2017 Air Quality Annual Status Report (ASR)

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

October 2017

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Executive Summary: Air Quality in Our Area

This report is East Hampshire District Council's 2017 Annual Status Report and forms part of the review and assessment of air quality in East Hampshire.

The report has been prepared by reference to Government's published Policy Guidance LAQM.PG (16) and in accordance with the Technical Guidance LAQM. TG (16).

Air Quality in East Hampshire District

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Air quality within the East Hampshire District is generally good. The Annual Status Report shows that the air quality objectives for all pollutants, but particularly those for nitrogen dioxide, sulphur dioxide and particulates (PM_{10}), are likely to be achieved throughout East Hampshire district. As a result of this no need has been identified to declare an Air Quality Management Area for any pollutants.

Nitrogen Dioxide which is mainly from road transportation continues to be the only pollutant that has shown elevated concentrations. As a result, the emphasis has

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

been placed on consideration of this pollutant within the main body of the report. While it is afforded special consideration the air quality objectives for nitrogen dioxide continue to be met. Compared with the falling trend in previous years, nitrogen dioxide increased at 11 of the 12 sites where there was data for both 2015 and 2016. The area that continues to have the highest levels of pollution is the centre of Bordon. Only one roadside site showed a slight decrease. Both background sites showed an increase on 2015 but the roadside sites showed a larger increase suggesting an increased traffic contribution.

Due to the emphasis placed on it in 2016 by DEFRA this report also considers the requirement for reducing exposure to fine particulate matter ($PM_{2.5}$). This pollutant is capable of penetrating deep into the lungs and can cause ill health in a number of ways. It is derived from natural sources but the significant proportion is from combustion in the energy industries, road transport (both exhaust and non-exhaust emissions), off-road transport, residential combustion and small-scale waste burning.

The concentrations of $PM_{2.5}$ vary across the East Hampshire district. There will be national, regional and local influences on the concentration. The National Atmospheric Emissions Inventory (1) predicts the levels of $PM_{2.5}$ to be within the range 10.4 and 12.4 $\mu g/m^{-3}$ for 2015 with progressive 0.5 $\mu g/m^{-3}$ reductions each five years thereafter. The results of the first complete year of monitoring at Chilbolton Observatory for 2016 showed that the annual average concentration was 8 $\mu g/m^{-3}$.

Despite the already low levels of $PM_{2.5}$ across much of East Hampshire the effect on the population is estimated by Public Health England (2) to cause some 53 deaths resulting in over 482 life years lost every year. Every reduction in concentration results in increased life expectancy. In addition, a significantly larger part of the population requires medical attention or has a worse quality of life as a result of exposure. There are presently no figures available as to how many people are affected in this way.

East Hampshire District Council works with neighbouring districts and boroughs in Hampshire to establish best practice. The Hampshire County Council play an important role in preventing and reducing emissions from road transport. The devolved Public Health function is also expected to play an active role in securing air quality improvements.

Preserving and improving the air quality will depend on wide participation and personal choices by residents. There are many ways that individuals can contribute to reducing air pollution and so improve air quality. Examples include the choice to use an alternative form of transport such as walking, cycling or using public transport instead of using the car. Further information on this is contained in Section 2.3.

Actions to Improve Air Quality

The Council continues to regularly review potential sources and to monitor air quality across the district for this purpose.

The East Hampshire District Council published an Energy Strategy in November 2014[4]. As well as seeking to establish energy security through sustainable means it sets out to reduce pollution. A number of projects have been initiated that have direct benefit to air quality including:

- Installation of an electric vehicle charging network at eight locations.
- The procurement of electric fleet vehicles.
- A feasibility study into the formation of a green energy company by the Council to, amongst other things, increase the use of solar photovoltaic technology in the district.
- Working with the Local Strategic Partnerships to reduce car usage.

[4] http://www.easthants.gov.uk/energy-strategy

Complementing this work there are proposals to revise one of the Supplementary Planning Documents to consider the provision of electric vehicle charge points in new developments.

The Bordon-Whitehill regeneration is seeking to deliver a self-sufficient and sustainable local community. This should ensure that the need to travel is reduced because good local facilities will be provided to serve the needs of the whole community.

The Bordon-Whitehill regeneration includes the development of a network of footpaths and cycle ways known as the green grid will encourage walking and cycling and reduce reliance on cars. A new bypass is anticipated to reduce congestion in the centre where air quality was close to breaching the U.K. limits. The Hampshire County Council continues to consider a new rail station and improving the bus network with the other towns in East Hampshire as part of the regeneration.

Conclusions and Priorities

Nitrogen dioxide (NO_2) is only pollutant of concern but does not exceed air quality objectives therefore no AQMA is being declared. Monitoring of NO_2 will continue. No new or alternative locations will be monitored as there are no changes to the sources and local knowledge does not suggest the need for further monitoring.

The priorities for the coming year are described below.

- The Energy Strategy will continue to be a key local priority. It has potential to reduce carbon emissions, reduce local pollution, and improve housing stock (through insulation schemes and replacement of energy consuming systems with more efficient ones). There are direct public health benefits in the

reduction of pollution and improving ambient temperatures in the housing stock as well as addressing energy poverty.

- The Cycling and Walking Strategy (formerly the Active Transport Strategy) is due to be adopted by April 2017 with a view to promoting these forms of transport. Further actions are likely once this has been published.

- The Bordon- Whitehill Regeneration project remains a key corporate priority. The intention is to deliver some 4,000 new homes as well as take action to improve the existing housing stock. This is a 20 year project with final delivery due in 2035. It should deliver significant economic and environmental benefits.

Local Engagement and How to get Involved

Road traffic gives rise to much of the air pollution in the East Hampshire district. There are a range of ways for people to get involved and help tackle this.

