



2016 Air Quality Annual Status Report (ASR)

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

October 2016

Hastings Borough Council

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Executive Summary: Air Quality in Our Area

Air Quality in Hastings Borough Council

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 billion³. Improving air quality can benefit those who may find their conditions are made worse through exposure to air pollution, for example people with heart or lung conditions. More information about the health effects of air pollution can be found at:

http://www.hastings.gov.uk/environmentalhealth/pollution/air/health_effects/

PM₁₀ has been measured at Bulverhythe since 2001. While the annual mean PM₁₀ concentration has never exceeded the annual objective concentration of 40 µg m⁻³, exceedance of the 50 µg m⁻³ daily mean objective concentration lead to declaration of an Air Quality Management Area (AQMA) in 2003⁴. The AQMA encompasses properties between the junction of the A259 (Bexhill Road) and Harley Shute Road, and number 576 Bexhill Road on its northern side, and numbers 211 to 585 Bexhill Road on its southern side. The monitoring station at Bulverhythe is located with the AQMA.

The Air Quality Action Plan published in 2005 showed that over half of the annual mean PM₁₀ concentration originated from regional background sources but nearly a quarter originated from resuspension of dust and 9 % from direct exhaust emissions from Bexhill Road. Dust suppression measures such as wheel washing and increased road sweeping were subsequently put in place to control PM₁₀ concentrations.

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

⁴ 08/12/2003

The number of exceedances of the daily mean value above $50 \mu\text{g m}^{-3}$ peaked at 62 per year in 2003 but have decreased significantly since then. Since 2011 the number of exceedances of the daily mean value above $50 \mu\text{g m}^{-3}$ has decreased to less than 5 a year providing the evidence that the AQMA within Hastings Borough can be revoked.

Monitoring of nitrogen dioxide occurs also at Bulverhythe by a continuous monitor and at fourteen other locations by diffusion tubes. Nitrogen dioxide concentrations at Bulverhythe are consistently below the annual objective concentration of $40 \mu\text{g m}^{-3}$. Elsewhere within the Borough concentrations were less than $40 \mu\text{g m}^{-3}$ in 2015 but nitrogen monitoring should continue at these locations as exceedance was measured at two locations in 2014 (71 and 81 Bexhill Road).

Actions to Improve Air Quality

Hastings Borough Council has taken forward a number of initiatives during the current reporting year of 2015 in pursuit of improving local air quality.

Local Priorities and Challenges

In order to fulfil its goal in producing quantifiable outcomes to timescale all delivery partners, such as East Sussex County Council, need to take responsibility and engage constructively in the process.

How to Get Involved

Road vehicles are a major source of many pollutants in urban areas. They produce over 50 per cent of the emissions of nitrogen oxides in the UK.

Before using your car, ask yourself:

- do I really need to make this journey?
- could I walk or cycle instead of taking the car?
- could I take a bus, tram or train?
- are the levels of air pollution already too high today?

If you must drive:

- drive smoothly. You'll save fuel, and your engine will also pollute less;

- don't rev your engine unnecessarily;
- maintain your car. Keep the engine properly tuned and the tyres at the right pressure; and
- turn off the engine when your car is stationary.

At home

- Buy water-based or low-solvent paints, varnishes, glues and wood preservatives.
- Avoid burning solid fuels if possible. If you live in a smoke control area, burn only authorised smokeless fuels (your local authority can advise you).
- Avoid lighting bonfires, but if you must, don't light them when pollution levels are high or while the weather is still and cold. Only burn dry material and never burn household waste, especially plastic, rubber, foam or paint. Levels of pollution can be quite high on bonfire night and other events/festivals with bonfires, and sensitive people, including people with respiratory conditions, may notice some effects. However exposure can be considerably reduced by remaining indoors and keeping windows closed.

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1 Local Air Quality Management

This report provides an overview of air quality in Hastings Borough 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 Hastings Borough 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 the objectives.

A summary of the AQMA declared by Hastings Borough Council can be found in Table 2-1.

Table 2-1 Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
AQMA 1	<ul style="list-style-type: none"> PM₁₀ 24-hour mean 	Bulverhythe, Hastings	An area encompassing properties between the junction of the A259 (Bexhill Road) and Harley Shute Road, and number 576 Bexhill Road on its northern side, and numbers 211 to 585 Bexhill Road on its southern side.	Draft action plan found at: http://hastings.modern.gov.co.uk/Data/Cabinet/20051031/Agenda/\$Air%20Quality%20Action%20Plan%20(31%2010%2005).doc.pdf

Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at:

https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=123

The AQMA is shown on the LAQM website and can accessed by clicking on the hyperlink: https://uk-air.defra.gov.uk/aqma/details?aqma_id=64. The AQMA is also shown in

Figure 2-1.

Figure 2-1: The extent of the AQMA along Bexhill Road in Hastings



2.2 Progress and Impact of Measures to address Air Quality in Hastings Borough Council

Hastings Borough Council has taken forward a number of 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 2-2. This action plan was issued in 2005 and provides a comprehensive listing of possible measures to improve air quality.

Key completed measures are:

- Closure of Freshfields waste transfer site in 2008
- Opening of the Bexhill to Hastings link road late 2015

Hastings Borough Council expects the following measures to be completed over the course of the next reporting year:

- Queensway Gateway Road due to be started in 2016
- Proposed dedicated bus lane from Filsham Road to Glyne Gap due to be put in place 2016/17.

