Cheltenham Borough Council

Annual Status Report 2021

Bureau Veritas

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Document Control Sheet

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CHELTENHAM
BOROUGH COUNCIL

2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: August 2021

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Executive Summary: Air Quality in Our Area

Air Quality in Cheltenham Borough Council

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[3].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[4].

The main source of air pollution in the Borough of Cheltenham is road traffic emissions from major roads, notably the A40 – Gloucester Road, A4013 – Princess Elizabeth Way, A4019 – Tewkesbury Road, A4019 – Swindon Road, A435 – London Road, A46 – High Street, and A46 Bath Road. These roads, among others form, the main arterial highway network within Cheltenham. They carry high volumes of traffic and can tend to become congested, in particular through Cheltenham Town Centre, resulting in increased pollutant

[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

[3] Defra. Air quality appraisal: damage cost guidance, July 2020

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

concentrations. As a result, Cheltenham Borough Council has one AQMA that was declared in September 2020 (following revocation of the whole-borough AQMA) in response to a detailed assessment undertaken during 2019. The AQMA was declared for the exceedance of the Nitrogen Dioxide (NO_2) annual mean UK Air Quality Strategy (AQS) Objective of 40µg/m^3, and can be viewed online via the UK Air website.

Details of the AQMA are provided in Table 2.1 and a map of the boundary is presented in Appendix D: Map(s) of Monitoring Locations and AQMAs.

NO_2 is the principal pollutant of concern for Cheltenham Borough Council and has been monitored since 1996. During 2020, NO_2 was monitored at 35 sites across the borough, inclusive of one automatic continuous site with co-located triplicate diffusion tubes and 13 newly deployed diffusion tube locations.

During 2020, the annual mean NO_2 concentration was not greater than 60 µg/m^3 at any non-automatic (passive) monitoring site and therefore exceedance of the 1-hour mean objective at any location within the borough is considered to be unlikely. In addition, the continuous automatic NO_2 monitor located on St Georges Street did not record any exceedance of the short term NO_2 1-hour objective throughout 2020.

All 22 existing monitoring sites that had been established prior to 2020 recorded a decrease in NO_2 concentrations during 2020 in comparison to 2019. Whilst the highest concentrations continue to be observed within the declared AQMA, there were no reported exceedances of the annual mean NO_2 objective of 40 µg/m^3 at any of the monitoring locations within the AQMA during 2020. The AQMA was declared as a result of road traffic emissions and the decreased concentrations during 2020 are therefore likely to be the result of reductions in vehicle traffic due to the Covid-19 pandemic and associated lockdowns enforced by the UK Government.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

The Cheltenham Borough Council Air Quality Action Plan (AQAP) published in 2014 contains the actions that have been approved in relation to reducing NO_2 concentrations. Within Cheltenham, several initiatives have been implemented, including the installation of nine AQ Mesh Pods to monitor NOx and Particulate Matter. All measures are presented in Table 2.2.

During 2020 the Council commissioned an update to the existing AQAP. As part of this process a review of the current AQMA has been completed and stakeholder workshops have been held in order to inform new measures. The revised AQAP is now in the process of being finalised and is expected to be released for consultation later this year.

Outside of the AQAP, Gloucestershire County Council's Sustainable Transport Plan & Fund aims to achieve a modal shift to public transport, cycling & walking. The Cheltenham Transport Plan[7] aims to reduce vehicle use leading to improved air quality. The Gloucestershire County Council initiative *Thinktravel* provides information & resources for sustainable travel in the county of Gloucestershire.

In addition, from August 2020, Cheltenham Borough Council installed nine Air Quality Mesh Pods in order to monitor real-time localised NOx, PM_{10} and $PM_{2.5}$. Due to the impacts of Covid-19, the calibration of recorded data is still being finalised. However the location of the pods can be viewed on the Council's website and the monitored results for 2021 are expected to be included in next year's Annual Status Report. While these monitors are not yet accredited and so can not be used with regards to LAQM compliance

[5] Defra. Clean Air Strategy, 2019

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

[7] Cheltenham Transport Plan available at https://www.cheltenham.gov.uk/info/47/cheltenham_development_task_force/1016/cheltenham_transport_plan

reporting, it is still considered that the real time data available from them is useful for an indication as to concentrations within the borough.

The Council have been able to use data from these Mesh Pods to undertake a short-term air quality study at three schools (All Saints Academy, Bournside School and Gloucester Road Primary School) within the borough between the 12th of April and the 2nd of May 2021. The study compared pollution levels during the Easter holidays and term-time, concluding that the school traffic does not cause levels of air pollution that break the Air Quality Standards Objectives. Further detail is provided in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

Conclusions and Priorities

During 2020, no exceedances of the NO_2 annual mean objective were recorded within or outside the existing AQMA. NO_2 concentrations monitored via diffusion tubes were lower at all sites than concentrations measured at the same locations during 2019.The highest concentrations were monitored at the sites within the AQMA, which recorded exceedances of the annual mean objective over the four years prior to 2020. The currently declared AQMA will therefore remain in force and monitoring of NO_2 both in the AQMA and within the wider borough will continue.

As highlighted above, Cheltenham Borough Council are currently in the process of finalising the substantial work that has been undertaken on a revised AQAP. The updated AQAP is expected to be released for consultation later this year.

In addition, the Council will continue their trial of the Air Quality Mesh Pods until 2022, and expect to report monitored concentrations at the nine locations within next year's Annual Status Report.

Local Engagement and How to get Involved

The public can engage with Cheltenham Borough Council via their website which includes information on:

- current air quality monitoring;
- declared AQMAs;
- previous Annual Status Reports;
- smoke control areas; and

- open fires and wood burning stoves.

The *Thinktravel* website also provides further information about the sustainable travel options available across the county of Gloucestershire, such as:

- local walking maps;
- cycle routes;
- public transport journey planner
- Park & Ride facilities;
- eco driving;
- car sharing; and
- electric vehicles.

Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Cheltenham Borough Council during 2020. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by 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 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 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Cheltenham Borough Council can be found in Table 2.1. The table presents a description of the single AQMA that is currently designated within Cheltenham Borough Council. This AQMA was declared in September 2020 in response to a detailed assessment undertaken during 2019, replacing the now revoked whole-borough AQMA. The current AQMA has been declared in response to localised exceedances of the NO_2 annual mean objective north of the town centre.

Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of the AQMA and also the air quality monitoring locations located across the borough.

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	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 Swindon Road from junction of Poole Way to St Georges Street	NO	30 - 33	30 - 33	Cheltenham Air Quality Action 2014 Plan (under revision)	https://www.cheltenham.gov.uk/download/downloads/id/3780/air_quality_action_plan_2014.pdf

☒ **Cheltenham Borough Council confirm the information on UK-Air regarding their AQMA is up to date. The declaration order came into effect in September 2020. This has been submitted to the LAQM Portal Admin and is waiting to be reflected on UK-Air.**

☒ **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 Borough Council

The Council are awaiting Defra's appraisal of last year's ASR. Appraisal comments were not available at the time of writing due to delays in the submission process.

Cheltenham Borough Council has taken forward a number of direct measures during the current reporting year of 2020 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

Seventeen 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 2020 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 2014 Action Plan.

During 2020 the installation of nine AQ Mesh Pods was completed to monitor NOx and Particulate Matter. Furthermore, in relation to the cycle network, the construction phase of the B4063 Gloucester to Cheltenham Cycleway scheme[8] is planned for the coming year. Further information on this new route can be found in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC The measures in Table 2.2 have helped to contribute towards compliance, as demonstrated by the revocation of the whole-borough AQMA and declaration of the more localised AQMA in September 2020; however, Cheltenham Borough Council anticipates that further additional measures will be required in subsequent years to achieve compliance north of the town centre and enable the revocation of this AQMA. A revised set of targeted measures will be set out in the revised AQAP, which is currently being finalised and is expected to be released for consultation later this year.

