



2009 Air Quality Updating and Screening Assessment for East Hampshire

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

April 2009

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Executive Summary

This is the fourth review and assessment of air quality carried out by East Hampshire District Council. The assessment is undertaken in two stages. The first stage is to carry out an Updating and Screening Assessment. Where a significant risk of exceeding the air quality objective is identified for a pollutant, we move to the second stage which is to carry out a Detailed Assessment. Progress Reports are required in all years when the authority is not completing an Updating and Screening Assessment.

This report contains the 2009 Updating and Screening Assessment for East Hampshire. The assessment has been carried out in accordance with the Government's published guidance.

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 Updating and Screening Assessment shows that the air quality objectives included in the Air Quality Regulations are likely to be achieved for all pollutants with the exception of nitrogen dioxide.

For nitrogen dioxide, the results from diffusion tube monitoring in Bordon show that the 2005 annual mean objective for nitrogen dioxide may be exceeded along the A325/Chalet Hill, Bordon at the following monitoring locations:

- Bordon, Corals (1) Chalet Hill
- Bordon, High Street (1)

These locations are not considered representative of relevant public exposure so additional monitoring tubes have been placed at a higher level which is closer to the facades of the nearest relevant exposure at first floor level. The results of the survey, which began in January 2009, will be reported to DEFRA at the end of August 2009 in a shortened Detailed Assessment. In addition to the new results, a review of data for previous years will also be submitted. This course of action was agreed with DEFRA in February 2009.

Should exceedences of the annual mean NO₂ objective be found to exist at the new high level monitoring positions, East Hampshire District Council will consider declaring an air quality management area.

Table of contents

1	Introduction	4
1.1	Description of Local Authority Area	4
1.2	Purpose of Report	4
1.3	Air Quality Objectives	4
1.4	Summary of Previous Review and Assessments	6
2	New Monitoring Data	6
2.1	Summary of Monitoring Undertaken	9
2.2	Comparison of Monitoring Results with AQ Objectives	12
3	Road Traffic Sources	17
3.1	Narrow congested streets with residential properties close to the kerb	17
3.2	Busy streets where people may spend 1-hour or more close to traffic	17
3.3	Roads with high flow of buses and/or HGVs.	17
3.4	Junctions and busy roads	17
3.5	New roads constructed or proposed since the last round of review and assessment	17
3.6	All roads with significantly changed traffic flows.	18
3.7	Bus and coach stations	18
4	Other Transport Sources	19
4.1	Airports	19
4.2	Railways (diesel and steam trains)	19
4.3	Ports (shipping)	19
5	Industrial Sources	20
5.1	New or Proposed Industrial Installations	20
5.2	Major fuel (petrol) storage depots	20
5.3	Petrol stations	21
5.4	Poultry farms	21
6	Commercial and Domestic Sources	22
6.1	Biomass combustion – Individual Installations	22
6.2	Biomass combustion – Combined Impacts	22
6.3	Domestic Solid-Fuel Burning	23
7	Fugitive or Uncontrolled Sources	24
8	Conclusions and Proposed Actions	25
8.1	Conclusions from New Monitoring Data	25
8.2	Conclusions from Assessment of Sources	25
8.3	Proposed Actions	25
9	References	26

Appendices

Appendix 1	Map of East Hampshire
Appendix 2	QA/QC data
Appendix 3	Maps showing the location of nitrogen dioxide diffusion tubes in East Hampshire
Appendix 4	Summary of review of diffusion tube monitoring positions May 2008
Appendix 5	Precision and accuracy sheet and single tube adjustment sheet
Appendix 6	Diffusion tube data for 2008
Appendix 7	Photos of new monitoring positions
Appendix 8	List of Industrial Installations

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 110,000 people. It is renowned for its attractive countryside, much of which is of an exceptionally high quality. Approximately 40% of the District lies within the East Hampshire Area of Outstanding Natural Beauty.

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 buoyant local economy. There is 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 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.

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).

East Hampshire District Council

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
	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

The First Review and Assessment of Air Quality

East Hampshire District Council completed the first review and assessment of air quality in December 2000¹. This assessment concluded that the air quality objectives contained in the Air Quality Regulations 1997 would be achieved throughout the District.

The Second Review and Assessment of Air Quality

East Hampshire District Council completed the second review and assessment of air quality in July 2005. This comprised of the following elements:

- Updating and Screening Assessment – August 2003²
- Progress Report – September 2004³
- Detailed Assessment – July 2005⁴

The Council carried out the Updating and Screening Assessment of air quality in August 2003. The results of this assessment showed that no pollutants were expected to exceed the air quality objectives and therefore there was no requirement to proceed to a Detailed Assessment. However the assessment highlighted several areas which the Council needed to investigate further. These included:

- Monitoring of nitrogen dioxide levels adjacent to the A3 Bramshott Chase
- Monitoring PM₁₀ at the Bordon Sandpit in Sleaford
- Discussion with the Mid Hants Watercross Line regarding public exposure to sulphur dioxide.

In 2004 the Council produced a Progress Report which investigated the issues raised in the 2003 Updating and Screening Assessment. The report also provided the latest nitrogen dioxide and PM₁₀ monitoring results from the air quality monitoring station at Horndean and from the nitrogen dioxide diffusion tube monitoring carried out across the District.

The results from the air quality monitoring station showed that the nitrogen dioxide and PM₁₀ concentrations were likely to meet the air quality objectives in 2004/05. The diffusion tube monitoring showed possible exceedences of the annual mean concentration of nitrogen dioxide in 2005 at the A3 Bramshott Chase and A325 Chalet Hill, Bordon. This meant that a Detailed Assessment of nitrogen dioxide was required for these locations.

In 2005 the Council commissioned Casella Stanger to undertake a Detailed Assessment of air quality adjacent to the A3 Bramshott Chase and A325 Chalet Hill, Bordon. Using dispersion modelling, it was predicted that the annual mean nitrogen dioxide concentrations would be below the annual mean objective and the EU limit value in all years at Bordon and Bramshott Chase. However, monitoring along the A3 at Bramshott Chase suggested a potential exceedence of the annual mean objective for nitrogen dioxide. Casella Stanger recommended that the air quality monitoring was continued in order to provide an annual average estimate for 2005. No AQMA was required at this time.

This Detailed Assessment was based on a worst case scenario as it ignored the Highways Agency's future development of a tunnel at Hindhead in Surrey which will improve traffic flow along the A3.

The Third Review and Assessment of Air Quality

East Hampshire District Council completed the third review and assessment of air quality in April 2009. This comprised of the following elements:

- Updating and Screening Assessment – June 2006⁵
- Detailed Assessment – August 2008⁶
- Progress Report – April 2009⁷

The Council carried out the Updating and Screening Assessment of air quality in June 2006. For nitrogen dioxide, the results from diffusion tube monitoring highlighted that the 2005 and 2010 annual mean objective for nitrogen dioxide may be exceeded at several monitoring locations in the District including:

East Hampshire District Council

- A3 Bramshott/Grayshott
- A3 Horndean/ Portsmouth Rd
- A325 Bordon

This meant that a Detailed Assessment of nitrogen dioxide was required for these locations.

In 2007 the Council experienced a significant turnover of staff within the Environmental Protection team including the loss of the air quality officer. This resulted in some loss of continuity with the review and assessment process and a loss of expertise in air quality.

At the end of 2007 the Council commissioned Faber Maunsell to undertake a Detailed Assessment of air quality adjacent to the A325 Bordon and A3 Horndean/Portsmouth Rd, but not the A3 Bramshott/Grayshott.

The reasons for excluding the A3 Bramshott/Grayshott relate to the construction of the A3 Hindhead tunnel, a major project being carried out by the Highways Agency to deliver quicker and more reliable journeys on a safer road between London and Portsmouth.

The majority of the tunnel construction work is located outside of East Hampshire within Waverley Borough Council's area. An Environmental Assessment of this scheme carried out for the Highways Agency in 2004 predicted that the alterations to the A3 will result in improvements to air quality within East Hampshire District Council's area⁸. The development was predicted to result in a lower exposure of traffic pollutants at residential properties at Bramshott Chase due to the realignment of the A3. Predictions demonstrated that annual mean nitrogen dioxide concentrations at locations with relevant public exposure will remain below the annual mean objective when the road works have been completed⁸. With this in mind the Council concluded to continue monitoring nitrogen dioxide in this area, but to not proceed to a Detailed Assessment at this time.

Further reasons why a Detailed Assessment of the A3 Bramshott/Grayshott was not carried out include:

- a. Conditions in Bramshott Chase are currently temporary and so monitoring results will only present a transient set of circumstances during the construction phase for the new A3.
- b. The current phase of the construction project has temporarily relocated the A3 at greater distance from the receptors that were of concern in the 2006 USA.
- c. Not all monitoring locations reported in the 2006 USA are at representative locations (i.e. residential facades), but either on commercial sites or much closer to the roadway than the nearest relevant exposure.
- d. The road works within East Hampshire are expected to be completed in December 2010 with the tunnel due to open mid 2011.
- e. The new road will be located at greater distance from existing sensitive receptors.

Using the AAQuIRE regional air quality dispersion model and reviewing monitoring data, the 2008 Detailed Assessment concluded that no Air Quality Management Area was required at either the A325/Bordon or A3 Horndean/Portsmouth Rd. The report predicted that the annual mean nitrogen dioxide concentrations would be below the annual mean objective and the EU limit value in all years at all locations.

The 2008 Detailed Assessment was submitted to DEFRA for consultation in August 2008. Further information was submitted to DEFRA in October 2008 to address issues that had been identified during the appraisal process which included the proposal to submit a Progress Report as an appendix in the delayed Detailed Assessment.