Businesses can:

- set up workplace travel plans and more information is available here: http://www3.hants.gov.uk/workplacetravel.
- subscribe to scheme such as Easit to obtain discount on travel and electric vehicles: https://www.easit.org.uk/

Everyone can:

- Walk, cycle, car share or use public transport. For information about journey planning visit http://myjourneyhampshire.com/.
- Switch to low emission vehicles. Grants are still available: https://www.gov.uk/plug-in-car-van-grants/what-youll-get. Further information and advice on electric vehicles and charging locations is available here:

https://www.zap-map.com/.

- Insulate buildings and wherever possible use electric heating system or low NOx emitting boilers to reduce background pollution levels.

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1 Local Air Quality Management

This report provides an overview of air quality in East Hampshire District Council during 2016. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) 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 an exceedance is considered likely the local authority must 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. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by East Hampshire District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

East Hampshire District Council currently does not have any AQMAs.

DEFRA PG16 recommends that authorities that have areas that are close to the air quality objectives should consider having a local air quality strategy. With the exception of the centre of Bordon then East Hampshire District Council does not have any of these areas.

The Bordon area has seen a gradual reduction in concentrations of nitrogen dioxide and it is predicted that these will fall further with the Bordon-Whitehill regeneration as a result of initiatives including the new bypass and the generation of the green grid to facilitate active travel techniques. It is for these reasons that the East Hampshire District Council does not consider that it is necessary to draft a local air quality strategy.

For reference, a map of East Hampshire District Council ’s monitoring locations is available in Appendix D.

☒ East Hampshire District Council confirm the information on UK-Air regarding their AQMA(s) is up to date

2.2 Progress and Impact of Measures to address Air Quality in East Hampshire District Council

Defra's appraisal of last years Annual Status Report concluded that its findings were acceptable for all sources and pollutants. It noted that the Council are maintaining an active programme of measures to reduce transport emissions in the district which it welcomed. It suggested that the Council may wish to consider reviewing the current monitoring programme to determine whether there maybe any further locations with relevant exposure above objective levels elsewhere. It was recommended that a table with five year trends of air quality data be included.

In response the East Hampshire District Council has elected to change one diffusion tube monitoring site but considers that the monitoring is directed at the most appropriate areas at this time.

Five year trends were included in the Annual Status Report 2016 in tabular and graphical format. However, for the purposes of satisfying DEFRA line graphs with trend lines are included in this report.

Despite not having any air quality management areas, East Hampshire District Council has taken forward a number of direct measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1.

More detail on a range of these measures can be found in :

- The Hampshire Transport Plan: https://www.hants.gov.uk/transport/strategies/transportstrategies

- The East Hampshire Energy Strategy: http://www.easthants.gov.uk/energy-strategy

East Hampshire District Council's priorities for the coming year continue to be the regeneration of Whitehill and Bordon leading to changes in transport and provision of sustainable development, further work on delivering the Energy Strategy and the adoption of the Cycling and Walking Strategy.

There are no significant challenges and barriers to implementation anticipated at this time but due to the complexity, scale and the ambitious nature of some of the actions it is foreseeable that circumstances may subsequently arise and be highlighted in future reports.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Council Low Emission Fleet	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising uptake of low emission vehicles	East Hampshire District Council	Completed	Commenced	Purchase of Nissan Leaf and NV 200 completed	N/A	Vehicles purchased	Dec-16	
2	Electric Charge Point Network	Promoting Low Emission Transport	Other	East Hampshire District Council	Completed	Commenced	Installation of 8 charging points	N/A	4 charge bays installed	Apr-19	
3	Modeshift STARS	Promoting Travel Alternatives	School Travel Plans	Hampshire County Council & East Hampshire District Council	Completed	Ongoing	Number of schools participating	N/A	8 Bronze achieved and 1 silver	Ongoing	
4	Park and Stride	Traffic Management	Other	East Hampshire District Council	Completed	2016-2017	-	N/A	Advertised on web and scheme in place	Ongoing	School drop off to nearby car park and then walk remainder
5	Work travel plans	Promoting Travel Alternatives	Work Travel Plans	Hampshire County Council	Completed	2011-2031	-	N/A	Information published on internet and supprt available	Ongoing	Sustrans provide implementation for Hampshire County Council
6	Shipwrights Way	Transport Planning * Infrastructure	Cycle Network	Hampshire County Council	Complete	Complete	Opening of 50 mile cycle route	N/A	Completed July 2016	N/A	
7	High speed broadband coverage[1]	Promote Travel Alternatives	Encourage / Facilitate home-working	Hampshire County Council	Completed	2011-2031	-	N/A	Phase 1 (90% coverage) completed	Provisional April 2018 for 95% coverage	Objective 11,Hants Transport Plan 2011-31

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
8	"My Journey – Helping Hampshire Getting Around" Travel Awareness Campaign	Promote Travel Alternatives	Intensive active travel campaign & infrastructure	Hampshire County Council	Completed	2011-31	-	N/A	Website established	Ongoing	Includes travel planning and car sharing
9	Bikeability training	Promote Travel Alternatives	Intensive active travel campaign & infrastructure	Hampshire County Council	Completed	2011-31	-	N/A	Advertised on web and scheme in place	Ongoing	
10	Licensing requirement for taxis	Promoting Low Emission Transport	Taxi Licensing conditions	East Hampshire District Council	Completed	Ongoing	-	N/A	Vehicles over six years old are required to have MoT every six months	Ongoing	
11	Cleaner buses	Promoting Low Emission Transport	Public Vehicle Procurement -Prioritising uptake of low emission vehicles	Hampshire County Council	Completed	Ongoing	Percentage of fleet complying with Euro V standard	N/A	Stagecoach has 70% of fleet Euro V and has plans to replace 6 older buses during 2016	Ongoing	

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

East Hampshire District Council is taking the following measures to address $PM_{2.5}$:

- Working with other organisations including the Hampshire County Council to ensure a complementary and co-ordinated approach to reducing emissions of $PM_{2.5.}$
- Creating or improving low emission transport networks for example the installation of electric vehicle charging points to encourage people toward electric vehicle ownership; and improvement of walking and cycle paths.
- Ensuring that developments with potential to have an impact on air quality submit air quality assessments and implement appropriate mitigation measures to ensure that development is sustainable and does not have an adverse impact on air quality.
- As construction activities can result in significant particulate emissions due to grinding, cutting, earthmoving and vehicle exhaust emissions Construction Environment Management Plans are required to ensure that air quality is protected throughout the construction phase.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

East Hampshire District Council undertook automatic (continuous) monitoring at one site during 2016. Table A.2 in Appendix A shows the details of the site.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

East Hampshire District Council undertook non- automatic (passive) monitoring of nitrogen dioxide at 12 sites during 2016 with a total of 16 diffusion tubes. Multiple tubes were located at three locations to either provide comparative data with the continuous automatic monitor or height adjusted data. Table A.3 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.4 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There have been no exceedances of either the annual or hourly objective value, however, the following observations are made:

- With the exception of the Ashmead, Bordon diffusion tube location, all monitoring locations reported an increase in NO_2 concentrations between 2015 and 2016.

