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Chiltern's Local AIR & Environment



2012 Air Quality Updating and Screening Assessment for Chiltern District Council

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

April, 2012



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Executive Summary

The UK Government published its strategic policy framework for air quality management in 1995 establishing national strategies and policies on air quality which culminated in Part IV of the Environment Act (1995). The Environment Act requires Local Authorities to undertake air quality reviews. In accordance with the Policy and Technical Guidance issued by the Department of the Environment, Food and Rural Affairs (Defra, 2009), all Local Authorities have a statutory duty to carry out a yearly assessment of air quality in their area.

The first, second third and fourth rounds of air quality Review and Assessment have been completed by Chiltern District Council, which considered all necessary pollutants. The first step in each round is to undertake an Updating and Screening Assessment, which provides updated information on monitoring data and emission sources. Where an exceedence or the likelihood of an exceedence of objective values is identified for a pollutant there is a requirement to proceed to a Detailed Assessment.

This Updating and Screening report considers any new air quality monitoring data, new sources or significant changes to existing sources, and any other significant local changes relevant to air quality. Changes to relevant public exposure will also be considered. It is not necessary to re-assess issues that have already been adequately considered in previous rounds.

Diffusion tube monitoring data has indicated that there was one exceedence of the annual mean objective value for nitrogen dioxide in 2011. This was located within the AQMA (which is addressed via the Action Plan), and therefore a Detailed Assessment is not required and it is not necessary to consider revoking the AQMA on this basis.

There have been no new sources of emissions, significant changes in existing sources, or any significant local changes relevant to air quality that would be likely to increase the risk of pollutants exceeding objective values.

Table of contents

1	Introduction	4
1.1	Description of Local Authority Area	4
1.2	Purpose of Report	5
1.3	Air Quality Objectives	6
1.4	Summary of Previous Review and Assessments	7
2	New Monitoring Data	12
2.1	Summary of Monitoring Undertaken	12
2.2	Comparison of Monitoring Results with AQ Objectives	18
3	Road Traffic Sources	32
3.1	Narrow congested streets with residential properties close to the kerb	32
3.2	Busy streets where people may spend 1-hour or more close to traffic	33
3.3	Roads with high flow of buses and/or HGVs.	33
3.4	Junctions and busy roads	33
3.5	New roads constructed or proposed since the last round of review and assessment	34
3.6	All roads with significantly changed traffic flows.	34
3.7	Bus and coach stations	34
4	Other Transport Sources	35
4.1	Airports	35
4.2	Railways (diesel and steam trains)	35
4.3	Ports (shipping)	36
5	Industrial Sources	37
5.1	New or Proposed Industrial Installations	37
5.2	Major fuel (petrol) storage depots	38
5.3	Petrol stations	39
5.4	Poultry farms	39
6	Commercial and Domestic Sources	40
6.1	Biomass combustion – Individual Installations	40
6.2	Biomass combustion – Combined Impacts	40
6.3	Domestic Solid-Fuel Burning	41
7	Fugitive or Uncontrolled Sources	42
8	Conclusions and Proposed Actions	43
8.1	Conclusions from New Monitoring Data	43
8.2	Conclusions from Assessment of Sources	44
8.3	Proposed Actions	45
9	References	46

List of Tables

- Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.
- Table 2.2.1 Details of Non- Automatic Monitoring Sites
- Table 2.2.2 Diffusion Tube Precision Summary (50% TEA in Acetone)
- Table 2.2.3 Bias Adjustment Factor Spreadsheet
- Table 2.3a Results of Nitrogen Dioxide Diffusion Tubes
- Table 2.3b Relevant Exposure at Locations exceeding the 40 µg/m³ Annual Mean NO₂ Objective
- Table 2.3c Results of Nitrogen Dioxide Diffusion Tubes

List of Figures

- Figure 1.1 Geographical location of the Chiltern District, and identification of main population areas.
- Figure 1.2 Broad Street / Berkhamstead Road AQMA (Chesham, Buckinghamshire)
- Figure 2.1.1 Location of Continuous Automatic Monitor (Berkhamstead Road, Chesham)
- Figure 2.4a Historical Trend of Sites Exceeding the Annual Mean Objective within the AQMA in (2008-2011)
- Figure 2.4b Historical Trend of Nitrogen Dioxide in Amersham (2008-2011)
- Figure 2.4c Historical Trend of Nitrogen Dioxide in Chesham (2008-2011)
- Figure 2.4d Historical Trend of Nitrogen Dioxide in Other Areas (2008-2011)
- Figure 2.4e Historical Trend of Background Nitrogen Dioxide (2008-2011)
- Figure 4.2 Stationary Train Location

Appendices

Appendix A: Non-Automatic Monitoring Uncertainty Measurements 2008

Appendix B: Diffusion Tube Monthly Mean Values

1 Introduction

1.1 Description of Local Authority Area

The Chiltern District is located in the South East of the county of Buckinghamshire, bordering Hertfordshire. The districts of South Bucks, Wycombe and Aylesbury Vale form the Western boundaries. The name of the district is derived from its location in the centre of the Chiltern Hills.

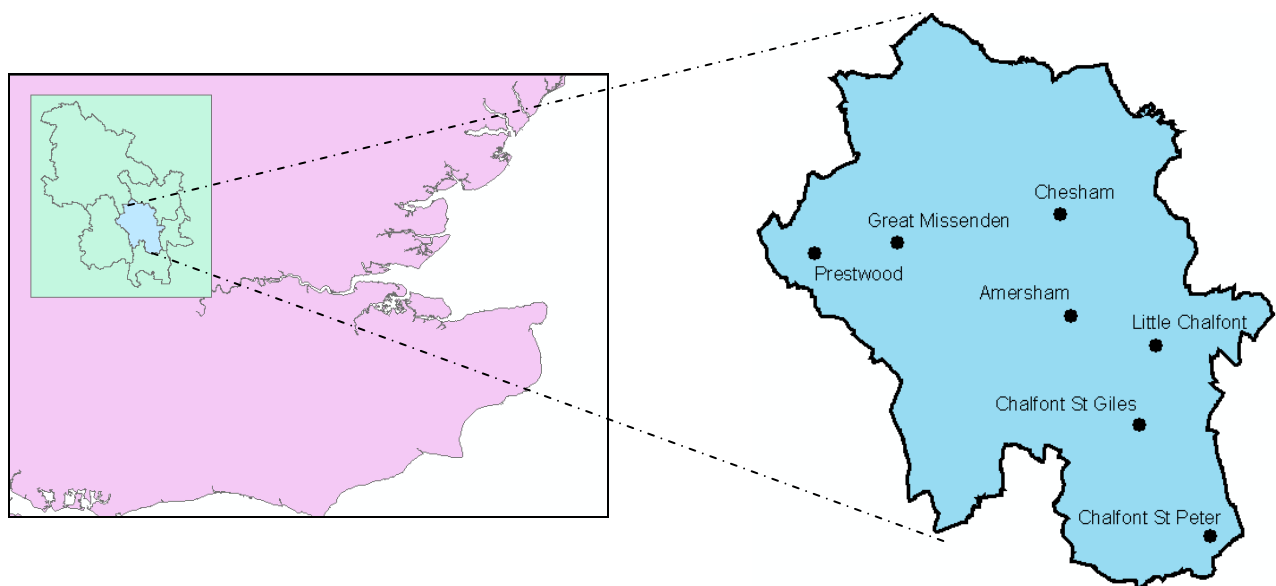


Figure 1.1 Geographical location of the Chiltern District, and identification of main population areas.

The District is a mixture of suburban and rural, with four main population centres. The rural character of the district is preserved by the green belt policy that acts to limit the urban sprawl of Greater London.

The District covers some 50,000 acres with a population of approximately 90,000 people. Approximately 70% live in the towns of Chesham (20,600), Amersham with Chesham Bois (15,500), and the villages of Chalfont St Peter (13,100), Prestwood and Great Missenden (10,500), Little Chalfont (4,400) and Chalfont St Giles (6,500).

Chiltern District Council

It has been found that residential properties have high per capita emissions of carbon dioxide and consumption of gas, electricity and water. The main use of land in the District, other than for residential use, is for agriculture. Current industrial activity is generally restricted to a number of small-medium size industrial estates, with only a handful of manufacturing operations.

Road traffic forms the principal source of air pollution in the District. The analysis of air quality monitoring and road traffic data formed the basis of designating an AQMA in 2007 within the town of Chesham.

Many of the towns and villages within the District are in close proximity to the M40 and M25, which are just outside the south eastern and south western borders, and only a short distance to the M1, which may have additional impacts on traffic volume. The busiest roads in the District include the A416 and A413.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management 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.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

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 microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (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 Local Air Quality Management in England.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004

Chiltern District Council

	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
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1.4 Summary of Previous Review and Assessments

- **The First Round of Review & Assessment of Air Quality for Chiltern District Council:**

Chiltern District Council has completed the following review and assessments of air quality in the first round.

- **Stage 1 and Stage 2 (March 1999)**

The Stage 1 and Stage 2 report concluded that air quality objectives within Chiltern district were likely to be met for 2005 and no further assessment was required in the first round of review and assessment.

- **The Updating & Screening Assessment of Air Quality for Chiltern District Council 2003**

Chiltern District Council completed a USA for air quality in 2003. It concluded that the air quality objectives were likely to be met for all pollutants and a detailed assessment would not be required.

- **Progress Report 2004**

Chiltern District Council completed the progress report for air quality in 2004. It concluded that the air quality objectives were likely to be met for all pollutants and a detailed assessment would not be required. It did however recommend additional monitoring with passive diffusion tubes along Berkhamstead Road in Chesham. This area was showing the greatest elevations of Nitrogen Dioxide (NO_2). The report was based on AEA Technology Intercomparison Bias.

- **Progress Report 2005**

Chiltern District Council completed the second progress report for air quality in 2005. It recommended additional monitoring along Berkhamstead Road in Chesham. It also suggested the potential for a detailed assessment to be undertaken along Berkhamstead Road.

- **The Updating & Screening Assessment of Air Quality for Chiltern District Council 2006**

This updating and screening assessment for Chiltern District Council concluded that all the objectives in the Air Quality Regulations for England would be met by the relevant dates for all pollutants except NO₂. However, the EU annual average limit value (Stage 2) for PM₁₀ may be exceeded at some locations within the District, close to busy roads and junctions in 2010.

A Detailed Assessment was recommended for NO₂ at the following locations.

- Chesham Berkhamstead Road
- Chesham near the Jolly Sportsman pub.
- Chesham Broad Street

- **Detailed Assessment 2007**

There were five sites with potentially relevant exposure to the public where it was predicted that the annual mean objective for 2005 for nitrogen dioxide had not been met. These areas were all in a location in Chesham. It was recommended that Chiltern District Council consider declaring this area as an Air Quality Management Area (AQMA).

- **AQMA Designation 2007**

Chiltern District Council designated an AQMA, by order in 2007. The area encompasses a small section of the A416 – Broad Street/Berkhamstead Road.



Figure 1.2 Broad Street / Berkhamstead Road AQMA (Chesham, Buckinghamshire)

- **Progress Report 2008**

The Progress Report was completed to schedule and provided an update on monitoring results across the District and considered any significant changes that may impact air quality.

- **Further Assessment 2009**

The Further Assessment considered that the AQMA along Broad Street / Berkhamstead Road was still appropriate in order to secure an improvement in air

quality. It advised that further monitoring was required to ensure this and measure improvements against the forthcoming action plan.

- **Air Quality Action Plan 2009**

The Draft Final Air Quality Action Plan was accepted by the Chiltern District Council Cabinet for statutory consultation.

- **Updating & Screening Assessment 2009**

This updating and screening assessment for Chiltern District Council concluded that all the objectives in the Air Quality Regulations for England would be met by the relevant dates for all pollutants except NO₂. A Detailed Assessment was recommended for NO₂ at the location of the continuous monitor to determine if there was a need to extend the AQMA.

- **Air Quality Action Plan 2010**

The Draft Final Air Quality Action Plan was accepted by Defra.

- **Progress Report 2010**

The Progress Report was completed to schedule and provided an update on monitoring results across the District and considered any significant changes that may have impacted air quality.

- **Detailed Assessment 2010**

The report concluded that the NO₂ annual mean and 1-hour AQS objective were met in and around Berkhamstead Road Chesham during 2009. It was therefore recommended that CDC did not extend the AQMA boundary. Continued monitoring at the diffusion tube locations on Berkhamstead Road was recommended.

- **Progress Report 2011**

Chiltern District Council

The Progress Report was completed to schedule and provided an update on monitoring results across the District and considered any significant changes that impacted air quality.

All documents are available for download from www.chiltern.gov.uk/CLAIRE

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

A permanent automatic monitor has not been deemed necessary, as the diffusion tube network (discussed subsequently) provides an acceptable picture of air quality across the District. In addition, when required, it is possible to adjust the data obtained from a temporary automatic monitor to estimate the annual mean by using background automatic monitoring data collated from neighbouring districts. This is achieved by using the procedure stated in Technical Guidance LAQM.TG (09) to provide an estimate of the annual mean. Additionally, it is possible to determine short term statistics from short term monitoring data, which can be compared with the Air Quality Objectives.

A temporary continuous monitor has not been used in the last 12 months. Since the last USA (2009), continuous monitoring was reported in the Detailed Assessment 2010. A temporary monitor is currently installed (commenced: 1st March 2012) for six months in the same location. During this period there will be planned road re-surfacing works in and around the AQMA (currently scheduled for April, May & June 2012). It is envisioned that these works will cause significant disruption to traffic routes through the AQMA, which could lead to data which is not representative. It is therefore important to have a clear understanding of the effect of the road surfacing activity on air quality within the AQMA.

The data from the continuous monitoring will be reported in the 2013 Progress Report.

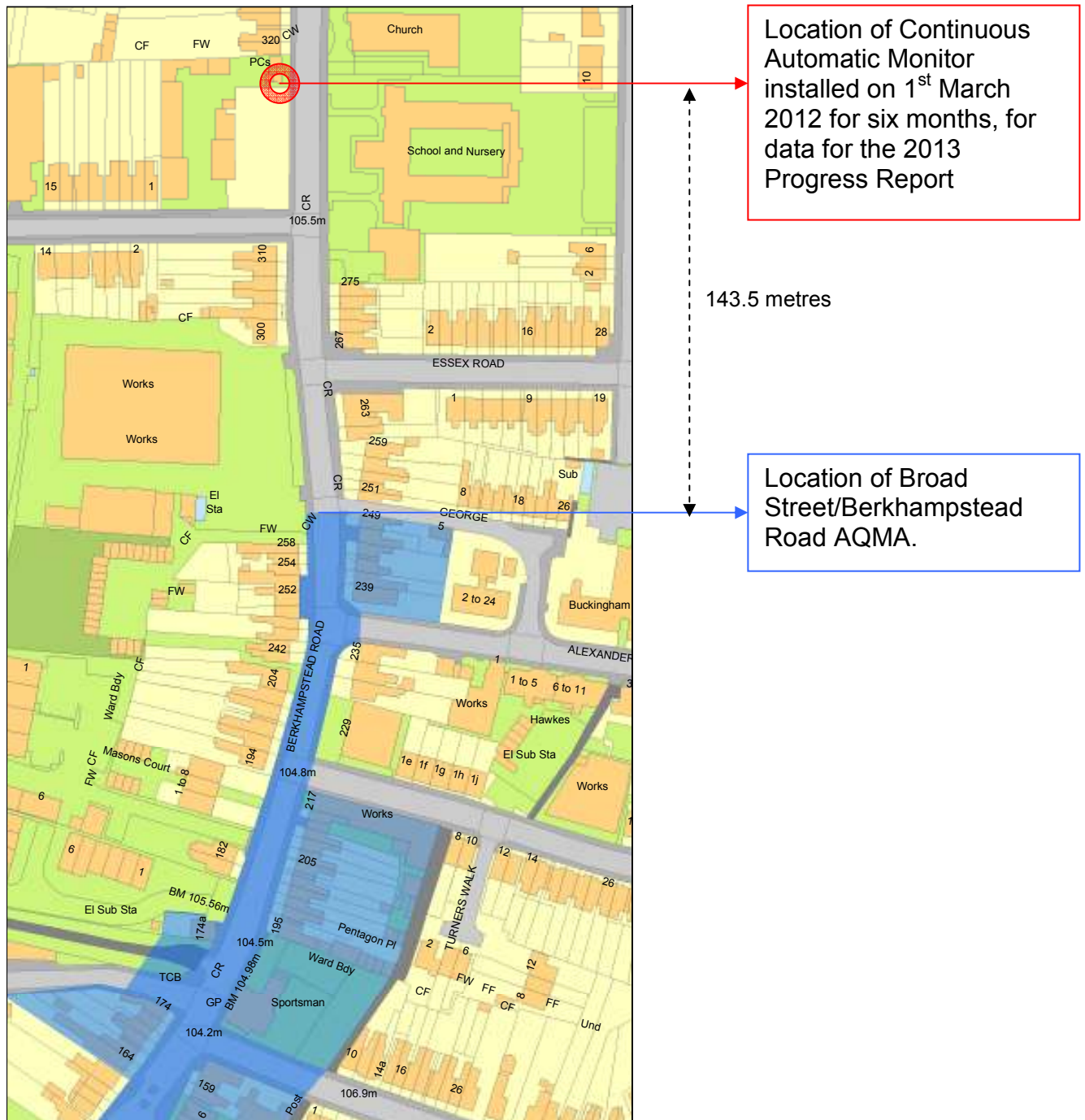


Figure 2.1.1 Location of Continuous Automatic Monitor (Berkhamstead Road, Chesham)

2.1.2 Non-Automatic Monitoring

Non-automatic diffusion tubes offer a relatively simple method of screening air quality to give a general indication of average pollution concentrations over a period of weeks or months. They are useful in highlighting ‘hotspots’ of high concentrations where more detailed studies may be required. There are currently a high number of

monitoring locations which enable good spatial coverage of the District with the resources available.

In 2011, there were 27 active locations for monitoring of NO₂ within the District. Historical data is available for a further 9 locations, for monitoring throughout 2000 – 2002. There are no national monitoring and survey sites located within the District. A background site (Hervines Park, Amersham) was selected to provide a benchmark to measure other sites against and establish a 'best case' level for the majority of the District.

Non-automatic monitoring site locations can be viewed in the Progress Report (2004) and additional locations in subsequent documents (Progress Report, 2005, Progress Report, 2008, Progress report 2010, and Progress report 2011).