[8] B4063 Gloucester to Cheltenham Cycle Improvements Scheme available at https://www.gloucestershire.gov.uk/highways/major-projects-list/b4063-gloucester-to-cheltenham-cycle-improvements-scheme/

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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 and Local Sustainable Transport Fund	GCC	TBC by GCC	TBC by GCC	TBC by GCC	TBC by GCC	1-2%	Reduction in through traffic and improved access to car parks. Reduced congestion at key junctions	A range of highway amendments have taken place and others are planned, subject to traffic regulation orders. To take place in 4 phases.	Phase 3 completed in Autumn 2017. 2-way junction priority changes at Albion Street and Imperial Square allowing traffic easier access to town centre car parks was completed in 2017.
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	0.005	Bus fleet data	Initial funding bid to Government failed but received positive response.	The main bus fleet company in Cheltenham and Gloucester has the most modern fleet in any area of the UK. Many buses are 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 & out of Cheltenham	Improved signage installed at Arle Court. 22 new spaces added to Arle Court Park and Ride.	The Park and Ride at Arle Court has plans to be completely redesigned and redeveloped. The design process is underway and expected construction is to begin early 2022.
4	Promotion of Greener Vehicles	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	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	Electric charging points (fast) are installed at Regent Arcade, Montpellier Street and Arle Court Park and Ride site. Rapid chargers are installed at Cheltenham Chase Hotel (Brockworth) and Compass Holidays (Cheltenham Railway Station). Promenade charging has not been installed to date.	The Borough and County Councils continue to encourage electric vehicle use 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 on street and in car parks. The Borough currently provide free EV charging at its car park charging points.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
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 working group 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 the current national guidelines and prioritise them based on available evidence, including 20mph 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	0.001	Traffic count data	A new website has been launched with promotional work taking place at businesses and on street across Cheltenham via flyers and face to face discussions. New road signage is installed.	'Parish Lift', a new community car sharing scheme was developed in 2016 to help support social inclusivity and rural accessibility across the Cotswolds Area of Outstanding Natural Beauty (AONB). The scheme compliments 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 or 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	Up to date Air Quality information available on CBC website	Emission reductions directly attributable to this action cannot be measured.
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	TBC by GCC	<0.1%	Uptake of grants	Grants completed in 2015	In 2016/17, 132 businesses, representing 2,205 staff, were contacted in the Cheltenham parking zones 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.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
9	Wayfinding Initiative	Promoting Travel Alternatives	Promotion of cycling Promotion of walking	2014-15	2017	Gloucestershire County Council	GCC	TBC by GCC	TBC by GCC	TBC by GCC	TBC by GCC	<0.1%	None	Signage installed	Work is ongoing to improve signage and route access for cyclists and pedestrians Phase 2 was completed in 2017.
10	Promote 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	No plan to date	Cheltenham Borough Council is about to introduce a Cycle to Work Scheme and is developing pool car and car sharing projects. 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	Planning for Air Quality - a good practice guide for Planners and Developers was published in 2013. The Joint Core Strategy contains policies that require consideration of air quality in planning.	Although no specific policy on Air Quality will be adopted as part of the emerging Cheltenham Local Plan (due 2017-2018), 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 where necessary.
12	Traffic Light Appraisal	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	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	Under the Cheltenham Transport Plan 2 sets of traffic lights have been removed. No further removals planned. Upgrades to traffic lights to MOVA system is ongoing. (see comments)	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.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
13	Bus and Taxi quality partnership	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2016-16	2018 and ongoing	Gloucestershire County Council	GCC	TBC by GCC	TBC by GCC	TBC by GCC	TBC by GCC	Unknown	Anecdotal	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 Council's AQAP proposed a Bus and Taxi Quality Partnership, to obtain an agreement with the main taxi and bus operators to encourage fuel efficient driving, no-idling when stationary and training in safe driving practices – with the aim of reducing vehicle emissions. 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	Greening of parts of Cheltenham High Street is due as part of improvements to the public realm during 2018/19.	Green Planting - CBC delivering the Habitat Cheltenham biodiversity projects

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
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	Air Quality Grant Scheme bid submitted in 2016 but was unsuccessful. Further bids will be looked at.	Through the Cheltenham Transport Plan and the CBC Car Parking Strategy the Borough Council will work with the County Council on the implementation of Vehicle Management Signage. This proposal is for the installation of electronically operated signs to inform drivers of the nearest available car parking spaces and alert drivers of possible congestion. This may encourage more sustainable transport choices and reduce traffic queues which will improve air quality
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 and accident & injury statistics	See comments	Barriers to Cycling' project completed Autumn 2017 with installation of contraflow cycle lane on Sandford Mill Road
17	Installation of AQ mesh pods	Monitoring	Other	2020	Ongoing	Cheltenham Borough Council	CBC	NO	Funded	£10k - 50k	Completed	n/a	Monitoring of $PM_{2.5}$ and NO_x at 9 sites within the borough which will lead to greater understanding of distribution of pollutants allowing for more effective and targeted measures.	Monitors installed during 2020. Locations and calibration of recorded data being finalised.	Dependant on lockdown measures.

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

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Efforts within the borough are being concentrated on monitoring NO_2 levels, with a particular focus on the established AQMA. As primary emissions of both NO_2 and particulates predominately originate from the same source, measures implemented to reduce NO_2 levels within Cheltenham will also reduce levels of PM_{10} and $PM_{2.5}$.

During August 2020, Cheltenham Borough Council installed nine Air Quality Mesh Pods in order to monitor real-time localised NOx, PM_{10} and $PM_{2.5}$. Due to the impacts of Covid-19, the calibration of recorded data is still being finalised, however the current locations of the pods can be viewed on the Council's website. The monitored results for 2021 are expected to be included in next year's Annual Status Report to provide indicative localised levels of these pollutants.

The current Defra 2020 background maps[9] for Cheltenham (2018 based) show that all background concentrations of $PM_{2.5}$ are far below the 2020 annual mean AQS objective of 25 µg/m^3. The highest concentration is predicted to be 9.9 µg/m^3 within the 1 x 1km grid square with the centroid grid reference of 395500, 222500. This grid square encompasses the north-east of Cheltenham city centre including part of the A46 key arterial route, where the PM secondary fraction (formed from gaseous pollutants), constitutes as the key contributor to $PM_{2.5}$.

The Public Health Outcomes Framework data tool compiled by Public Health England quantifies the mortality burden of $PM_{2.5}$ within England on a county and local authority scale. The 2018 fraction of mortality attributable to $PM_{2.5}$ pollution in Cheltenham is 5.2%, which is the same as the national average of 5.2%, but higher than the regional average (South West) 4.4%.

[9] Defra Background Mapping Data (2018 based) available at https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

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

This section sets out the monitoring undertaken within 2020 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 2016 and 2020 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 one site during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. Automatic monitoring results for Cheltenham Borough Council are available through the Council's website.

Maps showing the location of the monitoring site are provided in . Further details on how the monitor is calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Since 2019, Cheltenham Borough Council increased their non- automatic (i.e. passive) monitoring of NO_2 from 27 sites to 35 sites during 2020, inclusive of one triplicate co-location site. 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: Map(s) of Monitoring Locations and AQMAs as well as the interactive map on Cheltenham Borough Council's website. 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 concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

Table A. 3 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. The annual mean NO_2 concentration was not greater than 60 µg/m^3 at any non-automatic monitoring site during 2020. Therefore, exceedance of the 1-hour mean objective at any monitoring location within Cheltenham is considered to be unlikely. Furthermore, the continuous NO_2 monitor reported no exceedance of the short term NO_2 1-hour objective throughout 2020, or since 2015.

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Appendix B: Full Monthly Diffusion Tube Results for 2020 includes distance corrected values, only where relevant.

Data capture for one diffusion tube site (site 10) was below 75%, therefore annualisation (short-term to long-term adjustment) has been completed in line with LAQM.TG(16) using data from background automatic monitoring stations within 50 miles of the diffusion tube location.

The NO_2 results for 2020 have been bias adjusted using a local bias adjustment factor of 0.89. Full details of the bias adjustment and QA/QC monitoring procedures are provided in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

The analysis of the 2020 monitoring data is completed below in relation to the designated AQMA within Cheltenham Borough Council and monitoring across the wider borough.

Cheltenham Borough Council AQMA 2020

Monitored concentrations are presented in Table A. 4 and Figure A. 1. The concentrations in the Figure are compared against the annual mean objective value for NO_2.

There are three diffusion tube locations within the Cheltenham Borough Council AQMA, all with sufficient data capture during 2020 that annualisation was not required.

During 2020 sites 4, 5 and 6 monitored concentrations below the annual mean objective (32.3 µg/m^3, 32.9 µg/m^3 and 30.3 µg/m^3, respectively) however; as concentrations at these three sites have been in exceedance, or within 10 %, of the annual mean objective of 40 µg/m^3 for the four years prior to 2020 (43.1 µg/m^3, 46.5 µg/m^3 and 40.3 µg/m^3 in 2019, respectively) the AQMA is to remain in force.

Outside of the existing AQMA

Monitored concentrations are presented in Table A.4, Figure A. 2 and Figure A. 3. The concentrations in the Figures are compared against the annual mean objective value for NO_2.

There are 32 diffusion tube monitoring sites located outside of the existing AQMA, 14 of which have been monitoring for at least 5 years. Outside of the existing AQMA, NO_2 concentrations during 2020 are compliant and no site has recorded an exceedance of the NO_2 annual mean objective over the past 5 years.

In terms of data processing, site 10 had a data capture of less than 75 % and therefore data for this site was annualised.

