009	223887	Roadside	100	100	-	22.9	24.6	22.4	20.6
41	396399	224044	Suburban	100	100	-	-	10.1	10.0	8.7
43	395394	222875	Kerbside	100	100	23.6	22.8	23.9	21.9	20.0
44	394026	224231	Suburban	100	100	-	-	14.8	13.8	12.2
47	394443	223072	Roadside	90.5	90.5	-	-	-	20.9	18.4
48	395079	221696	Kerbside	100	100	-	-	-	-	15.1
49	395072	221524	Roadside	100	100	-	-	-	-	11.7
50	396294	223573	Suburban	100	100	-	-	-	-	10.6
51	394034	223525	Roadside	58.3	58.3	-	-	-	-	16.8

☒ **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 – Annual Mean NO_2 Concentrations (Non-Automatic), Sites in AQMA

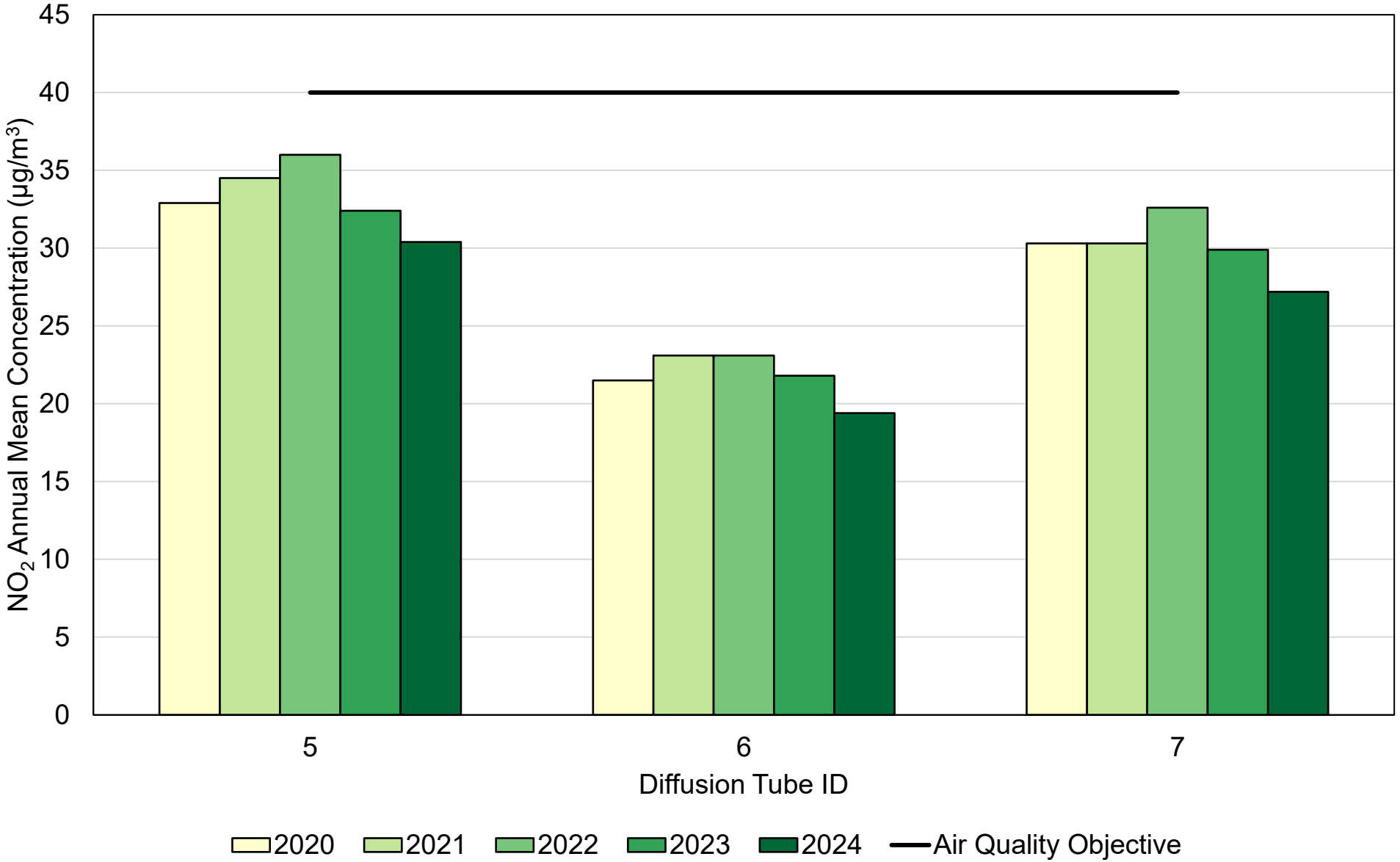


