CHELTENHAM
BOROUGH COUNCIL

2014 Air Quality Progress Report for Cheltenham Borough Council

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

May 2014

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Executive Summary

This Progress Report summarises the results from air quality monitoring that Cheltenham Borough Council has completed during 2013. It also provides details of initial progress with development of an air quality action plan to tackle continuing exceedance of the annual mean objective for nitrogen dioxide within Cheltenham's designated Air Quality Management Area (AQMA).

Since April 2009, Cheltenham Borough Council has monitored air quality for only one air pollutant - Nitrogen Dioxide (NO_2). The main source of NO_2 in Cheltenham is from vehicle emissions and seems to be a particular problem in narrow 'corridor' streets where stationary or slow moving traffic occurs. All other air quality pollutants that can be assessed under our Local Air Quality Management obligations, such as sulphur dioxide and PM_{10}, have been assessed during previous monitoring periods and were found to be within national objective limits. These other air pollutants have therefore not been measured further. There is currently no requirement for measurement of very fine particulate matter, usually referred to as PM2.5, although the potential health risks of these particles are well documented.

A new AQMA was declared in November 2011 which covers the whole Borough due to identification of a number of separate locations that exceeded the annual mean national objective for NO_2 during 2010. Monitoring data between 2011 and 2013 continues to justify declaration of the AQMA.

An Air Quality Action Plan has been developed and is due to be formally adopted by the Council in June 2014. Some of the proposed measures are in the process of being implemented.

A roadside monitoring unit was installed on St Georges Street in August 2011 to measure NO_2 in real-time using an approved chemi-luminescence reference method. The data is ratified and reports are produced to provide information on roadside levels of NO_2 and to compare results with nearby diffusion tube monitoring results. In 2012, a triplicate diffusion tube co-location study commenced at the roadside unit.

Results indicate very good correlation between roadside and co-located diffusion tube readings. The co-location data was used to calculate a local Bias Adjustment Factor for 2013 diffusion tube data.

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1 Introduction

1.1 Description of Local Authority Area

Cheltenham Borough Council is situated in central Gloucestershire. It is bordered by Tewkesbury Borough Council and Cotswold District Council (Figure 1). Cheltenham Borough Council has a population of approximately 111,700 and lies some five kilometres to the east of the M5 motorway mid-way between Bristol and Birmingham on the edge of the Cotswold Hills.

The Borough is based on the town of Cheltenham and is mainly urban with some areas of surrounding countryside. It covers an area of approximately 4,680 hectares of which 17 percent is designated as green belt and 22 percent as an area of outstanding natural beauty.

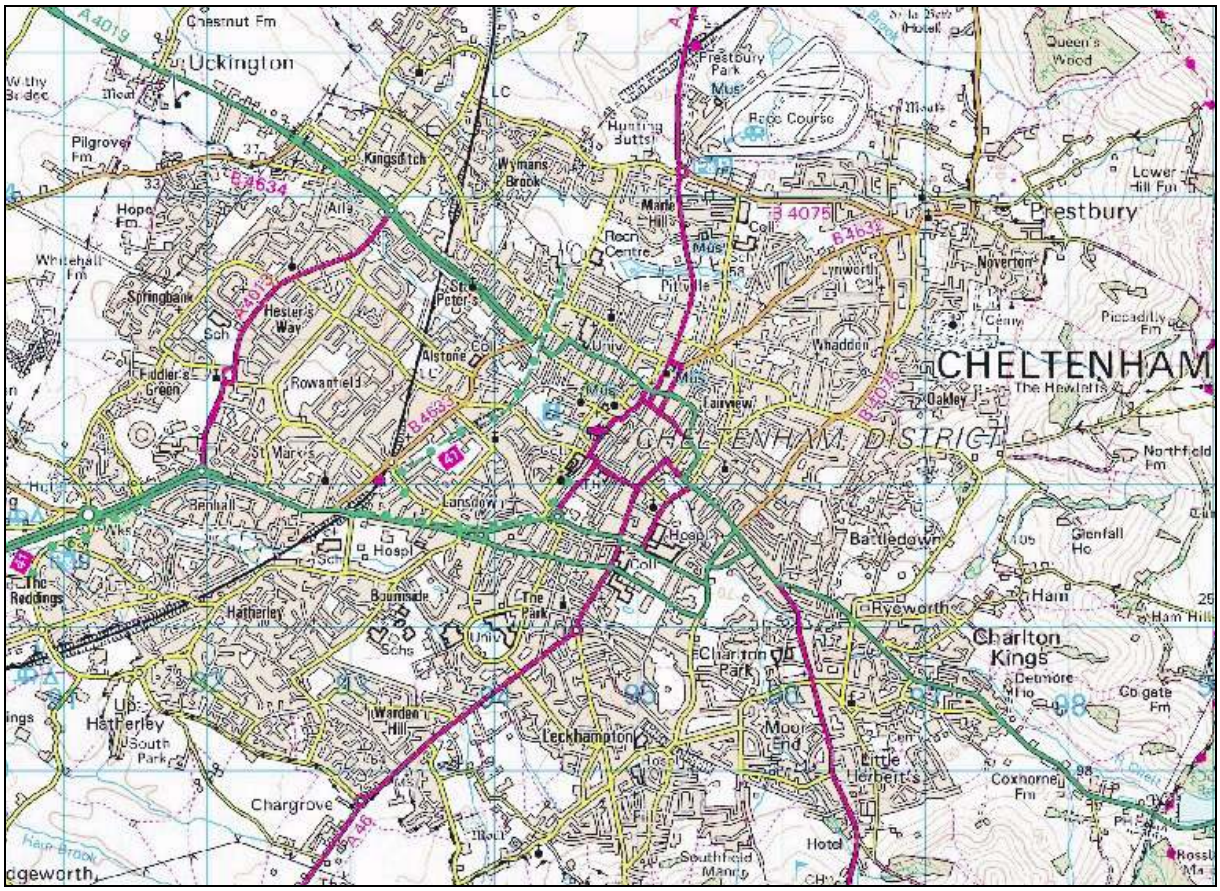


Figure 1. 1 Map of Cheltenham Borough Council area

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the LAQM process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre μg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1. 1 Air Quality Objectives included in Regulations for the purpose of LAQM

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

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

- 2009: Updating and Screening Assessment
- 2010: Progress Report
- 2011: Progress Report
- 2011: Detailed Assessment
- 2012: Updating and Screening Assessment
- 2013: Progress Report

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.

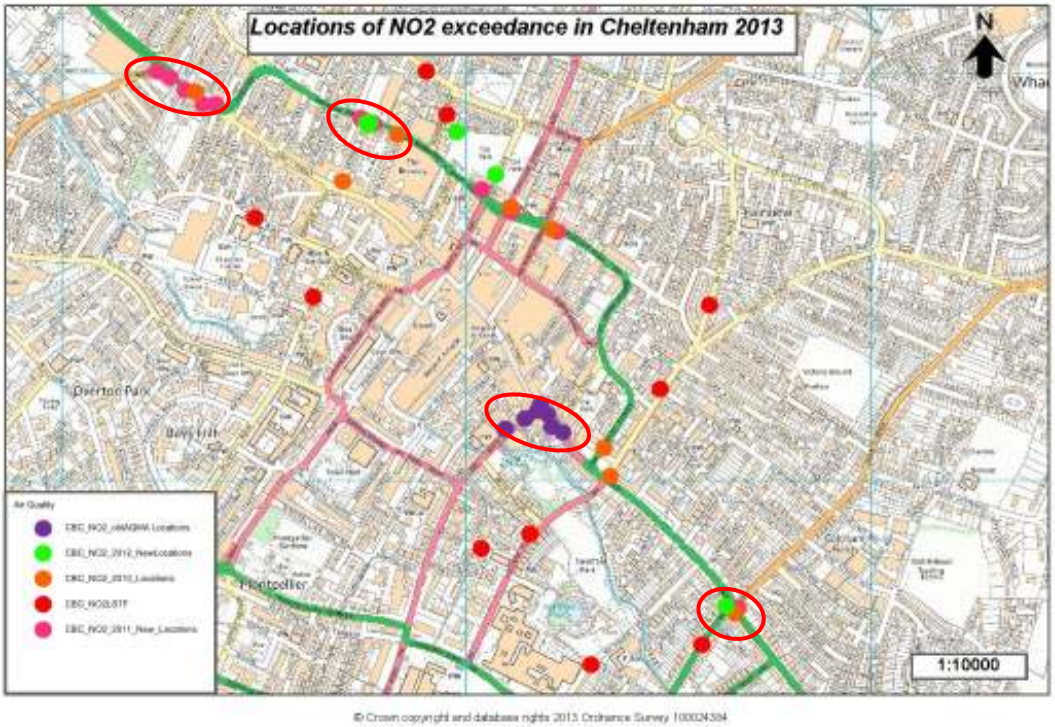
The 2010 Progress Report identified a number of new locations in Cheltenham which had exceeded the annual mean objective for NO_2. Following submission of a detailed assessment report in 2011, the existing AQMA was revoked and a new AQMA covering the whole of Cheltenham Borough was declared in relation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

During 2011, 2012 and 2013 the number of locations in Cheltenham that breached the annual mean objective for NO_2 has reduced to five (see figure 1.3), however the AQMA designation remained 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.