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	St Georges Street	Kerbside	394760	222878	NO_2	YES	Chemiluminescent	0	2.4	1.3

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)
3	Ladies College	Roadside	394621	222215	NO_2	No	0.0	5.7	No	2.9
4	2 Gloucester Road	Roadside	394237	223006	NO_2	Yes	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	New Rutland Court	Roadside	394738	222888	NO_2	Yes	0.0	1.9	No	2.9
7, 8, 9	Co-location	Roadside	394760	222878	NO_2	No	1.0	2.4	Yes	1.3
10	2 Swindon Road	Kerbside	394830	222845	NO_2	No	1.0	2.1	No	2.9
11	Portland Street	Roadside	395110	222670	NO_2	No	1.0	1.6	No	3.1
12	Winchcombe St./Fairview	Roadside	395210	222618	NO_2	No	1.0	3.2	No	3.1
13	54 Albion Street	Kerbside	395207	222465	NO_2	No	2.0	1.2	No	2.8
14	2 London Road	Roadside	395362	222000	NO_2	No	1.0	3.0	No	2.9
15	YMCA - High St	Roadside	395182	222183	NO_2	No	5.0	1.9	No	3.0
16	8a Bath Road	Roadside	395146	222149	NO_2	No	0.0	2.0	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)
18	81 London Road	Roadside	395660	221670	NO_2	No	0.0	4.7	No	2.7
19	264 Gloucester Road	Roadside	393296	222170	NO_2	No	0.0	0.8	No	2.5
20	340 Gloucester Road	Roadside	392912	221862	NO_2	No	0.0	3.6	No	2.8
22	Hatherley Lane	Roadside	391178	221641	NO_2	No	0.0	3.7	No	2.8
25	50 St Georges Street	Roadside	394708	222763	NO_2	No	2.3	0.4	No	3.0
26	22 St Pauls Road	Roadside	394902	223004	NO_2	No	1.5	1.1	No	2.9
27	St Lukes College Road	Roadside	395156	221866	NO_2	No	2.3	0.6	No	2.9
28	Princess Elizabeth Way North	Roadside	393081	223643	NO_2	No	1.0	1.2	No	2.9
29	Princess Elizabeth Way South	Roadside	392066	222540	NO_2	No	9.5	1.3	No	2.8
30	Clarence Parade Alternative	Roadside	394810	222439	NO_2	No	1.0	0.4	No	2.8
31	Gloucester Rd School	Kerbside	393906	222873	NO_2	No	12.5	0.3	No	2.9
32	Gloucester Rd / Stoneville St	Roadside	394180	222982	NO_2	No	1.6	1.9	No	2.9
33	48 Swindon Road	Roadside	394635	222928	NO_2	No	2.0	2.2	No	3.3

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)
34	Elvis Villas	Roadside	394980	222735	NO_2	No	0	2.2	No	2.9
35	Berkeley Place	Roadside	395340	222071	NO_2	No	2.8	1.9	No	3.2
36	Sandford Park Alehouse	Roadside	395300	222027	NO_2	No	6.5	1.9	No	3.4
37	A40 PE Way Roundabout	Roadside	391869	222084	NO_2	No	19.3	6.0	No	2.9
38	Gloucester Rd (Benhall)	Roadside	392267	222009	NO_2	No	22.0	4.0	No	2.0
39	Norwood / Gratton Rd	Roadside	394473	220935	NO_2	No	5.8	1.5	No	3.0
40	Opp. Wokswagon London Rd	Roadside	395862	221424	NO_2	No	8.4	2.2	No	2.8
41	170 Prestbury Rd	Roadside	395980	223322	NO_2	No	1.3	1.7	No	2.9
42	Prestbury Rd / Portland Square	Kerbside	395394	222875	NO_2	No	2.7	0.8	No	2.8
43	Boots Corner	Urban Centre	394954	222511	NO_2	No	2.1	3.3	No	2.8

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 2020 (%) (2)	2016	2017	2018	2019	2020
CM1	394760	222878	Kerbside	99	99	34.0	36.0	32.7	36.0	24.7

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Reported concentrations are those at the location of the monitoring site (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**.

All means have been "annualised" as per LAQM.TG16 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%).

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 2020 (%) (2)	2016	2017	2018	2019	2020
3	394621	222215	Roadside	100	100	33.8	32.8	27.5	29.6	20.8
4	394237	223006	Roadside	100.0	100	**43.2**	**45.4**	**41.2**	**43.1**	32.3
5	394350	222923	Roadside	76.9	76.9	**45.5**	**49.9**	**45.2**	**46.5**	32.9
6	394738	222888	Roadside	100.0	100	**40.8**	**41.6**	37.9	**40.3**	30.3
7, 8, 9	394760	222878	Roadside	100.0	100	33.3	36.4	32.9	35.1	24.8
10	394830	222845	Kerbside	57.7	57.7	38.2	39.4	35.6	39.2	26.6
11	395110	222670	Roadside	100.0	100	35.7	35.9	32.6	34.1	24.1
12	395210	222618	Roadside	92.3	92.3	32.2	32.8	31.8	34.4	24.5
13	395207	222465	Kerbside	100	100	-	34.8	31.3	30.4	22.3
14	395362	222000	Roadside	100	100	38.0	37.1	37.4	37.4	27.5
15	395182	222183	Roadside	100	100	32.9	31.9	29.1	28.5	20.3
16	395146	222149	Roadside	100	100	38.4	38.0	34.5	34.4	25.1
18	395660	221670	Roadside	100	100	39.6	38.4	37.3	37.6	28.4

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 2020 (%) [2]	2016	2017	2018	2019	2020
19	393296	222170	Roadside	100	100	32.2	34.4	30.6	33.4	23.6
20	392912	221862	Roadside	100	100	35.9	38.6	35.3	36.2	25.5
22	391178	221641	Roadside	100	100	-	-	34.9	33.4	25.2
25	394708	222763	Roadside	100	100	-	-	31.9	31.6	21.5
26	394902	223004	Roadside	100	100	-	-	29.0	31.3	22.7
27	395156	221866	Roadside	84.6	84.6	-	-	24.8	27.6	17.7
28	393081	223643	Roadside	100	100	-	-	38.4	38.2	31.2
29	392066	222540	Roadside	100	100	-	-	31.2	33.7	24.7
30	394810	222439	Roadside	100	100	-	-	-	31.6	22.1
31	393906	222873	Kerbside	100	100	-	-	-	-	24.3
32	394180	222982	Roadside	76.9	76.9	-	-	-	-	25.3
33	394635	222928	Roadside	100	100	-	-	-	-	21.5
34	394980	222735	Roadside	90.4	90.4	-	-	-	-	24.5
35	395340	222071	Roadside	100	100	-	-	-	-	19.1

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 2020 (%) (2)	2016	2017	2018	2019	2020
36	395300	222027	Roadside	100	100	-	-	-	-	27.7
37	391869	222084	Roadside	100	100	-	-	-	-	23.9
38	392267	222009	Roadside	84.6	84.6	-	-	-	-	21.6
39	394473	220935	Roadside	90.4	90.4	-	-	-	-	16.9
40	395862	221424	Roadside	84.6	84.6	-	-	-	-	21.7
41	395980	223322	Roadside	90.4	90.4	-	-	-	-	14.8
42	395394	222875	Kerbside	100	100	-	-	-	-	23.6
43	394954	222511	Urban Centre	100	100	-	-	-	-	20.3

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **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.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A. 1 – Trends in Annual Mean NO_2 Concentrations within AQMA