In February 2009 after further communication with DEFRA regarding levels of nitrogen dioxide along the A325/Bordon the following course of action was agreed:

- To submit the 2009 USA by the end of April 2009 in accordance with the national timetable.
- To submit a shortened Detailed Assessment for the A325/Bordon at the end of August 2009 that focuses on monitoring results only and takes into account new monitoring sites located at high level. The shortened Detailed Assessment is to be based upon the latest adjustment figures present at the time the data is analysed, but will not feature any modelling. Previous years' data will also be revisited taking into account the most recent bias adjustment factors available. This will give the Council sufficient data to determine whether an Air Quality Management Area is justified.

- To make amendments to the 2008 Detailed Assessment detailed in the Council's letter to DEFRA dated 27/10/08 including a forward setting out that the report is the work of EHDC, that the latest bias adjustment data suggests that the results in the report may be optimistic and the agreed undertaking to review the position during 2009.

Previous report	Date produced	Brief outcome
LAQM Review & Assessment Report	December 2000	Air quality objectives achieved
Updating and Screening Assessment	August 2003	Air quality objectives achieved, but identified that several areas require further investigation.
Progress Report	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	July 2005	Air quality objectives achieved
Updating and Screening Assessment	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	August 2008	Predicted that 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 are currently being made as agreed with DEFRA. EHDC to review to review the position during 2009.
Progress Report (due 2008)	May 2009	DEFRA agreed that this is to be submitted as an Appendix to the 2008 Detailed Assessment

2 New Monitoring Data

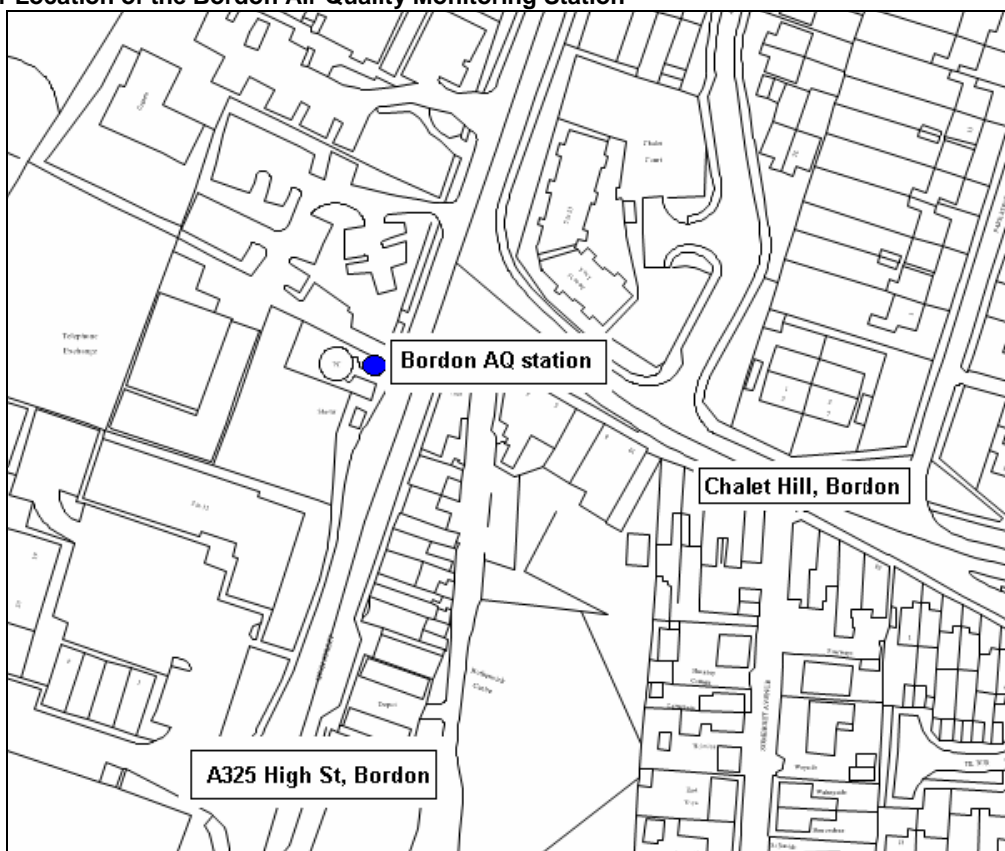
2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

East Hampshire District Council currently operates one continuous air quality monitoring station which monitors nitrogen dioxide and PM10 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 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 2.1.1 below. The station is not part of the national monitoring network.

Figure 2.1.1 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 Casella ETi. QA/QC audits are also carried by AEA through its calibration club. These audits involve checking the analyser linearity, NO_x converter efficiency and comparing the site cylinders with audit cylinders. AEA follow procedures adopted within the quality programme of the UK national Automatic Urban and Rural Monitoring Network (AURN).

The analysers are 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.

PM₁₀ levels are measured at the Bordon station using a R&P TEOM analyser. Technical Guidance LAQM TG(09)¹⁰ advises that the TEOM failed the detailed equivalence test when compared with the European reference sampler. TEOM analysers remain suitable for use for the purpose of LAQM, but TG(09) recommends that the data collected should be adjusted using the Kings College Volatile Correction Model (VCM) rather than the use of a simple 1.3 multiplication factor which was previously used and

recommended in Technical Guidance LAQM (03)⁹. The VCM has been used to correct the TEOM data provided in section 2.2.2.

All monitoring data collected by East Hampshire District Council provided in report has been ratified.

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location ?
Bordon	Urban background	479646, 135341	NO ₂ PM ₁₀	No	No	4m	N

The data from the station is collected via a GSM modem. Data management is carried out by Casella ETi who screen and validate the raw data and provide the Council with written reports of the results on a quarterly basis.

2.1.2 Non-Automatic Monitoring

Nitrogen dioxide is also measured in East Hampshire using diffusion tubes. The tubes 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. Further details on the QA/QC of the diffusion tubes can be seen in Appendix 2. Appendix 2 also discusses the bias adjustment factor used in this report. Maps showing the locations of the diffusion tube monitoring sites can be seen in Appendix 3.

East Hampshire District Council

Table 2.2 Details of Non- Automatic Monitoring Sites – Nitrogen dioxide

Site Name	Site Type ^a	OS Grid Ref	In AQMA	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location
Alton, Orchard House	UB	472109, 139487	No	Yes	N/A	No
Bordon, Corals (1) Chalet Hill	RS	479666, 135354	No	No Relevant exposure at 1 st /2 nd level	2.9	Yes
Bordon, Ashmead	RS	479707, 135438	No	Yes	8	No
Bordon, Chalet Court	RS	479695, 135356	No	Yes	6	No
Bordon, 10 Chalet Hill	RS	479711, 135321	No	No	2.4	Yes
Bordon, High Street (1)	RS	479654, 135312	No	No Relevant exposure at 1 st floor level	1.9	Yes
Bordon, Air Quality Cabin (3 tubes co-located)	RS	479646, 135341	No	No Representative of relevant exposure	4.3	No
Bordon, Bassenthwaite Gdns ^c	UB	479795, 136267	No	Yes	N/A	No
Whitehill, Petersfield Rd	RS	479314, 134307	No	No Residential façade is approx 18m from road	1	Yes
Bramshott, A3 South, Chase Villas	RS	487134, 133881	No	Yes	10	Yes
Petersfield, Town Hall	UB	474989, 123241	No	No	N/A	N/A
Petersfield, Lavant Court ^c	RS	474389, 123518	No	No Residential façade approx 3m away	3.6	Yes
Horndean, London Rd	RS	470554, 113582	No	Yes	1.9	Yes
Horndean, Roundabout	RS	470676, 113174	No	No	1.9	Yes
Horndean, Catherington Lane ^c	RS	469766, 112636	No	Yes	3	No

Table 2.2 continued

Site Name	Site Type	OS Grid Ref	In AQMA	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location
Petersfield, Station Rd ^b	RS	474451, 123592	No	No	2	No
Petersfield, The Causeway ^b	RS	474498, 122656	No	No	1	Yes
Grayshott, Crossways Rd, Kingswood ^b	RS	487183, 133944	No	No	4	Yes
Selborne, High St ^b	RS	474133, 133630	No	Yes	1	Yes
Liphook, Roundabout ^b	RS	483924, 131582	No	No	4	Yes
Bramshott, Mercedes Garage ^b	RS	487038, 133794	No	No	2	Yes
Horndean, Five Heads Road ^b	UB	470422, 113120	No	No	N/A	No

- a RS = roadside
UB = urban background
- b Monitoring at these locations ceased in May 2008 following a review of the diffusion tubes' locations. Tubes were removed from locations where concentrations of nitrogen dioxide consistently remained below the annual objective and/or where there was no relevant exposure. Further information on the review of monitoring locations that was carried out in May 2008 can be seen in Appendix 4. Results have been annualised using guidance in Box 3.2 of TG(09)¹⁰.
- c New monitoring position since July 2008. Results have been annualised using guidance in Box 3.2 of TG(09)¹⁰.

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 2008 falls below the air quality objective of 40 µg/m³ and there were no exceedances of the hourly mean objective of 200 µg/m³. This is shown in tables 2.3a and 2.3b.

East Hampshire District Council

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

Site ID	Within AQMA?	Proportion of year with valid data 2008 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)		
			2006	2007	2008
Bordon	N	98	27.8	30.8*	27.6

*Bordon station was switched off 25/05/07 – 11/10/07 due to the failure of the air conditioning unit. Data capture during this year was 58%

Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Within AQMA?	Data Capture 2008 %	Number of Exceedences of hourly mean ($200 \mu\text{g}/\text{m}^3$)		
			2006	2007 *	2008
Bordon	N	98	0	0 ($117 \mu\text{g}/\text{m}^3$)	0

*Bordon station was switched off 25/05/07 – 11/10/07 due to the failure of the air conditioning unit. Data capture during this year was 58%

(99.8th %ile of hourly means in brackets)

The results for 2007 are discussed in more detail in the 2008 Detailed Assessment⁶. The 99.8th percentile for 2007 was calculated for comparison against the hourly mean objective due to poor data capture. This was calculated using the guidance contained in paragraph A1.218, Annex 1 of TG(09)¹⁰.

