CHELTENHAM
BOROUGH COUNCIL

2016 Air Quality Annual Status Report (ASR)

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

January 2017

Local Authority Officer	Andrew Nunn, Senior Environmental Health Officer
Department	Public Protection
Address	Cheltenham Borough Council, Promenade, Cheltenham GL50 9SA
Telephone	01242 264358
E-mail	andrew.nunn@cheltenham.gov.uk
Report Reference number	ASR 2016 – V1.1
Date	31st January 2017

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].

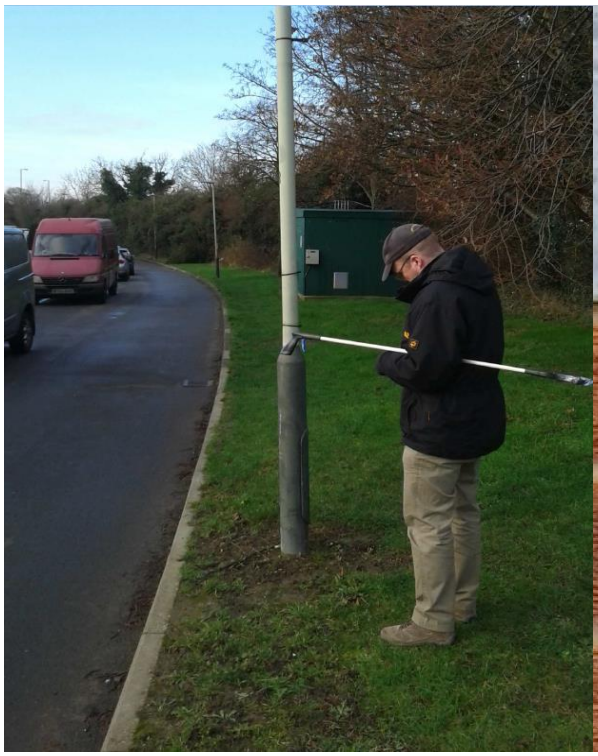
The main air quality issues within the borough of Cheltenham are almost exclusively as a result of vehicular emissions in distinct town centre locations.

There are limited sources of emissions from permitted industrial/commercial processes within the borough but these are located outside the town centre and are not a contributory factor regarding those areas coming near to, or failing, the air quality objective limit values. There have been no new major sources of emissions.

The principal pollutant of concern is Nitrogen Dioxide, from vehicle emissions. Other pollutants, for example Particulate Matter and Ozone, have historically been measured by roadside monitoring equipment, but protracted measurement over many years has shown that those pollutants come below the limit values. For that reason measurement of those pollutants has been discontinued.

Nitrogen dioxide has been measured in Cheltenham since 1996. This was carried out by affixing passive measuring devices (commonly known as “NOx tubes”) throughout the borough, at various roadside locations.

[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



The Council was then able to build up a picture of the worst air pollution areas in Cheltenham as a result of vehicular traffic.

In addition to the passive measuring devices around the town, a real-time roadside monitoring instrument was installed in August 2011 to record nitrogen dioxide levels at a location with relevant exposure. Data from this installation is compared with data obtained from co-located diffusion tubes.

Each year the Council is obliged to report its annual findings to DEFRA, in particular to state how many of its annualised readings breached the air quality objective limits.

The annual monitoring of Nitrogen Dioxide over previous years has shown marginal fluctuation in those results. This is mainly due to differing temperature and weather conditions from year to year (particularly cold spells increase NO2 results) whilst vehicular traffic flows have remained fairly constant.

This indicates is that traffic remains the main problem in the town centre, and this cannot be easily addressed.

The poor air quality in central Cheltenham resulted in the declaration of the whole Borough, in 2011, as an Air Quality Management Area (AQMA).

The poor air quality is almost solely as a result of vehicular activity within the town centre area. Areas outside of the town centre consistently meet the air quality objectives.

In order to address the failures of the air quality objectives at a small number of distinct locations an Air Quality Action Plan was required.

Continued monitoring during 2015 showed an increase in nitrogen dioxide (NO2) levels compared to 2014 levels. The annual mean nitrogen dioxide levels at eleven locations were still being exceeded in 2015 which means the existing AQMA declaration remains justified.

Actions to Improve Air Quality

The Cheltenham Air Quality Action Plan was released in April 2014 and proposed 20 separate initiatives. These mainly consisted of promoting alternative modes of travel, various traffic/highway measures, and a change to Planning Policy.

Some of the above initiatives are currently being addressed both separately and jointly at County and District level. 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 below, within the main body of the report.

Local Priorities and Challenges

The Local Priority is to continue working with the County Council and other partners to continually look at further ways to bring Air Quality within limit values. Various traffic schemes are proposed for 2016 and 2017 which may have a measureable effect on the worst air quality areas within the town centre. There are funding and resource challenges to overcome before some initiatives can be implemented.

How to Get Involved

Members of the public can do their bit by choosing alternative means of transport, particularly in the winter months. Firstly, think…

“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.

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 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 the parents of their students to encourage their children to walk or cycle to school and leave the car at home.

User greener and cleaner vehicles (Electric Vehicles, Hybrid, LPG, etc.)

Lead by example and champion better Air Quality.

Table of Contents

List of Tables

List of Figures

1 Local Air Quality Management

This report provides an overview of air quality in Cheltenham during 2016. 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 can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

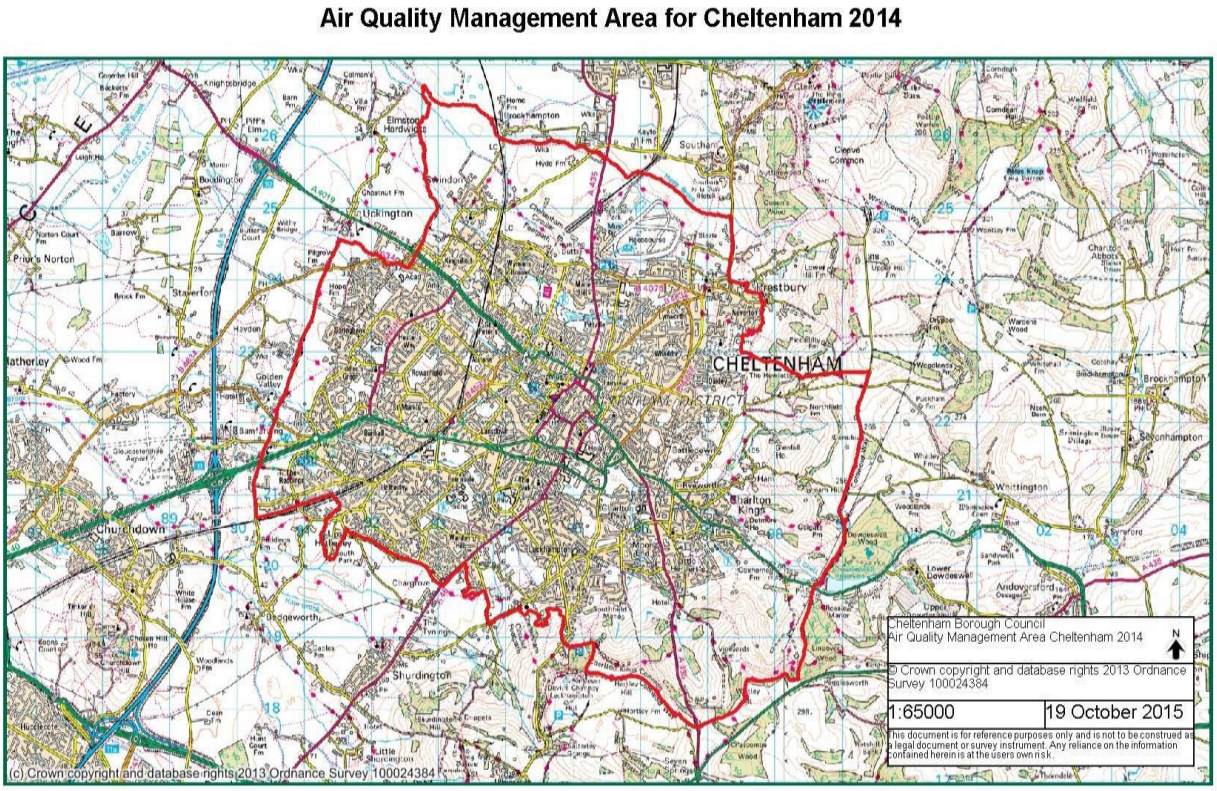
Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

Subsequent monitoring since 1996 highlighted several distinct areas of exceedance of EU limit values in the town centre due to road traffic. This led to the declaration in 2008 of a section of Bath Road/High Street as an Air Quality Management Area (AQMA).

Fig 2.1 Air Quality Management Area 2008

It was decided in 2011, as several other distinct town centre locations were also requiring individual declaration as AQMAs, that instead of several small AQMAs the whole of the Borough Council area would be declared as an AQMA.

Fig 2.2 Air Quality Management Area declared in 2011



The declaration of the whole of the Borough does not mean that areas outside the town centre have poor air quality. Far from it. The levels are reasonably good and almost all monitoring of Nitrogen Dioxide levels in the Borough come well within EU limit values.

