Cheltenham Borough Council

Annual Status Report 2020

Bureau Veritas

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2020 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management

July 2020

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Executive Summary: Air Quality in Our Area

Air Quality in Cheltenham

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[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

The main source of air pollution in the Borough 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, A46 Bath Road and A435 – Hewlett Road. These roads, among others, form the main arterial highway network within Cheltenham, carry high volumes of traffic within the Borough, specifically through congested areas such as Cheltenham Town Centre. As a result, Cheltenham Borough Council (CBC, 'the Council') has one Borough-wide AQMA that was declared in November 2011 for the exceedance of the Nitrogen Dioxide (NO_2) annual mean UK Air Quality Strategy (AQS) of 40µg/m^3.

The current Borough-wide AQMA can be viewed online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=54, details of the AQMAs are provided in Table 2.1 and boundary maps are presented in Appendix D: Maps of Monitoring Locations and AQMAs. In response to this an Air Quality Action Plan (AQAP) was adopted by the Council in 2014. This AQAP outlines a series of measures to be completed in order to improve air quality within the AQMA and therefore the Borough as a whole. Following completion of a detailed modelling assessment in 2019, the AQMA boundary is proposed to be amended to cover a smaller area within the town centre. The AQAP is proposed to be updated following completion of consultation on the AQMA amendments.

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

NO_2 is the principal pollutant of concern for the Council attributed to traffic sources, and as a result is currently solely monitored. NO_2 has been measured in Cheltenham since 1996. During 2019, NO_2 was monitored at 30 sites across the Borough inclusive of one automatic monitoring site and 29 non-automatic sites.

During 2019, three sites (Sites 4, 5 and 6) reported an exceedance of the NO_2 annual mean AQS objective limit at locations representative of receptors, five additional sites reported NO_2 annual mean concentrations to be within 10% of the AQS objective. Of these sites, two are within 10% at representative receptors location.

NO_2 annual mean concentrations have increased at 19 of 27 sites for which data was also available for 2018. The greatest increase is 3.6µg/m³ at Site 10. The average increase is 1µg/m³.

The annual mean NO_2 concentration was not greater than 60 µg/m^3 at any non-automatic monitoring site. Therefore exceedance of the 1-hour mean objective during 2019 at any monitoring location within Cheltenham is considered to be unlikely. Furthermore, the continuous NO_2 monitor present within Cheltenham reported no exceedance of the short term NO_2 1-hour objective throughout 2019, or since 2014.

In 2020, additional monitoring using AQMesh pods is proposed which will monitor for NO_x and $PM_{2.5}$ at nine locations.

Actions to Improve Air Quality

The AQAP for CBC is the main document to drive a reduction in air pollution within the Borough. This AQAP was published in 2014, in response to the declaration of the Borough-wide AQMA in 2011, for the monitored NO_2 annual mean exceedances across Cheltenham. The AQAP provides a series of measures (20) designed to help Cheltenham achieve compliance with the NO_2 annual mean AQS objective across the Borough. These mainly consisted of promoting alternative modes of travel, various traffic/highway measures, and a change to Planning Policy.

In 2019, due to the localisation of annual mean NO_2 exceedances towards the north of the Town Centre, as demonstrated in previous reporting years, CBC decided to undertake a Detailed Modelling Assessment to assess NO_2 concentrations within Cheltenham via a dispersion modelling exercise. The detailed assessment recommended that amendments be made to the current AQMA and monitoring

network. The detailed assessment recommended targeting measures to reduce emissions from Cars and LGVs which were the two largest identified contributors.

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 aims to reduce vehicle use leading to improved air quality. The Gloucestershire initiative *Thinktravel* provides information & resources for sustainable travel in Gloucestershire. The initiative can be found here www.thinktravel.info. More detailed information regarding these initiatives is given within the main body of this report.

Conclusions and Priorities

During the 2019 reporting year, CBC demonstrated proactive steps to improve air quality across the Borough. These measures include the completion of a Detailed Modelling Assessment to improve the Council's understanding of air quality within the region.

During 2019, there were only three reported exceedances of the annual mean NO_2 AQS objective limit (Sites 4, 5 and 6) at sites representative of relevant exposure within the current borough wide AQMA, demonstrating the challenge CBC faces with localisation of air quality hotspots in line with wider improvements. Five additional sites reported NO_2 annual mean concentrations to be within 10% of the AQS objective. Of these sites, two are within 10% at representative receptors location.

Within the current monitoring network, Site 4 and 5 have reported the highest annual mean NO_2 concentration each year since 2014. Site 4 is located on the corner of 2 Gloucester Road along a stretch of the A4019, and Site 5 is located at 422 High Street. The A4019 is one of the most significant arterial routes through Cheltenham.

The main priorities for the Council in 2019 are to:

- Continue to monitor NO_2 concentrations throughout the Borough, and consider the relocation and/or deployment of additional monitors in support of the Detailed Modelling Assessment findings;
- Install nine new AQ mesh monitors;

- Revoke/amend existing AQMA boundaries which has been supported by Defra and therefore will be implemented by CBC. For further guidance please refer to LAQM Technical Guidance 16 (TG16); and
- Update the existing AQAP in response of the declaration of an AQMA/s – if necessary.

Local Engagement and How to get Involved

Members of the public can do their bit by choosing alternative means of transport, particularly in the winter months. Further examples[4] of modifying behaviour to contribute positively to air quality are:

“Can I get into town without using the car?” Perhaps dig out that old bike?

“It’s a nice day, I think I’ll walk”. In fact at some times of the day your walk can almost take the same time as it does to drive. You’ll get fitter and feel better for it.

How about taking the bus and let somebody else do the driving whilst you relax?

Do you have any work colleagues who live nearby and would like to share the cost of taking the car? You’ll not only reduce your costs at least by half (the more who share, the greater the savings), but save on wear and tear, and mileage increases on your vehicles.

If living outside Cheltenham then perhaps think of our Park and Ride facilities (pay for the bus fare and receive free parking).

How about walking your child to school? Not only will the reduction in vehicles bring improved air quality, but you and your child will have the added benefit from the exercise.

Local schools can continue their work in persuading parents to encourage their children to walk or cycle to school and leave the car at home.

Members of the public are encouraged to use greener and cleaner vehicles (Electric Vehicles, Hybrid, LPG, etc.) and lead by example to champion better air quality.

[4] Cheltenham Borough Council Annual Status Report 2019

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1 Local Air Quality Management

This report provides an overview of air quality in Cheltenham during 2019. 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 show any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

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 must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMA declared by Cheltenham Borough Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=54. Alternatively, see Appendix D: Maps of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in the Borough.