Table 2.2.1 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQ MA ?	Relevant Exposure*	Distance to kerb of nearest road*	Worst-case Location?
St Mary's Way, Chesham	Roadside	495850 201510	NO ₂	N	7.5m	1.4m	Y
Rickmansworth Road, Amersham	Roadside	496550 198720	NO ₂	N	24.3m	2.2m	Y
High Street, Chalfont St Peter	Roadside	500050 190810	NO ₂	N	9.0m	3.6m	Y
The Pheasant, Chalfont St Giles	Roadside	499250 193750	NO ₂	N	6.4m	1.1m	Y
Gore Hill, Old Amersham	Roadside	495960 196940	NO ₂	N	8.3m	0.9m	Y
Stanley Hill, Amersham	Roadside	496760 197100	NO ₂	N	27.5m	1.3m	Y
Chesham Police Station, Broad Street	Roadside	496100 202000	NO ₂	Y	6.6m	3.7m	Y
Chesham flats by opticians, Broad Street	Roadside	496000 202000	NO ₂	Y	6.0m	2.1m	Y
Chesham Jolly Sportsman Pub, End of Berkhamstead Road	Roadside	496200 202300	NO ₂	Y	2.0m	1.9m	Y
Chesham opp 170 Berkhamstead Road	Roadside	496100 202300	NO ₂	Y	5.8m	1.6m	Y
Chesham at 305 Berkhamstead Road	Roadside	496300 202500	NO ₂	N	12.9m	1.5m	Y
Chesham by 336 Berkhamstead Road	Roadside	496200 202500	NO ₂	N	5.6m	1.3m	Y
Chesham opposite 5 Nashleigh Hill	Roadside	496300 202900	NO ₂	N	18.6m	1.4m	Y
Chesham opp St Columba Church, Berkhamstead Rd	Roadside	496200 202800	NO ₂	N	11.1m	1.5m	Y
Ashley green, by speed Camera, Chesham Road	Roadside	497600 205100	NO ₂	N	17.6m	0.7m	Y
Ashley green, by Bus stop/Church, Chesham Road	Roadside	497600 205200	NO ₂	N	26.8m	3.2m	Y
Little Chalfont, on back of sign	Roadside	500508 197878	NO ₂	N	35.3m	6.2m	Y
Nightingales Corner, on sign on roundabout, Nr Challoners Girl School	Roadside	499260 197452	NO ₂	N	29.8m	1.9m	Y
Hervines Park, on drain pipe on town building	Background	495708 198806	NO ₂	N	N/A	N/A	N
End of Broombar Lane, Great Missenden, on sign	Roadside	487991 200978	NO ₂	N	15.4m	3.4m	Y
Outside Chequers Pub, Prestwood	Roadside	487002 200812	NO ₂	N	11.4m	1.3m	Y
Old Amersham near speed calming measures	Roadside	495298 197520	NO ₂	N	7.8m	2.3m	Y
Amersham Hospital, Whielden Street, Next to fly over	Roadside	495446 196797	NO ₂	N	17.4m	2.0m	Y
Station Road, Amersham, opp number 76	Roadside	496450 197647	NO ₂	N	20.6m	2.2m	Y
Opposite side of road to Jolly Sportsman, Chesham	Roadside	496233 202329	NO ₂	Y	5.9m	2.5m	Y
Outside 75 High Street, Great Missenden	Roadside	489484 201234	NO ₂	N	1.5m	0.9m	Y
Automatic Monitor Co-Location, Berkhamstead Road	Roadside	496257 202617	NO ₂	N	7.5m	4.6m	Y

*For the categories of 'Relevant Exposure' and 'Distance to Kerb of Nearest Road' in the above table, distances have been calculated using base maps and aerial photography of the District on a Geographical Information System. The distances chosen are based on where the objectives should apply for the Annual Mean averaging period (Technical Guidance LAQM.TG (09) Box 1.4).

The diffusion tubes are prepared with 50% TEA in acetone and are analysed by Environmental Scientific Groups, who work in accordance with UKAS Accreditation for Nitrogen Dioxide Passive Tubes. The laboratory monitors accuracy on a monthly basis with an external proficiency scheme (Workplace Analysis Scheme for Efficiency), and also takes part in the Netcen Field Inter-comparison Exercise. The laboratory follows the procedures set out in the Harmonisation Practical Guidance.

Table 2.2.2 Diffusion Tube Precision Summary (50% TEA in Acetone), for Nitrogen Dioxide Diffusion Tube Collocation Studies. From Defra website 5th April 2012.

Environmental Scientific Groups, 50% TEA in Acetone	
2010	G
2010	G
2010	G
2010	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	P
2011	P

Diffusion tube precision based on laboratory performance is separated into two categories; Good or Poor. As seen in the table from the Review and Assessment website (v.03/09), the laboratory and method used has **Good** precision in 2011. (Table 2.2.2).

The latest bias adjustment factors were used to adjust the annual mean data in order to improve the accuracy of diffusion tube results. The bias adjustment factor used for

Chiltern District Council

2011 data is **0.84**, which was determined by the Nitrogen Dioxide Diffusion Tube Bias Adjustment Factor Spreadsheet (v.03/12) available from the Review and Assessment website (Table 2.2.3). It has been noted that the bias adjustment factor for 2010 was 0.93 which was significantly higher.

Table 2.2.3 National Diffusion Tube Bias Adjustment Factor Spreadsheet

version number: 03/12 From DEFRA website 5th April 2012

Analysed By ¹	Method <small>To include year selection, please fill from the pop up list</small>	Year ² <small>To include year selection, please fill</small>	Site Type	Local Authority	Length of Study (month s)	Diffusion Tube Mean Conc. (Dm) ($\mu\text{g}/\text{m}^3$)	Automatic Monitor Mean Conc. (Cm) ($\mu\text{g}/\text{m}^3$)	Bias (B)	Tube Precision ³	Bias Adjustment Factor (A) (Cm/Dm)
Environmental Scientific Groups	50% TEA in acetone	2011	R	Wyeombe District Council	10	43	39	11.5%	G	0.90
Environmental Scientific Groups	50% TEA in acetone	2011	R	Tunbridge Wells Borough Council	12	59	43	38.5%	P	0.72
Environmental Scientific Groups	50% TEA in acetone	2011	R	LB Newham	12	40	47	-14.3%	G	1.17
Environmental Scientific Groups	50% TEA in acetone	2011	UB	Canterbury City Council	11	17	15	17.8%	G	0.85
Environmental Scientific Groups	50% TEA in acetone	2011	R	Canterbury City Council	12	39	34	15.5%	G	0.87
Environmental Scientific Groups	50% TEA in acetone	2011	Overall Factor⁴ (22 studies)						Use	0.84

2.2 Comparison of Monitoring Results with AQ Objectives

Previously, the Updating and Screening Report (2009) identified that all the objectives in the in the Air Quality Regulations would be met by the relevant dates for all pollutants except NO₂.

2.2.1 Nitrogen Dioxide

Previously the measured annual mean concentration at a number of diffusion tube monitoring locations was >40 $\mu\text{g}/\text{m}^3$; however this is dependant on the bias adjustment factor used and adjustments for relevant exposure. It was predicted in the last USA that the bias adjustment factor would be more robust in subsequent rounds when more co-location results were available.

Background Concentrations

Background NO₂ concentrations have been measured using diffusion tubes since 2003. For data obtained in 2011, the annual mean concentration at the background site (Hervines Park, Amersham) was measured at 13.27 $\mu\text{g}/\text{m}^3$, which is lower than the estimated annual mean concentration for the District calculated from the UK Background Map for 2010 (15.43 $\mu\text{g}/\text{m}^3$) accessible from the Air Quality website. The maximum concentrations were estimated in the South East of the District, close to the A413 and M25 near Gerrards Cross, using the UK Background Map.

Diffusion Tube Monitoring Data

NO₂ diffusion tube data has been reported using the suggested format below (Table 2.4a). Uncertainty measurements for each month (Appendix A) and the full dataset for 2011 (appendix B) have been included. It can be seen that there are three

Chiltern District Council

locations in excess of the 40 $\mu\text{g}/\text{m}^3$ annual mean NO_2 objective, which are located within the AQMA. Historical data has also been reported using the suggested format in Table 2.4c.

Exceedence within the AQMA for NO_2 :

- **Chesham Jolly Sportsman Pub, End of Berkhamstead Road**
- **Chesham Police Station, Broad Street**
- **Chesham, opposite 170 Berkhamstead Road**

There were no annual means concentrations measured greater than 60 $\mu\text{g}/\text{m}^3$ within the AQMA.

Table 2.3a Results of Nitrogen Dioxide Diffusion Tubes with new bias adjustment figure of 0.84.

Site ID	Location	Within AQMA?	Data Capture 2011	Annual mean concentrations
				2011 ($\mu\text{g}/\text{m}^3$) Adjusted for bias
2	St Mary's Way, Chesham	N	100%	31.27849
9	Rickmansworth Road, Amersham	N	100%	28.83039
10	High Street, Chalfont St Peter	N	75%	23.38572
13	The Pheasant, Chalfont St Giles	N	100%	31.73445
14	Gore Hill, Old Amersham	N	100%	39.24526
16	Chesham Police Station, Broad Street	Y	83.3%	41.48859
17	Chesham flats by opticians, Broad Street	Y	91.7%	39.03448
18	Chesham Jolly Sportsman Pub, End of Berkhamstead Road	Y	83.3%	45.4062
19	Chesham opp 170 Berkhamstead Road	Y	91.7%	40.35912
20	Chesham at 305 Berkhamstead Road	N	100%	29.27532
21	Chesham by 336 Berkhamstead Road	N	100%	35.96989
22	Chesham opposite 5 Nashleigh Hill	N	100%	30.16959
23	Chesham opp St Columba Church, Berkhamstead Rd	N	75%	28.03733
24	Ashley green, by speed Camera, Chesham Road	N	100%	20.70418
25	Ashley green, by Bus stop/Church, Chesham Road	N	100%	20.90509
26	Little Chalfont, on back of sign	N	83.3%	18.62297
27	Nightingales Corner, on sign on roundabout, Nr Challoners Girl School	N	100%	30.45788
28	Hervines Park, on drain pipe on town building	N	100%	13.26822

29	End of Broombar Lane, Great Missenden, on sign	N	100%	17.68867
30	Outside Chequers Pub, Prestwood	N	100%	23.17026
31	Old Amersham near speed calming measures	N	100%	25.25944
32	Amersham Hospital, Whielden Street, Next to fly over	N	66.7%	27.321
33	Bottom of Stanley Hill, Amersham		100%	40.82554
34	Station Road, Amersham, opp number 76	N	100%	30.4132
36	Opposite side of road to Jolly Sportsman, Chesham	Y	100%	27.28538
37	Outside 75 High Street, Great Missenden	N	100%	20.95639
38	Automatic Monitor Co-Location, Berkhamstead Road	N	100%	26.53709

Relevant Exposure

For sites which are roadside, it is possible to calculate the concentration at the nearest relevant exposure using Technical Guidance LAQM.TG (09) Box 2.3 'Predicting nitrogen dioxide concentrations at different distances from roads'. These can then be compared to the annual mean objective.

Table 2.3b Relevant Exposure at Locations exceeding the 40 µg/m³ Annual Mean NO₂ Objective

Location	Measured annual mean concentration (µg/m ³)	Annual mean background concentration (µg/m ³)	Distance of monitor from kerb (m)	Distance of receptor from kerb (m)	Predicted annual mean at receptor (µg/m ³)
Stanley Hill, Amersham	40.83	13.27	1.3	27.5	22.9*
Chesham Police Station, Broad Street	41.49	13.27	3.7	6.6	37.0
Chesham Jolly Sportsman Pub, End of Berkhamstead Road	45.41	13.27	1.9	2.0	45.0
Chesham opp 170 Berkhamstead Road	40.36	13.27	1.6	5.8	32.6

*Receptor is more than 20m further from the kerb than the monitor, therefore treat result with caution.

Outside of the AQMA:

When taking into account relevant exposure, it has been found that an exceedence of the 40 µg/m³ annual mean NO₂ objective has not occurred outside of the AQMA:

Chiltern District Council

There were no annual mean concentrations measured using diffusion tubes greater than $60 \mu\text{g}/\text{m}^3$ outside of the AQMA.

There is no need to proceed to a Detailed Assessment with a view to determining whether or not to declare an AQMA at any location.

Within the AQMA for NO₂:

When taking into account relevant exposure, it has been found that an exceedence of the $40 \mu\text{g}/\text{m}^3$ annual mean NO₂ objective has occurred at this location:

- **Chesham Jolly Sportsman Pub, End of Berkhamstead Road (dual tube location)**

There were no annual mean concentrations measured using diffusion tubes greater than $60 \mu\text{g}/\text{m}^3$ within the AQMA for NO₂.

All annual means within the AQMA are not lower than $40 \mu\text{g}/\text{m}^3$, therefore is it not necessary to revoke the AQMA on this basis.

Further Analysis

On further analysis of the available data, historical information (Table 2.4c) shows that concentrations have not been measured below the objective concentration for several years within the AQMA.

Figure 2.4a shows the historical trend for sites within the AQMA which were found to exceed the $40 \mu\text{g}/\text{m}^3$ annual mean NO₂ objective prior to correcting for relevant exposure in 2008. None of these sites have had measured annual mean concentrations below $40 \mu\text{g}/\text{m}^3$ for the 8 years prior to 2011. However, this year, all but three sites have measured annual mean concentrations below $40 \mu\text{g}/\text{m}^3$. The measured annual mean concentrations are not consistently low enough to consider

revoking the AQMA, at this stage, but this will be addressed in the future Progress Report 2013 and Action Plan updates if this trend continues.

Figure 2.4a Historical Trend of Sites Previously Exceeding the Annual Mean Objective within the AQMA 2008-2011

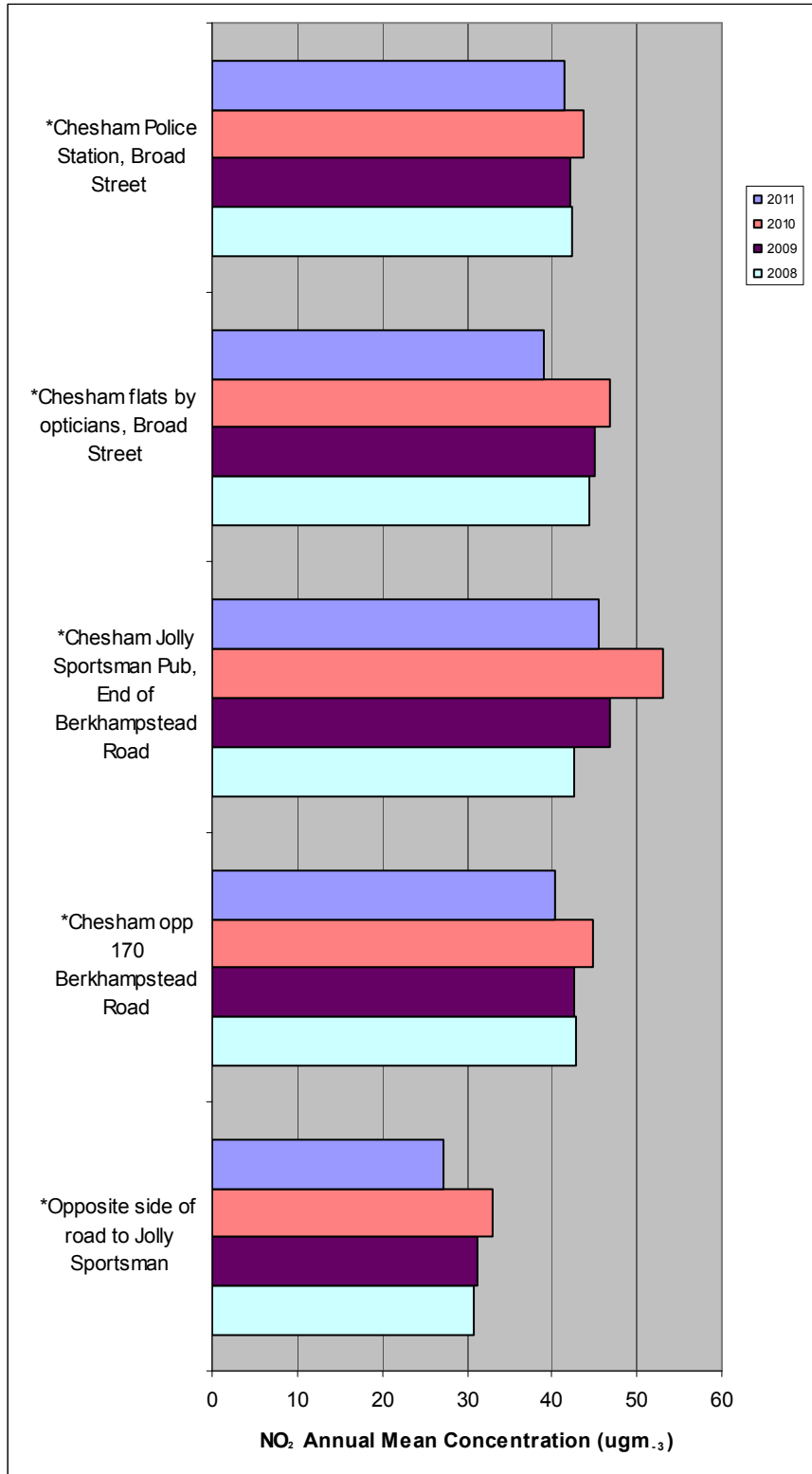


Table 2.3c Results of Nitrogen Dioxide Diffusion Tubes 2008 - 2011

Location	Within AQMA?				
		2008	2009	2010	2011
		Bias=0.93	Bias=0.92	Bias=0.83	Bias=0.84
St Mary's Way, Chesham	N	35.74	35.16	40.10	31.27849
Rickmansworth Road, Amersham	N	27.53	28.73	28.62	28.83039
High Street, Chalfont St Peter	N	29.47	29.40	30.56	23.38572
The Pheasant, Chalfont St Giles	N	38.65	34.45	34.93	31.73445
Gore Hill, Old Amersham	N	39.70	43.05	46.47	39.24526
Chesham Police Station, Broad Street	Y	42.40	42.25	43.72	41.48859
Chesham flats by opticians, Broad Street	Y	44.33	44.97	46.75	39.03448
Chesham Jolly Sportsman Pub, End of Berkhamstead Road	Y	42.53	46.84	53.14	45.4062
Chesham opp 170 Berkhamstead Road	Y	42.87	42.51	44.84	40.35912
Chesham at 305 Berkhamstead Road	N	32.48	33.97	36.66	29.27532
Chesham by 336 Berkhamstead Road	N	39.99	38.01	40.52	35.96989
Chesham opposite 5 Nashleigh Hill	N	32.79	31.36	30.94	30.16959
Chesham opp St Columba Church, Berkhamstead Rd	N	32.84	33.62	34.68	28.03733
Ashley green, by speed Camera, Chesham Road	N	21.24	21.94	23.61	20.70418
Ashley green, by Bus stop/Church, Chesham Road	N	20.77	22.56	25.23	20.90509
Little Chalfont, on back of sign	N	21.11	21.68	23.36	18.62297
Nightingales Corner, on sign on roundabout, Nr Challoners Girl School	N	31.63	33.90	33.61	30.45788
Hervines Park, on	N	13.99	15.67	16.73	13.26822

Chiltern District Council

drain pipe on town building					
End of Broombar Lane, Great Missenden, on sign	N	17.82	17.21	18.18	17.68867
Outside Chequers Pub, Prestwood	N	21.79	22.83	25.31	23.17026
Old Amersham near speed calming measures	N	27.93	27.60	30.47	25.25944
Amersham Hospital, Whielden Street, Next to fly over	N	30.93	30.21	32.25	27.321
Stanley Hill, Amersham	N	41.50	42.11	43.72	40.82554
Station Road, Amersham, opp number 76	N	30.09	33.73	36.38	30.4132
Opposite side of road to Jolly Sportsman, Chesham	Y	30.70	31.12	33.04	27.28538
Outside 75 High Street, Great Missenden	N	31.78	26.57	30.26	20.95639

Figures 2.3b, 2.3c, 2.3d and 2.3e show the historical trend throughout the District for annual mean concentrations from 2008 to 2011.