Diffusion Tube Monitoring Data

Annual means of nitrogen dioxide measured using diffusion tubes are shown in table 2.4a. Where less than 9 months data was available for a monitoring location, the results have been annualised following the guidance contained in Box 3.2 of TG(09)¹⁰. Results in bold indicate an exceedence of the annual mean objective for nitrogen dioxide of $40 \mu\text{g}/\text{m}^3$. A full dataset showing monthly mean values is detailed in Appendix 6.

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.

Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Within AQMA?	Data Capture 2008 %	Annual mean concentrations	
			2008 ($\mu\text{g}/\text{m}^3$) Not adjusted for bias	2008 ($\mu\text{g}/\text{m}^3$) Adjusted for bias ^d
Alton, Orchard House	N	100	18	17
Bordon, Corals (1) Chalet Hill	N	100	51	48
Bordon, Ashmead	N	100	27	25
Bordon, Chalet Court	N	92	27	26

East Hampshire District Council

Site ID	Within AQMA?	Data Capture 2008 %	Annual mean concentrations	
			2008 ($\mu\text{g}/\text{m}^3$) Not adjusted for bias	2008 ($\mu\text{g}/\text{m}^3$) Adjusted for bias ^d
Bordon, 10 Chalet Hill	N	92	32	30
Bordon, High Street (1)	N	83	46	43
Bordon, Air Quality Cabin (1)	N	92	29	27
Bordon, Air Quality Cabin (2)	N	92	29	27
Bordon, Air Quality Cabin (2)	N	92	29	27
Bordon, Bassenthwaite Gdns	N	42 (83) ^a	15	15
Whitehill, Petersfield Rd	N	58	35	33
Bramshott, A3 South, Chase Villas	N	83	18	17
Petersfield, Town Hall	N	100	17	16
Petersfield, Lavant Court	N	58 (100) ^b	37	34
Horndean, London Rd	N	75	41	38
Horndean, Roundabout	N	75	38	36
Horndean, Catherington Lane	N	58 (100) ^b	25	24
Petersfield, Station Rd ^c	N	42 (100)	32	30
Petersfield, The Causeway ^c	N	42 (100)	24	23
Grayshott, Crossways Rd, Kingswood ^c	N	33 (80)	25	23
Selborne, High St ^c	N	42 (100)	24	22
Liphook, Roundabout ^c	N	42 (100)	32	30
Bramshott, Mercedes Garage ^c	N	25 (60)	34	32
Horndean, Five Heads Road ^c	N	42 (100)	23	22

East Hampshire District Council

- a - New monitoring position in July 2008. Data capture % of duration of survey in 2008 (6 months) given in brackets
- b - New monitoring positions in June 2008. Data capture of duration of survey in 2008 (7 months) given in brackets
- c - Monitoring at these locations ceased in May 2008. Data capture of duration of survey (5 months) given in brackets
- d – Bias adjusted using the locally derived factor of 0.94. Details of the bias adjustment factor chosen can be found in Appendix 2

The results above show exceedances of the 40 µg/m³ annual mean NO₂ objective at two locations: Bordon, Corals (1) Chalet Hill and Bordon, High Street (1). Both these locations are worse case, roadside locations with no relevant exposure at ground level. The monitoring results have not been obtained at representative locations. The diffusion tubes are located at ground floor where as Bordon, Corals (1) Chalet Hill has relevant exposure at first and second floor level and Bordon, High Street (1) has relevant exposure at first floor level. Modelling carried out as part of the 2008 Detailed Assessment suggested that levels of nitrogen dioxide fall below the annual mean objective in Bordon at relevant receptors.

East Hampshire District Council accepts that the concentrations of nitrogen dioxide in Bordon provided in the 2008 Detailed Assessment⁶ may have been optimistic. When the report was produced it was felt that data was not sufficiently robust to base the declaration of an air quality management area upon. In response to comments made by DEFRA¹¹ and to investigate whether an air quality management area may be required, additional diffusion tubes have been placed at a high level which is closer to relevant public exposure. An additional monitoring point has also been introduced at 11 High Street, Bordon. This survey commenced in January 2009.

The new tubes are being used in conjunction with the existing tubes to investigate the actual nitrogen dioxide concentrations at first floor level. Photographs showing the locations of the new tubes are shown in Appendix 7. It has been agreed with DEFRA that a shortened Detailed Assessment for Bordon will be submitted at the end of August 2009. This will detail the results for the new monitoring positions with a view to declaring an air quality management area should concentrations greater than the annual mean NO₂ objective exist. In addition to the new results, data for previous years will be reviewed and adjusted using the latest bias adjustment factors available.

With the exception of the tubes discussed above, measured annual mean concentrations of nitrogen dioxide fall below the air quality objective of 40 µg/m³.

2.2.2 PM₁₀

The Government and the Devolved Administrations have adopted two Air Quality Objectives for fine particles (PM₁₀), which are equivalent to the EU Stage 1 limit values in the first Air Quality Daughter Directive. The objectives are 40 µgm³ as the annual mean, and 50 µgm³ as the fixed 24-hour mean to be exceeded on no more than 35 days per year, to be achieved by the end of 2004.

The PM₁₀ concentrations provided in tables 2.5a and 2.5b have been corrected using the Volatile Correction Model (VCM) as recommended in TG(09)¹⁰. This correction is applied to correct TEOM measurements for the loss of volatile components of the particulate matter that occur due to the high sampling temperatures employed by this instrument. The corrected measurements are considered to provide a gravimetric-equivalent result and the monitoring position is considered representative of the nearest relevant exposure which are the residential dwellings above the shops on the High Street.

Locally measured PM₁₀ levels were corrected using data from the three nearest AURN FDMS instruments located at:

- Chichester Roadside
- Tower Hamlets 4 – Blackwall
- Bexley 7 – Thames Road North

The monitoring results for these stations have not been ratified for the full year 2008.

Table 2.5a Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Within AQMA?	Data Capture 2008 %	Annual mean concentrations (µg/m ³) 2008
Bordon air quality station	N	97	19.9

Table 2.5b Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Within AQMA?	Data Capture 2008 %	Number of Exceedences of 24hr mean (50 µg/m ³) 2008
Bordon air quality station	N	97	5

The results show that the annual mean concentration of PM₁₀ in 2008 was less than the annual mean objective of 40 µg/m³ and there were less than 35, 24-hour exceedences of 50µg/m³.

3 Road Traffic Sources

TG(09)¹⁰ requires the focus for road traffic sources to be on relevant locations close to busy roads, especially in congested areas and near to junctions where emissions will be higher, and in built up areas where the road is canyon like with buildings on either side of the road which restricts the dispersion and dilution of emissions.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

East Hampshire 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

East Hampshire 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.

East Hampshire District Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

East Hampshire District Council confirms that there are no new/newly identified busy junctions/busy roads.

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

Since the 2006 USA construction work has commenced on the Hindhead Tunnel project which intends to upgrade the last single carriageway section of the A3 London to Portsmouth road to dual carriageway. The majority of the tunnel construction work is located outside of East Hampshire within Waverley Borough Council's area.

An Environmental Assessment of this scheme was carried out for the Highways Agency in 2004⁸. The assessment predicted that the alterations to the A3 will result in improvements to air quality within East Hampshire District Council's area. The development was predicted to result in a lower exposure of traffic

pollutants at residential properties at Bramshott Chase as the realignment of the A3 means that residential properties will be located further away from the road. Predictions demonstrated that annual mean nitrogen dioxide concentrations will fall below the annual mean objective when the road works have been completed.

The road works within East Hampshire are expected to be completed in December 2010 with the tunnel due to open early in 2011.

For the purposes of this USA, East Hampshire District Council concludes that it will not be necessary to proceed to Detailed Assessment at this stage, however it continues to monitor concentrations of nitrogen dioxide in this area at a location with relevant exposure so this conclusion can be reviewed on a regular basis. This conclusion is based on the findings of the Highway Agency's Environmental Assessment.

3.6 Roads with Significantly Changed Traffic Flows

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

3.7 Bus and Coach Stations

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

4 Other Transport Sources

4.1 Airports

There are no commercial passenger or freight airports in, or adjacent to East Hampshire predicted to have a total equivalent passenger throughput in 2008 of more than 10 million passengers per year. There are no existing background concentrations above 25 µg^m³ in East Hampshire.

There is one airfield located in East Hampshire known as Lasham Airfield which is owned by Lasham Gliding Society.

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

4.2 Railways (Diesel and Steam Trains)

The main train operator within East Hampshire is South West Trains (SWT) which serves Bentley, Alton, Liphook, Liss and Petersfield railway stations. Following previous consultation with SWT⁵ it has been established that the passenger trains using these lines are electric, however, there will be occasional use of diesel trains associated with track engineering works, the Holybourne Oil terminal (operated by English, Welsh & Scottish Railways) and trains on excursions from the Mid Hants Watercress Line.

There have been no changes to the above transport sources since the 2006 USA.

4.2.1 Stationary Trains

East Hampshire 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

East Hampshire 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)

East Hampshire District Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

Industrial sources are unlikely to make a significant local contribution to annual mean concentrations, but could be significant in terms of the short-term objectives.

A list of all industrial installations in East Hampshire can be seen in Appendix 8.

Approaches 1 to 3 in Section C.1 of Box 5.5 in TG(09)¹⁰ have been followed in carrying out this assessment.