Figure 1. 2 Map of AQMA Boundary

Figure 1. 3 Locations of NO2 exceedance in Cheltenham identified in 2013



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

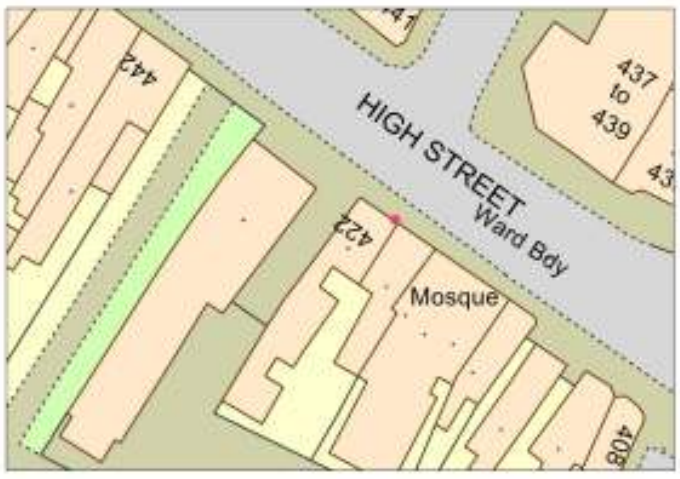
2.1.1 Automatic Monitoring Sites

A roadside monitoring unit is installed at the junction of Swindon Road and St Georges Street, Cheltenham near to a location where exceedance of nitrogen dioxide (annual mean) had been recorded from 2010 diffusion tube monitoring data. The unit measures NOx, NO_2 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. The equipment is currently hired until January 2015.

Two further air monitoring devices have been installed on the High Street in Cheltenham to assess the potential impact on air quality of the proposed Action Plan measures. Their current locations are at 422 High Street and at 199 High Street at the junction of Boots Corner. The machines are battery powered portable AQ Mesh units supplied by Air Monitors Limited and measure NO_2, NO, Pressure, O3, CO and SO_2. The monitoring method involves the use of sensitive electrochemical sensors and although not a reference method, the data provided is useful to compare with diffusion tube data or for evaluating pollution mitigation measures. The sensors are housed in 'pods' which run on advanced internal battery power and transmit data via cellular networks to cloud servers which process and relay the data direct to the end user via a web application. Further details of these monitoring devices can be obtained at http://www.airmonitors.co.uk/aqmesh

Figure 2. 1 Map of Automatic Monitoring Sites

Location of AQ Mesh pod at 422 High Street.
(indicated as pink dot)



Location of AQ Mesh Pod at 199 High Street – Boots Corner

(indicated as blue dot)

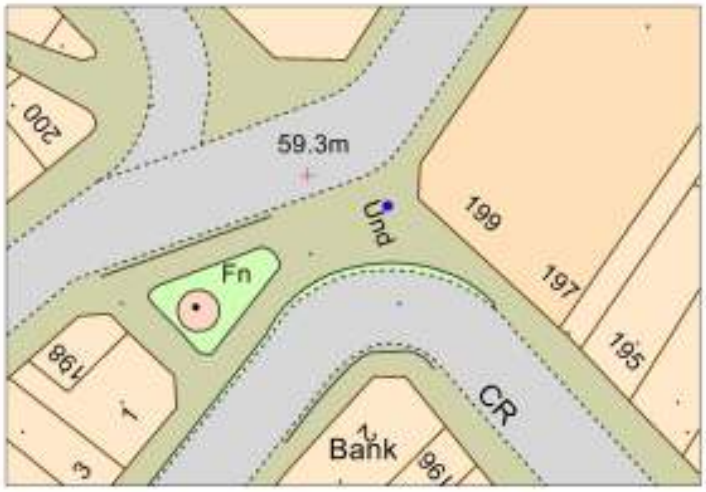


Image showing location of roadside monitoring unit at junction of Swindon Road and St George's St

Table 2. 1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
St Georges Street	Kerbside	394760	228878	1.5m	NO_2	Y	Chemi-luminescence	Y (1m)	2m	Y
422 High Street	Kerbside	394350	222923	2.5m	NO_2,NO, SO_2, O_3, CO	Y	Electrochemical sensors	Y (1m)	2m	Y
199 High Street	Roadside	394952	222512	2.5m	NO_2,NO, SO_2, O_3, CO	Y	Electrochemical sensors	N	4.5m	n/a

2.1.2 Non-Automatic Monitoring Sites

Cheltenham Borough Council has been undertaking NO_2 diffusion tube monitoring at a number of locations since 2003. Many of the monitoring locations have been recorded NO_2 levels consistently below the annual mean objective. Following a review at the beginning of 2010, several locations were replaced with new locations where there is relevant exposure and traffic congestion. Further monitoring tubes were installed in 2011 following exceedance of the nitrogen dioxide (annual mean) national objective levels at several new locations within the Borough with relevant exposure. At the beginning of 2012, a few further monitoring locations were installed to allow urban background measurement and a co-location study commenced at the roadside automatic monitoring station in April 2012. Further monitoring locations were added from September 2013 to assess air quality at sensitive locations prior to implementation of measures proposed within the Air Quality Action Plan.

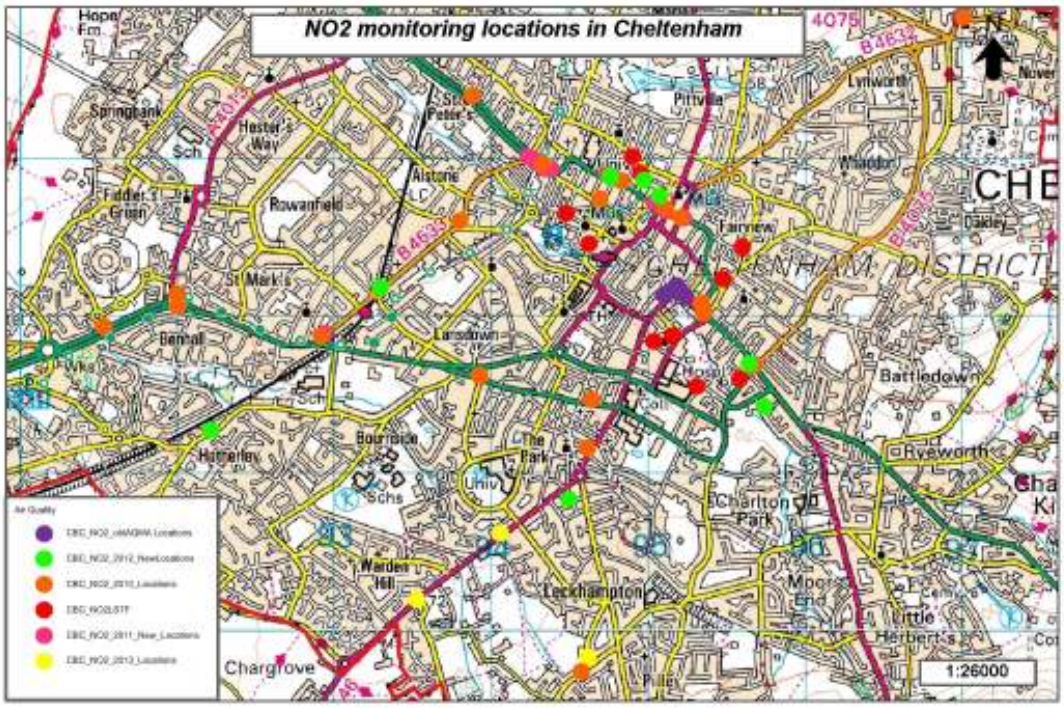
Figure 2.2 illustrates the approximate locations of all 61 of the 2013 diffusion tube monitoring sites within Cheltenham Borough. Table 2.2 provides details of these locations.

Details of Bias Adjustment

Nitrogen dioxide diffusion tubes used by Cheltenham Borough Council in 2013 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 Workplace Analysis Scheme for Proficiency (WASP) scheme. This is an independent analytical proficiency-testing (PT) scheme, operated by the Health and Safety Laboratory (HSL). The results from the WASP scheme for this laboratory during 2013 indicate that 100% of the results submitted were deemed to be satisfactory. See Appendix 1 for QA/QC data for diffusion tube monitoring.

The 61 diffusion tubes monitored during 2013 across the Borough of Cheltneham have a monthly exposure period. For 2013 the Bias Adjustment factor applied to the diffusion tube data was a Local Bias Adjustment Factor obtained from the co-location diffusion tube study located at the St Georges Street roadside monitoring unit. The bias adjustment value for 2013 was 1.04.

