# 2017 Air Quality Annual Status Report (ASR)

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

June 2017

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|---|---|
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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 billion[3].

More information about the health effects of air pollution can be found at:

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

Particulate matter ($PM_{10}$) has been measured at Bulverhythe (Hastings) since 2001. While the annual mean $PM_{10}$ concentration has never exceeded the annual objective concentration of 40 $\mu g/m^{-3}$, exceedance of the 50 $\mu g/m^{-3}$ daily mean objective concentration lead to declaration of an Air Quality Management Area (AQMA) in 2003. The AQMA encompassed 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. An air quality monitoring station (AQMS) was established in Bulverhythe and is located within the AQMA.

The Air Quality Action Plan published in 2005 showed that over half of the annual mean $PM_{10}$ 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 $PM_{10}$ concentrations.

**The number of exceedances of the daily mean value above 50 $\mu g/m^{-3}$ peaked at 62 per year in 2003 and decreased significantly since then with only 3**

[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

**exceedences in 2016. As the objective has not been exceeded for more than 12 years an application to revoke the AQMA was made in May 2017.**

We also monitor nitrogen dioxide ($NO_2$) at Bulverhythe by a continuous monitor in the AQMS, and at fourteen other locations by diffusion tubes. $NO_2$ concentrations within the AQMA in Bulverhythe continue to be consistently below the annual objective concentration of 40 μg/ $m^{-3}$. Elsewhere within the Borough concentrations were less than 40 μg/$m^{-3}$ in 2016 but nitrogen dioxide monitoring should continue at these locations as $NO_2$ was within 10-15% of the annual objective at two locations in 2016 (71 and 81 Bexhill Road).

## Actions to Improve Air Quality

Hastings Borough Council, together with partners, has been involved in taking forward a number of initiatives during the current reporting year of 2016 in pursuit of improving local air quality. This includes the continued operation of the Bexhill to Hastings link road, working with our partners at Sussex Air and utilisation of the Sussex air quality planning guidance document. In addition, works to undertake the installation of a priority bus lane between the western side of the borough through to Bexhill (Ravenside) continue to be developed and are in the final planning stages.

## Conclusions and Priorities

The 2016 ASR has confirmed that levels of $PM_{10}$ and $NO_2$ continue to reduce within the borough and $PM_{10}$ within the AQMA continue to be within compliance of the air quality objectives. A revocation order revoking the AQMA 1 (Buverhythe) was submitted to Defra by Hastings Borough Council in April 2017.

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

- Continue to work with partners such as East Sussex County Council (ESCC) and bus operators to improve bus routes, traffic management systems and new road links to reduce congestion and pollution.
- Continued promotion of sustainable transport options, such as cycling, bus information and electric vehicle charge point information.
- Work with taxi licencing to introduce clean taxi operations across the borough.

- Review the Action Plan and develop an Air Quality Strategy following revocation of the AQMA.

## Local Engagement and 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 (NOx) 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, or train or car pool?

• 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.

• 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 compliance with the objectives.

A summary of AQMAs declared by Hastings Borough Council can be found in Table 2.1. The AQMA was declared for exceedances of the 24-Hour Mean $PM_{10}$ (35 exceedences of 50µg/$m^3$ per annum).

The opening of the Hastings Link Road in 2015 and closure of a waste transfer site adjacent to the AQMA resulted in the required reduction in emissions and concentrations of $PM_{10}$ within the AQMA. Traffic reductions as a result of these activities have reduced, especially for Heavy Goods Vehicles (HGV) and monitoring data has consistently measured the number of days being below the compliance level (i.e. less than 35 days) since 2004 (see Figure A.3).

**The AQMA, was revoked in April 2017, and a copy of the revocation order submitted to Defra.**

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

Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

For reference, a map of Hastings Borough Council's monitoring locations is available in Appendix D.

## Table 2.1 – Declared Air Quality Management Areas

| AQMA Name | Date of Declaration | Pollutants and Air Quality Objectives | City / Town | One Line Description | Is air quality in the AQMA influenced by roads controlled by Highways England? | Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure) | | Action Plan (inc. date of publication) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | At Declaration | Now | |
| AQMA 1 | 08/12/2003 | $PM_{10}$ 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. | No | 57 (24hr exceedances of AQO in 2002) | 3 (2016) | Draft action plan found at: 2005 Hastings AQAP |

☒ **Hastings Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date** (confirm by selecting in box)

Number of exceedances of $PM_{10}$ 24-hour mean (> 50µg/m³) sourced from Hastings BC Detailed Assessment of Particulate levels on and around the A259, Bexhill Road, Hastings, East Sussex (Dr S. Vardoulakis Project Development Officer Sussex Air Quality Steering Group) 2004
http://www.hastings.gov.uk/content/env_health/pdfs/Detailed_Assessment_(.pdf_1,527KB).pdf

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

Defra have not raised or submitted any adverse comment to Hastings Borough Council following submission of the previous year's ASR.

Hastings Borough 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 2.2.

More detail on these measures can be found in their respective Draft Action Plan 2005 Hastings AQAP.

Key completed measures are:

- Hastings Link Road has been operational since 2015 and has reduced general traffic volumes and HGV routing through the AQMA, resulting in the revocation order (April 2017).

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

- Continue to work with partners such as East Sussex County Council (ESCC) and bus operators to improve bus routes, traffic management systems and new road links to reduce congestion and pollution.
- Continued promotion of sustainable transport options, such as cycling, bus information and electric vehicle charge point information.
- Work with taxi licencing to introduce clean taxi operations across the borough.
- Review the Action Plan and develop an Air Quality Strategy following the revocation of the AQMA.

Hastings Borough Council has implemented a number of measures stated above and in Table 2.2 have achieved compliance in AQMA 1 (Bulverhythe).