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

There are no new or proposed installations within East Hampshire where an air quality assessment has been carried out, therefore:

East Hampshire 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

East Hampshire 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

There has been one new industrial installation in East Hampshire since the previous round of review and assessment; a Part B industrial process involving the batching of concrete and the bulk storage and handling of cement operated by KRM Concrete Ltd. The installation is located away from relevant exposure on Waterside Industrial Estate, Alton. The nearest relevant exposure is over 300m away. It is considered unlikely to give rise to significant pollutant emissions.

East Hampshire District Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

5.2 Major Fuel (Petrol) Storage Depots

There are major fuel (petrol) storage depots within the Local Authority area, but these have been considered in previous reports.

5.3 Petrol Stations

TG(09)¹⁰ requires petrol stations to be considered for benzene emissions if the station has an annual petrol throughput greater than 2000m³ with a busy road nearby (i.e. more than 30,000 vehicles per day) and where members of the public might regularly be exposed within 10m of the pumps. Stations with Stage II recovery systems can be discounted.

The A3 and A3(M) are the only roads within the District where the daily traffic flow exceeds 30,000 vehicles per day. There are no petrol stations located either on or close to the A3 and A3(M) where members of the public might regularly be exposed within 10m of the pumps.

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

5.4 Poultry Farms

A small number of local authorities have identified potential exceedences of the PM₁₀ objectives associated with emissions from poultry farms. TG(09)¹⁰ requires poultry farms to be considered for PM₁₀ emissions if they house in excess of:

- 400,000 birds if mechanically ventilated
- 200,000 birds if naturally ventilated; or
- 100,000 birds for any turkey unit

and there is relevant exposure within 100m of the poultry units.

There are two poultry farms within East Hampshire; Broxhead Farm Poultry Unit which is operated by Straight Poultry Farms Limited and Steep Marsh Farm which is operated by Humphrey Holdings Limited.

Broxhead Farm is located in Lindford, Bordon, has a stocking capacity of 170,000 birds and is mechanically ventilated.

Steep Marsh Farm is located in Steep Marsh, Petersfield, has a stocking capacity of 126,000 birds and is mechanically ventilated. Therefore;

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Biomass burning can lead to an increase in PM₁₀ emissions due to the process of combustion and aerosol formation from volatile materials distilled from the wood is also an issue. Compared to conventional gas-burning, biomass burning can also result in an increase in the overall NO_x emissions due to the fuel-derived portion that is not present in gas combustion. TG(09)¹⁰ requires individual plants burning biomass rated 50kW to 20MW to be considered by all local authorities. This is a new requirement since the last round of review and assessment.

There is one known biomass combustion plant within East Hampshire. A force fed wood dust burner is operated by Tectonics at unit 17/18 Caker Stream Road, Alton. The 300kW boiler is installed in a building 6m high. The stack is 14m with a stack diameter of 0.25m.

This combustion plant has been assessed in accordance with the requirements of Box 5.8 of TG(09)¹⁰.

The pollutant emission rates for the burner have been estimated from the factors for a wood pellet boiler given in Appendix 1 of Technical Guidance: Screening assessment for biomass boilers produced by AEA Energy & Environment Group¹⁵. These are 66g/GJ for PM₁₀ and 250g/GJ for oxides of nitrogen. The emission rates are then:

$$66 \times 300 \times 10^{-6} = 0.02 \text{ g/s for PM}_{10}, \text{ and}$$

$$150 \times 300 \times 10^{-6} = 0.045 \text{ g/s for NO}_x$$

Using the national 1km x 1km maps produced by UK National Air Quality Archive¹⁶, the background annual average nitrogen dioxide concentration for 2008 is 11µgm³. The background annual PM₁₀ concentration is 16µgm³. Table 6.1a shows the calculated background adjusted emission rates.

The effective stack height is 1.66 x (14-6) = 13m.

Using the nomographs in Figure 5.19 and Figure 5.20 of TG(09)¹⁰ the threshold emission rates for PM₁₀ and NO₂ for 13m effective stack height have been determined. This is shown in Table 6.1a.

Table 6.1a Background adjusted emission rates and threshold emission rates

	PM ₁₀	Annual mean NO ₂	Hourly mean NO ₂
Emission rate g/s	0.02	0.045	0.045
Background concentration µgm³	16	11	11
Background adjusted emission rate g/s	0.00125	0.00155	0.01011
Threshold emission rate, for 13m effective stack height g/s	0.007	0.02	0.08

In each case the background adjusted emission rate is less than the threshold emission rate and so a more detailed assessment is not required.

East Hampshire District Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

TG(09)¹⁰ has introduced a new requirement to assess the impact that many small biomass combustion installations located in close proximity could have. Whilst small biomass combustion installations, such as

East Hampshire District Council

those installed in domestic premises may be individually acceptable, in combination they could lead to unacceptably high PM₁₀ concentrations.

There is no data for domestic biomass combustion installations available, but based on local knowledge it is unlikely that areas with a high density of houses and service sector biomass combustion appliances exist within the District that may give rise to unacceptably high PM₁₀ concentrations.

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

6.3 Domestic Solid-Fuel Burning

There is no data for domestic coal burning available, but based on local knowledge it is unlikely that there are more than 100 houses burning solid fuel as their primary source of heating within any 500m² area in the District.

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

7 Fugitive or Uncontrolled Sources

Dust emissions from a range of fugitive and uncontrolled sources can give rise to elevated PM₁₀. TG(09)¹⁰ requires locations that have not been covered by previous rounds of review and assessment, or where there is new relevant exposure to be included in this section.

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

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

Exceedences of the annual mean NO₂ objective have been identified at two locations in Bordon; at Corals (1) Chalet Hill and High Street (1). These locations are not considered representative of relevant public exposure so additional monitoring tubes have been placed at a higher level which is closer to the facades of the nearest relevant exposure at first floor level. The results of the survey, which began in January 2009, will be reported to DEFRA at the end of August 2009 in a shortened Detailed Assessment. In addition to the new results, a review of data for previous years will also be submitted.

Should exceedences of the annual mean NO₂ objective be found to exist at the new high level monitoring positions, East Hampshire District Council will consider declaring an air quality management area.

The results for the remainder of monitoring positions fall below the air quality objectives, therefore a Detailed Assessment for these locations is not currently required.

8.2 Conclusions from Assessment of Sources

The 2009 USA shows that local developments are unlikely to impact local air quality. The assessment of new or significantly changed sources has not identified any potential exceedences within East Hampshire.

8.3 Proposed Actions

Further information on air quality at Bordon A325/Chalet Hill will be submitted at the end of August 2009. The 2009 USA has not identified the need to proceed to a Detailed Assessment for any other pollutant.

Concentrations of NO₂ will continue to be monitored at Bramshott Chase during the construction of the A3 Hindhead Tunnel and will be reported again in the 2010 Progress Report.

9 References

- 1 East Hampshire District Council. (1999). First Stage Air Quality Review & Assessment. East Hampshire District Council
- 2 East Hampshire District Council (2003). Updating and Screening Assessment of Air Quality in East Hampshire. East Hampshire District Council
- 3 East Hampshire District Council (2004). Air Quality Progress Report for East Hampshire. East Hampshire District Council
- 4 Casella Stanger (2005). East Hampshire District Council Local Air Quality Management – Detailed Assessment Report. Casella Stanger
- 5 East Hampshire District Council (2006) Updating Screening and Assessment of Air Quality in East Hampshire. East Hampshire District Council
- 6 Faber Maunsell (2008). Detailed Assessment of Nitrogen Dioxide. Local Air Quality Management. Faber Maunsell
- 7 East Hampshire District Council (2009). Air Quality Progress Report for East Hampshire. East Hampshire District Council
- 8 Highways Agency (2004) A3 Hindhead Environmental Statement. Highways Agency
- 9 DEFRA. (2003). Local Air Quality Management LAQM.TG(03). Department for Environment, Food and Rural Affairs
- 10 DEFRA (2009) Local Air Quality Management LAQM.TG(09). Department for Environment, Food and Rural Affairs
- 11 DEFRA (2008) Review & Assessment Appraisal Report ref DA3-157. DEFRA
- 12 Highways Agency (2009) A3 Hindhead Improvement. Accessed on 27/04/09 available at <http://www.highways.gov.uk/roads/projects/3832.aspx>
- 13 Air Quality Review & Assessment Helpdesk (2009) Nitrogen Dioxide Diffusion Tube Bias Adjustment Factor Spreadsheet (v.03/09). Accessed on 27/04/09. Available at <http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusiontube310309.xls>
- 14 AEA Energy & Environment (2006) AEA_DifTPAB_V02.xls Bias adjustment factor spreadsheet. AEA
- 15 AEA Energy & Environment (2008) Technical guidance: Screening assessment for biomass boilers. AEA
- 16 UK National Air Quality Archive Website (2006) Estimated Background Air Pollution Maps for 2006 and Projections for Other Years. Available at: <http://www.airquality.co.uk/archive/laqm/tools.php?tool=background06>

Appendices

Appendix 1	Map of East Hampshire
Appendix 2	QA/QC data
Appendix 3	Maps showing the location of nitrogen dioxide diffusion tubes in East Hampshire
Appendix 4	Summary of review of diffusion tube monitoring positions May 2008
Appendix 5	Precision and accuracy sheet and single tube adjustment sheet
Appendix 6	Diffusion tube data for 2008
Appendix 7	Photos of new monitoring positions
Appendix 8	List of Industrial Installations

Appendix 1: Map of East Hampshire

Appendix 2: 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 2008 available from the R&A Helpdesk Database (version 03/09)¹³ at the time of writing this report was 0.93. This was based on 14 studies.

Factor from Local Co-location Study

East Hampshire District Council also carried out its own investigation of diffusion tube accuracy by carrying out a co-location study of nitrogen dioxide at the Bordon air quality station. The local bias adjustment factor was calculated using the spreadsheet available on the "LAQM tools" section of the Air Quality Archive at www.airquality.co.uk/archive/laqm/laqm.php¹⁴ the precision and accuracy of the co-located tubes was calculated. The spreadsheet provided the bias adjustment factor of 0.94 with a 95% confidence interval and was used to adjust the annual means of single tubes.

