



2013 Air Quality Progress Report for East Hampshire

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

April 2013

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Executive Summary

This report is East Hampshire District Council's 2013 Progress Report and forms part of the review and assessment of air quality in East Hampshire. The assessment has been carried out in accordance with the Government's published Technical Guidance LAQM.TG (09).

All relevant air quality monitoring data, transport information and emissions from industrial processes in the District have been considered in the production of this report.

The Progress Report shows that the air quality objectives included in the Air Quality Regulations are likely to be achieved for all pollutants throughout the East Hampshire District. Thus a Detailed Assessment is not currently required.

A decision was taken to revoke the East Hampshire Air Quality Management Area No 1 Order, due to further assessment of nitrogen dioxide levels in Bordon. Monitoring data obtained in 2012 provided further evidence to support this decision.

No new local developments have been identified which require more detailed consideration at this stage.

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1 Introduction

1.1 Description of Local Authority Area

East Hampshire is a rural District which borders West Sussex and Surrey and lies to the north of the urban areas of Portsmouth and Havant. The District covers an area of approximately 200 square miles and has a population of approximately 114,000 people. It is renowned for its attractive countryside, much of which is of an exceptionally high quality. Much of the District lies within the South Downs National Park.

The District is based around the two market towns of Petersfield and Alton with other major centres at Whitehill, Bordon and Horndean. The rest of the District is characterised by many attractive villages, the largest of which are Liphook and Liss. The towns and villages contain many buildings and areas of architectural, archaeological and historic interest, which contribute greatly to the attractive appearance and character of the District's built environment.

The District is bisected by the A3 (Motorway and Trunk Road), which is a major transport link between London and Portsmouth. Other roads of local importance include the A31 (Farnham to Winchester), the A32 (Alton to Fareham), the A272 (Winchester to Petersfield), the A325 (A3 to Farnham via Bordon) and the A339 (Alton to Basingstoke). Rail services to London and the South coast stop at Liphook, Liss, Petersfield and Rowlands Castle. There are also stations at Alton and Bentley. The Mid Hants Watercress Line operates steam trains between Alton and Ropley.

East Hampshire has a range of manufacturing and service industries, mainly in small to medium sized firms, and a significant public sector presence. The Ministry of Defence is also a major employer. In the countryside, agriculture remains an important sector of the local economy.

A map of East Hampshire is shown in Appendix 1.

1.2 Purpose of Progress 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 exceedances are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

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

1.3 Air Quality Objectives

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

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM 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 $\mu\text{g}/\text{m}^3$	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 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 $\mu\text{g}/\text{m}^3$	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
Particulate Matter (PM ₁₀) (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
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

A summary of the conclusions of previous rounds of review and assessment carried out by East Hampshire District Council (EHDC) are shown in Table 1.2. Further detail can be found in the individual reports which are available on the Council's website or on request from Environmental Health.

An Air Quality Management Area (AQMA) was declared in July 2010, due to elevated concentrations of nitrogen dioxide in Bordon. The AQMA included residential properties at first floor level above Corals, High Street, Bordon adjacent to the A325. A map showing the boundary of AQMA Order no 1 is shown in Appendix 2.

A Further Assessment of Air Quality in Bordon AQMA was published in June 2012. This was due to have been submitted to DEFRA in July 2011 but was delayed, with DEFRA's agreement, because traffic flows on the A325 were forecast to reduce by 8% following the opening of the A3 Hindhead Tunnel¹. The tunnel came into full use on 29 July 2011 and was subsequently shown to have had a significant effect on traffic in the AQMA and it was likely that this had contributed to a drop in concentration of nitrogen dioxide measured in Bordon in 2011.

The Further Assessment concluded that nitrogen dioxide concentrations within and around the High Street / Chalet Hill junction in Bordon had been assessed through diffusion tube monitoring and dispersion modelling. The results indicated that concentrations continued to be above 40 µg/m³ within the AQMA, but not at locations where there was relevant exposure. It was recommended that the AQMA be revoked. DEFRA agreed with the recommendations and a revocation order was made on 27th February 2013 (Appendix 2).

Table 1.2 Summary of previous rounds of Review and Assessment

Previous report	Date produced	Brief outcome
LAQM Review & Assessment Report ²	December 2000	Air quality objectives achieved
Updating and Screening Assessment ³	August 2003	Air quality objectives achieved, but identified that several areas require further investigation.
Progress Report ⁴	September 2004	Addressed areas raised in 2003 USA. Identified that a Detailed Assessment was required for nitrogen dioxide at A3 Bramshott Chase and A325 Chalet Hill/Bordon.
Detailed Assessment ⁵	July 2005	Air quality objectives achieved
Updating and Screening Assessment ⁶	June 2006	Identified that a Detailed Assessment was required for nitrogen dioxide at A3 Bramshott/Grayshott, A325 Chalet Hill/Bordon and A3 Horndean/Portsmouth Road
Detailed Assessment ⁷	August 2008	Predicted air quality objectives achieved at A3 Horndean/Portsmouth Road and A325 Chalet Hill/Bordon, but some concern that results in the report may be optimistic. Some minor alterations were made to the report as agreed with DEFRA.
2008 Detailed Assessment with 2008 Progress Report ⁷	May 2009	2008 Detailed Assessment submitted with agreed changes including 2008 Progress Report attached as an Appendix. Air quality objectives achieved with exception of nitrogen dioxide at the A325/ Chalet Hill, Bordon. EHDC agreed to review the position during 2009.
Updating and Screening Assessment ⁸	April 2009	Air quality objectives achieved, but highlighted Bordon being reviewed during 2009
Air Quality Update: Shortened Detailed Assessment of nitrogen dioxide in Bordon ⁹	September 2009	Likely exceedance of the annual mean objective for nitrogen dioxide identified at A325/Chalet Hill junction. EHDC proposed to review position and determine the extent of AQMA early in 2010 when a complete dataset for 2009 was available.
Progress Report ¹⁰	April 2010	Air quality objectives achieved with the exception of one position at A325/Chalet Hill junction. EHDC to declare an AQMA.
Progress Report ¹¹	April 2011	Air quality objectives achieved with the exception of one position at A325/Chalet Hill junction within Bordon AQMA.
Updating and Screening Assessment ¹²	April 2012	Air quality objectives achieved, except for exceedances within Bordon AQMA
Further Assessment ¹³	June 2012	Nitrogen dioxide above 40 µg/m ³ within the AQMA, but not at relevant exposure locations. AQMA revocation recommended.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