Figure A.3 – Annual Mean NO_2 Concentrations (Non-Automatic), Sites 1 – 13

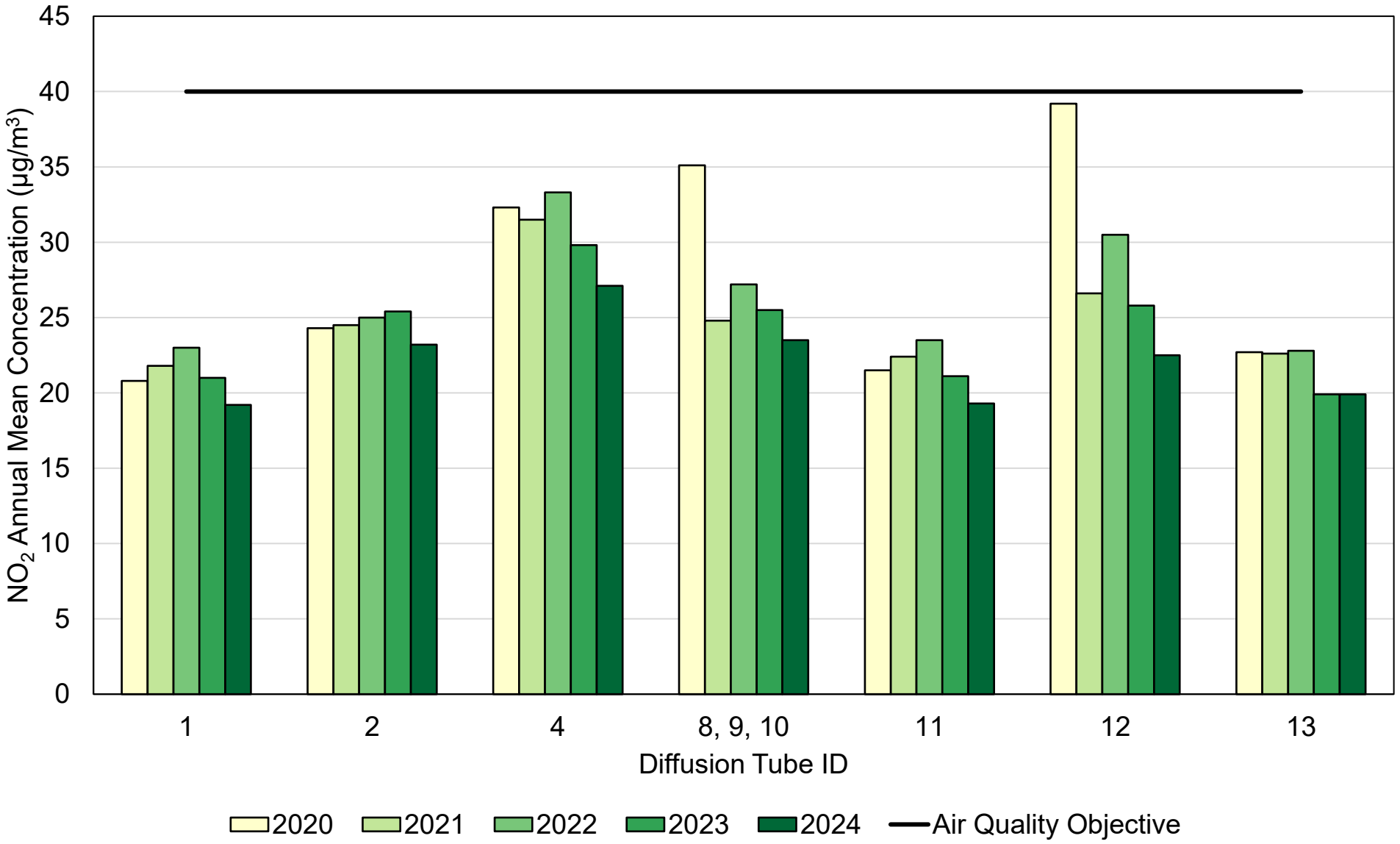


Figure A.4 – Annual Mean NO_2 Concentrations (Non-Automatic), Sites 14 – 20

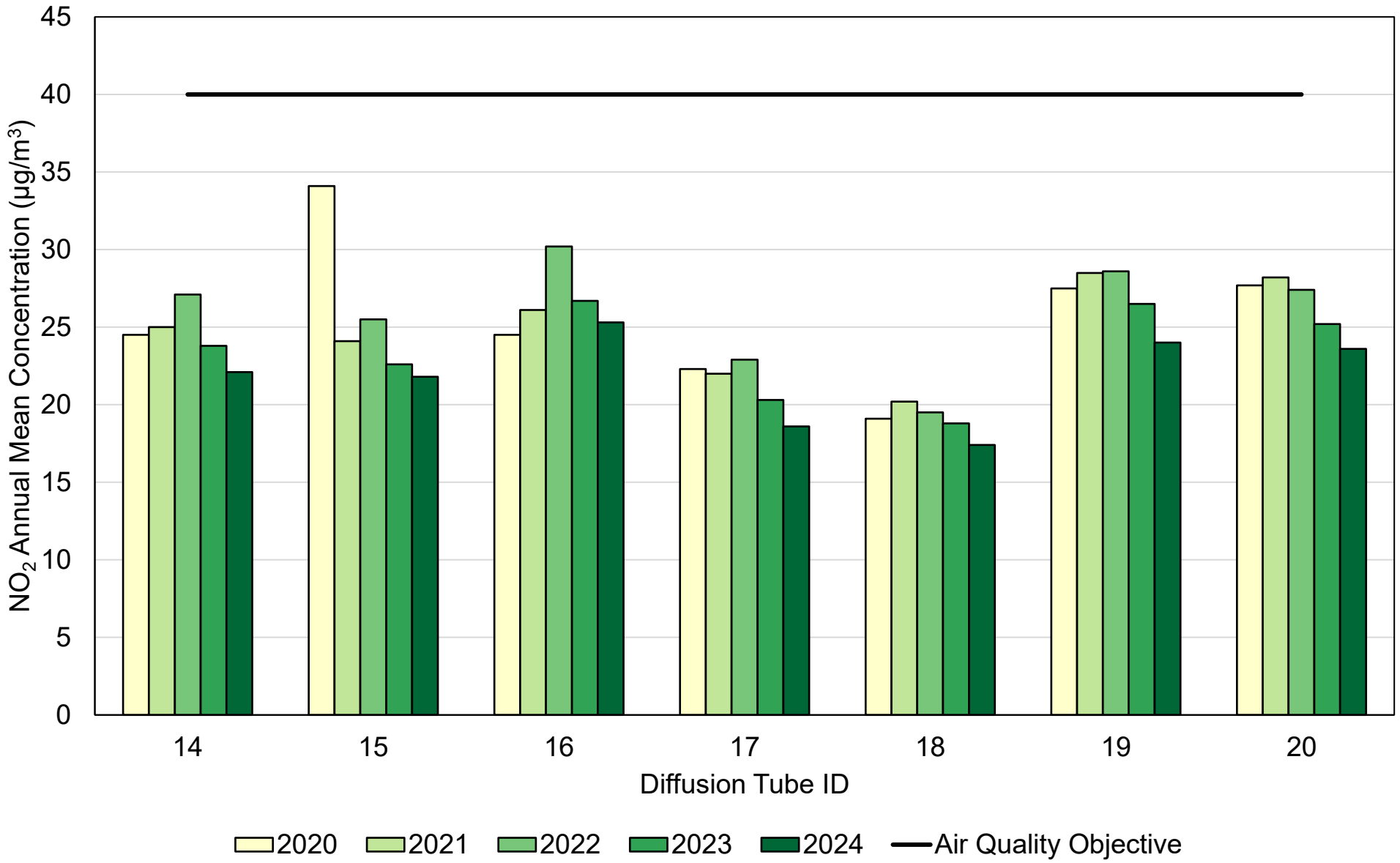


Figure A.5 – Annual Mean NO_2 Concentrations (Non-Automatic), 21 – 27

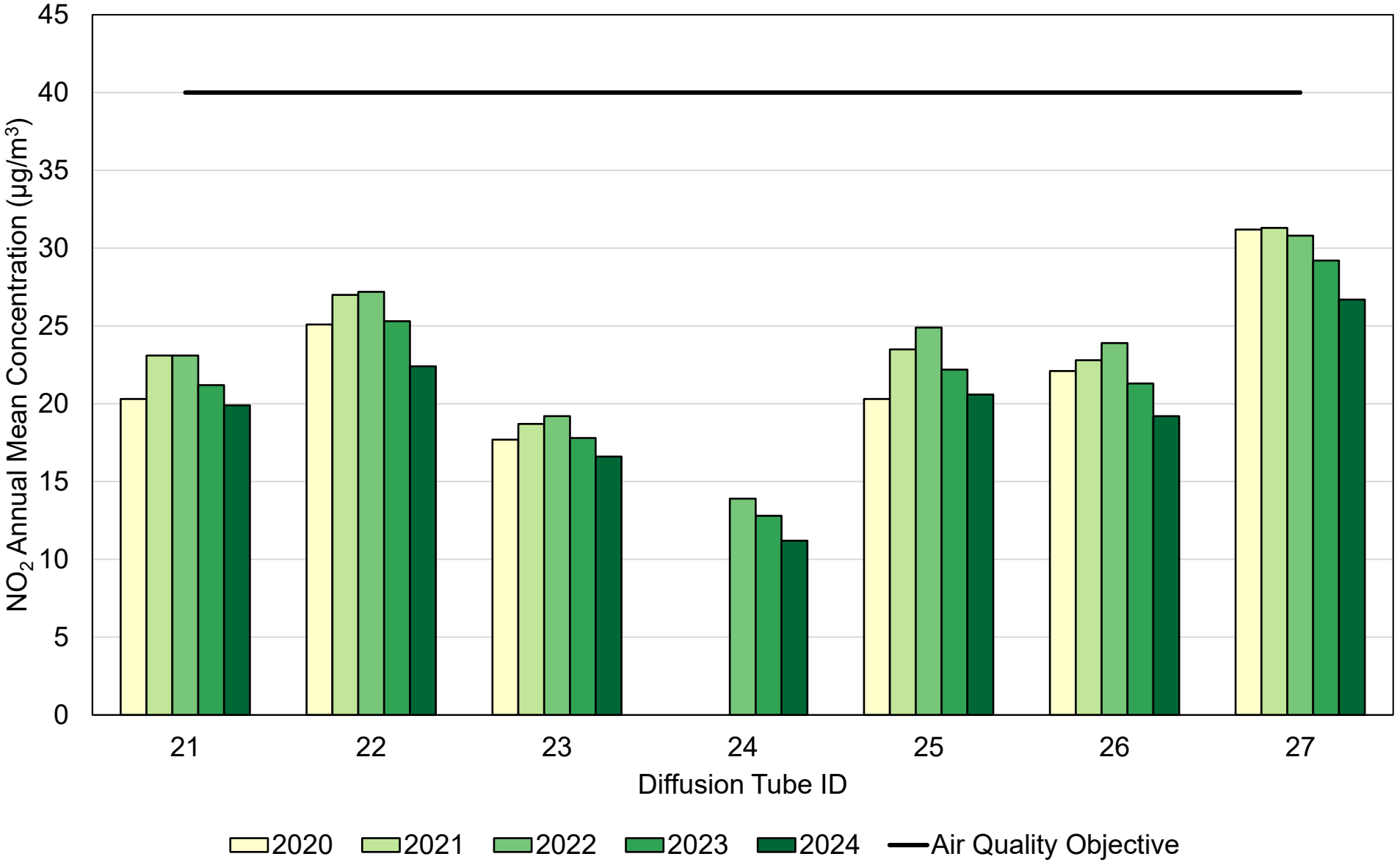


Figure A.6 – Annual Mean NO_2 Concentrations (Non-Automatic), 28 – 34

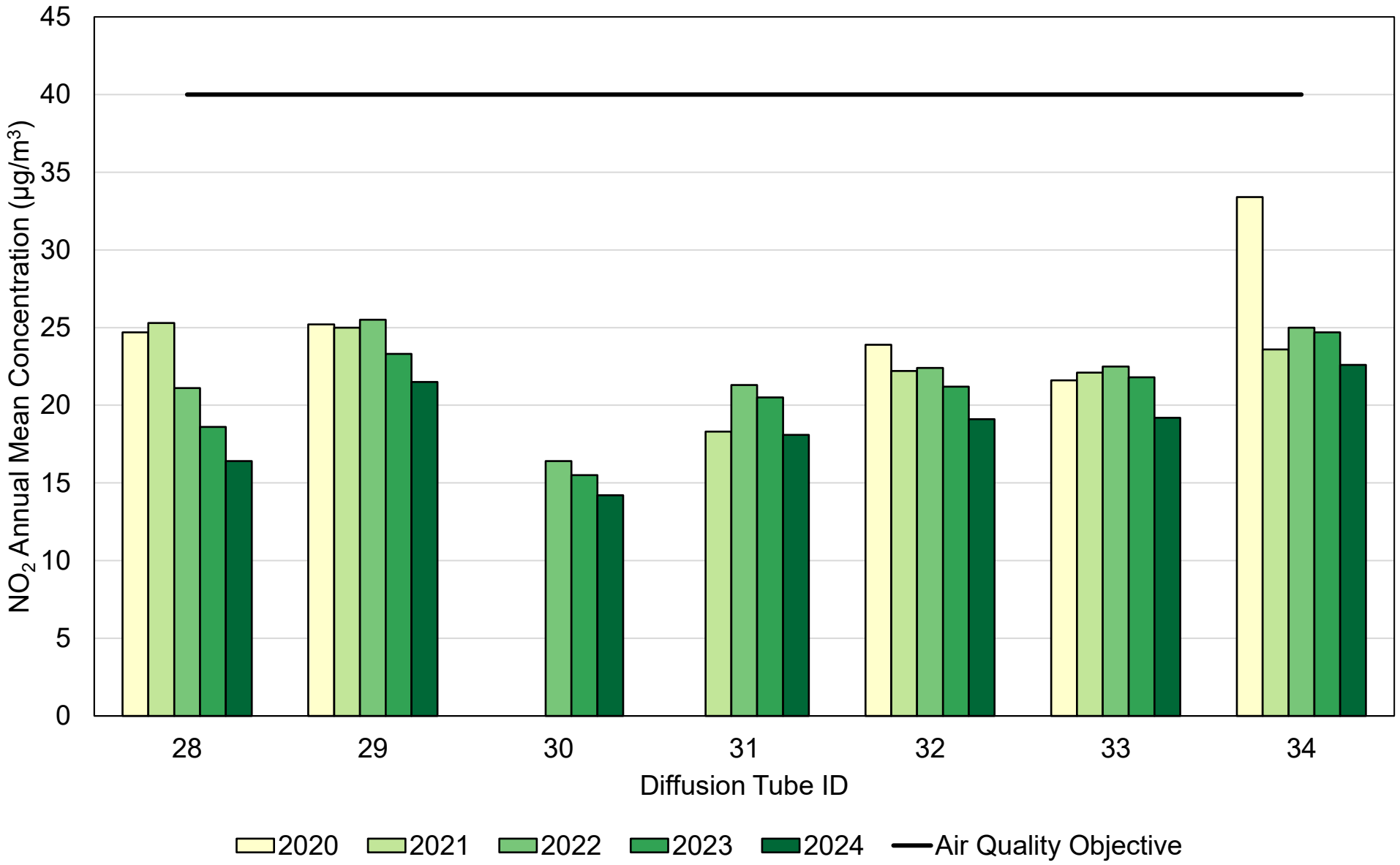


Figure A.7 – Annual Mean NO_2 Concentrations (Non-Automatic), 35 – 43

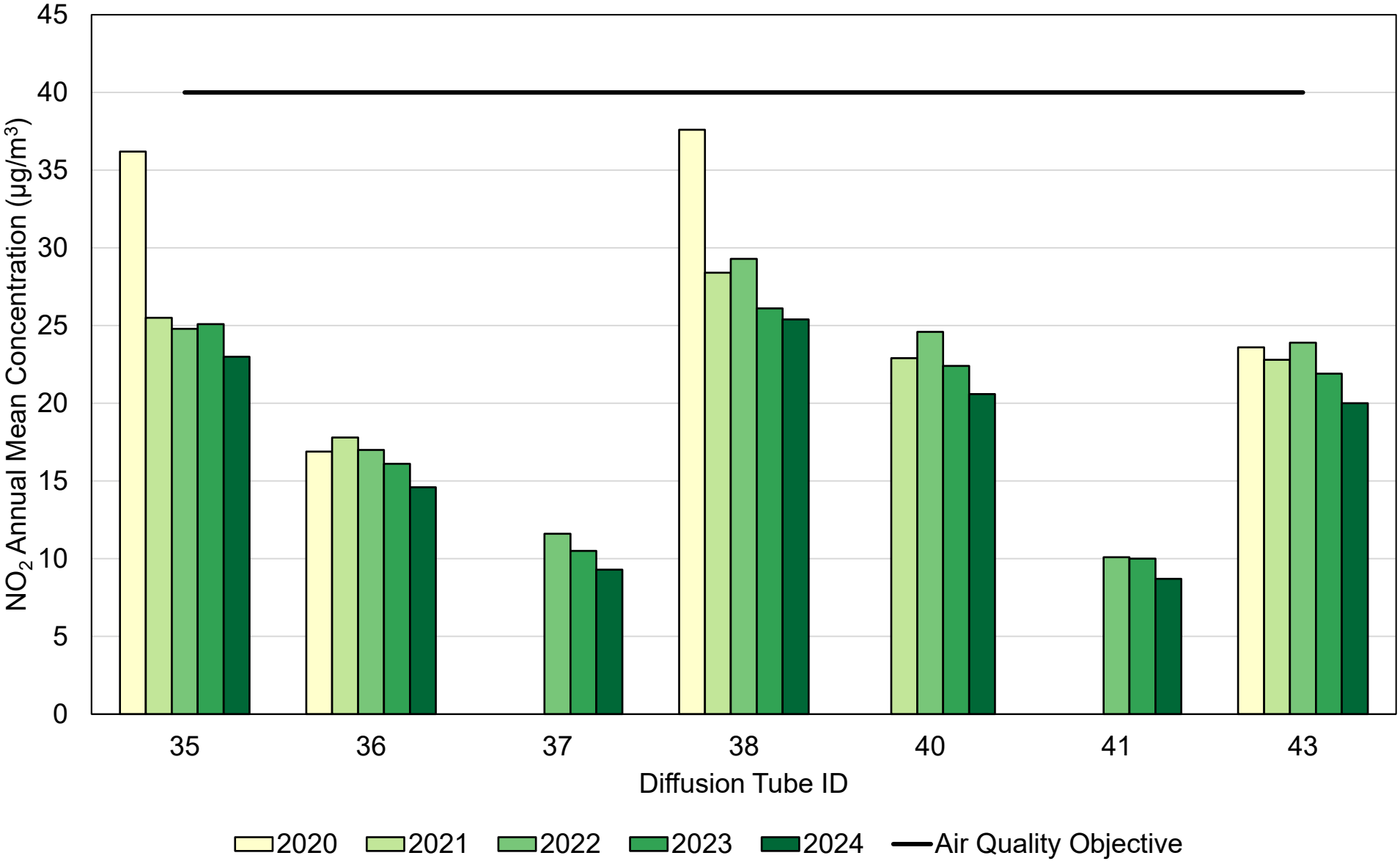


Figure A.8 – Annual Mean NO_2 Concentrations (Non-Automatic), 44 – 51