A copy of the spreadsheet used can be seen in Appendix 5. This spreadsheet does not detail the results for the diffusion tubes with less than 9 months data which were required to be annualised in accordance with Box 3.2 of TG(09)¹⁰.

Annual means and bias for each site can be seen in table 2.4a of the report.

Discussion of Choice of Factor to Use

For 2008 both local and national bias adjustment factors are available. For the 2009 USA the locally obtained bias adjustment factor has been applied as the co-location study was conducted at a site typical of all of the tubes' positions.

The impact of this choice is negligible as the national and local bias adjustment factors for 2008 are 0.93 and 0.94 respectively.

Data sets where less than 9 months data is available have been annualised using the guidance set out in Box 3.2 of TG(09)¹⁰ and bias adjusted using the local bias adjustment factor.

PM Monitoring Adjustment

TEOM data provided in this report has been corrected using the Kings College Volatile Correction Model as recommended in TG(09)¹⁰. This correction is applied to correct TEOM measurements for the loss of volatile components of the particulate matter that occur due to the high sampling temperatures employed by this instrument. The corrected measurements are considered to provide a gravimetric-equivalent result.

Short-term to Long-term Data adjustment

Where less than 9 months data was available for a monitoring location, the results have been annualised following the guidance contained in Box 3.2 of TG(09)¹⁰.

The long term sites chosen for the calculation were Reading New Town, Portsmouth and Bordon. An original choice of Oxford St Ebbs was rejected due to poor data capture. Bordon air quality station was included because its position is considered typical of the tubes' positions.

The start dates for the Period Means vary between different tubes.

Bassenthwaite Gardens

Long term site	Site Type	Annual Mean	Period Mean	Ratio
Portsmouth	Background	23.3	24.6	0.947
Reading	Background	22.1	23.0	0.961
Bordon	Roadside	27.6	29.0	0.952
			Average	0.953

Whitehill, Petersfield Road

Long term site	Site Type	Annual Mean	Period Mean	Ratio
Portsmouth	Background	23.3	25.4	0.917
Reading	Background	22.1	23.8	0.929
Bordon	Roadside	27.6	28.8	0.958
			Average	0.935

Petersfield, Lavant Court and Horndean, Catherington Lane

Long term site	Site Type	Annual Mean	Period Mean	Ratio
Portsmouth	Background	23.3	21.4	1.089
Reading	Background	22.1	20.1	1.100
Bordon	Roadside	27.6	25.7	1.074
			Average	1.087

Petersfield - Station Road, The Causeway, Selborne - High Street, Liphook Roundabout, Horndean - Five Heads Road

Long term site	Site Type	Annual Mean	Period Mean	Ratio
Portsmouth	Background	23.3	26	0.896
Reading	Background	22.1	25.0	0.884
Bordon	Roadside	27.6	30.2	0.914
			Average	0.898

Grayshott, Crossways Road, Kingswood

Long term site	Site Type	Annual Mean	Period Mean	Ratio
Portsmouth	Background	23.3	27.5	0.847
Reading	Background	22.1	25.7	0.860
Bordon	Roadside	27.6	28.2	0.979
			Average	0.895

Bramshott, Mercedes Garage

Long term site	Site Type	Annual Mean	Period Mean	Ratio
Portsmouth	Background	23.3	28.2	0.826
Reading	Background	22.1	27.4	0.807
Bordon	Roadside	27.6	34.8	0.793
			Average	0.809

QA/QC of automatic monitoring

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

East Hampshire District Council

The analysers are 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 tools" section of the Air Quality Archive at www.airquality.co.uk/archive/laqm/laqm.php automatic monitoring was found to show overall good precision. This spreadsheet can be seen in Appendix 5.

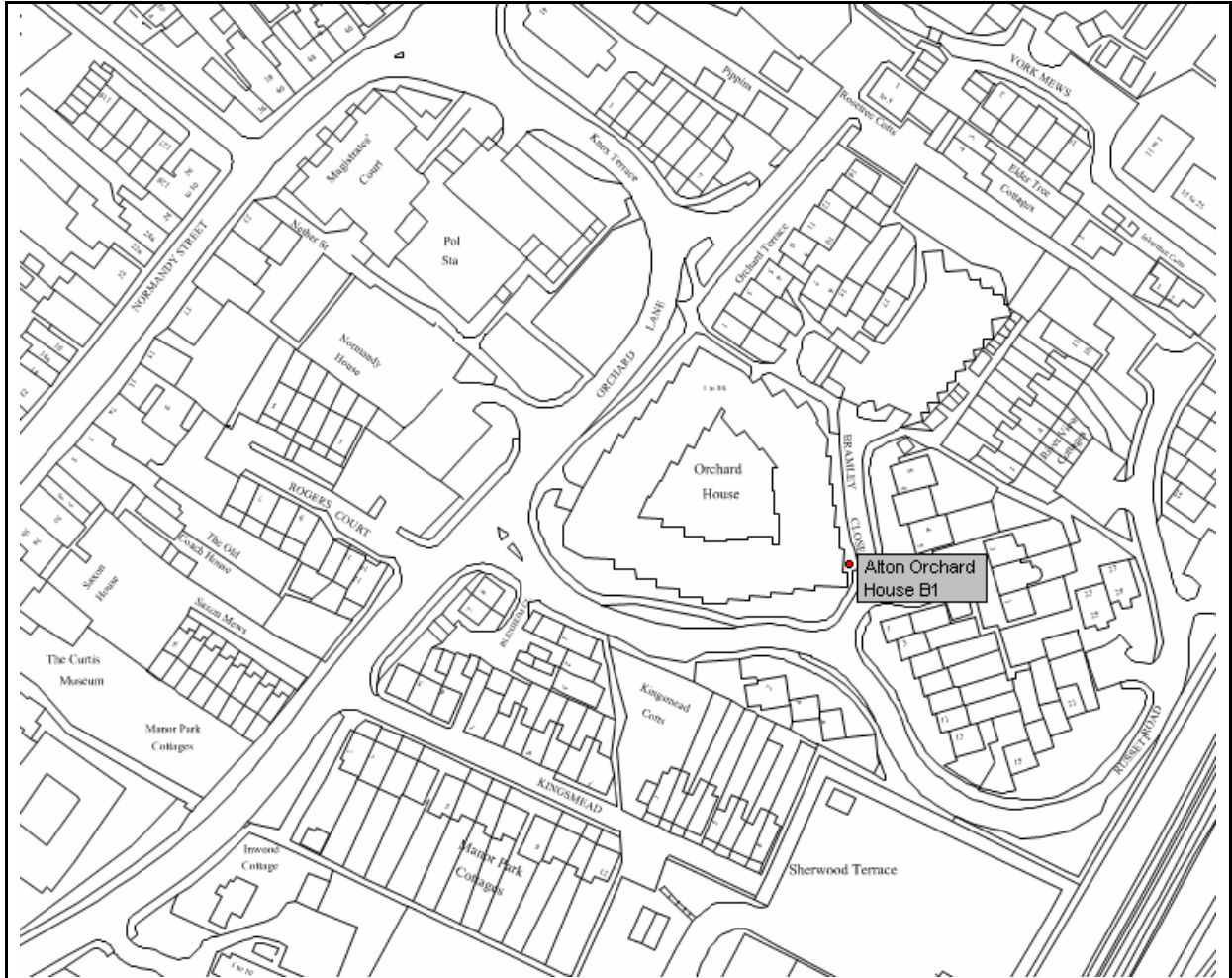
QA/QC of diffusion tube monitoring

The most recent summary of laboratories' performance in the Workplace Analysis Scheme for Proficiency (WASP) prepared by AEA on behalf of Defra and the Devolved Administrations published in February 2009 shows that Gradko have demonstrated good performance in the analysis of NO₂ diffusion tubes.

Using the spreadsheet available on the "LAQM tools" section of the Air Quality Archive at www.airquality.co.uk/archive/laqm/laqm.php diffusion tube monitoring was found to show overall good precision. This spreadsheet can be seen in Appendix 5.