Information on the Air Quality Management Area in Cheltenham can be found here https://www.cheltenham.gov.uk/info/66/environmental_protection_and_pollution/288/air_quality/3

Of the areas monitored, approximately 6 distinct locations still give cause for concern, year-on-year, regarding annual failure of EU limit values for Nitrogen

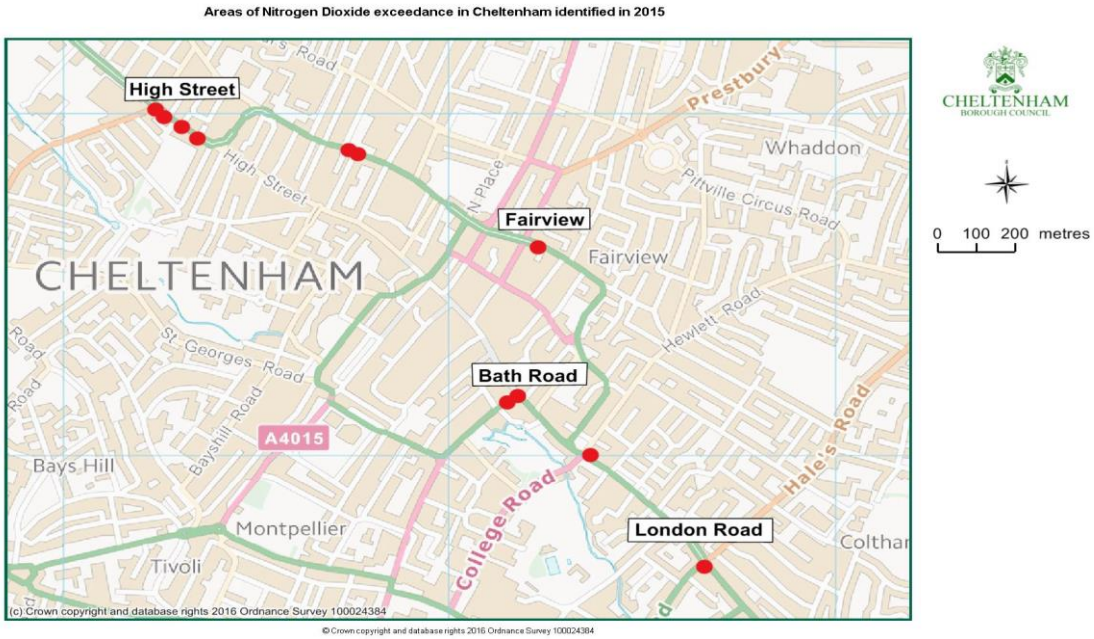
Dioxide. The other locations are used to monitor representative background levels in areas outside of the town centre, and also where the Council might see some change in traffic load due to development or change in road layout and establish limits of failure.

The remaining Air Quality hotspots are

- the lower high street, from its junction with Poole Way up to and including the junction at Gloucester Road
- parts of the A4019 looping to the north perimeter of the town centre (in particular Swindon Road and Fairview)
- where the Upper High Street turns into Bath Road (towards the east of the town centre)
- the busy traffic light junction at the intersection of London Road, College Road, Hewlett Road and High Street

As can be seen this is the route of traffic from the west or east coming into and arriving at the town centre, either to park within the town centre area or skirting it to the north, and then leaving it at Tewkesbury Road or London Road.

Fig 2.3 Locations of Nitrogen Dioxide exceedences in Cheltenham in 2015



A summary of AQMAs 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://www.cheltenham.gov.uk/info/66/environmental_protection_and_pollution/288/air_quality

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Cheltenham Borough Council Air Quality Management Area	NO_2 annual mean	Cheltenham	The whole of the Cheltenham Borough Council area, amalgamating several earlier, separate AQMAs	Air Quality Action Plan 2014 https://www.cheltenham.gov.uk/downloads/file/3780/air_quality_action_plan_2014

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

A range of proposals were highlighted within the Council's Air Quality Action Plan, which includes trying to encourage drivers to use alternative modes of travel (walking, cycling, etc.), or to alter traffic flow direction to ease congestion.

Cheltenham Borough Council has taken forward a number of measures during the current reporting year of 2015 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 Cheltenham Air Quality Action Plan, here: https://www.cheltenham.gov.uk/downloads/file/3780/air_quality_action_plan_2014

Key completed measures are:

Promotion of Personalised Travel Plans (PTP's) - The promotion of Personalised Travel Plans (PTP's) targeted individuals directly by actively promoting and developing alternative travel options for them to allow a change in their transport behaviour. It aimed to obtain a 10% shift away from car travel, hoping to achieve a bigly reduction of 365,000 less car journeys per annum. This initiative was implemented by Gloucestershire County Council. Further funding would be required to continue coverage of PTPs across the town and refresh the work carried out in 2013 in South Cheltenham as part of the Local Sustainable Transport Fund.

"Bike-It" Officer – A Transport Projects ("Bike-It") Officer was appointed by Gloucestershire County Council to work in a number of schools across Cheltenham between 2013 until 2015 with the aim of encouraging parents and children to cycle and walk to school where possible. This aimed to reduce the number of school run car trips and help to reduce congestion in Cheltenham during term-time. As a result of this work to date 59% of children at 'Bike-It' schools travel 'actively'.

Certain measures are ongoing and need to adapt to changing local conditions. These include:

Highway improvements

The Cheltenham Transport Plan, jointly addressed by both the Borough and County Councils looks at changing traffic flows. A range of highway amendments have taken place and others planned, subject to traffic regulation orders, to improve traffic flow and improve cycle and pedestrian provision within Cheltenham. It is proposed to allow 2-way traffic at certain junctions in town to "break the stranglehold of the ring-road" and allow easier access to car parks at point of entry to the town. These changes will allow the removal of through traffic at Boots Corner although it will remain open for buses. There will be a period of air monitoring to assess the impact of this measure. Service vehicles will have restricted access out of peak hours.

Air Quality Information

The Borough Council will continue to provide up to date information on local air quality and air quality forecasts, taking into account the proposed highways

amendments identified above. There will also be links to sustainable travel options on the Cheltenham Borough Council website. This will help to inform and educate visitors to the site and encourage more sustainable travel choices to be made.

Promotion of Park & Ride

The Borough and County Councils continue to promote existing Park & Ride schemes, with improved signage together with significant improvement and expansion of facilities.

Promotion of Greener Vehicles

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.

HGV & LGV restrictions

As part of the Cheltenham Transport Plan Ph4 (Boots Corner) there will be HGV & LGV restrictions to encourage deliveries during the quieter footfall periods of the day to reduce the pedestrian – HGV interface and reduce congestion during peak traffic hours.

Increase Car Sharing

The Council will continue to promote the existing car share website which will be upgraded and re-launched to promote the benefits of car sharing such as reduced single occupancy journeys, reduced costs and lower emissions. Improved roadside signage and flyers will also be provided to encourage car-sharing. This will require promotion through the County's existing Transport Project Officer post.

School Travel Grants

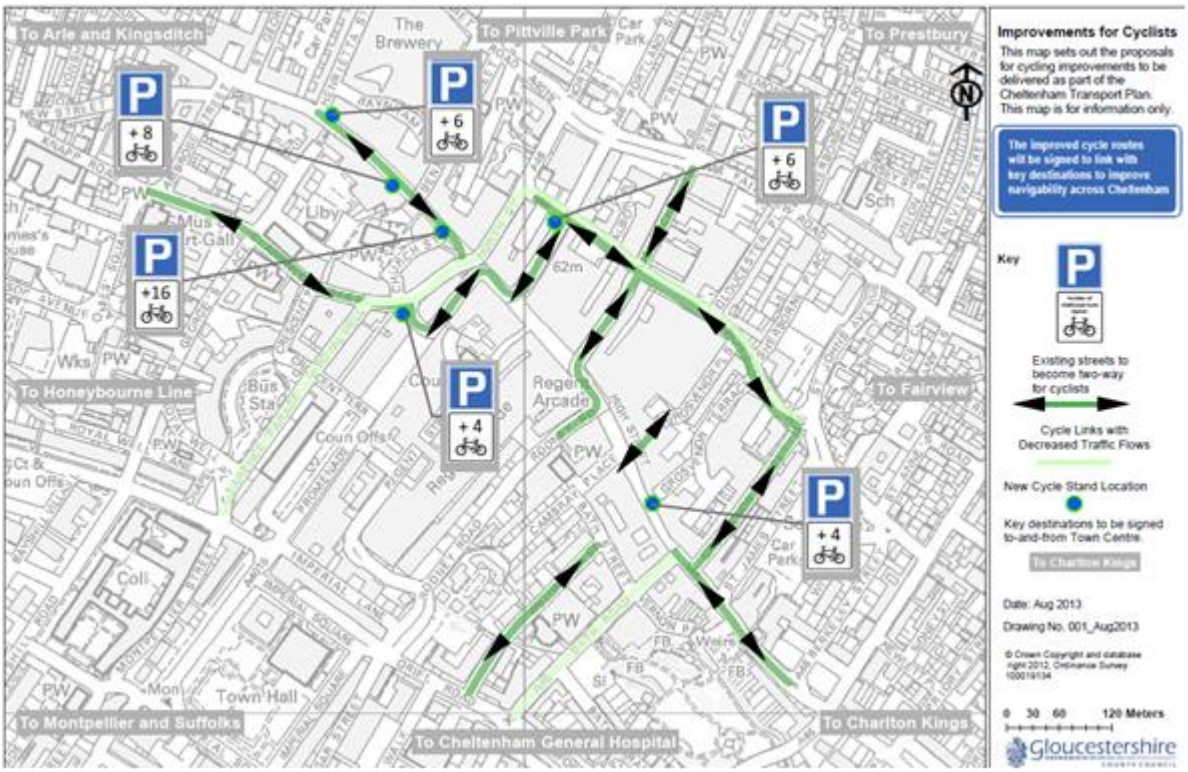
Schools are able to apply for School Travel Grant funding from LSTF for initiatives to encourage more sustainable transport choices by parents, pupils and teachers to reduce the traffic and parking issues during term associated with the 'school run'. 5 schools have applied and received Travel Grants.