Figure 2. 2 Maps of Non-Automatic Monitoring Sites



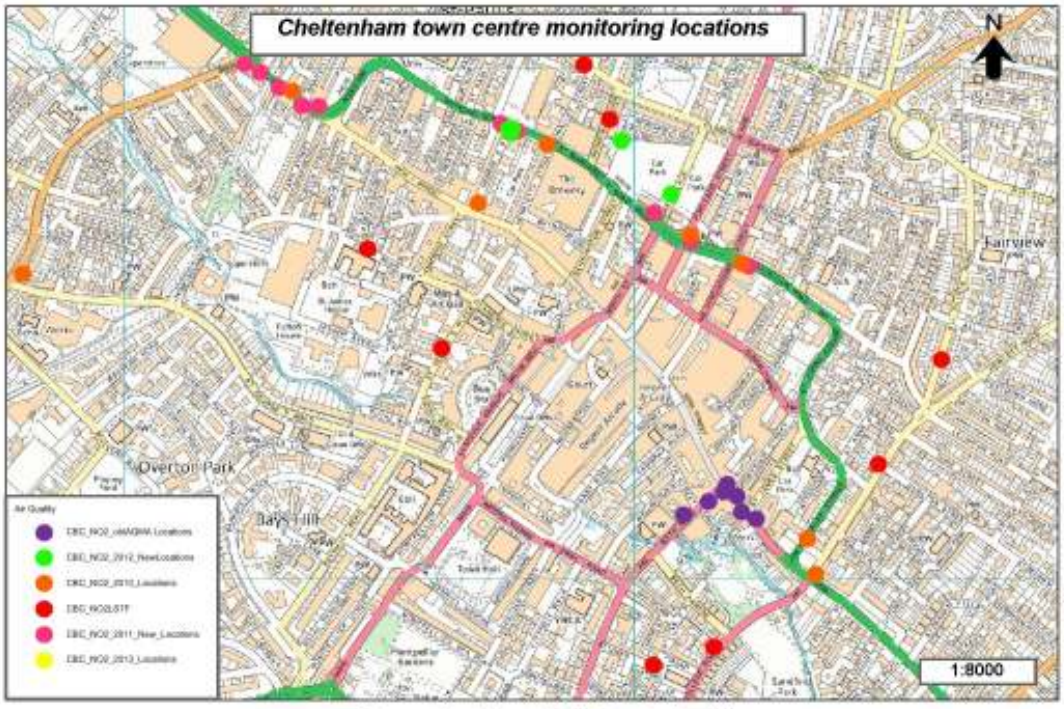


Table 2. 2 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser?	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	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	
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
6	56 Church Road	Roadside	394577	219728	2.8	NO2	Y	N	Y	2m	Y
7	66 Hall Road	Roadside	394612	219820	2.6	NO2	Y	N	Y	2m	Y
8	81 London Road	Roadside	395660	221670	2.7	NO2	Y	N	Y	5m	Y
9	104 London Road	Roadside	395672	221680	2.8	NO2	Y	N	Y	2m	Y
10	1 Bath Road	Roadside	395642	221685	3.0	NO2	Y	N	Y	2m	Y
11	8 Old Bath Road	Roadside	395602	221622	2.5	NO2	Y	N	Y	2m	Y
12	17 Chelsea Close	Background	395740	221412	2.8	NO2	Y	N	Y	3m	
13	60 Keynsham Rd	Kerbside	395308	221544	2.8	NO2	Y	N	Y	0.5m	Y
14	Prestbury Post Office	Roadside	397009	223888	2.7	NO2	Y	N	Y	2m	Y
15	91Tewkesbury Road	Roadside	393880	223390	2.7	NO2	Y	N	Y	5m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser?	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
16	124 Gloucester Road	Roadside	393802	222595	2.8	NO2	Y	N	Y	10m	Y
17	264 Gloucester Road	Roadside	393296	222170	3.0	NO2	Y	N	Y	2m	Y
18	338 Gloucester Road	Roadside	392940	221880	3.0	NO2	Y	N	Y	2m	Y
19	340 Gloucester Road	Roadside	392912	221862	2.9	NO2	Y	N	Y	2m	Y
20	Miserden Road	Roadside	391997	222051	2.7	NO2	Y	N	Y	5m	Y
21	P.E. Roundabout	Roadside	391996	222133	2.7	NO2	Y	N	Y	15m	Y
22	Telstar Road - GCHQ	Kerbside	391532	221923	2.9	NO2	Y	N	Y	1m	Y
23	233 Hatherley Rd	Roadside	392213	221265	3.0	NO2	Y	N	Y	2m	Y
24	7 Suffolk Road	Roadside	394640	221460	2.8	NO2	Y	N	Y	2m	Y
25	Chelsea Court – St Georges Place	Roadside	394622	222448	2.6	NO2	Y	N	Y	2m	Y
26	6 Knapp Road	Kerbside	394478	222644	2.5	NO2	Y	N	Y	0.5m	Y
27	St Georges Street	Kerbside	394695	222733	2.9	NO2	Y	N	Y	2m	Y
28	2 Gloucester Road	Roadside	394235	223055	3.0	NO2	Y	N	Y	2m	Y
29	Opp. White Hart Street	Roadside	394268	222988	3.0	NO2	Y	N	Y	2m	Y
30	452 High Street	Roadside	394305	222960	3.0	NO2	Y	N	Y	2m	Y
31	443 High Street	Roadside	394330	222955	3.0	NO2	Y	N	Y	3m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser?	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
32	422 High Street	Roadside	394350	222923	3.0	NO2	Y	N	Y	2m	Y
33	Church Hill Court	Roadside	394378	222925	2.9	NO2	Y	N	Y	3m	Y
34	New Rutland - Swindon Rd	Roadside	394738	222888	3.0	NO2	Y	N	Y	2m	Y
35	Saracens Court	Roadside	394771	222874	2.9	NO2	Y	N	Y	2m	Y
36	2 Swindon Road	Kerbside	394830	222845	3.0	NO2	Y	N	Y	1m	Y
37	22 St Paul's Rd	Roadside	394902	223004	2.6	NO2	Y	N	Y	1.3m	Y
38	10 Monson Avenue	Roadside	394952	222898	2.5	NO2	Y	N	Y	2.5m	Y
39	North Place West	Urbancentre	394975	222855	3.0	NO2	Y	N	N	100m	N
40	5 St Margaret'sTerrace	Roadside	395040	222715	3.0	NO2	Y	N	Y	3m	Y
41	North Place East	Roadside	395073	222750	3.0	NO2	Y	N	N	2m	N
42	Portland St/Fairview Rd	Roadside	395110	222670	2.9	NO2	Y	N	Y	2m	Y
43	Millenium Plaza - Fairview	Kerbside	395117	222658	3.0	NO2	Y	N	Y	1m	Y
44	Winchcombe St/Fairview	Roadside	395210	222618	3.1	NO2	Y	N	Y	2m	Y
45	Regency Hall - Fairview	Roadside	395225	222610	3.1	NO2	Y	N	Y	2m	Y
46	21 All Saints Rd	Kerbside	395602	222428	2.6	NO2	Y	N	Y	0.2m	Y
47	40 Hewlett Road	Roadside	395479	222222	2.6	NO2	Y	N	Y	3.5m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser?	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
48	7 Berkeley Place	Roadside	395340	222075	3.5	NO2	Y	N	Y	2m	Y
49	1 Hewlett Road	Roadside	395355	222055	2.9	NO2	Y	N	Y	2m	Y
50	The Swan	Roadside	395240	222112	3.0	NO2	Y	N	Y	2m	Y
51	Pisa Pizza	Roadside	395212	222130	3.2	NO2	Y	N	Y	2m	Y
52	The Restoration	Roadside	395202	222160	3.0	NO2	Y	N	Y	2m	Y
53	YMCA Shop	Roadside	395182	222183	3.2	NO2	Y	N	Y	2m	Y
54	Cutting Room	Roadside	395176	222169	3.2	NO2	Y	N	Y	2m	Y
55	8a Bath Road	Roadside	395146	222149	3.1	NO2	Y	N	Y	2m	Y
56	15a Bath Road	Roadside	395097	222124	3.0	NO2	Y	N	Y	2m	Y
57	15 College Road	Kerbside	395156	221865	2.5	NO2	Y	N	Y	0.1m	Y
58	26 St Lukes Rd	Roadside	395037	221830	2.5	NO2	Y	N	Y	2m	Y
59	Co-location – St Georges Street	Roadside	394760	222878	1.4	NO2	Y	Y	Y	2m	Y
60	Co-location – St Georges Street	Roadside	394760	222878	1.4	NO2	Y	Y	Y	2m	Y
61	Co-location – St Georges Street	Roadside	394760	222878	1.4	NO2	Y	Y	Y	2m	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

During 2013, Cheltenham Borough Council only carried out monitoring for the air pollutant nitrogen dioxide (NO_2). This was due to the fact that previous rounds of review and assessment had demonstrated that other air pollutants were unlikely to be breached.