In 2019, due to the localisation of annual mean NO_2 exceedances towards the north of the Town Centre, demonstrated in previous reporting years, CBC completed a Detailed Modelling Assessment to evaluate NO_2 concentrations within Cheltenham via dispersion modelling. Following completion of the detailed assessment, the AQMA will be revised in line with the modelling assessment outcomes to cover a concentrated area along Swindon Road/Poole Way. This illustrates to visitors, residents, and prospective purchasers of properties within Cheltenham that the whole of the Borough is not an area of poor air quality and allows more concerted and targeted action, by the District and County Councils and their partners, to address the known areas of poor air quality.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
Cheltenham Whole Borough AQMA	18/11/2011	NO_2 Annual Mean	Cheltenham	The whole borough of Cheltenham	Yes	47.9	µgm³	47.0	µg/m³	Cheltenham Borough Council 2014 AQAP	2014	https://www.cheltenham.gov.uk/downloads/file/3780/air_quality_action_plan_2014

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

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

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

1. In light of the monitoring results it would not be inappropriate to amend the current AQMA boundary to focus on the northern area of the borough. However, the Council has stated they wish to review both the modelling results (from the Detailed Modelling Assessment) and monitoring results prior to any changes being made to the AQMA boundaries. This is accepted.
2. As the current AQAP will be out of date by the end of 2019, it is strongly encouraged that the Council create a new AQAP to be published in the next reporting year. Within this AQAP, details of the potential amendment of the AQMA should be included.
3. The Council recently expanded their monitoring network, from 20 tubes to 29 tubes this is supported. The Council should continue to review their monitoring locations and amend when deemed appropriate.
4. Generally the report is concise, well written and illustrates the hard work the Council are undertaking to improve local air quality.

The monitoring data showed concentrations of NO_2 below the Air Quality Objective in areas outside of the town centre which prompted the further study. The AQMA is proposed to be amended following the results of the detailed modelling assessment, this has been reviewed and agreed by Defra.

Cheltenham Borough Council has taken forward a number of direct measures during the current reporting year of 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in the Action Plan which is proposed to be updated following consultation on the amendments to the AQMA.

Cheltenham Borough Council expects the following measures to be completed over the course of the next reporting year:

- Amended AQMA Boundary
- Installation of nine AQMesh monitors to monitor for NO_x and Particulate Matter

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, the Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance across Cheltenham. These measures are expected to be discussed within the future, updated, AQAP.

The measures have been ordered based on the expected indicative reduction in pollution. The measures expected to reduce pollution the most have been ranked highest.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Highways improvements	Transport Planning and Infrastructure	Other	Gloucestershire County Council and Local Sustainable Transport Fund	2013-14	2016-18	Reduction in through traffic and improved access to car parks. Reduced congestion at key junctions	1-2%	A range of highway amendments have taken place and others are planned, subject to traffic regulation orders. To take place in 4 phases.	2018	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	Cheltenham Borough Council	2013	2014-16	Bus fleet data	0.005	Initial funding bid to Government failed but received positive response.	Ongoing	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	Gloucestershire County Council	2014-15	2014-16	Reduced car travel into & out of Cheltenham	0.1-1%	Improved signage installed at Arle Court. 22 new spaces added to Arle Court Park and Ride.	2018	The Elmbridge Park & Ride proposal on the outskirts of Gloucester is the subject of a separate funding bid. The Elmbridge highway improvements were completed on time. A further scheme at Elms Park, Tewkesbury Road (to the west of Cheltenham) forms part of the proposed Bloor/Persimmon Development
5	Promotion of Greener Vehicles	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	Gloucestershire County Council	2012	2013-15	Charge Point usage data	<0.5%	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.	Ongoing	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.
6	Twenty is plenty	Promoting Low Emission Transport	Promoting Low Emission Public Transport	Cheltenham Borough Council	2014-15	2015-17	Traffic count/speed data	<0.5%	The Cabinet working group are awaiting better guidance on the benefits and implementation	Ongoing	Cheltenham and Gloucestershire County Council will look at the potential for reducing urban traffic speed limit to 20mph in some areas to reduce congestion and improve traffic flow on busier roads, which may improve highway safety for cyclists and pedestrians as well as improve air quality.
7	Increased Car Sharing	Alternatives to private vehicle use	Car & lift sharing schemes	Gloucestershire County Council	2013	2015	Traffic count data	0.001	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.	2016	'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'.
8	Air Quality Information	Public Information	Via the Internet	Cheltenham Borough Council	2014-15	2015-16	Hit counter on webpage	<0.1%	Up to date Air Quality information available on CBC website	Ongoing	Emission reductions directly attributable to this action cannot be measured.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
9	Business Travel Grants	Promoting Low Emission Transport	Promoting Low Emission Public Transport	Gloucestershire County Council	2013	2014-15	Uptake of grants	<0.1%	Grants completed in 2015	2018	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.
10	Wayfinding Initiative	Promoting Travel Alternatives	Promoting Low Emission Public Transport	Gloucestershire County Council	2013	2014-15	None	<0.1%	Signage installed	2017	Work is ongoing to improve signage and route access for cyclists and pedestrians Phase 2 was completed in 2017.
11	Promote Workplace Travel Plans	Promoting Travel Alternatives	Promoting Travel Alternatives	Cheltenham Borough Council	2014	2015	Whether or not a plan is implemented	<0.1%	No plan to date	unknown	Cheltenham Borough Council will develop its own workplace 'smarter' travel plan where resources allow and encourage larger businesses in Cheltenham to develop and implement similar plans. This will encourage more sustainable transport choices such as bus travel, car-sharing, cycling and walking.
12	Air Quality Planning Policy	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Cheltenham Borough Council	2013	2015	Air Quality Planning Policy adopted	Unknown but potentially significant	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.	unknown	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.
13	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	Gloucestershire County Council	2014	2015-17	Number of traffic lights removed and traffic count/speed data	Potentially significant in current areas of poor air quality	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)	Ongoing	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.
14	Bus and Taxi quality partnership	Promoting Low Emission Transport	Promoting Low Emission Public Transport	Gloucestershire County Council	2014	2016-16	Anecdotal	Unknown	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.	2018 and ongoing	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.
15	Green Planting	Traffic Management	Other	Cheltenham Borough Council	2014	2014-16	Number of urban planning applications with green planting schemes adopted	<0.1%	Greening of parts of Cheltenham High Street is due as part of improvements to the public realm during 2018/19.	Ongoing	Cheltenham Borough Council will seek to encourage green planting through planning control to help off-set potential pollution impacts where developments occur in areas of poorer air quality. Such measures include planting through planning controls, on CBC parks and property, and on Highways,

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
											which is ongoing and planting as part of street enhancement schemes (particularly through the Cheltenham Transport Plan) scheduled between 2016-2019.
16	Vehicle management signage	Traffic Management	Other	Cheltenham Borough Council	2014	2014-18	Traffic Count data	<0.1%	Air Quality Grant Scheme bid submitted in 2016 but was unsuccessful. Further bids will be looked at.	Unknown	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
17	Cycle Safety Improvements	Transport Planning and Infrastructure	Cycle network	Cheltenham Borough Council	2014	2014-16	Number of cyclists and accident & injury statistics	<0.1%	See comments	Ongoing	Barriers to Cycling' project completed Autumn 2017 with installation of contraflow cycle lane on Sandford Mill Road. Cycle Improvements on Up Hatherley Way with a new Shared Use Footway Cycleway, completed in June 2018. Kingsditch Lane Cycle Improvements, conversion of existing footway to shared use completed Oct 2017. Pitville to the Park Cycle Route – signing of the cycle route completed.
18	Installation of AQ mesh pods	Monitoring	Other	Cheltenham Borough Council	2019	2020	Monitoring of PM2.5 and NOx at 9 sites within the borough which will lead to greater understanding of distribution of pollutants allowing for more effective and targeted measures.	n/a	Due for installation when Coronavirus restrictions have been lifted	Ongoing	Installation 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.