- The background sites displayed an increase in concentration suggesting that at the roadside not all the increase was attributable to the transport sources.

- Nonetheless roadside concentrations saw an increase in emissions greater than that observed at background sites suggesting that the contribution from the road was greater than the contribution of the increase in background.

- However, when considering the trends all roadside sites showed a fall over the five year period, except for London Road Horndean where the trend rises and Petersfield Road in Whitehill where there is a slight increase.

Note that there are two further sites (HR 7 original and new site) that are not included on the five year figures as they do not have sufficient data. Neither site exceeds the annual or hourly objective.

3.2.2 Identification of new areas for monitoring for all pollutants

We have examined if there is a need to undertake new monitoring for all pollutants as a result of changes to sources. As there are no significant changes to sources or other information to indicate that pollutants may be elevated elsewhere no new locations have been highlighted for monitoring.

Appendix A: Monitoring Results

Table A.2 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
	Bordon	Urban background	479646	135341	NO2	No	Chemilluminescent	0	4	1.5

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
AB1	Alton, Orchard House	Urban background	472109	139487	NO2	N	0	N/A	N	3
BR4	Bordon, Corals (1) Chalet Hill	Roadside	479666	135345	NO2	N	2	2.9	N	2.56
BR7	Bordon, Corals (2) Chalet Hill	Roadside	479666	135345	NO2	N	1	1	N	3.31
BR1	Bordon, Ashmead	Roadside	479707	135438	NO2	N	0	10	N	2
BR2	Bordon, Chalet Court	Roadside	479695	135356	NO2	N	0	6	N	1.5
BR3	Bordon, 10 Chalet Hill	Roadside	479711	135321	NO2	N	1.5	2.4	N	2
BR5	Bordon, High Street (1)	Roadside	479654	135312	NO2	N	2	1.9	N	2.26
BR8	Bordon, High Street (2)	Roadside	479654	135312	NO2	N	0.5	1.9	N	3.17
BU1	Bordon, Bassenthwaite Gdns	Urban background	479795	136267	NO2	N	0	N/A	N	1.7
BR6	Bordon, Air Quality Cabin (3 tubes co-located)	Roadside	479646	135341	NO2	N	** Representative of relevant exposure at 4m	4.8	Y	2
WR1	Whitehill, Petersfield Rd	Roadside	479314	134307	NO2	N	18	1	N	3.25

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
PB1	Petersfield, Town Hall	Urban background	474989	123241	NO2	N	*N/A	N/A	N	2
HR1	Horndean, London Road	Roadside	470554	113582	NO2	N	2.3	2	N	2.6
HR7	Horndean Gales Brewery	Roadside	470655	113259	NO2	N	0.7	2.28	N	2.5

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.4 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
Bordon	Roadside	Automatic	N/A	99.9	22	23.5	22.6	20.1	23
AB1	Background	Diffusion Tube	N/A	100	14.1	14.1	12.7	10.6	13.4
BR4	Roadside	Diffusion Tube	N/A	100	38.0	37.4	39.0	34.2	38.7
BR7	Roadside	Diffusion Tube	N/A	100	36.6	37.6	37.8	32.2	38.1
BR1	Roadside	Diffusion Tube	N/A	100	20.5	19.6	19.8	18.2	18.1
BR2	Roadside	Diffusion Tube	N/A	100	22.8	23.5	23.0	20.8	23.2
BR3	Roadside	Diffusion Tube	N/A	83.3	27.6	27.8	26.0	24.4	28.1
BR5	Roadside	Diffusion Tube	N/A	100	35.0	37.0	36.9	32.9	39.0
BR8	Roadside	Diffusion Tube	N/A	100	32.9	34.6	32.0	29.5	35.2
BU1	Background	Diffusion Tube	N/A	100	10.9	11.9	10.8	9.6	11.6
BR6	Roadside	Diffusion Tube	N/A	100	21.2	24.0	22.8	19.5	22.7
BR6	Roadside	Diffusion Tube	N/A	100	21.4	23.3	22.2	20.1	22.8
BR6	Roadside	Diffusion Tube	N/A	100	20.8	23.1	22.8	20.4	22.5
WR1	Roadside	Diffusion Tube	N/A	100	31.0	33.2	32.5	29.7	34.5
PB1	Background	Diffusion Tube	N/A	100	13.7	14.3	13.7	11.4	15.2

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
HR1	Roadside	Diffusion Tube	N/A	100	32.4	32.2	33.3	31.6	36.8
HR7 (to 12/2015)	Roadside	Diffusion Tube	N/A	N/A	N/A	N/A	25.9	23.5	N/A
HR7 (New location)	Roadside	Diffusion Tube	N/A	100	N/A	N/A	N/A	N/A	32.8

☒ **Diffusion tube data has been bias corrected**

☐ **Annualisation has been conducted where data capture is <75%**

☒ **If applicable, all data has been distance corrected for relevant exposure**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.2 – Trends in Annual Mean NO_2 Concentrations - Bordon