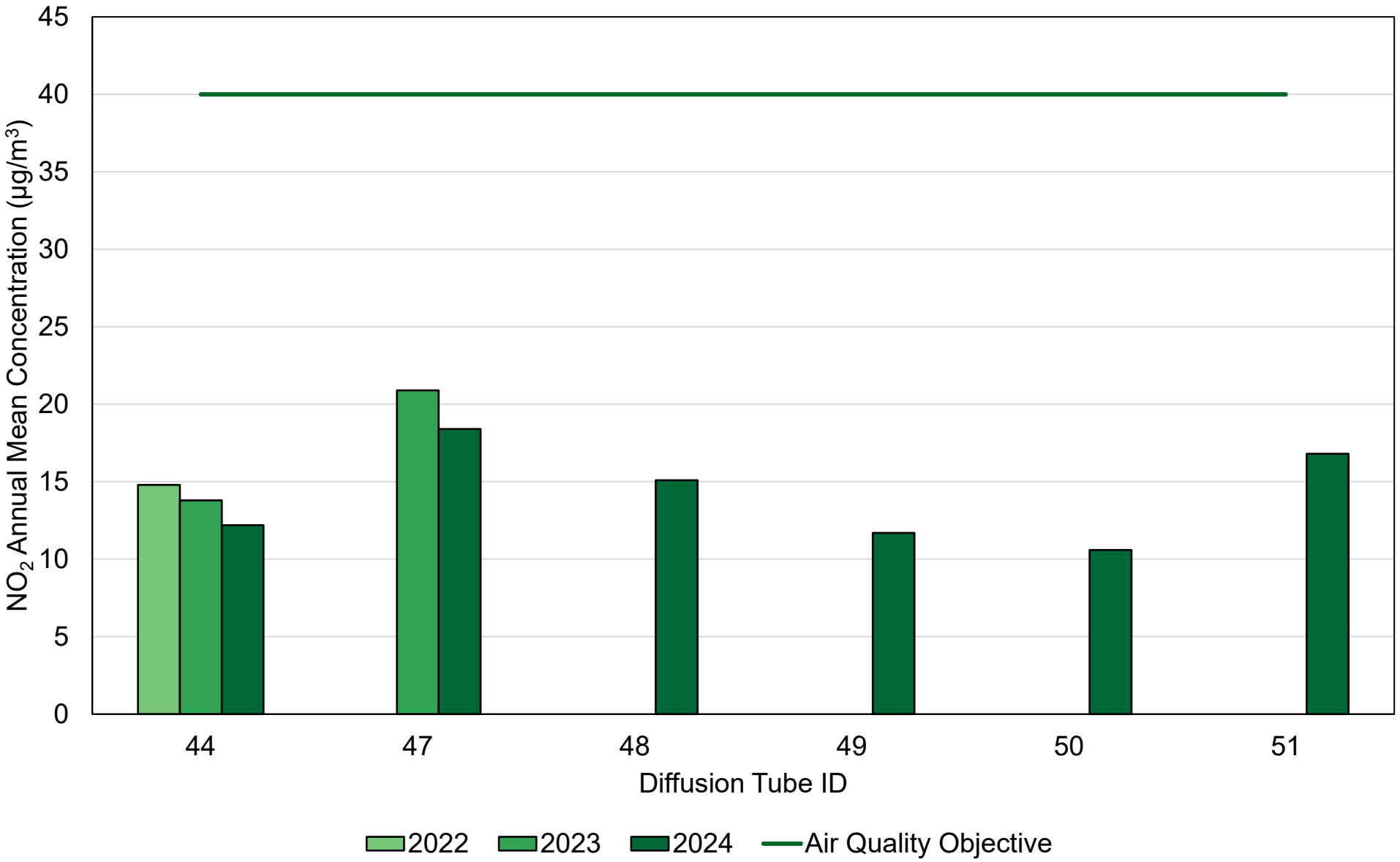


Table A.5 – 1-Hour Mean NO_2 Monitoring Results > 200 µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
CM1	394760	222878	Kerbside	95.6	95.6	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 (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 2024 (%) (2)	2020	2021	2022	2023	2024
CM2	392269	220077	Roadside	92.7	92.7	-	-	-	17.0	15.1

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

Notes:

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

Exceedances of the PM_{10} 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.