## Table 2.2 – 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 | Link Road (built) reducing traffic flows in the Air Quality Management Area | Traffic Management | | ESCC | | 2015 onwards | Traffic volumes (reduction) | Reduced emissins and conc. > 20% (achieved) | AQMA revocation May 2017 as a result of reduced traffic (esp HGV). | 2015 | |
| 2 | Proposed dedicated bus lane from Filsham Rd to Glyne Gap due to be put in place 2016/17 | Traffic Management | | ESCC/Bus Companies | 2016 | 2017/18 | TBC | Yes | Awaiting start date in 2016/17 | TBC | 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 on the Glyne Gap to the junction of Filsham Road and seafront east to town centre at Pelham Place | Traffic Management | | ESCC | 2016/17 | TBC | TBC | Yes | TBC | TBC | The upgrade of the A259 SCOOT Traffic system is under review |
| 4 | Proposed Queensway Gateway Road due to be started in 2016. | Traffic Management | | ESCC | 2016 | 2016/17 | Traffic volumes (reduction) | Yes | TBC | TBC | Reduce congestion and re-direct traffic away from areas of concern. |
| 5 | The extension of Real Time bus information systems into Hastings | Promoting Travel Alternatives | | Bus Companies | 2017 | TBC | TBC | Yes | TBC | TBC | ESCC and the Hastings and Rother QBP are committed to this project, but implementation has slipped due to technical difficulties |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | The implementation of travel choice measures to manage demand to travel by car. | Promoting Travel Alternatives | | ESCC/HBC | On going | 2015 - on going | Increase cycle | Yes | On going | On going | The Council has its own Staff Transport Plan including various initiatives to encourage alternative modes of transport to the car |
| 7 | Promote use of electric vehicles and charging network (Energise). | Promoting Low Emission Transport | | HBC/Sussex-air | 2014 | 2015 - on going | Increase charge point usage | Yes | On going | On going | On-going promotion of EV charge point information available at www.energisenetwork.co.uk + http://www.chargeyourcar.org.uk |
| 8 | Actively seek alternative renewable solutions and avoid combustion plant in the AQMA | Promoting Low Emission Plant | | HBC via planning process /Clean Air Act | 2005 | 2005 onwards | Solid fuel burning prone to emission peaks on starting up. Nox and PM higher than for oil and coal | Yes | On going | On going | |
| 9 | Taxi Licence Policy | Promoting Low Emission Transport | | HBC taxi licencing | 2014/15 | 2016 onwards | Number of Euro 6 taxis | Yes | On going | On going | Any licensed Hackney carriages will be more environmentally friendly |
| 10 | Encourage domestic solid fuel burning to use smokeless fuels and exempt appliances | Environmental Permits | | Env. Protection Team duties relating to Statutory Nuisance and the Clean Air Act | 2013 | 2013 onwards | Less NOx, PM and smoke reduction of indoor CO | Yes | On going | On going | |
| 11 | Households and building trade to avoid fires to dispose of waste in the AQMA | Environmental Permits | | Env. protection team duties relating to complaints and nuisance | 2005 | 2005 onwards | Less NOx, PM and smoke targetted | Yes | On going | On going | |

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

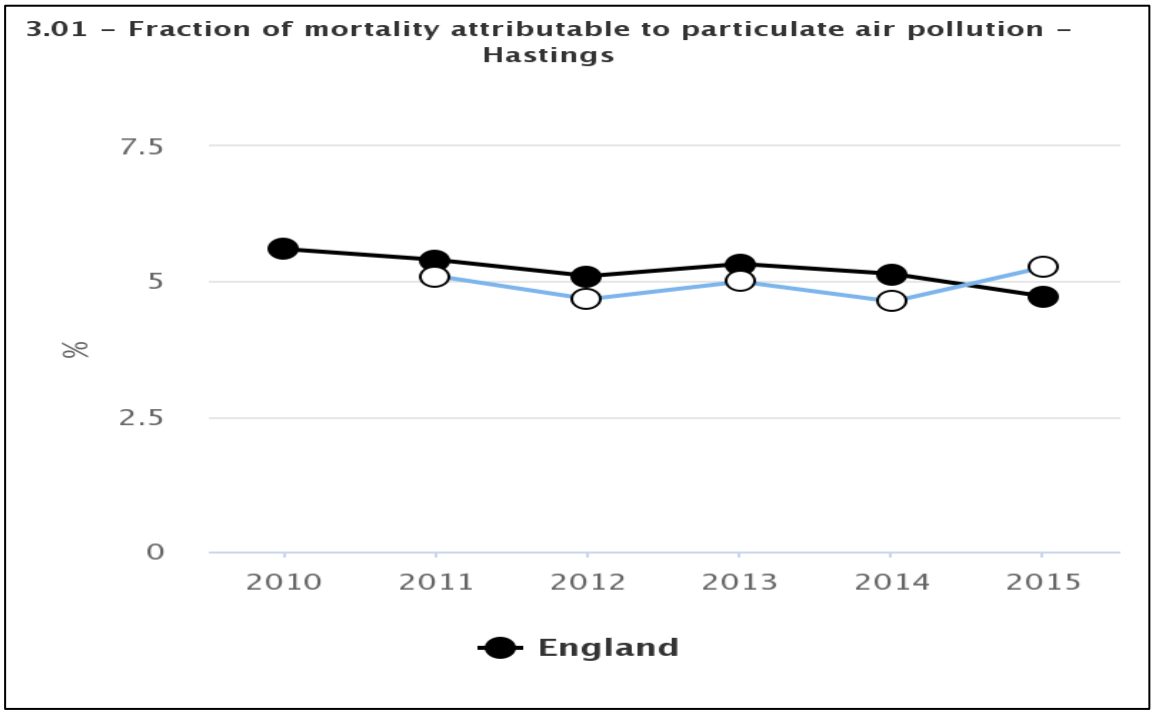
As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, 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 for the year 2015 is 5.3 %. This information is available from the following web link:

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

Figure 1: Fraction of mortality attributed to particulate air pollution in Hastings Borough Council shows that the mortality calculated for Hastings Borough Council is slightly above than that calculated for south east England (4.7 %) and England (4.7 %) as a whole.