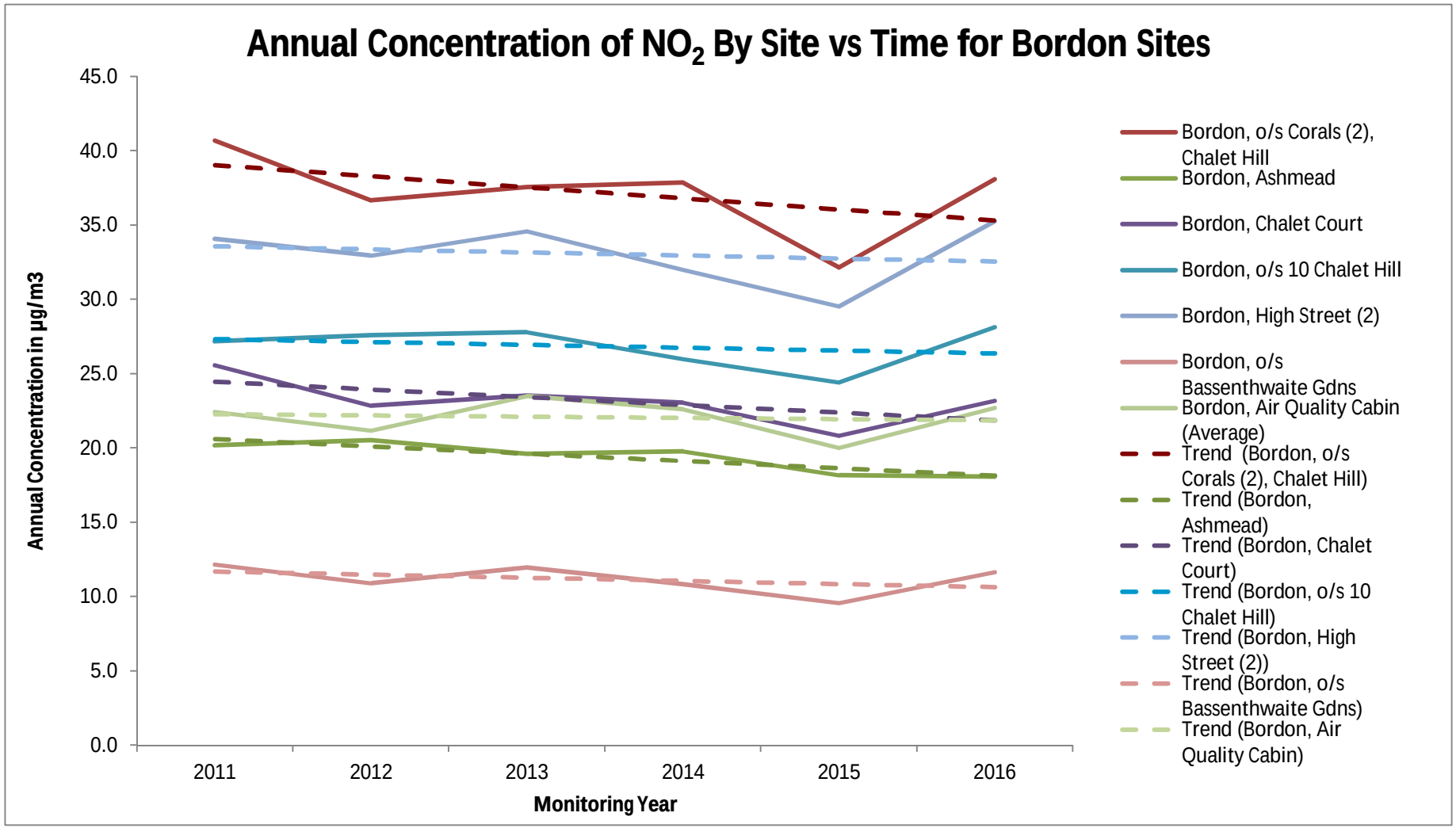


Figure A.3 – Trends in Annual Mean NO_2 Concentrations – Other Locations In East Hampshire