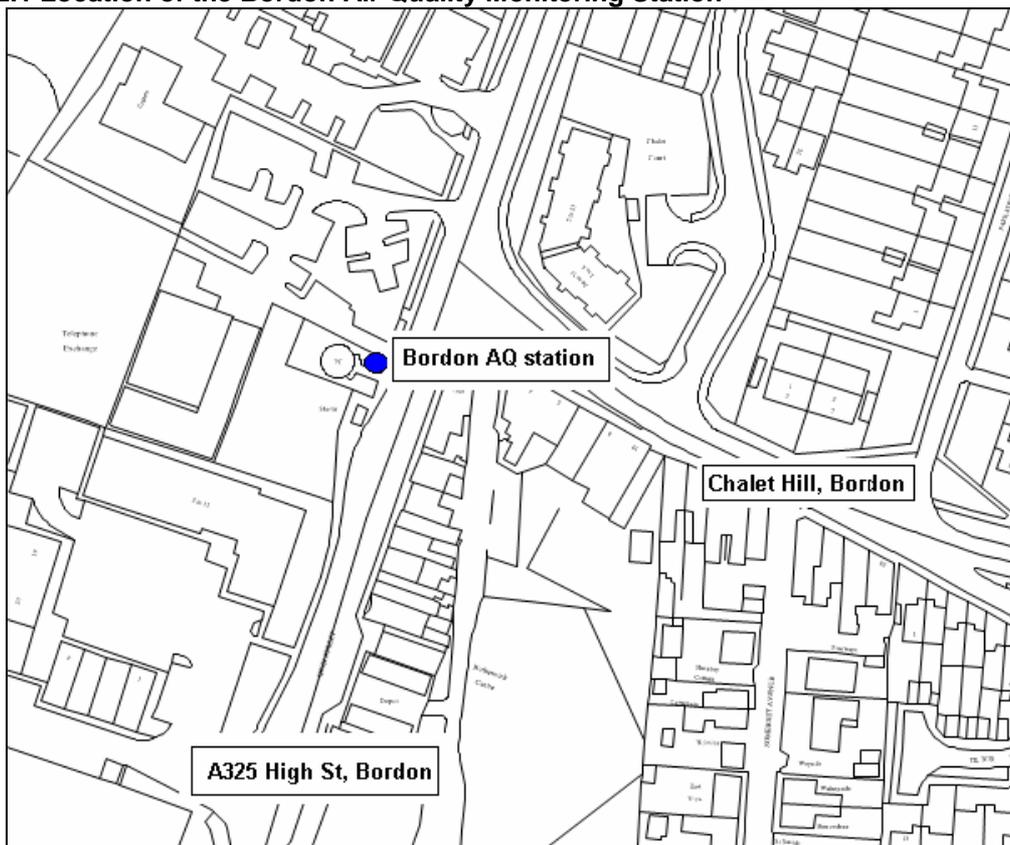
2.1.1 Automatic Monitoring Sites

East Hampshire District Council currently operates one continuous air quality monitoring station which monitors nitrogen dioxide levels.

The station is located along the A325 High Street, Bordon close to the junction with Chalet Hill. Monitoring commenced in March 2005. The station is classified as a roadside monitoring site which is approximately 4 metres from the kerb. The station location is representative of relevant exposure at Chalet Court, Bordon. The station location is shown in Figure 2.1 below. The station is not part of the national monitoring network.

The data from the Bordon air quality station is collected via a GSM modem. Data management during 2012 was carried out by Envitech/AQDM who screen and validate the raw data and provide the Council with written reports of the results on a quarterly basis. All monitoring data collected by East Hampshire District Council provided in this report has been ratified.

Figure 2.1 Location of the Bordon Air Quality Monitoring Station



Nitrogen dioxide is monitored at the station using a Monitor Labs chemiluminescent analyser, which is housed in a secure air-conditioned cabin. The analyser is serviced every 6 months by SupportingU. Separate QA/QC audits are also carried by Ricardo-AEA through its calibration club. These audits involve checking the analyser linearity, NO_x converter efficiency and comparing the site cylinders with audit cylinders. Ricardo-AEA follow procedures adopted within the quality programme of the UK national Automatic Urban and Rural Monitoring Network (AURN). The analyser is also checked and calibrated using gases

by the Council every 2 weeks in accordance with the Council's written procedure and the results are recorded in the site log.

Historically, PM₁₀ levels were also measured at the Bordon station using a R&P TEOM analyser with a retrofit FDMS instrument. In January 2011 East Hampshire District Council ceased monitoring PM₁₀ because measured concentrations were consistently below the air quality objectives. The financial savings allowed us to continue operating the nitrogen dioxide continuous monitor in this location adjacent to the AQMA.

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	Monitoring technique	In AQMA	Relevant Exposure	Distance to kerb of nearest road	Worst-case Location
Bordon	Urban background	479646, 135341	NO ₂	Chemiluminescent analyser	No	No. Representative of relevant exposure	4m	N

QA/QC data is provided in Appendix 3.

2.1.2 Non-Automatic Monitoring

Nitrogen dioxide is also measured in East Hampshire using diffusion tubes. During 2012 nitrogen dioxide concentrations were measured at 20 locations in East Hampshire. The tubes are supplied and analysed by Gradko International Ltd, a UKAS accredited laboratory, and prepared by using 50% v/v TEA in acetone methodology. Further details on the QA/QC of the diffusion tubes and calculation of the bias adjustment factor used in this report can be seen in Appendix 3. Maps showing the locations of the diffusion tube monitoring sites can be seen in Appendix 4.

Changes to diffusion tube locations

There were no changes to diffusion tube locations in 2012.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site name	Site Type ^a	OS Grid Ref	In AQMA	Relevant Exposure	Tube height (m)	Distance from kerb (m)	Worst-case Location
AB1 Alton, Orchard House	UB	472109, 139487	N	Yes	3	N/A	N/A
BR4 Bordon, Corals (1) Chalet Hill	RS	479666, 135345	Y	No Relevant exposure at 1 st /2 nd level	2.56	2.9	Yes
BR7 Bordon, Corals (2) Chalet Hill	RS	479666, 135345	Y	Yes	3.31	2.9	Yes
BR1 Bordon, Ashmead	RS	479707, 135438	N	Yes	2	10	No
BR2 Bordon, Chalet Court	RS	479695, 135356	N	Yes	1.5	6	No
BR3 Bordon, 10 Chalet Hill	RS	479711, 135321	N	No Representative of relevant exposure	2	2.4	Yes
BR5 Bordon, High Street (1)	RS	479654, 135312	N	No Relevant exposure at 1 st floor level	2.26	1.9	Yes
BR8 Bordon, High Street (2)	RS	479654, 135312	N	Yes	3.17	1.9	Yes
BR6 Bordon, Air Quality Cabin (3 tubes co-located)	RS	479646, 135341	N	No Representative of relevant exposure	2	4.8	No
BR9 Bordon, 11 High Street (1)	RS	479642, 135278	N	No	2	6	Yes
BR10 Bordon, 11 High Street (2)	RS	479642, 135278	N	Representative of relevant exposure	2	1.4	No
BU1 Bordon, Bassenthwaite Gdns	UB	479795, 136267	N	Yes	1.7	N/A	N/A
WR1 Whitehill, Petersfield Rd	RS	479314, 134307	N	No Residential façade is approx 18m from road	3.25	1	Yes
BramR1 Bramshott A3 South, Chase Villas	RS	487134, 133881	N	Yes	1.7	10	Yes
PB1 Petersfield, Town Hall	UB	474989, 123241	N	No	2	N/A	N/A
HR1 Horndean, London Road	RS	470554, 113582	N	Yes	2.77	1.9	Yes
HR2 Horndean, Roundabout	RS	470676, 113174	N	No	2	1.9	Yes
HR4 Horndean, 24 London Road	RS	470637, 113331	N	Yes	2.75	1.6	Yes

a RS = roadside
UB = urban background

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

The Government and the Devolved Administrations have adopted two air quality objectives for nitrogen dioxide (NO₂); an annual mean concentration of 40 µg/m³, and a 1-hour mean concentration of 200 µg/m³ not to be exceeded more than 18 times per year.