**Figure 1: Fraction of mortality attributed to particulate air pollution in Hastings Borough Council**



Hastings Borough Council is developing processes to determine how it will approach measures to address $PM_{2.5}$ in partnership with Sussex Air and the ESCC Public Health team. Hastings Borough Council is taking the following measures to address $PM_{2.5}$:

- Hastings will utilise the Sussex air quality mitigation and planning guidance (2013) to reduce emissions of $PM_{2.5}$ from new developments;
- The draft Action Plan is to be reviewed in light of the AQMA revocation and a new Air Quality Strategy for Hastings will be developed in partnership with Sussex-air and ESCC.

# 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 1 site during 2016. Table A.1 in Appendix A shows the details of the sites.

There are no national monitoring stations within the Hastings Borough. The Hastings air quality monitoring station located at Bulverhythe, forms part of the Sussex Air Quality Partnership (Sussex-air) network which provides data at the following web-site: http://www.sussex-air.net/AQNearMe/Monitoring/SiteDetails.aspx (Site Name = Hastings - Bulverhythe).

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 $NO_2$ at 14 sites during 2016. 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) 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. Further details on adjustments are provided in Appendix C.

### 3.2.1 Nitrogen Dioxide ($NO_2$)

Table A.3 in Appendix A compares the ratified and adjusted monitored $NO_2$ annual mean concentrations for the past 5 years with the air quality objective of 40µg/$m^3$. No measurement location within Hastings exceeded the annual air quality objective in 2016.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B. Although there were eleven sampling periods out of twelve in the year the lowest data capture for the period was 83%. Therefore, annualisation of the data was not required. Data was distance corrected to represent the closest local exposure concentrations. Concentrations were adjusted for bias using a factor of 0.94 (see Appendix C).

Table A.4 in Appendix A compares the ratified continuous monitored $NO_2$ 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 ($PM_{10}$)

Table A.5 in Appendix A compares the ratified and adjusted monitored $PM_{10}$ annual mean concentrations for the past 5 years with the air quality objective of 40µg/$m^3$. Table A.5 shows that the annual mean concentration remains significantly below the annual objective concentration.

Table A.6 in Appendix A compares the ratified continuous monitored $PM_{10}$ daily mean concentrations for the past 5 years with the air quality objective of 50µg/$m^3$, not to be exceeded more than 35 times per year.

Automatic $PM_{10}$ 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 –. 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.

Based on the measurements being consistently below the air quality objective within the AQMA, Hastings Borough Council revoked the AQMA in 2017.

**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[4] | 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 |
| 2016 | 3 | 87 |

[4] While 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| HT1 | Hastings-Bulverhythe | Roadside | 577633 | 108726 | $NO_2$ | YES | Chemiluminescent | 5 | 3 | 1.7 |
| | | | | | $PM_{10}$ | | TEOM | | | |

**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.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 / Alma Tce | Roadside | 580831 | 109964 | NO2 | NO | 1 | 1 | NO | 2 |
| 2 | Carlisle Parade | Roadside | 581496 | 109288 | NO2 | NO | 5 | 1 | NO | 2.5 |
| 3 | Manor Road | Roadside | 582223 | 110361 | NO2 | NO | 0 | 10 | NO | 2.5 |
| 4 | Ore Chur/Old London Rd | Roadside | 583610 | 111325 | NO2 | NO | 0 | 2 | NO | 2.5 |
| 5 | Harley Shute | Roadside | 578382 | 109601 | NO2 | YES | 10 | 1 | NO | 2 |
| 6 | Bexhill Road 'Boat' | Roadside | 576770 | 108101 | NO2 | YES | 15 | 1.5 | NO | 2.5 |
| 7 | 81 Bexhill Road | Roadside | 578500 | 108771 | NO2 | NO | 0.2 | 1.5 | NO | 2.5 |
| 8 | 45 Bexhill Road | Roadside | 578637 | 108798 | NO2 | NO | 1.5 | 2.8 | NO | 2 |
| 9 | 71 Bexhill Road | Roadside | 578532 | 108776 | NO2 | NO | 0.5 | 0.45 | NO | 2.5 |
| 10 | 138 Bexhill Rd | Roadside | 578290 | 108819 | NO2 | NO | 1.5 | 2 | NO | 2 |
| 11 | Railway Bridge Bexhill Rd | Roadside | 578447 | 108794 | NO2 | NO | 10 | 3 | NO | 2.5 |
| 12 | West Marina Gardens | Roadside | 578946 | 108746 | NO2 | NO | 10 | 0.5 | NO | 2.5 |
| 13 | 104 Bohemia Rd | Roadside | 580252 | 110058 | NO2 | NO | 0.5 | 1.5 | NO | 2 |
| 14 | 116 Bohemia Rd | Roadside | 580246 | 110064 | NO2 | NO | 0.5 | 1.5 | NO | 2 |