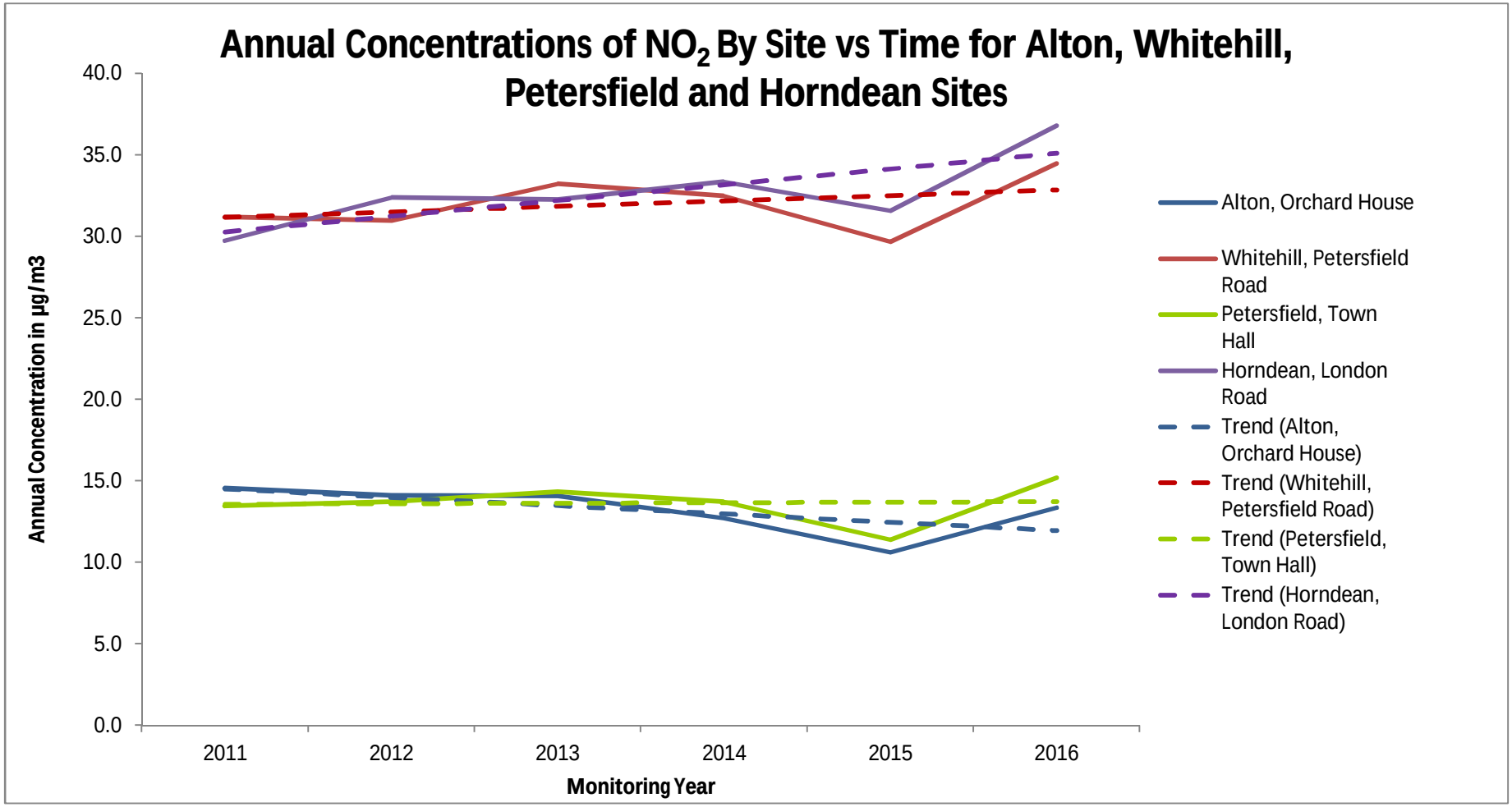


Table A.5 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2012	2013	2014	2015	2016
Bordon	Roadside	Automatic	95	95	0	0	0	0	0

Notes:

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

Information obtained from Air Quality Report (3).

Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.2 – NO_2 Monthly Diffusion Tube Results - 2016

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
AB1	14.5	13.0	13.6	10.5	9.2	8.9	7.0	8.5	11.3	15.5	18.1	19.5	12.5	13.4	N/A
BR4	37.9	36.6	28.3	33.2	34.4	32.6	32.4	32.5	38.2	37.8	44.3	46.0	36.2	38.7	N/A
BR7	36.5	38.9	27.6	32.3	33.1	36.1	30.0	30.2	40.0	34.8	43.4	44.3	35.6	38.1	N/A
BR1	23.8	19.5	18.5	15.0	12.1	13.5	12.6	12.6	15.6	14.8	23.7	20.8	16.9	18.1	N/A
BR2	21.0	19.0	18.9	19.7	20.5	20.9	17.4	17.8	22.4	25.6	28.5	28.4	21.7	23.2	N/A
BR3	27.8	26.1	25.8	21.8	21.7			19.9	23.6	28.0	34.7	33.5	26.3	28.1	N/A
BR5	34.2	29.2	33.8	36.8	37.7	43.0	24.1	28.4	38.2	45.1	43.1	43.9	36.5	39.0	N/A
BR8	31.9	27.5	35.1	31.8	35.2	34.3	21.4	25.2	33.6	37.4	39.2	42.5	32.9	35.2	N/A
BU1	11.2	10.8	10.5	9.5	8.5	8.3	6.0	6.7	10.0	13.6	16.3	19.1	10.9	11.6	N/A
BR6	20.9	19.3	21.6	18.9	20.2	19.1	14.9	15.4	21.5	23.3	28.7	31.2	21.2	22.7	N/A
BR6	21.7	19.9	21.8	18.8	21.2	19.6	13.1	16.0	20.6	25.2	28.1	30.2	21.3	22.8	N/A
BR6	21.1	20.2	23.0	17.0	20.8	19.2	14.4	14.2	21.1	23.7	28.1	30.1	21.1	22.5	N/A
WR1	31.5	31.7	30.7	29.0	29.2	30.6	24.1	26.4	32.2	37.4	40.5	43.4	32.2	34.5	N/A
PB1	15.1	17.0	13.6	11.0	11.0	11.3	8.9	9.7	13.5	17.3	20.3	21.8	14.2	15.2	N/A
HR1	42.1	37.1	32.4	30.2	30.2	28.4	25.2	27.4	36.0	33.9	41.0	48.8	34.4	36.8	N/A

HR7 (from 01/2016)	34.8	29.4	31.6	28.8	31.6	27.7	22.2	22.1	30.4	32.7	29.3	47.4	30.7	32.8	N/A

☒ **Local bias adjustment factor used**

☐ **National bias adjustment factor used**

☐ **Annualisation has been conducted where data capture is <75%**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

INTRODUCTION

Source Information

There have been no significant changes to source inputs.

Monitoring

This section contains information on the diffusion tube quality assurance and quality control techniques; the calculation and choice of bias factors.

There are no plans to reduce the monitoring carried out. The Bordon area monitoring is required to verify that the concentrations fall as is the anticipated by the regeneration project.

PM2.5 Information

Data has been obtained from the National Atmospheric Emissions Inventory and Chilbolton Observatory to improve understanding of the levels likely to be encountered locally but there are no proposals to conduct monitoring.

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 2016 available from the Local Air Quality Management Helpdesk Database (version 09/17)[18] at the time of writing this report was 1.01. This was based on 18 studies.

Factor from Local Co-location Studies

East Hampshire District Council carries out its own investigation of diffusion tube accuracy each year by carrying out a co-location study of nitrogen dioxide at the Bordon air quality station. The local bias adjustment factor is calculated using the spreadsheet available on the LAQM website at http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html[17]. The precision and accuracy of the co-located tubes is also calculated. For 2015 the spreadsheet provided a bias adjustment factor of 1.07 with a 95% confidence interval and this was used to adjust the annual means of single tubes.

Automated data capture was 99.9% providing sufficient data capture for all periods.

A copy of the spreadsheet used can be seen in Figure C.1 below.