Business Travel Grants

Through Business Travel Grants, businesses in Cheltenham will be able to apply for funding from LSTF to fund initiatives to encourage employees and visitors to travel more sustainably. 40 businesses have applied and received Travel Grants.

Wayfinding Initiative

Phase 1 of the Wayfinding Initiative commenced within Cheltenham in 2015. This initiative, set up jointly between CBC, GCC (LSTF) and the University of Gloucestershire looked at improving signage and routing for cyclists and pedestrians across the town which helps to encourage the uptake of cycling and walking. Work is ongoing.



Promote the development of Workplace Travel Plans

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.

Traffic Light appraisal

Following a recent traffic light switch off trial on Swindon Road, Cheltenham Borough Council will work with the County Council to investigate the potential for further traffic light trials with a view to removal of those considered to be non-essential. Evidence suggests that where traffic lights have been removed, traffic often flows better with less congestion thereby reducing air pollution. Under the Cheltenham Transport Plan 5 sets of traffic lights have already been removed.

Bus and Taxi Quality Partnership

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. This was to assist in reducing vehicle emissions. The Council will also look at bus routing and location of bus stops in light of the proposed junction priority changes under the LSTF scheme.

Twenty is Plenty

Cheltenham and Gloucestershire County Council will look at the potential for reducing the 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.

Encourage a low emission bus fleet

Cheltenham Borough Council will continue to encourage the improvement of bus fleets to meet latest Euro emission standards which will assist in reducing emissions and improve air quality. The Council will also investigate the feasibility of using traffic regulation conditions to control bus emissions within Cheltenham AQMA through emission checks.

Promotion of green planting in urban areas

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, which is ongoing and planting as part of street enhancement schemes (particularly through the Cheltenham Transport Plan) scheduled between 2016-2019.

Cycle safety improvements

The Council will encourage as far as possible the improvement of road layouts and associated infrastructure to improve the safety of cyclists in Cheltenham and reduce the potential conflicts between cyclists and other road users. This will help to encourage the uptake of cycling and improve cycle safety at key junctions.

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

Traffic flow changes at North Street and Albion Street, involving changes to the one-way system, to allow traffic from the east of the town to access the nearest car parks without having to drive through, and thereby contribute to, the areas of highest air pollution. This should see a reduction in the number of vehicles from the east using Fairview and Swindon Road.

Cheltenham Borough Council's priorities for the coming years are:

Highway Improvements

The Cheltenham Transport Plan will be implemented in four phases. Phase one will be completed in 2016, Phase 2 in Spring of 2017, Phase 3 and 4 in Autumn 2017.

The Cheltenham High Street Project will commence in the Spring of 2018 and will involve environmental improvements such as planting, drainage work under SUDS, and additional street furniture to encourage walking, such as cycle parking, etc.

There is a Bath Road Safety Scheme also tabled which will look to fund tree planting and SUDS, and will incorporate an enhanced cycle infrastructure.

Further Park and Ride schemes are proposed and will include the new Elmbridge scheme on the outskirts of Gloucester due to complete in 2017, which will assist in reducing car travel to and from Cheltenham. A further scheme at Elms Park, Tewkesbury Road (to the west of Cheltenham) forms part of the Bloor Homes/Persimmon Homes Development, which should come on-line in 2018.

Promotion of greener vehicles will continue. Electric car charging points are due to be installed in 2016 at Cheltenham Railway Station, Regent Arcade & Town Centre East car parks, and on the Promenade in 2017.

Wayfinding Initiative. Phase 2 of this initiative will commence in the Spring of 2017. Additional funding is currently being sourced to engage Phase 3, which would increase coverage to the whole of Cheltenham.

The Cheltenham Borough Council Staff Travel Plan is due to be adopted in 2016, implementation to take place between 2016 and 2019. This will encourage more sustainable transport choices such as bus travel, car-sharing, cycling and walking.

Planning Policy for Air Quality - An Air Quality Policy will be adopted as part of the emerging Cheltenham Local Plan (due 2017-2018), to ensure that air quality impacts of all significant developments are properly assessed and mitigation actions taken where necessary. This will integrate with Cheltenham's Air Quality Action Plan.

A Cheltenham Borough Council 20mph Cabinet Member Working Group will be set up in 2016 to look at the potential for reducing the urban traffic speed limit to 20mph in some areas to reduce congestion and improve traffic flow on busier roads.

Vehicle Management Signage - 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. The County and District Councils will in 2016 jointly bid for funding for the above works. If successful, those works will likely to commence in 2018.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	The Cheltenham Transport Plan	Transport Planning and Infrastructure	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	2013-14	2014-16	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 are others planned, subject to traffic regulation orders, to improve traffic flow and improve cycle and pedestrian provision within Cheltenham. In 4 phases. Phase one completed. Phase 2 in Spring of 2017, Phase 3 and 4 in Autumn 2017.	2016	Vehicle CO2 emissions have been modelled to fall within the inner ring road and core areas of Cheltenham compared to a 'do nothing' approach. It is not known what the impact will be on NO2 levels although a reduction is expected compared to a do nothing approach.
2	Air Quality Information	Public Information	Via the Internet	Cheltenham Borough Council	2014-2015	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	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
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.	2018	Elmbridge scheme on the outskirts of Gloucester due to complete in 2017, which will assist in reducing car travel to and from Cheltenham. A further scheme at Elms Park, Tewkesbury Road (to the west of Cheltenham) forms part of the Bloor Homes/Persimmon Homes Development, which should come on-line in 2018.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
4	Promotion of Personal Travel Plans (PTP)	Promoting Travel Alternatives	Personalised Travel Planning	Gloucestershire County Council	2012	2013-15	Repeat surveys to gauge behaviour change	0.5%	The PTP programme in Cheltenham targeted over 28,000 households between 1st June and 5th October 2013. Results show (on average) a 10% shift away from car travel as a mode share to sustainable travel methods. This was as high as 11% during the week and 9% at weekends. Respondents were also reducing the number of trips they made by all modes of transport. All residents who increased their cycling trips also decreased their car use.	Completed	The promotion of Personalised Travel Plans (PTP's) targets individuals directly by actively promoting and developing alternative travel options for them to allow a change in their transport behaviour. It aims to obtain a 10% shift away from car travel. This is mainly being implemented by the County Council. Further funding is required to continue coverage of PTPs across the town and refresh the work carried out in 2013 in South Cheltenham as part of the Local Sustainable Transport Fund.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5	Bike-it Officer	Promoting Travel Alternatives	Promotion of cycling	Gloucestershire County Council	2012	2013-15	None	< 0.5%	The Bike-it programme actively engaged with a number of schools in Cheltenham and aimed to reduce the percentage of children travelling into school by car, by over 5% and to increase the % of pupils arriving via sustainable travel modes. The programme has seen positive trends with all the schools worked with.	Completed	Difficult to quantify any reductions directly attributable to Bike-it Officer