Automatic Monitoring Data

The measured annual mean concentration of nitrogen dioxide at the Bordon air quality station for 2012 falls below the air quality objective of 40µg/m³ and there were no exceedances of the hourly mean objective of 200µg/m³. This is shown in Tables 2.3 and 2.4 and Figure 2.2.

Table 2.3 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Within AQMA?	Data Capture for full calendar year 2012 %	Annual mean concentrations (µg/m ³)		
			2010	2011	2012
Bordon	N	99.8	25.6	23.2	22

Figure 2.2 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Bordon Air Quality Station

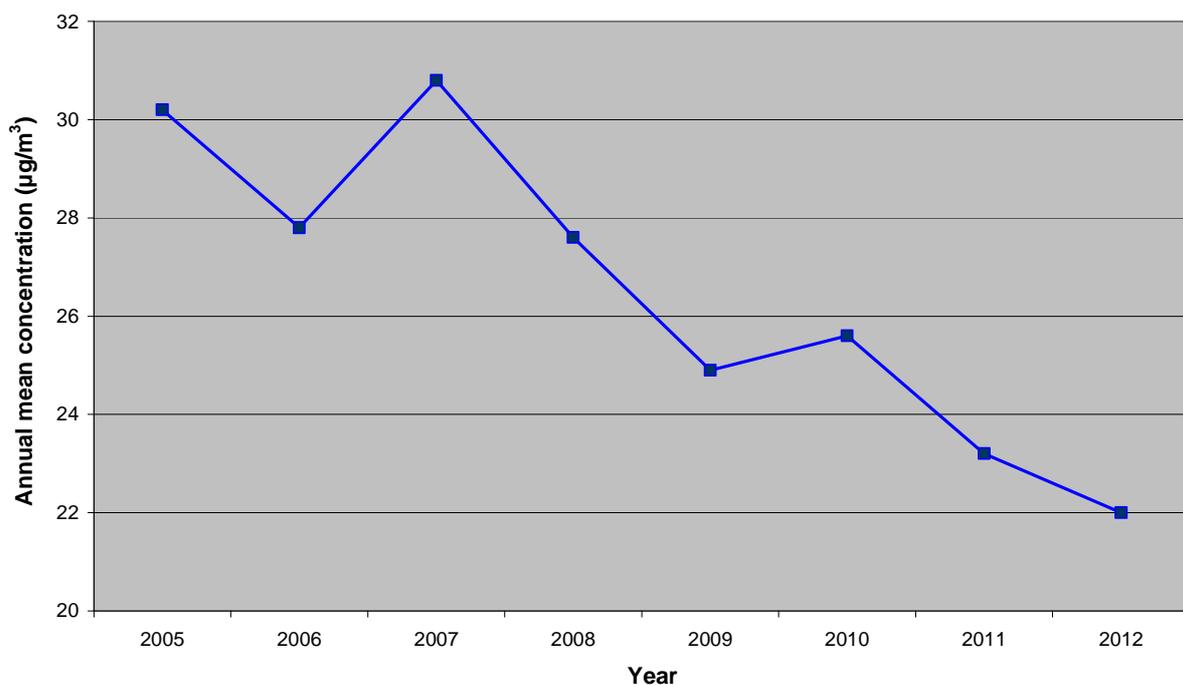


Figure 2.2 suggests that there has been a steady overall decline in levels of nitrogen dioxide at this location since monitoring began.

Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Within AQMA?	Data Capture for full calendar year 2012 %	Number of Exceedances of hourly mean (200 µg/m ³)		
			2010	2011	2012
Bordon	N	99.8	0	0	0

Diffusion Tube Monitoring Data

Annual means of nitrogen dioxide measured using diffusion tubes are shown in Table 2.5.

Results in bold indicate an exceedance of the annual mean objective for nitrogen dioxide of 40µg/m³. A full dataset showing monthly mean values for 2012 is provided in Appendix 5.

All data has been reviewed and the most suitable bias-adjustment factor available has been applied. In deciding which bias adjustment factor to apply, consideration has been given to guidance in Box 3.3 of TG(09)¹² and the advice of the air quality helpdesks' websites. Further information on the choice of the bias adjustment factor used for 2012 data is provided in Appendix 3. Further information on bias adjustment factors used for earlier years' data can be found in previous review and assessment reports.

Local bias adjustment factors have been calculated using the AEA Group's spreadsheet "Checking Precision and Accuracy of Triplicate Tubes"¹³. A copy of the spreadsheet completed for 2012 data is available in Appendix 6. National bias adjustment factors were obtained from the Review and Assessment Helpdesk's database (v03/11)¹⁴.

Most of the nitrogen dioxide concentrations are measured at roadside locations. Concentrations of nitrogen dioxide at the location of nearest relevant exposure may be lower as they are further away from the road.

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Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Data Capture 2012 %	2012 Annual mean concentrations ($\mu\text{g}/\text{m}^3$) (Bias Adjustment factor = 0.94) ^a
AB1	Alton, Orchard House	Background	No	N	100.0	14.1
BR4	Bordon, Corals (1) Chalet Hill	Roadside	Yes	N	100.0	38.0
BR7	Bordon, Corals (2) Chalet Hill	Roadside	Yes	N	100.0	36.6
BR1	Bordon, Ashmead	Roadside	No	N	100.0	20.5
BR2	Bordon, Chalet Court	Roadside	No	N	100.0	22.8
BR3	Bordon, 10 Chalet Hill	Roadside	No	N	100.0	27.6
BR5	Bordon, High Street (1)	Roadside	No	N	91.7	35.0
BR8	Bordon, High Street (2)	Roadside	No	N	91.7	32.9
BR6	Bordon, Air Quality Cabin	Roadside	No	Triplicate and co-located	91.7	21.2
					91.7	21.4
					91.7	20.8
BR9	Bordon, 11 High Street (1)	Roadside	No	N	83.3	26.8
BR10	Bordon, 11 High Street (2)	Roadside	No	N	91.7	27.5
BU1	Bordon, Bassenthwaite Gdns	Background	No	N	91.7	10.9
WR1	Whitehill, Petersfield Rd	Roadside	No	N	91.7	31.0
BramR1	Bramshott A3 South, Chase Villas	Roadside	No	N	91.7	15.3
PB1	Petersfield, Town Hall	Background	No	N	91.7	13.7
HR1	Horndean, London Road	Roadside	No	N	91.7	32.4
HR2	Horndean, Roundabout	Roadside	No	N	75.0	28.8
HR4	Horndean, 24 London Road	Roadside	No	N	91.7	27.9

a –Bias adjusted using the locally derived factor of 0.94. Details of this bias adjustment factor can be found in Appendix 3 & 6.