While there is proposed to be monitoring of $PM_{2.5}$ forthcoming in 2020, in 2019 there was no monitoring of $PM_{2.5}$ completed within the Borough, as efforts are being concentrated on monitoring NO_2 levels in line with the established Borough-wide AQMA. However, as primary emissions of both NO_2 and particulates predominately originate from the same source, measures which attempt to reduce NO_2 levels within Cheltenham will simultaneously reduce levels of PM_{10} and $PM_{2.5}$. Examples of such measures can be found in Table 2.2.

In the absence of monitoring, the current Defra 2019 background maps[5] for Cheltenham (2017 based) show that all background concentrations of $PM_{2.5}$ are far below the 2020 annual mean AQS objective for $PM_{2.5}$. The highest concentration is predicted to be 9.9µg/m^3 within the 1 x 1km grid square with the centroid grid reference of 396500, 223500. This grid square is located north-east of Cheltenham adjacent to the B4632 Prestbury Road where the PM secondary fraction (formed from gaseous pollutants), constitutes as the key contributor to $PM_{2.5}$.

The Public Health Outcomes Framework[6] data tool complied 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%.

[5] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017

[6] Public Health Outcomes Framework, Public Health England. data tool available online at https://fingertips.phe.org.uk/search/air%20pollution/page-options/ovw-do-0#page/0/gid/1/pat/6/par/E12000009/ati/201/are/E07000078/cid/4/tbm/1/page-options/ovw-do-0

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out the monitoring which has taken place and how it compares with objectives.

Cheltenham Borough Council undertook automatic (continuous) monitoring at 1 site during 2019. Table A.1 in Appendix A shows the detail of the site. 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. National monitoring results are available at https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2001

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 (passive) monitoring of NO_2 at 27 sites inclusive of one triplicate site during 2019. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias[7], “annualisation” (where the data capture falls below 75%), and distance correction[8]. Further details on adjustments are provided in Appendix C.

[7] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[8] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3. Note that the concentration data presented in Table A.3 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).

Cheltenham undertook non-automatic (passive) monitoring of NO_2 at 27 sites during 2019, including a triplicate colocation study (sites 7, 8, and 9). Monitoring at Clarence Parade has been removed and a new diffusion tube site installed at a different point on the same street due to the diffusion tube often going missing at the original location.

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

The annual mean NO_2 concentration was not greater than 60µg/m^3 at any non-automatic monitoring site. Therefore exceedance of the 1-hour mean objective during 2019 at any monitoring location within Cheltenham is considered to be unlikely. Furthermore, the continuous NO_2 monitor present within Cheltenham reported no exceedance of the short term NO_2 1-hour objective throughout 2019, or since 2014.

During 2019, three sites (Sites 4, 5 and 6) reported an exceedance of the NO_2 annual mean AQS objective limit at locations representative of receptors. Five additional sites reported NO_2 annual mean concentrations to be within 10% of the AQS objective, Of these sites, two are within 10% at representative receptors location.

NO2 annual mean concentrations have increased at 19 of 27 sites for which data was also available for 2018. The greatest increase is 3.6µg/m³ at Site 10. The average increase is 1.1µg/m³.

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?	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	Chemiluminescence	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

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
1	Municipal Offices (Front)	Roadside	394757	222320	NO_2	Yes	0	6.5	NO	3.7
2	Municipal Offices (Back)	Roadside	394724	222320	NO_2	Yes	10	4.5	NO	2.7
3	Ladies College	Roadside	394621	222215	NO_2	Yes	0	5.7	NO	2.9
4	2 Gloucester Road	Roadside	394235	223055	NO_2	Yes	2	0.5	NO	2.9
5	422 High St	Roadside	394350	222923	NO_2	Yes	0	1.8	NO	2.9
6	New Rutland	Roadside	394738	222888	NO_2	Yes	0	1.9	NO	2.9
7	Co-location - 1	Roadside	394760	222878	NO_2	Yes	1	2.4	YES	1.3
8	Co-location - 2	Roadside	394760	222878	NO_2	Yes	1	2.4	YES	1.3
9	Co-location - 3	Roadside	394760	222878	NO_2	Yes	1	2.4	YES	1.3
10	2 Swindon Road	Kerbside	394830	222845	NO_2	Yes	1	2.1	NO	2.9
11	Portland Street	Roadside	395110	222670	NO_2	Yes	1	1.6	NO	3.1
12	Winchcombe/Fairview	Roadside	395210	222618	NO_2	Yes	1	3.2	NO	3.1
13	Albion Street (outside no. 54)	Kerbside	395207	222465	NO_2	Yes	2	1.2	NO	2.8
14	2 London Road	Roadside	395362	222000	NO_2	Yes	1	3	NO	2.9
15	YMCA - High St	Roadside	395182	222183	NO_2	Yes	5	1.9	NO	3
16	8a Bath Road	Roadside	395146	222149	NO_2	Yes	0	2	NO	3
18	81 London Road	Roadside	395660	221670	NO_2	Yes	0	4.7	NO	2.7