Nitrogen Dioxide (NO_2)

During 2013, Cheltenham Borough Council monitored nitrogen dioxide levels using diffusion tubes at between 48 and 61 locations across the Borough. Three of the tubes were located at the roadside automatic monitoring instrument on St Georges Road, as a co-location study to obtain a local bias adjustment factor for NO_2. Additional monitoring tubes were added during the year following concerns about the potential air quality impacts of a proposed new urban development to the south of Cheltenham and the proposed Cheltenham Transport Plan. These additional locations were identified on the basis of potential residential exposure at locations where road traffic could increase.

Automatic Monitoring Data

In 2011 Cheltenham Borough Council decided that the installation of a roadside monitoring box would be useful to help validate elevated levels of nitrogen dioxide being measured in the area from diffusion tubes. The location of the roadside monitoring box was selected on the basis of relevant exposure being present and proximity to nearby diffusion tube monitoring points where elevated levels of nitrogen dioxide had been recorded. It was also located at a road junction where traffic congestion is a problem.

The data obtained during 2013 indicated an annual mean level slightly below the National Objective limit at 36ug/m^3. The results from the automatic monitoring station are identified in Table 2.3 below. This annual average measurement obtained during 2013 is very similar to the data obtained from the co-location study which yielded a Bias Adjustment Factor of 1.04. The nearby annual mean results at two nearby diffusion tube monitoring locations (Sites 34 and 35) recorded 41.2 ug/m^3 and 38.4 ug/m^3 respectively.

Table 2. 3 Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2013 %	Annual Mean Concentration (µg/m^3)				
					2009	2010	2011* [c]	2012	2013
St Georges Street	Roadside	Y	99.2	99.2	n/a	n/a	35	37	36

[c] This mean has been annualised using data from two long-term continuous monitoring sites forming part of the national network (St Paul's in Bristol and St Ebbe's in Oxford).

Table 2. 4 Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period %	Valid Data Capture 2013 %	Number of Hourly Means > 200µg/m^3				
					2009	2010	2011	2012	2013
St Georges Street	Roadside	Y	99.2	99.2	n/a	n/a	0	0	0

Please see data report provided by AQDM in Appendix 3

Diffusion Tube Monitoring Data

Additional diffusion tubes were added to the monitoring network in Cheltenham during 2013 following concerns over the potential air quality impact of proposed new development to the south of Cheltenham and transport proposals for Cheltenham town centre. The locations were selected on the basis of forecast traffic modelling data, potential residential exposure and ease of access for monitoring purposes.

Results for 2013 indicate broadly similar annual mean nitrogen dioxide levels across Cheltenham compared to 2012 with no significant trends identified. The High Street/Tewkesbury Road monitoring area indicated a slight overall increase in annual mean nitrogen dioxide levels which is a concern. Two locations which previously indicated exceedance of the annual mean during 2012, indicated a reduction to just below the 40ug/m3 objective. This is encouraging, however with various new developments planned, and traffic modelling data indicating potential increases in traffic on several roads in Cheltenham in the future, there is obviously concern that nitrogen dioxide levels may remain elevated at key locations in Cheltenham.

The number of areas that are currently exceeding the annual mean objective for NO_2 with relevant exposure in 2013 is four. This has reduced from the original 7 locations as reported in the Detailed Assessment report of 2011 and down from five locations reported in the 2012 Progress Report. Those areas exceeding the annual mean objective for NO_2 are indicated in Fig 1.2. and are identified as; High Street/Bath Road, Swindon Road near St Georges Street, High Street near Tewkesbury Road and London Road/Hales Road junction. The Fairview Road/ Winchcombe Street junction which was previously in exceedance of the annual mean during 2012 indicated a reduction to just below the objective during 2013. The sites at Gloucester Road and Suffolk Road that were reported as exceeding the annual mean objective in 2011 have continued to indicate NO_2 levels below this objective.

The monitored levels of NO_2 recorded during 2013 continue to justify the declaration of the current AQMA and implementation of an Air Quality Action Plan for Cheltenham. The results for monitoring during 2013 are identified in Table 2.5 below.

Table 2. 5 Results of NO_2 Diffusion Tubes 2013

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg/m^3) – Bias Adjustment factor = 1.04
1	Westal Green	Roadside	Y	N	100	33.6
2	179 Bath Road	Roadside	Y	N	83.3	31.7
3	51 Upper Norwood	Background	Y	N	100	19.6
4	97 Shurdington Road	Roadside	Y	N	83.3	33.8
5	Opposite Kidnappers Lane	Roadside	Y	N	83.3	27.9
6	56 Church Road	Roadside	Y	N	100	26.2
7	66 Hall Road	Roadside	Y	N	58.3	15.0
8	81 London Road	Roadside	Y	N	100	**42.1**
9	104 London Road	Roadside	Y	N	100	**41.7**
10	1 Bath Road	Roadside	Y	N	100	39.5
11	8 Old Bath Road	Roadside	Y	N	33.3	27.9*
12	17 Chelsea Close	Background	Y	N	100.0	17.3
13	60 Keynsham Rd	Kerbside	Y	N	33.3	23.6*
14	Prestbury Post Office	Roadside	Y	N	100.0	33.6
15	91Tewkesbury Road	Roadside	Y	N	100.0	30.4
16	124 Gloucester Road	Roadside	Y	N	100.0	33.7

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg/m^3) – Bias Adjustment factor = 1.04
17	264 Gloucester Road	Roadside	Y	N	100.0	38.3
18	338 Gloucester Road	Roadside	Y	N	100.0	37.5
19	340 Gloucester Road	Roadside	Y	N	100.0	37.6
20	Miserden Road	Roadside	Y	N	100.0	30.6
21	P.E. Roundabout	Roadside	Y	N	100.0	28.5
22	Telstar Road - GCHQ	Kerbside	Y	N	100.0	34.5
23	233 Hatherley Rd	Roadside	Y	N	100.0	29.2
24	7 Suffolk Road	Roadside	Y	N	100.0	33.4
25	Chelsea Court – St Georges Place	Roadside	Y	N	33.3	26.3*
26	6 Knapp Road	Kerbside	Y	N	33.3	22.7*
27	St Georges Street	Kerbside	Y	N	100.0	31.5
28	2 Gloucester Rd	Roadside	Y	N	100.0	**40.4**
29	Opposite White Hart Street	Roadside	Y	N	100.0	**43.2**
30	452 High Street	Roadside	Y	N	91.7	**45.6**
31	443 High Street	Roadside	Y	N	91.7	39.8
32	422 High Street	Roadside	Y	N	100.0	**50.9**
33	Church Hill Court	Roadside	Y	N	100.0	31.9
34	New Rutland - Swindon Rd	Roadside	Y	N	100.0	**41.2**

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg/m^3) – Bias Adjustment factor = 1.04
35	Saracens Court	Roadside	Y	N	100.0	38.4
36	2 Swindon Road	Kerbside	Y	N	91.7	39.2
37	22 St Paul's Rd	Roadside	Y	N	33.3	35.9*
38	10 Monson Avenue	Roadside	Y	N	33.3	27.9*
39	North Place West	Urbancentre	Y	N	100.0	25.4
40	5 St Margaret'sTerrace	Roadside	Y	N	83.3	36.3
41	North Place East	Roadside	Y	N	100.0	32.1
42	Portland St/Fairview Rd	Roadside	Y	N	100.0	38.5
43	Millenium Plaza - Fairview	Kerbside	Y	N	100.0	34.9
44	Winchcombe St/Fairview	Roadside	Y	N	100.0	38.9
45	Regency Hall - Fairview	Roadside	Y	N	100.0	38.2
46	21 All Saints Rd	Kerbside	Y	N	33.3	32.8*
47	40 Hewlett Road	Roadside	Y	N	33.3	36.6*
48	7 Berkeley Place	Roadside	Y	N	100.0	33.7
49	1 Hewlett Road	Roadside	Y	N	100.0	**41.4****
50	The Swan	Roadside	Y	N	100.0	32.0
51	Pisa Pizza	Roadside	Y	N	91.7	34.0
52	The Restoration	Roadside	Y	N	100.0	**40.2**

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg/m^3) – Bias Adjustment factor = 1.04
53	YMCA Shop	Roadside	Y	N	100.0	37.8
54	Cutting Room	Roadside	Y	N	100.0	37.7
55	8a Bath Road	Roadside	Y	N	100.0	**41.8**
56	15a Bath Road	Roadside	Y	N	100.0	35.0
57	15 College Road	Kerbside	Y	N	33.3	33.2*
58	26 St Lukes Rd	Roadside	Y	N	33.3	22.7*
59	Co-location – St Georges Street	Roadside	Y	Y	100.0	37.1
60	Co-location – St Georges Street	Roadside	Y	Y	100.0	36.5
61	Co-location – St Georges Street	Roadside	Y	Y	100.0	35.3

* These results have been annualised using nearby diffusion tube results from 8 locations. Details of calculations can be found in Appendix 4.