(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.9 – Annual Mean PM_{10} Concentrations (Automatic)

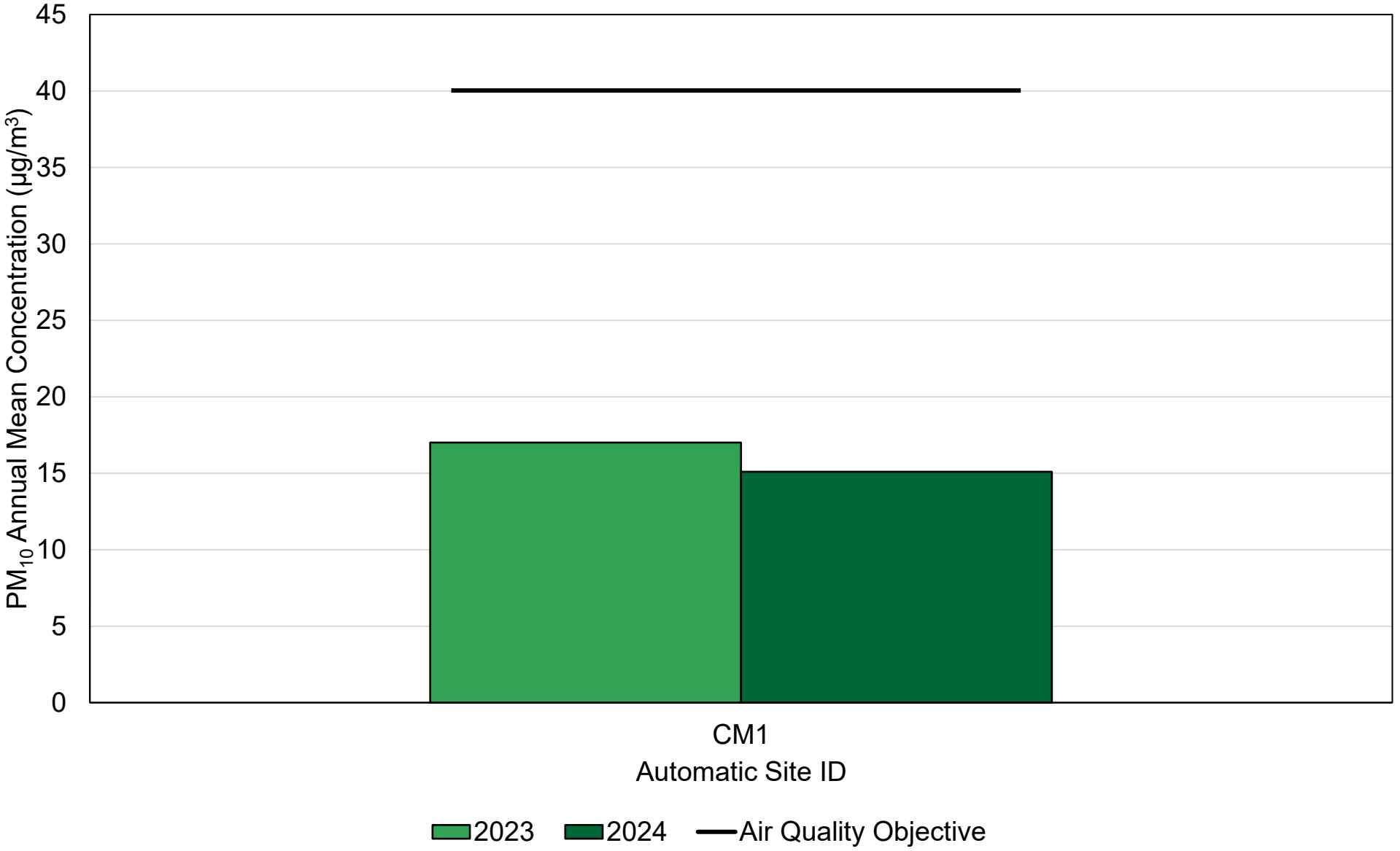


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results > 50 µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
CM2	392269	220077	Roadside	92.7	92.7	-	-	-	0	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 (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 2024 (%) (2)	2020	2021	2022	2023	2024
CM2	392269	220077	Roadside	93.4	93.4	-	-	-	9.6	8.7

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

Notes:

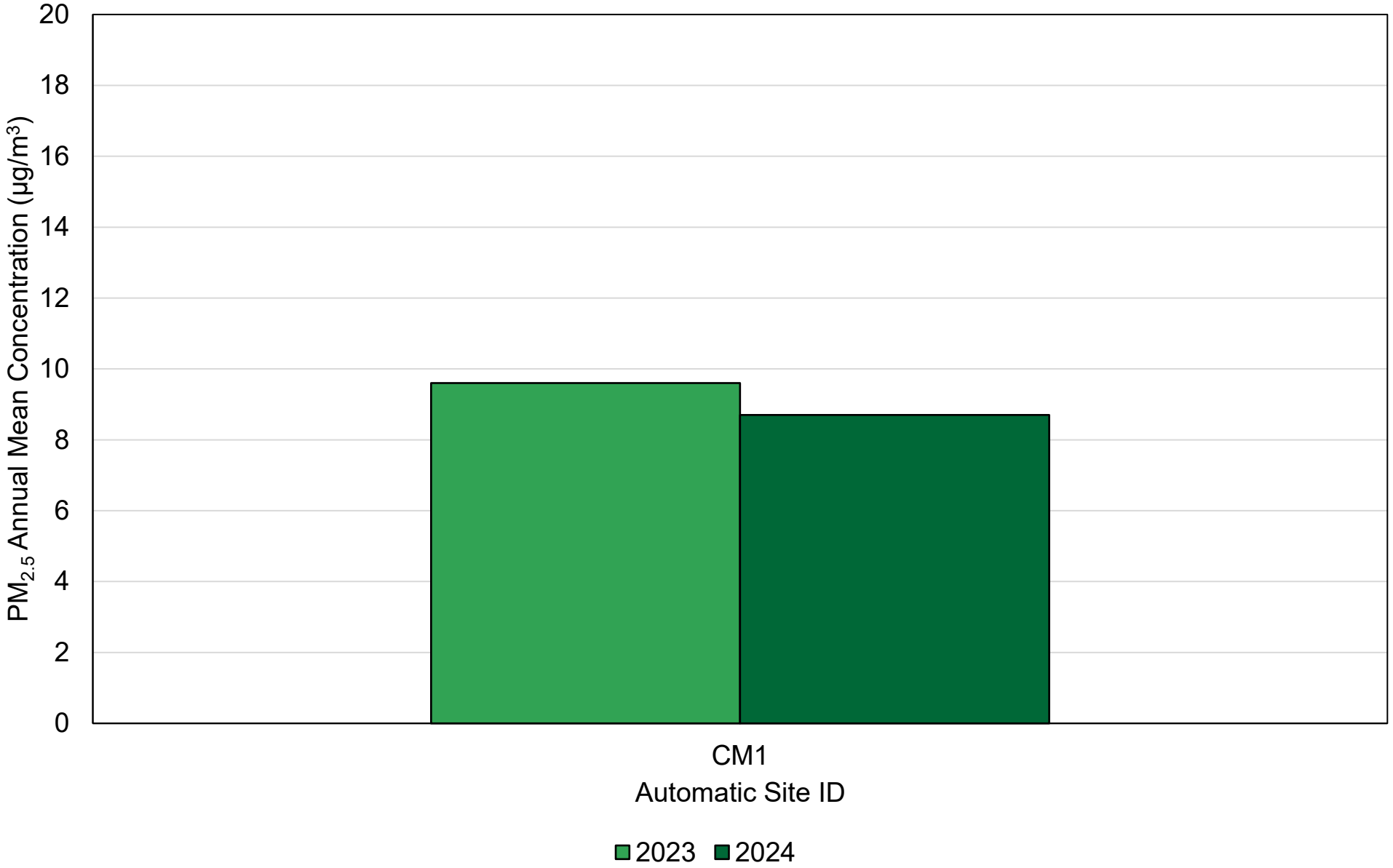
The annual mean concentrations are presented as µg/m^3.

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%).

Figure A.10 – Annual Mean $PM_{2.5}$ Concentrations (Automatic)