Figure 2.4b Historical Trend of Nitrogen Dioxide in Amersham (2008 – 2011)

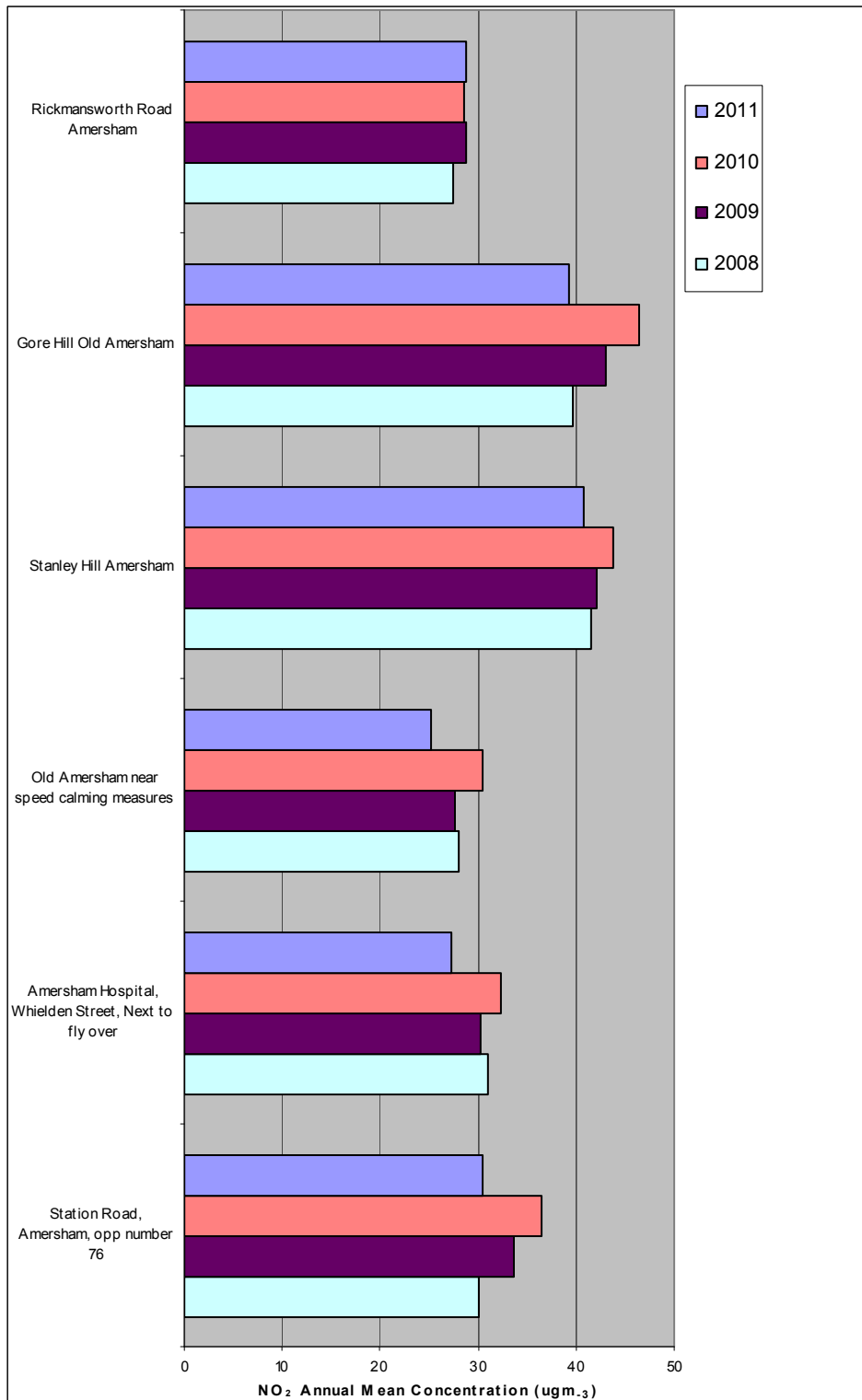
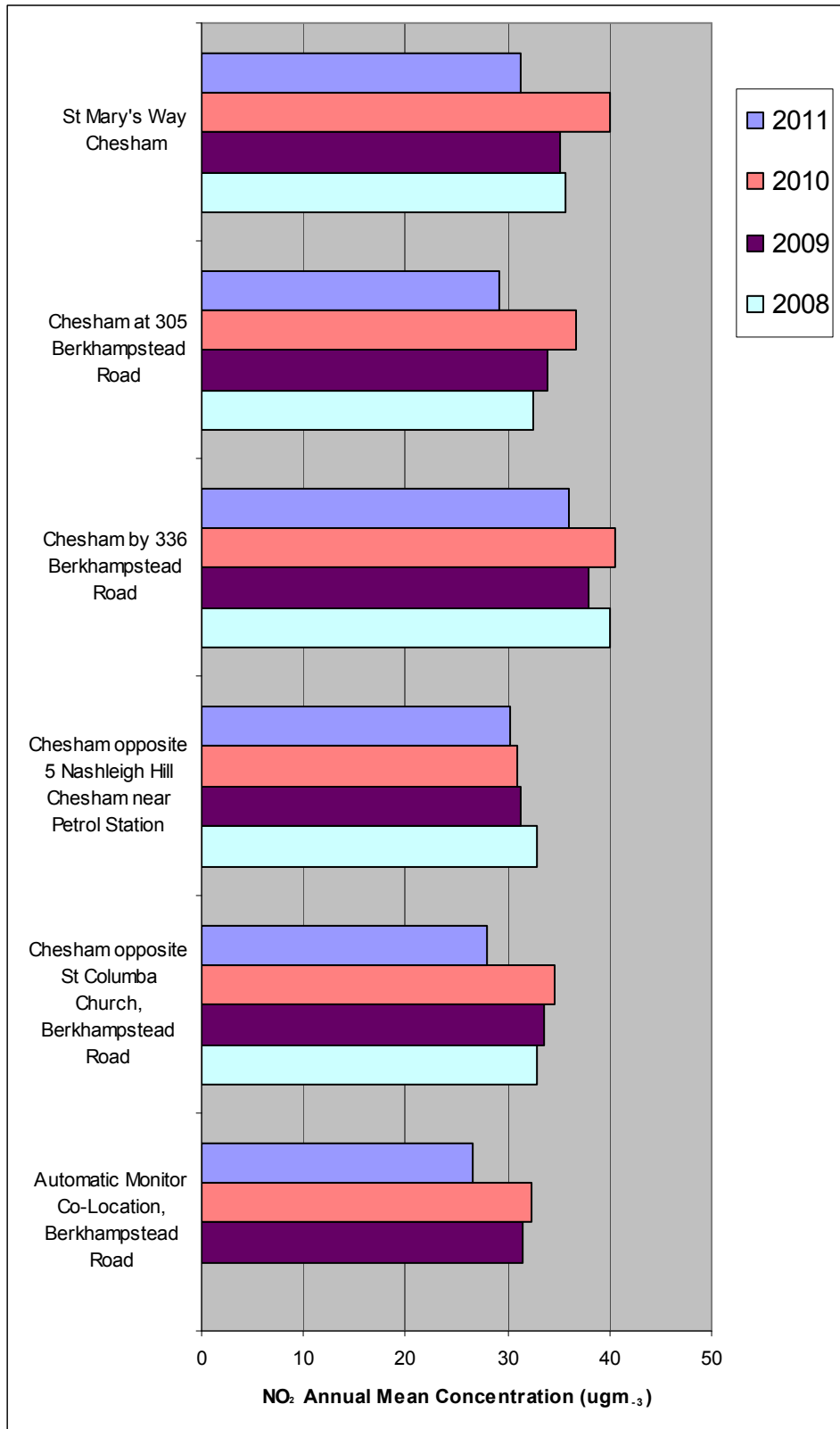


Figure 2.4c Historical Trend of Nitrogen Dioxide in Chesham (2008 – 2011)



Chiltern District Council

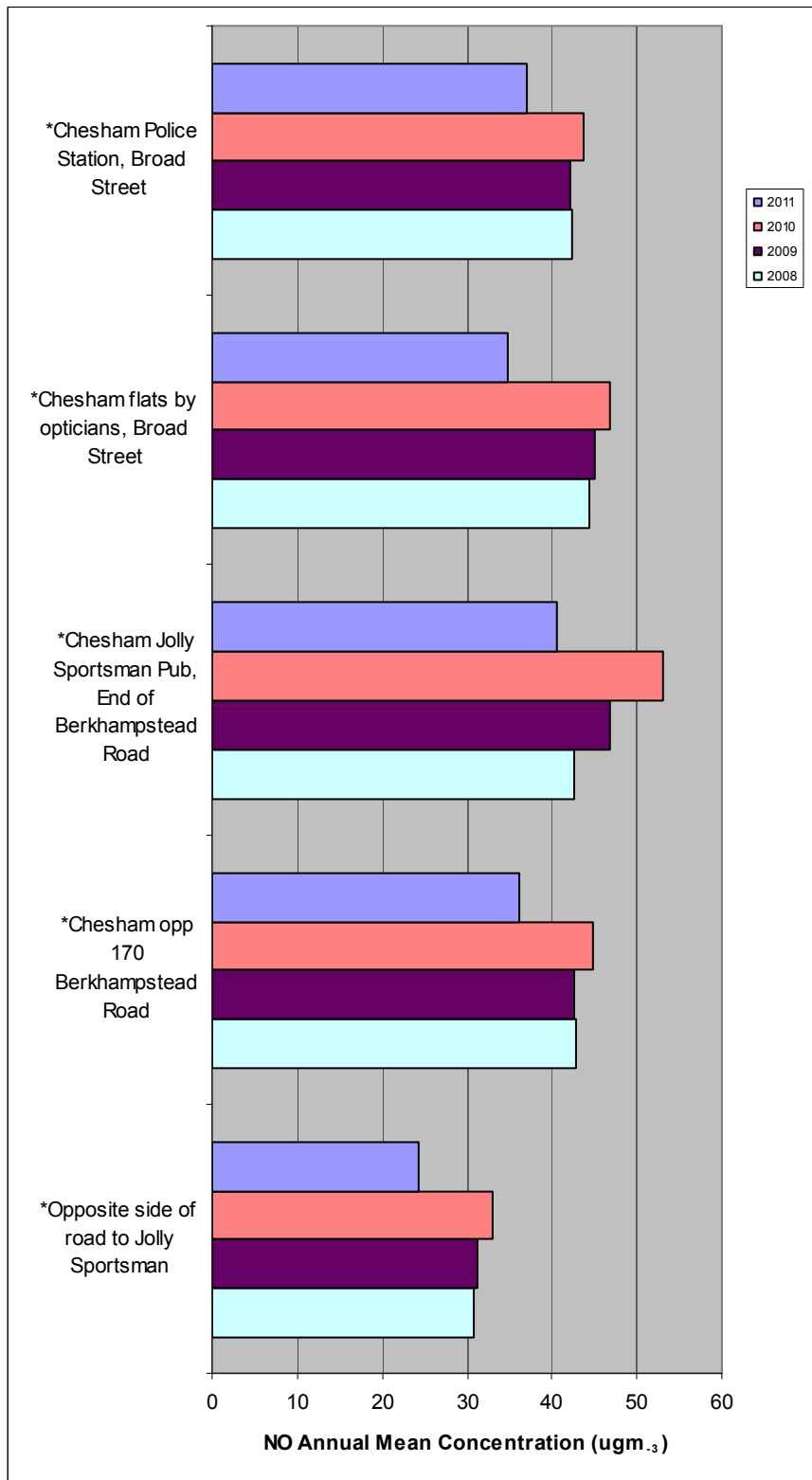


Figure 2.4d Historical Trend of Nitrogen Dioxide in Other Areas (2008 – 2011)

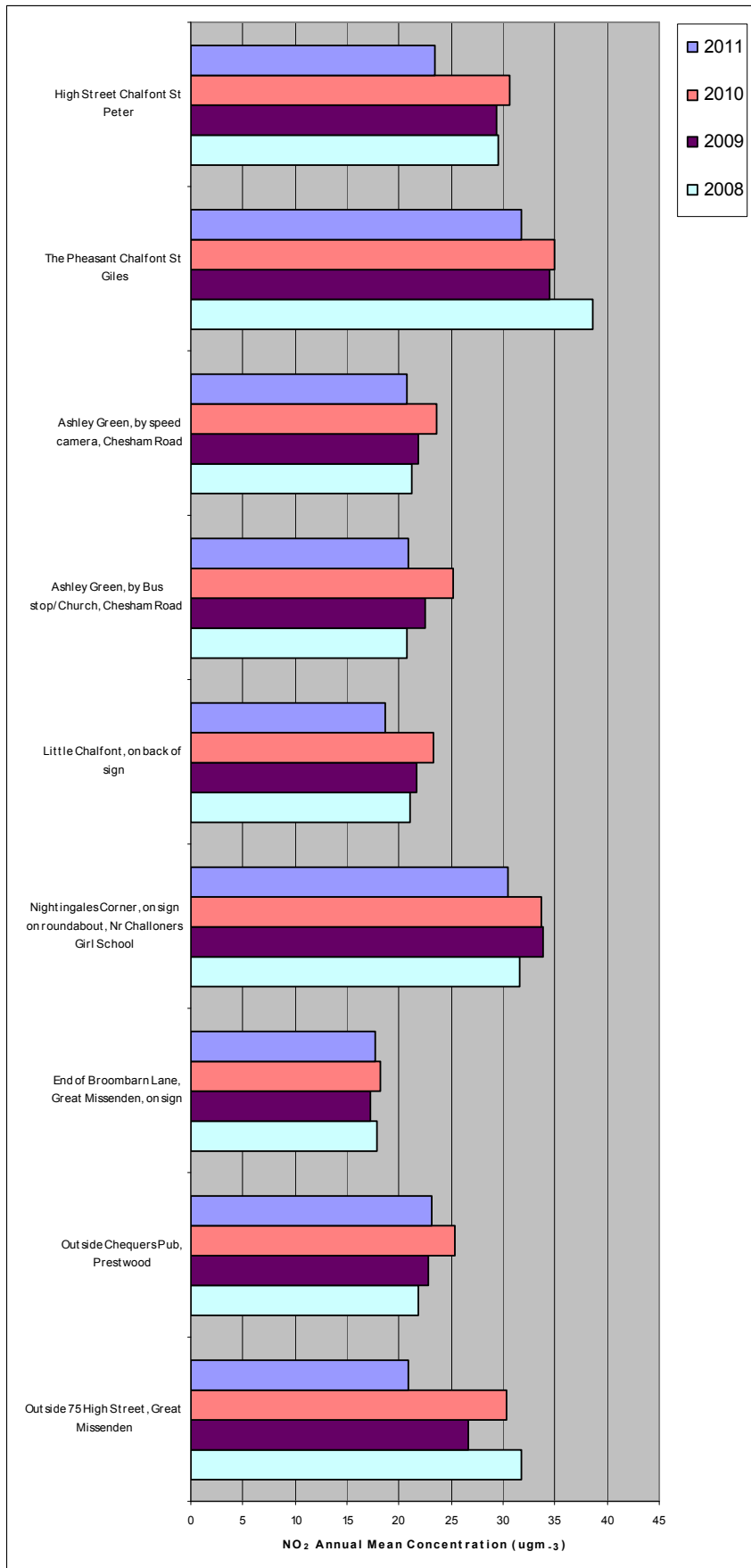
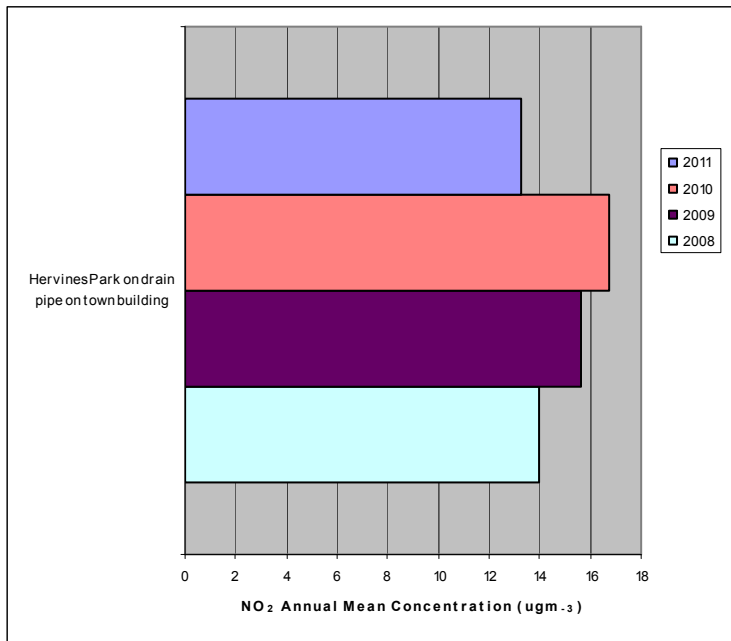


Figure 2.4e Historical Trend of Background Nitrogen Dioxide (2008 – 2011)



Measurements over several years have been fully considered. National trends in NO₂ concentrations are expected to decline over time, and this appears to be evident in monitoring data at a local level within the District. The automatic network average NO₂ concentrations have been steadily declining over the last two decades, and this trend looks set to continue. However, concentrations at the most polluted traffic-influenced UK sites remain well above the objective level (Air Pollution in the UK, 2007).