**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.3 – 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 (µg/m³) [3] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| HT1 | Roadside | Automatic | 87 | 87 | 22 | 28 (25.2) | 22 (23.3) | 18.8 | 18.4 |
| 1 | Roadside | Diffusion Tube | 83% | 83% | - | 18.9 | 24.2 | 19.7 | 21.1 |
| 2 | Roadside | Diffusion Tube | 92% | 92% | - | 26.9 | 29.9 | 23.3 | 21.5 |
| 3 | Roadside | Diffusion Tube | 92% | 92% | - | 14.3 | 15.2 | 13.7 | 17.6 |
| 4 | Roadside | Diffusion Tube | 92% | 92% | - | 25.7 | 25.9 | 24.6 | 24.9 |
| 5 | Roadside | Diffusion Tube | 83% | 83% | - | 37.4 | **40.4 (27.7)** | 31.9 | 19.5 |
| 6 | Roadside | Diffusion Tube | 92% | 92% | - | **42.9 (28.2)** | **54.9 (33.9)** | 37.1 | 22.7 |
| 7 | Roadside | Diffusion Tube | 83% | 83% | - | 39.5 (39.5) | **44.6 (44.6)** | 30.6 | 35.4 |
| 8 | Roadside | Diffusion Tube | 83% | 83% | - | 29.7 | 33.1 | 25.6 | 26.2 |
| 9 | Roadside | Diffusion Tube | 92% | 92% | - | **40.1 (39.7)** | **44.5 (44.1)** | 33.2 | 34.2 |
| 10 | Roadside | Diffusion Tube | 92% | 92% | - | 29.3 | 32.2 | 25.9 | 25.3 |
| 11 | Roadside | Diffusion Tube | 92% | 92% | - | 24.7 | 27.9 | 23.6 | 18.7 |
| 12 | Roadside | Diffusion Tube | 92% | 92% | - | 28.5 | 28.4 | 20.8 | 15.9 |
| 13 | Roadside | Diffusion Tube | 92% | 92% | - | 35.1 | 39.1 | 31.8 | 31.7 |
| 14 | Roadside | Diffusion Tube | 92% | 92% | - | 33.7 | 39.5 | 28.3 | 26.5 |

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

☒ **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.**

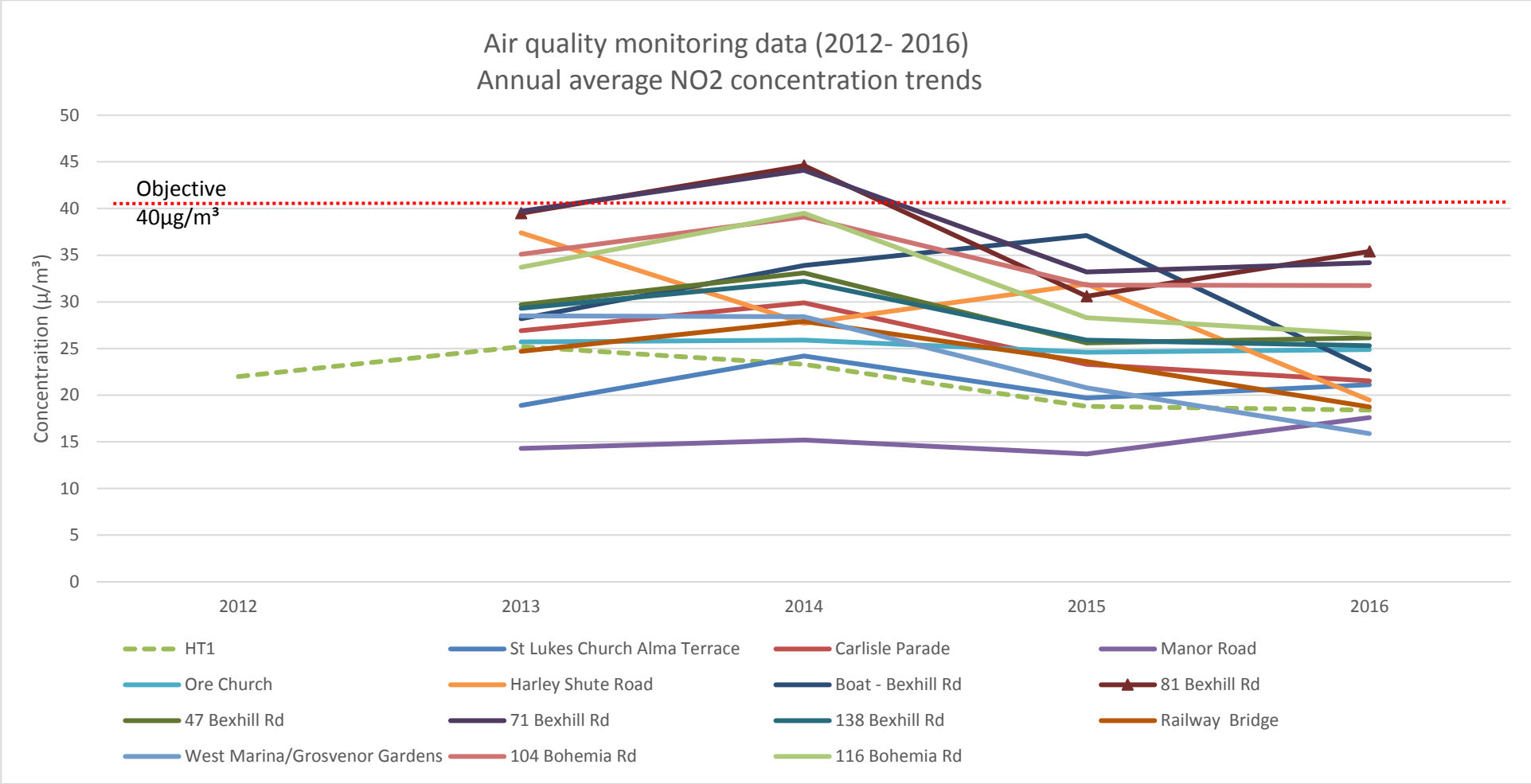
$NO_2$ concentrations in (brackets) have been readjusted for distance to sensitive receptor.

(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.1 – Trends in Annual Mean $NO_2$ Concentrations



## Table A.4 – 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 |
| HT1 | Roadside | Automatic | 87 | 87 | 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 99.8$^{th}$ percentile of 1-hour means is provided in brackets.

