2014 Air Quality Progress Report for East Hampshire District Council

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

May 2014

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Executive Summary

This report is East Hampshire District Council's 2014 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.

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. 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 (LAQM) process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

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

1.3 Air Quality Objectives

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

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

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

1.4 Summary of Previous Review and Assessments

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.

Table 1.2 Summary of previous rounds of Review and Assessment

Previous report	Date produced	Brief outcome
LAQM Review & Assessment Report[1]	December 2000	Air quality objectives achieved
Updating and Screening Assessment[2]	August 2003	Air quality objectives achieved, but identified that several areas require further investigation.
Progress Report[3]	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[4]	July 2005	Air quality objectives achieved
Updating and Screening Assessment[5]	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[6]	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[6]	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[7]	April 2009	Air quality objectives achieved, but highlighted Bordon being reviewed during 2009
Air Quality Update: Shortened Detailed Assessment of nitrogen dioxide in Bordon[8]	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[9]	April 2010	Air quality objectives achieved with the exception of one position at A325/Chalet Hill junction. EHDC to declare an AQMA.
Progress Report[10]	April 2011	Air quality objectives achieved with the exception of one position at A325/Chalet Hill junction within Bordon AQMA.
Updating and Screening Assessment[11]	April 2012	Air quality objectives achieved, except for exceedances within Bordon AQMA
Further Assessment[12]	June 2012	Nitrogen dioxide above 40 µg/m^3 within the AQMA, but not at relevant exposure locations. AQMA revocation recommended. AQMA revoked in February 2013
Progress Report[13]	April 2013	Air quality objectives achieved for all pollutants

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

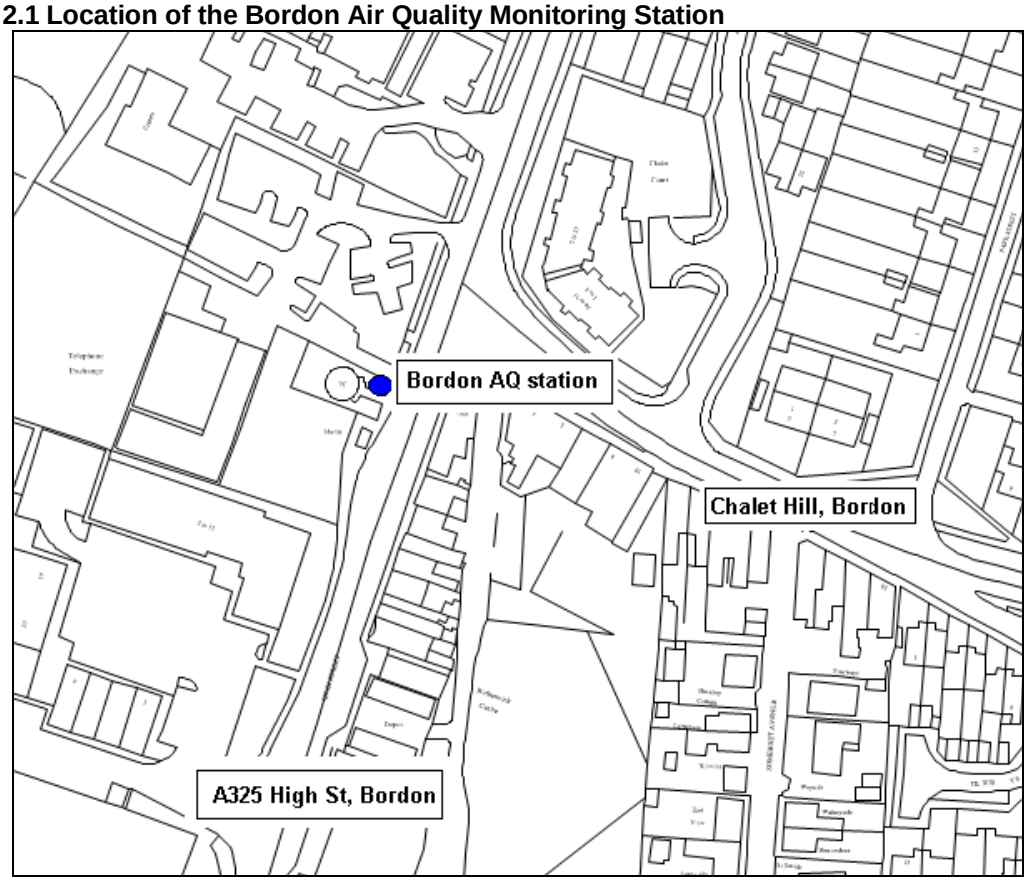
2.1.1 Automatic Monitoring Sites

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 2013 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, PM_{10} 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 PM_{10} because measured concentrations were consistently below the air quality objectives. The financial savings allowed the Council to continue operating the nitrogen dioxide continuous monitor in this location.

QA/QC data is provided in Appendix 3.

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Reference	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
Bordon	Urban background	479646, 135341	NO_2	No	Chemiluminescent analyser	No. Representative of relevant exposure	4m	N

2.1.2 Non-Automatic Monitoring Sites

Nitrogen dioxide is also measured in East Hampshire using diffusion tubes. During 2013 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

Monitoring was discontinued at Bordon, 11 High Street (BR9 and BR10) at the end of 2013 because measured concentrations of nitrogen dioxide were consistently below the national annual objective. The location was also not close to sites with relevant exposure.

Monitoring was also discontinued at Bramshott, A3 South, Chase Villas (BramR1) at the end of 2013 because the A3 has been open for over a year and measured concentrations of nitrogen dioxide remain significantly below the national annual objective.

The lamp posts used for diffusion tube monitoring at Horndean Roundabout (HR2) and Horndean 24 London Road (HR4) were removed during Summer 2013 and not replaced. An alternative monitoring location has since been found in the area and monitoring recommenced in January 2014. The results for the new position, Horndean Post Office (HR7) will be reported in the 2015 Updating and Screening Assessment.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Ref	Site Name	Site Type	OS Grid Reference	Tube Height (m)	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
AB1	Alton, Orchard House	Urban background	472109, 139487	3	N	N	Yes	N/A	N/A
BR4	Bordon, Corals (1) Chalet Hill	Roadside	479666, 135345	2.56	N	N	No Relevant exposure at 1st/2nd level	2.9	Yes
BR7	Bordon, Corals (2) Chalet Hill	Roadside	479666, 135345	3.31	N	N	Yes	2.9	Yes
BR1	Bordon, Ashmead	Roadside	479707, 135438	2	N	N	Yes	10	No
BR2	Bordon, Chalet Court	Roadside	479695, 135356	1.5	N	N	Yes	6	No
BR3	Bordon, 10 Chalet Hill	Roadside	479711, 135321	2	N	N	No Representative of relevant exposure	2.4	Yes