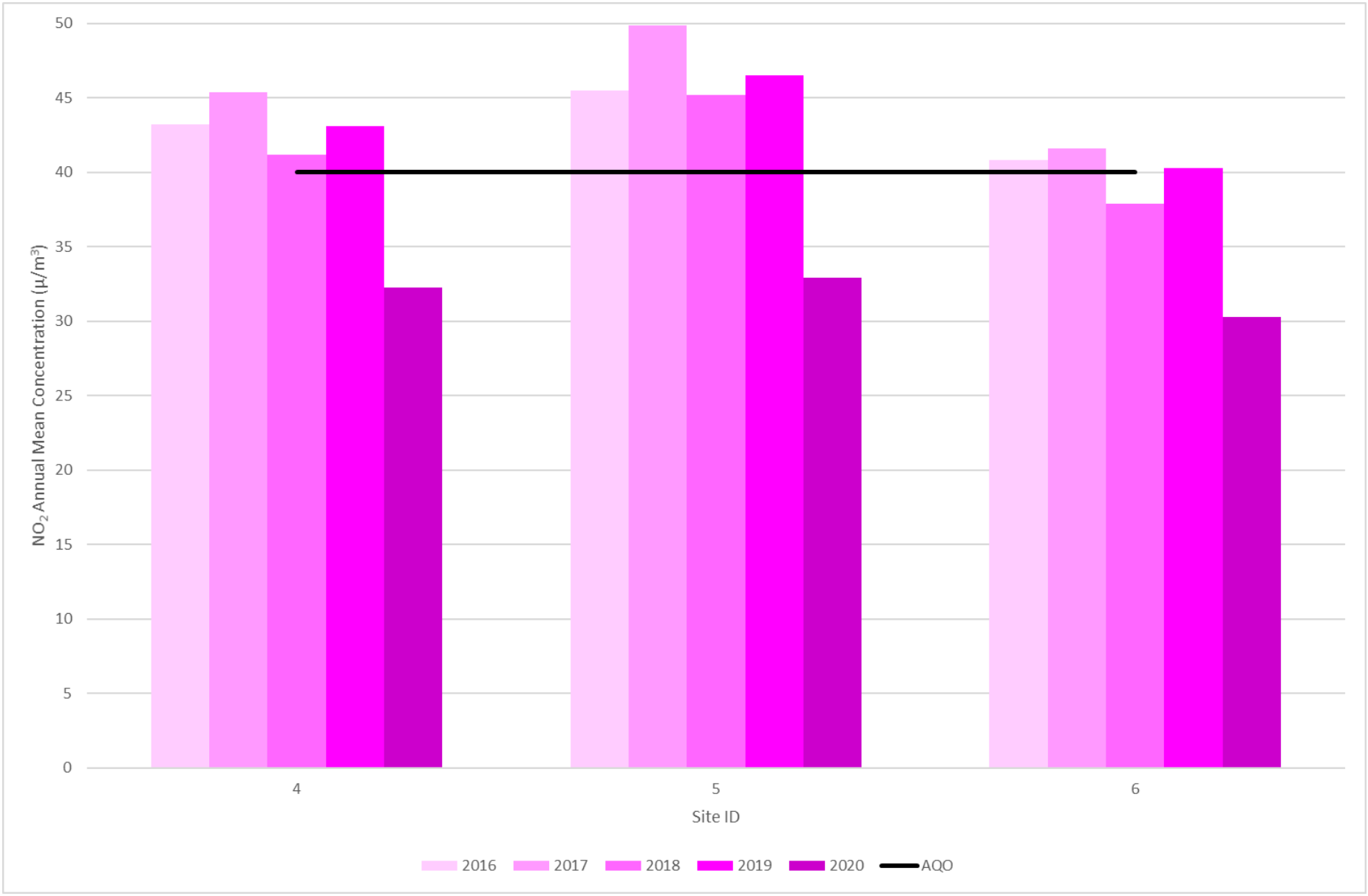


Figure A. 2 - Trends in Annual Mean NO_2 Concentrations: Sites CM1 - 25

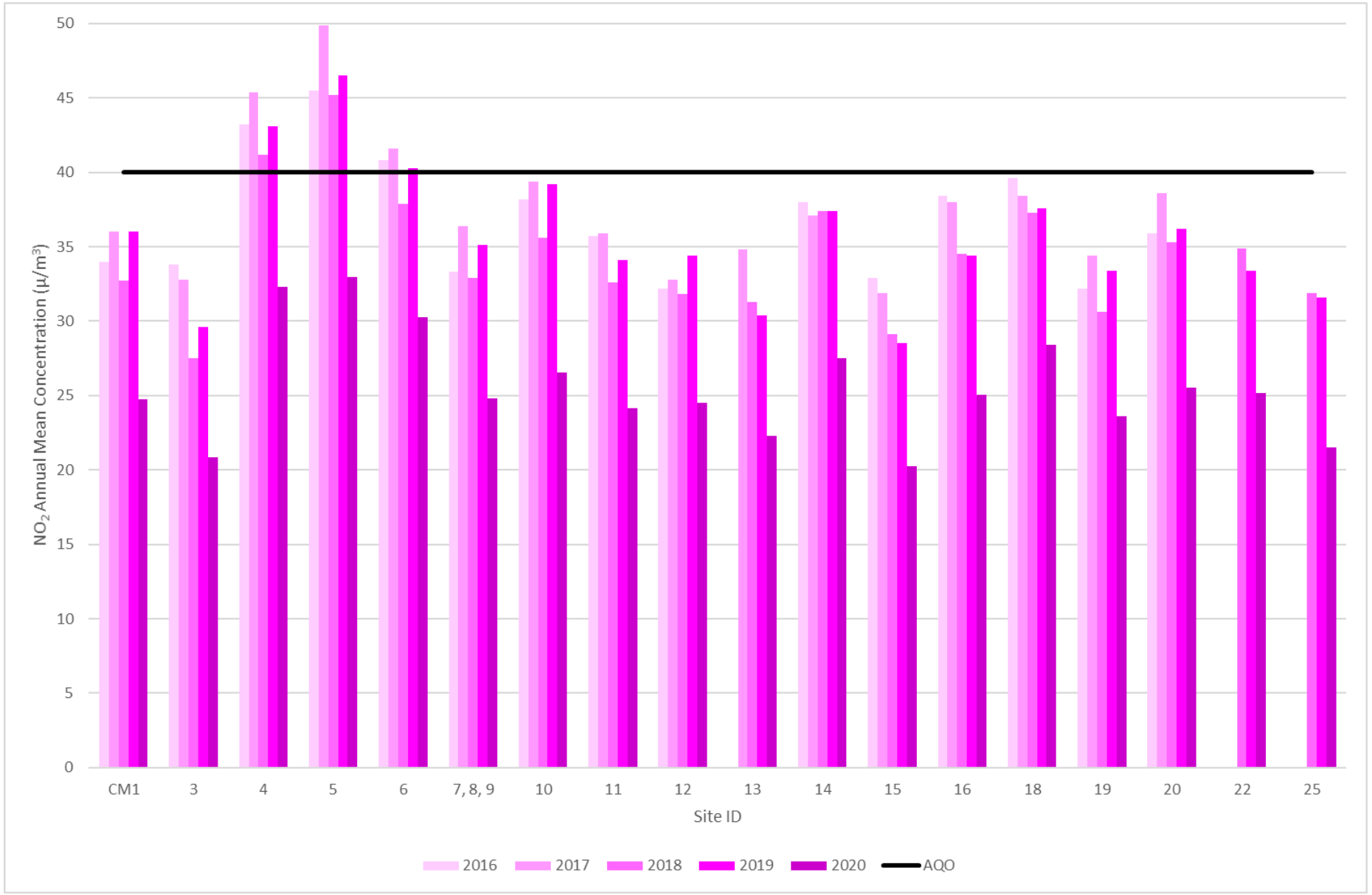


Figure A. 3 - Trends in Annual Mean NO_2 Concentrations: Sites 26 – 43

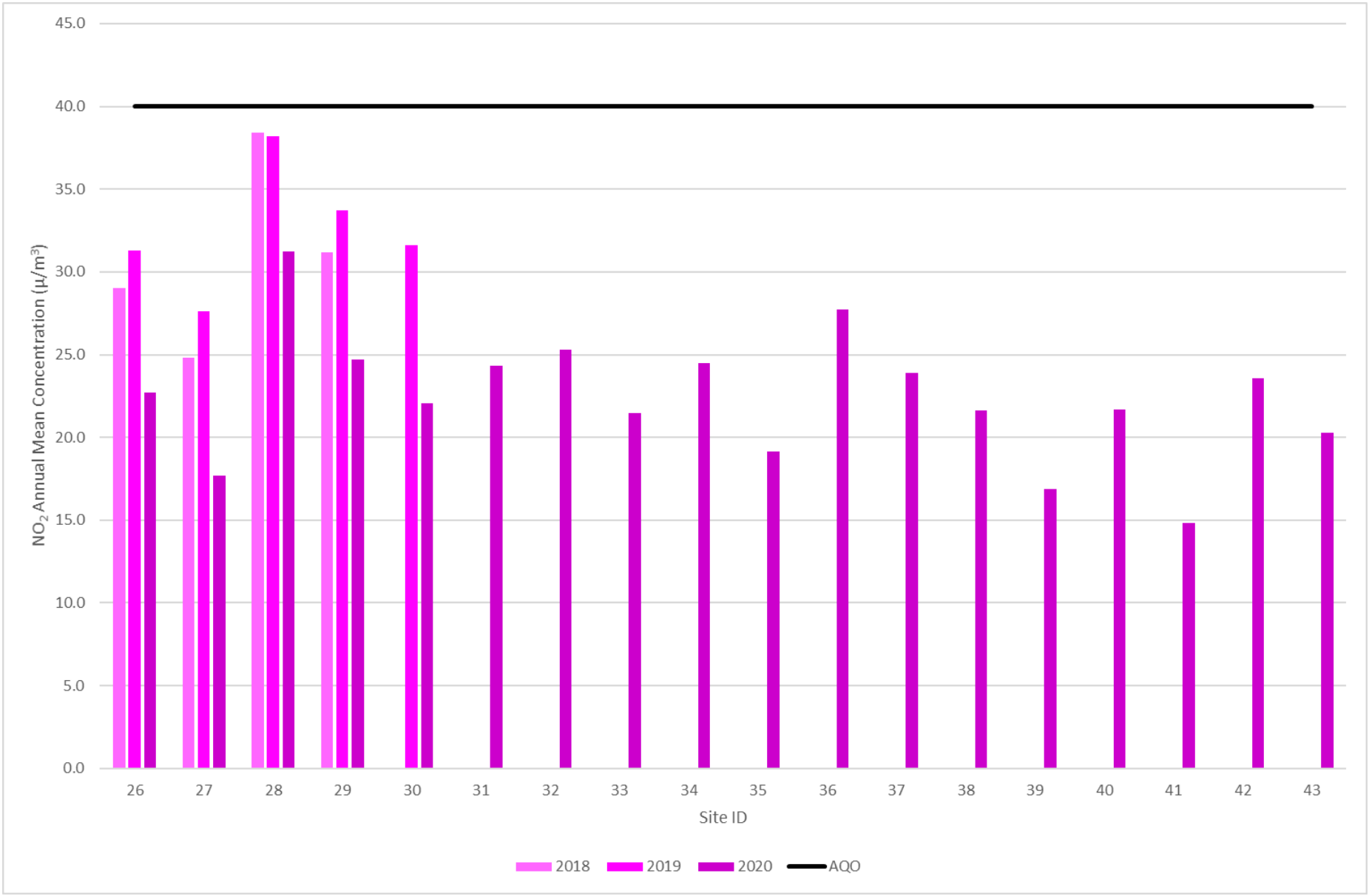


Table A. 5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM1	394760	222878	Kerbside	99	99	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%).

Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B. 1 – NO_2 2020 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	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
3	394621	222215	32.8	29.3	-	18.2	12.6	16.3	15.6	21.9	25.4	25.0	27.4	27.8	23.3	20.8	-	
4	394237	223006	50.8	45.6	-	26.3	22.6	29.1	26.9	33.7	38.5	37.3	41.9	38.8	36.2	32.3	-	
5	394350	222923	50.4	-	-	-	26.4	32.3	29.4	35.9	40.0	36.0	40.4	42.9	36.9	32.9	-	
6	394738	222888	49.4	38.8	-	23.5	22.7	28.9	24.4	33.1	35.1	35.2	40.6	38.2	33.9	30.3	-	
7	394760	222878	41.0	30.8	-	21.3	21.2	24.5	18.8	27.1	27.3	25.3	32.0	32.8	-	-	-	Triplicate Site with 7, 8 and 9 - Annual data provided for 9 only
8	394760	222878	40.0	32.5	-	22.3	20.8	23.8	19.9	28.2	29.7	26.2	32.8	33.3	-	-	-	Triplicate Site with 7, 8 and 9 - Annual data provided for 9 only
9	394760	222878	34.8	33.2	-	19.6	20.1	24.3	19.5	26.8	27.3	29.4	30.1	30.2	27.8	24.8	-	Triplicate Site with 7, 8 and 9 - Annual data provided for 9 only
10	394830	222845	34.2	-	-	21.6	19.7	24.5	20.1	-	30.7	32.1	-	-	26.1	26.6	-	
11	395110	222670	36.1	29.5	-	22.8	17.4	21.0	16.9	25.8	30.2	29.1	33.0	33.5	27.0	24.1	-	
12	395210	222618	39.6	32.2	-	19.7	15.0	18.7	17.8	25.5	-	30.6	34.8	36.5	27.5	24.5	-	
13	395207	222465	33.5	25.6	-	18.1	15.6	18.2	19.9	25.1	26.8	28.2	32.0	31.4	25.0	22.3	-	
14	395362	222000	36.7	32.9	-	25.5	24.3	27.4	21.1	29.8	37.3	33.3	32.7	36.0	30.8	27.5	-	
15	395182	222183	31.8	24.4	-	15.7	13.1	17.0	14.4	23.5	25.9	25.3	27.5	29.0	22.7	20.3	-	
16	395146	222149	31.1	31.2	-	20.8	19.8	26.3	18.5	29.9	29.6	30.8	33.6	33.6	28.1	25.1	-	
18	395660	221670	41.4	38.4	-	23.1	21.3	27.5	20.4	31.8	32.1	35.7	35.3	36.8	31.8	28.4	-	
19	393296	222170	38.5	35.6	-	22.0	16.5	19.2	19.8	21.6	27.4	26.0	30.7	28.2	26.5	23.6	-	
20	392912	221862	34.3	33.6	-	22.2	18.9	23.9	18.9	27.3	31.2	30.9	34.6	34.2	28.6	25.5	-	
22	391178	221641	36.5	30.8	-	21.0	18.4	22.5	23.7	27.9	29.9	30.4	33.0	34.1	28.2	25.2	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	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
25	394708	222763	28.8	29.2	-	20.0	16.8	18.2	15.3	21.1	24.9	25.9	31.0	29.4	24.1	21.5	-	
26	394902	223004	36.1	32.3	-	17.9	15.1	18.5	17.7	21.6	26.2	25.7	31.3	32.4	25.4	22.7	-	
27	395156	221866	27.5	-	-	14.8	11.9	16.7	12.7	19.2	20.9	22.4	26.2	25.8	19.8	17.7	-	
28	393081	223643	45.4	37.0	-	26.1	25.8	29.4	24.8	35.7	41.5	37.7	38.5	40.6	35.0	31.2	-	
29	392066	222540	37.5	30.9	-	21.1	18.9	22.4	17.1	27.2	31.1	27.3	34.2	34.4	27.7	24.7	-	
30	394810	222439	34.4	28.0	-	16.9	11.5	14.3	16.0	33.8	25.1	26.8	29.0	31.7	24.7	22.1	-	
31	393906	222873	36.7	34.2	-	19.4	17.5	20.0	18.6	22.6	29.1	29.1	33.8	33.3	27.2	24.3	-	
32	394180	222982	35.6	-	-	23.3	21.4	24.6	18.9	28.8	31.5	32.9	-	36.3	28.3	25.3	-	
33	394635	222928	35.5	24.4	-	18.5	17.4	19.3	13.7	22.8	25.3	25.3	30.6	31.4	24.1	21.5	-	
34	394980	222735	41.8	32.4	-	19.6	15.3	20.5	17.6	26.6	29.4	-	34.8	32.9	27.4	24.5	-	
35	395340	222071	29.7	22.2	-	17.3	13.4	14.3	12.9	20.3	24.7	22.6	28.6	29.0	21.4	19.1	-	
36	395300	222027	38.7	38.8	-	21.1	18.4	24.3	23.9	28.7	35.0	37.8	33.3	34.7	31.0	27.7	-	
37	391869	222084	38.7	31.0	-	18.8	16.6	21.1	18.4	25.9	30.6	28.3	31.7	30.4	26.7	23.9	-	
38	392267	222009	34.8	-	-	17.7	15.3	18.5	19.6	24.0	27.1	26.5	31.5	28.0	24.2	21.6	-	
39	394473	220935-	26.8	20.2	-	16.9	-	12.0	6.6	17.0	18.8	20.5	22.6	25.3	18.9	16.9	-	
40	395862	221424	36.2	-	-	17.5	17.1	23.6	17.1	22.9	22.9	25.8	28.6	31.1	24.3	21.7	-	
41	395980	223322	26.6	19.6	-	13.0	8.7	9.7	10.6	12.2	17.3	-	23.3	23.6	16.6	14.8	-	
42	395394	222875	37.8	32.0	-	17.9	16.4	20.1	17.1	22.5	28.3	28.8	32.5	32.9	26.4	23.6	-	
43	394954	222511	29.0	25.0	-	17.8	13.2	14.6	15.4	19.7	26.8	25.7	31.4	29.5	22.7	20.3	-	

☒ **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.TG16.**

☒ **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 2020 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.

*February data representative of tubes exposed through February and March due to Covid-19. Concentrations included in calculation of annual mean as they are in line with data recorded during other months.

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

New or Changed Sources Identified Within Cheltenham Borough Council During 2020

Cheltenham Borough Council note the following developments which have the potential to change pollution levels within the borough:

West Cheltenham Golden Valley Development – Cyber Central UK

The new Garden Community Development[10] will form the home of Cyber Central UK, delivering:

- approximately 1,100 new homes; and
- approximately 45 Ha of mixed-use development land for leading cyber businesses alongside academic facilities.

The development will set high sustainability and design standards that will address climate change by utilising new 'smart' technologies to reduce the use of water and energy resources in the construction process, long term use of buildings and environments, and transport connections to, through and from the site.

West Cheltenham Transport Improvement Scheme - UK Cyber Business Park

Work began on the scheme[11] in June 2020 and plans to reduce traffic congestion in the west of Cheltenham through carriageway, walking and cycling improvements at:

- M5 Junction 11 slip road and Arle Court Roundabout;
- Telstar Way and Benhall Roundabout up to Gloucester Road Junction; and
- Walking and Cycling improvements linking A40 and Cheltenham Station.

[10] West Cheltenham Cyber Central Garden Community available at https://www.cheltenham.gov.uk/info/12/planning_and_development/1561/cyber_central_garden_community

[11] West Cheltenham Transport Improvement Scheme available at https://www.gloucestershire.gov.uk/highways/major-projects-list/west-cheltenham-transport-improvement-scheme-uk-cyber-business-park/

The works are due to complete in 2022 and will support the West Cheltenham Golden Valley Development, as well as link cycle lane improvements along the A40 to a new cycleway being designed between Cheltenham and Gloucester.

An air quality assessment completed for Phase 1 of the scheme (M5 Junction 11 slip road and Arle Court Roundabout) in 2019 concluded that the effect on air quality at existing human health receptors would be considered not significant.

Additional Air Quality Works Undertaken by Cheltenham Borough Council During 2020

During 2020, Cheltenham Borough Council commissioned an update to the 2014 AQAP. As part of this process a review of the current AQMA has been completed and stakeholder workshops have been held in order to inform new measures. The revised AQAP is now in the process of being finalised and is expected to be released for consultation later this year.

In addition, during August 2020, Cheltenham Borough Council installed nine Air Quality Mesh Pods in order to monitor real-time localised NOx, PM_{10} and $PM_{2.5}$. Due to the impacts of Covid-19, the calibration of recorded data is still being finalised, however the location of the pods can be viewed on the Council's website and the monitored results for 2021 are expected to be included in next year's Annual Status Report.