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
6	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	2013-2015	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).	2015	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 energy free of charge at its car park charging points.
7	HGV Restrictions	Freight and delivery management	Route Management Plans/ Strategic routing strategy for HGV's	Gloucestershire County Council	2014	2015	Traffic count data	< 0.5%	None	2016	As part of the Cheltenham Transport Plan Ph4 (Boots Corner) there will be HGV & LGV restrictions to encourage deliveries during the quieter footfall periods of the day to reduce the pedestrian – HGV interface and reduce congestion during peak traffic hours.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
8	Increased car sharing	Alternatives to private vehicle use	Car & lift sharing schemes	Gloucestershire County Council	2013	2015	Traffic count data	0.1%	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.	2015	The Council's will continue to promote the existing car share website which will be upgraded and re-launched to promote the benefits of car sharing such as reduced single occupancy journeys, reduced costs and lower emissions. Improved roadside signage and flyers will also be provided to encourage car-sharing. This will require promotion through the County's existing Transport Project Officer post.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
9	School Travel Grants	Promoting Travel Alternatives	School Travel Plans	Gloucestershire County Council	2013	2014-15	Uptake of grants	< 0.1%	Travel infrastructure including cycle/scooter stands and hard standing have been installed across Cheltenham at Balcarras School, Pittville School, Greatfield Park Primary School, Springbank Primary Academy, Holy Apostles School and Charlton Kings Junior School to encourage students to use sustainable travel modes.	2015	Schools will be able to apply for School Travel Grant funding from LSTF for initiatives to encourage more sustainable transport choices by parents, pupils and teachers to reduce the traffic and parking issues during term associated with the 'school run'.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
10	Business Travel Grants	Promoting low emission transport	Other	Gloucestershire County Council	2013	2014-15	Uptake of grants	< 0.1%	Grants have been awarded via three rounds of business travel grants to fund schemes such as electric charging points, pool bike schemes, and cycle storage infrastructure and shower/locker facilities at 18 companies across Cheltenham.	2015	Through Business Travel Grants, businesses in Cheltenham will be able to apply for funding from LSTF to fund initiatives to encourage employees and visitors to travel more sustainably.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
11	Wayfinding Initiative	Promoting travel alternatives	Promotion of walking	Gloucestershire County Council	2013	2014-15	None	< 0.1%	Signage installed	2015	Phase 1 of the Wayfinding Initiative commenced within Cheltenham in 2015. This initiative, set up jointly between CBC, GCC (LSTF) and the University of Gloucestershire looked at improving signage and routing for cyclists and pedestrians across the town which helps to encourage the uptake of cycling and walking. Work is ongoing. Phase 2 of this initiative will commence in the Spring of 2017. Additional funding is currently being sourced to engage Phase 3, which would increase coverage to the whole of the town.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
12	Promote workplace travel plans	Promoting travel alternatives	Personalised travel planning	Cheltenham Borough Council	2014	2015	Whether or not a plan is implemented	< 0.1%	None	2015-16	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.
13	Air Quality Planning Policy	Policy guidance and development	Air Quality planning and policy guidance	Cheltenham Borough Council	2013	2015	Air Quality Planning Policy adopted	Unknown but potentially significant - >1%	Planning for Air Quality A good practice guide for Planners and Developers published in March 2013	2015	An Air Quality Policy will be adopted as part of the emerging Cheltenham Local Plan (due 2017-2018), to ensure that air quality impacts of all significant developments are properly assessed and mitigation actions taken where necessary. This will integrate with the Council's AQAP.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
14	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	2015-16	Number of traffic lights removed & traffic count/speed data	Potentially significant at current areas of poor air quality	6 sets of lights currently being appraised	2016	Following a recent traffic light switch off trial on Swindon Road, Cheltenham Borough Council will work with the County Council to investigate the potential for further traffic light trials with a view to removal of those considered to be non-essential. Evidence suggests that where traffic lights have been removed, traffic often flows better with less congestion thereby reducing air pollution. Under the Cheltenham Transport Plan 5 sets of traffic lights have been removed.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
15	Bus and Taxi quality partnership	Promoting low emission transport	Other	Gloucestershire County Council	2014	2015-16	Anecdotal	Unknown	None	2016	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. This was to assist in reducing vehicle emissions. The Council will also look at bus routing and location of bus stops in light of the proposed junction priority changes under the LSTF scheme.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
16	Twenty Is Plenty	Traffic management	Reduction of speed limits, 20mph zones	Cheltenham Borough Council	2014-15	2015-16	Traffic count / Speed data	< 0.5%	None	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. At Cheltenham Borough Council a 20mph Cabinet Member Working Group will be set up in 2016 to look at such measures.
17	A lower emission bus fleet	Vehicle fleet efficiency	Promoting low emission public transport	Cheltenham Borough Council	2013	2014-16	Bus fleet data	0.5%	Initial funding bid to Government failed but received positive response. Local bus operator due to upgrade buses to greener alternative in 2016.	Ongoing	Cheltenham Council will continue to encourage the improvement of bus fleets to meet latest Euro emission standards which will assist in reducing emissions and improve air quality. The Council will also investigate the feasibility of using traffic regulation conditions to control bus emissions within Cheltenham AQMA through emission checks.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
18	Green planting	Traffic management	Other	Cheltenham Borough Council	2014	2014-16	Number of urban planning applications with green planting schemes adopted	< 0.1%	None	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, which is ongoing and planting as part of street enhancement schemes (particularly through the Cheltenham Transport Plan) scheduled between 2016-2019.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
19	Vehicle management signage	Traffic management	Other	Cheltenham Borough Council	2014	2014-18	Traffic count data	< 0.1%	None	2018	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. This is likely to commence in 2018.
20	Cycle safety improvements	Transport planning and infrastructure	Cycle network	Cheltenham Borough Council	2014	2014-16	Number of cyclists and accident & injury statistics	< 0.1%	None	2016	Improvements to cycle priorities at some junctions will be implemented with Measure 1 above

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.

No $PM_{2.5}$ monitoring was carried out by Cheltenham Borough Council during the period covered by this report. Historical Urban Background monitoring up to 2009 did not identify any exceedance of PM_{10} levels, which correlate closely with $PM_{2.5}$ levels, but it is possible that roadside locations near to busy roads and junctions could exhibit elevated levels of $PM_{2.5}$.

Unfortunately there is no currently practical or affordable method for measuring $PM_{2.5}$ levels at roadside locations where there is potential exposure in Cheltenham.

This Local Authority will look at measures to include consideration of $PM_{2.5}$ for ASRs subsequent to this one.

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

3.1 Summary of Monitoring Undertaken

In recent years Cheltenham Borough Council has submitted the following reports:

2010: Progress Report

2011: Progress Report

2011: Detailed Assessment for Cheltenham for Nitrogen Dioxide

2012: Updating and Screening Assessment

2013: Progress Report

2014: Progress Report

2015: Updating and Screening Assessment

A Detailed Assessment was completed for Bath Road and High Street in 2007 where an exceedance of the annual mean objective for NO_2 occurred with relevant exposure. In December 2008 an Air Quality Management Area (AQMA) was declared along a section of Bath Road and High Street in Cheltenham. The area was designated in relation to a likely breach of the nitrogen dioxide (annual mean) objective as specified in the Air Quality Regulations (England) 2000.

The 2010 Progress Report identified a number of new locations in Cheltenham which had exceeded the annual mean objective for NO_2. Following submission of a detailed assessment report in 2011, the existing AQMA was revoked and a new AQMA covering the whole of Cheltenham Borough was declared in relation to a likely breach of the nitrogen dioxide (annual mean) objective at a total of seven locations, including the old AQMA area (see Figure 1.2).

During 2015 the number of locations in Cheltenham that breached the annual mean objective for NO_2 has increased to eleven (see figure 1.3), up from eight the year before. The AQMA designation therefore remains justified as a result of the continued breaches at these locations.

No other air pollutants are monitored in Cheltenham since previous rounds of review and assessment demonstrated that no breaches were likely.

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with the Air Quality objectives (see Appendix E below).

A roadside monitoring unit is installed at the junction of Swindon Road and St Georges Street, Cheltenham where exceedance of nitrogen dioxide (annual mean) had been recorded nearby from previous diffusion tube monitoring data. The unit measures NOx, NO2 and NO and commenced operation in August 2011. Data is sent via telemetry to Enviro Technology limited and forwarded to AQDM for data validation and ratification purposes. Monthly routine calibration and maintenance is carried out by the equipment supplier, Enviro Technology Limited.

Cheltenham Borough Council undertook automatic (continuous) monitoring at one site during 2015. Table A.1 in Appendix A shows the details of the site. National monitoring results are available at https://uk-air.defra.gov.uk/networks/find-sites

Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C. Maps showing the location of the monitoring sites are provided in Appendix D.

3.1.2 Non-Automatic Monitoring Sites

In 2015 Cheltenham Borough Council undertook non-automatic (passive) monitoring of NO2 at fifty three locations throughout the Borough, on a month-by-month basis. Maps showing the location of the monitoring sites are provided in Appendix D. Table A.2 in Appendix A shows the details of the sites. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

The fifty three locations were chosen as they represent a mix of areas where

- higher levels of Nitrogen Dioxide are expected (almost exclusively as a result of vehicular traffic),
- normal levels of air quality are to be expected (to be able to make a comparison with the worst areas).

Looking at the results of those monthly measurements of Nitrogen Dioxide, and ignoring those locations not breaching the annual air quality targets for Nitrogen Dioxide, one can clearly see that the measurements affecting the worst areas for Nitrogen Dioxide are located in a relatively short vehicular route skirting the town centre.

The highest readings for any of our monitoring tubes occur in the winter months, generally between November and February. The results obtained from this monitoring have the effect of pushing the rest of the months' readings over the annual limit values. Monitoring in the summer months shows that readings can be almost half of what they are in the winter months.

Details of Bias Adjustment

The 56 diffusion tubes monitored during 2015 across the Borough of Cheltenham have a monthly exposure period. Three of those tubes are located adjacent to the Council's St Georges Street roadside monitoring unit, in order to assess the difference in accuracy between the tubes and the monitoring device, which is calibrated monthly. This is termed a co-location study.