2.2.2 PM₁₀

Monitoring of PM₁₀ is not currently undertaken and there is currently no AQMA for PM₁₀ declared within the District.

The Updating and Screening Assessment in 2006 considered PM₁₀ in detail and concluded that it is unlikely that there were exceedences of the annual mean objective or 24 hour mean objective for PM₁₀.

Background Concentrations

The UK Background Map for 2010 has not yet been published, and the 2008 data, available from the Air Quality website, shows that the average background PM₁₀ concentration across the Chiltern District is potentially 17.24 µg/m³ with a maximum background value of 20.58 µg/m³. The UK Background Map was also used to provide average background PM₁₀ concentrations with other Districts within 50 miles and with a comparable location. As listed below, these background concentrations are generally above those in the District, and therefore automatic monitoring data from these sites would also be expected to exceed those within the District.

- Broxbourne: 19.16 µg/m³
- East Herts: 17.12 µg/m³
- Stevenage: 19.54 µg/m³
- Watford: 20.43 µg/m³

There is no need to proceed to a Detailed Assessment for PM ₁₀ based on previous assessment and the background information available.
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2.2.3 Sulphur Dioxide

Monitoring of sulphur dioxide is not currently undertaken and there is currently no AQMA for sulphur dioxide declared within the District.

The Updating and Screening Assessment 2009 concluded that there are no significant industrial or domestic sources of sulphur dioxide in the Chiltern District and exceedences of the Air Quality Objective are unlikely. Since this time, there has

Chiltern District Council

not been any significant industrial activity that would result in any change to the situation and this is discussed in the relevant section of this report.

There is no need to proceed to a Detailed Assessment for SO ₂ based on the monitoring information available.

2.2.4 Benzene

Monitoring of benzene is not currently undertaken and there is currently no AQMA for benzene declared within the District.

The Updating and Screen Assessment 2006 states that there are no roads in the District that can be classified as 'very busy' according to Technical Guidance LAQM.TG (03). Since this time, there have not been any significant changes that would result in any change to the situation. More recent information on petrol stations was assessed in the 2009 Updating and Screening Assessment.

Historical data is available from a short survey in 1998 using diffusion tubes and can be found in the First Round of Review and Assessment.

There is no need to proceed to a Detailed Assessment for benzene based on the monitoring information available.

2.2.5 Other pollutants monitored

There are no other pollutants monitored within the District.

3 Road Traffic Sources

The most recently available annual average daily traffic flow (AADT), by vehicle type, for individual major road links are available from the DfT Matrix website. The 2009 USA identified information obtained from the DfT Matrix which showed that there was no significant changes in traffic flow. Overall, daily traffic flow had increased by 3.4% from 2005 to 2007 at the locations monitored within the District. In comparison, the average annual traffic growth in the UK from 1950 to 2007 was 4.1% (DfT, 2007).

The guidance states that The Updating and Screening Assessment should consider locations not addressed in previous rounds of Review and Assessment and locations where conditions have changed significantly since being previously assessed.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

The 2009 USA identified a number of roads with a daily traffic flow of >5000 vehicles per day. Using local knowledge to identify narrow congested streets, it was determined that there were no congested streets as detailed in the guidance with residential properties within 2 metres of the kerb with a daily traffic flow of >5000 vehicles per day. There are no roads meeting the criteria for narrow congested streets outside of a traffic related AQMA.

Chiltern District Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Previous rounds of screening have identified a number of busy roads within the District. However, there were no new busy streets identified where individuals may be exposed within 5 metres of the kerb for 1-hour or more.

Chiltern District Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

There have been no new or newly identified roads with an unusually high proportion of buses and/or HGVs identified since the previous rounds of Review and Assessment. Estimates of flow based on measurements for 'A' roads within the District were obtained from the DfT website. There were no roads identified with more than 5.1% buses and HGVs.

Chiltern District Council confirms that there are no new/newly identified roads with high flows of buses/HGVs.

3.4 Junctions

Busy junctions were identified within the Updating and Screening Assessment 2009, and found that there were no junctions in the District where the annual mean values for NO₂ and PM₁₀ would exceed the objective values. Roads and junctions were identified with areas of high traffic volumes and the potential for public exposure; however the DMRB screening method did not indicate that any junctions would exceed the annual mean objective values.

Busy junctions within the District were identified; however no new busy junctions were found. There is no newly identified relevant exposure within 10 meters of the kerb at busy junctions.

Chiltern District Council confirms that there are no new/newly identified busy junctions.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

There have been no new roads constructed or proposed within the District since the Updating and Screening Assessment 2009.

Chiltern District Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

There have been no new / newly identified roads with significantly changed traffic flows within the District since the Updating and Screening Assessment 2009.

Chiltern District Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

Chiltern District Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Chiltern District Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

There are a small number of train stations within the Chiltern District, covering both National Rail and Transport for London (Metropolitan line) stations. These stations have been identified as:

- Amersham (electric and diesel trains)
- Chalfont and Latimer (electric and diesel trains)
- Chesham (electric shuttle train only)
- Great Missenden (diesel trains)

Stationary trains were assessed within the District for sulphur dioxide within the Updating and Screening Assessment 2006 & 2009, and it was found that there are no areas where railway engines are running for more than 15 minutes continuously and where members of the public might be exposed.

Further consideration was given to stationary trains near to Amersham Station for periods of 15 minutes or more in the 2009 USA. The locations of residential properties were then assessed for relevant exposure. It has been established that there is no potential for regular outdoor exposure of individuals within 15m.

Chiltern District Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

As stated in Technical Guidance LAQM.TG (09), a limited number of local authorities are required to assess railway lines with a high usage of diesel locomotives to establish whether there is relevant exposure nearby. These lines only need to be considered where the background annual mean NO₂ concentration is above 25 µg/m³. The background annual mean NO₂ concentration of the District has been measured at 11.85 µg/m³.

Chiltern District Council was not included in the list of 35 Local Authority areas, and therefore does not need to further consider these emission sources.

Chiltern District Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

Chiltern District Council confirms that there are no ports or shipping within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

There have been no planning applications relating to industrial installations received or granted by Chiltern District Council in 2011. There have also been no planning applications granted relating to industrial installations in neighbouring authorities.

Data collection for the European Pollutant Release and Transfer Register (E-PRTR) has not shown any significant emissions from installations covered by the IPPC Directive.

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

As no planning applications relating to industrial installations have been received or granted since the Progress Report 2011 it is not necessary to obtain details of air quality assessments. Therefore it is not necessary to proceed with “Approach 1” in Section C.1 of Box 5.5 of TG (09).

Chiltern District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

Existing installations within the District are inspected according to recommended timescales provided by Defra. Recent inspections have shown that all industrial installations and processes are in compliance with permit conditions and have not indicated that there has been a substantial increase in emissions or new relevant exposure. Therefore it is not necessary to proceed with “Approach 2” in Section C.1 of Box 5.5 of TG (09).

Chiltern District Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

As there have been no 'new or significantly changed installations with no previous air quality assessment' identified since the Progress Report 2010, it is not necessary to proceed with "Approach 3" in Section C.1 of Box 5.5 of TG(09).

Chiltern District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There have been no major fuel storage depots handling petrol identified within the District, or within neighbouring authorities.

There are no major fuel (petrol) storage depots within the Chiltern District Council area.

5.3 Petrol Stations

No new petrol stations with an annual throughput of more than 2000m³ per annum and with a busy road nearby, which have not been covered by previous Review and Assessment reports have been identified.

Chiltern District Council confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

No poultry farms of any significant size have been identified within the Chiltern District.

Chiltern District Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

There has been no plant burning biomass in 50kW to 20MW units identified within the District. The provision of chimneys for biomass burners less than 50kW is covered by Building Regulations.

The Updating and Screening Assessment 2009 stated that there were no small boiler processes with an output greater than 5MW identified within the District.

Chiltern District Council confirms that there are no biomass combustion plant in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

There is a potential that many small biomass combustion installations (including domestic solid-fuel burning), whilst individually acceptable, could in combination lead to unacceptably high PM₁₀ concentrations.

Local knowledge shows that there is no significant domestic or non-point source commercial combustion of coal or oil. The NAEI Data Warehouse background grids for the District were analysed in the 2009 USA to identify emission estimates for commercial, institutional and residential combustion. The total estimated PM₁₀ emissions for these sectors were calculated to be 28.09 tonnes for the whole District in 2006.

The background average PM₁₀ concentration across the District is 17.24 µg/m³ with a maximum background value of 20.58 µg/m³. The maximum value found for PM₁₀ emissions within a 1x1km square within the District at that time was 987 kilogrammes. Using both maximum values for background average PM₁₀ concentrations and PM₁₀ emissions would result in a worst case scenario. It was found that the combined commercial, institutional and residential sources would not

Chiltern District Council

exceed the threshold emission rate in the relevant nomogram. Annual emissions are unlikely to give rise to an exceedence of the 24 hour mean objective for PM₁₀ and it is not necessary to proceed to a Detailed Assessment.

Chiltern District Council confirms that there are no biomass combustion plant in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

As PM₁₀ has been considered above, domestic solid-fuel burning only considers sulphur dioxide.

Currently, solid fuel use continues to decline throughout the District. The Updating and Screening Assessment 2009 considered that it is unlikely that there are any 500x500m areas with more than 50 houses burning coal or smokeless fuel. Presently, it is still unlikely that there are any areas of 500x500m with more than 50 houses that burn coal or smokeless fuel as their primary source of heating.

Chiltern District Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

There have been no planning applications received or granted by Chiltern District Council in 2011 that would act as potential sources of fugitive particulate matter emissions. There are no known problematic fugitive or uncontrolled sources in the District, such as wind-blown dust and sea salt, and no activities such as quarrying and bulk materials handling are carried out. No new relevant exposure has been identified.

A planning application for the site located at The Council Depot, London Road, Amersham, to develop a Waste Transfer Station has been submitted to Buckinghamshire County Council. This planning approval has not yet been granted.

Chiltern District Council confirms that there are no new potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

Within the District, background monitoring has shown a continued reduction in annual mean NO₂ concentrations since 2005.

Outside the AQMA within Chesham, monitoring has shown that there are no exceedences of the NO₂ annual mean objective within the diffusion tube network; and it is noted that all locations in this area have had decreased concentrations from 2010 values.

Locations within Amersham also show decreased concentrations when compared to 2010 values. The annual mean concentration at Stanley Hill has decreased.

Monitoring at other locations within the District is generally lower than those found in the main towns of Chesham and Amersham.

As not all the monitoring results within the AQMA are below the air quality objective value, it would not be appropriate to revoke the AQMA at this time. There are three exceedences identified within the AQMA, where previously rounds identified 4 sites.

Action Plan Reporting is still required based on conclusions from new monitoring data, and in particular at the location of “The Jolly Sportsman”. The 2013 and 2014 Progress Report will provide data to demonstrate if 2011’s lower NO_x levels continue to trend, and can inform a decision to reduce or revoke the AQMA

8.2 Conclusions from Assessment of Sources

There have been no new or significantly changed sources identified within the District, and therefore no potential exceedences have been identified outside the existing AQMA.

Road traffic sources remain unchanged since the last round of Review and Assessment. No locations have been identified meeting the full criteria for each of the possible road traffic sources.

Industrial sources are of most concern when considering short-term objectives, as they are unlikely to make a significant local contribution to annual mean concentrations. There have been no new, proposed, or significant increases in industrial sources within the District.

No further petrol stations have been identified.

Commercial and domestic sources were considered under Biomass Combustion. It was found that the combined commercial, institutional and residential sources would not exceed the threshold emission rate for PM₁₀. There have been no areas identified where there is significant domestic fuel use within the District.

Fugitive and uncontrolled sources will be fully assessed on receipt of an Air Quality Assessment for a planning application that is currently pending.

A Detailed Assessment is not required based on conclusions from assessment of sources.

8.3 Proposed Actions`

This Updating and Screening Assessment has not identified the need to proceed to a Detailed Assessment for any pollutant.

The Updating and Screening Assessment has not identified any need for additional monitoring, or changes to the existing monitoring programme.

One year of lower diffusion tube data is not considered sufficient to alter the boundaries of the AQMA or revoke it. It is intended that alongside this USA, an update to the Action Plan will be submitted, and that a Progress Report will be submitted in 2013.

Chiltern District Council will continue to work on action planning in the AQMA area to reduce air pollution levels. A county-wide strategy will continue to provide focus for pro-actively tackling air quality in all areas of the District.

9 References

- Air Pollution in the UK (2007) AEA on behalf of DEFRA and the Dissolved Administrations
- Air Quality (England) Regulations 2000 (SI 928)
- Air Quality (England) (Amendment) Regulations 2002 (SI 3043)
- Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007)
- Chiltern District Council (2003) Updating and Screening Assessment.
- Chiltern District Council (2004) Progress Report.
- Chiltern District Council (2005) Progress Report.
- Chiltern District Council (2006) Updating and Screening Assessment.
- Chiltern District Council (2008) Progress Report.
- Chiltern District Council (2009) Further Assessment
- Chiltern District Council (2010)
- Part IV of the Environment Act (1995)
- Relevant Policy and Technical Guidance documents:
 - Technical Guidance LAQM.TG (09)
 - Policy Guidance LAQM.PG (09)
- Department for Transport (2007) Road Statistics: Traffic, Speeds and Congestion. Transport Statistics Bulletin.

Websites:

Department for Transport Matrix Website - <http://www.dft.gov.uk/matrix/>

NAEI Data Warehouse - http://www.naei.org.uk/data_warehouse.php

Review and Assessment Website - <http://www.uwe.ac.uk/aqm/review/>

UK Background Maps - <http://www.airquality.co.uk/archive/laqm/tools.php>

Appendices

Appendix A: Non-Automatic Monitoring Uncertainty Measurements 2011

2011	Uncertainty of Measurement (+/- %)
January	-1.00
February	-6.00
March	-5.50
April	-5.30
May	-5.30
June	-0.80
July	-4.70
August	-0.90
September	-0.35
October	-0.35
November	-1.40
December	-1.40

(For indicative monitoring techniques, such as diffusion tubes for NO₂, the EC Directives set an accuracy objective of +/-25% - Technical Guidance LAQM.TG 09)

Source: Diffusion Tube Laboratory – Environmental Scientific group.

Appendix B: Diffusion Tube Monthly Mean Values (Raw Results)

Tube number	January 2011	February 2011	March 2011	April 2011	May 2011	June 2011	July 2011	August 2011	September 2011	October 2011	November 2011	December 2011
1	46.5	49.6	47	34.2	23.8	33.0	30.9	27.5	28.9	45.2	45.6	35.3
2	57.8	46.7	42	30.2	32.1	30.0	27.6	24.4	33.5	40.2	49.7	32.0
3	33.2	32.8	42	23.8	10.5	16.2	12.8	19.0	20.2	30.0	37.8	19.0
4	33.1	34.5	42.3	19.7	10.8	16.1	15.9	20.0	23.7	25.1	39.8	19.1
5	32.9	32.1	36.3	25.1	18.4	18.8	17.4	17.7	24.3	33.1	36.5	17.2
6	36.9	30.7	34.5	14.1	14.3	16.2	2.4	18.1	21.0	30.1	41.6	21.9
7	44.5	47.9	45.9	28.1	22.9	25.9	18.9	27.3	36.9	44.4	48.5	39.8
8	43.2	42.7	33.5		24.4	27.0		22.8		35.6	43.6	35.9
9	57.3	50.9	51.6	36.7	34.7	31.2	29.0	39.5	41.2	50.2	54.1	40.6
10	53.2	49.7	50.8	31.7	30.3	31.1	30.2	34.6	45.1	51.1	53.1	49.8
11	43.9	49.8	43.8	21.2	25.7	28.3	22.9	29.7	26.7	41.9	44.6	34.4
12	55.1	35.8	48.8	33	26.2	27.6	26.4	26.1	28.9	39.9	44.8	30.9
13	76	71	79.1	48.9	35.2	29.0	31.5	31.6		57.6	69.1	36.8
14	68.9	54.8	54.7	38.3	42.2	38.2	40.4	33.1	44.4	51.8	58.5	
15	64.4	64.7	68.8	37.7	43.7	29.7	28.7	39.9	45.1	54.1	55.0	
16	61	57.9		32.5	32.2	39.6	37.8	40.9	48.3	49.3		34.6
17	70.9	58		49.1	37.2	37.2	39.7	37.6	51.7	51.7		35.0
18	62.1	52.2	58.9	46.7	48	36.1	36.3	26.1	41.6	57.2		50.0
19	54.1	53.4	49.4	43.5	45.6	36.7	31.9	40.1	42.8	54.0		55.7
20	34.8	41.6	44.3	23.3	21.8	26.9	21.4	37.9	46.0	45.8	53.1	32.4
21	35.8	42.6	44.2	18.8	22.3	22.9	21.3	23.9	40.8	42.3	48.0	31.4
22	45.2	63.4	74.1	51	30.1	32.6	35.4	37.8	42.5	55.3	70.5	39.1
23	57.5	60	71.1	42.5	30.9	35.6	32.7	42.0	45.1	59.7	30.0	37.3
24	50.1	43.3	47.3	41.6	30.6	31.6	29.3	31.2	31.6	41.1	45.1	36.4
25	54.8	39.7	51.5	31.6	27.9	20.6	29.7	28.2	33.8	41.2	54.7	33.8
26	39.6	39.2	40.1	23.5	23.9	16.7	22.6	16.3	28.7			35.4
27	25.1	29.2	32.6	17.7	15.4	15.2	15.1	13.8	24.5	33.1		
28	36.1	37.1	47.3	30.4	29.7	32.5	30.7	28.9	36.6	49.9	47.6	28.3
29	23.2	22.2	18.9	11.1	9.1	8.5	7.8	10.3	15.8	21.6	31.0	10.0
30	24.7	38.4	27.6	16.3	10.3	10.2	12.4	13.2	19.1	26.5	37.8	16.2
31	35.7	37.4	36.7	24.3	21.4	17.3	16.0	25.3	23.5	30.6	40.9	21.8
32	41.4	38.9	35.9	26.4	19	19.6	22.1	30.2	23.7	35.6	43.2	24.8
33	40.5	40.7	41	31.4	30.8	24.8	26.0	25.0				
34	53.5	64.4	79.8	41.8	14.1	25.1	33.4	42.7	51.1	58.7	74.6	44.0
35	53.7	42.5	69.3	32.5	23.8	18.8	20.1	26.2	30.8	40.7	51.7	24.3
36	74	73.7	77.9	49.7	33.9	30.6	34.4	16.6		57.9	74.9	43.8
37	45.9	41.7	47.8	26.9	20.2	12.2	18.1	18.4	33.2	41.5	53.7	30.1

Source: Diffusion Tube Laboratory – Environmental Scientific Groups

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Chiltern's Local AIR & Environment



2012 Air Quality Updating and Screening Assessment for Chiltern District Council

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

April, 2012



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Executive Summary

The UK Government published its strategic policy framework for air quality management in 1995 establishing national strategies and policies on air quality which culminated in Part IV of the Environment Act (1995). The Environment Act requires Local Authorities to undertake air quality reviews. In accordance with the Policy and Technical Guidance issued by the Department of the Environment, Food and Rural Affairs (Defra, 2009), all Local Authorities have a statutory duty to carry out a yearly assessment of air quality in their area.