Green cells indicate monitoring positions which have been placed at height

Measured annual mean concentrations of nitrogen dioxide fall below the air quality objective of 40µg/m³ at all locations.

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentration Measured using Diffusion Tubes in East Hampshire (excluding Bordon)

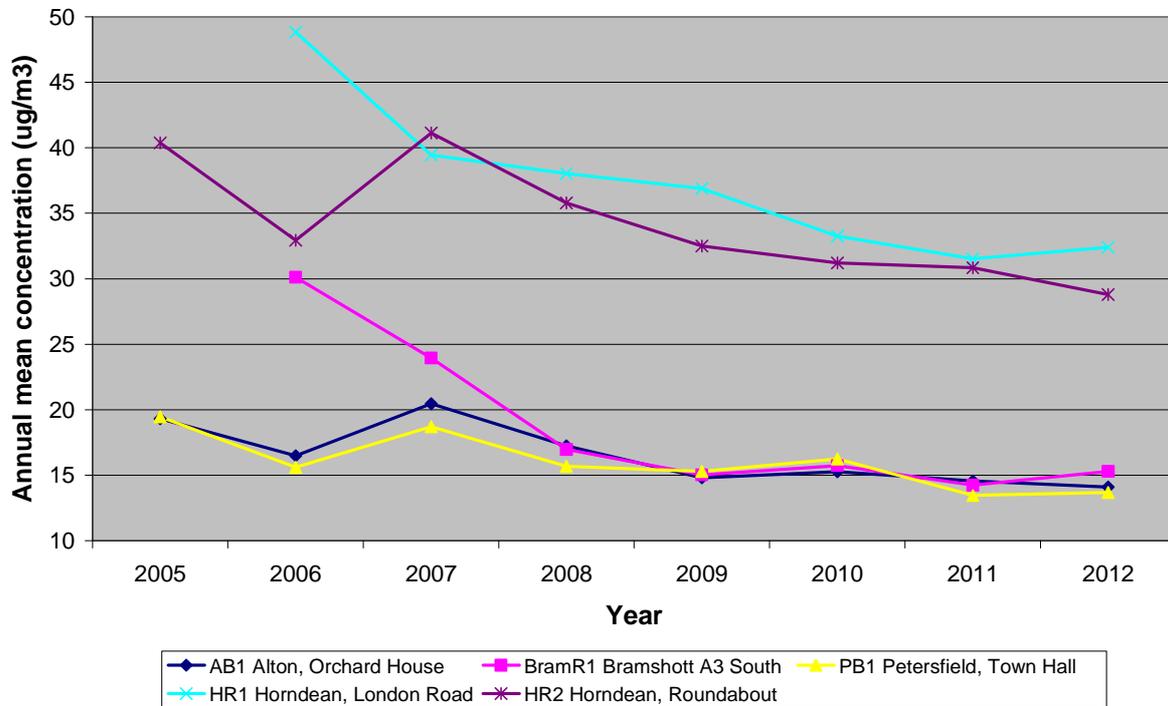


Figure 2.3 shows annual nitrogen dioxide levels at various sites in East Hampshire, excluding Bordon, which is covered in the next chart. Figure 2.3 suggests that levels of nitrogen dioxide have generally decreased across East Hampshire over the last eight years, although the rate of decline has slowed in more recent years.

Tube BramR1 (Bramshott A3 South) is located in the vicinity of the alterations to the A3 and construction of the Hindhead tunnel. Results for tube BramR1 show that concentrations of nitrogen dioxide significantly reduced after the construction of the Hindhead tunnel began in 2007. The Hindhead tunnel opened in summer 2011. Monitoring continued at this location after the tunnel opened and the new A3 layout came into use. This has shown that nitrogen dioxide concentrations have remained low. This is considered to be due to the increase in distance between relevant public exposure and the road and the erection of large acoustic fences along the edge of the highway.

Nitrogen dioxide diffusion tube data in Bordon, Hampshire

Table 2.6 shows measured annual mean concentrations of nitrogen dioxide at sites in Bordon. Previously there were concerns about nitrogen dioxide levels being above the air quality objective of 40 µg/m³ at:

- BR4 - Corals (1) Chalet Hill; and
- BR5 - High Street (1).

However, neither of these tubes are representative of relevant public exposure. They are located at ground floor level outside commercial premises. The closest relevant public exposures are residential premises located at first floor height. Tube BR4 is attached to a lamp post in front of a commercial façade and BR5 is located on rain water goods in front of a

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commercial façade. The Corals building is one of the tallest buildings in this area and is three storeys high. The majority of the other buildings in this commercial parade are two storeys high.

Tubes BR4 and BR7 (Corals (1) and (2) Chalet Hill) are located in the AQMA which was declared in Bordon in July 2010. The AQMA includes the residential properties above Corals, High Street, Bordon.

Figure 2.4 Photographs of BR4 Corals (1) (lower tube) and BR7 Corals (2) (higher tube)



Red dots mark position of diffusion tubes

Nitrogen Dioxide levels, for all locations in Bordon, were below the air quality objective of $40 \mu\text{g}/\text{m}^3$ and the decline is considered to be due partly to traffic changes resulting from the opening of the Hindhead Tunnel.

It should be noted that tube BR7 is located a small distance away from the façade of the first floor flat it is adjacent to. It is likely that concentrations at the relevant receptor are lower than the measured value.

Figure 2.5 shows a decreasing trend in concentrations of nitrogen dioxide in Bordon, similar to that observed elsewhere in East Hampshire, as shown in Figure 2.3.

Monitoring at tubes BR7 (Corals (2) Chalet Hill), BR8 (High Street (2)) and BR10 (11 High Street (2)) which are located at first floor height began in January 2009. The survey at height commenced to address concerns that ground floor concentrations of nitrogen dioxide are not representative of higher floors.

The Further Assessment undertaken in 2012 indicated that nitrogen dioxide levels at relevant receptors in Bordon were unlikely to be above $40 \mu\text{g}/\text{m}^3$ and recommended revocation of the AQMA. The data from nitrogen dioxide monitoring in Bordon in 2012 provides further evidence of declining nitrogen dioxide levels in the area and supports the decision to revoke the AQMA.