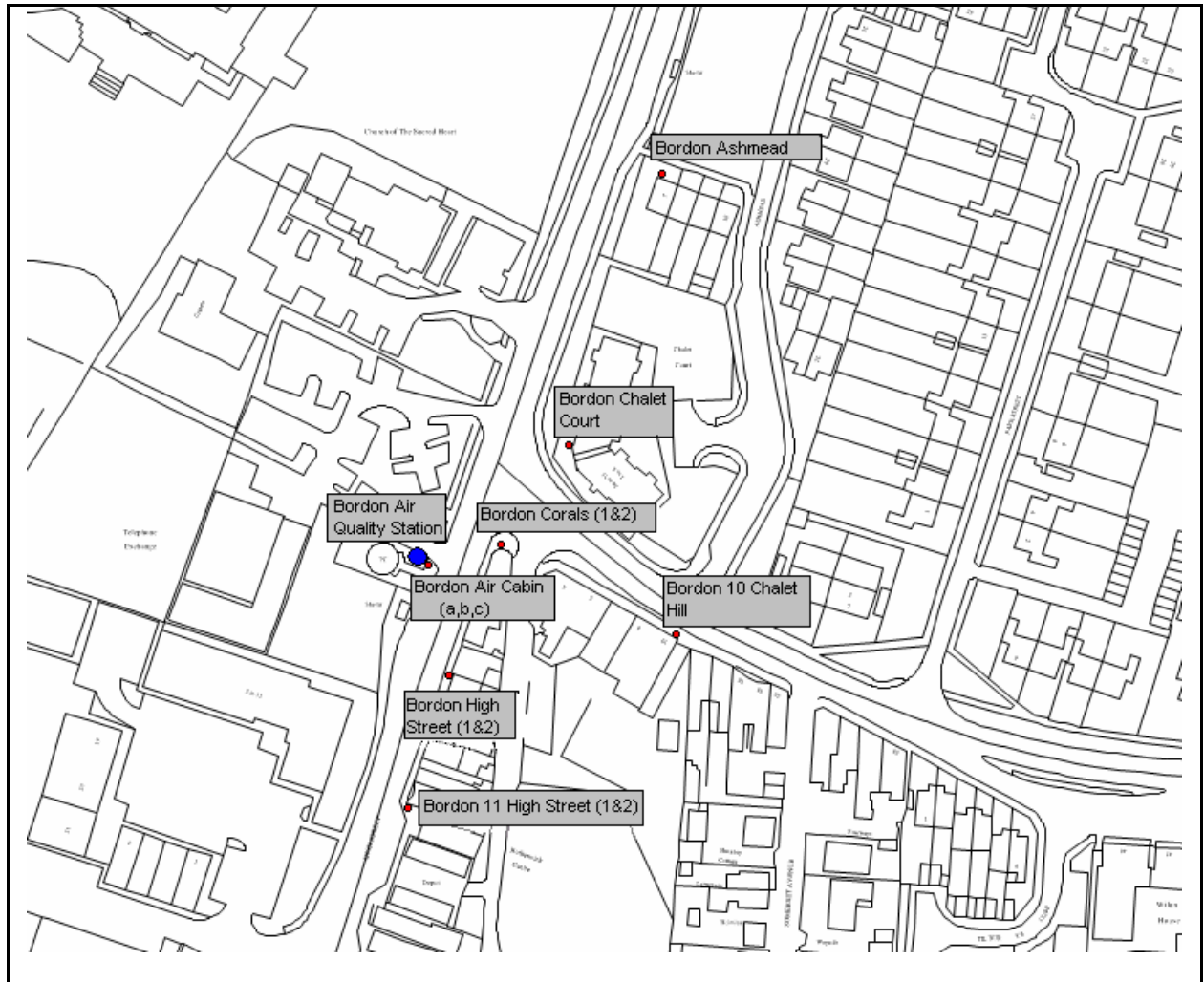
Appendix 3: Maps showing the location of nitrogen dioxide diffusion tubes in East Hampshire