The first, second third and fourth rounds of air quality Review and Assessment have been completed by Chiltern District Council, which considered all necessary pollutants. The first step in each round is to undertake an Updating and Screening Assessment, which provides updated information on monitoring data and emission sources. Where an exceedence or the likelihood of an exceedence of objective values is identified for a pollutant there is a requirement to proceed to a Detailed Assessment.

This Updating and Screening report considers any new air quality monitoring data, new sources or significant changes to existing sources, and any other significant local changes relevant to air quality. Changes to relevant public exposure will also be considered. It is not necessary to re-assess issues that have already been adequately considered in previous rounds.

Diffusion tube monitoring data has indicated that there was one exceedence of the annual mean objective value for nitrogen dioxide in 2011. This was located within the AQMA (which is addressed via the Action Plan), and therefore a Detailed Assessment is not required and it is not necessary to consider revoking the AQMA on this basis.

There have been no new sources of emissions, significant changes in existing sources, or any significant local changes relevant to air quality that would be likely to increase the risk of pollutants exceeding objective values.

Table of contents

1	Introduction	4
1.1	Description of Local Authority Area	4
1.2	Purpose of Report	5
1.3	Air Quality Objectives	6
1.4	Summary of Previous Review and Assessments	7
2	New Monitoring Data	12
2.1	Summary of Monitoring Undertaken	12
2.2	Comparison of Monitoring Results with AQ Objectives	18
3	Road Traffic Sources	32
3.1	Narrow congested streets with residential properties close to the kerb	32
3.2	Busy streets where people may spend 1-hour or more close to traffic	33
3.3	Roads with high flow of buses and/or HGVs.	33
3.4	Junctions and busy roads	33
3.5	New roads constructed or proposed since the last round of review and assessment	34
3.6	All roads with significantly changed traffic flows.	34
3.7	Bus and coach stations	34
4	Other Transport Sources	35
4.1	Airports	35
4.2	Railways (diesel and steam trains)	35
4.3	Ports (shipping)	36
5	Industrial Sources	37
5.1	New or Proposed Industrial Installations	37
5.2	Major fuel (petrol) storage depots	38
5.3	Petrol stations	39
5.4	Poultry farms	39
6	Commercial and Domestic Sources	40
6.1	Biomass combustion – Individual Installations	40
6.2	Biomass combustion – Combined Impacts	40
6.3	Domestic Solid-Fuel Burning	41
7	Fugitive or Uncontrolled Sources	42
8	Conclusions and Proposed Actions	43
8.1	Conclusions from New Monitoring Data	43
8.2	Conclusions from Assessment of Sources	44
8.3	Proposed Actions	45
9	References	46

List of Tables

- Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.
- Table 2.2.1 Details of Non- Automatic Monitoring Sites
- Table 2.2.2 Diffusion Tube Precision Summary (50% TEA in Acetone)
- Table 2.2.3 Bias Adjustment Factor Spreadsheet
- Table 2.3a Results of Nitrogen Dioxide Diffusion Tubes
- Table 2.3b Relevant Exposure at Locations exceeding the 40 µg/m³ Annual Mean NO₂ Objective
- Table 2.3c Results of Nitrogen Dioxide Diffusion Tubes

List of Figures

- Figure 1.1 Geographical location of the Chiltern District, and identification of main population areas.
- Figure 1.2 Broad Street / Berkhamstead Road AQMA (Chesham, Buckinghamshire)
- Figure 2.1.1 Location of Continuous Automatic Monitor (Berkhamstead Road, Chesham)
- Figure 2.4a Historical Trend of Sites Exceeding the Annual Mean Objective within the AQMA in (2008-2011)
- Figure 2.4b Historical Trend of Nitrogen Dioxide in Amersham (2008-2011)
- Figure 2.4c Historical Trend of Nitrogen Dioxide in Chesham (2008-2011)
- Figure 2.4d Historical Trend of Nitrogen Dioxide in Other Areas (2008-2011)
- Figure 2.4e Historical Trend of Background Nitrogen Dioxide (2008-2011)
- Figure 4.2 Stationary Train Location

Appendices

Appendix A: Non-Automatic Monitoring Uncertainty Measurements 2008

Appendix B: Diffusion Tube Monthly Mean Values

1 Introduction

1.1 Description of Local Authority Area

The Chiltern District is located in the South East of the county of Buckinghamshire, bordering Hertfordshire. The districts of South Bucks, Wycombe and Aylesbury Vale form the Western boundaries. The name of the district is derived from its location in the centre of the Chiltern Hills.

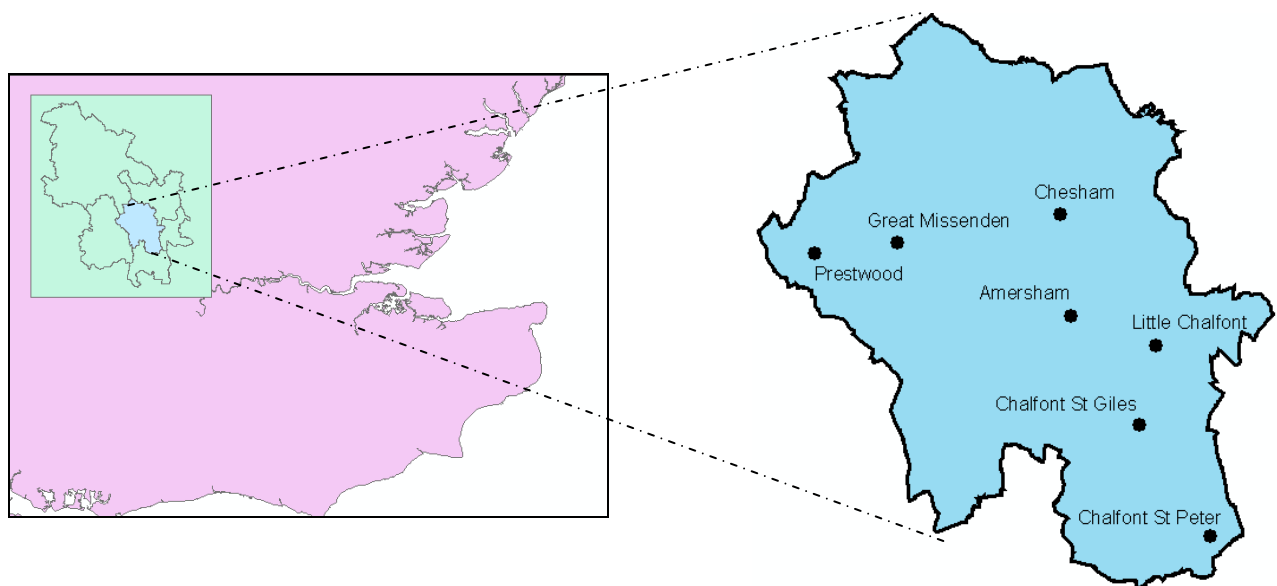


Figure 1.1 Geographical location of the Chiltern District, and identification of main population areas.

The District is a mixture of suburban and rural, with four main population centres. The rural character of the district is preserved by the green belt policy that acts to limit the urban sprawl of Greater London.

The District covers some 50,000 acres with a population of approximately 90,000 people. Approximately 70% live in the towns of Chesham (20,600), Amersham with Chesham Bois (15,500), and the villages of Chalfont St Peter (13,100), Prestwood and Great Missenden (10,500), Little Chalfont (4,400) and Chalfont St Giles (6,500).

Chiltern District Council

It has been found that residential properties have high per capita emissions of carbon dioxide and consumption of gas, electricity and water. The main use of land in the District, other than for residential use, is for agriculture. Current industrial activity is generally restricted to a number of small-medium size industrial estates, with only a handful of manufacturing operations.

Road traffic forms the principal source of air pollution in the District. The analysis of air quality monitoring and road traffic data formed the basis of designating an AQMA in 2007 within the town of Chesham.

Many of the towns and villages within the District are in close proximity to the M40 and M25, which are just outside the south eastern and south western borders, and only a short distance to the M1, which may have additional impacts on traffic volume. The busiest roads in the District include the A416 and A413.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management 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.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

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 microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (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 Local Air Quality Management in England.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004

Chiltern District Council

	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
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1.4 Summary of Previous Review and Assessments

- **The First Round of Review & Assessment of Air Quality for Chiltern District Council:**

Chiltern District Council has completed the following review and assessments of air quality in the first round.

- **Stage 1 and Stage 2 (March 1999)**

The Stage 1 and Stage 2 report concluded that air quality objectives within Chiltern district were likely to be met for 2005 and no further assessment was required in the first round of review and assessment.

- **The Updating & Screening Assessment of Air Quality for Chiltern District Council 2003**

Chiltern District Council completed a USA for air quality in 2003. It concluded that the air quality objectives were likely to be met for all pollutants and a detailed assessment would not be required.

- **Progress Report 2004**

Chiltern District Council completed the progress report for air quality in 2004. It concluded that the air quality objectives were likely to be met for all pollutants and a detailed assessment would not be required. It did however recommend additional monitoring with passive diffusion tubes along Berkhamstead Road in Chesham. This area was showing the greatest elevations of Nitrogen Dioxide (NO₂). The report was based on AEA Technology Intercomparison Bias.

- **Progress Report 2005**

Chiltern District Council completed the second progress report for air quality in 2005. It recommended additional monitoring along Berkhamstead Road in Chesham. It also suggested the potential for a detailed assessment to be undertaken along Berkhamstead Road.

- **The Updating & Screening Assessment of Air Quality for Chiltern District Council 2006**

This updating and screening assessment for Chiltern District Council concluded that all the objectives in the Air Quality Regulations for England would be met by the relevant dates for all pollutants except NO₂. However, the EU annual average limit value (Stage 2) for PM₁₀ may be exceeded at some locations within the District, close to busy roads and junctions in 2010.

A Detailed Assessment was recommended for NO₂ at the following locations.

- Chesham Berkhamstead Road
- Chesham near the Jolly Sportsman pub.
- Chesham Broad Street

- **Detailed Assessment 2007**

There were five sites with potentially relevant exposure to the public where it was predicted that the annual mean objective for 2005 for nitrogen dioxide had not been met. These areas were all in a location in Chesham. It was recommended that Chiltern District Council consider declaring this area as an Air Quality Management Area (AQMA).

- **AQMA Designation 2007**

Chiltern District Council designated an AQMA, by order in 2007. The area encompasses a small section of the A416 – Broad Street/Berkhamstead Road.



Figure 1.2 Broad Street / Berkhamstead Road AQMA (Chesham, Buckinghamshire)

- **Progress Report 2008**

The Progress Report was completed to schedule and provided an update on monitoring results across the District and considered any significant changes that may impact air quality.

- **Further Assessment 2009**

The Further Assessment considered that the AQMA along Broad Street / Berkhamstead Road was still appropriate in order to secure an improvement in air

quality. It advised that further monitoring was required to ensure this and measure improvements against the forthcoming action plan.

- **Air Quality Action Plan 2009**

The Draft Final Air Quality Action Plan was accepted by the Chiltern District Council Cabinet for statutory consultation.

- **Updating & Screening Assessment 2009**

This updating and screening assessment for Chiltern District Council concluded that all the objectives in the Air Quality Regulations for England would be met by the relevant dates for all pollutants except NO₂. A Detailed Assessment was recommended for NO₂ at the location of the continuous monitor to determine if there was a need to extend the AQMA.

- **Air Quality Action Plan 2010**

The Draft Final Air Quality Action Plan was accepted by Defra.

- **Progress Report 2010**

The Progress Report was completed to schedule and provided an update on monitoring results across the District and considered any significant changes that may have impacted air quality.

- **Detailed Assessment 2010**

The report concluded that the NO₂ annual mean and 1-hour AQS objective were met in and around Berkhamstead Road Chesham during 2009. It was therefore recommended that CDC did not extend the AQMA boundary. Continued monitoring at the diffusion tube locations on Berkhamstead Road was recommended.

- **Progress Report 2011**

Chiltern District Council

The Progress Report was completed to schedule and provided an update on monitoring results across the District and considered any significant changes that impacted air quality.

All documents are available for download from www.chiltern.gov.uk/CLAIRE

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

A permanent automatic monitor has not been deemed necessary, as the diffusion tube network (discussed subsequently) provides an acceptable picture of air quality across the District. In addition, when required, it is possible to adjust the data obtained from a temporary automatic monitor to estimate the annual mean by using background automatic monitoring data collated from neighbouring districts. This is achieved by using the procedure stated in Technical Guidance LAQM.TG (09) to provide an estimate of the annual mean. Additionally, it is possible to determine short term statistics from short term monitoring data, which can be compared with the Air Quality Objectives.

A temporary continuous monitor has not been used in the last 12 months. Since the last USA (2009), continuous monitoring was reported in the Detailed Assessment 2010. A temporary monitor is currently installed (commenced: 1st March 2012) for six months in the same location. During this period there will be planned road re-surfacing works in and around the AQMA (currently scheduled for April, May & June 2012). It is envisioned that these works will cause significant disruption to traffic routes through the AQMA, which could lead to data which is not representative. It is therefore important to have a clear understanding of the effect of the road surfacing activity on air quality within the AQMA.

The data from the continuous monitoring will be reported in the 2013 Progress Report.

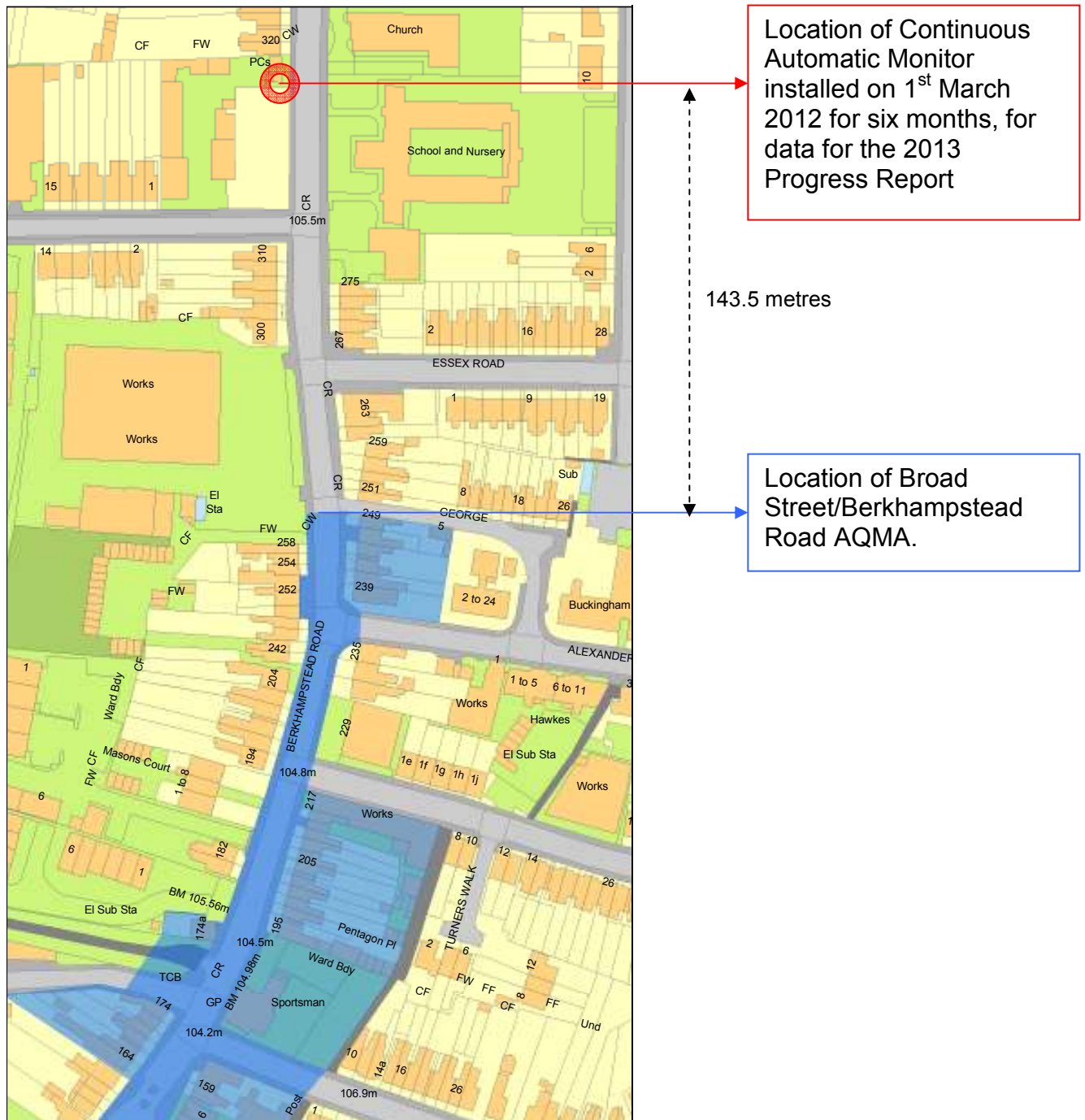


Figure 2.1.1 Location of Continuous Automatic Monitor (Berkhamstead Road, Chesham)

2.1.2 Non-Automatic Monitoring

Non-automatic diffusion tubes offer a relatively simple method of screening air quality to give a general indication of average pollution concentrations over a period of weeks or months. They are useful in highlighting ‘hotspots’ of high concentrations where more detailed studies may be required. There are currently a high number of

monitoring locations which enable good spatial coverage of the District with the resources available.

In 2011, there were 27 active locations for monitoring of NO₂ within the District. Historical data is available for a further 9 locations, for monitoring throughout 2000 – 2002. There are no national monitoring and survey sites located within the District. A background site (Hervines Park, Amersham) was selected to provide a benchmark to measure other sites against and establish a 'best case' level for the majority of the District.

Non-automatic monitoring site locations can be viewed in the Progress Report (2004) and additional locations in subsequent documents (Progress Report, 2005, Progress Report, 2008, Progress report 2010, and Progress report 2011).