## Table A.5 – Annual Mean $PM_{10}$ Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2016 (%) (2) | $PM_{10}$ Annual Mean Concentration ($\mu g/m^3$) (3) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| HT1 | Roadside | 86 | 86 | 22 | 20.6 | 21.6 | 23.3 | 19.3 |

**Notes:**

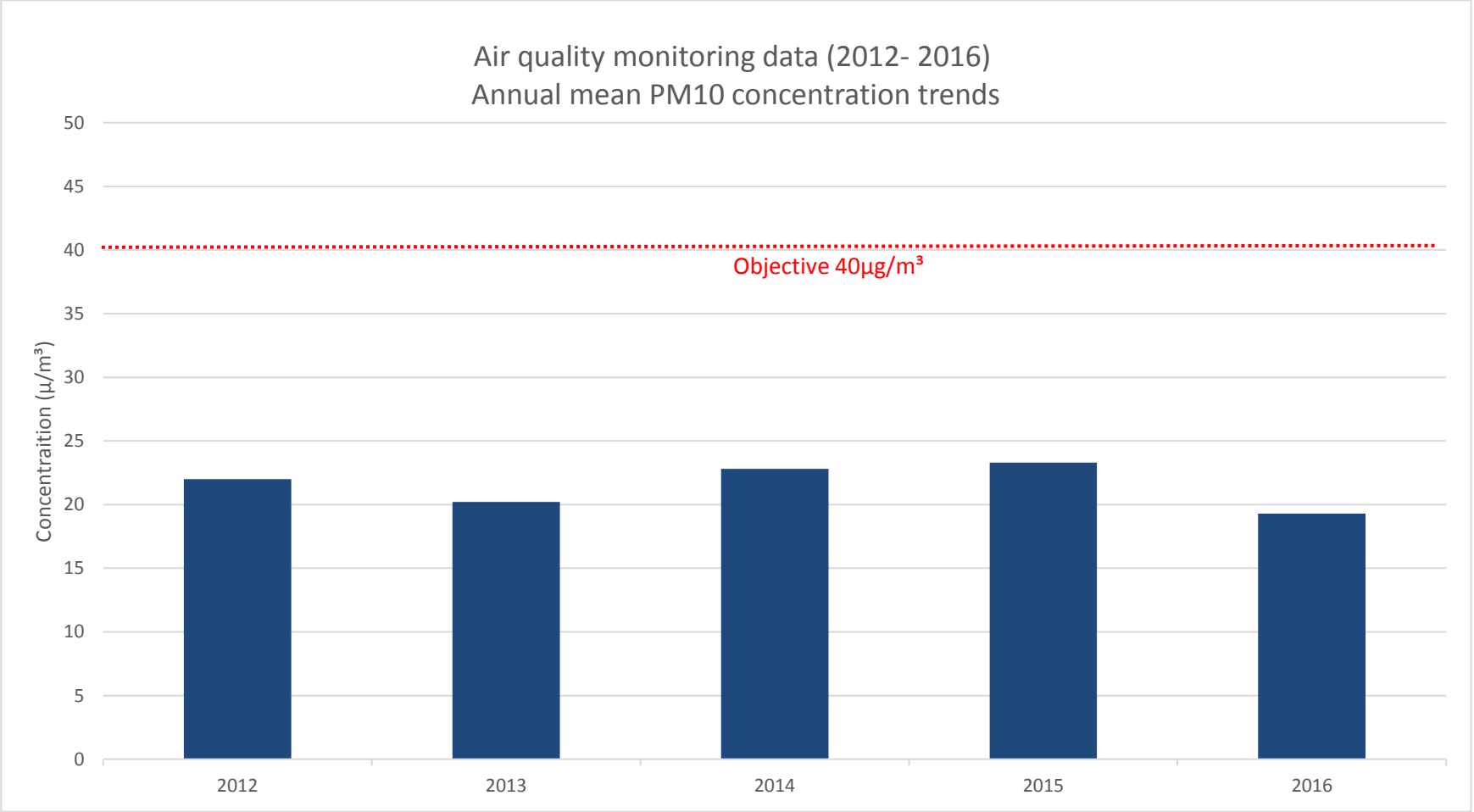
Exceedances of the $PM_{10}$ annual mean objective of 40$\mu g/m^3$ are shown in **bold.**

(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 Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

## Figure A.2 – Trends in Annual Mean $PM_{10}$ Concentrations



## Table A.6 – 24-Hour Mean $PM_{10}$ Monitoring Results

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2016 (%) (2) | $PM_{10}$ 24-Hour Means > 50µg/m$^3$ (3) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| HT1 | Roadside | 86 | 86 | **1** | **0** | **0** | **3** | 3 |