The Council have been able to use data from these Mesh Pods to undertake a short-term air quality study at three schools (All Saints Academy, Bournside School and Gloucester Road Primary School) within the borough between the 12th of April and the 2nd of May 2021. The study compared pollution levels during the Easter holidays and term-time, concluding the following:

- Morning NO_2 peaks are generally not correlated to school traffic as they start too early and are on the decline by the time the school run occurs;
- The influence of afternoon school traffic on NO_2 is stronger, with average concentrations during pick-up time being higher during term-time compared to the Easter holidays;
- School traffic does not cause levels of air pollution that breach Air Quality Standards;
- Particulate matter is not influenced by school traffic and Cheltenham-wide factors are its main driver;

- During this three-week study period, Bournside School had an average NO_2 concentration of 44.6 µg/m^3. Further monitoring is required to see if these levels are maintained throughout the year or if the study period coincided with elevated NO_2 in the area; and
- Borough-wide strategies to reduce air quality will have a stronger effect in reducing air pollution at schools compared to school-targeted strategies, as school traffic does not appear to be the main driver in pollution.

Furthermore, preliminary design work of a cycleway linking Gloucester and Cheltenham along the B4063 has been completed by Highways England and passed to Gloucester County Council's design team for further development. The new route will link the cycle route along London Road in Gloucester to cycling improvements along the A40 in Cheltenham, aiming to improve health and wellbeing whilst reducing traffic emissions. Construction of the cycleway is planned for 2021/22 and a map of the route is shown in Figure C. 1 below.

Figure C. 1 - B4063 Gloucester to Cheltenham Cycle Improvements Scheme

QA/QC of Diffusion Tube Monitoring

The diffusion tubes for the year 2020 were supplied and analysed by Gradko International Ltd, the tubes were prepared using the 20% TEA in water preparation method. All results have been bias adjusted and annualised where required before being presented in Table A. 4.

Gradko is a UKAS accredited laboratory and participates in the new AIR-PT Scheme (a continuation of the Workplace Analysis Scheme for Proficiency (WASP)) for NO_2 tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations reported are of a high calibre. The latest available AIR-PT results are AIR-PT AR036 (January – February 2020), AIR-PT AR037 (May – June 2020), AIR-PT AR039 (July – August 2020) and AIR-PT AR040 (September – October 2020). Whilst the rounds PT AR037 and PT AR039 were cancelled due to the pandemic, Gradko scored 75% on PT AR036 and PT AR040. The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$.

The precision of all 18 local authority co-location studies in 2020 was rated as ‘good’ (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%).

Diffusion Tube Annualisation

In regards to the 2020 diffusion tube set, annualisation was required at one of the thirty-seven diffusion tube locations due to data capture being below 75%. Annualisation has been completed in line with Box 7.9 and Box 7.10 within LAQM.TG(16) and using the Diffusion Tube Data Processing Tool (version 1.1)[12].

In completing the annualisation process, data has been taken from a number of automatic monitoring sites that are part of the AURN. In line with LAQM.TG(16) the monitoring sites that have been used lie within a radius of approximately 50 miles of the sites to be annualised.

[12] Diffusion Tube Data Processing Tool (v1.1) available at https://laqm.defra.gov.uk/tools-monitoring-data/dtdp.html

All monitoring stations that were used are background monitoring stations and as such are not influenced by local sources of air pollution such as road traffic emissions at roadside monitoring sites. The monitoring sites that were used are as follows:

- Swindon Walcot (Urban Background)
- Oxford St Ebbes (Urban Background)
- Leominster (Suburban Background)

Full working details of the diffusion tube annualisation carried out are presented in Table C.1 below.

Table C. 1 – Annualisation Summary (concentrations presented in µg/m3)

Site ID	Annualisation Factor Oxford St Ebbes	Annualisation Factor Swindon Walcot	Annualisation Factor Leominster	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
10	1.1239	1.1387	1.1565	1.1397	26.1	29.8	

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 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.TG16 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 operate one continuous automatic analyser that has a triplicate set of diffusion tubes (7, 8, and 9) co-located at the monitoring site. A local bias adjustment factor has been calculated for the location using the Diffusion Tube Data Processing Tool (version 1.1)[13]. The output is summarised below in Table C. 2.

[13] Diffusion Tube Data Processing Tool (v1.1) available at https://laqm.defra.gov.uk/tools-monitoring-data/dtdp.html

The diffusion tubes used by Cheltenham Council are supplied and analysed by Gradko International, the tubes were prepared using the 20% TEA in water preparation method. The 2020 national bias adjustment factor for Gradko 20% TEA in water is 0.81, based on 18 studies, as derived from the national bias adjustment factor spreadsheet[14].

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/21

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

This spreadsheet will be updated at the end of June 2021
LAQM Helpdesk Website

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

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

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To make your selection, choose [All] from the pop-up list)	Year[2] (To make your selection, choose [All])	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2020	R	Gedling Borough Council	10	31	25	24.1%	G	**0.81**
Gradko	20% TEA in water	2020	R	SOUTHAMPTON CITY COUNCIL	12	37	27	37.1%	G	**0.73**
Gradko	20% TEA in water	2020	R	Fareham Borough Council	10	25	14	77.4%	G	**0.56**
Gradko	20% TEA in water	2020	R	Fareham Borough Council	12	30	22	35.1%	G	**0.74**
Gradko	20% TEA in water	2020	R	Fareham Borough Council	10	22	17	26.5%	G	**0.79**
Gradko	20% TEA in water	2020	R	SOUTHAMPTON CITY COUNCIL	11	32	31	4.9%	G	**0.95**
Gradko	20% TEA in water	2020	KS	Marylebone Road Intercomparison	12	57	43	33.3%	G	**0.75**
Gradko	20% TEA in water	2020	R	Bath & North East Somerset	11	32	29	13.0%	G	**0.89**
Gradko	20% TEA in water	2020	R	Gateshead Council	12	22	17	28.1%	G	**0.78**
Gradko	20% TEA in water	2020	R	Gateshead Council	12	23	21	11.6%	G	**0.90**
Gradko	20% TEA in water	2020	R	Gateshead Council	10	26	25	6.5%	G	**0.94**
Gradko	20% TEA in water	2020	R	Gateshead Council	12	28	21	30.5%	G	**0.77**
Gradko	20% TEA in water	2020	R	Gateshead Council	12	31	32	-3.4%	G	**1.03**
Gradko	20% TEA in water	2020	R	Luton Borough Council	9	38	28	33.8%	G	**0.75**
Gradko	20% TEA in water	2020	R	Nottingham City Council	12	31	34	-8.5%	G	**1.09**
Gradko	20% TEA in water	2020	R	Dudley MBC	13	33	28	19.9%	G	**0.83**
Gradko	20% TEA in water	2020	UB	Dudley MBC	13	23	14	61.2%	G	**0.62**
Gradko	20% TEA in water	2020	R	Dudley MBC	13	44	34	30.6%	G	**0.77**
Gradko	20% TEA in water	2020		**Overall Factor[3] (18 studies)**				**Use**		**0.81**

Cheltenham Borough Council have applied the local bias adjustment factor of 0.89 to the 2020 monitoring data, in line with previous years and in order to process the data most conservatively. The automatic monitor and co-located diffusion tubes all had good overall data capture for the period, and the diffusion tubes had good overall precision.

A summary of bias adjustment factors used by Cheltenham Borough Council over the past five years is presented in Table C. 3.

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

Table C. 2 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input
Periods used to calculate bias	11
Bias Factor A	0.89 (0.85 - 0.95)
Bias Factor B	12% (6% - 18%)
Diffusion Tube Mean (µg/m3)	27.5
Mean CV (Precision)	4.7%
Automatic Mean (µg/m3)	24.6
Data Capture	98%
Adjusted Tube Mean (µg/m3)	24 (23 - 26)

Notes: A single local bias adjustment factor has been used to bias adjust the 2020 diffusion tube results.

Table C. 3 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	Local	-	0.89
2019	Local	-	0.99
2018	Local	-	0.97
2017	Local	-	1.03
2016	Local	-	1.01

QA/QC of Automatic Monitoring

Cheltenham Borough Council's automatic continuous monitoring site CM1, located on St Georges Street/Swindon Road junction, is operated and managed by Enviro Technology Services plc. The M200E NOx analyser is MCERTS approved, mirroring compliance with the European Committee for Standardisation (CEN) standard EN14211:2012, and measures NOx, NO_2 and NO. The unit was installed in August 2011 and Enviro Technology Services undertake routine monthly calibration visits and data download services. Data received is ratified by Geoff Broughton from Air Quality Data Management (AQDM) with concentration data provided every quarter.

Automatic Monitoring Annualisation

Cheltenham Borough Council's automatic monitoring location recorded data capture of greater than 75% during 2020 (98%), therefore no annualisation was required.

NO_2 Fall-off with Distance from the Road

No diffusion tube or automatic NO_2 monitoring locations within Cheltenham Borough Council required distance correction during 2020.