These measures are expected to continue to reduce PM₁₀ and NO₂ concentrations within Hastings Borough Council

Hastings Borough Council's priorities for the coming year are:

- Continue to take measures that will improve air quality

Table 2-2 Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	The construction of the Link Road, which will reduce traffic flows in the Air Quality Management Area	Traffic management	UTC, Congestion Management, Traffic Reduction	ESCC		2014	Restrain or reduce traffic volumes in AQMA	Y	Completed	December 2015	COMPLETED IN 2015 IMPROVEMENT IN AIR QUALITY OBSERVED IN AQMA 2016, AQMA TO BE REVOKED BY MARCH 2017
2	A feasibility design project to further investigate the provision of a bus lane from Glyne Gap to the junction of Filsham Road	Traffic management	UTC, Congestion Management, Traffic Reduction	ESCC /BUS COMPANIES	2016	2016	Restrain or reduce traffic volumes in AQMA	Y	AWAITING START DATE IN 2016	JANUARY 2017	AWAITING METHOD STATEMENT AND TIMETABLE OF WORKS FROM ESCC
3	A feasibility design project to consider options to upgrade the current SCOOT traffic signal management system and potential bus lane priority measures on the Glyne Gap to the junction of Filsham Road and seafront east to town centre at Pelham Place	Traffic management	UTC, Congestion Management, Traffic Reduction	ESCC			Restrain or reduce traffic volumes in AQMA	Y	THE UPGRADING OF THE A259 SCOOT TRAFFIC MANAGEMENT WILL BE CONSIDERED NOW THE BEXHILL-HASTINGS LINK ROAD HAS BEEN COMPLETED		
4	The extension of Real Time bus information systems into Hastings	Promoting Travel Alternatives	Personalised Travel Planning	ESCC/QBP		2017		Y	Still under consideration by escs AND QBP	ONGOING	

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Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5	The implementation of travel choice measures to manage demand to travel by car.	Promoting Travel Alternatives	Personalised Travel Planning	ESCC/HBC	N/A	2015	Restrain or reduce traffic volumes in AQMA	Y	The Council has its own Staff Transport Plan including various initiatives to encourage alternative modes of transport to the car		
6	Provision of Cycle facilities between Bexhill and Hastings	Transport Planning & Infrastructure	CYCLE NETWORK	HBC / SUSTRANS	N/A	2013	Restrain or reduce traffic volumes in AQMA	Y	COMPLETED	COMPLETED	
7	Rapid vehicle charging network OLEV funded project with electromotive	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, and Gas fuel	Sussex Air Quality Partnership			Rapid, fast and slow electromotive charge choices in HBC and Sussex	Wider Area with potential benefits for more than one AQMA	Implemented, use is monitored on the network	COMPLETE	Infrastructure part of wider South East network
8	Actively seek alternative renewable solutions and avoid combustion plant in the AQMA	Avoid Combustion Plant and Seek Alternatives	Other measure for low emission fuels for stationary and mobile sources	HBC Active via the planning process	2005	2005	Solid fuel burning prone to emission peaks on starting up. NOx and PM higher than for oil and coal	YES	ONGOING	ONGOING	Appropriate location for carbon saving strategies such as wood burning is not likely to be in high density AQMAs

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Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
8	Taxi Licence Policy	Promoting Low Emission Transport	Taxi emission incentives	Taxi Licence Forum	2014/15	2015/16	Increase Petrol Hybrid and Retrofit Taxis	Yes	Considered by Committee	2016/17	Taxis can Licence in other LAs so scope needs to be wider
9	Encourage domestic solid fuel burning to use smokeless fuels and exempt appliances	Domestic Solid Fuel Burning	Clean Air Act	Environmental Protection Team duties relating to Statutory Nuisance and the Clean Air Act	2013	NOW	Less NOx, PM and smoke reduction of indoor CO	Y	Public Engagement	Constant	Reduce complaints from solid fuel burning in the home
10	Households and building trade to avoid fires to dispose of waste in the aqma	domestic solid fuel burning	statutory nuisance	environmental protection team duties relating to complaints and nuisance	2005	2005-	less nox, pm and smoke	web information	advice given when complaint received	ongoing	reduce complaints

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

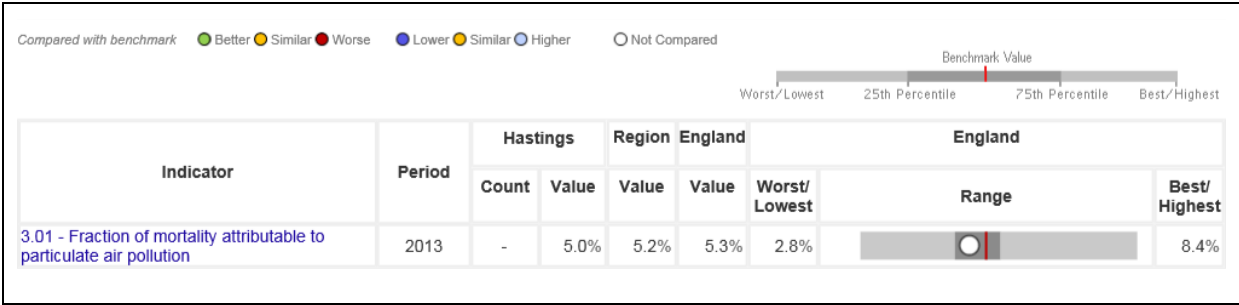
As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM_{2.5} has a significant impact on human health,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