Figure 2.5 Trends in Annual Mean Nitrogen Dioxide Concentration Measured using Diffusion Tubes in Bordon

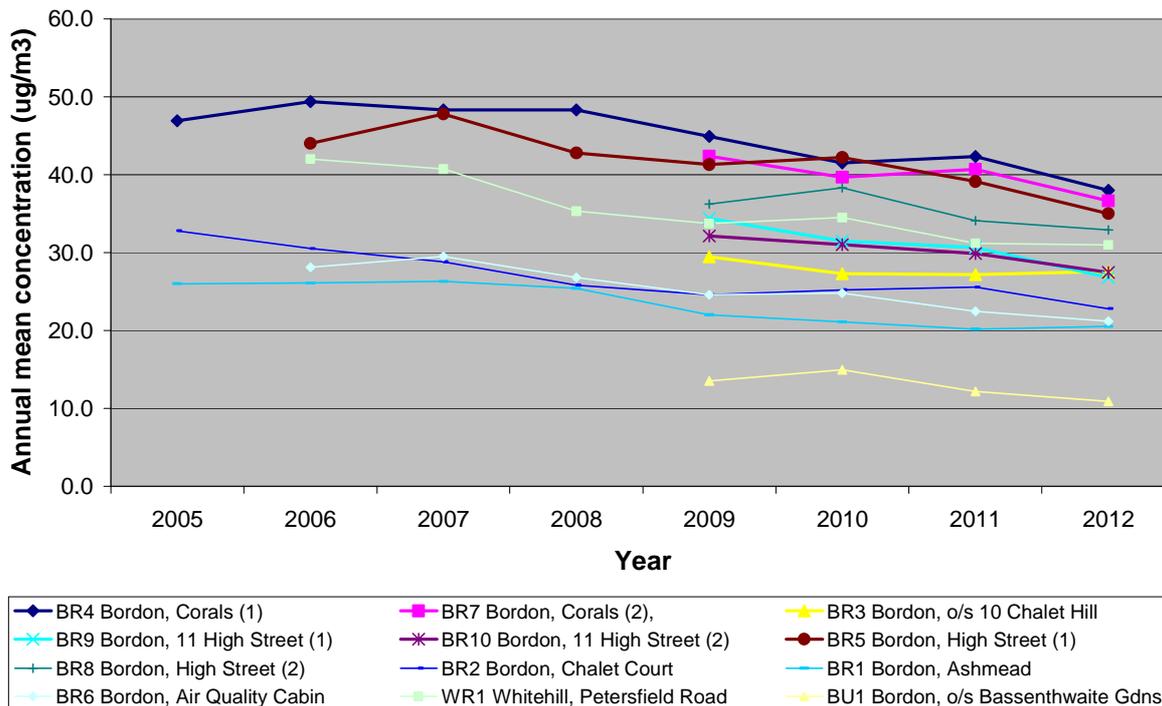


Table 2.6 Summary of results of 2012 diffusion tube survey at height, Bordon

Site ID	Site name	Height of tube from ground (m)	Annual mean concentrations (µg/m ³)	Reduction in concentration
BR4	Corals (1) Chalet Hill	2.56	38	Increase in height of 0.75m achieves reduction in concentration of 1.4 µg/m³
BR7	Corals (2) Chalet Hill	3.31	36.6	
BR5	High Street (1)	2.26	35	Increase in height of 0.91m achieves reduction in concentration of 2.1 µg/m³
BR8	High Street (2)	3.17	32.9	
BR9	11 High Street (1)	2.6	26.8	Increase in height of 0.65m sees increase in concentration of 0.7 µg/m³
BR10	11 High Street (2)	3.25	27.5	

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Monitoring continues at all positions discussed above and results will be reviewed on an annual basis.

Further information on the bias adjustment factors used in this report is provided in Appendix 3.

2.2.2 Other pollutants monitored

No monitoring of PM₁₀, carbon monoxide, benzene, 1,3-butadiene, lead or sulphur dioxide is currently undertaken by East Hampshire District Council.

2.2.3 Summary of Compliance with Air Quality Strategy Objectives

East Hampshire District Council has examined the results from monitoring in East Hampshire. Concentrations are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

3.1 Road Traffic Sources

There have been no new road traffic sources in East Hampshire since the 2012 Update and Screening Assessment.

3.2 Other Transport Sources

There have been no new transport sources in East Hampshire since the 2012 Update and Screening Assessment.

3.3 Industrial Sources

There have been no new or newly identified industrial sources since the 2012 Update and Screening Assessment. The permit application for a spray painting/wax coating installation at Maltby's Engineering in Alton was not determined and is likely to be refused. If this application proceeds the implications for air quality management will be reviewed in a future report.

3.4 Commercial and Domestic Sources

There have been no new or newly identified commercial or domestic sources since the 2012 Update and Screening Assessment. The 2012 Update and Screening Assessment identified a proposed biomass boiler to be installed as part of the redevelopment of the Bordon Fire Station. This did not proceed and gas boilers were installed.

3.5 New Developments with Fugitive or Uncontrolled Sources

There have been no new or newly identified developments with fugitive or uncontrolled sources since the 2012 Update and Screening Assessment.

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

East Hampshire District Council confirms that all the following have been considered:

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

4 Planning Applications

The land-use planning system is recognised to play an integral part in improving air quality. No planning applications were approved during 2012 which were considered to have the potential to impact local air quality.

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

No exceedances of the national air quality objectives have been identified at any locations within the district, including within the, now revoked, Air Quality Management Area.

5.2 Conclusions relating to New Local Developments

No new local development has been identified that requires more detailed consideration. If a revised application for an Environmental Permit is submitted for a spray painting/wax coating installation at Maltby's Engineering in Alton, this will be considered in a future report.

5.3 Proposed Actions

New monitoring data has not identified the need to proceed to a Detailed Assessment for any pollutant.

Monitoring data has also not identified the need for additional monitoring or changes to the existing monitoring. The results of the diffusion tube monitoring at the junction of the A325 High Street with Chalet Hill indicate that monitoring in this area should continue as concentrations of nitrogen dioxide remain close to the annual air quality objective of 40 $\mu\text{g}/\text{m}^3$, but 2012 data supported the decision to revoke the AQMA

Proposed further action:

- 1) East Hampshire District Council will submit a further Progress Report by the end of April 2014 in accordance with the national timetable.