**Notes:**

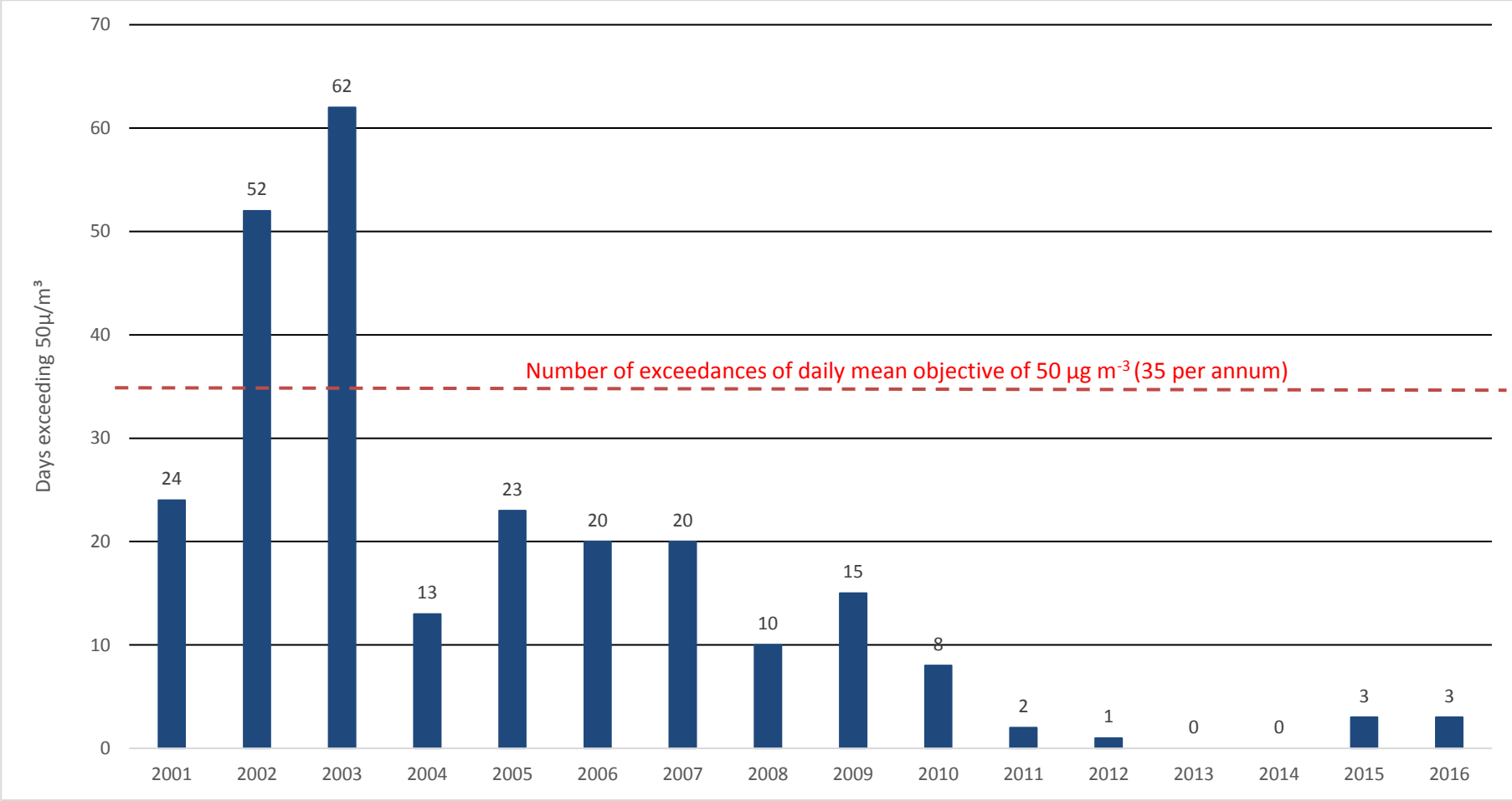
Exceedances of the $PM_{10}$ 24-hour mean objective (50µg/m$^3$ not to be exceeded more than 35 times/year) are shown in **bold.**

(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 90.4$^{th}$ percentile of 24-hour means is provided in brackets.

## Figure A.3 – Trends in Number of 24-Hour Mean $PM_{10}$ Results >50µg/$m^3$



# Appendix B: Full Monthly Diffusion Tube Results for 2016

## Table B.1 – $NO_2$ Monthly Diffusion Tube Results - 2016

| Site ID | $NO_2$ Mean Concentrations ($\mu g/m^3$) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | | |
| | | | | | | | | | | | | | Raw Data | Bias Adjusted (0.94) and Annualised (1) | Distance Corrected to Nearest Exposure (2) |
| 1 | 28.7 | 28.2 | 21.9 | 20.7 | 21.5 | 18.2 | 21.4 | 29.0 | 24.2 | 25.0 | - | 24.9 | 24.0 | 22.5 | 21.1 |
| 2 | 26.4 | 27.7 | 23.6 | 27.2 | 27.8 | 23.7 | 23.1 | | 27.3 | 32.3 | - | 44.0 | 28.3 | 26.6 | 21.5 |
| 3 | 6.6 | 17.3 | 16.5 | 13.8 | 13.7 | 12.3 | 13.4 | 36.3 | 15.6 | 19.6 | - | 40.8 | 18.7 | 17.6 | 17.6 |
| 4 | 30.7 | 30.4 | 23.8 | 24.8 | 26.3 | 21.8 | 25.3 | 12.7 | 29.3 | 26.4 | - | 39.6 | 26.5 | 24.9 | 24.9 |
| 5 | - | 33.2 | 25.6 | 28.7 | 30.8 | 25.1 | 27.2 | 26.3 | 31.4 | 33.6 | - | 39.6 | 30.2 | 28.3 | 19.5 |
| 6 | 42.3 | 42.5 | - | 40.9 | 48.3 | 36.6 | 40.2 | 31.4 | 46.5 | 36.0 | - | 47.0 | 41.2 | 38.7 | 22.7 |
| 7 | 43.0 | 41.6 | 34.3 | 37.2 | 38.9 | 29.6 | 33.9 | 21.9 | 49.4 | 43.4 | - | 49.9 | 38.5 | 36.1 | 35.4 |
| 8 | 28.4 | 30.8 | 27.2 | 23.8 | 32.6 | 27.0 | 27.7 | 28.6 | 35.8 | 29.9 | - | 38.5 | 30.0 | 28.2 | 26.2 |
| 9 | 40.7 | 38.2 | 32.8 | 38.3 | 39.9 | 31.6 | 34.8 | 39.8 | 48.9 | 44.4 | - | 54.5 | 40.4 | 37.9 | 34.2 |
| 10 | 32.7 | 31.4 | 26.5 | 26.8 | 26.4 | 22.9 | 22.5 | 39.4 | 29.4 | 31.3 | - | 35.3 | 29.5 | 27.7 | 25.3 |
| 11 | 34.7 | 33.7 | 25.2 | 17.3 | 22.8 | 19.2 | 20.4 | 26.7 | 24.5 | - | - | 37.1 | 26.2 | 24.6 | 18.7 |
| 12 | 26.3 | 26.9 | 21.4 | 22.8 | 26.1 | 20.1 | 22.2 | 22.6 | 25.8 | - | - | 37.9 | 25.2 | 23.7 | 15.9 |
| 13 | 47.0 | 44.0 | 30.3 | 33.3 | 38.6 | 29.4 | 31.7 | 20.0 | 41.8 | 37.0 | - | 34.5 | 35.2 | 33.1 | 31.7 |
| 14 | 37.5 | 31.9 | 27.5 | 32.2 | 26.2 | 25.6 | 26.0 | 0.0 | 35.7 | 32.3 | - | 47.5 | 29.3 | 27.5 | 26.5 |