Table 2.2.1 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQ MA ?	Relevant Exposure*	Distance to kerb of nearest road*	Worst-case Location?
St Mary's Way, Chesham	Roadside	495850 201510	NO ₂	N	7.5m	1.4m	Y
Rickmansworth Road, Amersham	Roadside	496550 198720	NO ₂	N	24.3m	2.2m	Y
High Street, Chalfont St Peter	Roadside	500050 190810	NO ₂	N	9.0m	3.6m	Y
The Pheasant, Chalfont St Giles	Roadside	499250 193750	NO ₂	N	6.4m	1.1m	Y
Gore Hill, Old Amersham	Roadside	495960 196940	NO ₂	N	8.3m	0.9m	Y
Stanley Hill, Amersham	Roadside	496760 197100	NO ₂	N	27.5m	1.3m	Y
Chesham Police Station, Broad Street	Roadside	496100 202000	NO ₂	Y	6.6m	3.7m	Y
Chesham flats by opticians, Broad Street	Roadside	496000 202000	NO ₂	Y	6.0m	2.1m	Y
Chesham Jolly Sportsman Pub, End of Berkhamstead Road	Roadside	496200 202300	NO ₂	Y	2.0m	1.9m	Y
Chesham opp 170 Berkhamstead Road	Roadside	496100 202300	NO ₂	Y	5.8m	1.6m	Y
Chesham at 305 Berkhamstead Road	Roadside	496300 202500	NO ₂	N	12.9m	1.5m	Y
Chesham by 336 Berkhamstead Road	Roadside	496200 202500	NO ₂	N	5.6m	1.3m	Y
Chesham opposite 5 Nashleigh Hill	Roadside	496300 202900	NO ₂	N	18.6m	1.4m	Y
Chesham opp St Columba Church, Berkhamstead Rd	Roadside	496200 202800	NO ₂	N	11.1m	1.5m	Y
Ashley green, by speed Camera, Chesham Road	Roadside	497600 205100	NO ₂	N	17.6m	0.7m	Y
Ashley green, by Bus stop/Church, Chesham Road	Roadside	497600 205200	NO ₂	N	26.8m	3.2m	Y
Little Chalfont, on back of sign	Roadside	500508 197878	NO ₂	N	35.3m	6.2m	Y
Nightingales Corner, on sign on roundabout, Nr Challoners Girl School	Roadside	499260 197452	NO ₂	N	29.8m	1.9m	Y
Hervines Park, on drain pipe on town building	Background	495708 198806	NO ₂	N	N/A	N/A	N
End of Broombar Lane, Great Missenden, on sign	Roadside	487991 200978	NO ₂	N	15.4m	3.4m	Y
Outside Chequers Pub, Prestwood	Roadside	487002 200812	NO ₂	N	11.4m	1.3m	Y
Old Amersham near speed calming measures	Roadside	495298 197520	NO ₂	N	7.8m	2.3m	Y
Amersham Hospital, Whielden Street, Next to fly over	Roadside	495446 196797	NO ₂	N	17.4m	2.0m	Y
Station Road, Amersham, opp number 76	Roadside	496450 197647	NO ₂	N	20.6m	2.2m	Y
Opposite side of road to Jolly Sportsman, Chesham	Roadside	496233 202329	NO ₂	Y	5.9m	2.5m	Y
Outside 75 High Street, Great Missenden	Roadside	489484 201234	NO ₂	N	1.5m	0.9m	Y
Automatic Monitor Co-Location, Berkhamstead Road	Roadside	496257 202617	NO ₂	N	7.5m	4.6m	Y

*For the categories of 'Relevant Exposure' and 'Distance to Kerb of Nearest Road' in the above table, distances have been calculated using base maps and aerial photography of the District on a Geographical Information System. The distances chosen are based on where the objectives should apply for the Annual Mean averaging period (Technical Guidance LAQM.TG (09) Box 1.4).

The diffusion tubes are prepared with 50% TEA in acetone and are analysed by Environmental Scientific Groups, who work in accordance with UKAS Accreditation for Nitrogen Dioxide Passive Tubes. The laboratory monitors accuracy on a monthly basis with an external proficiency scheme (Workplace Analysis Scheme for Efficiency), and also takes part in the Netcen Field Inter-comparison Exercise. The laboratory follows the procedures set out in the Harmonisation Practical Guidance.

Table 2.2.2 Diffusion Tube Precision Summary (50% TEA in Acetone), for Nitrogen Dioxide Diffusion Tube Collocation Studies. From Defra website 5th April 2012.

Environmental Scientific Groups, 50% TEA in Acetone	
2010	G
2010	G
2010	G
2010	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	P
2011	P

Diffusion tube precision based on laboratory performance is separated into two categories; Good or Poor. As seen in the table from the Review and Assessment website (v.03/09), the laboratory and method used has **Good** precision in 2011. (Table 2.2.2).

The latest bias adjustment factors were used to adjust the annual mean data in order to improve the accuracy of diffusion tube results. The bias adjustment factor used for

Chiltern District Council

2011 data is **0.84**, which was determined by the Nitrogen Dioxide Diffusion Tube Bias Adjustment Factor Spreadsheet (v.03/12) available from the Review and Assessment website (Table 2.2.3). It has been noted that the bias adjustment factor for 2010 was 0.93 which was significantly higher.

Table 2.2.3 National Diffusion Tube Bias Adjustment Factor Spreadsheet

version number: 03/12 From DEFRA website 5th April 2012

Analysed By ¹	Method <small>To include year selection, please [fill] from the pop up list</small>	Year ² <small>To include year selection, please [fill]</small>	Site Type	Local Authority	Length of Study (month s)	Diffusion Tube Mean Conc. (Dm) ($\mu\text{g}/\text{m}^3$)	Automatic Monitor Mean Conc. (Cm) ($\mu\text{g}/\text{m}^3$)	Bias (B)	Tube Precision ³	Bias Adjustment Factor (A) (Cm/Dm)
Environmental Scientific Groups	50% TEA in acetone	2011	R	Wyeombe District Council	10	43	39	11.5%	G	0.90
Environmental Scientific Groups	50% TEA in acetone	2011	R	Tunbridge Wells Borough Council	12	59	43	38.5%	P	0.72
Environmental Scientific Groups	50% TEA in acetone	2011	R	LB Newham	12	40	47	-14.3%	G	1.17
Environmental Scientific Groups	50% TEA in acetone	2011	UB	Canterbury City Council	11	17	15	17.8%	G	0.85
Environmental Scientific Groups	50% TEA in acetone	2011	R	Canterbury City Council	12	39	34	15.5%	G	0.87
Environmental Scientific Groups	50% TEA in acetone	2011	Overall Factor⁴ (22 studies)						Use	0.84

2.2 Comparison of Monitoring Results with AQ Objectives

Previously, the Updating and Screening Report (2009) identified that all the objectives in the in the Air Quality Regulations would be met by the relevant dates for all pollutants except NO₂.

2.2.1 Nitrogen Dioxide

Previously the measured annual mean concentration at a number of diffusion tube monitoring locations was >40 $\mu\text{g}/\text{m}^3$; however this is dependant on the bias adjustment factor used and adjustments for relevant exposure. It was predicted in the last USA that the bias adjustment factor would be more robust in subsequent rounds when more co-location results were available.

Background Concentrations

Background NO₂ concentrations have been measured using diffusion tubes since 2003. For data obtained in 2011, the annual mean concentration at the background site (Hervines Park, Amersham) was measured at 13.27 $\mu\text{g}/\text{m}^3$, which is lower than the estimated annual mean concentration for the District calculated from the UK Background Map for 2010 (15.43 $\mu\text{g}/\text{m}^3$) accessible from the Air Quality website. The maximum concentrations were estimated in the South East of the District, close to the A413 and M25 near Gerrards Cross, using the UK Background Map.

Diffusion Tube Monitoring Data

NO₂ diffusion tube data has been reported using the suggested format below (Table 2.4a). Uncertainty measurements for each month (Appendix A) and the full dataset for 2011 (appendix B) have been included. It can be seen that there are three

Chiltern District Council

locations in excess of the 40 µg/m³ annual mean NO₂ objective, which are located within the AQMA. Historical data has also been reported using the suggested format in Table 2.4c.

Exceedence within the AQMA for NO₂:

- **Chesham Jolly Sportsman Pub, End of Berkhamstead Road**
- **Chesham Police Station, Broad Street**
- **Chesham, opposite 170 Berkhamstead Road**

There were no annual means concentrations measured greater than 60 µg/m³ within the AQMA.

Table 2.3a Results of Nitrogen Dioxide Diffusion Tubes with new bias adjustment figure of 0.84.

Site ID	Location	Within AQMA?	Data Capture 2011	Annual mean concentrations
				2011 (µg/m ³) Adjusted for bias
2	St Mary's Way, Chesham	N	100%	31.27849
9	Rickmansworth Road, Amersham	N	100%	28.83039
10	High Street, Chalfont St Peter	N	75%	23.38572
13	The Pheasant, Chalfont St Giles	N	100%	31.73445
14	Gore Hill, Old Amersham	N	100%	39.24526
16	Chesham Police Station, Broad Street	Y	83.3%	41.48859
17	Chesham flats by opticians, Broad Street	Y	91.7%	39.03448
18	Chesham Jolly Sportsman Pub, End of Berkhamstead Road	Y	83.3%	45.4062
19	Chesham opp 170 Berkhamstead Road	Y	91.7%	40.35912
20	Chesham at 305 Berkhamstead Road	N	100%	29.27532
21	Chesham by 336 Berkhamstead Road	N	100%	35.96989
22	Chesham opposite 5 Nashleigh Hill	N	100%	30.16959
23	Chesham opp St Columba Church, Berkhamstead Rd	N	75%	28.03733
24	Ashley green, by speed Camera, Chesham Road	N	100%	20.70418
25	Ashley green, by Bus stop/Church, Chesham Road	N	100%	20.90509
26	Little Chalfont, on back of sign	N	83.3%	18.62297
27	Nightingales Corner, on sign on roundabout, Nr Challoners Girl School	N	100%	30.45788
28	Hervines Park, on drain pipe on town building	N	100%	13.26822

29	End of Broombar Lane, Great Missenden, on sign	N	100%	17.68867
30	Outside Chequers Pub, Prestwood	N	100%	23.17026
31	Old Amersham near speed calming measures	N	100%	25.25944
32	Amersham Hospital, Whielden Street, Next to fly over	N	66.7%	27.321
33	Bottom of Stanley Hill, Amersham		100%	40.82554
34	Station Road, Amersham, opp number 76	N	100%	30.4132
36	Opposite side of road to Jolly Sportsman, Chesham	Y	100%	27.28538
37	Outside 75 High Street, Great Missenden	N	100%	20.95639
38	Automatic Monitor Co-Location, Berkhamstead Road	N	100%	26.53709

Relevant Exposure

For sites which are roadside, it is possible to calculate the concentration at the nearest relevant exposure using Technical Guidance LAQM.TG (09) Box 2.3 'Predicting nitrogen dioxide concentrations at different distances from roads'. These can then be compared to the annual mean objective.

Table 2.3b Relevant Exposure at Locations exceeding the 40 µg/m³ Annual Mean NO₂ Objective

Location	Measured annual mean concentration (µg/m ³)	Annual mean background concentration (µg/m ³)	Distance of monitor from kerb (m)	Distance of receptor from kerb (m)	Predicted annual mean at receptor (µg/m ³)
Stanley Hill, Amersham	40.83	13.27	1.3	27.5	22.9*
Chesham Police Station, Broad Street	41.49	13.27	3.7	6.6	37.0
Chesham Jolly Sportsman Pub, End of Berkhamstead Road	45.41	13.27	1.9	2.0	45.0
Chesham opp 170 Berkhamstead Road	40.36	13.27	1.6	5.8	32.6

*Receptor is more than 20m further from the kerb than the monitor, therefore treat result with caution.

Outside of the AQMA:

When taking into account relevant exposure, it has been found that an exceedence of the 40 µg/m³ annual mean NO₂ objective has not occurred outside of the AQMA:

Chiltern District Council

There were no annual mean concentrations measured using diffusion tubes greater than $60 \mu\text{g}/\text{m}^3$ outside of the AQMA.

There is no need to proceed to a Detailed Assessment with a view to determining whether or not to declare an AQMA at any location.

Within the AQMA for NO₂:

When taking into account relevant exposure, it has been found that an exceedence of the $40 \mu\text{g}/\text{m}^3$ annual mean NO₂ objective has occurred at this location:

- **Chesham Jolly Sportsman Pub, End of Berkhamstead Road (dual tube location)**

There were no annual mean concentrations measured using diffusion tubes greater than $60 \mu\text{g}/\text{m}^3$ within the AQMA for NO₂.

All annual means within the AQMA are not lower than $40 \mu\text{g}/\text{m}^3$, therefore is it not necessary to revoke the AQMA on this basis.

Further Analysis

On further analysis of the available data, historical information (Table 2.4c) shows that concentrations have not been measured below the objective concentration for several years within the AQMA.

Figure 2.4a shows the historical trend for sites within the AQMA which were found to exceed the $40 \mu\text{g}/\text{m}^3$ annual mean NO₂ objective prior to correcting for relevant exposure in 2008. None of these sites have had measured annual mean concentrations below $40 \mu\text{g}/\text{m}^3$ for the 8 years prior to 2011. However, this year, all but three sites have measured annual mean concentrations below $40 \mu\text{g}/\text{m}^3$. The measured annual mean concentrations are not consistently low enough to consider

revoking the AQMA, at this stage, but this will be addressed in the future Progress Report 2013 and Action Plan updates if this trend continues.

Figure 2.4a Historical Trend of Sites Previously Exceeding the Annual Mean Objective within the AQMA 2008-2011

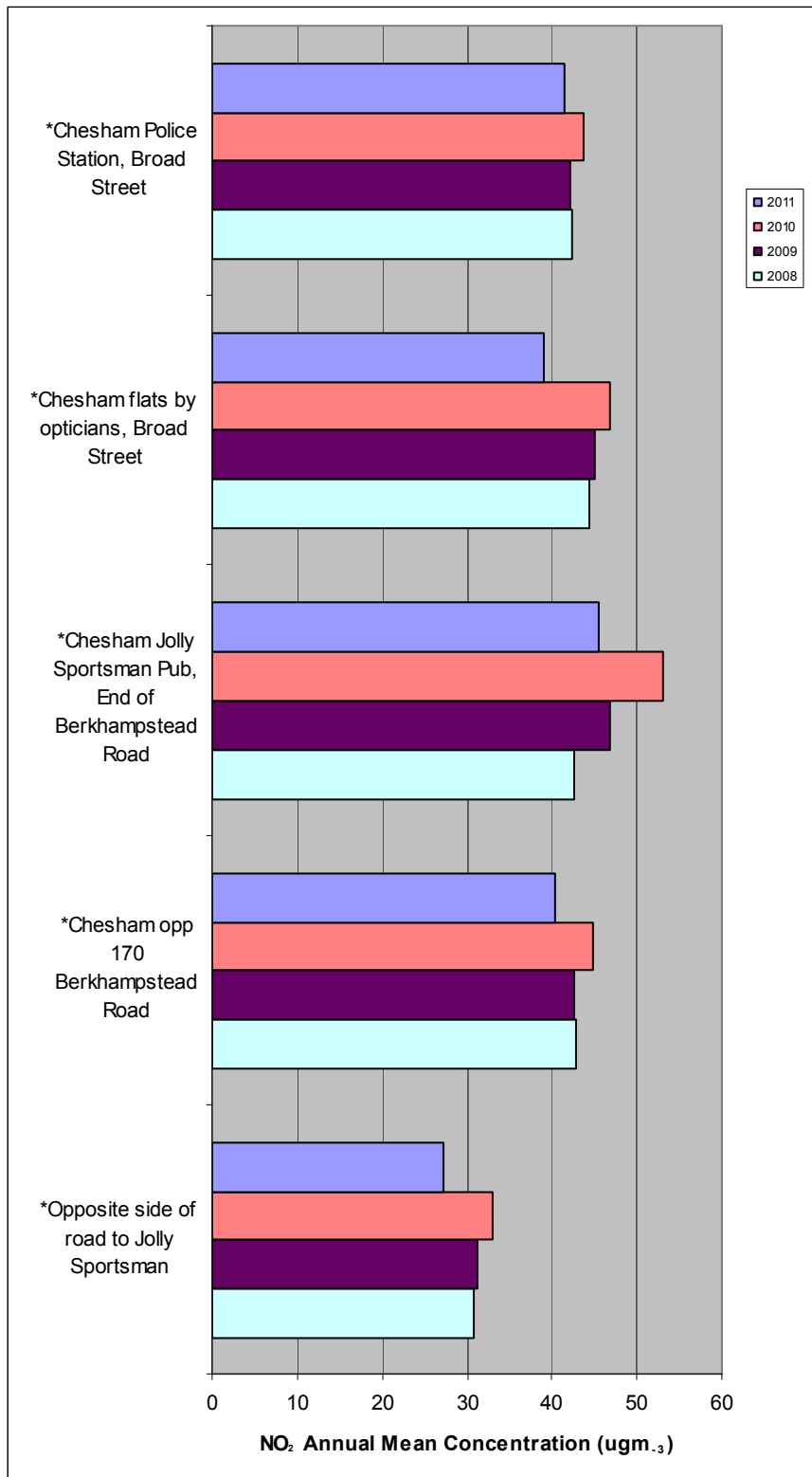


Table 2.3c Results of Nitrogen Dioxide Diffusion Tubes 2008 - 2011

Location	Within AQMA?				
		2008	2009	2010	2011
		Bias=0.93	Bias=0.92	Bias=0.83	Bias=0.84
St Mary's Way, Chesham	N	35.74	35.16	40.10	31.27849
Rickmansworth Road, Amersham	N	27.53	28.73	28.62	28.83039
High Street, Chalfont St Peter	N	29.47	29.40	30.56	23.38572
The Pheasant, Chalfont St Giles	N	38.65	34.45	34.93	31.73445
Gore Hill, Old Amersham	N	39.70	43.05	46.47	39.24526
Chesham Police Station, Broad Street	Y	42.40	42.25	43.72	41.48859
Chesham flats by opticians, Broad Street	Y	44.33	44.97	46.75	39.03448
Chesham Jolly Sportsman Pub, End of Berkhampstead Road	Y	42.53	46.84	53.14	45.4062
Chesham opp 170 Berkhampstead Road	Y	42.87	42.51	44.84	40.35912
Chesham at 305 Berkhampstead Road	N	32.48	33.97	36.66	29.27532
Chesham by 336 Berkhampstead Road	N	39.99	38.01	40.52	35.96989
Chesham opposite 5 Nashleigh Hill	N	32.79	31.36	30.94	30.16959
Chesham opp St Columba Church, Berkhampstead Rd	N	32.84	33.62	34.68	28.03733
Ashley green, by speed Camera, Chesham Road	N	21.24	21.94	23.61	20.70418
Ashley green, by Bus stop/Church, Chesham Road	N	20.77	22.56	25.23	20.90509
Little Chalfont, on back of sign	N	21.11	21.68	23.36	18.62297
Nightingales Corner, on sign on roundabout, Nr Challoners Girl School	N	31.63	33.90	33.61	30.45788
Hervines Park, on	N	13.99	15.67	16.73	13.26822

Chiltern District Council

drain pipe on town building					
End of Broombarn Lane, Great Missenden, on sign	N	17.82	17.21	18.18	17.68867
Outside Chequers Pub, Prestwood	N	21.79	22.83	25.31	23.17026
Old Amersham near speed calming measures	N	27.93	27.60	30.47	25.25944
Amersham Hospital, Whielden Street, Next to fly over	N	30.93	30.21	32.25	27.321
Stanley Hill, Amersham	N	41.50	42.11	43.72	40.82554
Station Road, Amersham, opp number 76	N	30.09	33.73	36.38	30.4132
Opposite side of road to Jolly Sportsman, Chesham	Y	30.70	31.12	33.04	27.28538
Outside 75 High Street, Great Missenden	N	31.78	26.57	30.26	20.95639

Figures 2.3b, 2.3c, 2.3d and 2.3e show the historical trend throughout the District for annual mean concentrations from 2008 to 2011.