Appendix B: Full Monthly Diffusion Tube Results for 2024

Table B.1 – NO_2 2024 Diffusion Tube Results (µg/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 (0.91)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1	394621	222215	23.8	24.1	22.4	17.4	20.3	18.2	18.9	19.0	21.7	21.6	24.5	21.4	21.1	19.2		
2	393906	222873	28.9	31.4	24.5	21.7	23.9	21.4	21.6	21.7	25.3	24.3	34.3	27.1	25.5	23.2		
4	394235	223055	31.8	35.6	31.2	25.7	29.2	24.4	28.7	26.5	27.6	32.0	34.9	29.5	29.8	27.1		
5	394350	222923	35.5	36.0	36.9	29.7	32.0	31.8	32.2	29.9	35.6	27.5	40.2	34.2	33.4	30.4		
6	394635	222928	26.3	21.2	20.4	19.0	21.5	16.4	18.0	15.3	23.7	22.9	30.3	21.3	21.3	19.4		
7	394738	222888	32.6	34.9	33.6	25.2	29.2	28.2	28.6	28.1	28.9	30.2	31.1	29.2	30.0	27.2		
8	394760	222878	27.2	27.5	24.8	22.1	27.1	23.1	25.8	25.4	28.0	25.8	32.7	-	-	-		Triplicate Site with 8, 9 and 10 - Annual data provided for 10 only
9	394760	222878	27.4	28.2	27.6	21.4	25.9	23.3	25.9	22.5	24.5	26.6	24.6	25.1	-	-		Triplicate Site with 8, 9 and 10 - Annual data provided for 10 only
10	394760	222878	27.3	28.8	28.3	21.4	26.5	23.2	23.1	22.5	24.9	28.0	33.0	26.2	25.9	23.5		Triplicate Site with 8, 9 and 10 - Annual data provided for 10 only
11	394708	222763	26.4	24.7	20.6	17.3	19.7	15.3	16.8	16.5	21.2	21.7	31.8	22.3	21.2	19.3		
12	394830	222845	27.3	27.3	24.7	20.3	24.4	20.9	25.3	22.9	28.1	26.4	-	-	24.8	22.5		
13	394902	223004	24.3	26.0	21.0	18.6	-	17.0	18.2	17.4	22.0	21.9	30.3	24.2	21.9	19.9		
14	394980	222735	29.5	28.5	26.8	20.6	18.9	20.3	21.9	20.8	23.8	25.9	31.5	23.8	24.3	22.1		
15	395110	222670	27.2	27.2	26.9	20.4	24.6	17.8	20.1	19.4	23.9	25.9	31.7	22.3	24.0	21.8		
16	395210	222618	32.4	27.2	26.8	23.2	29.2	22.8	25.8	23.0	31.0	26.6	34.7	30.8	27.8	25.3		
17	395207	222465	27.4	21.8	18.9	16.7	19.1	16.2	17.5	15.3	22.5	21.9	27.0	20.9	20.4	18.6		
18	395340	222071	26.7	20.6	18.0	15.7	18.0	12.4	13.8	13.7	21.1	22.2	28.2	-	19.1	17.4		
19	395362	222000	33.2	26.2	25.6	23.1	27.6	22.1	23.2	21.4	27.8	26.8	33.6	25.9	26.4	24.0		
20	395300	222027	30.8	29.8	26.9	22.8	22.9	23.0	24.0	22.5	26.6	23.4	32.1	27.3	26.0	23.6		
21	395182	222183	27.5	24.1	21.7	17.7	21.1	17.1	19.3	15.8	24.3	23.8	31.0	18.8	21.9	19.9		
22	395146	222149	27.8	22.5	27.3	21.4	24.5	20.6	23.8	21.9	25.1	24.5	29.3	26.5	24.6	22.4		
23	395156	221866	25.2	21.2	18.0	16.6	17.1	14.0	15.8	15.0	16.2	19.6	22.5	18.3	18.3	16.6		
24	395037	222222	18.9	14.5	10.8	9.6	9.3	7.7	8.7	8.3	10.9	13.2	20.6	14.9	12.3	11.2		
25	394954	222511	27.6	22.8	21.4	21.6	22.3	19.1	18.6	18.3	25.5	22.3	28.1	24.5	22.7	20.6		
26	394810	222439	26.8	23.5	20.2	17.4	17.4	18.0	18.6	17.7	22.5	21.2	27.7	22.6	21.1	19.2		

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 (0.91)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
27	393081	223643	32.1	30.9	29.1	27.1	29.3	26.0	29.3	25.9	29.9	30.0	35.5	27.3	29.4	26.7		
28	392066	222540	23.7	18.0	16.9	13.9	15.7	12.4	14.9	14.2	20.5	21.4	26.0	18.7	18.0	16.4		
29	391178	221641	30.4	22.6	21.1	22.8	22.3	22.1	20.1	18.7	27.6	22.1	31.1	23.1	23.7	21.5		
30	391462	222662	22.2	17.9	14.5	12.5	13.8	10.9	11.9	10.8	15.9	15.3	24.0	17.2	15.6	14.2		
31	391507	221978	27.1	25.6	21.4	15.8	16.7	14.5	15.4	15.4	17.8	22.6	26.0	21.4	20.0	18.1		
32	391869	222084	25.6	24.8	21.0	-	20.2	14.2	17.6	17.9	18.5	23.9	26.8	-	21.0	19.1		
33	392267	222009	-	24.8	21.5	17.3	20.0	18.2	19.4	18.3	20.5	24.1	27.6	20.6	21.1	19.2		
34	393296	222170	28.9	27.1	26.7	21.7	23.4	23.4	22.3	20.1	22.8	22.3	32.3	27.0	24.8	22.6		
35	392912	221862	24.5	30.0	25.2	21.8	26.7	20.6	22.9	21.5	24.3	27.0	32.8	25.9	25.3	23.0		
36	394473	220935	23.4	18.4	14.9	12.8	14.5	11.3	11.7	10.8	15.7	16.6	24.2	18.8	16.1	14.6		
37	394492	220822	17.4	11.6	8.3	7.7	8.1	6.0	6.0	5.7	10.4	10.0	17.9	13.9	10.3	9.3		
38	395660	221670	31.6	28.8	31.3	26.3	27.0	23.3	26.3	25.1	26.7	29.7	31.6	27.5	27.9	25.4		
40	397009	223887	25.8	26.6	23.7	18.4	20.0	18.4	20.6	20.0	20.2	24.6	27.1	26.9	22.7	20.6		
41	396399	224044	14.7	12.2	9.7	6.8	6.8	5.5	5.7	6.1	8.2	10.4	17.0	12.1	9.6	8.7		
43	395394	222875	26.9	24.1	23.1	19.8	20.9	16.4	19.0	17.0	22.9	18.8	29.5	25.9	22.0	20.0		
44	394026	224231	19.7	17.5	13.1	10.2	10.0	8.8	9.6	9.4	12.0	12.9	22.3	15.8	13.4	12.2		
47	394443	223072	24.6	22.7	20.0	16.1	19.9	15.8	16.8	-	18.8	20.6	27.1	20.1	20.2	18.4		
48	395079	221696	22.4	21.2	16.8	13.4	14.3	12.0	11.9	12.2	15.9	16.8	23.4	19.1	16.6	15.1		
49	395072	221524	18.2	13.8	11.4	10.0	11.1	9.8	10.7	9.7	13.4	13.5	18.5	13.6	12.8	11.7		
50	396294	223573	16.9	13.9	10.4	8.9	8.6	8.1	8.0	8.6	10.6	11.7	18.9	16.0	11.7	10.6		
51	394034	223525	24.5	20.9	-	-	-	15.5	15.3	-	-	19.6	28.9	21.3	20.9	16.8		Low data capture due to site being situated outside a school (high potential for removal)

☒ **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 2024 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 QC/QC

New or Changed Sources Identified with Cheltenham During 2024

During 2024, Cheltenham Borough Council have identified the following development which may be a potential pollution source and have a negative impact on air quality:

- Continued development of 'Golden Valley Cyber Park (commercial development of high-tech industries) to the west of the town centre.

Additional Air Quality Works Undertaken by Cheltenham Borough Council During 2024

Cheltenham Borough Council have appointed an Air Quality Educations Project Officer to engage with schools on the subject of air quality. Primarily, this is implemented through the 'Care for our Air' project, which is a free educational initiative that aims to raise awareness of the importance of air quality and support school communities to take positive action to improving air quality. The project provides schools with the option to participate in free STEM workshops, whole-schools assemblies and national campaigns, all centred on air quality and pollution. Additionally, the project offers schools the opportunity to undertake air quality monitoring by using Zephyr monitors. From the data that is recorded, schools can receive support from the Air Quality Educations Project Officer on measures to implement to improve the level of air pollution at schools (i.e. creating a school travel plan, leading awareness campaigns, and promoting active travel).

QA/QC of Diffusion Tube Monitoring

During the 2024 monitoring year, diffusion tubes were supplied and analysed by Gradko International, using the 20% TEA in water preparation method. Gradko International are a UKAS accredited laboratory and 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 high calibre. For all AIR-PT rounds for diffusion tubes analysed during 2024, Gradko International received a score of 100% – the percentage score reflects the results deemed satisfactory based upon the z-score of ± 2.

Additionally, the precision of the NO_2 diffusion tubes (20% TEA in water) supplied by Gradko International was classified as 'good' for all 26 observations in 2024. This reflects the laboratory's performance and consistency in preparing and analysing the diffusion tubes, as well as the subsequent handling of the tubes in the field. Tube are considered to have 'good' precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more monitoring periods during the year is less than 20%. Further information on the precision results is available on the LAQM Website.

During 2024, the diffusion tube monitoring was completed in adherence with the Defra monitoring calendar, with all changeovers completed within 1 day of the specified date.

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".

Therefore, as the minimum data capture across all sites in the diffusion tube network was 58.3%, annualisation was required. This was however only for one site (Site ID: 51). The annualisation calculation was performed by using automatic monitoring data from three nearby background monitoring sites (Oxford St Ebbes, Swindon Walcott and Leominster). This is in accordance with the methodology outlined in Box 7.9 of TG(22):

"Identify two to four nearby, long-term, continuous monitoring sites, ideally those forming part of the national network. The data capture from each of these sites should be at least 85%. These sites should be background (Urban Background, Suburban or Rual) 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".

The Oxford St Ebbes, Swindon Walcott and Leominster sites are an approximate distance of 38 miles, 28 miles and 35 miles, respectively, from the site that required annualisation. All of the sites also had sufficient data capture (above 85%) to be used for annualisation. The annualisation factor of each site and the average factor is provided in Table C.1.

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

Site ID	Annualisation Factor Oxford St Ebbes	Annualisation Factor Swindon Walcott	Annualisation Factor Leominster	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
51	0.8969	0.8898	0.8703	0.8857	20.9	18.5

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2024 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 TG(22) 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 0.91 to the 2024 monitoring data. A summary of bias adjustment factors used by Cheltenham Borough Council over the past five years is presented in Table C.2. The calculation for the local bias adjustment applied to the 2024 data is presented in Table C.3. The local bias adjustment factor of 0.91 was used, as it provides a more conservative approach than using the national bias adjustment factor for Gradko 20% TEA in water tubes of 0.84.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2024	Local	-	0.91
2023	Local	-	0.89
2022	Local	-	0.94
2021	Local	-	0.89
2020	Local	-	0.89

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	11
Bias Factor A	0.91 (0.87 – 0.96)
Bias Factor B	10% (5% - 15%)
Diffusion Tube Mean (µg/m^3)	25.8
Mean CV (Precision)	4.9%
Automatic Mean (µg/m^3)	23.5
Data Capture	98%
Adjusted Tube Mean (µg/m^3)	23 (22 – 25)

Notes:

A single local bias adjustment factor has been used to bias adjust the 2024 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.