Work carried out by Public Health England as part of the Public Health Outcomes Framework (PHOF) shows that the mortality associated with particulate air pollution within Hastings Borough Council is 5.0 %. This information is available from the following web link:

<http://www.phoutcomes.info/search/air%20quality#page/1/gid/1/pat/6/par/E12000008/ati/101/are/E07000062/iid/30101/age/230/sex/4>

Figure 2-2 shows that the mortality calculated for Hastings Borough Council is slightly less than that calculated for south east England (5.2 %) and England (5.3 %) as a whole.

Figure 2-2 Fraction of mortality attributed to particulate air pollution in Hastings Borough Council



Hastings Borough Council is currently developing its approach to address PM_{2.5} in partnership with public health local authority officers. The approach to address PM_{2.5} will be reported on in the 2017 Annual Status report.

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.

Hastings Borough Council undertook automatic (continuous) monitoring at one site during 2015. This site, at Bulverhythe, forms part of the Sussex-Air Air Quality Partnership. Further information, including site description and monitoring data, can be obtained from the following web link:

<http://www.sussex-air.net/AQNearMe/Monitoring/SiteDetails.aspx?SiteCode=HT1&SiteName=Hastings%20-%20Bulverhythe>

Table A.1 in Appendix A shows the details of the sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. 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

Hastings Borough Council undertook non- automatic (passive) monitoring of NO₂ at 14 sites during 2015. Table A.2 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) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

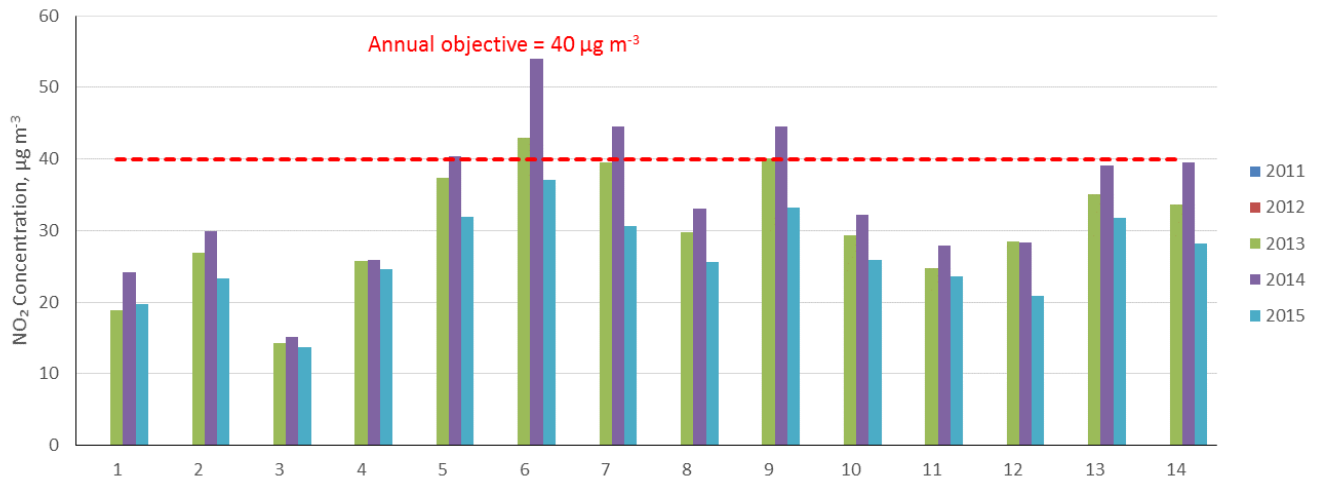
The air quality monitoring results presented in this section are, where relevant, adjusted for “annualisation” and bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in Appendix A compares the monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40 µg m⁻³. In 2015, the annual mean concentration was below the annual objective concentration at all sampling sites after the bias adjustment factor was applied. Hence, there is no need to apply a distance correction factor from diffusion tube location to point of nearest exposure⁵. Figure 3-1 compares the non-distance corrected concentration for all years for which monitoring data is available. Although concentrations showed a significant reduction from 2014 to 2015 monitoring will continue to ensure that the concentration remains below the annual objective concentration

⁵ Three sites (Site 6, Bexhill Road Boat; site 7, 81 Bexhill Road and Site 9, 71 Bexhill Road) showed an exceedance of the annual objective concentration (40 µg m⁻³) in 2014, however, after the distance correction was applied from monitoring location to point of nearest relevant exposure, concentrations remained above the annual objective at two sites: Site 7(81 Bexhill Road) and Site 9 (71 Bexhill Road).