☒ **National bias adjustment factor used**

☐ **Annualisation has been conducted where data capture is <75% (n/a)**

**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.

(3) Data for November 2016 was unavailable.

# 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 $NO_2$ 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 0.94 for 2016.**

## Figure C.1– The diffusion tube national adjustment factor spreadsheet (2016).

**National Diffusion Tube Bias Adjustment Factor Spreadsheet** — Spreadsheet Version Number: 03/17 V2

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
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2017
LAQM Helpdesk Website

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:** Select the Laboratory that Analyses Your Tubes from the Drop-Down List
If a laboratory is not shown, we have no data for this laboratory.

**Step 2:** Select a Preparation Method from the Drop-Down List
If a preparation method is not shown, we have no data for this method at this laboratory.

**Step 3:** Select a Year from the Drop-Down List
If a year is not shown, we have no data [2]

**Step 4:**
**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 [3] shown in blue at the foot of the final column.**
If you have your own co-location study then see footnote [4]. 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 [2] | Site Type | Local Authority | Length of Study (months) | Diffusion Tube Mean Conc. (Dm) (µg/m³) | Automatic Monitor Mean Conc. (Cm) (µg/m³) | Bias (B) | Tube Precision [4] | Bias Adjustment Factor (A) (Cm/Dm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Gradko | 20% TEA in water | 2016 | R | Wokingham Borough Council | 11 | 45 | 41 | 9.0% | G | **0.92** |
| Gradko | 20% TEA in water | 2016 | R | Wokingham Borough Council | 11 | 37 | 34 | 9.5% | G | **0.91** |
| Gradko | 20% TEA in water | 2016 | R | Cheshire West and Chester | 12 | 37 | 39 | -5.3% | G | **1.06** |
| Gradko | 20% TEA in water | 2016 | R | Thurrock Borough Council | 12 | 29 | 26 | 11.0% | G | **0.90** |
| Gradko | 20% TEA in water | 2016 | R | Borough Council of King's Lynn & West Norf | 11 | 30 | 25 | 18.2% | G | **0.85** |
| Gradko | 20% TEA in water | 2016 | UB | Eastleigh Borough Council | 11 | 29 | 30 | -4.7% | G | **1.05** |
| Gradko | 20% TEA in water | 2016 | R | Eastleigh Borough Council | 12 | 44 | 42 | 2.9% | G | **0.97** |
| Gradko | 20% TEA in water | 2016 | R | Brighton & Hove City Council | 12 | 52 | 48 | 8.8% | G | **0.92** |
| Gradko | 20% TEA in water | 2016 | R | Eastleigh Borough Council | 11 | 29 | 37 | -22.0% | G | **1.28** |
| Gradko | 20% TEA in water | 2016 | KS | Marylebone Road Intercomparison | 12 | 99 | 79 | 25.2% | G | **0.80** |
| Gradko | 20% TEA in water | 2016 | R | Monmouthshire County Council | 11 | 39 | 34 | 16.6% | G | **0.86** |
| Gradko | 20% TEA in Water | 2016 | R | Preston City Council | 10 | 30 | 27 | 10.0% | G | **0.91** |
| Gradko | 20% TEA in water | 2016 | R | Dudley MBC | 12 | 37 | 34 | 11.0% | G | **0.90** |
| Gradko | 20% TEA in water | 2016 | UB | Dudley MBC | 12 | 26 | 22 | 18.6% | G | **0.84** |
| Gradko | 20% TEA in water | 2016 | R | Dudley MBC | 11 | 43 | 38 | 12.4% | G | **0.89** |
| Gradko | 20% TEA in water | 2016 | R | Dudley MBC | 12 | 51 | 54 | -5.6% | G | **1.06** |
| Gradko | 20% TEA in water | 2016 | B | LB Waltham Forest | 12 | 31 | 30 | 2.3% | G | **0.98** |
| Gradko | 20% TEA in water | 2016 | R | NOTTINGHAM CITY COUNCIL | 12 | 37 | 39 | -5.4% | G | **1.06** |
| Gradko | 20% TEA in water | 2016 | | **Overall Factor [3] (21 studies)** | | | | **Use** | | **0.94** |

## Annualisation of measurements

$NO_2$ diffusion tube measurements required no annualised correction as all measurement data was above 75%.