During 2024, no diffusion tube site within Cheltenham required distance correction.

QA/QC of Automatic Monitoring

The automatic monitoring stations on Swindon Road (CM1) and Gloucester Road (CM2) are operated and managed by Enviro Technology (ET). The M200E NO_x 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 has been in operation since August 2011 and is visited on a monthly basis by ET for routine calibration and download of data. The data that is recorded is ratified by Air Quality Data Management (AQDM), with concentration data provided to Cheltenham Borough Council 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 automatic monitoring station on Gloucester Road (CM2) that measures both PM_{10} and $PM_{2.5}$ has been in operation since November 2022 and is operated and managed by ET. As with the NO_x analyser on Swindon Road (CM1), the PM_{10} and $PM_{2.5}$ analyser on Gloucester Road (CM2) is visited calibrated by ET, with the data recorded ratified by AQDM. The PM_{10} concentrations may require scaling into Gravimetric Equivalent concentration units by Defra depending on the measurement technique. Therefore, as the PM_{10} analyser is a Smart Heated BAM, the concentrations have been divided by 1.035.

Automatic Monitoring Annualisation

During 2024, the two automatic monitoring stations within Cheltenham both recorded a data capture greater than 75% (CM1 – 95.6% and CM2 – 92.7%). Therefore, the 2024 data from both of these monitoring stations did not require annualisation.

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 NO_2 fall-off with distance calculator available on the LAQM Support website.

During 2024, no automatic monitoring site within Cheltenham required distance correcting.

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Map of Distribution of Monitoring Sites (Cheltenham Boundary)

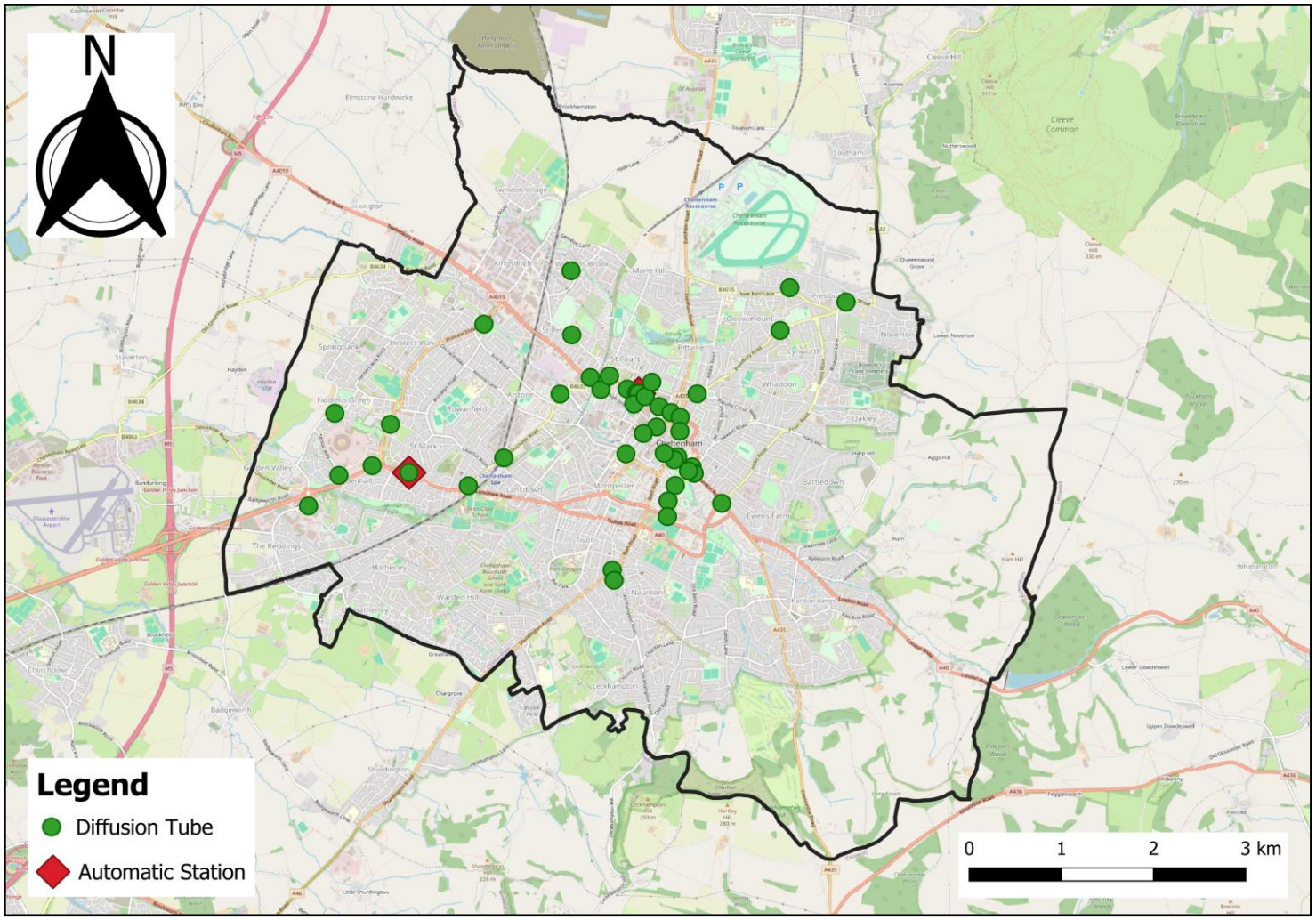


Figure D.2 – Map of Monitoring Sites (Cheltenham AQMA)

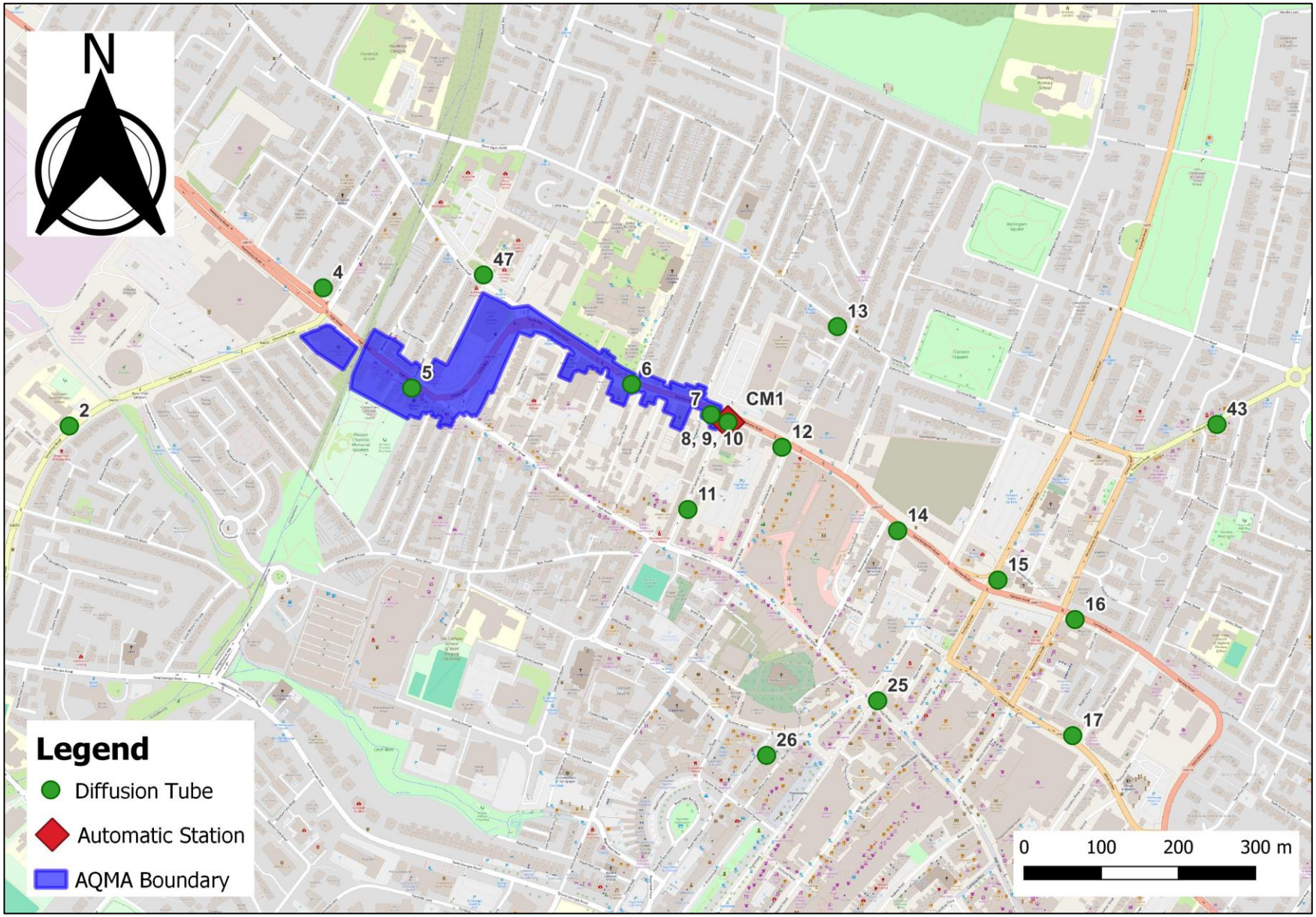


Figure D.3 – Map of Monitoring Sites (Cheltenham Centre)