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
19	264 Gloucester Road	Roadside	393296	222170	NO_2	Yes	0	0.8	NO	2.5
20	340 Gloucester Road	Roadside	392912	221862	NO_2	Yes	0	3.6	NO	2.8
21	14 Imperal Square	Roadside	394809	222060	NO_2	Yes	5	0.4	NO	2.8
22	Hatherley Lane	Roadside	391178	221641	NO_2	Yes	0	3.7	NO	2.8
23	St James Square	Roadside	394577	222424	NO_2	Yes	4	0.5	NO	2.8
24	St Gregorys Church	Roadside	394566	222600	NO_2	Yes	7	1.4	NO	2.9
25	St Georges Street	Roadside	394708	222763	NO_2	Yes	2.3	0.4	NO	2.95
26	St Pauls Road	Roadside	394902	223004	NO_2	Yes	1.5	1.1	NO	2.9
27	St Lukes College Road	Roadside	395156	221866	NO_2	Yes	2.3	0.6	NO	2.85
28	Princess Elizabeth Way North	Roadside	393081	223643	NO_2	Yes	1	1.2	NO	2.9
29	Princess Elizabeth Way South	Roadside	392066	222540	NO_2	Yes	9.5	1.3	NO	2.8
30	Clarence Parade Alternative Location	Roadside	394810	222439	NO_2	Yes	1	0.4	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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
CM1	394760	222878	Kerbside	Automatic	97.3	97.3	35.0	34.0	36.0	32.7	36.0
1	394757	222320	Roadside	Diffusion Tube	100.0	100.0	-	-	26.4	22.9	23.8
2	394724	222320	Roadside	Diffusion Tube	100.0	100.0	-	-	32.9	28	27.6
3	394621	222215	Roadside	Diffusion Tube	100.0	100.0	36.6	33.8	32.8	27.5	29.6
4	394235	223055	Roadside	Diffusion Tube	100.0	100.0	**46.5**	**43.2**	**45.4**	**41.2**	**43.1**
5	394350	222923	Roadside	Diffusion Tube	100.0	100.0	**47.3**	**45.5**	**49.9**	**45.2**	**46.5**
6	394738	222888	Roadside	Diffusion Tube	100.0	100.0	**42.4**	**40.8**	**41.6**	37.9	**40.3**
7	394760	222878	Roadside	Diffusion Tube	91.7	91.7	34.6	33.3	36.4	32.9	35.1
8	394760	222878	Roadside	Diffusion Tube	100.0	100.0					
9	394760	222878	Roadside	Diffusion Tube	100.0	100.0					
10	394830	222845	Kerbside	Diffusion Tube	91.7	91.7	37.9	38.2	39.4	35.6	39.2
11	395110	222670	Roadside	Diffusion Tube	100.0	100.0	36.8	35.7	35.9	32.6	34.1
12	395210	222618	Roadside	Diffusion Tube	100.0	100.0	33.0	32.2	32.8	31.8	34.4
13	395207	222465	Kerbside	Diffusion Tube	100.0	100.0	-	-	34.8	31.3	30.4
14	395362	222000	Roadside	Diffusion Tube	100.0	100.0	**40**	38	37.1	37.4	37.4

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
15	395182	222183	Roadside	Diffusion Tube	100.0	100.0	34.5	32.9	31.9	29.1	28.5
16	395146	222149	Roadside	Diffusion Tube	100.0	100.0	**41.1**	38.4	38	34.5	34.4
18	395660	221670	Roadside	Diffusion Tube	91.7	91.7	**41.4**	**39.6**	38.4	37.3	37.6
19	393296	222170	Roadside	Diffusion Tube	83.3	83.3	**36.7**	32.2	34.4	30.6	33.4
20	392912	221862	Roadside	Diffusion Tube	100.0	100.0	38.7	35.9	38.6	35.3	36.2
21	394809	222060	Roadside	Diffusion Tube	100.0	100.0	-	-	-	23.4	23.9
22	391178	221641	Roadside	Diffusion Tube	75.0	75.0	-	-	-	34.9	33.4
23	394577	222424	Roadside	Diffusion Tube	100.0	100.0	-	-	-	30.9	32.6
24	394566	222600	Roadside	Diffusion Tube	91.7	91.7	-	-	-	27.9	25.1
25	394708	222763	Roadside	Diffusion Tube	100.0	100.0	-	-	-	31.9	31.6
26	394902	223004	Roadside	Diffusion Tube	100.0	100.0	-	-	-	29.0	31.3
27	395156	221866	Roadside	Diffusion Tube	91.7	91.7	-	-	-	24.8	27.6
28	393081	223643	Roadside	Diffusion Tube	100.0	100.0	-	-	-	38.4	38.2
29	392066	222540	Roadside	Diffusion Tube	100.0	100.0	-	-	-	31.2	33.7
30	394810	222439	Roadside	Diffusion Tube	77.8	58.3	-	-	-		31.6

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

☒ **Annualisation has been conducted where data capture is <75%**

☒ **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 adjustment**

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.**

(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%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations (Sites CM1 – 14)

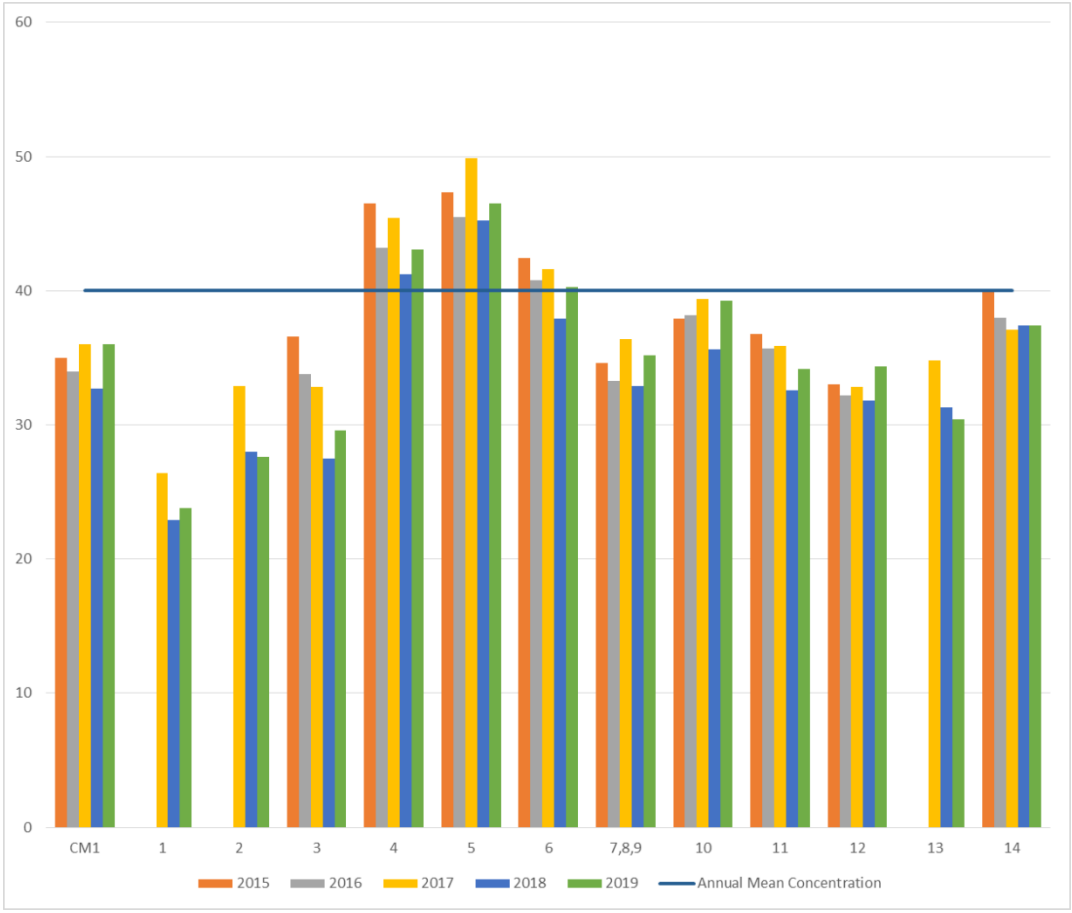


Figure A.2 – Trends in Annual Mean NO_2 Concentrations (Sites 15 – 30)