For 2015 the Bias Adjustment factor applied to the diffusion tube data was a Local Bias Adjustment Factor obtained from the co-location diffusion tube study. The bias adjustment value for 2015 was 1.06.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for “annualisation” and bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Cheltenham Borough Council currently only monitors for exceedance of the Nitrogen Dioxide limit values.

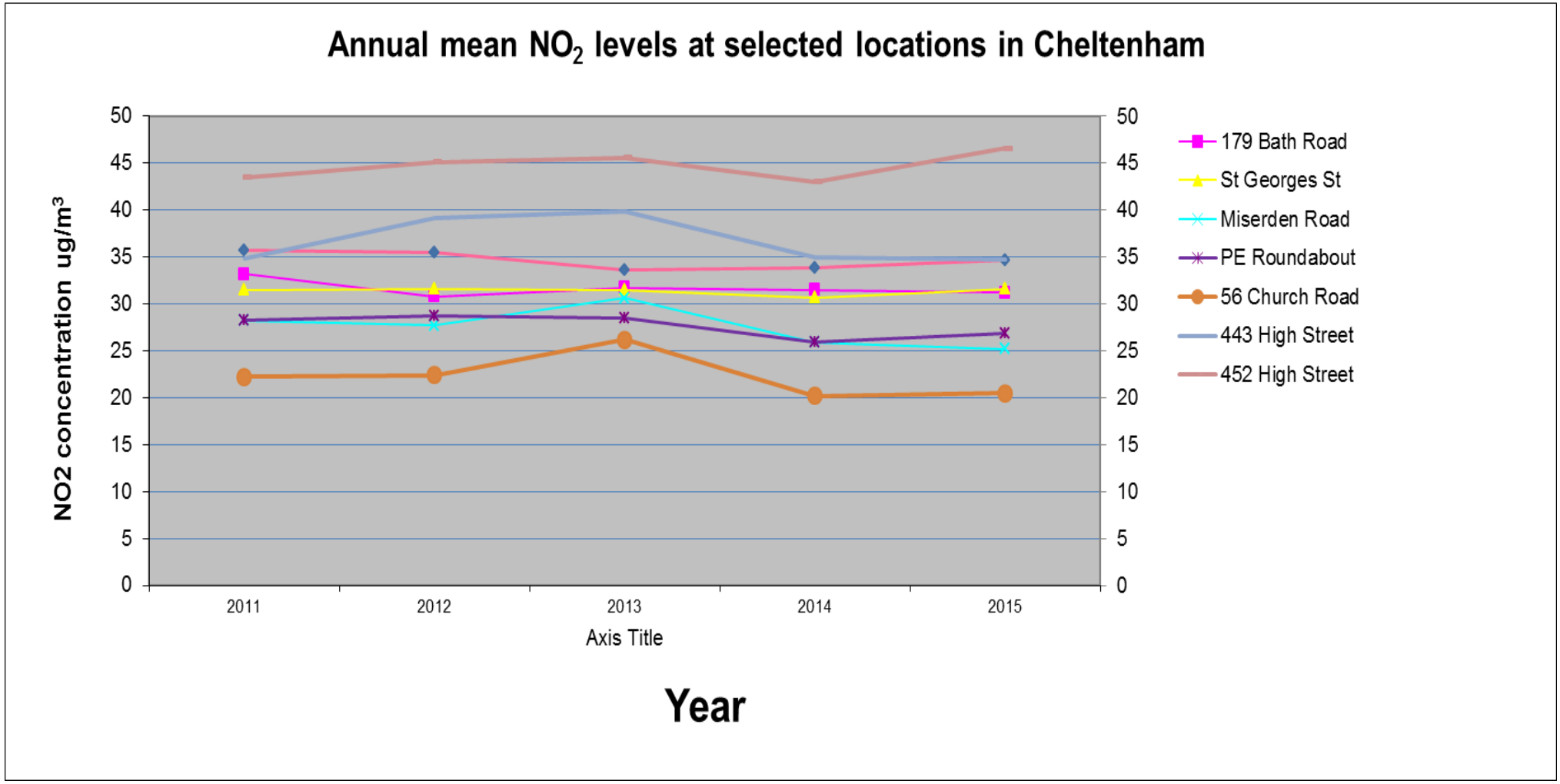
Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

The most recent trend saw a small rise in monitored levels compared to the previous year, back to similar levels the year before that.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B. All diffusion tube measurements were within the AQMA of Cheltenham Borough Council and all were at locations of relevant exposure.

As the recorded readings of levels in the most polluted areas are due to road traffic, and as road traffic alternatives and routes aren’t easy to achieve in an urban town centre the annual readings are only majorly changed by differences in temperature during the winter months. This can be observed from the Full Monthly Diffusion Tube Results for 2015 as detailed below in Appendix B, and subsequent years’ readings available from the Council’s website. 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. No annual means were greater than 60µg/m^3, which indicates that an exceedance of the 1-hour mean objective is also unlikely at these sites.

Fig 3.1 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites



3.2.2 Particulate Matter (PM_{10})

No PM10 monitoring was carried out by Cheltenham Borough Council during the period covered by this report. Although historical Urban Background monitoring up to 2009 did not identify any exceedance of PM10 levels, it is possible that roadside locations near to busy roads and junctions could exhibit elevated levels of PM10.

Unfortunately there is no currently practical or affordable method for measuring PM10 levels at roadside locations where there is potential exposure in Cheltenham.

3.2.3 Particulate Matter ($PM_{2.5}$)

No Particulate Matter ($PM_{2.5}$) monitoring was undertaken in 2015 as at that time no threshold limit values were stipulated. Cheltenham Borough Council will be considering the extent of monitoring required to satisfy subsequent Annual Status Reports.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	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	228878	NO_2	Y	Chemiluminescence	0	1.5	1.5