Figure 2.4b Historical Trend of Nitrogen Dioxide in Amersham (2008 – 2011)

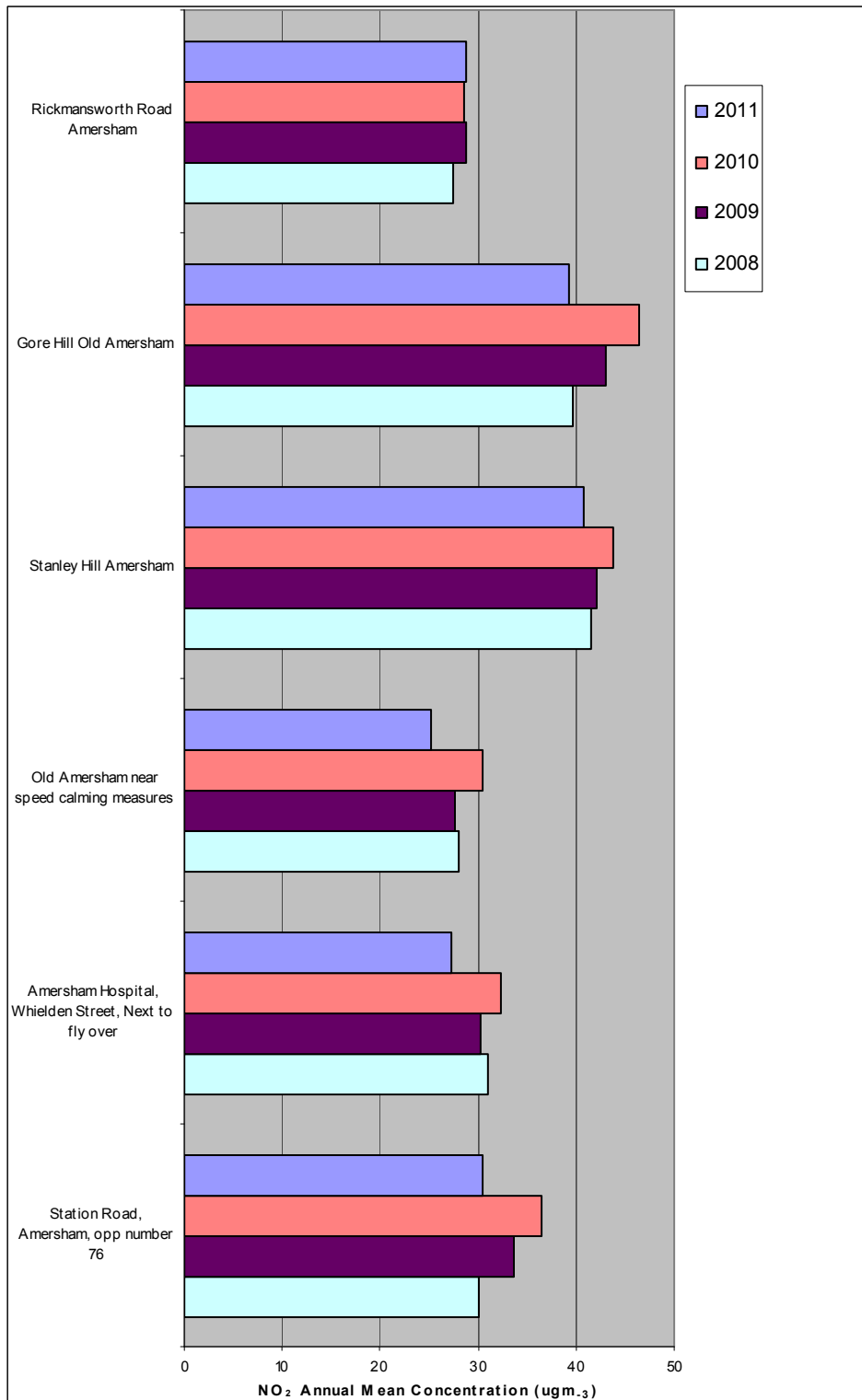
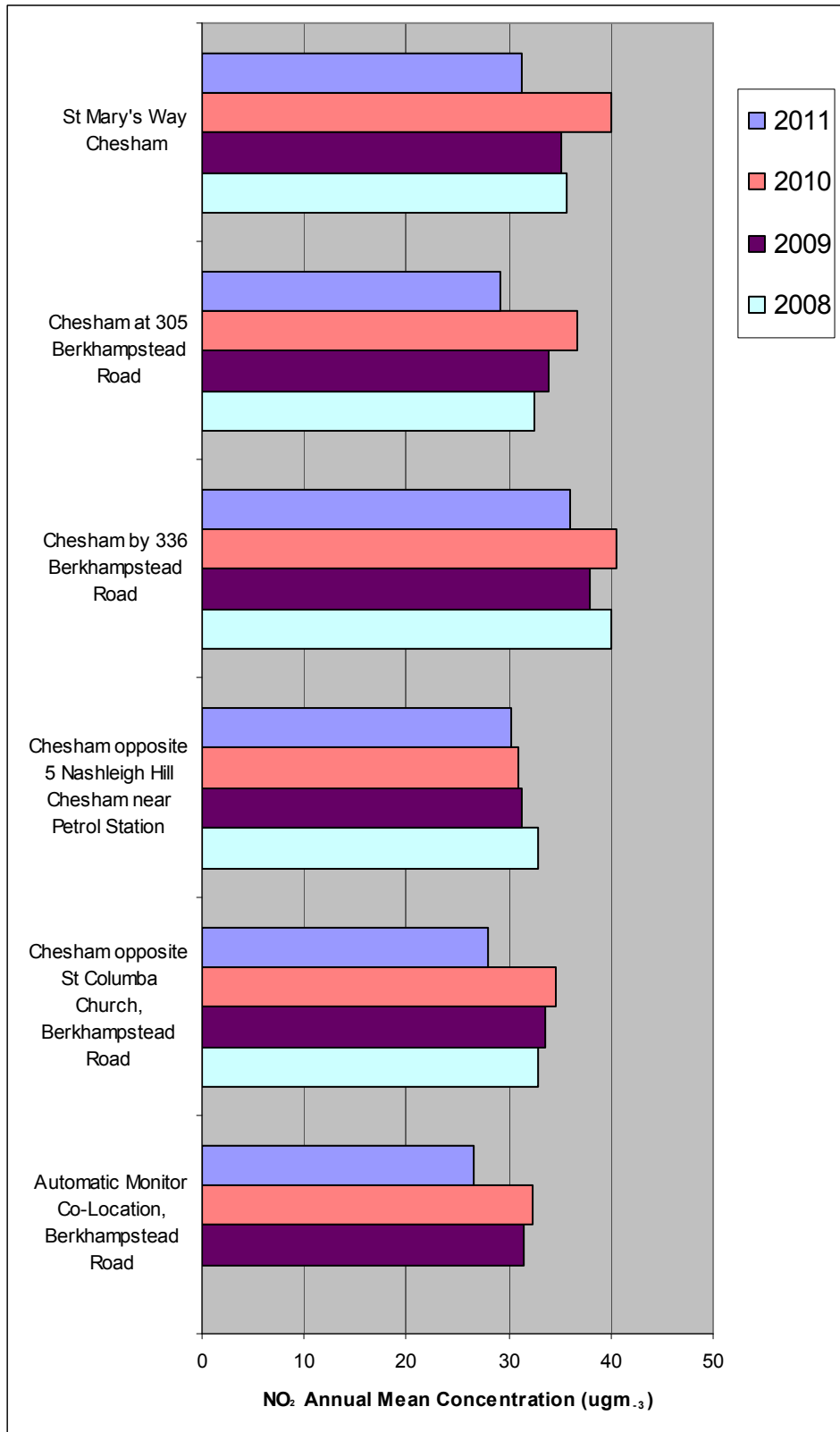


Figure 2.4c Historical Trend of Nitrogen Dioxide in Chesham (2008 – 2011)



Chiltern District Council

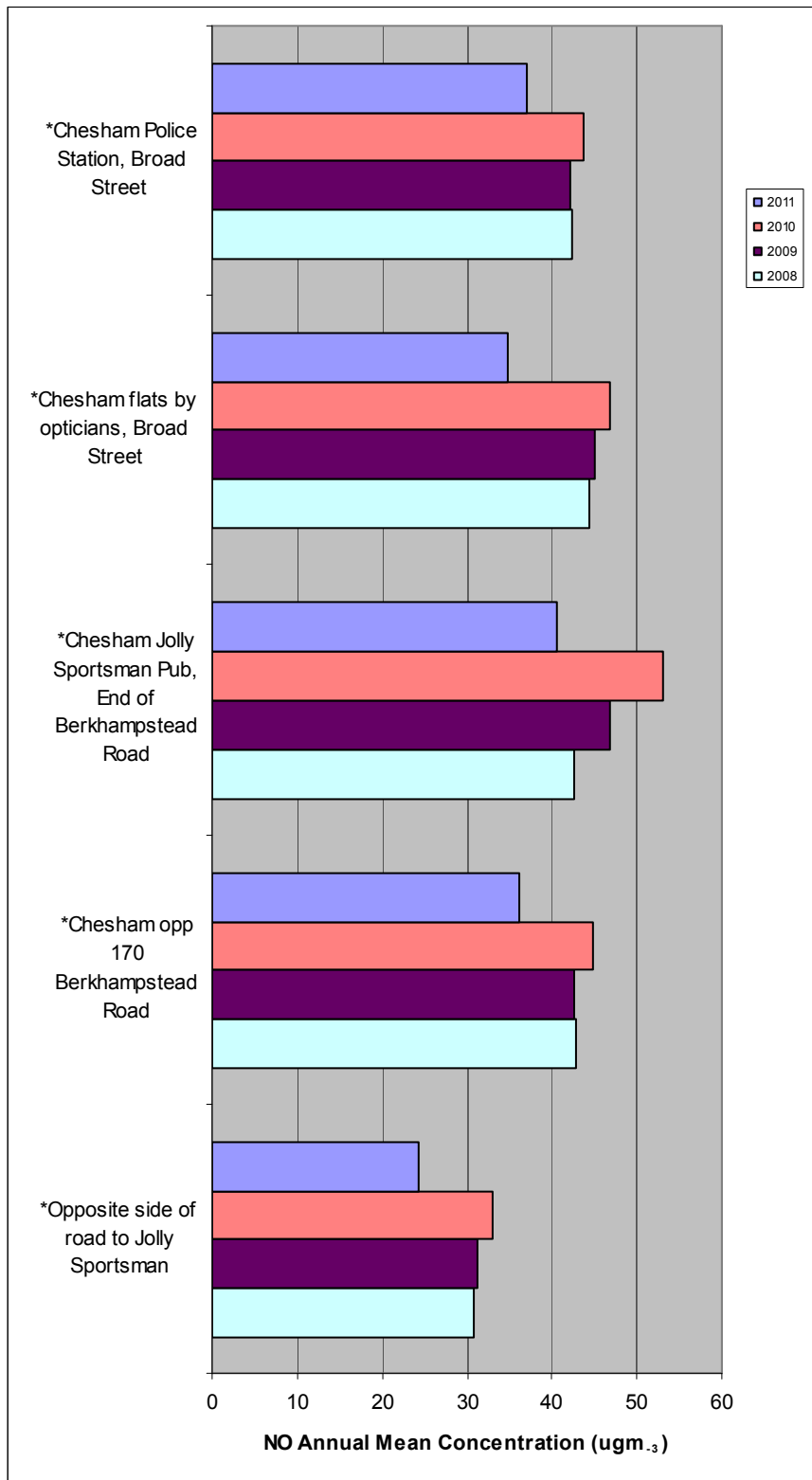


Figure 2.4d Historical Trend of Nitrogen Dioxide in Other Areas (2008 – 2011)

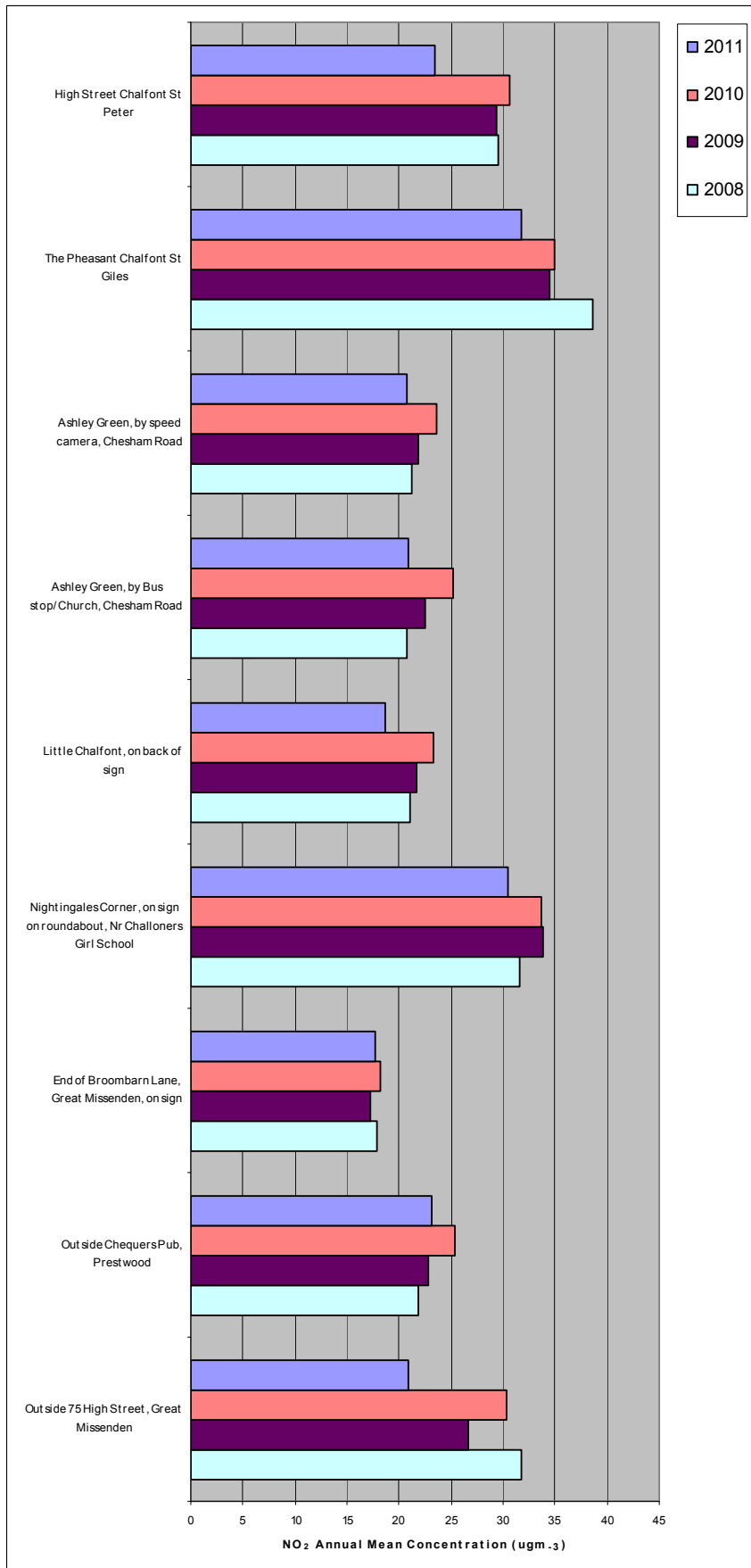
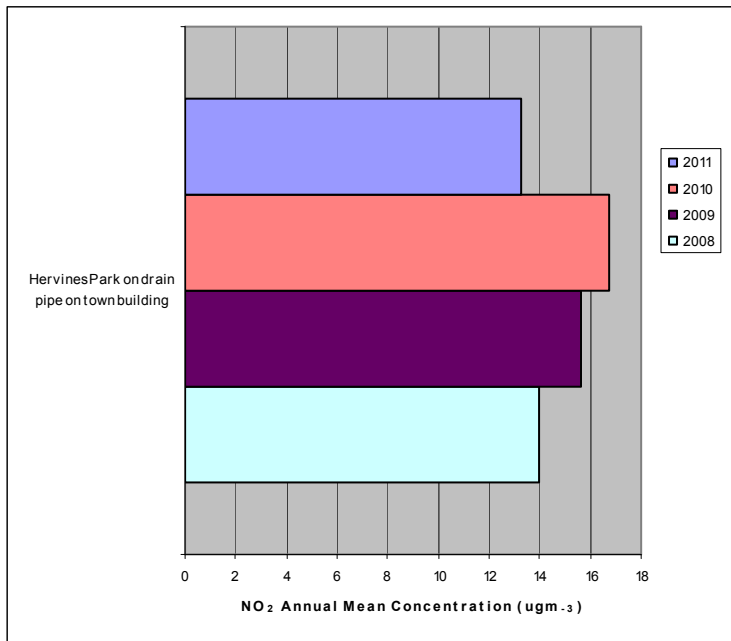


Figure 2.4e Historical Trend of Background Nitrogen Dioxide (2008 – 2011)



Measurements over several years have been fully considered. National trends in NO₂ concentrations are expected to decline over time, and this appears to be evident in monitoring data at a local level within the District. The automatic network average NO₂ concentrations have been steadily declining over the last two decades, and this trend looks set to continue. However, concentrations at the most polluted traffic-influenced UK sites remain well above the objective level (Air Pollution in the UK, 2007).