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

Figure D. 1 – NO_2 Diffusion Tube and Automatic Monitoring Locations: AQMA

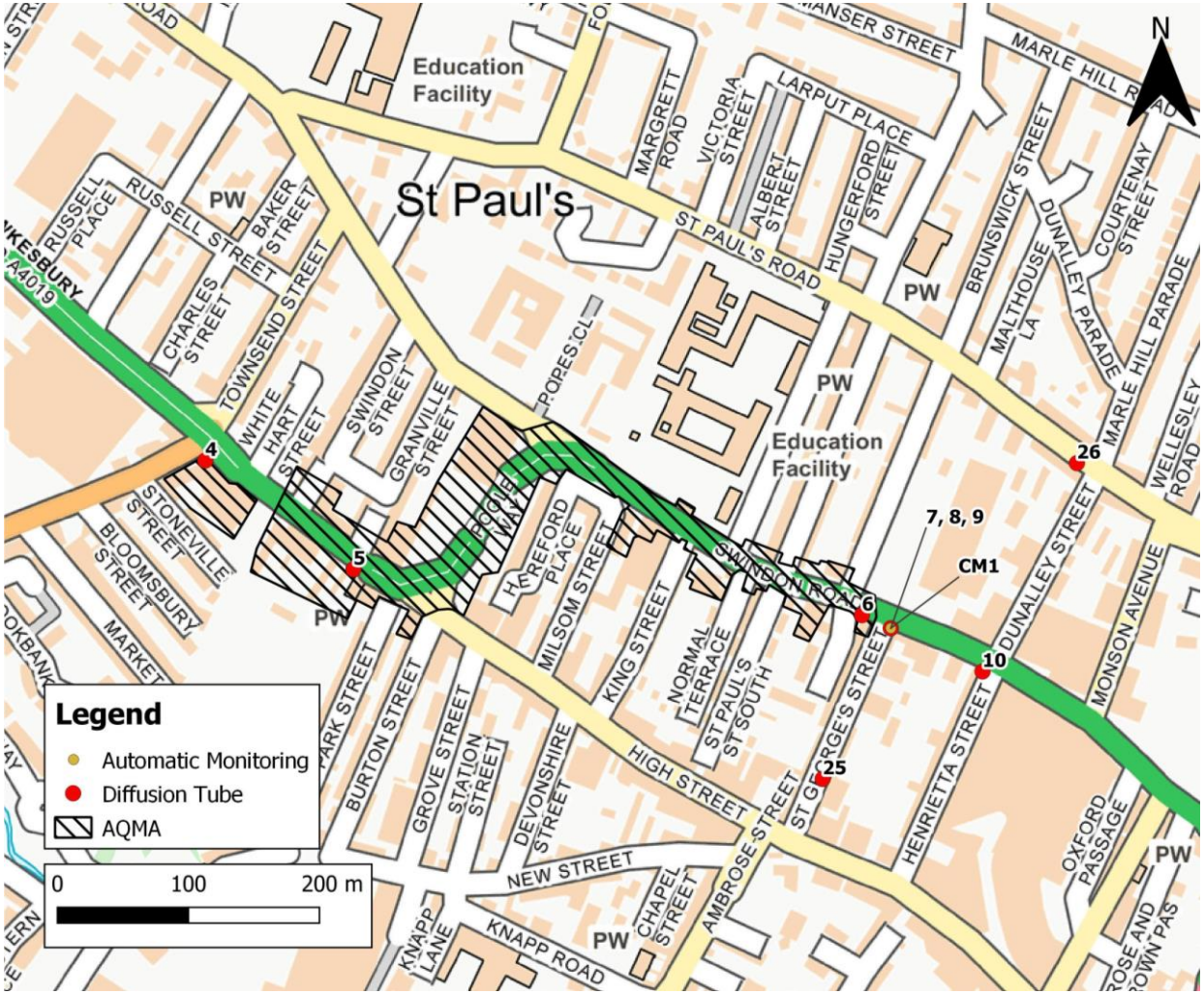


Figure D. 2 - NO_2 Diffusion Tube Monitoring Locations: Cheltenham Centre

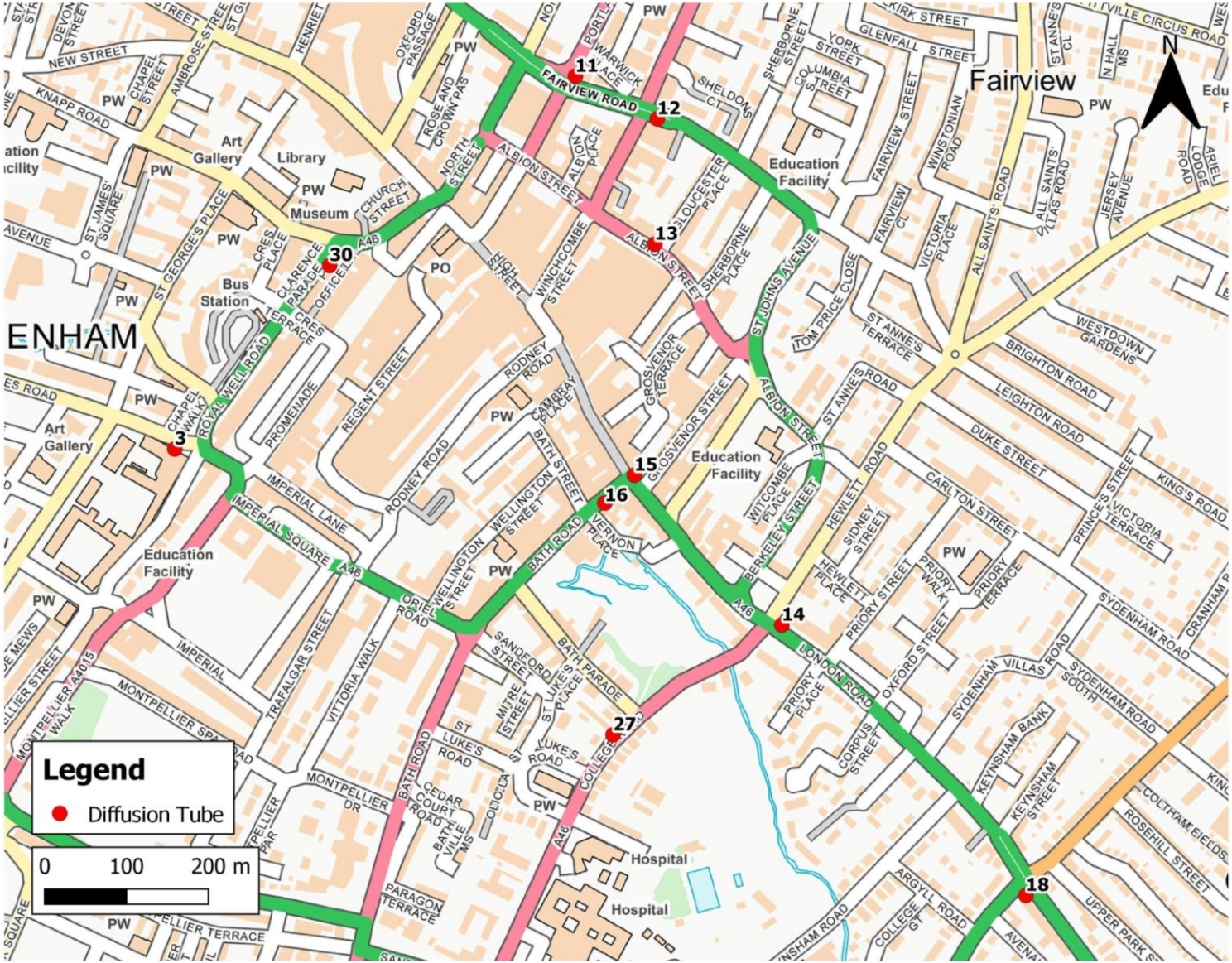


Figure D. 3 - NO_2 Diffusion Tube Monitoring Locations: A4013 Princess Elizabeth Way