(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	Y OS Grid Ref	Height (m)	Pollutants Monitored	In AQMA ?	Tube collocated with a Continuous Analyser?	Relevant Exposure ?	Distance to kerb of nearest road (m) (2)	Does this Location Represent Worst-Case Exposure?
1	Westal Green	Roadside	393924	221608	2.8	NO2	Y	N	Y	2m	Y
2	179 Bath Road	Roadside	394614	221153	3.0	NO2	Y	N	Y	2m	Y
3	51 Upper Norwood	Background	394494	220823	2.7	NO2	Y	N	Y	2m	Y
4	97 Shurdington Road	Roadside	394058	220608	2.5	NO2	Y	N	Y	2m	Y
5	Opposite Kidnappers Lane	Roadside	393525	220187	2.5	NO2	Y	N	Y	2m	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Height (m)	Pollutants Monitored	In AQMA ?	Tube collocated with a Continuous Analyser?	Relevant Exposure ?	Distance to kerb of nearest road (m) (2)	Does this Location Represent Worst-Case Exposure?
6	56 Church Road	Roadside	394577	219728	2.8	NO2	Y	N	Y	2m	Y
7	81 London Road	Roadside	395660	221670	2.7	NO2	Y	N	Y	5m	Y
8	104 London Road	Roadside	395672	221680	2.8	NO2	Y	N	Y	2m	Y
9	1 Old Bath Road	Roadside	395642	221685	3.0	NO2	Y	N	Y	2m	Y
10	8 Old Bath Road	Roadside	395602	221622	2.5	NO2	Y	N	Y	2m	Y
11	17 Chelsea Close	Background	395740	221412	2.8	NO2	Y	N	Y	3m	Y
12	60 Keynsham Rd	Kerbside	395308	221544	2.8	NO2	Y	N	Y	0.5m	Y
13	Prestbury Post Office	Roadside	397009	223888	2.7	NO2	Y	N	Y	2m	Y
14	91Tewkesbury Road	Roadside	393880	223390	2.7	NO2	Y	N	Y	5m	Y
15	124 Gloucester Road	Roadside	393802	222595	2.8	NO2	Y	N	Y	10m	Y
16	264 Gloucester Road	Roadside	393296	222170	3.0	NO2	Y	N	Y	2m	Y
17	338 Gloucester Road	Roadside	392940	221880	3.0	NO2	Y	N	Y	2m	Y
18	340 Gloucester Road	Roadside	392912	221862	2.9	NO2	Y	N	Y	2m	Y
19	5 Miserden Road	Roadside	391997	222051	2.7	NO2	Y	N	Y	5m	Y
20	P.E. Roundabout	Roadside	391996	222133	2.7	NO2	Y	N	Y	15m	Y
21	7 Suffolk Road	Roadside	394640	221460	2.8	NO2	Y	N	Y	2m	Y
22	Ladies College	Roadside	394621	222215	2.8	NO2	Y	N	Y	3m	Y
23	Chelsea Court	Roadside	394622	222448	2.6	NO2	Y	N	Y	2m	Y
24	6 Knapp Road	Kerbside	394478	222644	2.5	NO2	Y	N	Y	0.5m	Y
25	50 St Georges St	Kerbside	394695	222733	2.9	NO2	Y	N	Y	2m	Y
26	2 Gloucester Rd	Roadside	394235	223055	3.0	NO2	Y	N	Y	2m	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Height (m)	Pollutants Monitored	In AQMA ?	Tube collocated with a Continuous Analyser?	Relevant Exposure ?	Distance to kerb of nearest road (m) (2)	Does this Location Represent Worst-Case Exposure?
27	Opp. White Hart St	Roadside	394268	222988	3.0	NO2	Y	N	Y	2m	Y
28	452 High Street	Roadside	394305	222960	3.0	NO2	Y	N	Y	2m	Y
29	443 High Street	Roadside	394330	222955	3.0	NO2	Y	N	Y	3m	Y
30	422 High Street	Roadside	394350	222923	3.0	NO2	Y	N	Y	2m	Y
31	New Rutland - Swindon Rd	Roadside	394738	222888	3.0	NO2	Y	N	Y	2m	Y
32	Saracens Court	Roadside	394771	222874	2.9	NO2	Y	N	Y	2m	Y
33	2 Swindon Road	Kerbside	394830	222845	3.0	NO2	Y	N	Y	1m	Y
34	22 St Paul's Rd	Roadside	394902	223004	2.6	NO2	Y	N	Y	1.3m	Y
35	10 Monson Avenue	Roadside	394952	222898	2.5	NO2	Y	N	Y	2.5m	Y
36	North Place West	Urbancentre	394975	222855	3.0	NO2	Y	N	N	100m	N
37	5 St Margaret's Terrace	Roadside	395040	222715	3.0	NO2	Y	N	Y	3m	Y
38	North Place East	Roadside	395073	222750	3.0	NO2	Y	N	N	2m	N
39	Portland St/Fairview Rd	Roadside	395110	222670	2.9	NO2	Y	N	Y	2m	Y
40	Millennium Plaza - Fairview	Kerbside	395117	222658	3.0	NO2	Y	N	Y	1m	Y
41	Winchcombe St/Fairview	Roadside	395210	222618	3.1	NO2	Y	N	Y	2m	Y
42	Regency Hall - Fairview	Roadside	395225	222610	3.1	NO2	Y	N	Y	2m	Y
43	21 All Saints Rd	Kerbside	395602	222428	2.6	NO2	Y	N	Y	0.2m	Y
44	40 Hewlett Road	Roadside	395479	222222	2.6	NO2	Y	N	Y	3.5m	Y
45	7 Berkeley Place	Roadside	395340	222075	3.5	NO2	Y	N	Y	2m	Y
46	2 London Road	Roadside	395362	222000	2.9	NO2	Y	N	Y	2m	Y
47	Pisa Pizza	Roadside	395212	222130	3.2	NO2	Y	N	Y	2m	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Height (m)	Pollutants Monitored	In AQMA ?	Tube collocated with a Continuous Analyser?	Relevant Exposure ?	Distance to kerb of nearest road (m) (2)	Does this Location Represent Worst-Case Exposure?
48	The Restoration	Roadside	395202	222160	3.0	NO2	Y	N	Y	2m	Y
49	YMCA Shop	Roadside	395182	222183	3.2	NO2	Y	N	Y	2m	Y
50	Cutting Room	Roadside	395176	222169	3.2	NO2	Y	N	Y	2m	Y
51	8a Bath Road	Roadside	395146	222149	3.1	NO2	Y	N	Y	2m	Y
52	15 College Road	Kerbside	395156	221865	2.5	NO2	Y	N	Y	0.1m	Y
53	26 St Lukes Rd	Roadside	395037	221830	2.5	NO2	Y	N	Y	2m	Y
54	Co-location – St Georges Street	Roadside	394760	222878	1.4	NO2	Y	Y	Y	2m	Y
55	Co-location – St Georges Street	Roadside	394760	222878	1.4	NO2	Y	Y	Y	2m	Y
56	Co-location – St Georges Street	Roadside	394760	222878	1.4	NO2	Y	Y	Y	2m	Y

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
St Georges Street	Roadside	Automatic	99	99	35	37	36	35	35
Cheltenham Borough Council	Roadside	Diffusion Tube	99	99	35	35	37	34	35

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

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
St Georges Street	Roadside	Automatic	99	99	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 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2015

Site ID		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 (1)
1	Westal Green	27.15	32.80	30.91	22.75	22.75	25.27	25.40	25.90	30.26	32.80	29.80	19.60	27.12	28.74
2	179 Bath Road	29.94	35.71	34.10	23.20	23.20	26.48	27.07	26.70	29.52	31.90	35.50	29.50	29.40	31.16
3	51 Upper Norwood	22.57	23.97	20.46	10.81	10.81	11.13	10.35	12.50	15.90	23.60	18.50	12.60	16.10	17.07
4	97 Shurdington Road	34.93	33.42	32.09	22.16	22.16	26.72	21.33	24.70	31.50	36.20	26.10	23.10	27.87	29.54
5	Opp. Kidnappers Lane	26.26	31.41	27.85	19.51	19.51	missing	21.95	23.60	24.80	missing	26.60	16.90	23.84	25.27
6	56 Church Road	missing	28.48	22.35	13.34	13.34	15.90	13.75	16.10	20.70	26.90	22.10	missing	19.30	20.45
7	81 London Road	46.99	44.30	36.94	32.67	32.67	32.96	36.87	38.90	35.50	45.00	44.10	41.60	39.04	41.38
8	104 London Road	37.66	39.14	40.67	27.58	27.58	34.03	31.39	36.90	38.00	42.10	missing	29.20	34.93	37.03
9	1 Old Bath Road	37.38	41.03	39.71	27.72	27.72	missing	35.66	33.00	39.80	37.50	40.50	23.60	34.88	36.97
10	8 Old Bath Road	28.82	32.26	21.97	21.12	21.12	24.03	23.81	23.90	29.40	34.90	21.50	22.40	25.44	26.96
11	17 Chelsea Close	18.85	19.26	18.81	9.45	9.45	10.21	9.47	11.20	13.70	19.90	17.20	10.10	13.97	14.80
12	60 Keynsham Road	24.53	25.62	20.90	13.32	13.32	14.59	12.40	15.20	18.40	22.20	20.30	16.30	18.09	19.18
13	Prestbury P.O.	37.40	39.12	34.41	24.89	24.89	30.52	34.38	30.30	33.40	33.70	38.70	31.20	32.74	34.71
14	91 Tewkesbury Road	34.86	32.11	30.08	21.38	21.38	24.21	24.08	26.70	32.20	30.00	29.10	23.70	27.48	29.13
15	124 Gloucester Road	missing	31.37	33.02	20.23	20.23	22.80	25.68	27.80	28.40	33.00	34.60	26.70	27.62	29.28
16	264 Gloucester Road	42.86	45.17	38.05	26.91	26.91	31.55	missing	missing	missing	33.80	37.30	29.00	34.62	36.69
17	338 Gloucester Road	43.22	44.12	34.58	25.60	25.60	31.20	32.98	on the ground	36.30	36.50	39.70	33.30	34.83	36.92
18	340 Gloucester Road	43.48	42.81	38.73	30.16	30.16	33.30	33.55	34.10	38.20	43.50	37.60	32.30	36.49	38.68
19	5 Miserden Road	33.54	28.57	missing	17.05	17.05	22.20	19.70	20.11	30.60	31.60	22.70	18.20	23.76	25.18
20	P.E. Roundabout	33.33	28.36	28.04	17.12	17.12	23.20	20.69	24.30	26.50	31.40	31.20	23.20	25.37	26.89
21	7 Suffolk Road	25.17	26.78	31.28	17.94	17.94	23.50	20.28	23.30	31.70	35.70	27.50	17.20	24.86	26.35
22	Ladies College	39.20	39.38	36.03	29.86	29.86	33.70	36.66	34.20	35.10	34.10	35.11	31.40	34.55	36.62
23	Chelsea Court	33.29	32.15	29.93	18.27	18.27	18.80	17.31	23.00	27.00	31.60	27.80	17.50	24.58	26.05