Figure C.1 Image of Spreadsheet To Calculate Bias

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2016	03/02/2016	20.9	21.7	21.1	21	0.4	2	1.0
2	03/02/2016	02/03/2016	19.3	19.9	20.2	20	0.5	2	1.1
3	02/03/2016	30/03/2016	21.6	21.8	23.0	22	0.8	3	1.9
4	30/03/2016	27/04/2016	18.9	18.8	17.0	18	1.1	6	2.7
5	27/04/2016	25/05/2016	20.2	21.2	20.8	21	0.5	2	1.3
6	25/05/2016	29/06/2016	19.1	19.6	19.2	19	0.3	1	0.7
7	29/06/2016	27/07/2016	14.9	13.1	14.4	14	0.9	7	2.3
8	27/07/2016	24/08/2016	15.4	16.0	14.2	15	0.9	6	2.3
9	24/08/2016	28/09/2016	21.5	20.6	21.1	21	0.5	2	1.1
10	28/09/2016	26/10/2016	23.3	25.2	23.7	24	1.0	4	2.5
11	26/10/2016	30/11/2016	28.7	28.1	28.1	28	0.3	1	0.9
12	20/11/2016	04/01/2017	31.2	30.2	30.1	31	0.6	2	1.5
13									

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

Automatic Method	
Period Mean	Data Capture (% DC)
21.5	99.9
24.1	99.9
26.4	99.4
21.7	99.6
21	99.7
18	99.9
13	99.9
15	99.6
22	99.9
29	99.7
28.2	99.6
30.5	99.9
Overall survey -->	

Data Quality Check	
Tubes Precision Check	Automatic Monitor Data
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good precision	Good Overall DC

(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	1.07 (1 - 1.14)
Bias B	-6% (-12% - 0%)
Diffusion Tubes Mean:	21 µgm^{-3}
Mean CV (Precision):	3
Automatic Mean:	23 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	23 (21 - 24) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	1.07 (1 - 1.14)
Bias B	-6% (-12% - 0%)
Diffusion Tubes Mean:	21 µgm^{-3}
Mean CV (Precision):	3
Automatic Mean:	23 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	23 (21 - 24) µgm^{-3}

Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Discussion of Choice of Factor to Use

For 2016 both local and national bias adjustment factors are available. The locally obtained bias adjustment factor has been applied to the 2016 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 2016 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 2016 with the different bias adjustment factors applied to them is provided in Table C2 below.

Site ref	Site ID	Site	Adjusted with local bias ($\mu g/m^{-3}$)	Adjusted with national bias ($\mu g/m^{-3}$)	Difference (local-national)
AB1	81836	Alton, Orchard House	13.4	12.6	0.7
BR4	84294	Bordon, o/s Corals (1), Chalet Hill	38.7	36.6	2.2
BR7	86516	Bordon, o/s Corals (2), Chalet Hill	38.1	36.0	2.1
BR1	84300	Bordon, Ashmead	18.1	17.1	1.0
BR2	84299	Bordon, Chalet Court	23.2	21.9	1.3
BR3	85311	Bordon, o/s 10 Chalet Hill	28.1	26.5	1.6
BR5	84308	Bordon, High Street (1)	39.0	36.8	2.2
BR8	86517	Bordon, High Street (2)	35.2	33.3	2.0
BU1	86396	Bordon, o/s Bassenthwaite Gardens	11.6	11.0	0.7
BR6	84309	Bordon, Air Quality Cabin (1)	22.7	21.5	1.3
BR6	84310	Bordon, Air Quality Cabin (2)	22.8	21.6	1.3
BR6	84311	Bordon, Air Quality Cabin (3)	22.5	21.3	1.3
WR1	85312	Whitehill, Petersfield Road	34.5	32.5	1.9
PB1	81834	Petersfield, Town Hall	15.2	14.3	0.9
HR1	85314	Horndean, London Road	36.8	34.7	2.1
HR7	87593	Horndean, Gales Brewery (New site)	32.8	31.0	1.8

Compared to national bias adjustment the local adjustment provides a higher reading. In 2015 the relationship was reversed and the local bias adjustment provided a lower value.

Discussion of Distance correction

Based on advice from the LAQM Helpdesk no distance calculation to the relevant receptor has been applied.

The Helpdesk (6)recommended that the distance calculation only be applied where the concentration was in excess of 40ug/m3; and that it was inaccurate and more so in areas where there are building wake effects such as the locations in Bordon where the diffusion tubes are located in streets with buildings either side.

Appendix D: Maps of Monitoring Locations

Bordon Continuous Air Quality Monitoring Station

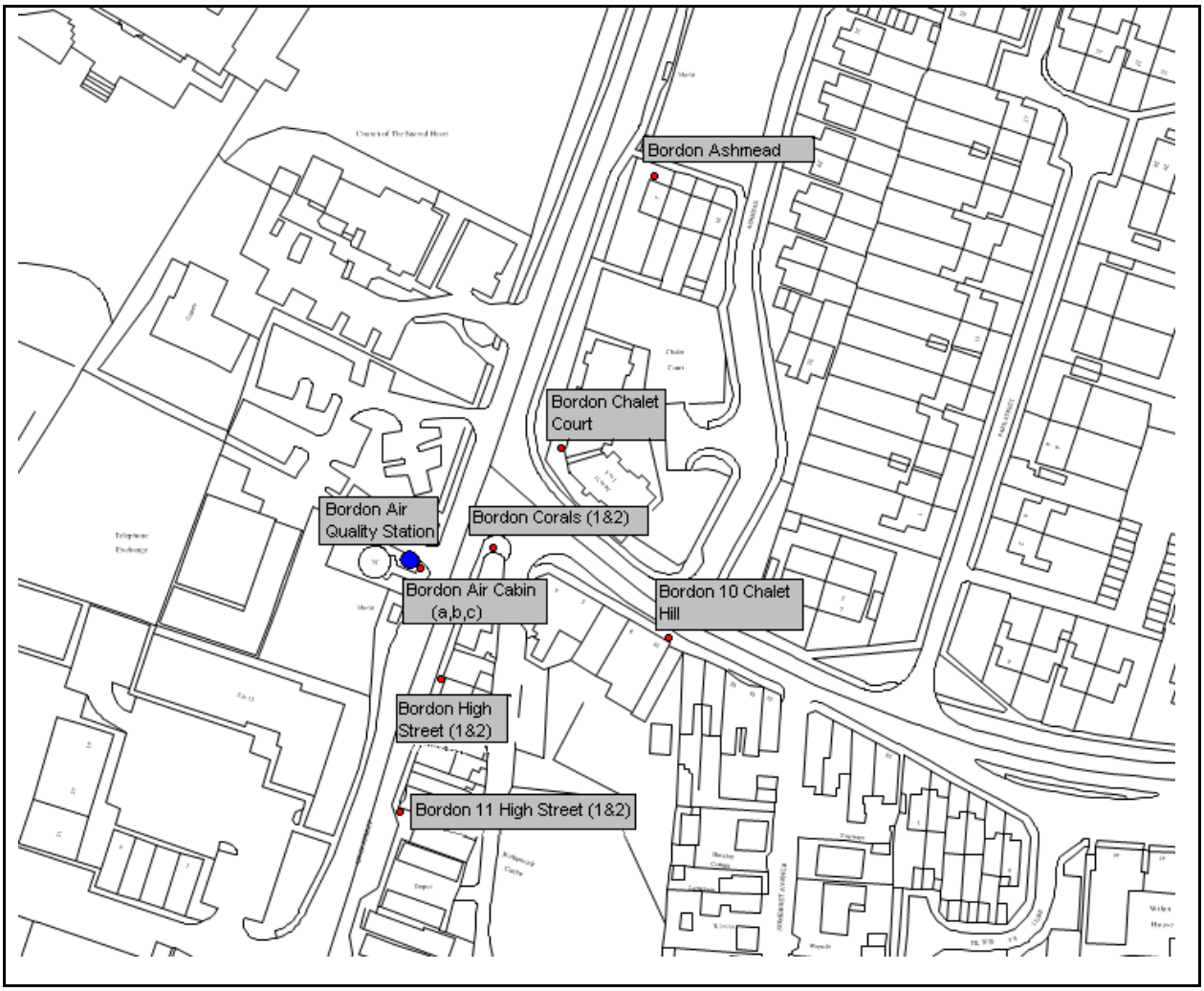
A325 High Street, Bordon near junction with Chalet Hill

Diffusion Tube Monitoring Location:

Alton, Orchard House

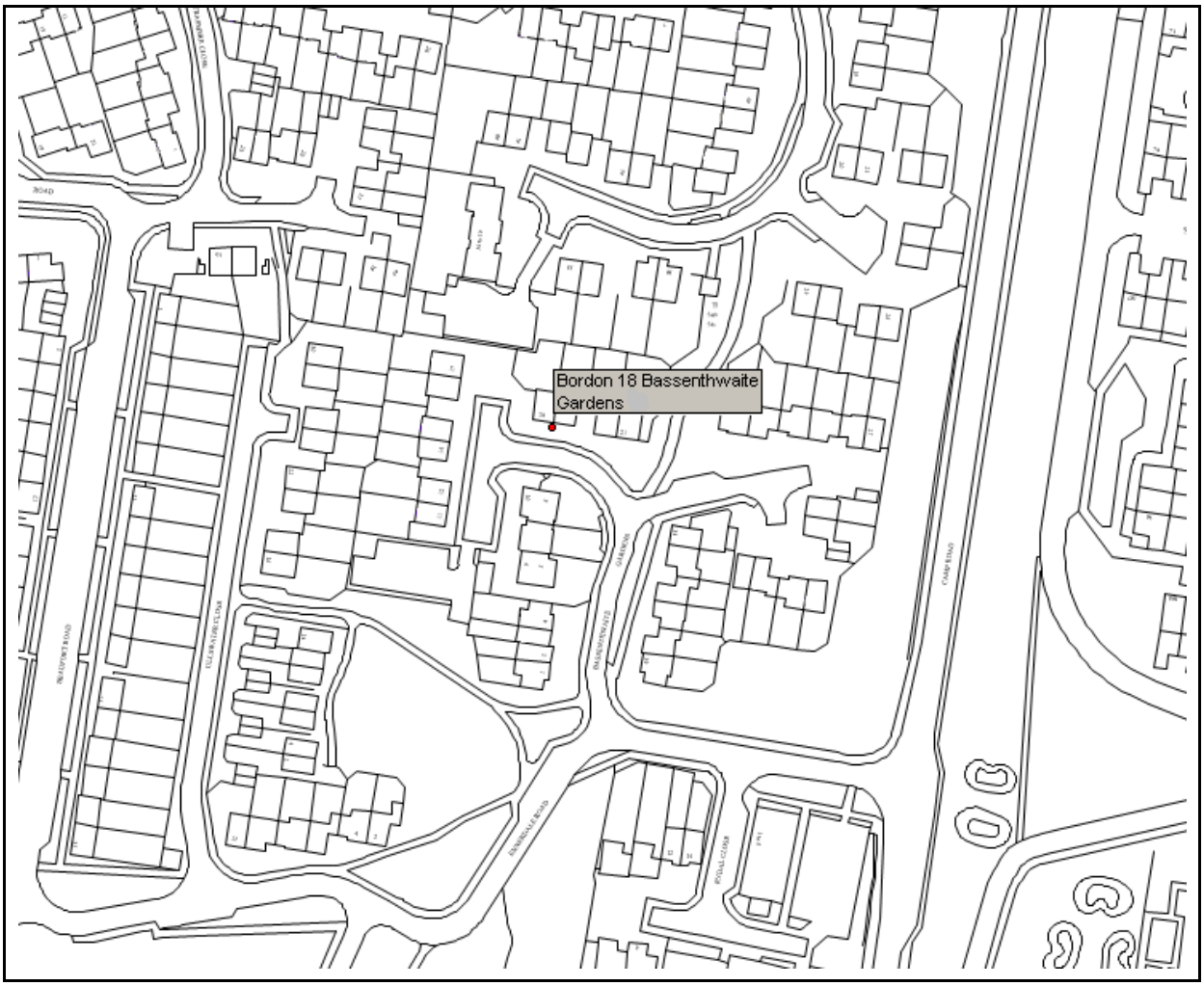
Diffusion Tube Monitoring Location:

Bordon, A325/Chalet Hill



Diffusion Tube Monitoring Location

Bordon, Bassenthwaite Gardens



Diffusion Tube Monitoring Location:

Whitehill, Petersfield Road

Diffusion Tube Monitoring Location:

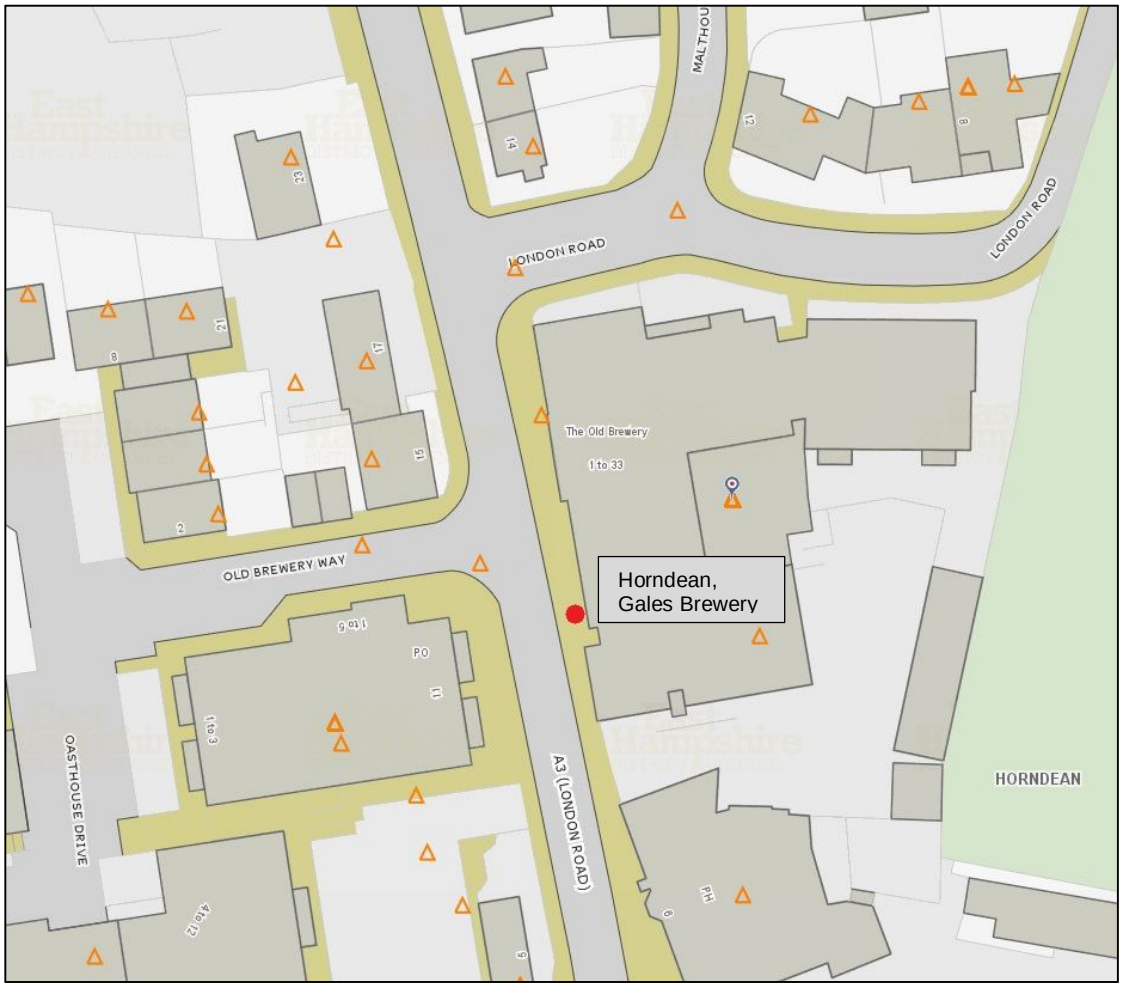
PB1 – Petersfield, Town Hall

Diffusion Tube Monitoring Location:

HR1 - Horndean, London Road

Diffusion Tube Monitoring Location:

HR7 - Horndean, Gales Brewery



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[5]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

Table E.2 Standards for $PM_{2.5}$

Pollutant	Air Quality Standard (England only)	
	Requirement	Measured as
Particulate Matter ($PM_{2.5}$)	Work towards reducing emissions/concentrations of fine particulate matter ($PM_{2.5}$)	Annual mean

(See Table 1.1, page 1-3 LAQM.TG16)

Table E.3 EC Directive 2008/50/EC Recommendations for $PM_{2.5}$

Pollutant	Air Quality Standard	
	Requirement	Measured as
Particulate Matter ($PM_{2.5}$)	20 µg/m^3 limit by 01/01/2020	Annual mean
	Work towards reducing emissions/concentrations of fine particulate matter ($PM_{2.5}$)	Annual mean

[5] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

1. DEFRA. Background Mapping data for local authorities. DEFRA. [Online] Department of Environment Food & Rural Affairs. [Cited: 12 June 2016.] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011.

2. Public Health England. Estimating Local Mortality Burdens associated with air pollution. s.l. : Public Health England, 2014.

3. AQDM on behalf of East Hampshire District Council. Air Quality Report East Hampshire Bordon 2016. s.l. : AQDM, 2016.

4. AEA Energy & Environment. AEA_DifTPAB_V04.xls Checking Precision and Accuracy of Triplicate Tubes. 2011.

5. World Health Organization. Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005 Summary of risk assessment. s.l. : World Health Organization, 2006.

6. Telephone conversation with LAQM Helpdesk on 16 October 2017.