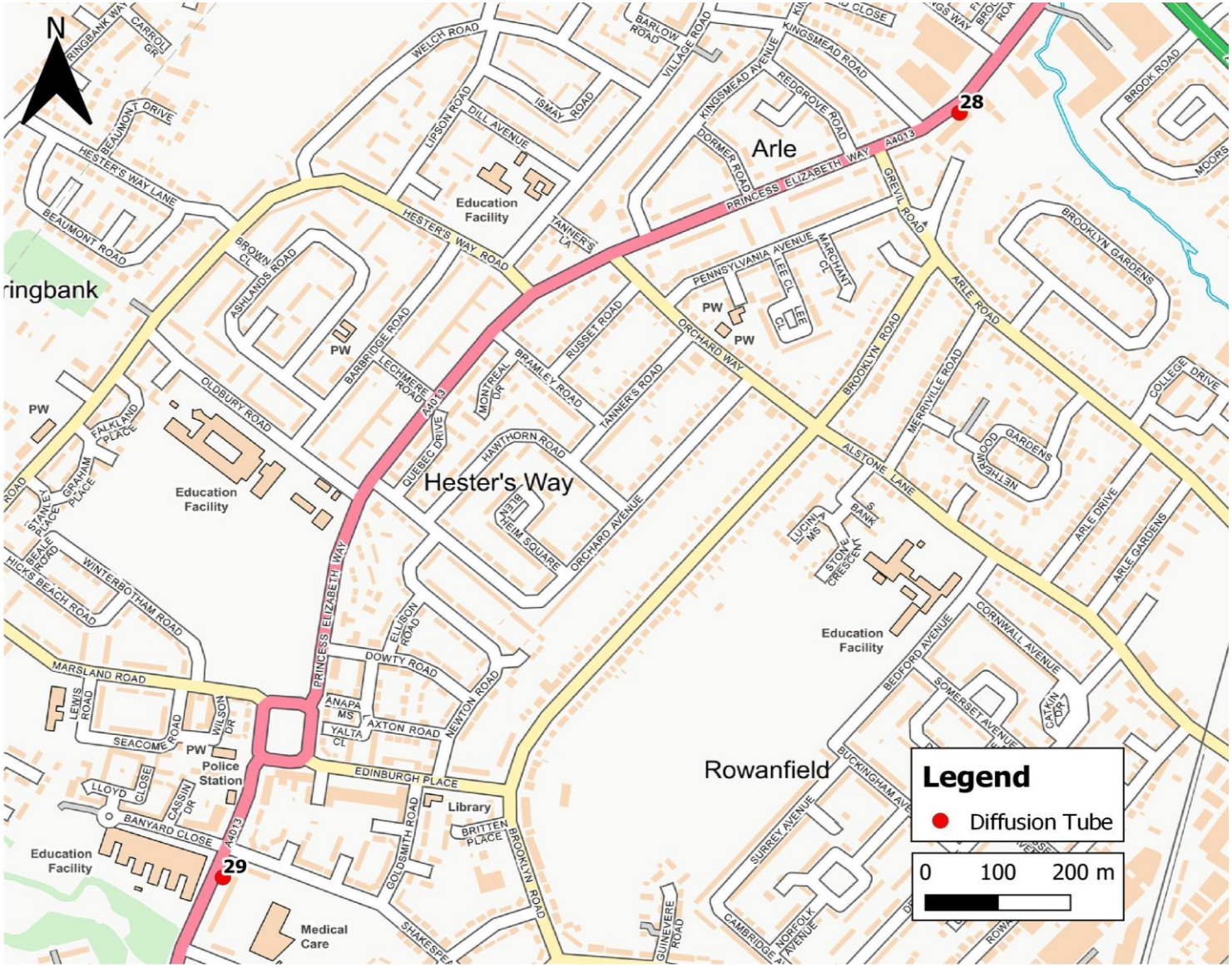
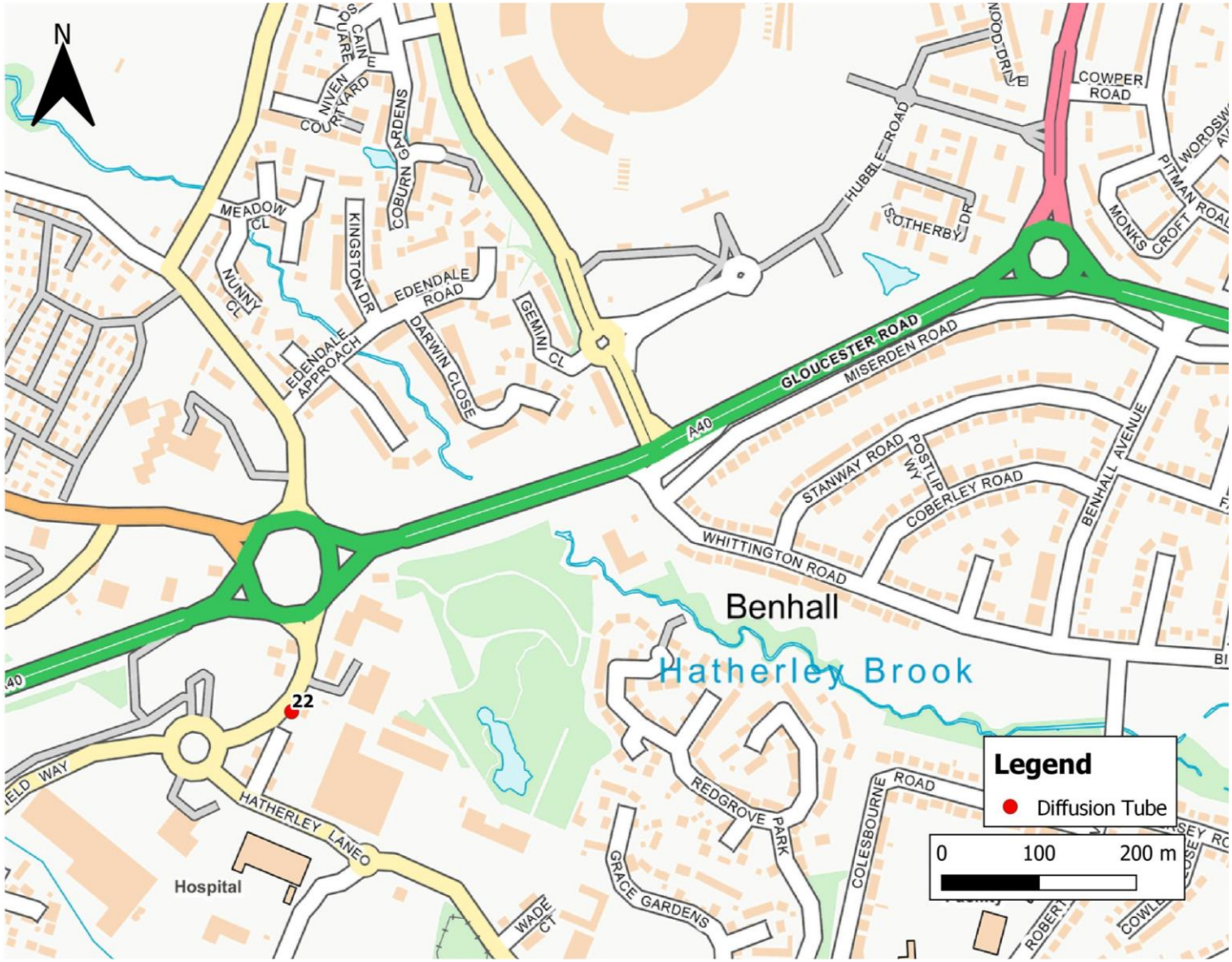


Figure D. 4 - NO_2 Diffusion Tube Monitoring Locations: B4633 Gloucester Road

Figure D. 5 - NO_2 Diffusion Tube Monitoring Locations: A40 Gloucester Road



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[15]

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[16] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[17] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

[16] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[17] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Cheltenham Borough Council

During 2020, the air quality monitoring programme continued in Cheltenham Borough Council and a 25 – 29 % reduction in monitored NO_2 concentrations in the AQMA was observed in comparison to 2019.

Overall, across the borough as a whole, reductions in monitored concentrations in comparison to 2019 range between 18 – 36 % and the average reduction was 28 %. This has provided an evidence base that shows it is achievable to reach the annual mean objective across Cheltenham.

Opportunities Presented by COVID-19 upon LAQM within Cheltenham Borough Council

No LAQM related opportunities have arisen as a consequence of COVID-19 within Cheltenham Borough Council.

Challenges and Constraints Imposed by COVID-19 upon LAQM within Cheltenham Borough Council

- During 2020, the diffusion tube monitoring programme across Cheltenham Borough Council was disrupted during February and March. Tubes deployed at the beginning of February were not changed over until the beginning of April and were therefore exposed for longer than the recommended period. The results recorded

for February through March look to be generally in line with those from tubes exposed in line with the national monitoring calendar and recommended exposure times, so have been included in the calculations for the annual average, shown in Table A.2. All values are included in Table B.1. The diffusion tubes were left out over two exposure periods as a result of Covid-19 restrictions. **Impact: Small.**

- As with previous years, a local bias adjustment factor has been utilised to adjust the diffusion tube results for 2020. The continuous automatic analyser had a 99% data capture during 2020 and the co-located diffusion tubes a data capture of 100%, therefore there was no increased uncertainty associated with the local bias adjustment. **Impact: None.**
- Progress on the implementation of Action Plan measures through 2020 was not significantly affected, with the exception of the installation of nine AQ Mesh Pods. The pods were successfully installed during 2020; however, due to the impacts of Covid-19, the calibration of data recorded by these pods is still being finalised. **Impact: Small.**
- A revised AQAP is being developed for the AQMA declared in September 2020. Although there was a reallocation of Council resources during 2020 due to the pandemic, the timeline for the development and implementation of the AQAP has remained unaffected and the revised AQAP will be prepared and sent out for draft consultation during 2021. **Impact: None.**

The impacts as presented above are aligned with the criteria as defined in Table F 1, with professional judgement considered as part of their application.

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

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 Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. 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.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Cheltenham Schools Air Quality Report, May 2021;
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/21 published in March 2021;
- Cheltenham Borough Council Annual Status Report 2020;
- Cheltenham Borough Council Detailed Modelling Assessment 2019; and,
- Cheltenham Borough Council AQAP 2014.