**The monitoring result at this location is not representative of public exposure due to the distance from the nearest property façade (approximately 4.5m). Utilising the NO_2 fall-off with distance calculator tool and a local background level from a nearby location at Chelsea Close of 17.3ug/m^3, the estimated exposure level at the building façade is calculated to be 37.9ug/m^3

Table 2. 6 Results of NO_2 Diffusion Tubes (2009 to 2013)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias				
			2009 (Bias Adjustment Factor = 0.84)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.99)	2013 (Bias Adjustment Factor = 1.04)
1	Roadside	Y	33.9	35.8	30.3	31.4	33.6
2	Roadside	Y	32.2	34.7	33.2	30.8	31.7
3	Background	Y				18.8	19.6
4	Roadside	Y					33.8
5	Roadside	Y					27.9
6	Roadside	Y	22.6	25.2	22.2	22.4	26.2
7	Roadside	Y					15.0
8	Roadside	Y		**45.5**	**42.5**	**42.5**	**42.1**
9	Roadside	Y			39.3	39.0	**41.7**
10	Roadside	Y				39.4	39.5
11	Roadside	Y					27.9*
12	Background	Y				17.0	17.3
13	Kerbside	Y					23.6*
14	Roadside	Y	35.0	37.0	35.7	35.5	33.6
15	Roadside	Y		31.9	27.6	31.0	30.4
16	Roadside	Y	29.8	34.0	29.6	30.5	33.7

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias				
			2009 (Bias Adjustment Factor = 0.84)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.99)	2013 (Bias Adjustment Factor = 1.04)
17	Roadside	Y				37.1	38.3
18	Roadside	Y			37.3	37.2	37.5
19	Roadside	Y		**44.5**	39.7	39.6	37.6
20	Roadside	Y	28.5	32.7	28.2	27.7	30.6
21	Roadside	Y	29.3	30.4	28.3	28.7	28.5
22	Kerbside	Y		36.5	33.9	35.4	34.5
23	Roadside	Y				28.3	29.2
24	Roadside	Y		**40.1**	31.0	31.6	33.4
25	Roadside	Y					26.3*
26	Kerbside	Y					22.7*
27	Kerbside	Y	30.4	32.8	31.5	31.6	31.5
28	Roadside	Y			33.7	35.9	**40.4**
29	Roadside	Y			32.5	**44.3**	**43.2**
30	Roadside	Y			**43.5**	**45.1**	**45.6**
31	Roadside	Y		**41.4**	34.8	39.1	39.8
32	Roadside	Y			**46.7**	**49.8**	**50.9**
33	Roadside	Y			28.3	30.4	31.9
34	Roadside	Y			**44.0**	**43.3**	**41.2**

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias				
			2009 (Bias Adjustment Factor = 0.84)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.99)	2013 (Bias Adjustment Factor = 1.04)
35	Roadside	Y			**40.2**	**41.3**	38.4
36	Kerbside	Y		**45.7**	**40.0**	**40.3**	39.2
37	Roadside	Y					35.9*
38	Roadside	Y					27.9*
39	Urbancentre	Y				27.8	25.4
40	Roadside	Y			35.6	35.2	36.3
41	Roadside	Y				33.0	32.1
42	Roadside	Y		**41.8**	38.2	37.7	38.5
43	Kerbside	Y			32.3	33.5	34.9
44	Roadside	Y		39.6	37.1	37.7	38.9
45	Roadside	Y			**41.8**	**42.0**	38.2
46	Kerbside	Y					32.8*
47	Roadside	Y					36.6*
48	Roadside	Y		38.2	29.6	31.3	33.7
49	Roadside	Y		**47.9**	38.9	**40.3**	**41.4****
50	Roadside	Y	32.4	35.8	31.0	30.8	32.0
51	Roadside	Y	34.6	36.2	32.8	33.1	34.0
52	Roadside	Y	38.6	**42.0**	37.3	**40.5**	**40.2**

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias				
			2009 (Bias Adjustment Factor = 0.84)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.99)	2013 (Bias Adjustment Factor = 1.04)
53	Roadside	Y	**40.3**	**45.1**	37.0	38.0	37.8
54	Roadside	Y	**45.6**	**47.3**	39.9	37.9	37.7
55	Roadside	Y	**43.5**	**46.3**	**43.1**	**42.0**	**41.8**
56	Roadside	Y	34.8	39.8	34.2	35.0	35.0
57	Kerbside	Y					33.2*
58	Roadside	Y					22.7*
59	Roadside	Y				34.5	37.1
60	Roadside	Y				35.0	36.5
61	Roadside	Y				34.7	35.3

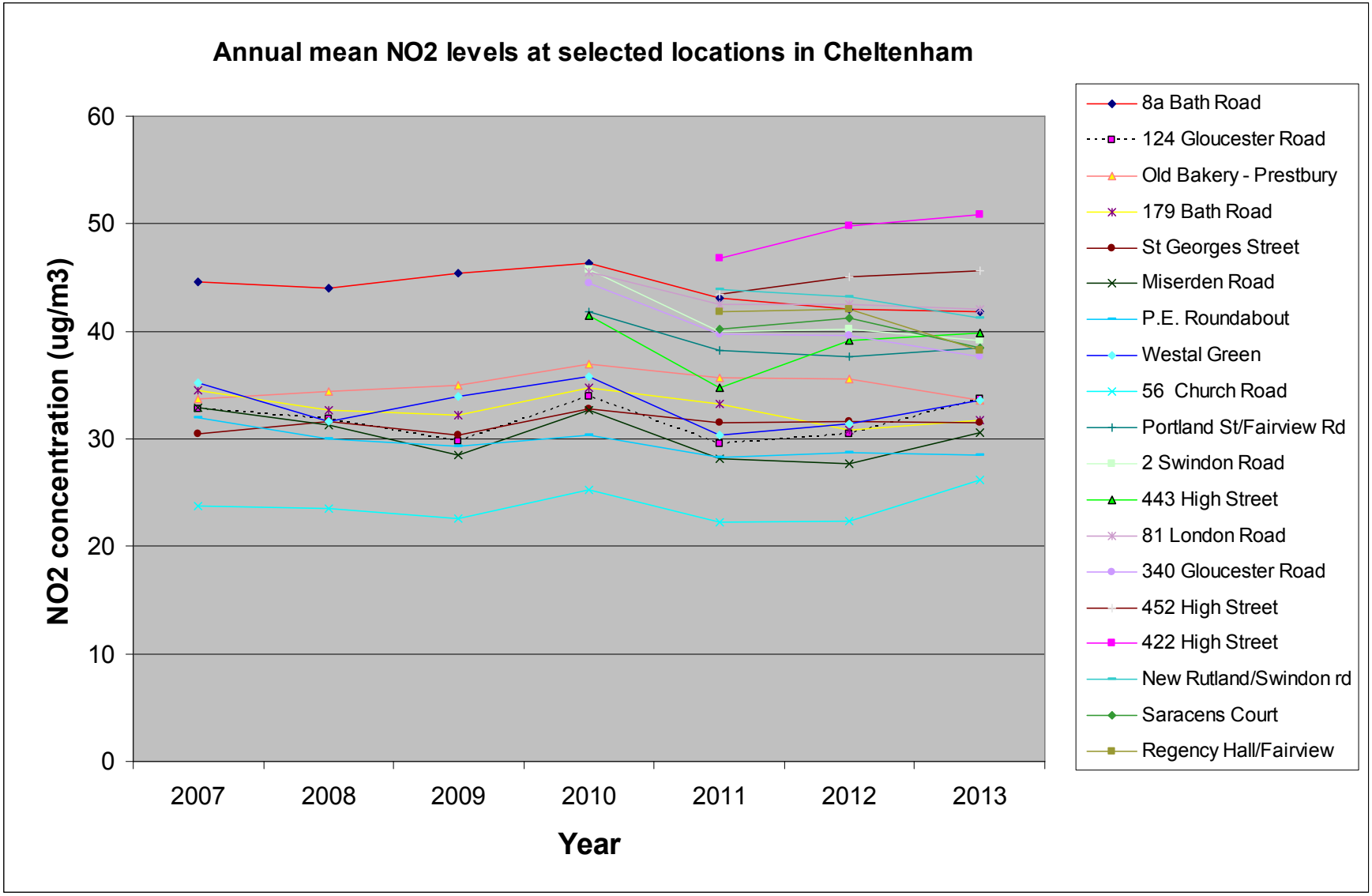
In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

Blank results indicate that the monitoring location was not included during this year.

* These results have been annualised using nearby diffusion tube results from 8 locations. Details of calculations can be found in Appendix 4.

**The monitoring result at this location is not representative of public exposure due to the distance from the nearest property façade (approximately 4.5m). Utilising the NO_2 fall-off with distance calculator tool and a local background level from a nearby location at Chelsea Close of 17.3ug/m^3, the estimated exposure level at the building façade is calculated to be 37.9ug/m^3

Figure 2. 3 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites



2.2.1 Particulate Matter (PM_{10})

No PM_{10} 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 PM_{10} levels, it is possible that roadside locations near to busy roads and junctions could exhibit elevated levels of PM_{10}.