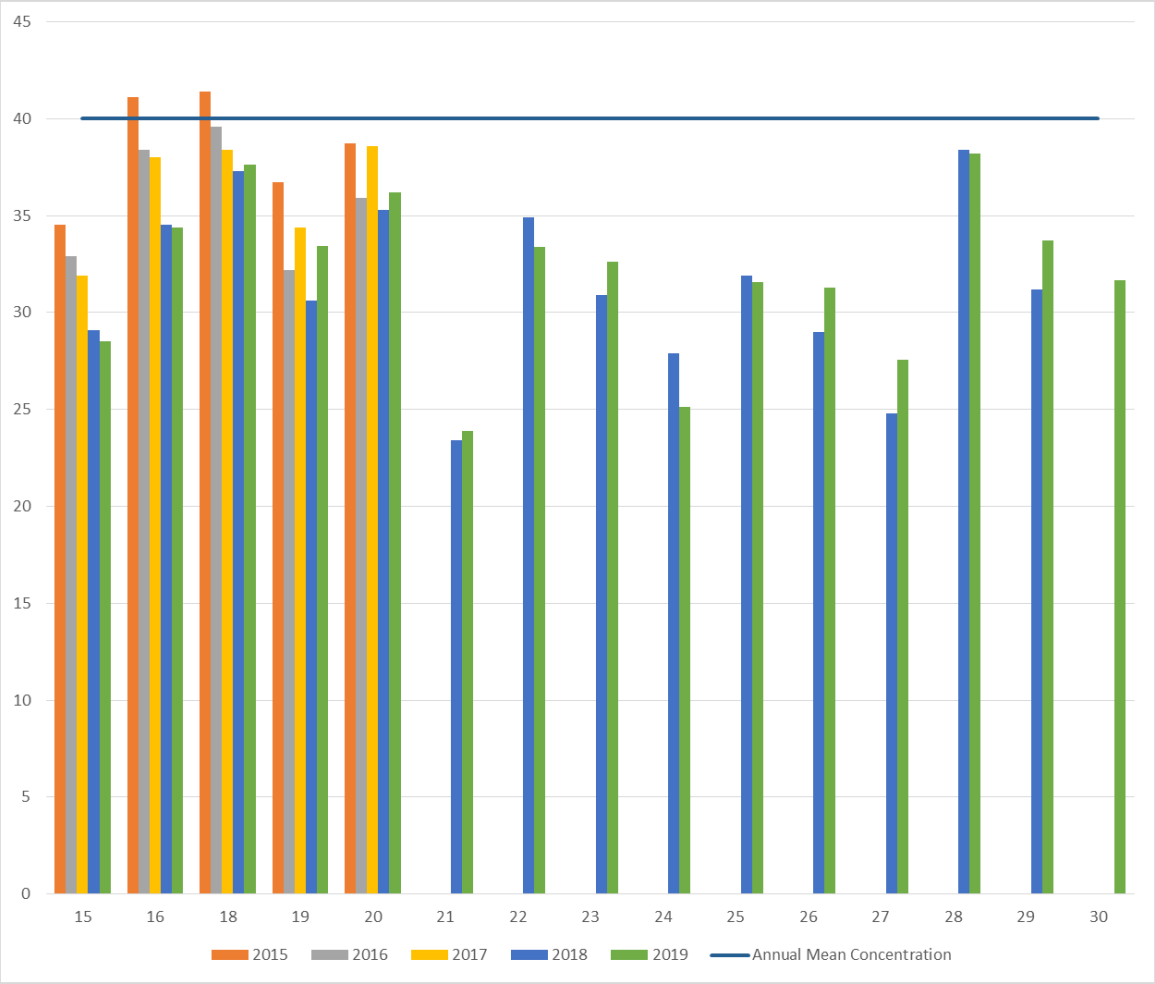


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
							2015	2016	2017	2018	2019
CM1	394760	222878	Kerbside	Automatic	97.3	97.3	0	0	0	0	0

Notes:

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.**

(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%).

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

Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO_2 Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations ($\mu g/m^3$)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.99) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
Site 1	394757	222320	34.0	29.7	28.6	16.5	18.9	18.9	17.3	18.3	21.5	26.2	31.2	27.6	24.0	23.8	
Site 2	394724	222320	37.3	32.0	27.9	31.0	23.2	22.1	20.8	19.3	24.3	25.2	41.1	30.8	27.9	27.6	
Site 3	394621	222215	36.7	36.8	33.5	25.4	25.9	24.7	24.2	24.9	26.7	30.3	37.0	32.8	29.9	29.6	
Site 4	394235	223055	53.5	55.9	43.6	39.2	37.5	35.6	38.5	36.9	39.7	40.3	52.5	48.8	43.5	43.1	41.5
Site 5	394350	222923	55.4	57.6	52.3	45.1	44.8	38.6	43.0	40.6	42.6	42.3	54.6	47.2	47.0	46.5	
Site 6	394738	222888	50.8	52.3	43.6	37.9	36.0	31.8	33.2	35.6	38.5	40.7	43.0	44.6	40.7	40.3	
Site 7	394760	222878	40.7	43.4	41.2	31.4	30.7	37.2	33.7	30.5		33.9	42.4	36.1	36.5	35.1	
Site 8	394760	222878	43.5	36.7	32.9	33.7	35.1	28.7	33.5	29.4	31.0	31.1	40.0	34.3	34.2		
Site 9	394760	222878	47.5	40.0	38.6	35.1	32.4	32.3	30.9	31.7	36.0	33.5	41.2	34.4	36.1		
Site 10	394830	222845	48.9		42.1	36.3	34.9	30.9	29.5	29.8	31.3	35.1	46.7	70.5	39.6	39.2	34.0
Site 11	395110	222670	38.5	42.3	34.6	39.4	29.1	27.8	29.1	25.3	34.1	33.9	45.7	34.0	34.5	34.1	
Site 12	395210	222618	47.2	46.5	36.5	32.2	25.8	28.1	26.6	27.1	31.1	34.9	41.9	38.6	34.7	34.4	
Site 13	395207	222465	41.4	36.9	32.9	28.4	26.7	25.1	21.7	23.3	29.1	29.8	42.7	30.9	30.7	30.4	
Site 14	395362	222000	43.0	41.1	34.6	45.8	34.3	35.0	34.0	28.7	35.8	37.8	49.2	34.0	37.8	37.4	32.6
Site 15	395182	222183	37.5	35.3	30.8	29.0	23.8	25.9	23.3	21.5	24.9	27.9	35.9	29.7	28.8	28.5	