Figure 3-1 Annual NO₂ concentration as measured by diffusion tube within Hastings Borough Council



The full 2015 dataset of monthly mean values is provided in Appendix B. As there were eleven sampling periods in the year the annual average concentration was derived using time weighted annual means. Concentrations were adjusted for bias using a factor of 0.88 (see Appendix C). Data capture was significantly better than 2014 with only Site 7 (81 Bexhill Road) showing a data capture less than 75 % (69 %). The data at this site was annualised using data from Brighton Park, Eastbourne and Portsmouth obtained from UK-AIR. The annualisation factor was 0.93

Table A.4 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations measured at Bulverhythe for the past 5 years with the air quality objective of 200 µg m⁻³, not to be exceeded more than 18 times per year. There were no exceedances of the hourly concentration threshold at any point during the last five years.

As the annual average concentrations at diffusion tube sites were significantly less than 60 µg m⁻³ it is also highly unlikely that there is exceedance of the 1-hour mean objective at these sites.

3.2.2 Particulate Matter (PM₁₀)

Table A.5 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 40 µgm⁻³. Figure 3-2 shows that the annual mean concentration remains significantly below the annual objective concentration.

Figure 3-2 Annual mean PM₁₀ concentration measured at Bulverhythe

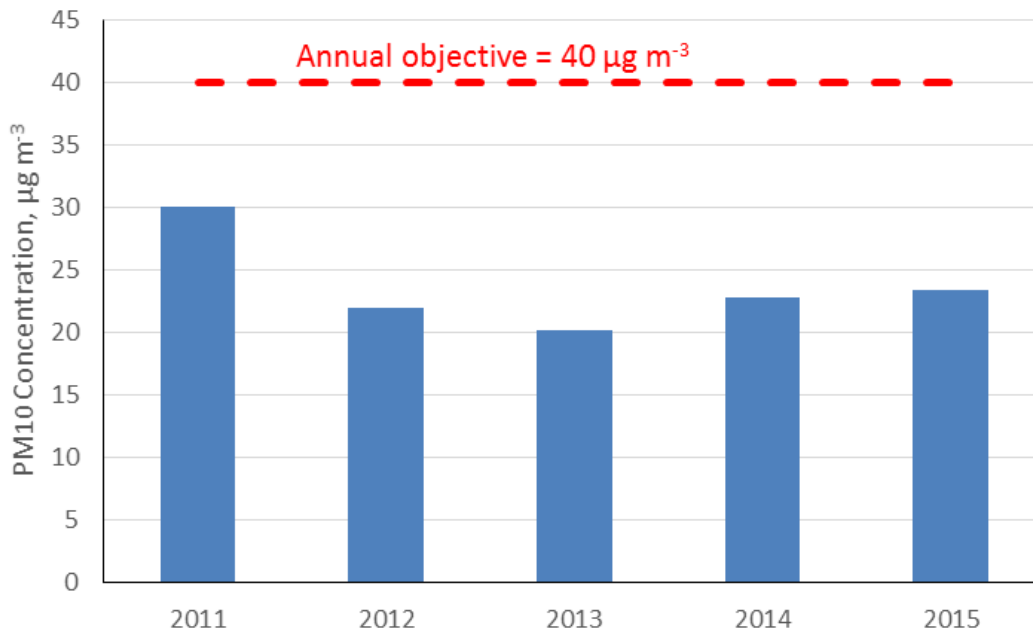


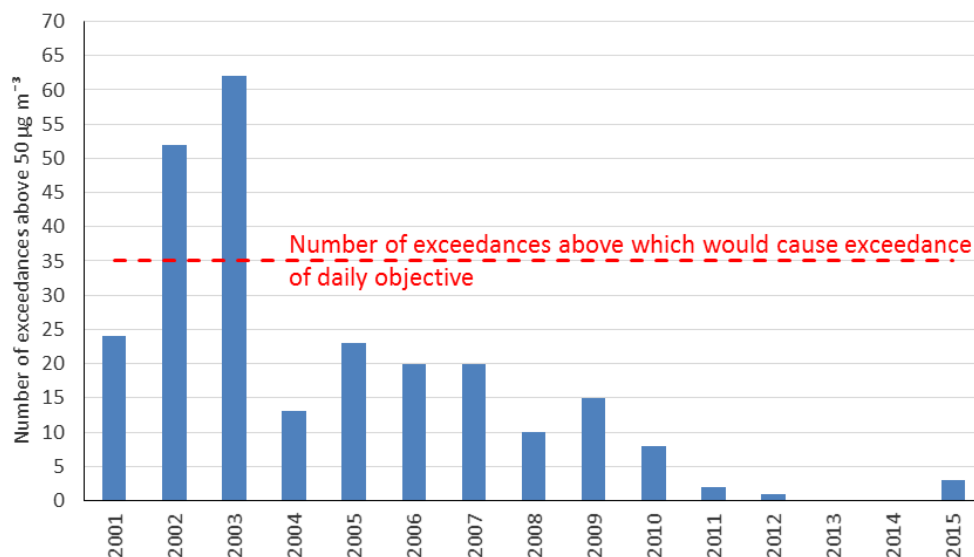
Table A.6 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50 µg m⁻³, not to be exceeded more than 35 times per year.

However, PM₁₀ monitoring began at Bulverhythe in June 2001. The number of exceedances of the daily mean above 50 µg m⁻³ and the associated data capture are shown in Table 3-1. Figure 3-3 compares the number of exceedances of the daily mean objective of 50 µg m⁻³ with the daily mean objective (no more than 35 exceedances a year). The largest reduction in daily exceedances actually occurred from 2003 (62 exceedances) to 2004 (13 exceedances). Since 2011 the number of measured exceedances have been less than 5 each year. Such a small of exceedances provides the required evidence that the AQMA within Hastings Borough can be revoked.