Alton, Orchard House



East Hampshire District Council

Bordon, A325/Chalet Hill



East Hampshire District Council

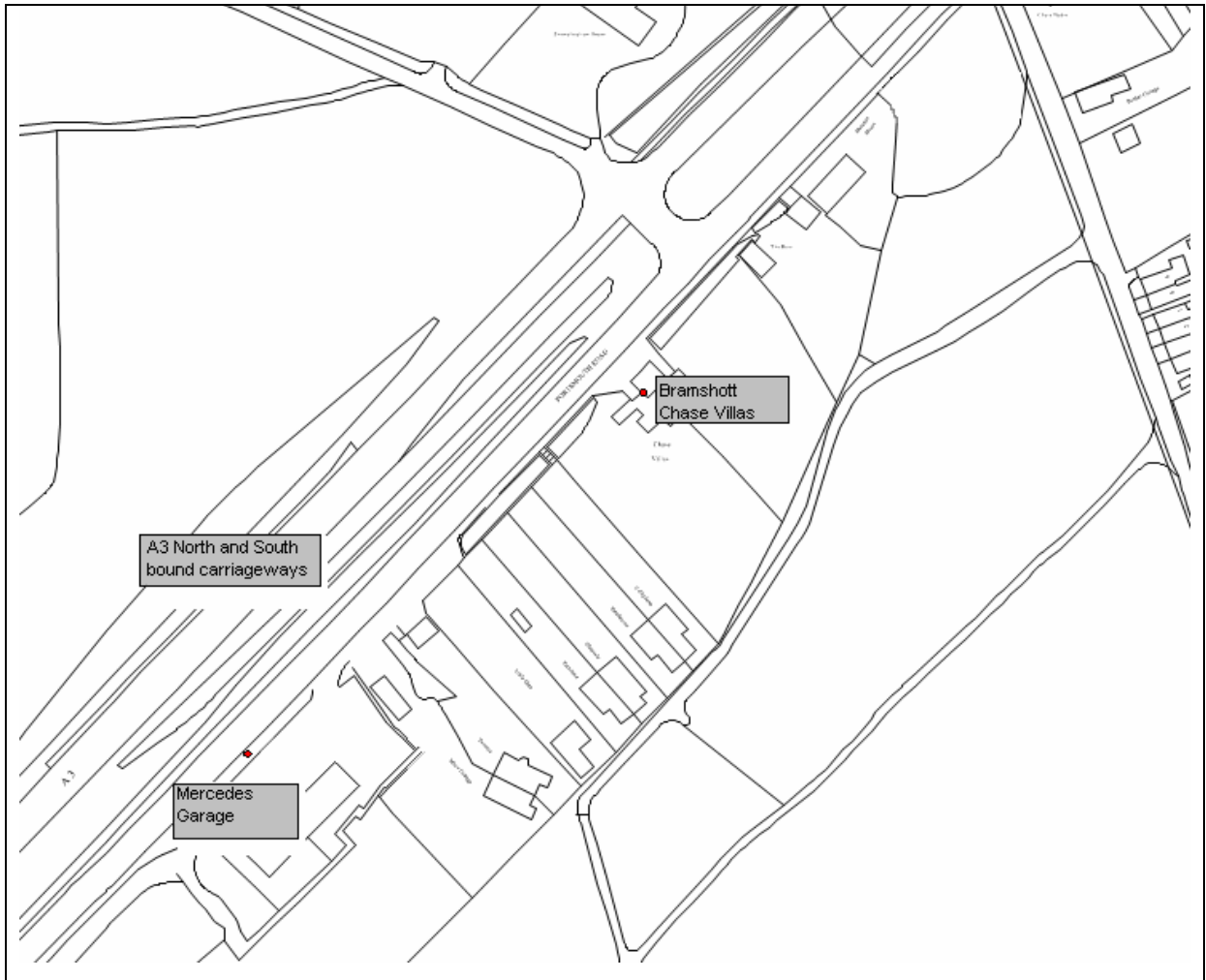
Whitehill, Petersfield Road



Petersfield



Bramshott Chase

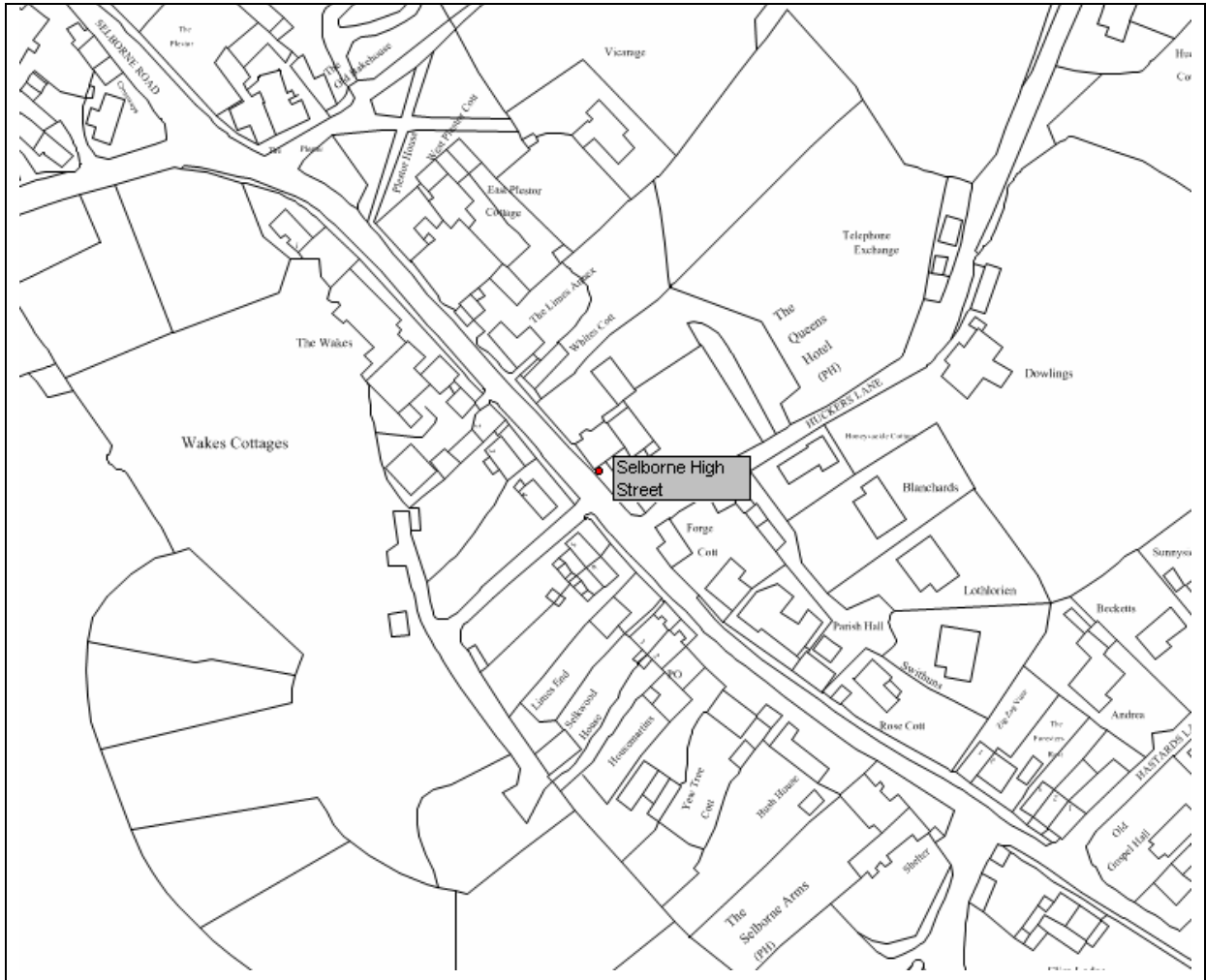


East Hampshire District Council

Liphook Roundabout



Selborne



East Hampshire District Council

Appendix 4: Summary of review of diffusion tube monitoring positions May 2008

Site name	Site classification	Action	Reason
Petersfield, Town Hall	Background	Keep	Historical data
Petersfield, Station Rd	Roadside	Move to other side of road?	Queuing traffic at railway crossing up to 4x hour. Busy junction. No relevant exposure. Move to other side of road, closer to queuing traffic and relevant exposure. New site called Lavant Court
Petersfield, The Causeway	Roadside	Remove	Below annual objective. Not relevant receptors.
Alton, Orchard House	Background	Keep	Below annual objective. Historical data
Horndean, Roundabout	Roadside	Keep	
Bordon, Ashmead	Roadside	Keep	
Bordon, High Street	Roadside	Keep	
Bordon, Chalet Court	Roadside	Keep	
Bordon, o/s Corals, Chalet Hill	Roadside	Keep	
Bordon, o/s 10 Chalet Hill	Roadside	Keep	
Whitehill, Petersfield Road	Roadside	Keep	
Liphook, Roundabout	Roadside	Remove	Monitored since 2000, in a worse case position, not near relevant receptor. Below objective
Bramshott, A3 South, Mercedes garage	Roadside	Remove	No relevant receptor
Bramshott A3 South, Chase Villas	Roadside	Keep	Relevant receptor and to investigate concentrations once tunnel works completed.
Grayshott, Crossways Road Kingswood	Roadside	Remove	Below annual objective
Selborne, High St	Roadside	Remove	Below annual objective
Horndean, London Road	Roadside	Keep	
Horndean, Five Heads Road	Background	Remove	Below annual objective
Bordon, Air Quality Cabin (1)	Roadside	Keep	
Bordon, Air Quality Cabin (2)	Roadside	Keep	
Bordon, Air Quality Cabin (3)	Roadside	Keep	

New monitoring positions			
32 Catherington Lane	Roadside	New	For information, noted queuing traffic here on a regular basis
Background Bordon	Background	New	For information

May 2008 GR

Appendix 5: Precision and accuracy sheet and single tube adjustment sheet

Checking Precision and Accuracy of Triplicate Tubes

Period	Diffusion Tubes Measurements						Automatic Method		Data Quality Check				
	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	01/01/2008	31/01/2008	26.2	23.7	29.0	26	2.6	10	6.6	23.8	99.9	Good	Good
2	01/02/2008	28/02/2008	35.5							42.4	99.4	Good	Good
3	01/03/2008	31/03/2008	20.4	20.2	21.3	21	0.6	3	1.5	18.5	99.2	Good	Good
4	01/04/2008	30/04/2008	27.4	27.0	28.5	28	0.8	3	1.9	28.2	99.7	Good	Good
5	01/05/2008	31/05/2008	41.5	44.3	40.9	42	1.8	4	4.4	38	100	Good	Good
6	01/06/2008	30/06/2008	25.2	26.1	24.2	25	1.0	4	2.4	21	77.1	Good	Good
7	01/07/2008	31/07/2008	21.1	22.0	22.5	22	0.7	3	1.7	20	99.5	Good	Good
8	01/08/2008	31/08/2008		21.5	20.0	21	1.1	5	9.8	14	100	Good	Good
9	01/09/2008	30/09/2008	27.3	34.0	28.2	30	3.6	12	8.9	29	99.6	Good	Good
10	01/10/2008	31/10/2008	27.1	28.8	27.2	28	1.0	4	2.5	28	99.9	Good	Good
11	01/11/2008	31/11/2008	31.1	29.8	30.1	30	0.7	2	1.7	30.6	100	Good	Good
12	01/12/2008	31/12/2008	34.2	35.6	39.0	36	2.5	7	6.2	37.6	99.3	Good	Good
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
----------------	--------

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

Bias calculated using 11 periods of data
Bias factor A 0.94 (0.86 - 1.03)
Bias B 7% (-2% - 16%)

Diffusion Tubes Mean: 28 μgm^{-3}
Mean CV (Precision): 5

Automatic Mean: 26 μgm^{-3}
Data Capture for periods used: 98%

Adjusted Tubes Mean: 26 (24 - 29) μgm^{-3}

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

Accuracy (with 95% confidence interval)
WITH ALL DATA

Bias calculated using 11 periods of data
Bias factor A 0.94 (0.86 - 1.03)
Bias B 7% (-2% - 16%)

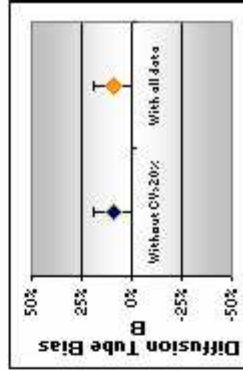
Diffusion Tubes Mean: 28 μgm^{-3}
Mean CV (Precision): 5

Automatic Mean: 26 μgm^{-3}
Data Capture for periods used: 98%

Adjusted Tubes Mean: 26 (24 - 29) μgm^{-3}

Overall survey -->

Good precision
(Check average CV & DC from Accuracy calculations)



Jaume Targa

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Version 03 - November 2006

Adjustment of DUPLICATE or TRIPLICATE Tubes



From the AEA group

Diffusion Tubes Measurements									
Point	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 mean
1	01/01/2008	31/01/2008	26.2	23.7	29.0	26.3	2.65	10.08	6.59
2	01/02/2008	28/02/2008	35.5						
3	01/03/2008	31/03/2008	20.4	20.2	21.3	20.6	0.59	2.84	1.46
4	01/04/2008	30/04/2008	27.4	27.0	28.5	27.6	0.78	2.81	1.93
5	01/05/2008	31/05/2008	41.5	44.3	40.9	42.2	1.81	4.30	4.51
6	01/06/2008	30/06/2008	25.2	26.1	24.2	25.2	0.95	3.78	2.36
7	01/07/2008	31/07/2008	22.1	22.0	22.5	22.2	0.26	1.19	0.66
8	01/08/2008	31/08/2008	21.5	21.5	20.0	20.8	1.06	5.11	9.53
9	01/09/2008	30/09/2008	27.3	34.0	28.2	29.8	3.64	12.19	9.03
10	01/10/2008	31/10/2008	27.1	28.8	27.2	27.7	0.95	3.44	2.37
11	01/11/2008	30/11/2008	31.1	29.8	30.1	30.3	0.68	2.24	1.69
12	01/12/2008	31/12/2008	34.2	35.6	39.0	36.3	2.47	6.81	6.13
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 air quality station

Jaume Targa

jaume.targa@aea.co.uk

Version: 03 - November 2006

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

Bias calculated using 11 periods of data
 Tube Precision: 5 Automatic DC: 98%
 Bias factor A: 0.94 (0.86 - 1.03)
 Bias B: 7% (-2% - 16%)

Information about tubes to be adjusted
 Diffusion Tube average: 28 μgm^{-3}
 Average Precision (CV): 5
 Adjusted Tube average: 26 +/- 2 μgm^{-3}

Adjusted measurement (95% confidence level)
 with all data

Bias calculated using 11 periods of data
 Tube Precision: 5 Automatic DC: 98%
 Bias factor A: 0.94 (0.86 - 1.03)
 Bias B: 7% (-2% - 16%)

Information about tubes to be adjusted
 Diffusion Tube average: 28 μgm^{-3}
 Average Precision (CV): 5
 Adjusted Tube average: 26 +/- 2 μgm^{-3}

Data Quality Check	
Diffusion Tubes Precision Check	Good
	Good
	Good
	Good
	Good
	Good
	Good
	Good
	Good
	Good
	Good
	Good
	Good
	Good

East Hampshire District Council

Appendix 6: Diffusion tube data for 2008

NO ₂ diffusion tube results 2008																			
Tube information					Monthly mean (ug/m ³)														
Site	OS grid reference	Tube height	Distance from kerb	Type	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Raw mean	Valid periods	Data capture (%)
Alton, Orchard House	472109, 139487	3	N/A	Urban background	18.9	26.6	15.9	18.3	16.8	13.4	11.8	13.3	17.4	17.2	21.3	29.1	18.3	12	100
Bordon, o/s Corals (1), Chalet Hill	479666, 135354	2.6	2.9	Roadside	62.4	51.9	47.5	44.3	46.2	50.1	43.8	45.2	69.4	49.6	50.8	55.6	51.4	12	100
Bordon, Ashmead	479707, 135438	2	8	Roadside	28.4	33.5	25.3	29.0	17.6	21.1	27.7	20.8	29.6	27.1	30.8	33.8	27.1	12	100
Bordon, Chalet Court	479695, 135356	1.5	6	Roadside	23.9		26.4	29.5	32.3	27.7	19.2	24.4	20.6	30.3	29.3	38.9	27.5	11	92
Bordon, o/s 10 Chalet Hill	479711, 135321	2	2.4	Roadside	28.8	41.5	34.0	34.4	31.1	29.8	24.4	24.6	32.1	31.5	36.0		31.7	11	92
Bordon, High Street (1)	479654, 135312	2.3	1.9	Roadside	36.9	50.6	35.6		62.6	49.0	41.2	36.7	52.5	44.3	45.8		45.5	10	83
Bordon, Air Quality Cabin (1)	479646, 135341	2	4.3	Roadside	26.2	35.5	20.4	27.4	41.5	25.2	22.1		27.3	27.1	31.1	34.2	28.9	11	92
Bordon, Air Quality Cabin (2)	479646, 135341	2	4.3	Roadside	23.7		20.2	27.0	44.3	26.1	22.0	21.5	34.0	28.8	29.8	35.6	28.4	11	92
Bordon, Air Quality Cabin (3)	479646, 135341	2	4.3	Roadside	29.0		21.3	28.5	40.9	24.2	22.5	20.0	28.2	27.2	30.1	39.0	28.3	11	92
Bordon, o/s Bassenthwaite Gdns	479795, 136267	1.8	N/A	Urban background							8.1		15.7	12.9	18.7	25.6	16.2	5	42
Whitehill, Petersfield Road	479314, 134307	2	1	Roadside		29.4					32.3	30.4	40.2	33.4	42.2	55.0	37.6	7	58