Unfortunately there is no currently practical or affordable method for measuring PM_{10} levels at roadside locations where there is potential exposure in Cheltenham.

2.2.2 Sulphur Dioxide (SO_2)

No Sulphur Dioxide monitoring was carried out by Cheltenham Borough Council during the period covered by this report.

2.2.3 Benzene

No Benzene monitoring was carried out by Cheltenham Borough Council during the period covered by this report.

2.2.4 Other Pollutants Monitored

No other pollutants were monitored by Cheltenham Borough Council during the period covered by this report.

2.2.5 Summary of Compliance with AQS Objectives

Cheltenham Borough Council has examined the results from monitoring in the Borough.

Concentrations within the AQMA still exceed the annual mean objective for nitrogen dioxide at several locations as identified within the report and the AQMA should remain.

3 New Local Developments

There is a proposal to develop an area of land to the south of Cheltenham off Shurdington Road. Potential air quality impacts have been assessed as part of the submitted Environmental Statement for the site (Chapter 11). An Air Quality assessment was conducted using local existing receptors and residential facade receptor locations of the new development. The Air Quality Assessment was produced by RPS and associates in September 2013 (Ref: JBB7795.C0191).

The conclusions from the submitted air quality assessment state that the predicted concentrations in the opening year at the façades of the existing receptors would be below the Air Quality Standard objective for NO_2, PM_{10} and $PM_{2.5}$. The magnitude of change at all receptors is described as 'imperceptible' and the overall significance of air quality effects is considered to be 'negligible'.

Impacts during the construction of the proposed development, such as dust generation and plant vehicle emissions, are predicted to be of short duration and only relevant during the construction phase. Implementation of the 'highly recommended' mitigation measures set out in the Institute of Air Quality Management (IAQM) Dust and Air Emissions Mitigation Measures document for high risk sites should reduce the impact of construction activities to medium, or even low.

3.1 Road Traffic Sources

There are no new significant road traffic sources identified within the Borough during the period covered by the report.

3.2 Other Transport Sources

There are no new other transport sources identified within the Borough during the period covered by the report.

3.3 Industrial Sources

There are no significant industrial sources of air pollution identified within the Borough during the period covered by this report

3.4 Commercial and Domestic Sources

There are no new significant commercial or domestic sources of air pollution identified within the Borough during the period covered by this report.

3.5 New Developments with Fugitive or Uncontrolled Sources

Cheltenham Borough Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Cheltenham Borough Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Local / Regional Air Quality Strategy

Cheltenham Borough Council does not have a local air quality strategy. There is a Gloucestershire Air Quality Strategy but this is considered to be largely out of date and does not really set out targets and actions for individual authorities to work towards.

More importantly, Cheltenham Borough Council is in the process of implementing its own Air Quality Action Plan in conjunction with proposals agreed under the Gloucestershire Local Sustainable Transport Plan.

5 Planning Applications

As described in Section 3 there is a proposal for a significant urban development to the south west of Cheltenham known as the ‘Kidnapper’s Lane Development’. A detailed Air Quality Assessment was produced as part of the Environmental Statement submitted as part of the planning application.

It stated in conclusion; “Detailed atmospheric dispersion modelling has been undertaken for the first year in which the development is expected to be fully operational, 2023. Pollutant concentrations were expected to be below the relevant objectives at the façades of existing and proposed receptors. Changes in pollutant concentrations associated with the operation of the proposed development at existing receptors are not expected to be significant. Using professional judgement, the overall significance of effects is considered to be ‘negligible’. No mitigation measures are deemed necessary as a direct consequence of the development because the associated risks are very low and thus acceptable.”

6 Air Quality Planning Policies

Cheltenham Borough Council does not currently have any specific air quality planning policies. However as part of the Council's standard planning consultation procedures, all planning proposals are scrutinised by the relevant officer responsible for air quality and assessed for potential Air Quality implications. Recommendations are made as appropriate to ensure that sufficient information is submitted by the applicant to demonstrate that the development will not have a significant negative impact on local air quality and will not contribute to exceedances of any national air quality objectives. The Officer will consider various aspects of the development such as scale of the development, affect on traffic flow, local conditions – for example existing air quality and exposure – and whether the proposal incorporates any biomass boilers or PPC regulated processes. If it is considered that there is the potential for a significant impact on air quality from a proposed development then an Air Quality Impact Assessment will be requested from the developer which must define the magnitude of changes to air quality and the impacts at specific receptors together with appropriate mitigation measures.

Where required, a screening assessment will be carried by Cheltenham Borough Council on those proposed developments that could significantly impact air quality such as Biomass Boilers. This will progress to a detailed assessment where necessary.

Cheltenham Borough Council is in the process of reviewing the Cheltenham Local Plan which expired in 2011. Through this process, the officer responsible for air quality at the Council is to ensure that a suitable air quality planning policy is included within the final Plan to ensure that air quality is taken seriously as a material planning consideration during early pre-application stages of development proposals.

In addition the Council officer responsible for air quality has produced a guidance document to assist both planners and developers to understand the importance of air quality as a material planning consideration and the requirements for submission of an air quality assessment.

7 Local Transport Plans and Strategies

Cheltenham Borough Council's transport strategy is derived from the Gloucestershire Local Transport Plan. The latest Local Transport Plan has been produced and covers the period from 2011 to 2026. It can be viewed on line at the following location; http://www.gloucestershire.gov.uk/index.cfm?articleid=102114

The overall Local Transport Plan (LTP3) vision is: "Providing a safe and sustainable transport network within Gloucestershire" where safe means a transport network that people feel safe and secure using and sustainable means a transport network that is both environmentally and financially sustainable.

LTP3 has to address national transport priorities at the local level. These priorities are to;

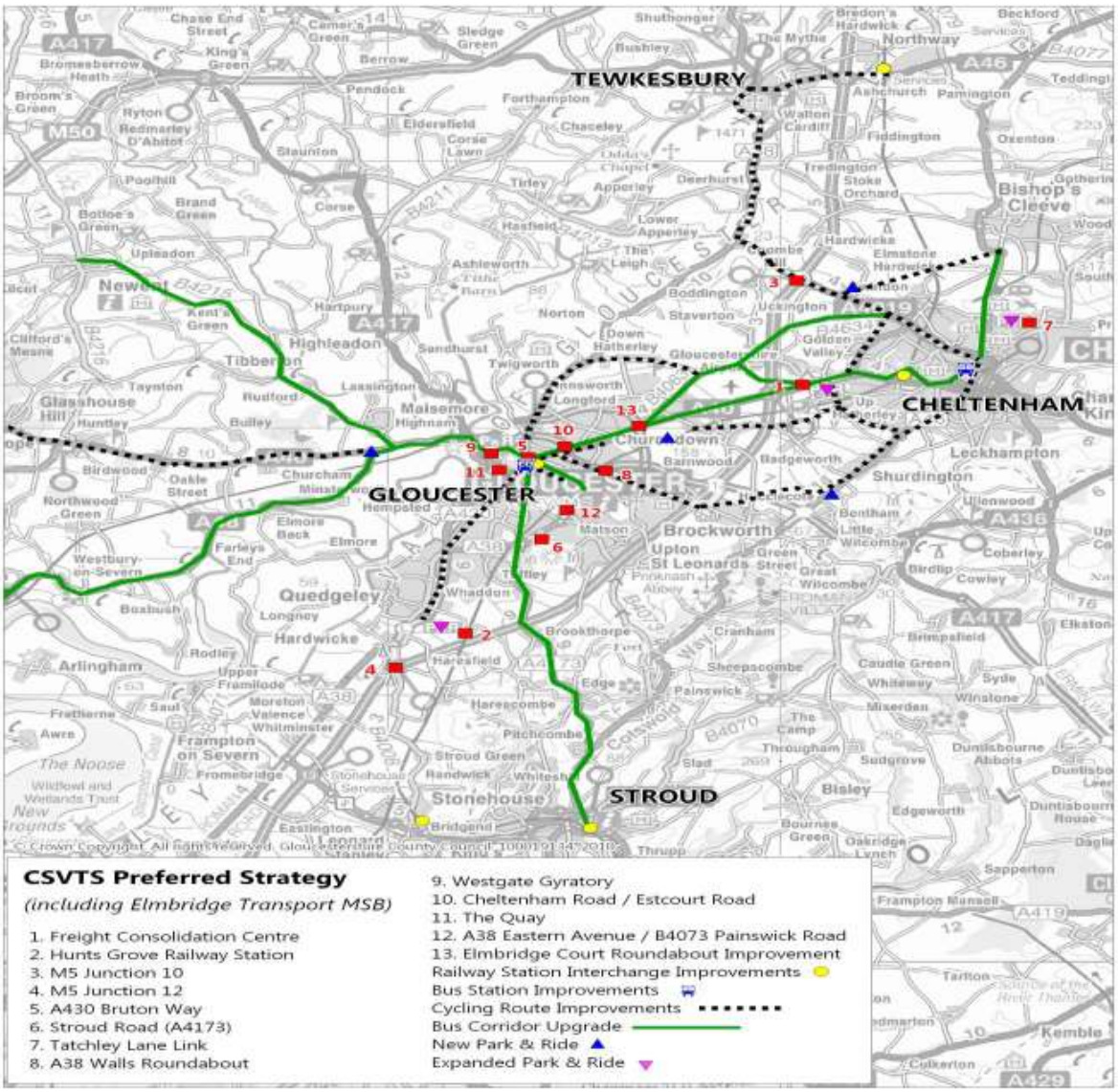
- Tackle climate change;
- Support economic growth;
- Promote equality of opportunity;
- Contribute to better safety, security and health;
- Improve quality of life.

and it has aligned these to four main themes, which are:-

- A greener, healthier Gloucestershire;
- Sustainable economic growth;
- A safer, securer transport system;
- Good access to services.