6 References

- 1 Alan Baxter (2010). Whitehill Bordon Transport Strategy Prepared for EHDC March 2012: http://issuu.com/easthampshire/docs/transport_strategy_low_resolution
- 2 East Hampshire District Council. (2000). First Stage Air Quality Review & Assessment. East Hampshire District Council
- 3 East Hampshire District Council (2003). Updating and Screening Assessment of Air Quality in East Hampshire. East Hampshire District Council
- 4 East Hampshire District Council (2004). Air Quality Progress Report for East Hampshire. East Hampshire District Council
- 5 Casella Stanger (2005). East Hampshire District Council Local Air Quality Management – Detailed Assessment Report. Casella Stanger
- 6 East Hampshire District Council (2006) 2006 Updating Screening and Assessment of Air Quality in East Hampshire. East Hampshire District Council
- 7 East Hampshire District Council (2009). 2008 Detailed Assessment of Nitrogen Dioxide for East Hampshire including 2008 Progress Report. East Hampshire District Council
- 8 East Hampshire District Council (2009). 2009 Updating Screening and Assessment of Air Quality in East Hampshire. East Hampshire District Council
- 9 East Hampshire District Council (2009). Air quality update: Shortened detailed assessment of nitrogen dioxide in Bordon, Hampshire
- 10 East Hampshire District Council (2010). 2010 Air Quality Progress Report for East Hampshire. East Hampshire District Council
- 11 East Hampshire District Council (2011). 2011 Air Quality Progress Report for East Hampshire. East Hampshire District Council
- 12 East Hampshire District Council (2012). 2012 Updating Screening and Assessment of Air Quality in East Hampshire. East Hampshire District Council
- 13 East Hampshire District Council (2012). 2012 Further Assessment of Air Quality in Bordon AQMA – Air Quality Consultants
- 14 DEFRA (2009) Local Air Quality Management LAQM.TG(09). Department for Environment, Food and Rural Affairs
- 15 AEA Energy & Environment (2011) AEA_DifTPAB_V04.xls Checking Precision and Accuracy of Triplicate Tubes. AEA
- 16 Air Quality Review & Assessment Helpdesk (2013) Spreadsheet of Bias Adjustment Factors (v.03/13). Accessed 09/04/2013 at: http://laqm.defra.gov.uk/documents/Database_Diffusion_Tube_Bias_Factors-v03_13-Final.xls
- 17 AEA (2012) WASP – Annual Performance Criteria for NO₂ Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards, and Summary of Laboratory Performance in Rounds 112-119.

Appendices

Appendix 1: Map of East Hampshire

Appendix 2: Plan showing boundary of the Bordon AQMA, and revocation order

Appendix 3: QA/QC Data (including bias adjustment factors and short-term to long-term data adjustment).

Appendix 4: Maps showing the location of nitrogen dioxide diffusion tubes in East Hampshire

Appendix 5: Full Raw Dataset for Diffusion Tubes 2012 (monthly)

Appendix 6: Precision and Accuracy of Triplicate Tubes

Appendix 7: 2012 Diffusion Tube Data with Local and National Bias Adjustment Factors Applied

Appendix 1: Map of East Hampshire



Appendix 2: AQMA no 1 Bordon: Plan showing boundary and Revocation Order





Environment Act 1995 Part IV Section 83(2)(b)

East Hampshire District Council

ORDER REVOKING AN AIR QUALITY MANAGEMENT AREA

East Hampshire District Council in exercise of the powers conferred upon it by Section 83(2)(b) of the Environment Act 1995 hereby makes the following Order:

1. This Order shall revoke the area known as the East Hampshire **Air Quality Management Area No 1** for nitrogen dioxide as shown on the attached map.
2. This Order shall come into force on 27th February 2013.

Dated the 27th February 2013

The **COMMON SEAL** of EAST HAMPSHIRE DISTRICT COUNCIL
was hereunto affixed in the presence of:-

Solicitor to the Council



218335

Appendix 3: QA/QC Data

Diffusion Tube Bias Adjustment Factors

The diffusion tubes used by East Hampshire District Council are supplied and analysed by Gradko International Ltd and prepared by using 50% v/v TEA in acetone methodology. Gradko International Ltd is a UKAS accredited laboratory.

The bias adjustment factor for 2012 available from the R&A Helpdesk Database (version 03/13)¹⁴ at the time of writing this report was 1.01. This was based on 18 studies.

Factor from Local Co-location Studies

East Hampshire District Council carries out its own investigation of diffusion tube accuracy each year by carrying out a co-location study of nitrogen dioxide at the Bordon air quality station. The local bias adjustment factor is calculated using the spreadsheet available on the LAQM website at <http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html>¹³. The precision and accuracy of the co-located tubes is also calculated. For 2012 the spreadsheet provided a bias adjustment factor of 0.94 with a 95% confidence interval and this was used to adjust the annual means of single tubes.

A copy of the spreadsheet used can be seen in Appendix 6.

Annual means for each site can be seen in Table 2.4 of the report.

Discussion of Choice of Factor to Use

For 2012 both local and national bias adjustment factors are available. The locally obtained bias adjustment factor has been applied to the 2012 data as the co-location study was conducted at a site typical of all of the tubes' positions.

In the review of diffusion tube data for 2012 both bias adjustment factors have been considered because it is recognised that the application of the national bias factor results in higher final annual mean concentrations.

A summary of the annual mean concentrations of nitrogen dioxide for 2012 with the different bias adjustment factors applied to them is provided in Appendix 7.

QA/QC of automatic monitoring

The Bordon air quality station is serviced every 6 months by SupportingU. QA/QC audits are also carried by Ricardo-AEA through its calibration club. These audits involve checking the analyser linearity, NO_x converter efficiency and comparing the site cylinders with audit cylinders. Ricardo-AEA follow procedures adopted within the quality programme of the UK national Automatic Urban and Rural Monitoring Network (AURN).

The analysers were also checked and calibrated using gases by the Council every 2 weeks in accordance with the Council's written procedure and the results are recorded in the site log.

Using the spreadsheet available on the LAQM website at <http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html>¹³ automatic monitoring was found to show overall good precision. This spreadsheet can be seen in Appendix 6.

East Hampshire District Council

QA/QC of diffusion tube monitoring

The most recent summary of laboratories' performance in the Workplace Analysis Scheme for Proficiency (WASP)¹⁵ prepared by HSL for BV/NPL on behalf of Defra and the Devolved Administrations published in December 2012 shows that Gradko continues to demonstrate good performance in the analysis of NO₂ diffusion tubes. Gradko follows the procedures set out in the Practical Guidance document.