East Hampshire District Council

Bramshott A3 South, Chase Villas	487134, 133881	1	10	Roadside	17.7	23.8			15.8	15.4	9.6	11.8	17.1	14.8	25.4	29.4	18.1	10	83
Petersfield, Town Hall	474989, 123241	2	N/A	Roadside	5.9	28.3	15.2	16.6	17.0	13.8	11.0	11.3	18.4	17.3	21.2	24.5	16.7	12	100
Petersfield, Lavant Court	474389, 123518	2	3.6	Roadside						33.5	28.3	28.7	32.0	37.3	34.4	40.8	33.6	7	58
Horndean, London Road	470554, 113582	2	1.9	Roadside	45.3	40.9		39.6		38.3	30.5	34.3	42.8	42.3		50.3	40.5	9	75
Horndean, Roundabout	470676, 113174	1.5	1.9	Roadside	37.6	45.1	36.6	35.9	35.4		30.2			40.3	37.6	43.9	38.1	9	75
Horndean, Catherington Lane	469766, 112636	1.7	3	Roadside						22.1	17.9	15.2	23.4	24.7	24.6	33.1	23.0	7	58
Petersfield, Station Rd	474451, 123592	2	2	Roadside	31.4	41.2	29.1	33.9	43.7								35.9	5	42
Petersfield, The Causeway	474498, 122656	2	1	Roadside	22.5	33.1	25.4	29.9	24.7								27.1	5	42
Grayshott, Crossways Road Kingswood	487183, 133944	2	4	Roadside	24.1	37.1	20.5	27.9									27.4	4	33
Selborne, High St	474133, 133630	2	1	Roadside	17.0	32.3	21.4	26.4	34.8								26.4	5	42
Liphook, Roundabout	483924, 131582	2	4	Roadside	28.7	41.2	29.7	33.7	43.3								35.3	5	42
Bramshott, A3 South, Mercedes garage	487038, 133794	2	2	Roadside	41.5	43.0			40.9								41.8	3	25
Horndean, Five Heads Road	470422, 113120	1.5	N/A	Roadside	28.2	32.9	17.5	23.8	27.5								26.0	5	42

Appendix 7: Photos of new monitoring positions (monitoring commenced January 2009)

Bordon, Corals (1) and (2), Chalet Hill



Bordon, 11 High Street (1) and (2)



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Bordon, High Street (1) and (2)



Appendix 8: List of Industrial Installations

Part B Processes in East Hampshire

Operator Name & Address	Process & Guidance Note	Authorisation Number
Hanson Premix, Sleaford Sand Pit, Sleaford, Bordon, Hants GU35 0HN	Blending, packing, loading and use of bulk cement PG3/1(04)	003
Liphook Coachworks, Unit 3 Bleach's Industrial Estate, Station Road, Liphook, Hants, GU30 7EE	Re-spraying of road vehicles PG6/34(04)	009
Tectonics Ltd, 17/18 Caker Stream Road, Alton, Hants GU34 2QA	Manufacture of timber & wood based products PG6/2(95) Combustion of fuel manufactured from or comprised of solid waste in appliances between 0.4 and 3MW rated thermal input PG1/12(04)	015
Kemlite Ltd, 25 Caker Stream Road, Alton Hants GU34 2QF	Manufacture of fibre reinforced plastics PG4/2(05)	019
Morrisons Petrol Station, Wm Morrison Supermarkets Plc, Lakesmere Road, Horndean, Hants PO8 9FB	Unloading of petrol into storage at a petrol station PG1/14(04)	012
Jet, Hen & Chicken Service Station Froyle, Hants GU34 4JH	Unloading of petrol into storage at a petrol station PG1/14(04)	023
BP Oil UK Ltd, Alton Service Station 5-15 Butts Road, Alton, Hants GU34 1LH	Unloading of petrol into storage at a petrol station PG1/14(04)	024
Sainsbury's Petrol Station, Draymans Way, Alton, Hants GU34 1HR	Unloading of petrol into storage at a petrol station PG1/14(04)	025
Ramshill Service Station, London Road, Petersfield, Hants GU31 4AT	Unloading of petrol into storage at a petrol station PG1/14(04)	026
Sainsbury's Petrol Station, Midhurst Road, Liphook, Hants GU30 7TW	Unloading of petrol into storage at a petrol station PG1/14(04)	027
Sleaford Service Station, Farnham Road, Kingsley, Hants GU35 9NJ	Unloading of petrol into storage at a petrol station PG1/14(04)	028

East Hampshire District Council

Operator Name & Address	Process & Guidance Note	Authorisation Number
Total UK Ltd, 57 Winchester Road, Four Marks, Hants, GU34 5HR	Unloading of petrol into storage at a petrol station PG1/14(04)	029
Shell UK Ltd, Whichers Gate, Rowlands Castle, Hants PO9 6BB	Unloading of petrol into storage at a petrol station PG1/14(04)	030
Shell UK Ltd, Dean Self Serve, Winchester Road, Ropley, Hants SO24 0DP	Unloading of petrol into storage at a petrol station PG1/14(04)	031
Shell UK Ltd, Liphook Services South, A3 By-Pass, Liphook, Hants GU30 7TT	Unloading of petrol into storage at a petrol station PG1/14(04)	032
Shell UK Ltd, Liphook Services North, A3 By-Pass, Liphook, Hants GU30 7TU	Unloading of petrol into storage at a petrol station PG1/14(04)	033
Total UK Ltd, Coach House Service Station, 40-44 Dragon Street, Petersfield, Hants GU31 4JJ	Unloading of petrol into storage at a petrol station PG1/14(04)	036
H.E. Hall Rowlands Ltd, 8 The Green, Rowlands Castle, Hants PO9 6BN	Operation of waste oil burner - less than 0.4MW PG1/1(04)	037
Williams of Bordon Ltd, Gal Mali, Petersfield Road, Whitehill, Bordon, Hants GU35 9AW	Mobile crusher & screening process PG3/16(904)	038
Bordon Service Station Ltd, High Street, Bordon, Hants GU35 0AN	Unloading of petrol into storage at a petrol station PG1/14(04)	039
Woolmer Service Station Ltd, 1 Woolmer Way, Bordon, Hants GU35 9QF	Unloading of petrol into storage at a petrol station PG1/14(04)	040
Petersfield Connect BP Oil Ltd, Winchester Road, Petersfield, Hants	Unloading of petrol into storage at a petrol station PG1/14(04)	043
Bucks Horn Oak Service Station, Bucks Horn Oak, Hants, GU10 4LT	Unloading of petrol into storage at a petrol station PG1/14(04)	044
Wm Morrison Supermarkets Plc, Lakesmere Road, Waterlooville, PO8 9FB	Dry cleaning PG6/46 (04)	046
Solent Cleaners Ltd, 71a High Street, Alton GU34 1AB	Dry cleaning PG6/46 (04)	047
Liphook Valet Service, 5b Chapel Street, Petersfield, GU32 3DT	Dry cleaning PG6/46 (04)	048

East Hampshire District Council

Operator Name & Address	Process & Guidance Note	Authorisation Number
Liphook Valet Service, 16 Forest Centre, Bordon, GU35 OTN	Dry cleaning PG6/46 (04)	049
Liphook Valet Service, 1 Crossways Road, Grayshott, Hindhead, GU26 6HJ	Dry cleaning PG6/46 (04)	050
Hampshire Dry Cleaners, 19 Lavant Street, Petersfield, GU32 3EL	Dry cleaning PG6/46 (04)	051
Alton Dry Cleaning Centre and Laundrette, 92 High Street, Alton, GU34 1EN	Dry cleaning PG6/46 (04)	052
AC Hutchins Demolition, Former Coal yard, Lasham c/o 74 Basingstoke Road, Alton.	Mobile crusher & screen process PG3/16(04)	053
KRM Concrete Ltd (Alton plant), Waterbrook Estate, Alton, GU34 2QH	Blending, packing, loading, unloading and use of bulk cement PG3/1(04)	054
Universal Chinese Laundry Limited, Unit 12, Caker Stream Road, Alton, GU34 2QA.	Dry cleaning PG6/46 (04)	055

Part A2 Processes in East Hampshire

Operator Name & Address	Process	Authorisation Number
Selborne Brick and Tile Co Ltd, Honey Lane, Selborne, Alton Hants GU34 3BT	Manufacture of bricks and tiles IPPC SG7	017

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Environment Agency regulated processes in East Hampshire with emissions to air

Operator Name & Address	Process	Authorisation Number
Star Energy UK Onshore Ltd, Holybourne Terminal, Cuckoos Corner, Holybourne, Alton, Hants, GU34 4JA	Gasification/Liquifac/Refining	AF5328
Star Energy UK Onshore Ltd, Horndean Oilfield, Horndean, Hampshire.	Gasification/Liquifac/Refining	AF5344
Coors Brewery, Lower Turk Street, Manor Park, Alton, GU34 2PS	Animal vegetable and food/Treating etc vegetable materials for food >300T/D	BV0210IM
Broxhead Farm, Lindford, Bordon, GU35 0NY	Rearing of poultry	RP3837MR
Steep Marsh Farm, Steep Marsh, Petersfield, GU32 2BN	Rearing of poultry	GP3133UA