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.99) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
Site 16	395146	222149	44.6	41.8	34.4	36.0	29.9	31.6	29.9	28.1	31.5	34.9	37.6	36.6	34.7	34.4	
Site 18	395660	221670	42.7	51.1	34.4	39.2	32.8	36.5	34.7	31.1	33.1		41.5	41.0	38.0	37.6	
Site 19	393296	222170	44.7	40.2	38.5	26.7	29.3	27.5	29.4	29.2	31.1		41.1		33.8	33.4	
Site 20	392912	221862	47.1	47.3	39.4	38.6	26.6	32.4	30.8	27.8	32.3	33.9	43.9	38.7	36.6	36.2	
Site 21	394809	222060	34.5	28.1	21.4	27.0	18.8	21.4	17.1	15.3	21.2	24.5	35.6	24.8	24.1	23.9	
Site 22	391178	221641	44.3	36.8	39.0		27.6			23.1	30.8	32.7	38.3	31.0	33.7	33.4	
Site 23	394577	222424	42.4		33.2	28.9	27.0	28.4	27.9	29.3	27.7	34.1	39.5	34.4	32.9	32.6	
Site 24	394566	222600	39.0		24.4	25.3	19.2	20.3	19.7	17.2	22.3	28.4	34.0	29.2	25.4	25.1	
Site 25	394708	222763	40.9	38.1	31.8	34.8	25.3	29.4	26.8	21.9	30.7	31.9	37.7	33.2	31.9	31.6	
Site 26	394902	223004	45.7	38.6	33.7	27.0	25.0	24.9	25.6	21.6	28.0	36.9	37.0	34.8	31.6	31.3	
Site 27	395156	221866	31.8	31.6	26.2	27.7	23.7	25.6	22.6	22.9		29.8	35.0	29.3	27.8	27.6	
Site 28	393081	223643	53.8	50.5	39.4	41.3	37.0	34.5	36.7	26.2	37.5	24.2	41.5	40.3	38.6	38.2	37.1
Site 29	392066	222540	45.9	42.9	34.9	34.9	25.1	30.0	26.3	20.7	27.4	40.2	43.9	36.5	34.1	33.7	
Site 30	394810	222439				25.3	24.5		23.0	22.0	27.5	33.6		33.3	27.0	31.6	

☒ Local bias adjustment factor used

☐ National bias adjustment factor used

☒ Annualisation has been conducted where data capture is <75%

☒ Where applicable, data has been distance corrected for relevant exposure in the final column

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.**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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

Diffusion Tube Local Bias Adjustment Factors

Cheltenham Council operate one continuous NO_2 analyser (CM1) that has a triplicate site of diffusion tubes co-located at the monitoring site. A local bias adjustment factor has been calculated for the location using the Precision and Bias adjustment spreadsheet (v04) as completed by Cheltenham Borough Council, the output is presented below in Figure C.1.

Figure C.1 – Local Bias Correction Output: St George's Street (Tubes 7/8/9)

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	09/01/2019	07/02/2019	40.70	43.49	47.51	44	3.4	8	8.5	45.4	92.6	Good	Good
2	07/02/2019	07/03/2019	43.37	36.67	39.99	40	3.4	8	8.3	40.1	95.7	Good	Good
3	07/03/2019	03/04/2019	41.19	32.90	38.59	38	4.2	11	10.5	35.9	88.2	Good	Good
4	03/04/2019	01/05/2019	31.36	33.72	35.11	33	1.9	6	4.7	37.1	98.2	Good	Good
5	01/05/2019	05/06/2019	30.67	35.12	32.45	33	2.2	7	5.6	32	99.6	Good	Good
6	05/06/2019	03/07/2019	37.18	28.70	32.33	33	4.3	13	10.6	29	99.6	Good	Good
7	03/07/2019	07/08/2019	33.70	33.46	30.93	33	1.5	5	3.8	29	96.4	Good	Good
8	07/08/2019	04/09/2019	30.48	29.42	31.74	31	1.2	4	2.9	26	99.7	Good	Good
9	04/09/2019	02/10/2019		31.04	35.95	33	3.5	10	31.2	29	99.9	Good	Good
10	02/10/2019	06/11/2019	33.89	31.09	33.47	33	1.5	5	3.8	36	99.5	Good	Good
11	06/11/2019	04/12/2019	42.37	40.03	41.20	41	1.2	3	2.9	45.3	99.7	Good	Good
12	04/12/2019	08/01/2020	36.10	34.27	34.42	35	1.0	3	2.5	37.9	96.4	Good	Good
13													

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey --> Good precision | Good Overall DC

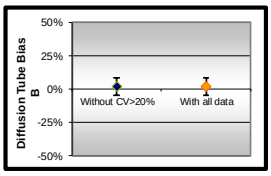
Site Name/ ID:	Cheltenham Borough Council

Precision: 12 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.99 (0.93 - 1.06)
Bias B	1% (-6% - 7%)
Diffusion Tubes Mean:	36 µgm^{-3}
Mean CV (Precision):	7
Automatic Mean:	35 µgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	35 (33 - 38) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.99 (0.93 - 1.06)
Bias B	1% (-6% - 7%)
Diffusion Tubes Mean:	36 µgm^{-3}
Mean CV (Precision):	7
Automatic Mean:	35 µgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	35 (33 - 38) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Diffusion Tube National Bias Adjustment Factor

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 2019 national bias adjustment factor for Gradko 20% TEA in water is 0.92, based on 30 studies, as derived from the national bias adjustment factor spreadsheet.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 06/20