The LTP3 sets out how the county council, working with its agents in Cheltenham and Gloucester and elsewhere in the county, aims to achieve the above themes and improvements through implementation of a number of specific schemes.

A summary of the preferred schemes identified within LTP3 for the Central Severn Vale area which covers Cheltenham are illustrated on the plan below.



It is hoped that the adoption of these schemes will assist in reducing traffic vehicle movements in Cheltenham which should result in a consequential improvement in air quality.

However many of these schemes rely on significant funding which, due to the uncertain economic climate, may not be guaranteed.

Additionally it is recognised that people may not respond to measures to encourage them to change to travel by cycle, on foot, car-sharing or by public transport. This may therefore result in increased congestion and CO2 emissions.

8 Climate Change Strategies

Cheltenham Borough Council produced a Climate Change Strategy in 2005 which can be found on the following link;
http://www.cheltenham.gov.uk/site/scripts/download_info.php?fileID=955

The OVERARCHING AIM of this strategy is to make Cheltenham a carbon neutral borough.

The MAIN OBJECTIVES of the strategy are to:
• raise awareness of the potential impact of climate change;
• establish accurate data of greenhouse gas emissions from activities in Cheltenham;
• propose measures to help prevent the causes of climate change, by aiming to reduce CO2 emissions from activities in Cheltenham by 20% from 1990 levels by 2010 and by 60% by 2050;
• propose measures to help us adapt to the inevitable consequences of climate change;
• engage with external agencies and other stakeholders to gain commitment to addressing climate change issues and delivering the climate change action plan.

Although it doesn't specifically detail improvements to Air Quality it does highlight the need to reduce the impact of road transport in terms of greenhouse gas emissions.

The Strategy accepts that the most effective tools to reduce CO2 emissions from vehicles are likely to be EU and national legislation and taxes. Car manufacturers are reducing average CO2 emissions from new cars by 25% from 1995 to 2008, and changes to vehicle tax bands and company car taxation are designed to encourage cleaner vehicles. However emissions of some air pollutants such as nitrogen dioxide has not mirrored the reduction in CO2 emissions.

However there is minimal evidence to demonstrate a reduction in car usage in Cheltenham. Recent traffic count data suggests that car use and congestion has not decreased since Cheltenham adopted its Climate Change Strategy.

9 Implementation of Action Plans

Cheltenham Borough Council is shortly to approve the implementation of an Air Quality Action Plan. This approval is scheduled for June 2014 and subject to this approval, the document will be placed on the Borough Council website. The Action Plan document has been developed through the council Air Quality Steering Group and has been through the required consultation process. Rather than being a static document, it is seen as a live document subject to further review and modification as actions are implemented and results become available.

The majority of the suggested actions described within the Action Plan are those that are to be implemented through Gloucestershire County Council's Local Sustainable Transport Fund (LSTF). The implementation of the remaining proposed measures that are not LSTF funded will depend on resource and funding availability.

Despite the Action Plan needing official approval, several of the LSTF measures identified within the document have either been implemented or are in the process of being implemented. The most contentious of these measures is the planned Highways Improvement work. Many residents have raised concerns about closure of Cheltenham's inner ring road on the basis that traffic may increase on roads near to their houses and create an air pollution problem. As a result of these concerns, Cheltenham Borough Council has installed further diffusion tube monitoring at key locations of concern to assess air quality prior to implementation of the proposed Highways Improvement work.

Table 9.1 Action Plan Progress

No.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
1	Highways Improvements	A range of highway amendments to improve traffic flow and improve cycle and pedestrian provision within Cheltenham.	Glos County Council	2013-14	2014-16	Reduction in through traffic and improved access to car parks. Reduced congestion at key junctions	1-2%	The authority has applied for a Traffic Regulation Order to implement the junction changes	Scheme approved by Council	2016	Vehicle CO2 emissions have been modelled to fall within the inner ring road and core areas of Cheltenham compared to Do nothing approach
2	Air Quality Information	To provide up to date information on local air quality, air quality forecasts and sustainable travel options	Chelt Borough Council	2014-15	2014-15	Hit counter on webpage.	<0.1%	None	-	2015	Emission reductions directly attributable to this action cannot be measured
3	Promotion of Park & Ride	The promotion of existing and proposed new Park & Ride schemes to include improved signage	Glos County Council	2014-15	2014-16	Reduced car travel into & out of Cheltenham	0.1-1%	Ongoing transport planning work for development of new P&R site	Securing new site. New signage erected	2016?	Gauge use of P&R site and relate to traffic count data.

No.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completio n Date	Comments Relating to Emission Reductions
4	Promotion of Personal Travel Plans (PTP)	Target individuals directly by actively promoting and developing alternative travel options to allow a change in their transport behaviour	Glos County Council	2012	2013-2015	Repeat surveys to gauge behaviour change	0.5%	First phase of PTP completed	First phase of PTP completed	2015	Difficult to quantify any reductions directly attributable to PTP
5	Bike-It-Officer	To encourage parents and children to cycle and walk to school where possible	Glos County Council	2012	2013-2015	none	<0.5%	Numerous schools visited		2015	Difficult to quantify any reductions directly attributable to Bike it officer
6	Promotion of Greener Vehicles	To encourage electric vehicle use through the installation of charge points in car parks & on-street plus differential car parking charges	Glos County Council	2012	2013-2015	Charge point use data	<0.5%	None	None	2015	Dependant on uptake of electric vehicles locally

No.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completio n Date	Comments Relating to Emission Reductions
7	HGV restrictions	To encourage deliveries during the quieter footfall periods of the day to reduce congestion	Glos County Council & Chelt Borough Council	2014	2015	Traffic count data	0.1%	None	None	2016	
8	Increase Car Sharing	Upgrade and re-launch car-sharing website plus improved signage and promotion	Glos County Council	2013	2015	Traffic count data	0.1%	None	None	2016	
9	School Travel Grants	LSTF grants to schools for sustainable travel initiatives	Glos County Council	2013	2014-15	Uptake of grants	<0.1%	None	None	2016	
10	Business Travel Grants	LSTF grants to businesses for sustainable travel initiatives	Glos County Council	2013	2014-15	Uptake of grants	<0.1%	None	None	2016	
11	Wayfinding Initiative	To improve signage and routing for bus users and pedestrians	Glos County Council	2013	2014-15	none	<0.1%	New direction signage installed	New direction signage installed	2016	Greater bus use and walking difficult to quantify emission reductions

No.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completio n Date	Comments Relating to Emission Reductions
12	Promote Workplace Travel Plans	Cheltenham Borough Council will develop a workplace 'smarter' travel plan where resources allow and encourage businesses	Chelt Borough Council	2014	2015	Whether or not a plan is implemented	<0.1%l	None	None	2015?	Aim to encourage more sustainable travel choices by staff through formal adoption of a Travel Plan
13	Air Quality Planning Policy	An Air Quality Policy will be adopted as part of the emerging Cheltenham Local Plan	Chelt Borough Council	2013	2015	Whether or not a formal AQ planning Policy is adopted	Unknown but potentially significant - >1%	Draft AQ Policy submitted for consultatio n	Draft AQ Policy submitted for consultatio n	2015	
14	Traffic Light Appraisal	To investigate the potential for traffic light switch off trials with a view to removal	Glos 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 looked at	6 sets of lights currently being looked at	2015	
15	Bus & taxi quality partnership	To encourage fuel efficient & safe driving with no idling	Glos County Council and Chelt Borough Council	2013	2014-15	Anecdotal	unknown	None	None	2016	Will also look at bus routing to assist emission reductions

No.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completio n Date	Comments Relating to Emission Reductions
16	Twenty is Plenty	Reduce urban speed limit to 20mph in some areas to reduce congestion and improve traffic flow on busier roads	Chelt Borough Council and Glos County Council	2014-15	2015-16?	Traffic count/speed data	<0.5%	None	None	2016	Limited data on emission reductions from reducing traffic speed
17	A lower emission bus fleet	To encourage improvement of bus fleets to meet latest Euro emission standards	Chelt Borough Council	2013	2014-16	Bus fleet data	0.5%	Initial funding bid to Govt failed but positive response	Initial funding bid to Govt failed but positive response	Ongoing	May depend on Govt funding to assist bus fleet upgrade
18	Green Planting	To increase green planting through planning to help off-set air pollution impacts	Chelt Borough Council	2014	2014-2016	Number of urban planning applications with green planting schemes adopted	<0.1%	None	None	Ongoing	Evidence supports green planting to help reduce airborne pollution
19	Vehicle Management Signage	Electric signage to inform drivers of congestion and nearest parking	Chelt Borough Council & Glos County Council	2014	2014-2016	Traffic count data	<0.1%	None	None	2016?	