Site Ref	Site Name	Site Type	OS Grid Reference	Tube Height (m)	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
BR5	BR5 Bordon, High Street (1)	Roadside	479654, 135312	2.26	N	N	No Relevant exposure at 1st floor level	1.9	Yes
BR8	BR8 Bordon, High Street (2)	Roadside	479654, 135312	3.17	N	N	Yes	1.9	Yes
BR6	BR6 Bordon, Air Quality Cabin (3 tubes co-located)	Roadside	479646, 135341	2	N	Y	No Representative of relevant exposure	4.8	No
BU1	Bordon, Bassenthwaite Gdns	Urban background	479795, 136267	1.7	N	N	Yes	N/A	N/A
WR1	Whitehill, Petersfield Rd	Roadside	479314, 134307	3.25	N	N	No Residential façade is approx 18m from road	1	Yes

Site Ref	Site Name	Site Type	OS Grid Reference	Tube Height (m)	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
PB1	Petersfield, Town Hall	Urban background	474989, 123241	2	N	N	No	N/A	N/A
HR1	Horndean, London Road	Roadside	470554, 113582	2.77	N	N	Yes	1.9	Yes
HR2	Horndean, Roundabout	Roadside	470676, 113174	2	N	N	No	1.9	Yes
HR4	Horndean, 24 London Road	Roadside	470637, 113331	2.75	N	N	Yes	1.6	Yes

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

The Government and the Devolved Administrations have adopted two air quality objectives for nitrogen dioxide (NO_2); an annual mean concentration of 40 µg/m^3, and a 1-hour mean concentration of 200 µg/m^3 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 2013 falls below the air quality objective of 40µg/m^3 and there were no exceedances of the hourly mean objective of 200µg/m^3. This is shown in Tables 2.3 and 2.4 and Figure 2.3.

Figure 2.3 suggests that there has been a steady overall decline in levels of nitrogen dioxide at this location since monitoring began, however concentrations increased marginally in 2013.

Table 2.3 Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 %	Annual Mean Concentration (µg/m^3)				
				2009	2010	2011	2012	2013
Bordon	Roadside	N	99.6	24.9	25.6	23.2	22	23.5

Figure 2.3 Trends in Annual Mean NO_2 Concentrations Measured at Automatic Monitoring Sites

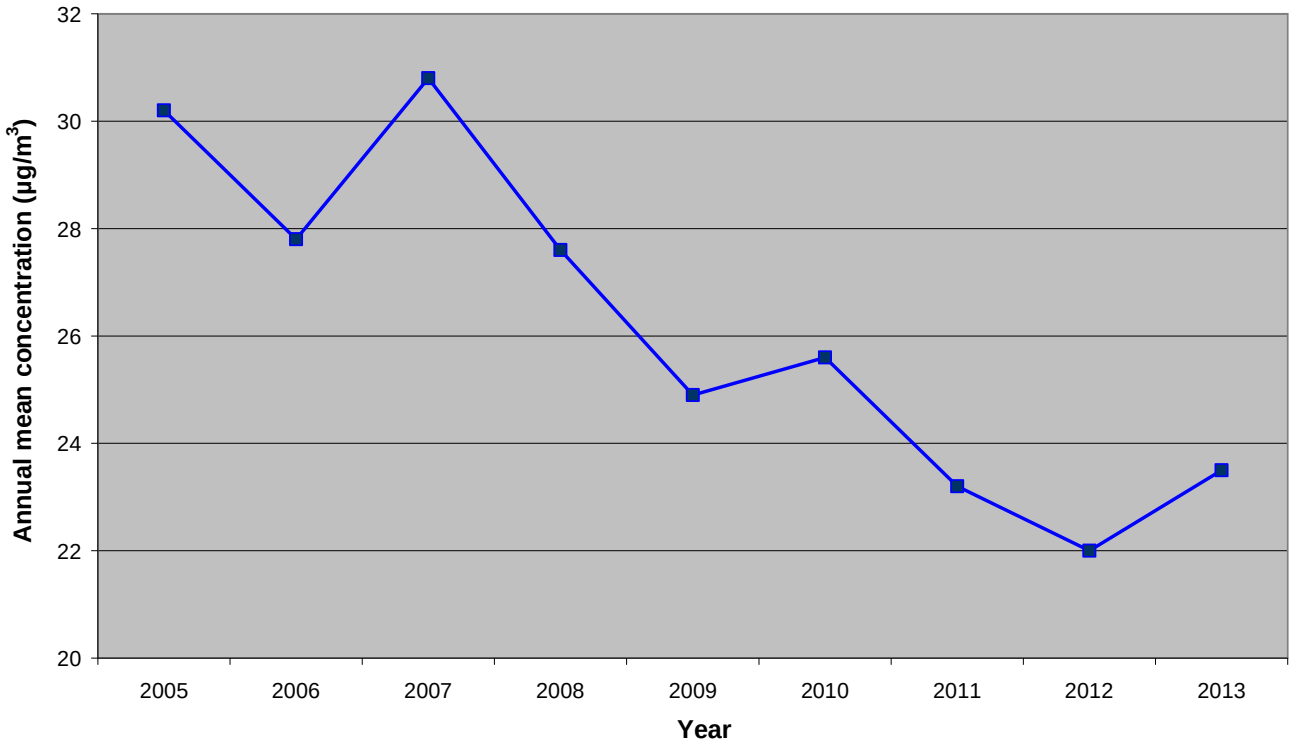


Table 2.4 Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 %	Annual Mean Concentration (µg/m^3)				
				2009	2010	2011	2012	2013
Bordon	Roadside	N	99.6	0	0	0	0	0

Diffusion Tube Monitoring Data

Annual means of nitrogen dioxide measured using diffusion tubes are shown in Table 2.5. A full dataset showing monthly mean values for 2013 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)[14] and the advice of the air quality helpdesks' websites. Further information on the choice of the bias adjustment factor used for 2013 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"[15]. A copy of the spreadsheet completed for 2013 data is available in Appendix 6. National bias adjustment factors were obtained from the Review and Assessment Helpdesk's database (v03/14)[16].

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.

Results for HR2 and HR4 have been annualised using the methodology in Box 3.2 of TG(09)[14] before being compared to the annual mean objective. This is because data capture at these locations during 2013 was less than 75% of the full calendar year. Further details of this can be found in Appendix 3.

Table 2.5 Results of NO_2 Diffusion Tubes 2013

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Data Capture 2013 %	2013 Annual mean concentrations (µg/m^3) (Bias Adjustment factor = 0.96)[a]
AB1	Alton, Orchard House	Background	No	N	100.0	14.1
BR4	Bordon, Corals (1) Chalet Hill	Roadside	Yes	N	91.7	37.4
BR7	Bordon, Corals (2) Chalet Hill	Roadside	Yes	N	83.3	37.6
BR1	Bordon, Ashmead	Roadside	No	N	100.0	19.6
BR2	Bordon, Chalet Court	Roadside	No	N	100.0	23.5
BR3	Bordon, 10 Chalet Hill	Roadside	No	N	83.3	27.8
BR5	Bordon, High Street (1)	Roadside	No	N	91.7	37.0
BR8	Bordon, High Street (2)	Roadside	No	N	100.0	34.6
BR6	Bordon, Air Quality Cabin	Roadside	No	Triplicate and co-located	100.0	24.0
					91.7	23.3
					100.0	23.1
BU1	Bordon, Bassenthwaite Gdns	Background	No	N	100.0	11.9
WR1	Whitehill, Petersfield Rd	Roadside	No	N	100.0	33.2
PB1	Petersfield, Town Hall	Background	No	N	91.7	14.3

HR1	Horndean, London Road	Roadside	No	N	100.0	32.2
HR2	Horndean, Roundabout	Roadside	No	N	50.0	30.2[b]
HR4	Horndean, 24 London Road	Roadside	No	N	41.7	28.0 [b]

a – Bias adjusted using the locally derived factor of 0.96. Further details on this bias adjustment factor can be found in Appendix 3

b – Means have been annualised following guidance in Box 3.2 of TG(09) because calendar year data capture is less than 75%. Details of this can be found in Appendix 3.