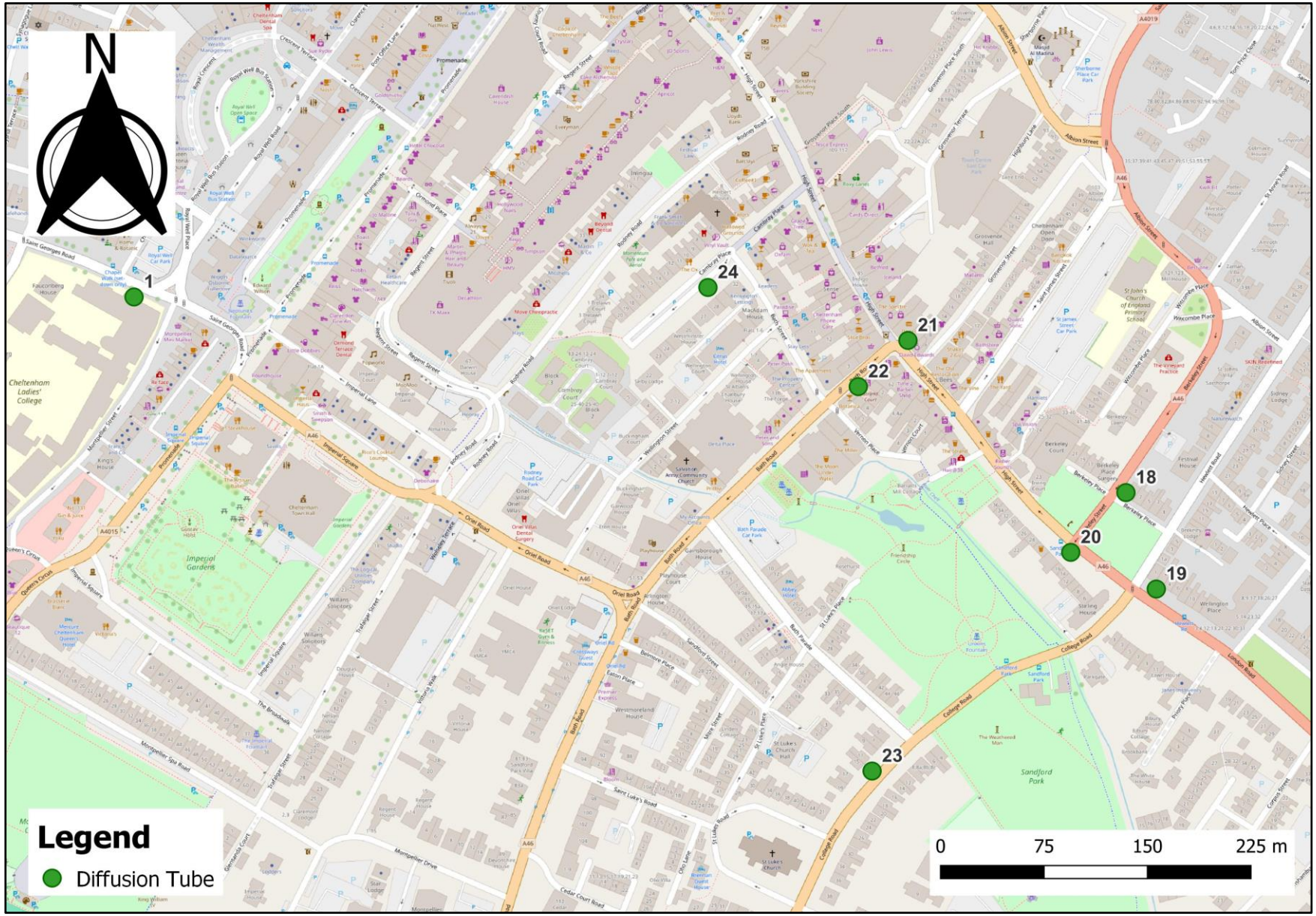


Figure D.4 – Map of Monitoring Sites (Benhall & St Marks)

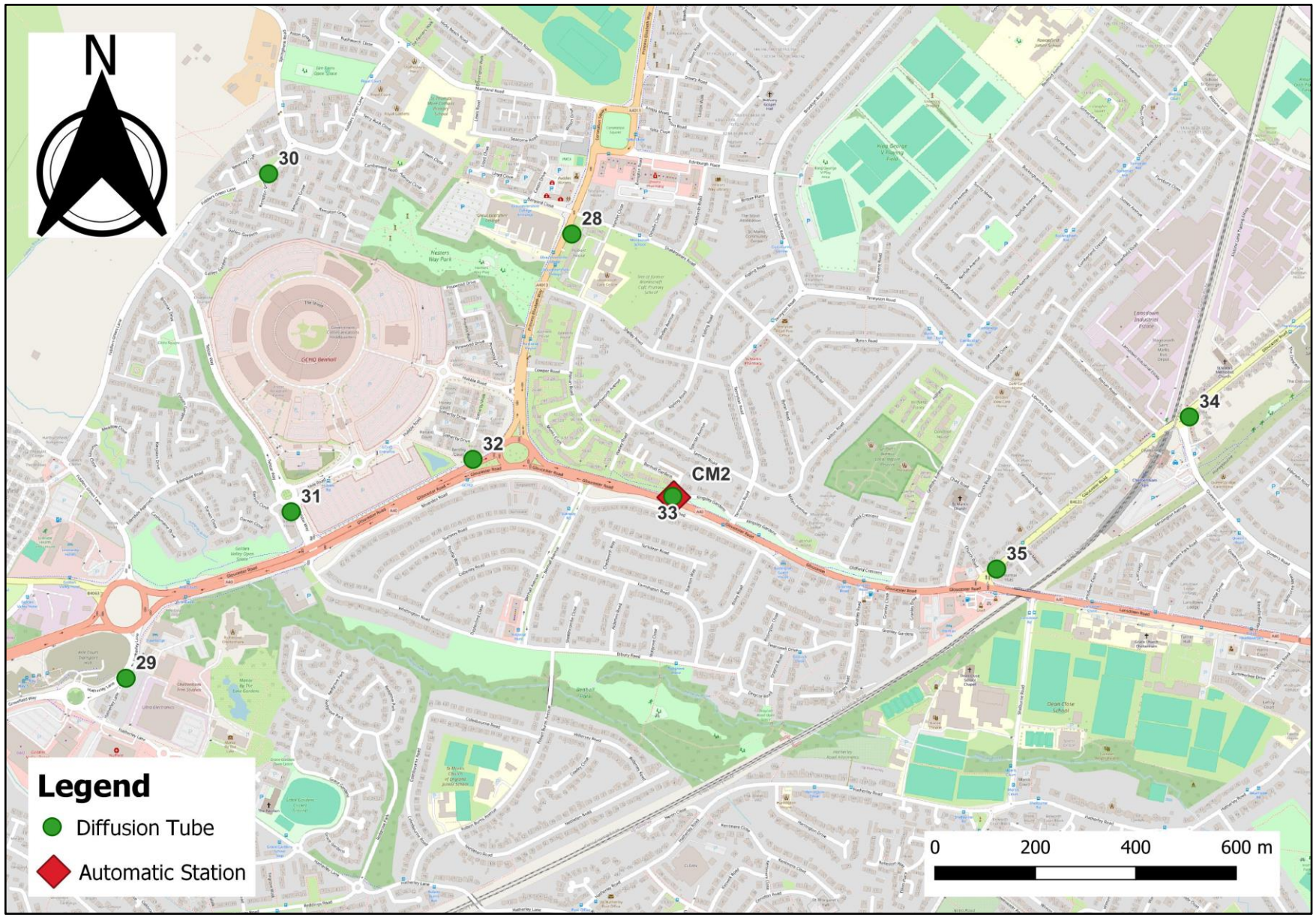


Figure D.5 – Map of Monitoring Sites (Norwood)