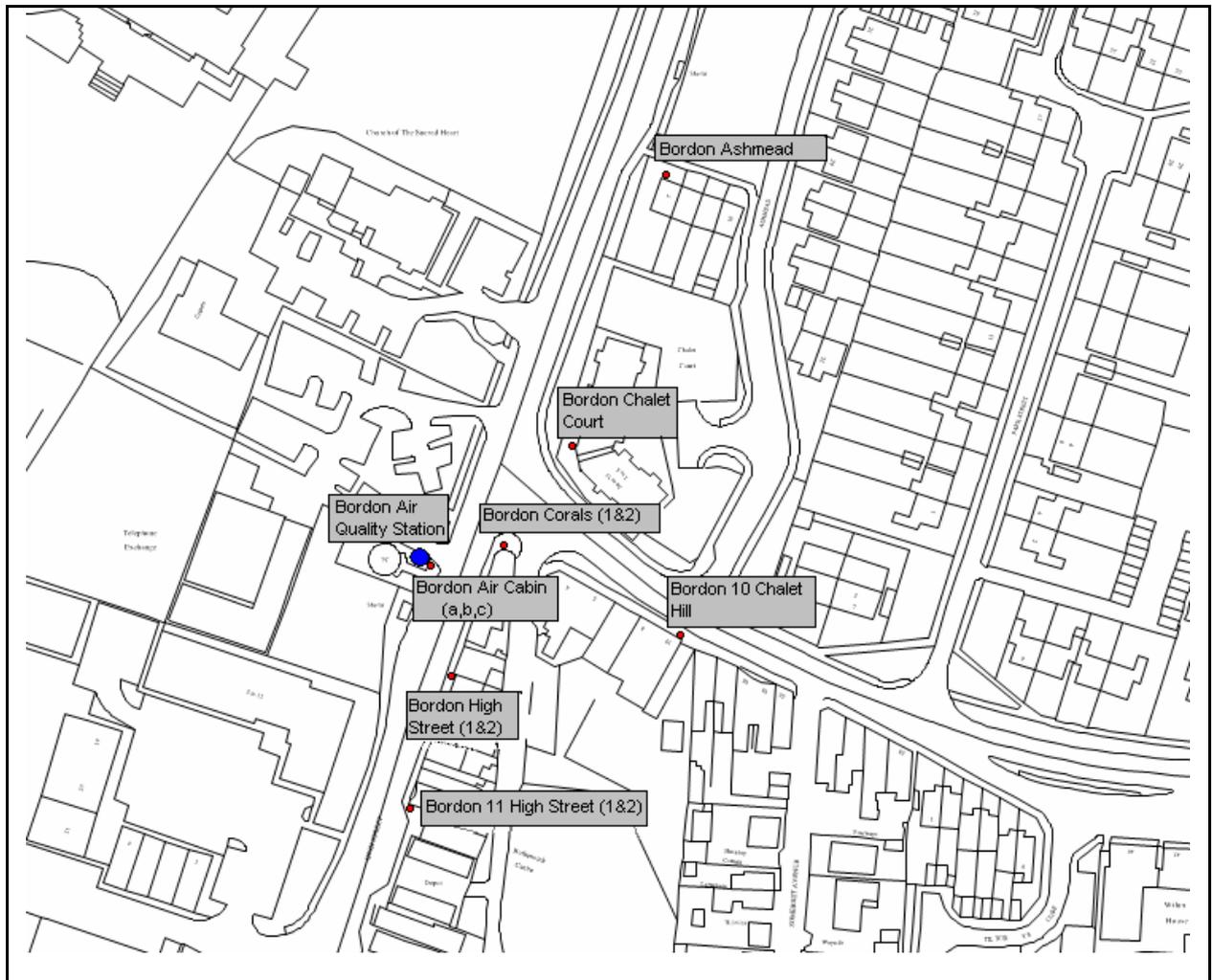
East Hampshire District Council has compared the diffusion tubes with the reference method in a co-location study. Using the spreadsheet available on the LAQM website at <http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html> diffusion tube monitoring was found to show overall good precision during 2012. This spreadsheet can be seen in Appendix 6.

Appendix 4: Maps showing the location of nitrogen dioxide diffusion tubes in East Hampshire

Alton, Orchard House



Bordon, A325/Chalet Hill



Whitehill, Petersfield Road



PB1 – Petersfield, Town Hall



Bramshott Chase



HR4 - Horndean, 24 London Road



Appendix 5: Full Raw Dataset for Diffusion Tubes 2012 (monthly)

Tube information		Monthly mean (ug/m3)											
Site ref	Site	January	February	March	April	May	June	July	August	September	October	November	December
AB1	Alton, Orchard House	20.6	22.09	19.98	10.57	11.61	7.97	9.98	9.99	13.86	16.64	17.17	19.44
BR4	Bordon, o/s Corals (1), Chalet Hill	44.59	46.09	44.51	35.7	34.51	33.73	33.73	40.32	39.55	45.99	47.37	38.66
BR7	Bordon, o/s Corals (2), Chalet Hill	47.43	46.23	43.02	31.97	39.09	37.1	36.51	44.22	19.31	42.45	43.01	37.5
BR1	Bordon, Ashmead	31.98	28.96	29.52	18.99	15.59	12.21	14.72	16.04	18.86	25.16	24.8	24.92
BR2	Bordon, Chalet Court	27.48	31.84	29.63	20.18	23.55	20.12	18.79	19.97	21.98	27.28	27.72	22.8
BR3	Bordon, o/s 10 Chalet Hill	39.83	34.43	39.13	24.1	25.31	21.02	21.4	22.86	29.77	32.19	32.53	29.42
BR5	Bordon, High Street (1)		40.04	46.31	35.31	45.04	33.2	23.83	33.4	31.58	44.73	43.62	32.09
BR8	Bordon, High Street (2)	34.69		42.57	35.98	35.98	28.44	31.33	36.57	29.36	37.5	40.42	32.44
BR6	Bordon, Air Quality Cabin (1)	26.12		28.36	17.24	20.61	20.78	17.69	23.05	16.94	26.28	28.3	23.1
BR6	Bordon, Air Quality Cabin (2)	26.03		29.05	16.31	22.55	18.49	16.4	23.11	17.14	29.35	28.3	24.26
BR6	Bordon, Air Quality Cabin (3)	23.29		28.15	17.28	22.47	17.61	17.98	21.58	16.9	29.71	27.64	21.03
BR9	Bordon, 11 High Street (1)			33.46	22.52	22.01	25.97	24.91	30.51	26.6	31.87	38.04	28.93
BR10	Bordon, 11 High Street (2)	33.72		33.99	24.63	23.09	26.5	23.98	30.73	26.36	31.27	37.58	29.66
BU1	Bordon, o/s Bassenthwaite Gdns	12.42		18.3	9.31	9.86	8.58	6.82	8.84	8.99	14.65	16.47	13.04
WR1	Whitehill, Petersfield Road	41.96		40.09	23.21	33.65	23.5	26.8	29.98	30.56	38.83	41.08	32.81
BramR1	Bramshott A3 South, Chase Villas	20.32		20.99	19.09	15.19	12.07	10.79	11.15	13.99	19.67	16.43	19.04
PB1	Petersfield, Town Hall	20.98		20.45	15.27	11.8	8.14	9.39	10.82	12.17	15.89	18.16	17.4
HR1	Hordean, London Road	42.31		43.38	28.21	29.07	23.26	28.89	30.38	32.81	37.64	43.31	39.8
HR2	Hordean, Roundabout	23.44		40.12		31.16		23.08	26.41	30.07	28.94	36.47	36.26
HR4	Hordean, 24 London Road	38.04		36.11	21.68	26.44	17.81	23.6	25.58	28.06	36.33	38.98	33.86