Green cells indicate monitoring that has taken place at first floor height

Table 2.6 Results of NO_2 Diffusion Tubes (2009 to 2013)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias				
			2009 (Bias Adjustment Factor = 0.92)	2010 (Bias Adjustment Factor = 0.94)	2011 (Bias Adjustment Factor = 0.92)	2012 (Bias Adjustment Factor = 0.94)	2013 (Bias Adjustment Factor = 0.96)
AB1	Background	N	14.8a	15.3	14.6	14.1	14.1
BR4	Roadside	N	**44.9**	**41.5**	**42.3**	38.0	37.4
BR7	Roadside	N	**42.4**	39.7	40.7	36.6	37.6
BR1	Roadside	N	22.0	21.1	20.2	20.5	19.6
BR2	Roadside	N	24.6	25.2	25.6	22.8	23.5
BR3	Roadside	N	29.5	27.3	27.2	27.6	27.8
BR5	Roadside	N	**41.3**	**42.2**	39.1	35.0	37.0
BR8	Roadside	N	36.2	38.3	34.1	32.9	34.6
BR6 (3 tubes co-located)	Roadside	N	27	24.6	22.4	21.1	23.5
BU1	Background	N	13.5	14.9	12.2	10.9	11.9
WR1	Roadside	N	33.7	34.5	31.2	31.0	33.2
PB1	Background	N	15.3	16.2	13.5	13.7	14.3
HR1	Roadside	N	36.9	33.3	31.5	32.4	32.2
HR2	Roadside	N	32.5	31.2	30.8	28.8	30.2 [a]
HR4	Roadside	N	26.1	27.2	26.1	27.9	28.0 [a]

a – Means have been annualised following guidance in Box 3.2 of TG(09) as calendar year data capture is less than 75%
Exceedance of the NO_2 annual mean AQS objective of 40µg/m^3 is shown in bold.
All results adjusted with locally derived bias adjustment factors. Details available in previous LAQM reports.
Green cells indicate monitoring that has taken place at first floor height.

Table 2.6 shows annual nitrogen dioxide levels at all the diffusion tube sites in East Hampshire over the last five years. Results in bold indicate an exceedance of the annual mean objective for nitrogen dioxide of 40µg/m^3.

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured using Diffusion Tubes in East Hampshire (excluding Bordon)

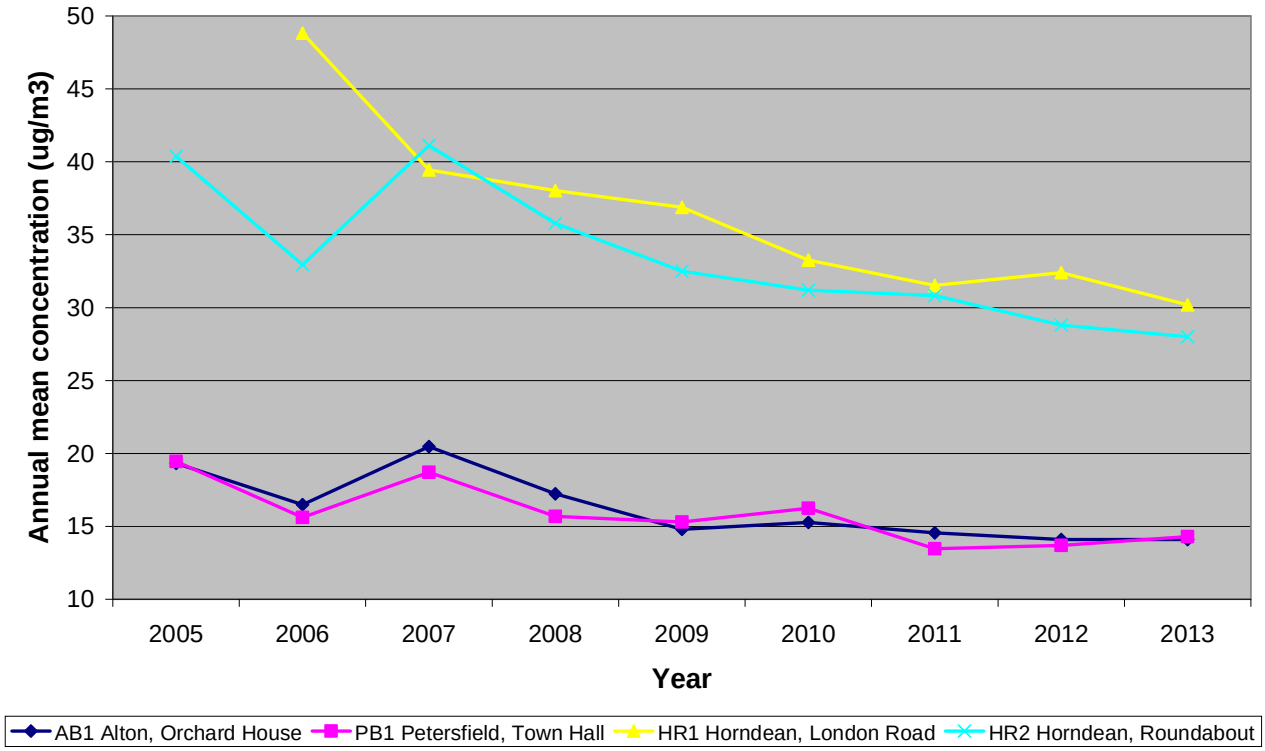
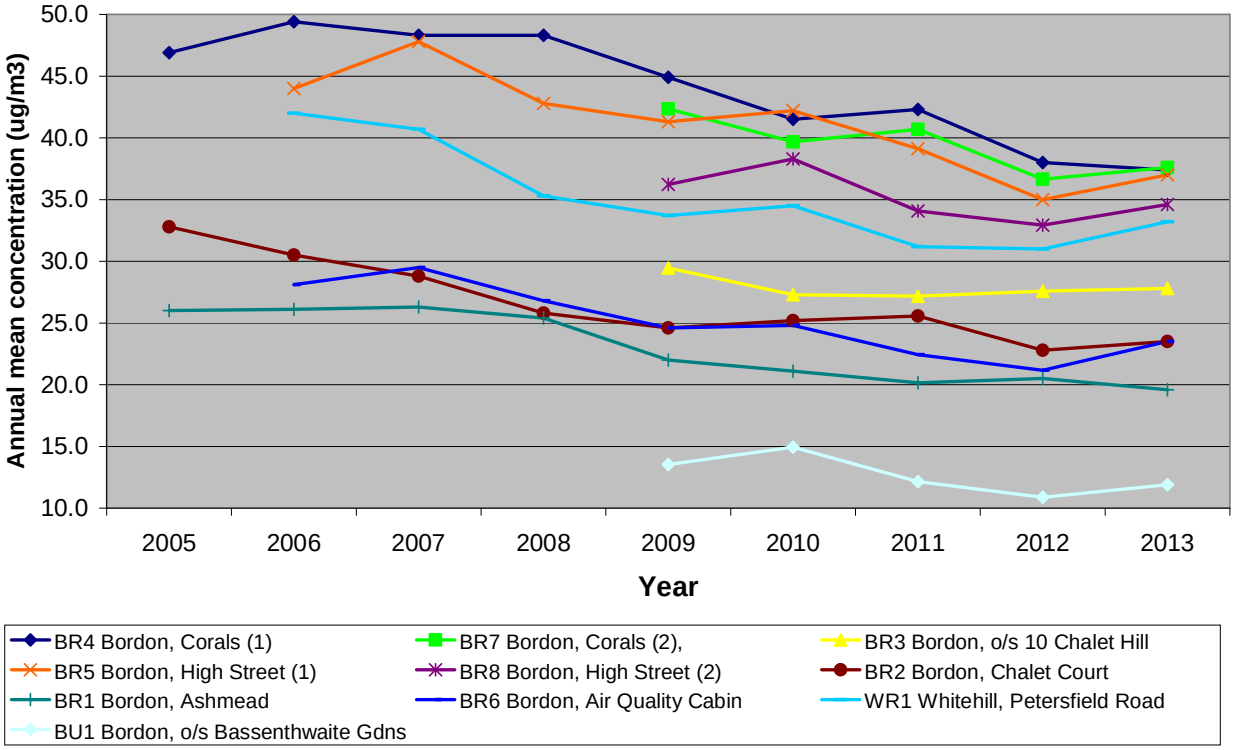