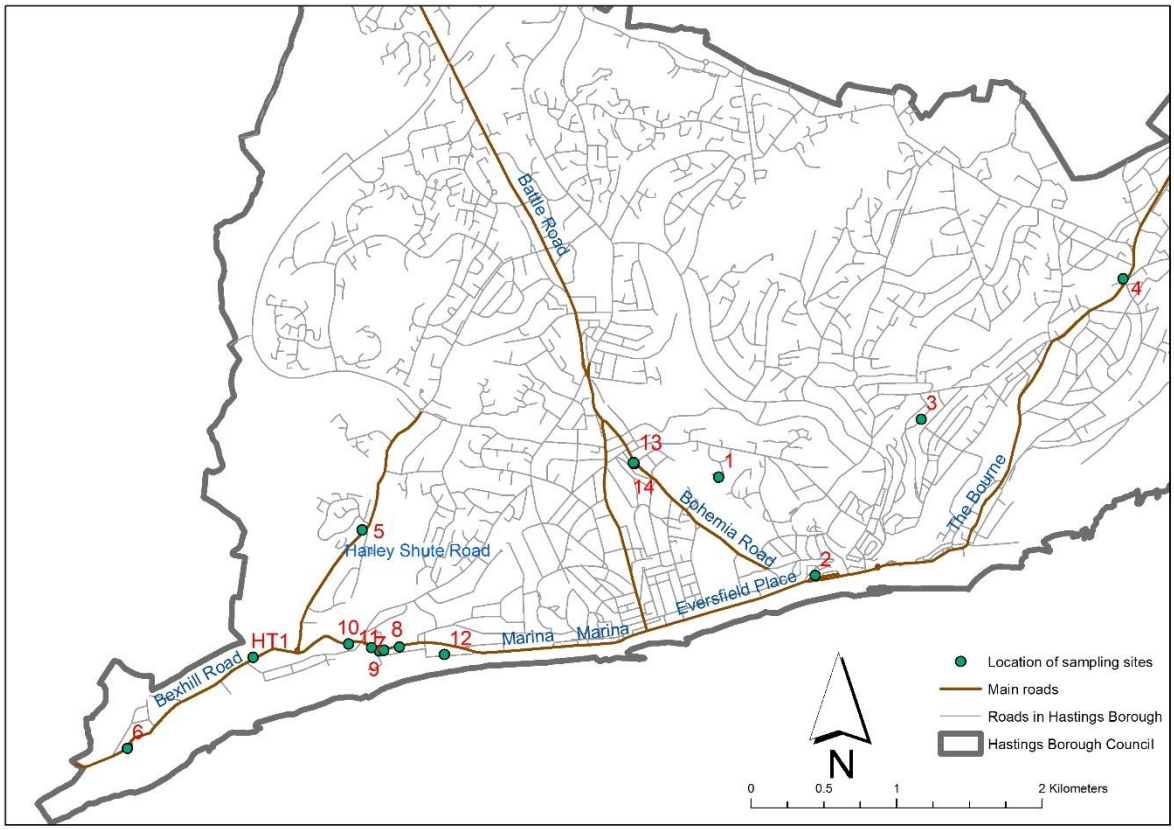
## Distance correction for $NO_2$ measurements

Distance correction of $NO_2$ diffusion tube measurements used the NO2 fall-off with distance calculator available on the LAQM website and discussed in Paragraphs 7.77-7.79 of LAQM.TG16.

Table B.1 presents the 2016 $NO_2$ diffusion tube measurements as distance corrected to the nearest exposure.

# Appendix D: Map(s) of Monitoring Locations and AQMAs

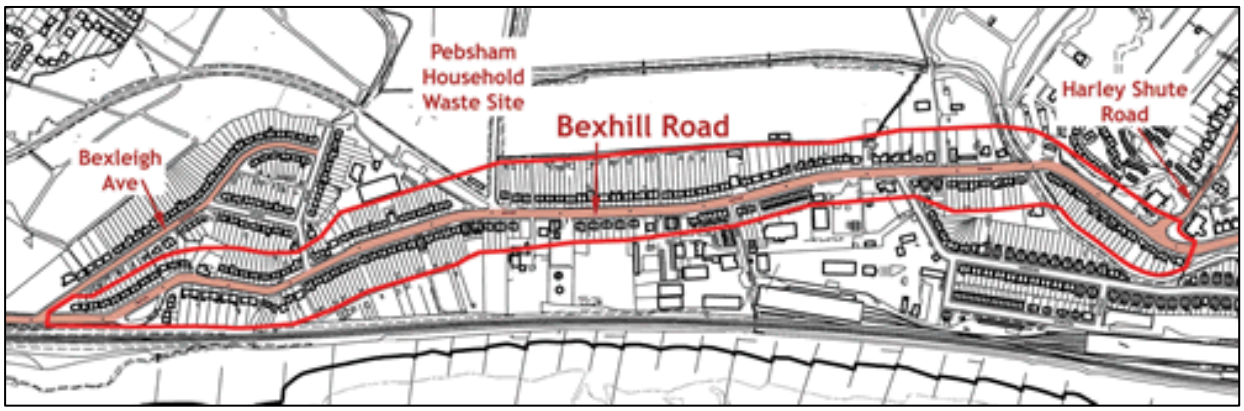
## Figure D-1: Monitoring locations adjacent to AQMA 1 along Bexhill Road in Hastings.




**Key:**

| Site ID | Location | Site ID | Location |
|---|---|---|---|
| HT1 | Bultherhythe AQMS | | |
| 1 | St Lukes Church Alma Terrace | 8 | 47 Bexhill Rd |
| 2 | Carlisle Parade | 9 | 71 Bexhill Rd |
| 3 | Manor Road | 10 | 138 Bexhill Rd |
| 4 | Ore Church | 11 | Railway Bridge |
| 5 | Harley Shute Road | 12 | West Marina/Grosvenor Gardens |
| 6 | Boat - Bexhill Rd | 13 | 104 Bohemia Rd |
| 7 | 81 Bexhill Rd | 14 | 116 Bohemia Rd |

**Figure D-2: The extent of the now revoked AQMA 1 along Bexhill Road in Hastings.**



# 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 |

[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 |
| EU | European Union |
| 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 |