No.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completio n Date	Comments Relating to Emission Reductions
20	Cycle Safety Improvements	Improvement of road layouts and associated infrastructure to improve the safety of cyclists in Cheltenham	Chelt Borough Council & Glos County Council	2014	2014-2016	Number of cyclists and accident & injury statistics	<0.1%	None	None	2016?	

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

The new monitoring data for 2013 continues to demonstrate that the annual mean objective for NO_2 is being exceeded at four locations in Cheltenham where there is relevant exposure. These locations are indicated in Fig. 1.2. and described in Section 2.2. Two locations that previously exceeded the annual mean objective, at Gloucester Road and Suffolk Road (in 2010) and at Fairview Road (2010-2012) now fall within the national objective limit. However they are still being monitored in case the situation changes. It is hoped that the proposed Action Plan measures that are due to be implemented will help to reduce NO_2 levels further.

10.2 Conclusions relating to New Local Developments

No significant new local developments have occurred during the period covered by this report. There are proposals to undertake a significant residential development off Shurdington Road to the south of Cheltenham as described in section 3. An air quality assessment has been carried out as part of the planning process and this demonstrated that potential air quality impacts are insignificant to both existing and future receptors. Detailed Air Quality Assessments will be required by developers for any future developments in and around Cheltenham.

10.3 Other Conclusions

There are no further conclusions.

10.4 Proposed Actions

There are no other proposed actions other than continuing implementation of measures identified within the current Air Quality Action Plan.

11 References

1. Local Air Quality Management – Technical Guidance LAQM.TG(09) – DEFRA (2009)
2. Updated Screening Assessment (2012) - Cheltenham Borough Council
3. Progress Report (2011) - Cheltenham Borough Council

Appendices

Appendix 1: 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

For 2012 and 2013, a local Bias Adjustment factor was used from a triplicate co-location study that commenced at the Council's roadside Air Quality Monitoring Station in April 2012.

Factor from Local Co-location Studies

The Bias Adjustment Factor used for 2012 and 2013 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 1.04 for 2013. This was calculated using the AEA_DifTPAB_v04.xls spreadsheet. A copy of the spreadsheet is included in Appendix 2.

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 chemi-luminescence 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. Bi-annual servicing and maintenance is also carried out.
Data received is ratified by Geoff Broughton from Air Quality Data Management (AQDM). Ratified data is provided to us every quarter (see Appendix 3).

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

Gradko International Limited participates in the WASP scheme. The WASP performance testing scheme uses artificially spiked Palmes type diffusion tubes to test each participating laboratory's analytical performance on a quarterly basis. At the completion of the round, laboratories receive a report detailing how they have performed and how their results relate to those of their peers.

A summary of the WASP performance for Gradko International laboratory is provided in Table 1. This table provides the percentage of results where the z score was between -2 and +2 which is deemed to be a satisfactory z-score. Performance scores are currently based upon the z-score statistic, a widely used scoring system employed in chemical proficiency testing.

Table 1

The following table lists the results from Gradko International laboratory which participated in recent HSL WASP NO2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be satisfactory based upon a z-score of < ± 2.

WASP round	WASP R120	WASP R117	WASP R118	WASP R119	WASP R120
Period	Jan – Mar 2013	Apr – June 2013	July – Sept 2013	Oct – Dec 2013	Jan – Mar 2014
Gradko	100%	100%	100%	100%	100%

Appendix 2: 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	02/01/2013	31/01/2013	38.6	37.6	39.8	39	1.1	3	2.8	46.5	99.2	Good	Good
2	31/01/2013	01/03/2013	42.7	39.6	44.5	42	2.5	6	6.1	42.8	96	Good	Good
3	01/03/2013	02/04/2013	32.2	34.6	31.9	33	1.5	4	3.6	38.9	99.5	Good	Good
4	02/04/2013	02/05/2013	32.4	30.7	32.8	32	1.1	3	2.8	34.3	99.9	Good	Good
5	02/05/2013	31/05/2013	25.2	26.2	22.0	24	2.2	9	5.5	33	99.6	Good	Good
6	31/05/2013	28/06/2013	26.6	28.3	25.7	27	1.3	5	3.3	27	99.6	Good	Good
7	28/06/2013	31/07/2013	32.9	32.7	32.3	33	0.3	1	0.8	29	99.6	Good	Good
8	31/07/2013	02/09/2013	29.4	29.9	31.0	30	0.8	3	2.0	30	99.8	Good	Good
9	02/09/2013	01/10/2013	36.4	34.5	33.9	35	1.3	4	3.3	37	96	Good	Good
10	01/10/2013	04/11/2013	36.4	37.1	30.5	35	3.6	10	9.0	32	99.6	Good	Good
11	04/11/2013	29/11/2013	54.2	51.2	45.4	50	4.5	9	11.1	52.7	99.7	Good	Good
12	29/11/2013	31/12/2013	40.9	39.1	38.0	39	1.4	4	3.6	38	99.6	Good	Good
13	31/12/2013	31/01/2014	38.2	38.4	37.2	38	0.6	2	1.6	36.7	99.7	Good	Good
										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

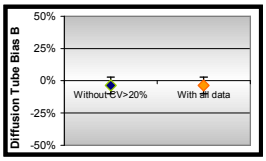
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision 13 out of 13 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 13 periods of data
Bias factor A 1.04 (0.98 - 1.12)
Bias B -4% (-11% - 2%)
Diffusion Tubes Mean: 35 µgm^{-3}
Mean CV (**Precision**): 5
Automatic Mean: 37 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 37 (34 - 39) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 13 periods of data
Bias factor A 1.04 (0.98 - 1.12)
Bias B -4% (-11% - 2%)
Diffusion Tubes Mean: 35 µgm^{-3}
Mean CV (**Precision**): 5
Automatic Mean: 37 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 37 (34 - 39) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Appendix 3: Ratified data from Automatic NO2 analyser on St Georges Road – Swindon Road junction

Produced by AQDM on behalf of Cheltenham B.C.

CHELTENHAM SWINDON ROAD 2013

These data have been fully ratified by AQDM to LAQM TG(09) standards

Site Description

Junction of Swindon Road and St George St

Air Quality Statistics

Pollutant	NO_2	NO	NO_X
Number Very High #	0	-	-
Number High #	0	-	-
Number Moderate #	0	-	-
Number Low #	8688	-	-
Maximum 15-minute mean	193 µg m^{-3}	471 µg m^{-3}	861 µg m^{-3}
Maximum hourly mean	157 µg m^{-3}	420 µg m^{-3}	774 µg m^{-3}
Maximum running 8-hour mean	124 µg m^{-3}	215 µg m^{-3}	428 µg m^{-3}
Maximum running 24-hour mean	93 µg m^{-3}	142 µg m^{-3}	295 µg m^{-3}
Maximum daily mean	85 µg m^{-3}	134 µg m^{-3}	283 µg m^{-3}
Average	36 µg m^{-3}	24 µg m^{-3}	72 µg m^{-3}
Data capture	99.2 %	99.2 %	99.2 %

Daily Air Quality Index (DAQI) as defined by COMEAP 1st January 2012 and revised in 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}	36 µg m^{-3}	0	-	-	No
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	157 µg m^{-3}	0	0	18 hours	No

Appendix 4: Details of annualisation calculations carried out for diffusion tube monitoring locations with less than 6 months data

Long term monitoring site	Annual mean	Period Mean	Ratio am/pm
124 Gloucester Road	33.71304363	37.81773119	0.891461295
264 Gloucester Road	38.27840297	40.45112504	0.946287722
338 Gloucester Road	37.52172756	41.38307302	0.906692636
340 Gloucester Road	37.5856019	41.95769526	0.895797581
YMCA - High St	37.80715841	41.69324795	0.906793312
Cutting Room - High St	37.68457251	46.99694985	0.801851453
8a Bath Road	41.83534466	48.35322588	0.865202764
15 Bath Road	35.04406227	39.97621884	0.876622734
		Average	**0.886338687**

The average figure was used to annualise the ‘average’ data obtained from those monitoring locations with less than 6 months of monitoring data.