Table 3-1 Number of exceedances of daily mean objective of 50 µg m⁻³ and the associated data capture at Bulverhythe since 2001

Year	Number of days above 50 µg m ⁻³	Data Capture (%)
2001	24 ⁶	48
2002	52	78
2003	62	96
2004	13	94
2005	23	87
2006	20	84
2007	20	88
2008	10	93
2009	15	95
2010	8	100
2011	2	97
2012	1	92
2013	0	44
2014	0	61
2015	3	86

Figure 3-3 Number of exceedances of daily mean objective of 50 µg m⁻³ at Bulverhythe since 2001



⁶While the data extracted from the Sussex-Air website had only 48 % data capture for 2001, the 2005 Air Quality Action Plan used an extrapolation method to estimate that there were 48 exceedances of the daily objective of 50 µg m⁻³.

Appendix A: Monitoring Results

Table A.1 – 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)
HT-1	Hastings-Bulverhythe	Roadside	577633	108726	NO ₂ ; PM ₁₀	Y	Chemiluminescent; TEOM ³	5	3	

(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.

(3) PM₁₀ concentrations have had the VCM corrections applied.

Table A.2 – 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)
1	St Luke's Church, Alma Terrace	Roadside	580831	109964	NO ₂	N	1	1	N	2
2	Carlisle Parade	Roadside	581496	109288	NO ₂	N	5	1	N	2.5
3	Manor Road	Roadside	582223	110361	NO ₂	N	0	10	N	2.5
4	Ore Church Old London Road	Roadside	583610	111325	NO ₂	N	0	2	N	2.5
5	Harley Shute	Roadside	578382	109601	NO ₂	Y	10	1	N	2
6	Bexhill Road Boat	Roadside	576770	108101	NO ₂	Y	15	1.5	N	2.5
7	81 Bexhill Road	Roadside	578500	108771	NO ₂	N	0.2	1.5	N	2.5
8	45 Bexhill Road	Roadside	578637	108798	NO ₂	N	1.5	2.8	N	2
9	71 Bexhill Road	Roadside	578532	108776	NO ₂	N	0.5	0.45	N	2.5
10	138 Bexhill Rd	Roadside	578290	108819	NO ₂	N	1.5	2	N	2
11	Railway Bridge Bexhill Rd	Roadside	578447	108794	NO ₂	N	10	3	N	2.5
12	West Marina Gardens	Roadside	578946	108746	NO ₂	N	10	0.5	N	2.5
13	104 Bohemia Rd	Roadside	580252	110058	NO ₂	N	0.5	1.5	N	2
14	116 Bohemia Road	Roadside	580246	110064	NO ₂	N	0.5	1.5	N	2

(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.3 – Annual Mean NO₂ Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2011	2012	2013	2014	2015
HT1	Bulverhyde	Roadside	CM	93.6	93.6	22	22	28 (25.2)	22 (23.3)	18.8
1	St Luke's, 19 Barnfield Close	Roadside	DT	100	100			18.9	24.2	19.7
2	Carlisle Parade	Roadside	DT	92	92			26.9	29.9	23.3
3	Manor Road	Roadside	DT	90	90			14.3	15.2	13.7
4	Ore Church, Old London Road	Roadside	DT	100	100			25.7	25.9	24.6
5	Harley Shute	Roadside	DT	79	79			37.4	40.4 (27.7)	31.9
6	Bexhill Road Boat	Roadside	DT	100	100			42.9 (28.2)	54.9 (33.9)	37.1
7	81 Bexhill Road	Roadside	DT	69	69			39.5 (39.5)	44.6 (44.6)	30.6
8	45 Bexhill Road	Roadside	DT	100	100			29.7	33.1	25.6
9	71 Bexhill Road	Roadside	DT	100	100			40.1 (39.7)	44.5 (44.1)	33.2
10	139 Bexhill Road	Roadside	DT	100	100			29.3	32.2	25.9
11	Bexhill Rd rail bridge	Roadside	DT	100	100			24.7	27.9	23.6
12	West Marina Gardens	Roadside	DT	100	100			28.5	28.4	20.8
13	114 Bohemia Road	Roadside	DT	100	100			35.1	39.1	31.8
14	116 Bohemia Road	Roadside	DT	92	92			33.7	39.5	28.3

Notes: Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 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 Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 – 1-Hour Mean NO₂ Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
						2011	2012	2013	2014	2015
HT1	Bulverhythe	Roadside	Automatic	94	94	0	0	0 (84)	0 (96)	0 (72)

Notes: Exceedances of the NO₂ 1-hour mean objective (200µg/m³ 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.