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 September 2020
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[1]. If uncertain what to do then contact the Local Air Quality Management Helpdesk LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2019	R	Blackburn with darwen Borough Council	10	29	21	36.9%	G	0.73
Gradko	20% TEA in water	2019	R	Cheshire West and Chester	12	39	38	2.0%	G	0.98
Gradko	20% TEA in water	2019	R	Cheshire West and Chester	11	34	34	-2.1%	G	1.02
Gradko	20% TEA in water	2019	R	Gedling Borough Council	12	32	30	7.3%	G	0.93
Gradko	20% TEA in water	2019	R	NOTTINGHAM CITY COUNCIL	10	37	40	-7.0%	G	1.07
Gradko	20% TEA in water	2019	R	Bedford Borough Council	11	29	29	-1.0%	G	1.01
Gradko	20% TEA in water	2019	R	Bedford Borough Council	12	37	32	13.0%	G	0.89
Gradko	20% TEA in water	2019	KS	Marylebone Road Intercomparison	12	85	65	30.1%	G	0.77
Gradko	20% TEA in water	2019	R	Borough Council of King's Lynn and West No	9	27	21	28.4%	G	0.78
Gradko	20% TEA in water	2019	R	Lancaster City Council	13	40	34	16.4%	G	0.86
Gradko	20% TEA in water	2019	R	Lancaster City Council	12	31	31	1.6%	G	0.98
Gradko	20% TEA in Water	2019	R	Monmouthshire County Council	12	39	39	1.3%	G	0.99
Gradko	20% TEA in water	2019	R	Dudley MBC	12	33	32	4.5%	G	0.96
Gradko	20% TEA in water	2019	R	Dudley MBC	12	44	42	3.9%	G	0.96
Gradko	20% TEA in water	2019	UB	Dudley MBC	12	23	19	19.8%	G	0.83
Gradko	20% TEA in water	2019	UB	Eastleigh Borough Council	12	24	26	-7.1%	G	1.08
Gradko	20% TEA in water	2019	R	Gateshead Council	12	34	27	23.7%	P	0.81
Gradko	20% TEA in water	2019	R	Gateshead Council	11	40	44	-10.5%	G	1.12
Gradko	20% TEA in water	2019	R	Gateshead Council	10	32	34	-7.2%	G	1.08
Gradko	20% TEA in water	2019	R	Gateshead Council	12	30	25	18.1%	G	0.85
Gradko	20% TEA in water	2019	R	Thurrock Borough Council	12	29	24	21.6%	G	0.82
Gradko	20% TEA in water	2019	R	Brighton & Hove City Council	11	45	46	-1.3%	G	1.01
Gradko	20% TEA in water	2019	R	Belfast City Council	12	40	33	21.0%	G	0.83
Gradko	20% TEA in water	2019	R	Belfast City Council	12	44	45	-2.2%	G	1.02
Gradko	20% TEA in water	2019	R	Belfast City Council	12	28	26	5.4%	G	0.95
Gradko	20% TEA in water	2019	UB	Southampton City Council	12	30	28	8.6%	G	0.92
Gradko	20% TEA in water	2019	UB	Liverpool City Council	12	20	19	1.7%	G	0.98
Gradko	20% TEA in water	2019	R	Ards and North Down Borough Council	12	33	25	31.1%	G	0.76
Gradko	20% TEA in water	2019	R	Eastleigh Borough Council	12	25	26	-3.3%	G	1.03
Gradko	20% TEA in water	2019	R	Lisburn & Castlereagh City Council	12	28	22	28.3%	G	0.78
Gradko	20% TEA in water	2019		Overall Factor[3] (30 studies)				Use		0.92

Discussion of Choice of Bias Adjustment Factor to Use

The diffusion tube data has been corrected using a bias adjustment factor, which is an estimate of the difference between diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring. The Defra LAQM.TG(16) 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.

The local bias adjustment factor (0.99) has been used to adjust the 2019 diffusion tube data. The automatic monitor and co-located diffusion tubes all had good overall data capture for the period, whilst the diffusion tubes had good precision throughout.

QA/QC of Automatic Monitoring

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.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes for 2019 were supplied and analysed by Gradko using the 20% TEA in water preparation method. All results have been bias adjusted where required before being presented in Table A.3. 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 lab follows the procedures set out in the Harmonisation Practical Guidance In the latest available AIR-PT results, AIR-PT Rounds 24 to 34 (January 2018 to November 2019), AIR-PT Rounds 22 to 33 (September 2017 to August 2019), AIR-PT Rounds 21 to 31 (July 2017 to May 2019) and AIR-PT Rounds 19 to 30 (April 2017 to February 2019). Gradko has scored 100% on all results in 2019 apart from AirPT AR030 (Jan - Feb 2019) which scored 75%. The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$. All Local Authority co-location studies in 2019 were 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%).

Short-term to Long-term Data Adjustment

In regards to the 2019 diffusion tube data set, annualisation was required at one diffusion tube location 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) using the LAQM annualisation tool and full working details are presented in Table C.1 to Table C.2.

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 and have a data capture of 85% or above. The monitoring sites that were used are listed in Table C.1 and the calculations shown in Table C.2.

Table C.1 – AURN Monitoring Stations used for Annualisation

Pollutant	Background AURN Sites used for Annualisation
NO_2	1. Swindon Walcot – Urban Background 2. Oxford St Ebbes – Urban Background 3. Leominster – Suburban Background

Table C.2- Annualisation of NO_2 Data Recorded at Site 30

Diffusion Tube ID	Annualisation Factor Swindon Walcot	Annualisation Factor Oxford St Ebbes	Annualisation Factor Leominster	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)
30	1.2186	1.1792	1.1504	1.1827	27.0	32.0

Fall-off With Distance Correction

In accordance with TG(16); Section 7.78, distance correction calculations have been applied using the NO_2 fall-off with distance calculator. Sites 4, 10 and 28 were corrected as the annual mean was within 10% of the AQS. Details of the correction are tabulated below.

Table C.3- Fall off with Distance Calculations (Post Bias Adjustment)

Site Name/ID	Distance (m)		NO_2 Annual Mean Concentration (µg/m^3)		
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site (Bias Adjusted)	Predicted at Receptor
4	2	2.5	13.5	**43.1**	**41.5**
10	1	3.1	16.4	39.2	34.0
14	1	3	15.5	37.4	32.6
28	1	2.2	15.2	38.2	34.5

New Sources of Pollution

The following developments were approved in 2019 which have the potential to increase pollutant levels within the district.

19/02009/FUL - Vibixa Works, Kingsditch Lane, Cheltenham, Gloucestershire GL51 9ND

Planning permission was granted for Re-development of site to provide 14no. commercial and industrial units within Use Classes B1(c), B2, and B8, with ancillary trade uses, first floor mezzanines, and associated access, parking, and landscaping. An air quality assessment was supported as part of the application which concluded that effects would not be significant

19/01285/FUL - 27 - 33 Swindon Road, Cheltenham, Gloucestershire, GL50 4AH

Planning permission was granted for: sub-division of existing Use Class A1 retail unit to create two Class A1 units, internal and external refurbishment of building to provide new entrances, shopfronts and other openings, re-cladding elevations, relocation of delivery dock and plant area, re-arrangement of car park and associated works following minor demolition works to the existing building and removal of existing trees and hedges. An air quality assessment was supported as part of the application which concluded that effects would not be significant.