Appendix 6: Precision and Accuracy of Triplicate Tubes

Checking Precision and Accuracy of Triplicate Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	04/01/2011	31/01/2012	26.1	26.0	23.3	25	1.6	6	4.0
2	31/01/2012	29/02/2012							
3	29/02/2012	28/03/2012	28.4	29.1	28.2	29	0.5	2	1.2
4	28/03/2012	25/04/2012	17.2	16.3	17.3	17	0.5	3	1.4
5	25/04/2012	30/05/2012	20.6	22.6	22.5	22	1.1	5	2.7
6	30/05/2012	27/06/2012	20.8	18.5	17.6	19	1.6	9	4.1
7	27/06/2012	01/08/2012	17.7	16.4	18.0	17	0.8	5	2.1
8	01/08/2012	29/08/2012	23.1	23.1	21.6	23	0.9	4	2.2
9	29/08/2012	26/09/2012	16.9	17.1	16.9	17	0.1	1	0.3
10	26/09/2012	30/10/2012	26.3	29.4	29.7	28	1.9	7	4.7
11	30/10/2012	28/11/2012	28.3	28.3	27.6	28	0.4	1	0.9
12	28/11/2012	02/01/2013	23.1	24.3	21.0	23	1.6	7	4.1
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
21.9	93	Good	Good
27.1	99.9		Good
30.8	99.6	Good	Good
20.6	99	Good	Good
23	99.6	Good	Good
15	99.9	Good	Good
15	99.9	Good	Good
16	99.6	Good	Good
15	99.4	Good	Good
23	99.9	Good	Good
29.7	99.9	Good	Good
23.2	99.8	Good	Good

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

Overall survey -->

Good precision **Good Overall DC**

Site Name/ ID: **Bordon**

Precision **11 out of 11 periods have a CV smaller than 20%**

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%

Bias calculated using 11 periods of data
Bias factor A: 0.94 (0.84 - 1.06)
Bias B: 6% (-6% - 18%)

Diffusion Tubes Mean: 23 μgm^{-3}
Mean CV (Precision): 5

Automatic Mean: 21 μgm^{-3}
Data Capture for periods used: 99%

Adjusted Tubes Mean: 21 (19 - 24) μgm^{-3}

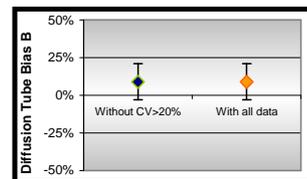
Accuracy (with 95% confidence interval)
WITH ALL DATA

Bias calculated using 11 periods of data
Bias factor A: 0.94 (0.84 - 1.06)
Bias B: 6% (-6% - 18%)

Diffusion Tubes Mean: 23 μgm^{-3}
Mean CV (Precision): 5

Automatic Mean: 21 μgm^{-3}
Data Capture for periods used: 99%

Adjusted Tubes Mean: 21 (19 - 24) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI of mean
1	04/01/2011	31/01/2012	26.1	26.0	23.3	25.1	1.61	6.40	4.00
2	31/01/2012	29/02/2012							
3	29/02/2012	28/03/2012	28.4	29.1	28.2	28.5	0.47	1.65	1.17
4	28/03/2012	25/04/2012	17.2	16.3	17.3	16.9	0.55	3.24	1.36
5	25/04/2012	30/05/2012	20.6	22.6	22.5	21.9	1.10	5.02	2.73
6	30/05/2012	27/06/2012	20.8	18.5	17.6	19.0	1.64	8.63	4.07
7	27/06/2012	01/08/2012	17.7	16.4	18.0	17.4	0.84	4.85	2.09
8	01/08/2012	29/08/2012	23.1	23.1	21.6	22.6	0.87	3.84	2.15
9	29/08/2012	26/09/2012	16.9	17.1	16.9	17.0	0.13	0.76	0.32
10	26/09/2012	30/10/2012	26.3	29.4	29.7	28.4	1.89	6.63	4.68
11	30/10/2012	28/11/2012	28.3	28.3	27.6	28.1	0.38	1.36	0.95
12	28/11/2012	02/01/2013	23.1	24.3	21.0	22.8	1.64	7.18	4.06
13									

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

Site Name/ ID: **Bordon**

Jaume Targa, for AEA
Version 04 - February 2011

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 99%
Bias factor A: 0.94 (0.84 - 1.06)
Bias B: 6% (-6% - 18%)

Information about tubes to be adjusted
Diffusion Tube average: 23 μgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 21 +/- 2 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 99%
Bias factor A: 0.94 (0.84 - 1.06)
Bias B: 6% (-6% - 18%)

Information about tubes to be adjusted
Diffusion Tube average: 23 μgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 21 +/- 2 μgm^{-3}

Appendix 7: 2012 Diffusion Tube Data with Local and National Bias Adjustment Factors Applied

Site ID	Site name	Annual mean concentrations of nitrogen dioxide 2012		
		Raw data	Corrected using local bias adjustment factor 0.94	Corrected using national bias adjustment factor 1.01
AB1	Alton, Orchard House	15.0	14.1	15.14
BR4	Bordon, o/s Corals (1), Chalet Hill	40.4	38.0	40.80
BR7	Bordon, o/s Corals (2), Chalet Hill	39.0	36.6	39.38
BR1	Bordon, Ashmead	21.8	20.5	22.03
BR2	Bordon, Chalet Court	24.3	22.8	24.52
BR3	Bordon, o/s 10 Chalet Hill	29.3	27.6	29.63
BR5	Bordon, High Street (1)	37.2	35.0	37.57
BR8	Bordon, High Street (2)	35.0	32.9	35.38
BR6	Bordon, Air Quality Cabin (1)	22.6	21.2	22.81
BR6	Bordon, Air Quality Cabin (2)	22.8	21.4	23.05
BR6	Bordon, Air Quality Cabin (3)	22.1	20.8	22.37
BR9	Bordon, 11 High Street (1)	28.5	26.8	28.77
BR10	Bordon, 11 High Street (2)	29.2	27.5	29.52
BU1	Bordon, o/s Bassenthwaite Gdns	11.6	10.9	11.69
WR1	Whitehill, Petersfield Road	33.0	31.0	33.28
BramR1	Bramshott A3 South, Chase Villas	16.2	15.3	16.41
PB1	Petersfield, Town Hall	14.6	13.7	14.73
HR1	Horndean, London Road	34.5	32.4	34.80
HR2	Horndean, Roundabout	30.7	28.8	30.97
HR4	Horndean, 24 London Road	29.7	27.9	29.98