2.2.2 PM₁₀

Monitoring of PM₁₀ is not currently undertaken and there is currently no AQMA for PM₁₀ declared within the District.

The Updating and Screening Assessment in 2006 considered PM₁₀ in detail and concluded that it is unlikely that there were exceedences of the annual mean objective or 24 hour mean objective for PM₁₀.

Background Concentrations

The UK Background Map for 2010 has not yet been published, and the 2008 data, available from the Air Quality website, shows that the average background PM₁₀ concentration across the Chiltern District is potentially 17.24 µg/m³ with a maximum background value of 20.58 µg/m³. The UK Background Map was also used to provide average background PM₁₀ concentrations with other Districts within 50 miles and with a comparable location. As listed below, these background concentrations are generally above those in the District, and therefore automatic monitoring data from these sites would also be expected to exceed those within the District.

- Broxbourne: 19.16 µg/m³
- East Herts: 17.12 µg/m³
- Stevenage: 19.54 µg/m³
- Watford: 20.43 µg/m³

There is no need to proceed to a Detailed Assessment for PM ₁₀ based on previous assessment and the background information available.
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2.2.3 Sulphur Dioxide

Monitoring of sulphur dioxide is not currently undertaken and there is currently no AQMA for sulphur dioxide declared within the District.

The Updating and Screening Assessment 2009 concluded that there are no significant industrial or domestic sources of sulphur dioxide in the Chiltern District and exceedences of the Air Quality Objective are unlikely. Since this time, there has

Chiltern District Council

not been any significant industrial activity that would result in any change to the situation and this is discussed in the relevant section of this report.

There is no need to proceed to a Detailed Assessment for SO ₂ based on the monitoring information available.

2.2.4 Benzene

Monitoring of benzene is not currently undertaken and there is currently no AQMA for benzene declared within the District.

The Updating and Screen Assessment 2006 states that there are no roads in the District that can be classified as 'very busy' according to Technical Guidance LAQM.TG (03). Since this time, there have not been any significant changes that would result in any change to the situation. More recent information on petrol stations was assessed in the 2009 Updating and Screening Assessment.

Historical data is available from a short survey in 1998 using diffusion tubes and can be found in the First Round of Review and Assessment.

There is no need to proceed to a Detailed Assessment for benzene based on the monitoring information available.

2.2.5 Other pollutants monitored

There are no other pollutants monitored within the District.

3 Road Traffic Sources

The most recently available annual average daily traffic flow (AADT), by vehicle type, for individual major road links are available from the DfT Matrix website. The 2009 USA identified information obtained from the DfT Matrix which showed that there was no significant changes in traffic flow. Overall, daily traffic flow had increased by 3.4% from 2005 to 2007 at the locations monitored within the District. In comparison, the average annual traffic growth in the UK from 1950 to 2007 was 4.1% (DfT, 2007).

The guidance states that The Updating and Screening Assessment should consider locations not addressed in previous rounds of Review and Assessment and locations where conditions have changed significantly since being previously assessed.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

The 2009 USA identified a number of roads with a daily traffic flow of >5000 vehicles per day. Using local knowledge to identify narrow congested streets, it was determined that there were no congested streets as detailed in the guidance with residential properties within 2 metres of the kerb with a daily traffic flow of >5000 vehicles per day. There are no roads meeting the criteria for narrow congested streets outside of a traffic related AQMA.

Chiltern District Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Previous rounds of screening have identified a number of busy roads within the District. However, there were no new busy streets identified where individuals may be exposed within 5 metres of the kerb for 1-hour or more.

Chiltern District Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

There have been no new or newly identified roads with an unusually high proportion of buses and/or HGVs identified since the previous rounds of Review and Assessment. Estimates of flow based on measurements for 'A' roads within the District were obtained from the DfT website. There were no roads identified with more than 5.1% buses and HGVs.

Chiltern District Council confirms that there are no new/newly identified roads with high flows of buses/HGVs.

3.4 Junctions

Busy junctions were identified within the Updating and Screening Assessment 2009, and found that there were no junctions in the District where the annual mean values for NO₂ and PM₁₀ would exceed the objective values. Roads and junctions were identified with areas of high traffic volumes and the potential for public exposure; however the DMRB screening method did not indicate that any junctions would exceed the annual mean objective values.

Busy junctions within the District were identified; however no new busy junctions were found. There is no newly identified relevant exposure within 10 meters of the kerb at busy junctions.

Chiltern District Council confirms that there are no new/newly identified busy junctions.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

There have been no new roads constructed or proposed within the District since the Updating and Screening Assessment 2009.

Chiltern District Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

There have been no new / newly identified roads with significantly changed traffic flows within the District since the Updating and Screening Assessment 2009.

Chiltern District Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

Chiltern District Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Chiltern District Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

There are a small number of train stations within the Chiltern District, covering both National Rail and Transport for London (Metropolitan line) stations. These stations have been identified as:

- Amersham (electric and diesel trains)
- Chalfont and Latimer (electric and diesel trains)
- Chesham (electric shuttle train only)
- Great Missenden (diesel trains)

Stationary trains were assessed within the District for sulphur dioxide within the Updating and Screening Assessment 2006 & 2009, and it was found that there are no areas where railway engines are running for more than 15 minutes continuously and where members of the public might be exposed.

Further consideration was given to stationary trains near to Amersham Station for periods of 15 minutes or more in the 2009 USA. The locations of residential properties were then assessed for relevant exposure. It has been established that there is no potential for regular outdoor exposure of individuals within 15m.

Chiltern District Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

As stated in Technical Guidance LAQM.TG (09), a limited number of local authorities are required to assess railway lines with a high usage of diesel locomotives to establish whether there is relevant exposure nearby. These lines only need to be considered where the background annual mean NO₂ concentration is above 25 µg/m³. The background annual mean NO₂ concentration of the District has been measured at 11.85 µg/m³.

Chiltern District Council was not included in the list of 35 Local Authority areas, and therefore does not need to further consider these emission sources.

Chiltern District Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

Chiltern District Council confirms that there are no ports or shipping within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

There have been no planning applications relating to industrial installations received or granted by Chiltern District Council in 2011. There have also been no planning applications granted relating to industrial installations in neighbouring authorities.

Data collection for the European Pollutant Release and Transfer Register (E-PRTR) has not shown any significant emissions from installations covered by the IPPC Directive.

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

As no planning applications relating to industrial installations have been received or granted since the Progress Report 2011 it is not necessary to obtain details of air quality assessments. Therefore it is not necessary to proceed with “Approach 1” in Section C.1 of Box 5.5 of TG (09).

Chiltern District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

Existing installations within the District are inspected according to recommended timescales provided by Defra. Recent inspections have shown that all industrial installations and processes are in compliance with permit conditions and have not indicated that there has been a substantial increase in emissions or new relevant exposure. Therefore it is not necessary to proceed with “Approach 2” in Section C.1 of Box 5.5 of TG (09).

Chiltern District Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

As there have been no 'new or significantly changed installations with no previous air quality assessment' identified since the Progress Report 2010, it is not necessary to proceed with "Approach 3" in Section C.1 of Box 5.5 of TG(09).

Chiltern District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There have been no major fuel storage depots handling petrol identified within the District, or within neighbouring authorities.

There are no major fuel (petrol) storage depots within the Chiltern District Council area.

5.3 Petrol Stations

No new petrol stations with an annual throughput of more than 2000m³ per annum and with a busy road nearby, which have not been covered by previous Review and Assessment reports have been identified.

Chiltern District Council confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

No poultry farms of any significant size have been identified within the Chiltern District.

Chiltern District Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

There has been no plant burning biomass in 50kW to 20MW units identified within the District. The provision of chimneys for biomass burners less than 50kW is covered by Building Regulations.

The Updating and Screening Assessment 2009 stated that there were no small boiler processes with an output greater than 5MW identified within the District.

Chiltern District Council confirms that there are no biomass combustion plant in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

There is a potential that many small biomass combustion installations (including domestic solid-fuel burning), whilst individually acceptable, could in combination lead to unacceptably high PM₁₀ concentrations.

Local knowledge shows that there is no significant domestic or non-point source commercial combustion of coal or oil. The NAEI Data Warehouse background grids for the District were analysed in the 2009 USA to identify emission estimates for commercial, institutional and residential combustion. The total estimated PM₁₀ emissions for these sectors were calculated to be 28.09 tonnes for the whole District in 2006.

The background average PM₁₀ concentration across the District is 17.24 µg/m³ with a maximum background value of 20.58 µg/m³. The maximum value found for PM₁₀ emissions within a 1x1km square within the District at that time was 987 kilogrammes. Using both maximum values for background average PM₁₀ concentrations and PM₁₀ emissions would result in a worst case scenario. It was found that the combined commercial, institutional and residential sources would not

Chiltern District Council

exceed the threshold emission rate in the relevant nomogram. Annual emissions are unlikely to give rise to an exceedence of the 24 hour mean objective for PM₁₀ and it is not necessary to proceed to a Detailed Assessment.

Chiltern District Council confirms that there are no biomass combustion plant in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

As PM₁₀ has been considered above, domestic solid-fuel burning only considers sulphur dioxide.

Currently, solid fuel use continues to decline throughout the District. The Updating and Screening Assessment 2009 considered that it is unlikely that there are any 500x500m areas with more than 50 houses burning coal or smokeless fuel. Presently, it is still unlikely that there are any areas of 500x500m with more than 50 houses that burn coal or smokeless fuel as their primary source of heating.

Chiltern District Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

There have been no planning applications received or granted by Chiltern District Council in 2011 that would act as potential sources of fugitive particulate matter emissions. There are no known problematic fugitive or uncontrolled sources in the District, such as wind-blown dust and sea salt, and no activities such as quarrying and bulk materials handling are carried out. No new relevant exposure has been identified.

A planning application for the site located at The Council Depot, London Road, Amersham, to develop a Waste Transfer Station has been submitted to Buckinghamshire County Council. This planning approval has not yet been granted.

Chiltern District Council confirms that there are no new potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

Within the District, background monitoring has shown a continued reduction in annual mean NO₂ concentrations since 2005.

Outside the AQMA within Chesham, monitoring has shown that there are no exceedences of the NO₂ annual mean objective within the diffusion tube network; and it is noted that all locations in this area have had decreased concentrations from 2010 values.

Locations within Amersham also show decreased concentrations when compared to 2010 values. The annual mean concentration at Stanley Hill has decreased.

Monitoring at other locations within the District is generally lower than those found in the main towns of Chesham and Amersham.

As not all the monitoring results within the AQMA are below the air quality objective value, it would not be appropriate to revoke the AQMA at this time. There are three exceedences identified within the AQMA, where previously rounds identified 4 sites.

Action Plan Reporting is still required based on conclusions from new monitoring data, and in particular at the location of “The Jolly Sportsman”. The 2013 and 2014 Progress Report will provide data to demonstrate if 2011’s lower NO_x levels continue to trend, and can inform a decision to reduce or revoke the AQMA

8.2 Conclusions from Assessment of Sources

There have been no new or significantly changed sources identified within the District, and therefore no potential exceedences have been identified outside the existing AQMA.

Road traffic sources remain unchanged since the last round of Review and Assessment. No locations have been identified meeting the full criteria for each of the possible road traffic sources.

Industrial sources are of most concern when considering short-term objectives, as they are unlikely to make a significant local contribution to annual mean concentrations. There have been no new, proposed, or significant increases in industrial sources within the District.

No further petrol stations have been identified.

Commercial and domestic sources were considered under Biomass Combustion. It was found that the combined commercial, institutional and residential sources would not exceed the threshold emission rate for PM₁₀. There have been no areas identified where there is significant domestic fuel use within the District.

Fugitive and uncontrolled sources will be fully assessed on receipt of an Air Quality Assessment for a planning application that is currently pending.

A Detailed Assessment is not required based on conclusions from assessment of sources.

8.3 Proposed Actions`

This Updating and Screening Assessment has not identified the need to proceed to a Detailed Assessment for any pollutant.

The Updating and Screening Assessment has not identified any need for additional monitoring, or changes to the existing monitoring programme.

One year of lower diffusion tube data is not considered sufficient to alter the boundaries of the AQMA or revoke it. It is intended that alongside this USA, an update to the Action Plan will be submitted, and that a Progress Report will be submitted in 2013.

Chiltern District Council will continue to work on action planning in the AQMA area to reduce air pollution levels. A county-wide strategy will continue to provide focus for pro-actively tackling air quality in all areas of the District.

9 References

- Air Pollution in the UK (2007) AEA on behalf of DEFRA and the Dissolved Administrations
- Air Quality (England) Regulations 2000 (SI 928)
- Air Quality (England) (Amendment) Regulations 2002 (SI 3043)
- Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007)
- Chiltern District Council (2003) Updating and Screening Assessment.
- Chiltern District Council (2004) Progress Report.
- Chiltern District Council (2005) Progress Report.
- Chiltern District Council (2006) Updating and Screening Assessment.
- Chiltern District Council (2008) Progress Report.
- Chiltern District Council (2009) Further Assessment
- Chiltern District Council (2010)
- Part IV of the Environment Act (1995)
- Relevant Policy and Technical Guidance documents:
 - Technical Guidance LAQM.TG (09)
 - Policy Guidance LAQM.PG (09)
- Department for Transport (2007) Road Statistics: Traffic, Speeds and Congestion. Transport Statistics Bulletin.

Websites:

Department for Transport Matrix Website - <http://www.dft.gov.uk/matrix/>

NAEI Data Warehouse - http://www.naei.org.uk/data_warehouse.php

Review and Assessment Website - <http://www.uwe.ac.uk/aqm/review/>

UK Background Maps - <http://www.airquality.co.uk/archive/laqm/tools.php>

Appendices

Appendix A: Non-Automatic Monitoring Uncertainty Measurements 2011

2011	Uncertainty of Measurement (+/- %)
January	-1.00
February	-6.00
March	-5.50
April	-5.30
May	-5.30
June	-0.80
July	-4.70
August	-0.90
September	-0.35
October	-0.35
November	-1.40
December	-1.40

(For indicative monitoring techniques, such as diffusion tubes for NO₂, the EC Directives set an accuracy objective of +/-25% - Technical Guidance LAQM.TG 09)

Source: Diffusion Tube Laboratory – Environmental Scientific group.

Appendix B: Diffusion Tube Monthly Mean Values (Raw Results)

Tube number	January 2011	February 2011	March 2011	April 2011	May 2011	June 2011	July 2011	August 2011	September 2011	October 2011	November 2011	December 2011
1	46.5	49.6	47	34.2	23.8	33.0	30.9	27.5	28.9	45.2	45.6	35.3
2	57.8	46.7	42	30.2	32.1	30.0	27.6	24.4	33.5	40.2	49.7	32.0
3	33.2	32.8	42	23.8	10.5	16.2	12.8	19.0	20.2	30.0	37.8	19.0
4	33.1	34.5	42.3	19.7	10.8	16.1	15.9	20.0	23.7	25.1	39.8	19.1
5	32.9	32.1	36.3	25.1	18.4	18.8	17.4	17.7	24.3	33.1	36.5	17.2
6	36.9	30.7	34.5	14.1	14.3	16.2	2.4	18.1	21.0	30.1	41.6	21.9
7	44.5	47.9	45.9	28.1	22.9	25.9	18.9	27.3	36.9	44.4	48.5	39.8
8	43.2	42.7	33.5		24.4	27.0		22.8		35.6	43.6	35.9
9	57.3	50.9	51.6	36.7	34.7	31.2	29.0	39.5	41.2	50.2	54.1	40.6
10	53.2	49.7	50.8	31.7	30.3	31.1	30.2	34.6	45.1	51.1	53.1	49.8
11	43.9	49.8	43.8	21.2	25.7	28.3	22.9	29.7	26.7	41.9	44.6	34.4
12	55.1	35.8	48.8	33	26.2	27.6	26.4	26.1	28.9	39.9	44.8	30.9
13	76	71	79.1	48.9	35.2	29.0	31.5	31.6		57.6	69.1	36.8
14	68.9	54.8	54.7	38.3	42.2	38.2	40.4	33.1	44.4	51.8	58.5	
15	64.4	64.7	68.8	37.7	43.7	29.7	28.7	39.9	45.1	54.1	55.0	
16	61	57.9		32.5	32.2	39.6	37.8	40.9	48.3	49.3		34.6
17	70.9	58		49.1	37.2	37.2	39.7	37.6	51.7	51.7		35.0
18	62.1	52.2	58.9	46.7	48	36.1	36.3	26.1	41.6	57.2		50.0
19	54.1	53.4	49.4	43.5	45.6	36.7	31.9	40.1	42.8	54.0		55.7
20	34.8	41.6	44.3	23.3	21.8	26.9	21.4	37.9	46.0	45.8	53.1	32.4
21	35.8	42.6	44.2	18.8	22.3	22.9	21.3	23.9	40.8	42.3	48.0	31.4
22	45.2	63.4	74.1	51	30.1	32.6	35.4	37.8	42.5	55.3	70.5	39.1
23	57.5	60	71.1	42.5	30.9	35.6	32.7	42.0	45.1	59.7	30.0	37.3
24	50.1	43.3	47.3	41.6	30.6	31.6	29.3	31.2	31.6	41.1	45.1	36.4
25	54.8	39.7	51.5	31.6	27.9	20.6	29.7	28.2	33.8	41.2	54.7	33.8
26	39.6	39.2	40.1	23.5	23.9	16.7	22.6	16.3	28.7			35.4
27	25.1	29.2	32.6	17.7	15.4	15.2	15.1	13.8	24.5	33.1		
28	36.1	37.1	47.3	30.4	29.7	32.5	30.7	28.9	36.6	49.9	47.6	28.3
29	23.2	22.2	18.9	11.1	9.1	8.5	7.8	10.3	15.8	21.6	31.0	10.0
30	24.7	38.4	27.6	16.3	10.3	10.2	12.4	13.2	19.1	26.5	37.8	16.2
31	35.7	37.4	36.7	24.3	21.4	17.3	16.0	25.3	23.5	30.6	40.9	21.8
32	41.4	38.9	35.9	26.4	19	19.6	22.1	30.2	23.7	35.6	43.2	24.8
33	40.5	40.7	41	31.4	30.8	24.8	26.0	25.0				
34	53.5	64.4	79.8	41.8	14.1	25.1	33.4	42.7	51.1	58.7	74.6	44.0
35	53.7	42.5	69.3	32.5	23.8	18.8	20.1	26.2	30.8	40.7	51.7	24.3
36	74	73.7	77.9	49.7	33.9	30.6	34.4	16.6		57.9	74.9	43.8
37	45.9	41.7	47.8	26.9	20.2	12.2	18.1	18.4	33.2	41.5	53.7	30.1

Source: Diffusion Tube Laboratory – Environmental Scientific Groups