Figure 2.5 Trends in Annual Mean Nitrogen Dioxide Concentration Measured using Diffusion Tubes in Bordon



Figures 2.4 and 2.5 show that there has been a steady overall decline in levels of nitrogen dioxide in East Hampshire over recent years, however concentrations increased slightly at some sites in 2013.

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 AQS 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 traffic sources in East Hampshire since the 2013 Progress Report.

3.2 Other Transport Sources

There have been no new transport sources in East Hampshire since the 2013 Progress Report.

3.3 Industrial Sources

There have been no new or newly identified industrial sources since the 2013 Progress Report.

3.4 Commercial and Domestic Sources

There have been no new or newly identified commercial or domestic sources since the 2013 Progress Report.

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 2013 Progress Report.

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 2013 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.

5.2 Conclusions relating to New Local Developments

No new local development has been identified that requires more detailed consideration.

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 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 µg/m^3. Data continues to support the decision to revoke the AQMA which was carried out in February 2013.

Proposed further action:

1) East Hampshire District Council will submit an Updating Screening Assessment by the end of April 2015 in accordance with the national timetable.

6 References

1. East Hampshire District Council. (2000). 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) 2006 Updating Screening and Assessment of Air Quality in East Hampshire. East Hampshire District Council

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8. East Hampshire District Council (2009). Air quality update: Shortened detailed assessment of nitrogen dioxide in Bordon, Hampshire

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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 (2014) Spreadsheet of Bias Adjustment Factors (v.03/14). Accessed 09/04/2013 at: http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

17. LAQM Helpdesk (2014) Summary of Laboratory Performance in WASP NO2 Proficiency Testing Scheme for Rounds 117-124. Accessed on 22/05/2014 at: http://laqm.defra.gov.uk/documents/LAQM-WASP-Rounds-117-124-(April-2012--March-2014)-NO2-report.pdf

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).

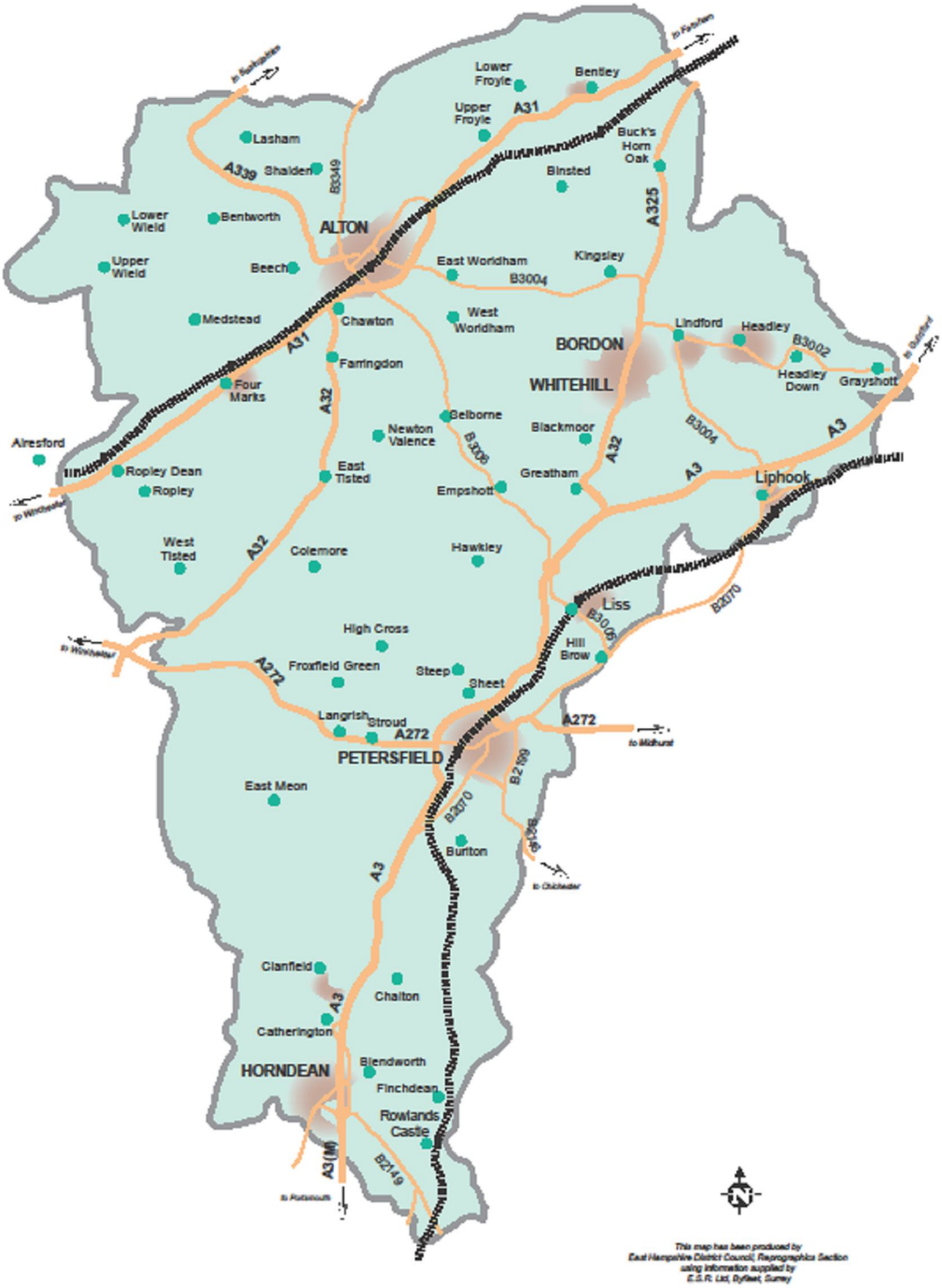
Appendix 4: Maps showing the location of nitrogen dioxide diffusion tubes in East Hampshire