Site ID		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 (1)
24	6 Knapp Road	25.79	25.51	21.87	11.76	11.76	11.80	13.56	15.90	19.60	24.80	19.90	15.10	18.11	19.20
25	50 St Georges Street	40.28	34.57	30.87	24.39	24.39	20.20	24.12	25.50	32.70	35.00	38.20	27.70	29.83	31.62
26	2 Gloucester Road	missing	45.97	45.62	33.77	33.77	41.60	53.41	45.70	44.20	40.60	52.80	44.70	43.83	46.46
27	Opp. White Hart St	58.42	47.18	43.98	40.37	40.37	44.60	57.65	51.00	48.20	42.90	61.60	55.20	49.29	52.24
28	452 High St	53.40	46.61	49.86	37.24	37.24	40.80	43.05	41.40	49.40	43.20	45.10	39.80	43.93	46.56
29	443 High St	34.58	37.29	39.63	28.60	28.60	32.40	27.23	31.80	40.10	44.80	28.20	19.80	32.75	34.72
30	422 High St	54.33	46.19	43.55	34.22	34.22	42.40	48.38	45.50	48.40	45.80	47.70	44.40	44.59	47.27
31	New Rutland	49.43	40.79	39.32	33.50	33.50	34.10	38.93	40.30	41.40	41.30	45.30	41.70	39.96	42.36
32	Saracens Court	46.82	50.30	39.29	31.49	31.49	33.20	35.81	39.30	41.10	39.70	43.40	40.40	39.36	41.72
33	2 Swindon Road	44.82	39.55	39.99	29.50	29.50	30.90	33.20	38.90	34.70	39.70	37.30	31.20	35.77	37.92
34	22 St Paul's Road	41.59	37.35	35.22	20.50	20.50	24.30	26.83	27.80	30.00	35.30	28.80	27.30	29.62	31.40
35	10 Monson Avenue	33.04	30.66	25.58	no data	23.15	missing	missing	19.00	20.80	27.30	26.10	24.30	25.55	27.08
36	North Place West	29.58	missing	missing	no access	no access	no access	no access	no access	no access	no access	no access	no access	29.58	0.00
37	5 St Margarets Terrace	31.96	42.20	40.82	23.15	23.15	25.40	24.62	28.90	33.00	missing	missing	29.70	30.29	32.11
38	North Place East	40.10	33.76	34.72	22.03	22.03	23.35	25.54	27.10	28.30	missing	30.50	32.80	29.11	30.86
39	Portland Street	42.04	40.07	missing	29.36	29.36	31.60	32.82	33.70	36.50	missing	35.90	35.90	34.72	36.81
40	Millenium /Fairview	36.22	32.31	38.43	25.04	25.04	31.30	26.58	28.70	33.50	40.80	31.30	24.90	31.18	33.05
41	Winchcombe/Fairview	missing	41.16	no data	24.40	24.40	25.90	28.07	28.50	32.70	36.30	36.40	33.30	31.11	32.98
42	Regency Hall/Fairview	53.08	51.75	47.18	30.13	30.13	33.07	missing	missing	35.60	38.70	35.60	42.50	39.77	42.16
43	21 All Saints Road	34.78	35.56	32.95	21.27	21.27	24.20	21.91	25.40	30.00	34.20	31.40	27.30	28.35	30.05
44	40 Hewlett Road	40.10	36.68	39.20	26.54	26.54	29.90	29.89	33.40	35.80	38.20	37.50	29.90	33.64	35.66
45	7 Berkeley Place	31.94	38.33	38.30	20.65	20.65	23.20	22.32	27.80	33.00	35.10	28.40	23.20	28.57	30.29
46	2 London Road	42.15	41.92	43.89	29.33	29.33	35.33	38.63	33.90	44.90	49.90	35.70	28.10	37.76	40.02
47	Pisa Pizza - High St	33.22	42.58	34.82	24.91	24.91	26.70	27.97	30.70	34.10	33.90	31.60	26.90	31.03	32.89
48	Restoration - High St	45.11	41.97	40.67	25.64	25.64	29.30	28.64	32.50	36.50	40.90	29.50	31.50	33.99	36.03
49	YMCA - High St	38.50	37.47	39.67	24.90	24.90	28.30	29.56	32.70	missing	41.40	missing	28.40	32.58	34.53
50	Cutting Room - High St	46.56	39.36	41.80	33.15	33.15	35.10	40.01	39.00	39.20	39.30	36.50	44.20	38.94	41.28

Site ID		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 (1)
51	8a Bath Road	47.43	39.55	41.25	31.69	31.69	35.40	32.25	41.10	35.80	43.60	46.60	38.70	38.75	41.08
52	15 College Road	36.03	35.38	32.26	20.98	20.98	23.43	25.54	28.40	26.70	33.30	29.60	22.30	27.91	29.58
53	26 St Lukes Road	23.99	26.04	25.14	12.62	12.62	14.00	14.63	16.60	20.70	25.80	20.80	15.70	19.05	20.20
54	Co-location - 1	37.30	39.34	35.95	26.21	26.21	27.70	28.44	32.40	39.60	40.40	30.50	27.20	32.60	34.56
55	Co-location - 2	42.00	40.70	33.19	27.40	27.40	29.00	31.84	31.20	36.30	37.80	32.60	28.90	33.20	35.19
56	Co-location - 3	38.85	39.63	33.83	24.63	24.63	29.60	29.99	31.10	36.60	35.60	33.40	27.30	32.10	34.02

(1) See Appendix C for details on bias adjustment

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

Assessment of Monitoring Data:

There are continued exceedances of the nitrogen dioxide annual mean objective within the AQMA.

There are no other pollutants of concern within Cheltenham Borough Council.

Assessment of Sources:

Following the screening criteria in LAQM.TG (16), there are no transport sources of concern; therefore, a Screening Assessment will not be required.

Following the screening criteria in LAQM.TG (16), there are no other transport sources of concern; therefore, a Screening Assessment will not be required.

Following the screening criteria in LAQM.TG (16), there are no industrial sources of concern; therefore, a Screening Assessment will not be required.

Following the screening criteria in LAQM.TG (16), there are no commercial/domestic sources of concern; therefore, a Screening Assessment will not be required.

Following the screening criteria in LAQM.TG (16), there are no fugitive sources of concern; therefore, a Screening Assessment will not be required.

QA:QC Data

Diffusion Tube Bias Adjustment Factors

During the period covered by this report, the diffusion tubes (20% TEA in Acetone) were supplied and analysed by Gradko International Limited. The tubes at all locations throughout the area have a monthly exposure period. For 2010 and 2011 a local bias adjustment was not available. Instead a National Bias Adjustment factor was calculated in March each year using the Bias Adjustment Factor Spreadsheet available at http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html. The bias adjustment factors utilised were:

• 2011 bias adjustment factor: 0.83

• 2012 bias adjustment factor: 0.99

• 2013 bias adjustment factor: 1.04

• 2014 bias adjustment factor: 0.97

• 2015 bias adjustment factor: 1.06

From 2012 local Bias Adjustment Factors were used from a triplicate co-location study that commenced at the Council's roadside Air Quality Monitoring Station in April 2012. Triplicate co-location measurements continue to be used.

Factor from Local Co-location Studies

The Bias Adjustment Factor used for 2015 was from a local co-location study located at the roadside Automatic NO2 analyser instrument at the junction of St George's Street and Swindon Road. The Bias Adjustment Calculation resulted in a Bias Adjustment Factor of 1.06 for 2015. This was calculated using the AEA_DifTPAB_v04.xls spreadsheet. A copy of the spreadsheet is included in below.

Discussion of Choice of Factor to Use

The Local Bias Adjustment Factor was used since the triplicate study demonstrated good precision and we obtained high quality chemiluminescence analyser results.

QA/QC of automatic monitoring

Cheltenham Borough Council's nitrogen dioxide Air Quality Monitoring Station (AQMS) on St Georges Street/Swindon Road junction is operated and managed by Enviro Technology Services plc. 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). Ratified data is provided to us every quarter in a .pdf format (see below).

The M200E NOx analyser is MCERTS approved and measures nitric oxide and oxides of nitrogen in total. The analyser uses a technique called chemiluminescence to detect the gases. The analytical technique used can be broadly explained by stating that a beam of light is directed onto the molecules of gases as they enter the analyser. As a result, the gas molecules themselves either emit or absorb light, and it is the intensity of the emitted or absorbed light that is measured by the analysers,

and the concentrations of the pollutants are then calculated. The concentrations of the gases are then expressed in parts per billion (parts of gas per billion parts of air).

QA/QC of diffusion tube monitoring

Nitrogen dioxide diffusion tubes used by Cheltenham Borough Council in 2015 were 20% TEA in water supplied and analysed by Gradko International Limited. It can be confirmed that the laboratory follows the procedures set out in the Harmonisation Practical Guidance Procedures under the DEFRA practical guidance. It also participates in the Ambient, Indoor, Workplace Air and Stack Emissions Proficiency Testing (AIR PT) scheme. This is an independent analytical proficiency-testing (PT) scheme, operated by the Health and Safety Laboratory (HSL) and accredited by LGC Limited. The results from the AIR PT scheme for this laboratory during 2015 indicate that 99% of the results submitted were deemed to be satisfactory.

Copy of Diffusion Tube Co-location study calculation of Precision and Bias Adjustment

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	31/12/2014	28/01/2015	37.3	42.0	38.9	39	2.4	6	5.9	37.1	99.2	Good	Good
2	28/01/2015	02/03/2015	39.3	40.7	39.6	40	0.7	2	1.8	29.4	96	Good	Good
3	02/03/2015	01/04/2015	36.0	33.2	33.8	34	1.4	4	3.6	42.6	99.5	Good	Good
4	01/04/2015	30/04/2015	26.2	27.4	24.6	26	1.4	5	3.5	36.4	99.9	Good	Good
5	30/04/2015	01/06/2015	26.2	27.4	24.6	26	1.4	5	3.5	32	99.6	Good	Good
6	01/06/2015	29/06/2015	27.7	29.0	29.6	29	1.0	3	2.4	29	99.6	Good	Good
7	29/06/2015	30/07/2015	28.4	31.8	30.0	30	1.7	6	4.2	27	99.6	Good	Good
8	30/07/2015	28/08/2015	32.4	31.2	31.1	32	0.7	2	1.8	27	99.8	Good	Good
9	28/08/2015	28/09/2015	39.6	36.3	36.6	38	1.8	5	4.5	35	96	Good	Good
10	28/09/2015	28/10/2015	40.4	37.8	35.6	38	2.4	6	6.0	33	99.6	Good	Good
11	28/10/2015	27/11/2015	30.5	32.6	33.4	32	1.5	5	3.7	42	99.7	Good	Good
12	27/11/2015	29/12/2015	27.2	28.9	27.3	28	1.0	3	2.4	43.7	99.6	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

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

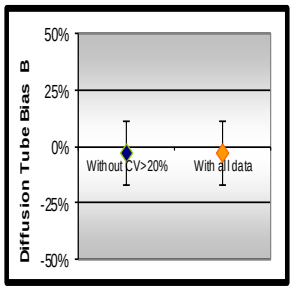
Site Name/ ID:	Cheltenham Borough Council

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	1.06 (0.92 - 1.24)
Bias B	-5% (-19% - 9%)
Diffusion Tubes Mean:	33 µgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	35 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	35 (30 - 40) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	1.06 (0.92 - 1.24)
Bias B	-5% (-19% - 9%)
Diffusion Tubes Mean:	33 µgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	35 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	35 (30 - 40) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Ratified data from NO2 analyser on St Georges Road - Swindon Road junction

Produced by AQDM on behalf of Cheltenham B.C.