Table A.5 – Annual Mean PM₁₀ Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2011	2012	2013	2014	2015
HT1	Bulverhythe	Roadside	Automatic	86	86	30	22	20.6 (20.2)	21.6 (22.8)	23.3

Notes: Exceedances of the PM₁₀ annual mean objective of 40µg/m³ 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) All means have been “annualised” as per Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	PM10 Daily Mean > 50µg/m ³ ⁽³⁾				
						2011	2012	2013	2014	2015
HT1	Bulverhythe	Roadside	Automatic	86	86	2	1	0 (31)	0 (30)	3 (36)

Notes: Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 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 90.4th percentile of 24-hour means is provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2015

ID	Site Name	NO ₂ Mean Concentrations (µg/m ³) for each of the eleven sampling periods											Annual Mean	
		08/12/14- 22/01/15	22/01/15- 19/02/15	19/02/15- 19/03/15	19/03/15- 22/04/15	22/04/15- 21/05/15	21/05/15- 30/06/15	30/06/15- 07/08/15	07/08/15- 18/09/15	18/09/15- 19/10/15	19/10/15- 20/11/15	20/11/15- 04/01/16	Raw Data	Bias Adjusted ⁽¹⁾
1	St Luke's 19 Barnfield Close	30.1	29.9	27.3	21.8	19.3	18.1	21.9	20.7	22.0	21.8	19.7	22.4	19.7
2	Carlisle Parade	29.2	35.5		28.9	25.2	23.3	25.2	28.1	29.5	25.8	18.5	26.5	23.3
3	Manor Road	20.7	20.3	16.3	17.3	13.3	12.7		14.1	15.7	16.1	12.5	15.5	13.7
4	Ore Church Old London Road	30.8	32.6	31.3	32.5	24.7	23.3	28.9	27.6	27.6	29.3	22.6	28.0	24.6
5	Harley Shute	44.1	47.3	48.0	38.1	33.1			33.9	33.4	35.4	21.9	36.2	31.9
6	Bexhill Road Boat	41.1	50.7	45.6	47.6	39.9	42.5	50.6	25.8	46.0	49.2	32.0	42.2	37.1
7	81 Bexhill Road	37.3	46.4	39.3		36.0			39.1	37.9	40.0	27.1	34.7	30.6 (28.3) ²
8	45 Bexhill Road	8.0	34.9	31.3	33.2	33.1	27.8	27.7	30.4	28.6	34.6	26.3	29.1	25.6
9	71 Bexhill Road	43.5	45.2	38.9	42.0	37.6	29.1	38.3	39.2	34.9	44.3	28.0	37.7	33.2

ID	Site Name	NO ₂ Mean Concentrations (µg/m ³) for each of the eleven sampling periods											Annual Mean	
		08/12/14-22/01/15	22/01/15-19/02/15	19/02/15-19/03/15	19/03/15-22/04/15	22/04/15-21/05/15	21/05/15-30/06/15	30/06/15-07/08/15	07/08/15-18/09/15	18/09/15-19/10/15	19/10/15-20/11/15	20/11/15-04/01/16	Raw Data	Bias Adjusted ⁽¹⁾
		10	138 Bexhill Rd	33.0	39.6	34.8	35.1	27.9	22.0	21.8	30.7	31.4		
11	Railway Bridge Bexhill Rd	31.5	36.2	26.2	29.2	26.8	23.0	18.8	19.9	27.4	38.5	25.0	26.8	23.6
12	West Marina Gardens	29.8	31.4	30.3	29.3	26.2	21.4	18.4	26.2	17.1	17.0	18.8	23.7	20.8
13	104 Bohemia Rd	47.6	50.6	36.1	35.8	31.2	27.6	37.5	39.6	38.9	32.6	28.0	36.1	31.8
14	116 Bohemia Road	44.2	45.4		28.0	27.0	26.2	30.4	33.9	30.5	40.6	23.4	32.1	28.3

(1) See Appendix C for details on bias adjustment

(2) An annualised adjustment factor of 0.93 was applied to 81 Bexhill Road. Derivation of annualised factor is also shown in Appendix C

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

QA/QC of automatic monitoring data

The site is part of the Sussex Air Quality Network; hence the standards of QA/QC are similar to those of the government's AURN sites. The calibrations and filter change data are sent to the Environmental Research Group (ERG) at Kings College, London on a fortnightly basis.

The ERG collect data from the instruments on a daily basis, verifying the data against other monitoring stations in the south-east and ratifying it using the calibration information supplied. The Local Site Operations (LSO) duties are carried out by trained officers from the Council.

Diffusion Tube Bias Adjustment Factors

Diffusion tubes may systematically under or over-read NO₂ concentrations when compared to the reference chemiluminescence analyser. This is described as bias and can be corrected to improve the accuracy of the diffusion tube results, using a suitable bias adjustment factor. Hastings Borough Council's diffusion tubes are prepared and analysed by Gradko using the 20% TEA in water method. This laboratory takes part in the QA/QC Field Intercomparison, operated on behalf of DEFRA

The diffusion tube national adjustment factor spreadsheet is shown in below. The national adjustment factor derived from the spreadsheet was 0.88. The adjustment of 0.88 has been used to adjust all diffusion tubes results in 2015.