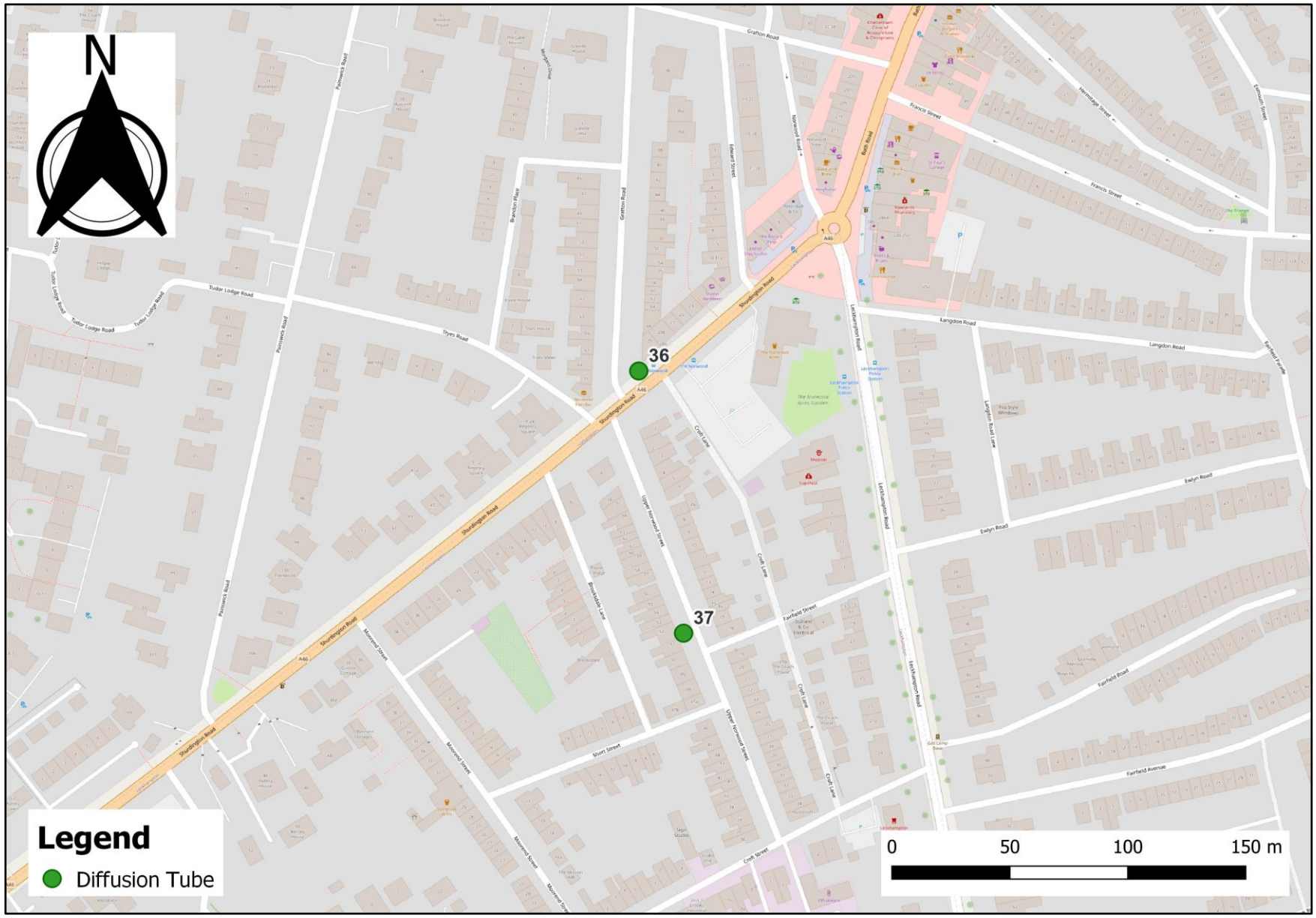


Figure D.6 – Map of Monitoring Sites (Cleevemount & Prestbury)

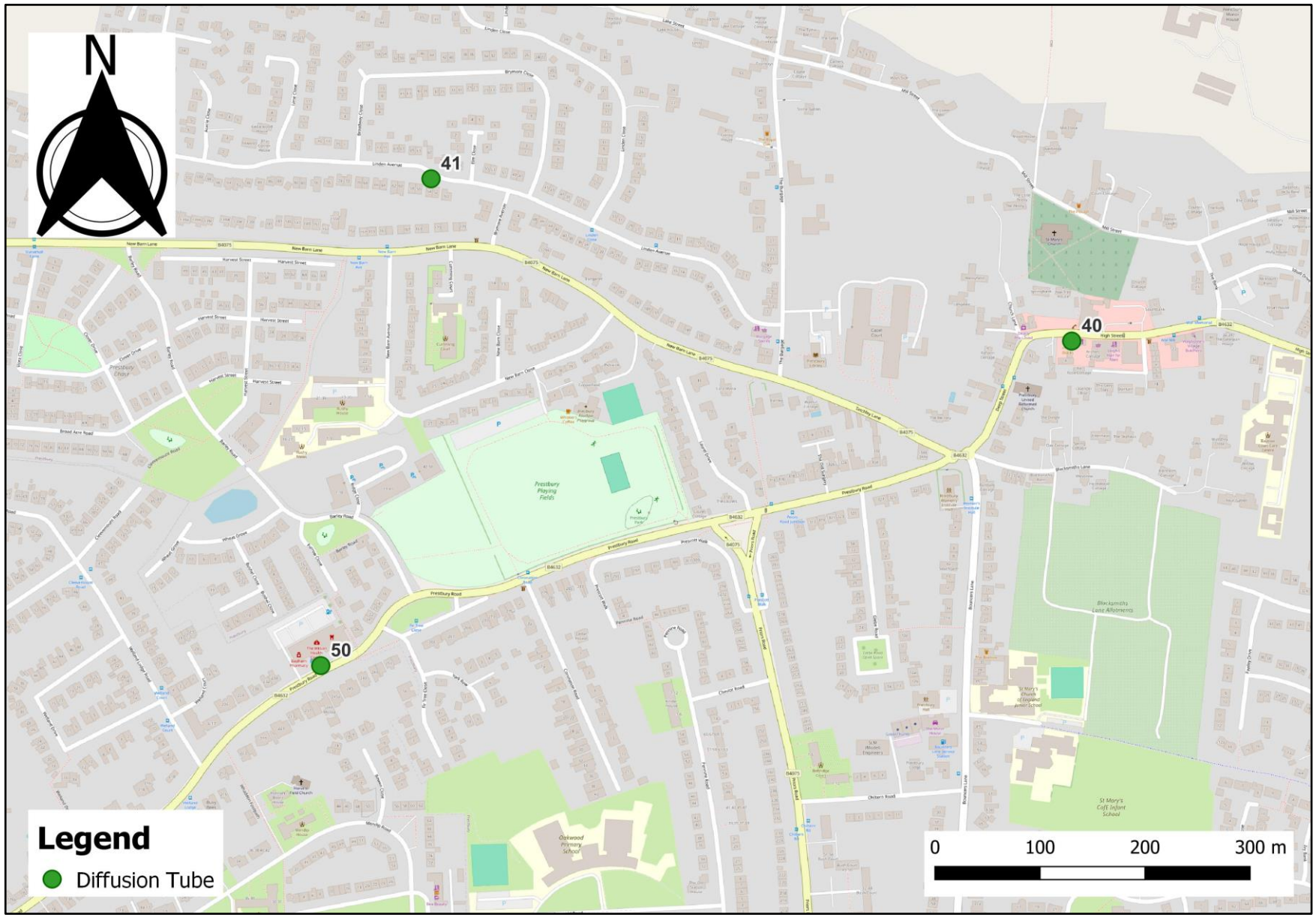
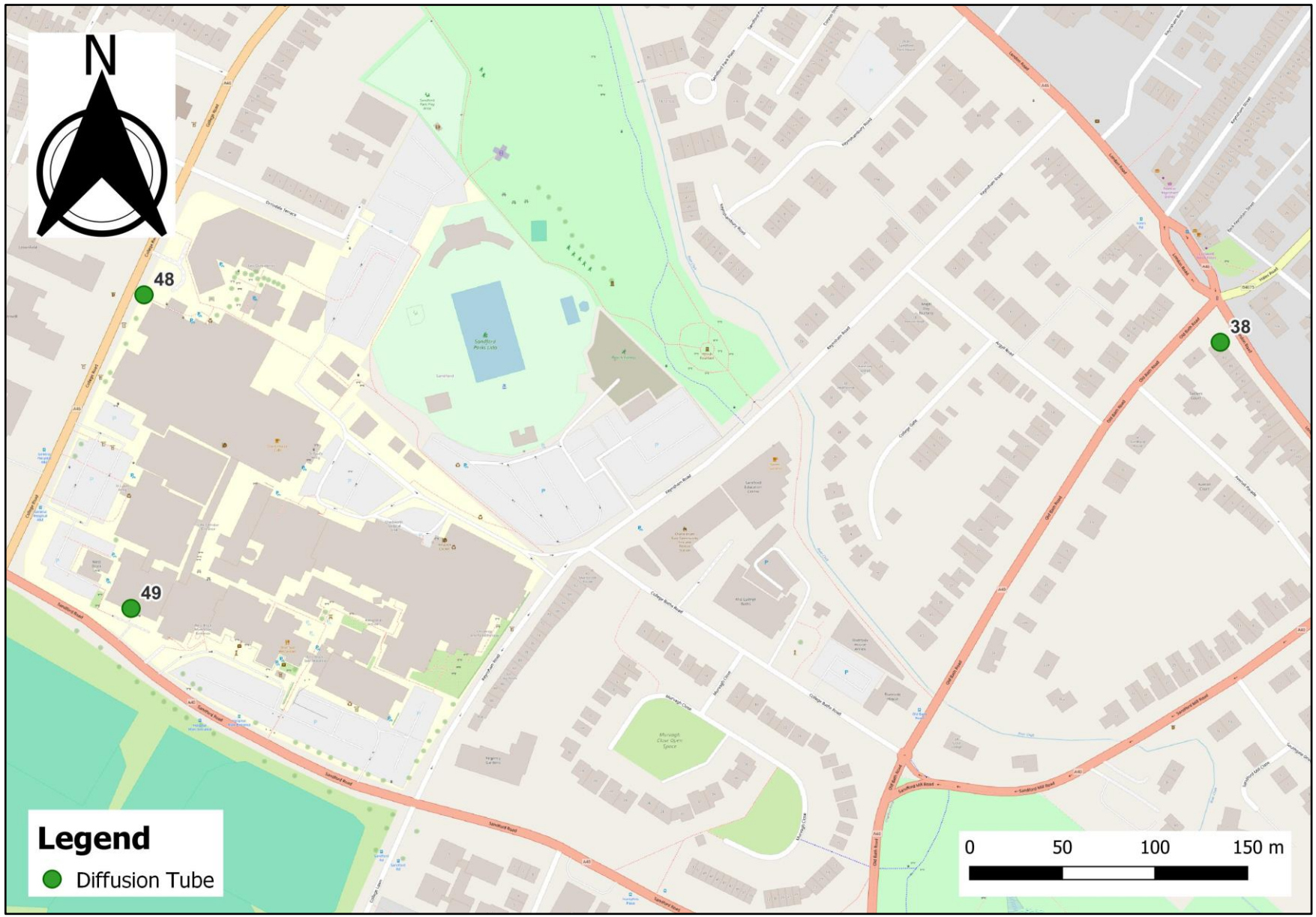


Figure D.7 – Map of Monitoring Sites (Princess Elizabeth Way, Seneca Way & Swindon Road)

Figure D.8 – Map of Monitoring Sites (Cheltenham Hospital & London Road)



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[4]

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

[4] 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
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.
- 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. June 2024.