CHELTENHAM SWINDON ROAD 1 January to 31 December 2015

This data has been fully ratified by AQDM to LAQM TG(09) standards

Site Description

ROADSIDE: Junction of Swindon Road and St George St

Statistical Summary Report

This 2015 report contains all the statistics required for the LAQM reporting.

Air Quality Statistics

Pollutant	NO	NO_2	NO_X
Number Very High #	-	0	-
Number High #	-	0	-
Number Moderate #	-	0	-
Number Low #	-	8241	-
Maximum 15-minute mean	528 µg m^{-3}	181 µg m^{-3}	987 µg m^{-3}
Maximum hourly mean	428 µg m^{-3}	149 µg m^{-3}	802 µg m^{-3}
Maximum running 8-hour mean	153 µg m^{-3}	95 µg m^{-3}	319 µg m^{-3}
Maximum running 24-hour mean	86 µg m^{-3}	72 µg m^{-3}	202 µg m^{-3}
Maximum daily mean	79 µg m^{-3}	68 µg m^{-3}	188 µg m^{-3}
Average	22 µg m^{-3}	33 µg m^{-3}	66 µg m^{-3}
Data capture	94.1 %	94.1 %	94.1 %

Daily Air Quality Index (DAQI) as defined by COMEAP January 2012 and revised April 2013
Mass units for the gases are at 20'C and 1013mb
NO_X mass units are NO_X as NO_2 µg m^{-3}

Air Quality Exceedences

Pollutant	Air Quality (England) Regulations 2000 & (Amendment) Regulations 2002	Max Conc	Number	Days	Allowed	Exceeded
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	33 µg m^{-3}	0	-	-	No
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	149 µg m^{-3}	0	0	18 hours	No

The annual mean for Nitrogen Dioxide was 33 µg m^{-3} which did not exceed the 40 µg m^{-3} Objective.

The maximum hourly mean was 149 µg m^{-3} so there were no exceedences on the NO2 hourly limit of 200 µg m^{-3}. There is an annual allowance of 18 hours so this Objective was not exceeded.

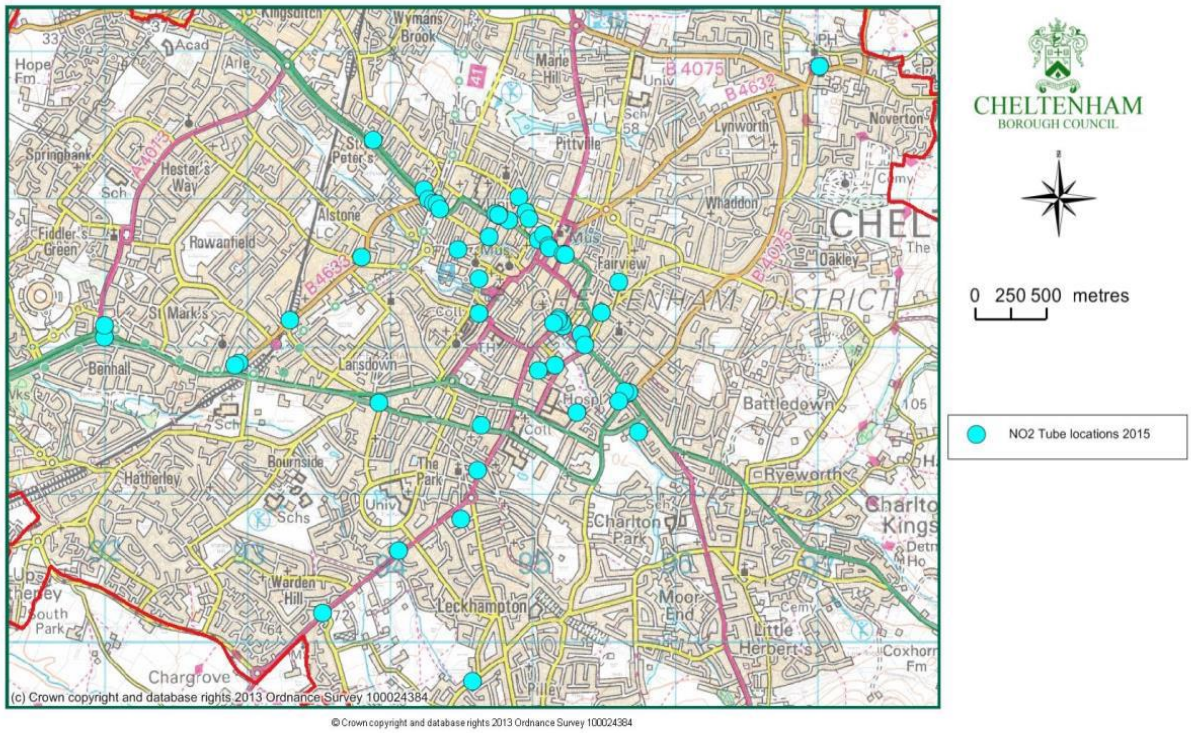
Appendix D: Map(s) of Monitoring Locations

Fig D.1 Location of NO2 Automatic Monitoring Station

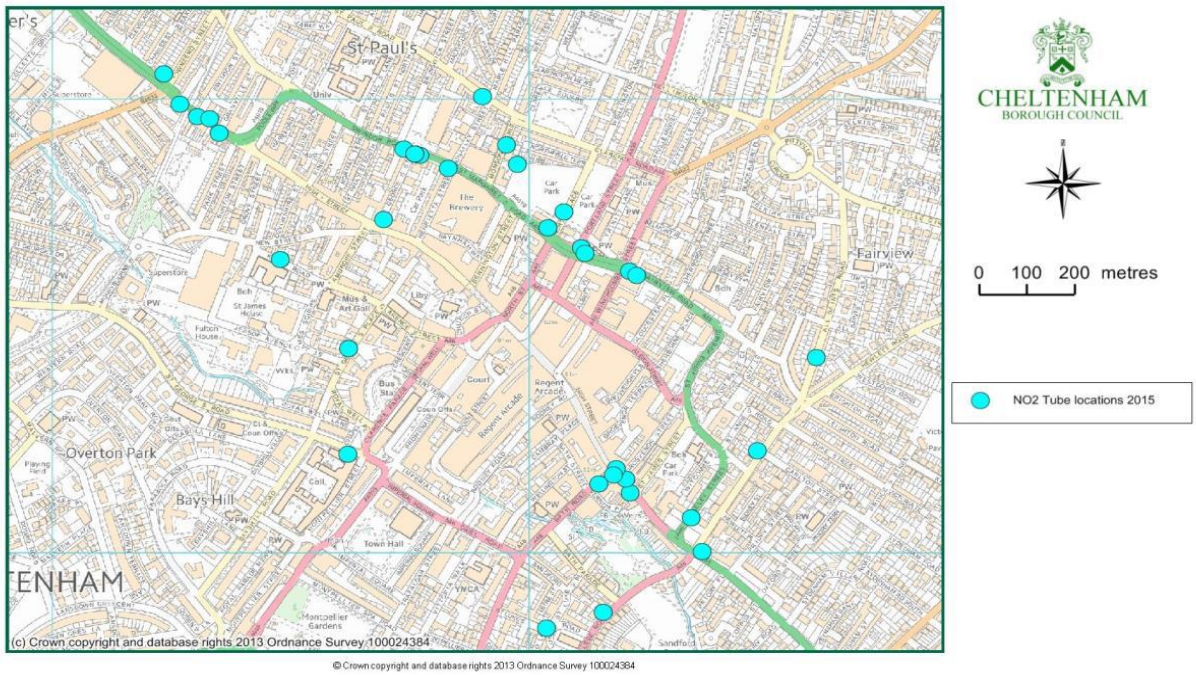
Location of automatic NO2 roadside monitoring station, Cheltenham

Fig D.2 Map of Non-Automatic Monitoring Sites

NO2 monitoring locations in Cheltenham



NO2 monitoring locations Cheltenham Town Centre



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

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
DAQI	Daily Air Quality Index
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
…	…

References

List of Tables

List of Figures