National Diffusion Tube Bias Adjustment Factor Spreadsheet		Spreadsheet Version Number: 06/16									
Follow the steps below in the correct order to show the results of relevant co-location studies											
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods										This spreadsheet will be updated at the end of September 2016	
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet										LAQM Helpdesk Website	
This spreadsheet will be updated every few months, the factors may therefore be subject to change. This should not discourage their immediate use.											
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.						Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.					
Step 1:			Step 2:			Step 3:			Step 4:		
Select the Laboratory that Analyses Your Tubes from the Drop-Down List			Select a Preparation Method from the Drop-Down List			Select a Year from the Drop-Down List			Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.		
If a laboratory is not shown, we have no data for this laboratory.			If a preparation method is not shown, we have no data for this method at this laboratory.			If a year is not shown, we have no data.			If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953		
Analysed By ¹	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ²	Bias Adjustment Factor (A) (Cm/Dm)	
1898	Gradko	20% TEA in water	2015	R	Ards and North Down Borough Council	12	38	26	48.6%	G	0.67
1900	Gradko	20% TEA in water	2015	UC	Breckland Council	12	30	29	1.5%	G	0.99
1901	Gradko	20% TEA in water	2015	R	Cheltenham Borough Council	12	35	35	2.7%	G	0.97
1909	Gradko	20% TEA in water	2015	R	Lisburn & Castlereagh City Council	10	36	29	24.8%	G	0.80
1910	Gradko	20% TEA in water	2015	R	Luton Borough Council	12	46	44	6.0%	G	0.94
1914	Gradko	20% TEA in water	2015	R	Monmouthshire County Council	12	41	37	11.0%	G	0.90
1917	Gradko	20% TEA in water	2015	B	Pembrokeshire Council	10	4	3	36.7%	G	0.73
1928	Gradko	20% TEA in water	2015	R	City of Lincoln Council	12	39	33	17.9%	G	0.85
1930	Gradko	20% TEA in water	2015	R	Borough Council of King's Lynn and West Norfolk	12	29	22	32.5%	G	0.75
1931	Gradko	20% TEA in water	2015	R	Cheshire West and Chester	10	38	40	-5.2%	G	1.06
1932	Gradko	20% TEA in water	2015	R	Dudley MBC	12	47	50	-5.9%	G	1.06
1933	Gradko	20% TEA in water	2015	R	Dudley MBC	12	40	35	14.0%	G	0.88
1934	Gradko	20% TEA in water	2015	R	Dudley MBC	12	34	31	10.0%	G	0.91
1935	Gradko	20% TEA in water	2015	UB	Dudley MBC	11	23	19	20.9%	G	0.83
1955	Gradko	20% TEA in water	2015	KS	Marylebone Road Intercomparison	12	102	81	26.2%	G	0.79
1976	Gradko	20% TEA in water	2015	UB	Liverpool	12	20	22	-9.0%	G	1.10
1980	Gradko	20% TEA in water	2015	R	Preston City Council	12	29	27	8.9%	G	0.92
1986	Gradko	20% TEA in water	2015	R	Thurrock Borough Council	12	28	23	22.5%	G	0.82
1987	Gradko	20% TEA in water	2015	R	Gateshead Council	11	33	34	-1.2%	G	1.01
1988	Gradko	20% TEA in water	2015	R	Gateshead Council	12	28	27	3.9%	G	0.96
1989	Gradko	20% TEA in water	2015	R	Gateshead Council	10	36	32	11.5%	G	0.90
1996	Gradko	20% TEA in water	2015	KS	New Forest DC	11	47	36	31.1%	P	0.76
1997	Gradko	20% TEA in water	2015	R	New Forest DC	11	33	25	31.7%	G	0.76
2007	Gradko	20% TEA in water	2015	UC	Southampton City Council	12	28	29	-3.5%	G	1.04
2008	Gradko	20% TEA in water	2015	R	Wokingham Borough Council	11	36	33	7.9%	G	0.93
2014	Gradko	20% TEA in water	2015	R	Brighton & Hove City Council	9	47	38	24.1%	G	0.81
2042	Gradko	20% TEA in water	2015	R	NOTTINGHAM CITY COUNCIL	12	40	39	4.3%	G	0.96
2299	Gradko	20% TEA in water	2015		Overall Factor ³ (27 studies)					Use	0.88

Annualisation of Diffusion Tube data.

Data capture in 2015 was less than 75 % at only one site - 81 Bexhill Road. The annualisation process described in Box 7.8 of TG(16) was used to estimate the annual mean concentration. The data adjustment process is based on the principle that patterns in pollution concentrations usually affect a wide region. The first step was to identify two to four nearby continuous monitoring sites that measure the pollutant in question. The selected monitoring sites must be at a background location, be affiliated to the Automatic Urban and Rural Network (AURN) and have a data capture of above 90%. The three closest background AURN sites were: Brighton Park (47 km), Eastbourne (18 km) and Portsmouth (112 km).