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Borough-Wide AQMA

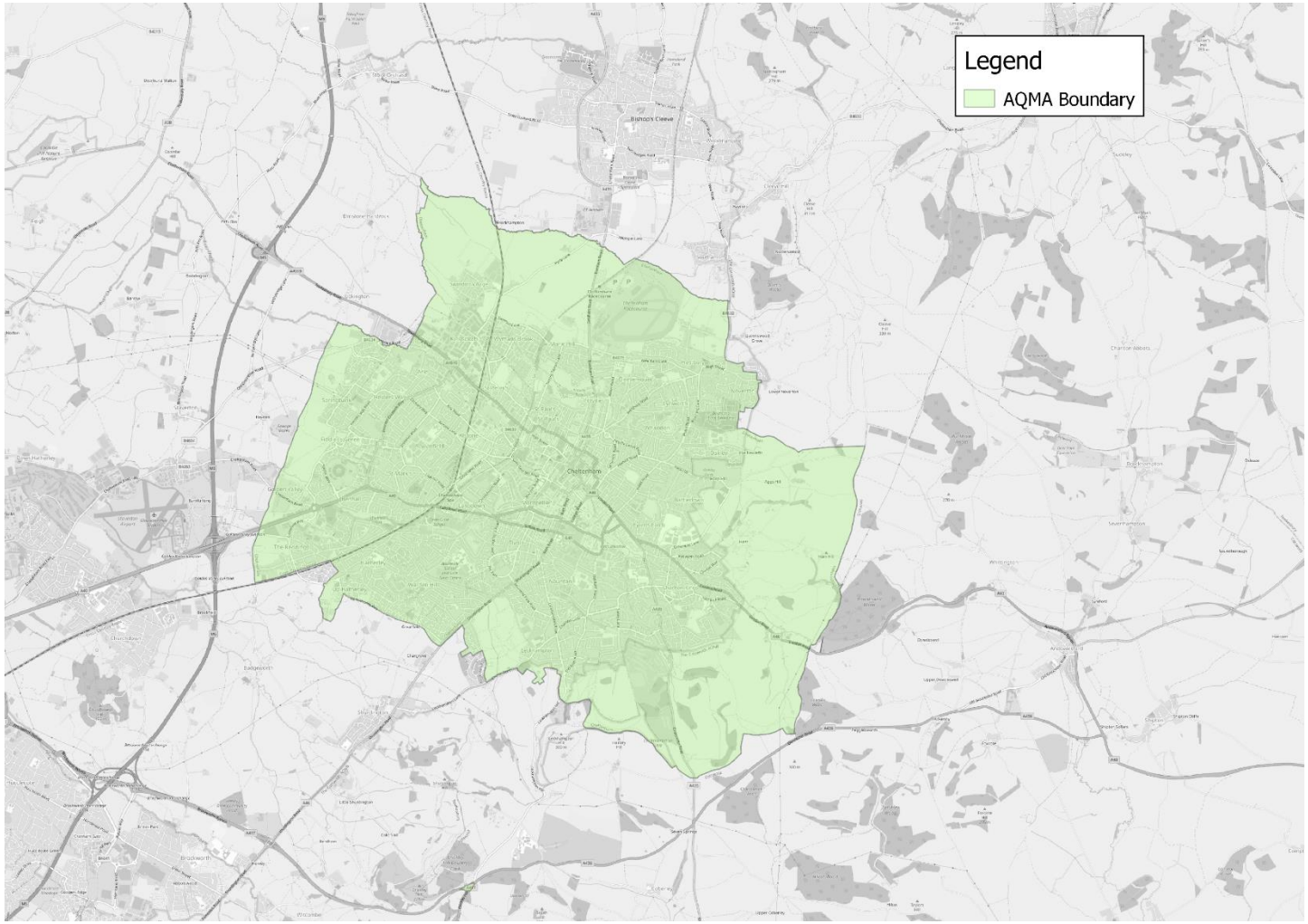
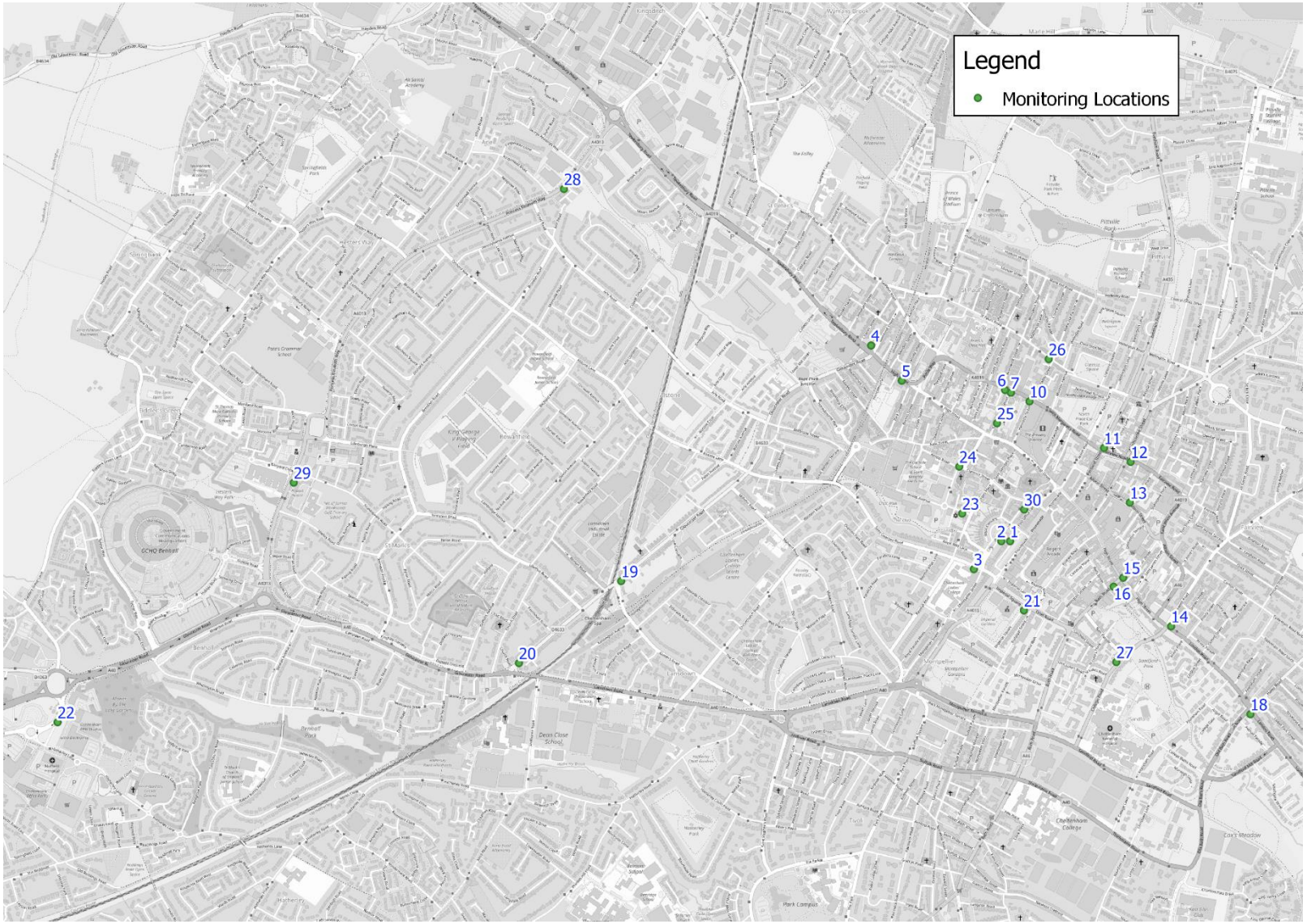


Figure D.2 – Monitoring Locations within AQMA



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[9]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality 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 (micrometres or microns) 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
CBC	Cheltenham Borough Council

References

- Local Air Quality Management Technical Guidance LAQM.TG(16). February 2018. 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.PG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland;
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/19 published in March 2019;
- Cheltenham Borough Council Annual Status Report 2019;
- Cheltenham Borough Council Detailed Modelling Assessment 2019; and,
- Cheltenham Borough Council AQAP 2014.