Appendix 5: Full Raw Dataset for Diffusion Tubes 2013 (monthly)

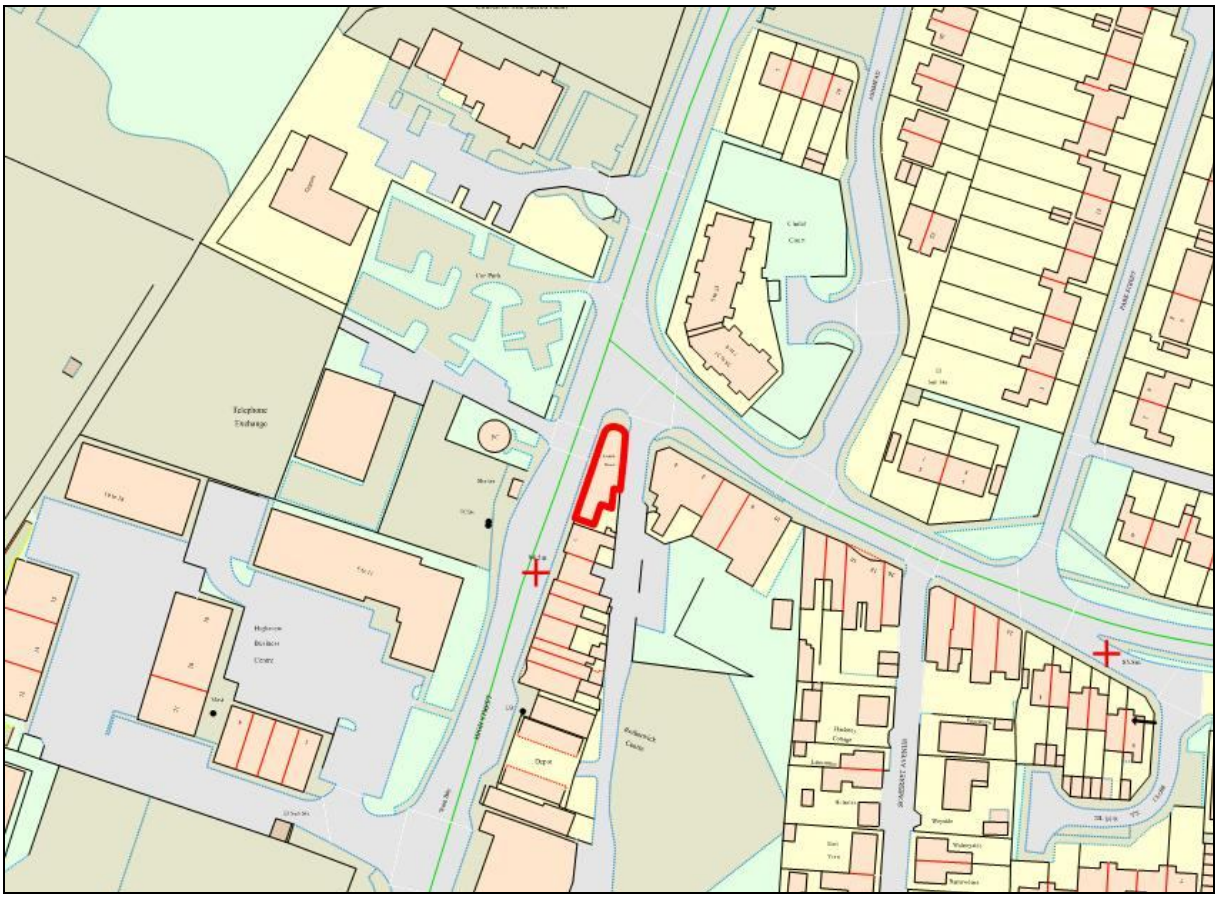
Appendix 6: Precision and Accuracy of Triplicate Tubes

Appendix 7: 2013 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

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 2013 available from the R&A Helpdesk Database (version 03/14)[16] at the time of writing this report was 1. This was based on 17 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[15]. The precision and accuracy of the co-located tubes is also calculated. For 2013 the spreadsheet provided a bias adjustment factor of 0.96 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 2013 both local and national bias adjustment factors are available. The locally obtained bias adjustment factor has been applied to the 2013 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 2013 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 2013 with the different bias adjustment factors applied to them is provided in Appendix 7.

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)[14]. The monitoring results detailed in the table below have been annualised in this report:

Site ID	Monitoring location	Pollutant	Data capture of calendar year %	Dates for short term means	Reason for poor data capture
HR2	Horndean, Roundabout	NO_2	50	02/01/13 – 26/06/13	Vandalism followed by monitoring site (lamp post) being removed in August 2013
HR4	Horndean, 24 London Road	NO_2	41	02/01/13 – 29/05/13	Vandalism followed by monitoring site (lamp post) being removed in June 2013

The long term AURN urban background sites chosen for the calculations were Reading New Town and Brighton Preston Park due to their proximity to the monitoring locations and high data capture rates (over 90%). Portsmouth was considered due to its proximity to the monitoring site however had a lower data capture rate in 2013 of 84%. Data for both sites is partly ratified.

Table A.1 Short-Term to Long-Term Monitoring Data Adjustment

HR2 Horndean, Roundabout– nitrogen dioxide

Site	Site Type	Annual Mean	Period Mean	Ratio
Reading	Background	26.60	27.74	0.96
Brighton	Background	17.23	16.63	1.01
			Average	**0.997**

HR4 Horndean, 24 London Road – nitrogen dioxide

Site	Site Type	Annual Mean	Period Mean	Ratio
Reading	Background	26.60	29.67	0.90
Brighton	Background	17.23	18.2	0.95
			Average	**0.921**

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 4 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[15] automatic monitoring was found to show overall good precision. This spreadsheet can be seen in Appendix 6.

QA/QC of diffusion tube monitoring

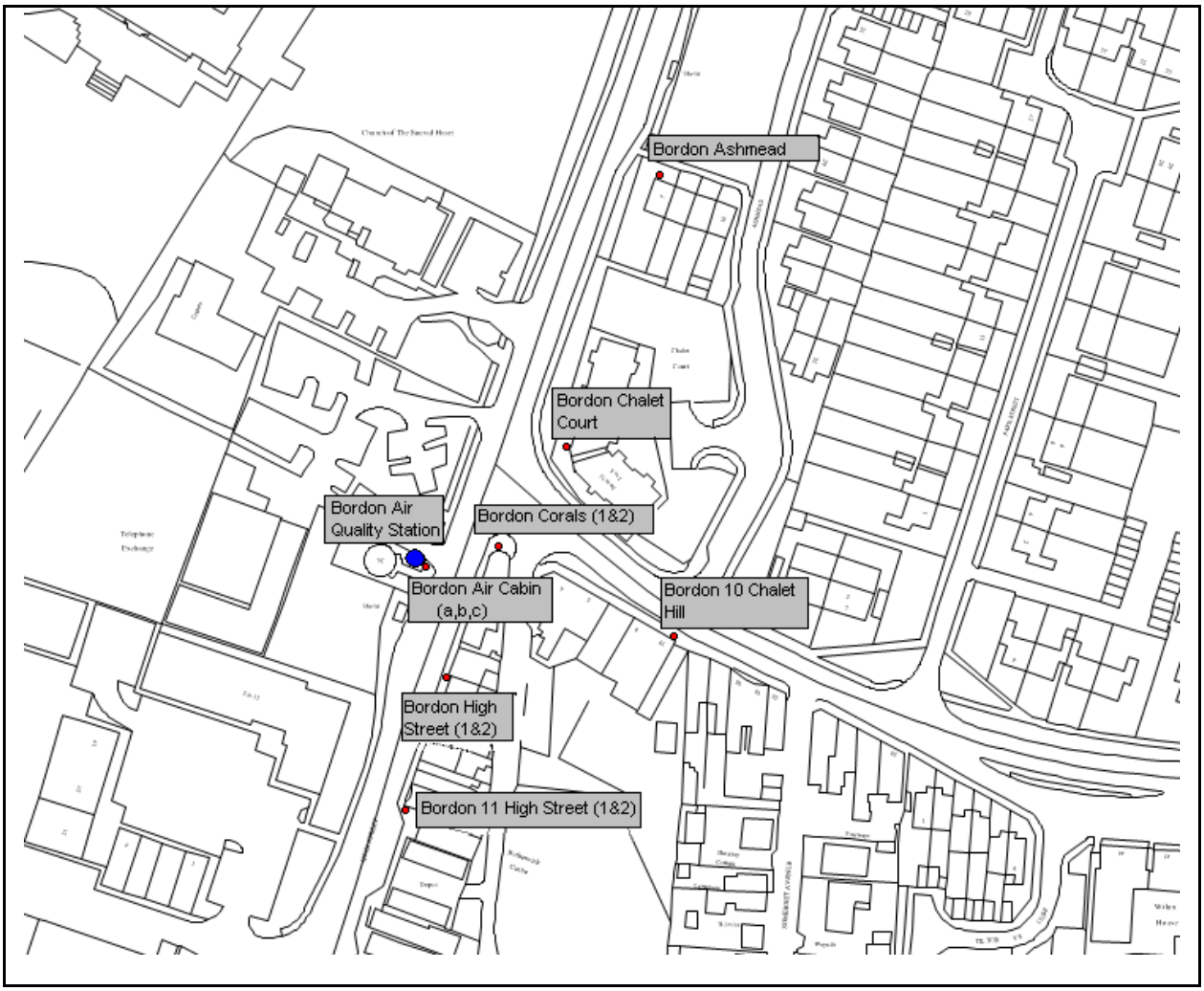
The most recent summary of laboratories' performance in the Workplace Analysis Scheme for Proficiency (WASP)[17] prepared by HSL for BV/NPL on behalf of Defra and the Devolved Administrations published in April 2014 shows that Gradko continues to demonstrate satisfactory performance in the analysis of NO_2 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 2013. This spreadsheet can be seen in Appendix 6.

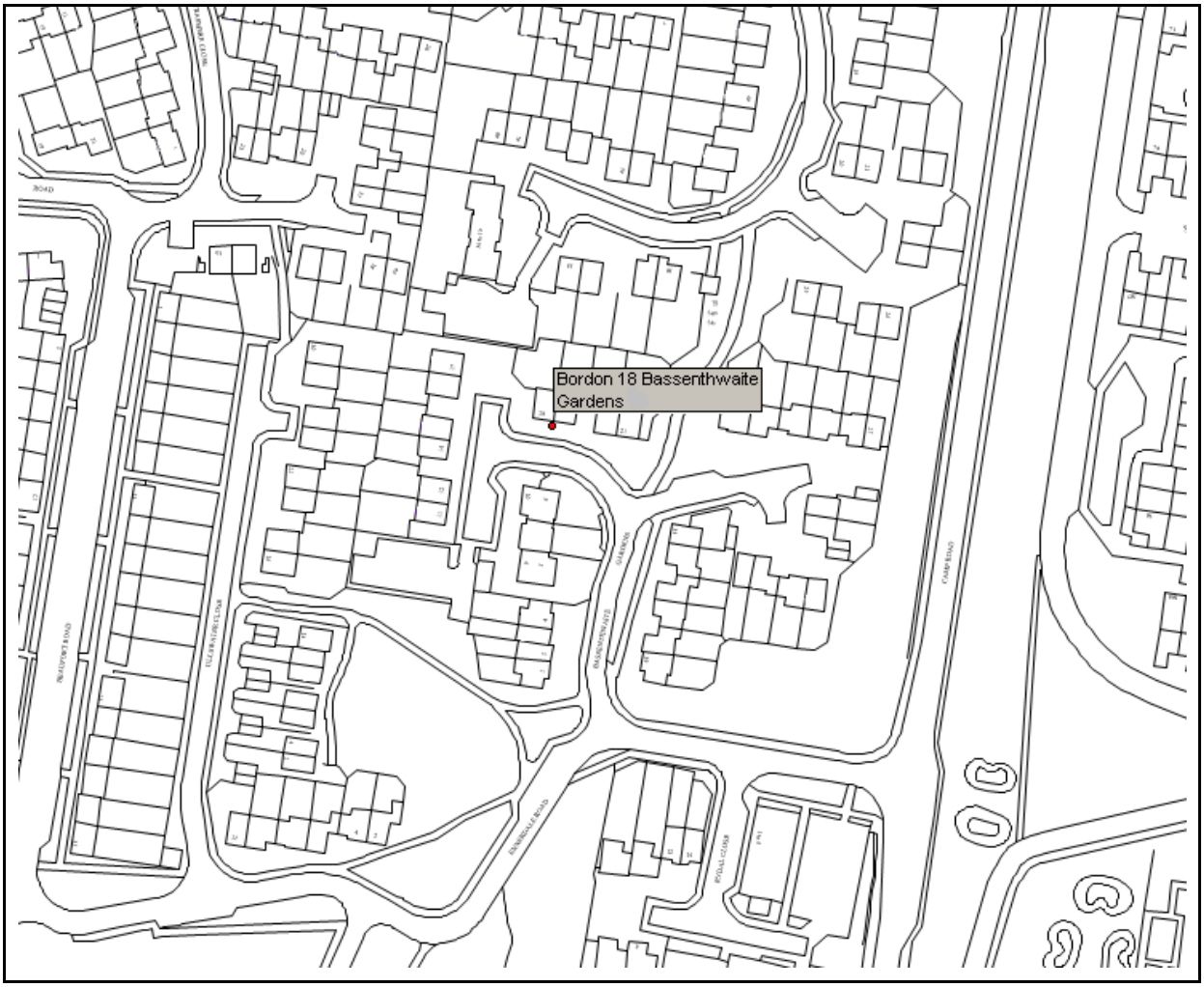
Appendix 4: Maps showing the location of nitrogen dioxide diffusion tubes in East Hampshire

Alton, Orchard House

Bordon, A325/Chalet Hill



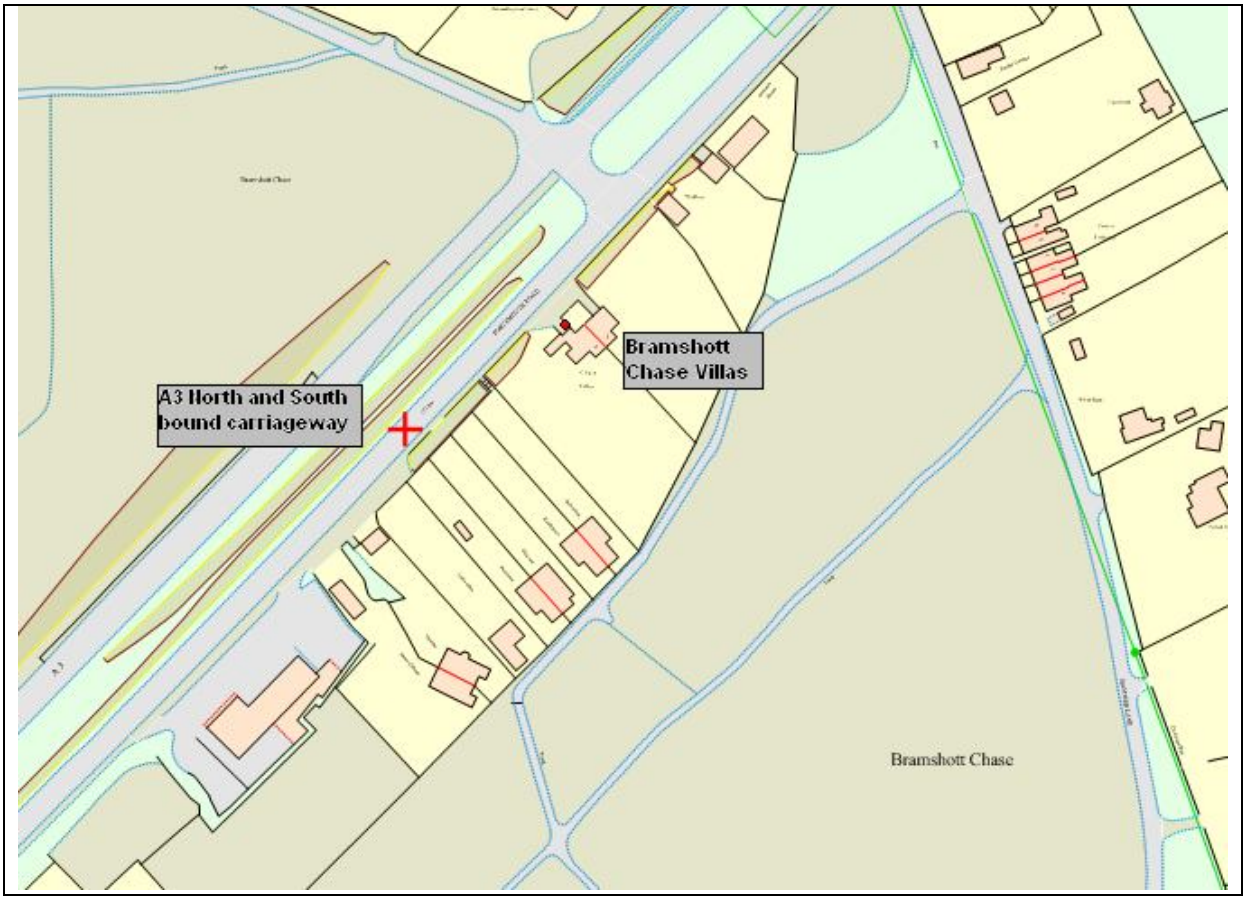
Bordon, Bassenthwaite Gardens



Whitehill, Petersfield Road

PB1 – Petersfield, Town Hall

BramR1 - Bramshott Chase Villas

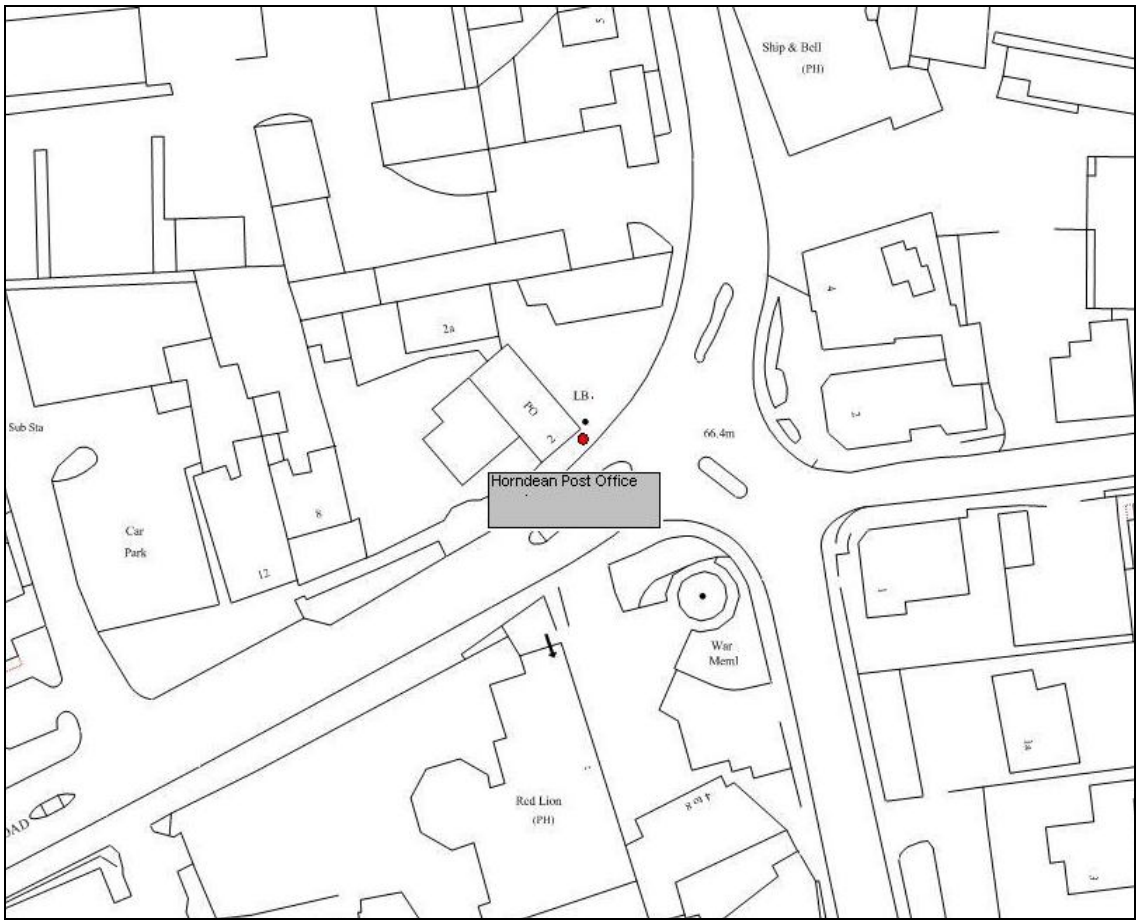


HR1 - Horndean, London Road

HR2 - Horndean Roundabout

HR4 - Horndean, 24 London Road

HR7 - Horndean, Post Office



Appendix 5: Full Raw Dataset for Diffusion Tubes 2013 (monthly)

Site ref	Site	January	February	March	April	May	June	July	August	September	October	November	December
AB1	**Alton, Orchard House**	20.39	14.76	22.6	10.82	9.94	11.47	11.41	10.73	13.2	13.32	21.07	16.12
BR4	**Bordon, o/s Corals (1), Chalet Hill**	45.16	41.29	33.8	31.5	35.98	33.16	39.62	42.12	44.42	38.74		43.16
BR7	**Bordon, o/s Corals (2), Chalet Hill**	43.38	39.55	37.3	34.84	35.49		39.17	42.16	39.49	38.37		41.49
BR1	**Bordon, Ashmead**	28.52	26.29	22.19	17.4	16.5	14.7	16.27	15.2	15.81	19.08	28.55	24.34
BR2	**Bordon, Chalet Court**	26.56	23.93	29.31	19.19	20.06	21.06	24.86	23.51	25.84	24.63	29.67	25.23
BR3	**Bordon, o/s 10 Chalet Hill**	36.91	32.14	38.06		19.74	23.66	25.52	24.42		25.03	36.36	27.71
BR5	**Bordon, High Street (1)**	42.34	41.18	53.81	32.51	30.99	37.74	40.7	38.3	35.35	36.28		35.04
BR8	**Bordon, High Street (2)**	38.87	34.48	43.01	27.94	32	31.27	39.2	35.11	40.99	33.2	44.9	31.25
BR6	**Bordon, Air Quality Cabin (1)**	27.99	24.86	37.3	25.02	16.41	23.7	23.55	21.26	21.45	23.66	29.24	25.52
BR6	**Bordon, Air Quality Cabin (2)**	27.6	27.06	37.13	19.14	16.84	24.62	26.62	20.3	20.13	19.59	28.37	
BR6	**Bordon, Air Quality Cabin (3)**	29.16	23.74	30.42	19.56	15.7	25.05	24.63	21.33	20.97	25.21	28.37	25.03
BU1	**Bordon, o/s Bassenthwaite Gdns**	17.96	13.47	16.84	11.69	8.55	10.17	10.98	9.54	10.2	10.78	16.07	13.06
WR1	**Whitehill, Petersfield Road**	41.55	34.24	40.56	26.55	24.24	32.63	36.47	33.71	32.81	33.05	44.59	34.66
PB1	**Petersfield, Town Hall**	20.07	17.63	15.47	10.9	12.21	12.4	12.93	13.52		14.03	20.81	14.2
HR1	**Horndean, London Road**	43.32	35.3	30.63	23.24	26.83	28.67	30.93	31.41	36.5	32.11	43.28	40.76
HR2	**Horndean, Roundabout**	40.8	35.04	38.73	24.56	22.06	28.22						
HR4	**Horndean, 24 London Road**	37.51	35.26	35.94	28.87	21.16							

Appendix 6: Precision and Accuracy of Triplicate Tubes

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	02/01/2013	30/01/2013	28.0	27.6	29.2	28	0.8	3	2.0	30.2	99.7	Good	Good
2	30/01/2013	27/02/2013	24.9	24.1	23.7	24	0.6	2	1.4	26.7	99.9	Good	Good
3	27/02/2013	27/03/2013	37.3	37.1	30.4	35	3.9	11	9.7	33.9	99.6	Good	Good
4	27/03/2013	24/04/2013	25.0	19.1	19.6	21	3.3	15	8.1	25.9	99.7	Good	Good
5	24/04/2013	29/05/2013	16.4	16.8	15.7	16	0.6	4	1.4	18	99.9	Good	Good
6	29/05/2013	26/06/2013	23.7	24.6	25.1	24	0.7	3	1.7	21	99.4	Good	Good
7	26/06/2013	31/07/2013	23.6	26.6	24.6	25	1.6	6	3.9	21	99.9	Good	Good
8	31/07/2013	28/08/2013	21.3	20.3	21.3	21	0.6	3	1.4	18	99.9	Good	Good
9	28/08/2013	25/09/2013	21.5	20.1	21.0	21	0.7	3	1.7	18	99.4	Good	Good
10	25/09/2013	30/10/2013	23.7	19.6	25.2	23	2.9	13	7.2	21	99.6	Good	Good
11	30/10/2013	04/12/2013	29.2	28.4	28.4	29	0.5	2	1.2	27.8	99.9	Good	Good
12	04/12/2013	08/01/2014	25.5		25.0	25	0.3	1	3.1	21.9	98.7	Good	Good
13													
										Overall survey -->		Good precision	Good Overall DC

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

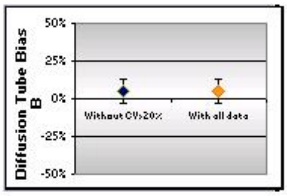
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Bordon

Precision	12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.96 (0.89 - 1.05)
Bias B	4% (-4% - 12%)
Diffusion Tubes Mean:	24 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	24 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	23 (22 - 26) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.96 (0.89 - 1.05)
Bias B	4% (-4% - 12%)
Diffusion Tubes Mean:	24 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	24 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	23 (22 - 26) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

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

Site ID	Site name	Annual mean concentrations of nitrogen dioxide 2013 (µg/m^3)		
		Raw data	Corrected using local bias adjustment factor 0.96	Corrected using national bias adjustment factor 1
AB1	Alton, Orchard House	14.7	14.1	14.7
BR4	Bordon, o/s Corals (1), Chalet Hill	39.0	37.4	39.0
BR7	Bordon, o/s Corals (2), Chalet Hill	39.1	37.6	39.1
BR1	Bordon, Ashmead	20.4	19.6	20.4
BR2	Bordon, Chalet Court	24.5	23.5	24.5
BR3	Bordon, o/s 10 Chalet Hill	29.0	27.8	29.0
BR5	Bordon, High Street (1)	38.6	37.0	38.6
BR8	Bordon, High Street (2)	36.0	34.6	36.0
BR6	Bordon, Air Quality Cabin (1)	25.0	24.0	25.0
BR6	Bordon, Air Quality Cabin (2)	24.3	23.3	24.3
BR6	Bordon, Air Quality Cabin (3)	24.1	23.1	24.1
BU1	Bordon, o/s Bassenthwaite Gdns	12.4	11.9	12.4
WR1	Whitehill, Petersfield Road	34.6	33.2	34.6
PB1	Petersfield, Town Hall	14.9	14.3	14.9
HR1	Horndean, London Road	33.6	32.2	33.6
HR2	Horndean, Roundabout	31.6	30.3	31.6
HR4	Horndean, 24 London Road	31.7	30.5	31.7