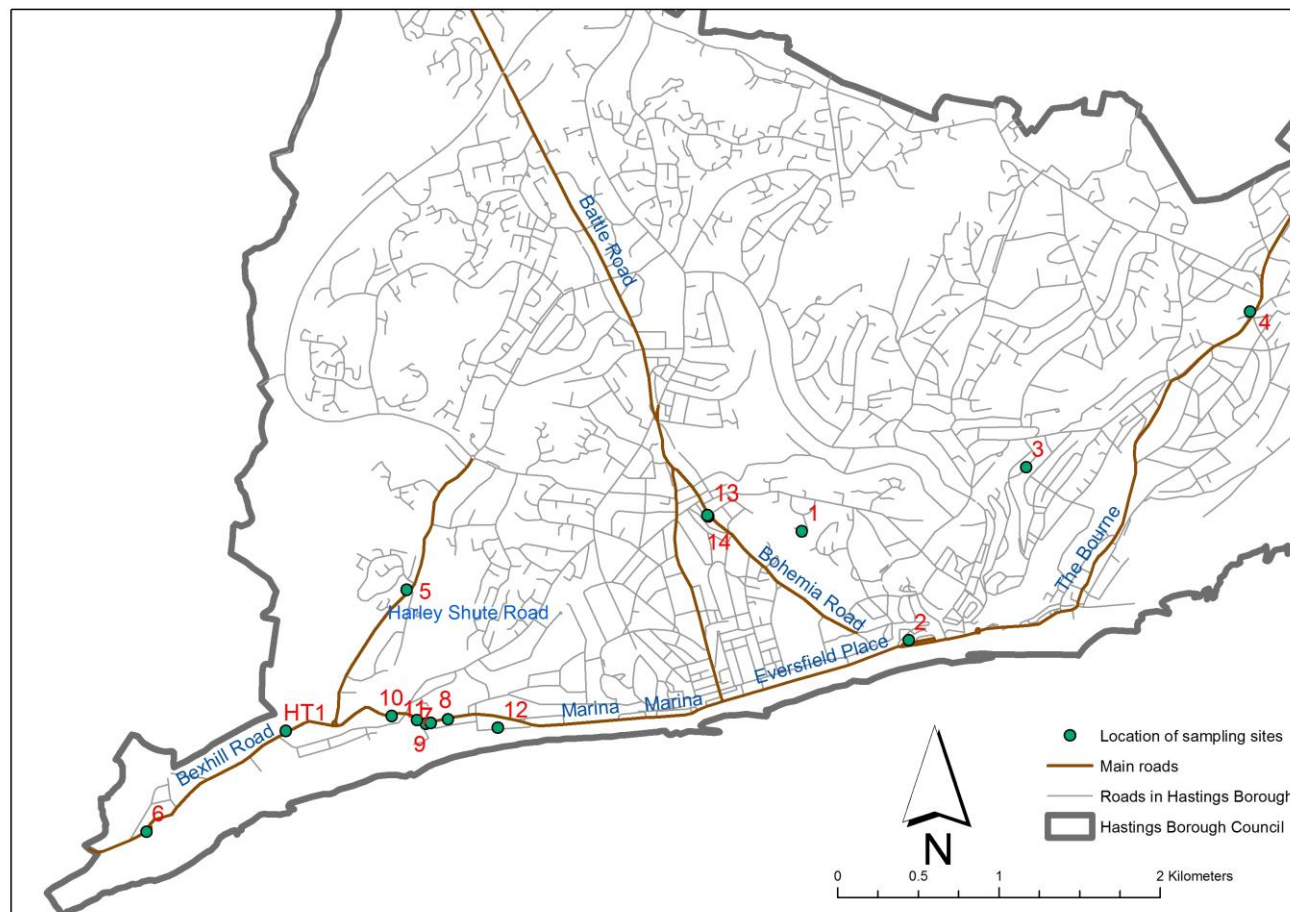
The monitoring data was obtained for each of these locations and the annual means (Am) calculated. The period means (Pm) were then calculated for each location, to match the period in which the diffusion tube sampling periods. The ratios of the annual mean to the period mean (Am/Pm) were then calculated for each location. An average was then taken of the two ratios to give the final adjustment factor (Ra). These data are shown in the table below:

Hastings Borough Council

Period mean (Pm) and annual mean (Am) concentrations ($\mu\text{g m}^{-3}$) calculated at Brighton Park, Eastbourne and Portsmouth corresponding to the diffusion tube sampling periods

Start time	End time	81 Bexhill Road	Brighton Park	Eastbourne	Portsmouth
08/12/2014	22/01/2015	37.3	18.5	12.3	24.4
22/01/2015	19/02/2015	46.4	21.8	17.6	29.6
19/02/2015	19/03/2015	39.3	18.7	14.8	22.9
19/03/2015	22/04/2015				
22/04/2015	21/05/2015	36.0	11.5	7.6	13.9
21/05/2015	30/06/2015				
30/06/2015	07/08/2015				
07/08/2015	18/09/2015	39.1	13.1	9.2	18.7
18/09/2015	19/10/2015	37.9	16.5	13.2	22.9
19/10/2015	20/11/2015	40.0	14.7	10.5	17.4
20/11/2015	04/01/2016	27.1	11.2	7.5	16.1
Period Mean (Pm)			15.8	11.6	20.7
Annual mean (Am)			14.8	10.6	19.1
Ratio of annual /period mean			0.94	0.92	0.92
Average Annual /period mean (Ra)			0.93		

Appendix D: Map(s) of Monitoring Locations



Site id	Site name
HT1	Bulverhythe
1	St Lukes 19 Barnfield Close
2	Carlisle Parade
3	Manor Road
4	Ore Church Old London Road
5	Harley Shute
6	Bexhill Road Boat
7	81 Bexhill Road
8	45 Bexhill Road
9	71 Bexhill Road
10	138 Bexhill Rd
11	Railway Bridge Bexhill Rd
12	West Marina Gardens
13	104 Bohemia Rd
14	116 Bohemia Road

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁷	
	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

⁷ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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

Hastings Borough Council (2005), Air Quality Action Plan for the Bexhill Road Air Quality Management Area.

TG(16) Local Air Quality Management Technical Guidance (TG16), April 2016

<http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf>