



***Boston Borough Council
Annual Status Report 2017***

Bureau Veritas





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2017 Air Quality Annual Status Report (ASR)

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

August 2017

Boston Borough Council

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Executive Summary: Air Quality in Our Area

Air Quality in Boston 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.

Boston Borough Council currently has two designated Air Quality Management Areas (AQMA) at Haven Bridge and at Bargate Bridge. Both have been declared in relation to exceedences of the AQS annual mean objective for NO₂, which is due to traffic emissions from major roads, notably the A16 and A52.

During 2016, there were 3 exceedences of the annual mean AQS objective of 40µg/m³. The highest recorded concentration was 46.2µg/m³ at site 3, adjacent to 68 Liquorpond Street. This indicates that an exceedence of the 1-hour mean objective is unlikely at these sites.

Two out of the five monitoring locations within the Haven Bridge AQMA were observed to have an annual mean NO₂ concentration that exceeded the annual mean AQS objective of 40µg/m³ in 2016. These two sites are site 1 and site 3.

One of the four monitoring locations within the Bargate Bridge AQMA, site 9, was observed to have an annual mean NO₂ concentration that exceeded the annual mean AQS objective of 40µg/m³ in 2016. The NO₂ annual mean concentrations for 2016 are at similar levels as that recorded in 2015 for all monitoring sites in the AQMA, except site 9 where an increase was reported.

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

As reported previously, properties in the AQMA are set back from the A16 Spilsby Road. Site 9 is not representative of public exposure. In order to estimate the actual NO₂ annual mean concentration at relevant exposure within the AQMA, the NO₂ fall-off with distance calculator provided by Defra on the LAQM Support website has been used. Prior to distance correction, the annual mean NO₂ concentration at site 9 was 41.5µg/m³. Based on the tool, and considering a distance of 6m from the façade of properties to the kerb (which is conservative), the NO₂ concentration at relevant nearby exposure is predicted to be 34.9µg/m³ at site 9.

Actions to Improve Air Quality

The AQAP for Boston Borough Council is the main action to drive a reduction in air pollution within the Borough. The measures set out within the AQAP have been developed as actions to help Boston work towards achieving compliance with the NO₂ annual mean AQS objective.

In recognition of the importance that transport plays, Boston Borough Council, in partnership with Lincolnshire County Council, has released a new Boston Transport Strategy (2016-2036) that builds upon the improvements delivered since the last Strategy was published in 2006. The Strategy provides information on how these authorities in conjunction with other partners will improve accessibility and a sustainable transport network to support the growth of Boston and tackle air quality issues. A primary objective of the new strategy (Boston Transport Strategy (2016-2036)) is to work with Lincolnshire County Council and developers to deliver elements of the Boston Distributer Road which in the longer term will provide a western link road between the A16 in the south of the town and the A16 in the north.

In addition, the 4th Lincolnshire Local Transport Plan incorporates a Transport Strategy for Boston: 'The Transport Strategy for Boston 2006 – 2021 and beyond'. This includes a high level of consideration throughout the plan in relation to the reconfiguration of roads, sustainable transport plans and modes of transport, alternative modes of transport to private vehicles and to overall reduce the impact of the transport system on air quality within the local area.

Conclusions and Priorities

Within the Council area concentrations of NO₂ remain above the AQS annual mean objective only within the designated AQMAs. The AQMAs are located on the main arterial routes around the town. Annual mean NO₂ concentrations will be continued to be monitored with diffusion tubes to enable the impacts of the AQAP to be measured.

The following actions are considered to be key priorities in ensuring reductions continue:

- Update the AQAP;
- Progress the measures that are set out within the AQAP which have been designed to address these elevated concentrations with the overall goal of ensuring pollution levels are below the AQS objectives;
- Implement the new Boston Transport Strategy (2016-2036); and
- Cooperate with all the Boroughs within Lincolnshire to implement The Lincolnshire Local Travel Plan, which aims to reduce the impact of transport on local air quality. The plan was developed by engaging with a wide range of people, community groups and organisations.

Local Engagement and How to get Involved

As the main source of air pollution within Boston Borough Council arises from transport sources, a way for the public to get involved with helping to improve air quality within the area would be to look at alternatives to the way they usually travel.

The following are suggested alternatives to private travel that are given within the AQAP measures that would contribute to improving the air quality within the Borough:

- Use of public transport – The use of the bus facilities, which in turn reduces pollutant concentration through the number of vehicles and reducing congestion;
- Walk or cycle if your journey allows – From choosing to walk or cycle for your journey the number of vehicles is reduced and also there is the added benefit of keeping fit and healthy.
- Car/lift sharing – Where a number of individuals are making similar journeys, such as travelling to work or to school car sharing reduces the number of

vehicles on the road and therefore the amount of emissions being released. This can be promoted via travel plans through the workplace and within schools; and

- Alternative fuel / more efficient vehicles – Choosing a vehicle that meets the specific needs of the owner, fully electric, hybrid fuel and more fuel efficient cars are available and all have different levels benefits by reducing the amount of emissions being released.

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1 Local Air Quality Management

This report provides an overview of air quality in Boston 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 Boston 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 Boston Borough Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <http://www.boston.gov.uk/index.aspx?articleid=3720>. See full list of AQMA's at <http://uk-air.defra.gov.uk/aqma/list>.

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

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 - Haven Bridge	10/09/2001	NO ₂ Annual Mean	Boston	A major highway consisting of John Adams Way(A16), Queen Street and Liquorpond Street(A52).	YES	44.7	46.2	Boston Borough Council, Air Quality Action Plan, 2006
AQMA 2 - Bargate Bridge	01/03/2005	NO ₂ Annual Mean	Boston	Key roundabout for the A16 and A1137.	YES	42.9	41.5	Boston Borough Council, Air Quality Action Plan, 2007

Boston Borough Council confirm the information on UK-Air regarding their AQMAs is up to date

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

Defra's appraisal of last year's ASR concluded a review of the AQAP should be carried out for submission within the next ASR report due in 2017 and the monitoring in the Bargate Bridge AQMA should continue until it is established that the monitored levels are continuing below objective levels. The AQAP is expected to be updated in the coming year.

Boston 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 the Boston Borough Council, Local Air Quality Management – Air Quality Action Plan (Joint AQAP update 2010), the Boston Transport Strategy (2016-2036) and Local Plan. The new Local Plan jointly with South Holland District Council and Lincolnshire County Council has now been submitted to the Secretary of State for approval and is set to be adopted in Spring 2018.

Key measures which have already been undertaken include:

- Transport:
 - Traffic management improvements;
 - Reduce impact of HGV's;
 - Improvements for pedestrians and cyclists;
 - Better integration of public transport; and
 - Promoting alternatives to singular private vehicle use.
- Infrastructure:
 - Include planning policies within the Boston Transport Strategy and AQAP.
- Awareness:
 - Campaigns to raise awareness of air quality and travel plans;
 - Make monitoring data and LAQM reports available online.

- Enforcement:
 - Maintain an air quality non-automatic monitoring network within the Borough.

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

- Update the AQAP;
- Continue to maintain and expand the network of promotional information sources available for sustainable transport modes;
- The implementation and on-going monitoring of the Travel Plan Policy;
- Investigate further opportunities for the improvement of local bus services, the delivery of identified new cycle routes, improving sustainable transport provision, and for traffic management improvements; and
- Continue of non-automatic NO₂ diffusion tubes monitoring across Boston Borough Council and the AQMAs, ensuring high level of data capture.

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
AQAP 1	Building of the Boston Docks Link Road	Traffic Management	Strategic highway improvements	LCC / BBC	The scheme has been abandoned	-	Traffic counts, non-automatic NO ₂ monitoring	Reduction of 2µg/m ³ per year	within Boston Transport Strategy 2016-2036	-	Scheme To be reviewed
AQAP 2	Provision of the Outer Distributor Road for Boston	Traffic Management	Strategic highway improvements	LCC / BBC	The Boston Transport Strategy considers the Distributor Road as a longer term aspiration	South East Lincolnshire Local Plan 2011-2036	Traffic counts, non-automatic NO ₂ monitoring	Significantly reduce levels of Heavy Good Vehicles, achievement of annual target mean.<40 µg/m ³	-	LCC Local Transport Plan Future Delivery to be agreed	South East Lincolnshire Local Plan 2011-2036 Submitted for Examination July 2017
AQAP 3	Development of a Transport Strategy for Boston	Policy Guidance and Development	Air Quality Planning and Policy Guidance	LCC / BBC	Completed	South East Lincolnshire Local Plan 2011-2036	Traffic counts, non-automatic NO ₂ monitoring	Annual mean reduction achieved <40 µg/m ³	Boston Transport Strategy 2016 – 2036 has been published.	Project/funding stream required to progress	
AQAP 4	Expansion of the Community Travel Zone	Promoting Travel Alternatives	Promotion of walking and cycling	LCC	Schemes to encourage walking and cycling implemented during 1st LTP period	A Non-Motorised User study for the town has been completed. This has identified several prospective walking and cycling schemes which are currently being prioritised	Traffic counts, non-automatic NO ₂ monitoring	General public accepting change and raise awareness on different forms of sustainable transport.	-	Enhanced cycling and walking facilities in Boston have been approved and are going ahead such as the Spa Trail connect and Black Sluice Path	-

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						for deliver as funding become available.					
AQAP 7	Provision of Liquid Petroleum Gas (LPG) pumps at filling station	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	BBC	No policy in Local Plan	-	Non-automatic NO ₂ monitoring	Annual mean reduction achieved <40 µg/m ³	South East Lincolnshire Local Plan 2011-2036	National Air Quality Strategy	Not included in Plan
AQAP 9	Park & Ride Schemes for applicability to Boston	Alternatives to private vehicle use	Bus based Park & Ride	LCC	The Boston Transport Strategy does not support the merits of a Park & Ride for Boston. However, the adopted Boston Transport Strategy does propose other improvements to public transport	The new 'IntoTown' town bus service was introduced in 2008. As well as more frequent service using low floor buses, this has included improvements to bus stops and timetable information, together with real time information. The service has seen a threefold increase in patronage since its introduction.	-	Annual mean reduction achieved <40 µg/m ³	3 cross town loops every 30 minutes Operate Mon-Sat 0700-1900 passengers has risen over 300% and now carrying 24,000/month	South East Lincolnshire Local Plan 2011-2036 Scheme abandoned	-
AQAP 10	Development of a rail-freight interchange through the Local Plan	Freight and Delivery Management	Other	LCC / SHDC	-	-	-	Annual mean reduction achieved <40 µg/m ³	South East Lincolnshire Local Plan 2011-2036	Scheme abandoned	No developer

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AQAP 11	Designate a senior officer responsibility for transport-related issues within BBC	Policy Guidance and Development Control	Other policy	BBC	South East Lincolnshire Local Plan 2011-2036	Chief Executive Phil Drury representing BBC on Boston Transport Strategy	-	Annual mean reduction achieved <math><40 \mu\text{g}/\text{m}^3</math>	Complete	Complete	Boston Transport Strategy 2016-2036
AQAP 12	Controlled Parking Zone (CPZ) Framework	Traffic Management	UTC, Congestion management, traffic reduction	LCC / BBC	Feasibility study carried out.	Civil Parking Enforcement has been introduced	-	Annual mean reduction achieved <math><40 \mu\text{g}/\text{m}^3</math>	Additional signage to direct drivers to most appropriate car parks. New pricing charges introduced.	-	A multi-storey car park was proposed, but the developer pulled out on funding.
AQAP 13	Encouraging walking and cycling routes for new development	Transport Planning and Infrastructure	Cycle network	LCC / BBC	South East Lincolnshire Local Plan 2011-2036	An on-going objective when considering planning applications for new development, to achieve adequate facilities within the developments	Traffic counts at major roads	Annual mean reduction achieved <math><40 \mu\text{g}/\text{m}^3</math>	Implementation started 2010/2011, examples are Sleaford Road cycleway, Toucan crossing at Bargate Bridge.	On-going	-
AQAP 14	Discouraging development within the town-centre than places an emphasis on private vehicle use over public transport.	Promoting Travel Alternatives	Other	BBC	South East Lincolnshire Local Plan 2011-2036	This is an on-going objective when considering planning applications for new development, to achieve adequate facilities within the developments and linkages to existing	-	Annual mean reduction achieved <math><40 \mu\text{g}/\text{m}^3</math>	South East Lincolnshire Local Plan 2011-2036	On-going	-

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						networks.					
AQAP 15	Request detailed air quality assessments for proposed development that is likely to have a significant impact on local air quality	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	BBC	South East Lincolnshire Local Plan 2011-2036	Air quality assessments are required of developers where a significant impact is likely.	-	-	On-going development control	On-going	South East Lincolnshire Local Plan 2011-2036 Submitted for Examination July 2017
AQAP 16	Use of Planning Conditions or S106 Agreements	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	BBC	South East Lincolnshire Local Plan 2011-2036	These tools are used where appropriate and according to the scale of the problem.	-	-	South East Lincolnshire Local Plan 2011-203 Submitted for Examination July 20176	On-going	-
AQAP 18	Production of a Council Sustainable Travel Plan	Promoting Travel Alternatives	Workplace Travel Planning	BBC	The County Council is working in partnership with Boston Borough Council to implement a Travel Plan for the Municipal Buildings in Boston (which are also subject to the East Lincolnshire Primary Care Trust	A staff survey was carried out in March 2004 which identified employees travel patterns and a Travel Plan was adopted in the summer of 2005	-	-	Smarter Driving Courses commencing 2010/2011. Adopted Carbon Management Plan 2010 - 2014	Complete	-

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					and the County Council's Divisional staff).						
AQAP 19	Promotion of Sustainable Travel Plans for large employers (more than 500 employees)	Promoting Travel Alternatives	Workplace Travel Planning	BBC	South East Lincolnshire Local Plan 2011-2036	These tools are used where appropriate and according to the scale of the problem.	Number of employers that joins the programme	-	Two children's centres in the Borough have submitted travel plans to LCC	On-going	-
AQAP 20	Promotion of walking as a healthy alternative to car use for short journeys within the town-centre	Promoting Travel Alternatives	Promotion of walking	BBC	Promotion of walking has been delivered through the LTP through Safe Routes to School and Community Travel Zones in Boston	The Boston Transport Strategy proposes a number of measures to promote walking. 12 Boston Community Health Walks Groups operational. Health Improvement funding withdrawn, now operates on a voluntary basis with some support from BBC and Lincolnshire Coop.	Increase in number of participants/partners. Traffic counts on major roads	-	Numbers participating in social walking groups – throughput for April-June 2017 was 2001	On-going	Cycling Road Show event July 2017
AQAP 22	Investigation of inland waterways as complementary distribution methods for freight	Promoting Travel Alternatives	Promote use of rail and inland waterways	BBC	South East Lincolnshire Local Plan 2011-2036	Outline planning permission has been granted for the construction of a tidal	Non-automatic NO ₂ monitoring	-	Proposal for Lock link to Haven. Lock link completed. Barrier position finalised	Barrier to be built commencing 2018	Funding secured

						barrage and a lock link to encourage greater use of the River Witham and to provide a navigable link to the South Forty Foot Drain. This will ultimately link to the R. Welland, R Nene and R. Ouse, known as the Fens Waterway Link.					
AQAP 23	Discourage use of bonfires for disposal of waste	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	BBC	Statutory Nuisance enforcement on-going. Garden waste recycling scheme introduced 2012	Statutory Nuisance enforcement on-going. Recycling of green waste at 52%	-	-	Statutory nuisance enforcement on-going	On-going	-
AQAP 24	Maintenance of current monitoring stations and networks	Promoting Low Emission Plant	Other	BBC	Haven Bridge continuous monitoring station ceased. Non-automatic NO ₂ monitoring across the council	Haven Bridge continuous monitoring station closed due to lack of funds.	Non-automatic NO ₂ monitoring	Annual mean reduction achieved <40 µg/m ³	15 Diffusion tube sites	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.

The Public Health Outcomes Framework indicator for the fraction of deaths attributable to PM_{2.5} in Boston is 5.5% during 2015, which is above national average of 4.7%, but lower than a number of other authorities in the East Midlands region.

There are no automatic PM_{2.5} monitoring stations currently within Boston Borough Council, but the council is working to reduce emissions of air pollutant across the Borough, many of the measures used to reduce emissions of NO₂ also impact the emissions of PM₁₀ and PM_{2.5}. The following pollutant emission reduction measures included within Boston's existing AQAP are also likely to reduce emissions of PM_{2.5}:

- To support and enhance sustainable travel and alternatives to the private car through widening choice, improving public transport and increasing provision for cycling and walking.
- To provide an efficient, convenient and accessible transport network for all, reducing the adverse impacts of travel, particularly from private cars and road-based freight.
- To support the sustainable development, regeneration and growth of Boston, helping to attract inward investment and meeting current and future housing and business needs.
- To reduce carbon emissions from personal travel and freight transport.
- To protect and enhance the quality and attractiveness of the built and natural environment of Boston and the surrounding area.

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

3.1 Summary of Monitoring Undertaken

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

3.1.1 Automatic Monitoring Sites

Boston Borough Council did not undertake any automatic (continuous) monitoring during 2016.

3.1.2 Non-Automatic Monitoring Sites

Boston Borough Council undertook non- automatic (passive) monitoring of NO₂ at 15 sites during 2016. Table A.1 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, annualised and distance corrected. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

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

During 2016, there were 3 exceedences of the annual mean NO₂ objective of 40µg/m³, where the highest recorded concentration was 46.2µg/m³ at site 3, adjacent

to 68 Liquorpond Street. As the annual mean concentration does not exceed $60\mu\text{g}/\text{m}^3$, an exceedance of the 1-hour mean objective is unlikely at these sites.

AQMA 1 – Haven Bridge

Two out of the five monitoring locations within the Haven Bridge AQMA were observed to have an annual mean NO_2 concentration that exceeded the annual mean AQS objective of $40\mu\text{g}/\text{m}^3$ in 2016, as shown in Table A.2. These two sites are site 1 and site 3. Figure A.1 shows that the peak concentrations were reported in 2013 at all sites except site 1 with the peak concentration in 2014.

AQMA 2 – Bargate Bridge

One of the four monitoring locations within the Bargate Bridge AQMA, site 9, was observed to have an annual mean NO_2 concentration that exceeded the annual mean AQS objective of $40\mu\text{g}/\text{m}^3$ in 2016, shown in Table A.2 and Figure A.1.

The NO_2 annual mean concentrations for 2016 are at the similar level as that recorded in 2015 for all monitoring sites in the AQMA except site 9 with an increase.

As reported previously, properties in the AQMA are set back from the A16 Spilsby Road. Site 9 is not representative of public exposure. In order to estimate the actual NO_2 annual mean concentration at relevant exposure within the AQMA, the NO_2 fall-off with distance calculator provided by Defra on the LAQM Support website has been used. Prior to distance correction, the annual mean NO_2 concentration at site 9 was $41.5\mu\text{g}/\text{m}^3$.

Based on the tool, and considering a distance of 6m from the façade of properties to the kerb (which is conservative), the NO_2 concentration at relevant nearby exposure is predicted to be $34.9\mu\text{g}/\text{m}^3$ at site 9, as shown in Table C.2 and Figure C. 1. These results indicate that annual mean NO_2 concentrations were below the objective at locations relevant for public exposure close to site 9 within the AQMA.

3.2.2 Particulate Matter (PM_{10})

Boston Borough Council did not undertake any monitoring for PM_{10} within the local authority boundary and have not identified any new specific sources of particulates at this time.

Appendix A: Monitoring Results

Table A.1 – 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	Adjacent to former AQMS, North side of Haven Bridge Road	Roadside	532575	343696	NO2	Y Haven Bridge AQMA	0	1.5	N	3
2	Opposite former AQMS, North side of Haven Bridge Road	Roadside	532656	343716	NO2	Y Haven Bridge AQMA	N/A	0.5	N	3
3	Adjacent to 68 Liquorpond Street	Roadside	532470	343736	NO2	Y Haven Bridge AQMA	0.1	0.5	N	3
4	Adjacent to 18 Queen Street	Roadside	532331	343848	NO2	Y Haven Bridge AQMA	0.1	1.5	N	3
5	John Adams Way intersection with Haven Bridge	Roadside	532859	343760	NO2	Y Haven Bridge AQMA	3.5	2.2	N	3
6	Adjacent to 37 Spayne Road	BG	533124	343939	NO2	N	6.8	2.7	N	3
7	29 Manor Gardens	BG	533324	344044	NO2	N	10	26.8	N	3
8	Bargate Roundabout	Roadside	533112	344476	NO2	Y Bargate Bridge AQMA	N/A	2.3	N	3
9	Roadside adjacent to 30 Spilsby Road	Roadside	533251	344642	NO2	Y Bargate Bridge AQMA	4	2	N	3

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)
10	Façade of 23 Spilsby Road	Roadside	533312	344665	NO2	N	0	5	N	3
11	41 Spilsby Road	Roadside	533368	344728	NO2	N	8.5	0.3	N	3
12	Junction of New Asda Road and Sleaford Road	Roadside	532168	343987	NO2	N	8.9	1.5	N	3
13	Façade of 42 Spilsby Road	Roadside	533287	344675	NO2	N	0	7	N	3
14	Roadside adjacent to 20 Spilsby Road	Roadside	533226	344624	NO2	Y Bargate Bridge AQMA	3	2	N	3
15	Façade of 32 Spilsby Road	Roadside	533253	344653	NO2	Y Bargate Bridge AQMA	0.1	10	N	3

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.2 – Annual Mean NO₂ 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/m ³) ⁽³⁾				
					2012	2013	2014	2015	2016
1	Roadside	Diffusion Tube	91.7	91.7	52.3	50.5	51.7	49.7	45.8
2	Roadside	Diffusion Tube	66.7	66.7	39.9	54.6	53.7	50.1	37.5
3	Roadside	Diffusion Tube	41.7	41.7	48.3	49.2	45.3	46	46.2
4	Roadside	Diffusion Tube	100.0	100.0	36.8	42.5	40.2	36.4	38.6
5	Roadside	Diffusion Tube	100.0	100.0	37.7	38.7	36.1	34.9	34.6
6	Urban Background	Diffusion Tube	91.7	91.7	22.4	18.5	17	17.1	17.8
7	Urban Background	Diffusion Tube	100.0	100.0	20.5	17.7	15.9	16.3	17.0
8	Roadside	Diffusion Tube	100.0	100.0	34.4	33.1	34.2	31.1	31.1
9	Roadside	Diffusion Tube	100.0	100.0	46.9	44.1	46.6	44.2	41.5
10	Roadside	Diffusion Tube	100.0	100.0	-	31	31.7	28.5	28.2
11	Roadside	Diffusion Tube	91.7	91.7	35.6	37.4	36.3	33	30.6
12	Roadside	Diffusion Tube	100.0	100.0	33.3	34.6	30.7	28.6	26.8
13	Roadside	Diffusion Tube	100.0	100.0	-	24.1	23.3	22	21.7
14	Roadside	Diffusion Tube	100.0	100.0	36.9	41.1	41.6	36.6	36.7
15	Roadside	Diffusion Tube	100.0	100.0	21.5	24.7	25.2	21.4	21.8

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

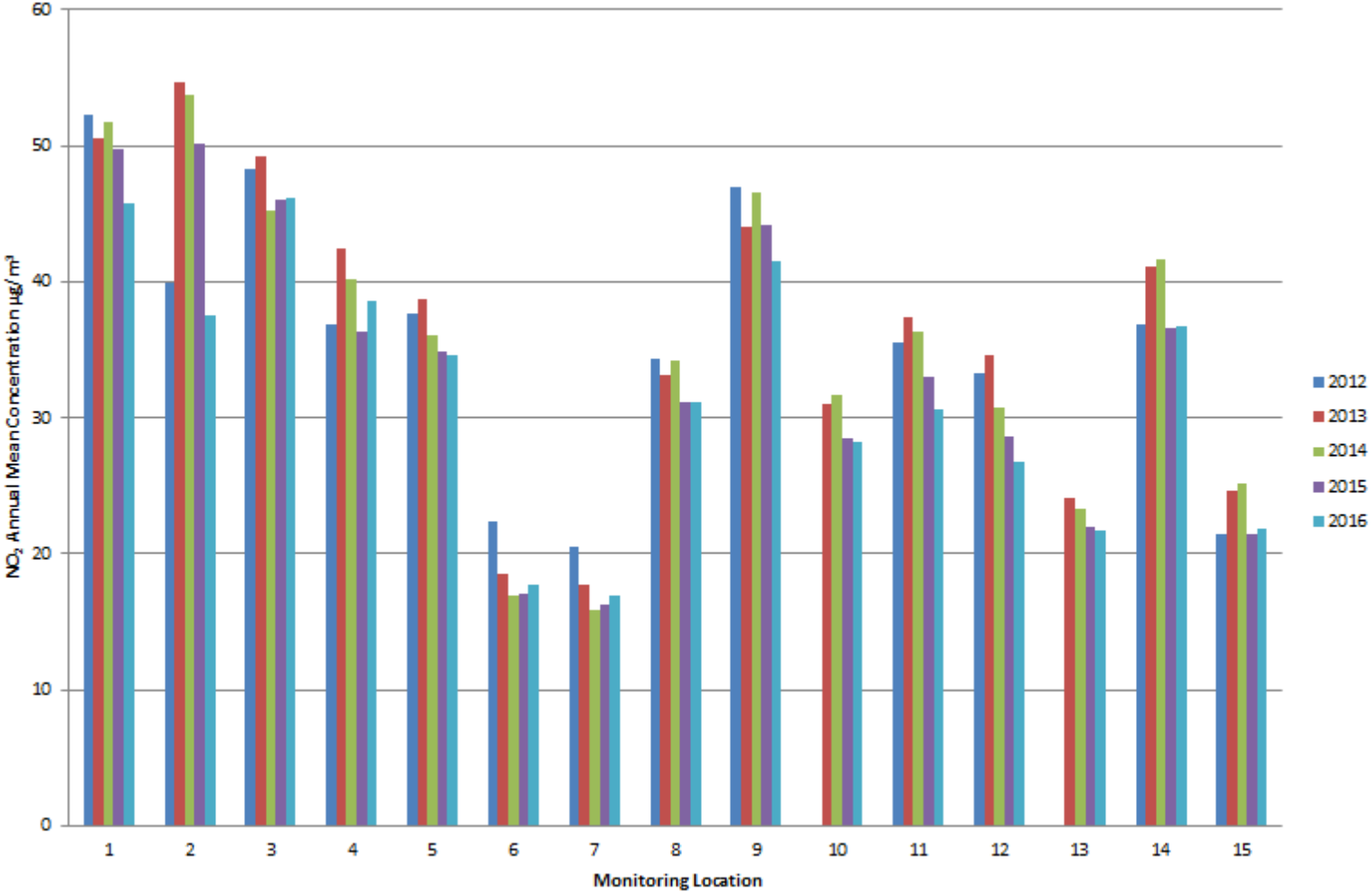
Notes:

Exceedances of the 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 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 NO₂ Concentrations at Non-automatic Monitoring Locations



Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2016

Site ID	NO ₂ Mean Concentrations (µg/m ³)												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.92) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
1	51.9	59.9	40.4	35.0	-	43.1	42.0	50.5	56.6	56.4	52.8	59.6	49.8	45.8	-
2	44.9	54.9	30.5	51.6	51.9	-	-	-	-	46.7	54.8	45.3	47.6	37.5	-
3	46.4	-	39.9	55.1	-	-	38.0	44.0	-	-	-	-	44.7	46.2	-
4	40.2	48.2	36.3	48.7	39.6	40.1	30.6	36.6	41.9	48.9	48.5	43.8	42.0	38.6	-
5	39.4	43.3	32.3	35.3	37.4	25.9	36.7	37.6	35.4	40.8	46.5	40.4	37.6	34.6	-
6	26.3	24.1	-	16.4	15.2	11.6	13.9	13.0	18.8	16.4	28.8	27.8	19.3	17.8	-
7	24.4	25.1	17.0	14.0	15.0	8.9	12.2	11.1	18.2	16.9	28.6	30.5	18.5	17.0	-
8	31.9	38.4	28.6	31.5	38.4	29.4	29.2	30.9	35.3	34.6	40.8	36.8	33.8	31.1	-
9	44.8	54.6	34.5	39.2	47.0	34.4	34.0	37.2	52.1	39.8	59.6	63.6	45.1	41.5	34.9
10	31.6	33.5	27.4	27.1	29.2	26.6	26.7	28.2	31.5	31.7	37.5	36.2	30.6	28.2	-
11	34.0	30.5	28.3	32.5	37.1	29.4	28.6	31.4	36.6	37.3	-	40.5	33.3	30.6	-
12	20.7	37.4	32.8	33.7	28.7	28.1	19.5	24.1	23.5	35.9	31.7	33.7	29.2	26.8	-
13	28.5	26.3	21.1	22.2	21.9	17.2	18.4	17.0	25.5	18.5	32.9	33.2	23.6	21.7	-
14	38.3	47.2	33.5	35.8	44.2	41.7	32.4	30.3	37.6	39.3	50.5	47.8	39.9	36.7	-
15	32.1	28.8	21.6	20.3	20.4	18.8	16.8	16.6	24.6	20.2	30.2	34.5	23.7	21.8	-

Local bias adjustment factor used

National bias adjustment factor used

Annualisation has been conducted where data capture is <75%

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) 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

Diffusion Tube Bias Adjustment Factors

The diffusion tubes are supplied and analysed by Gradko utilising the 20% triethanolamine (TEA) in water preparation method. A bias adjustment of 0.92 for the year 2016 (based on 27 studies) has been derived from the national bias adjustment calculator⁴.

Discussion of Choice of Factor to Use

Historically the Council has used a local bias adjustment factor based on results from the diffusion tube co-located with the automatic air quality monitoring site that was installed within the Haven Bridge AQMA. However the site was decommissioned at the end of 2011 and therefore the national bias adjustment factor has been applied to the monitoring results since 2012.

QA/QC of Diffusion Tube Monitoring

Gradko International Ltd (Gradko) is a UKAS accredited laboratory and participates in the AIR-PT Scheme² (a continuation of the Workplace Analysis Scheme for Proficiency (WASP)) for NO₂ tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO₂ concentrations are reported to a high level of accuracy. The lab follows the procedures set out in the Harmonisation Practical Guidance.

In the 2016 AIR-PT results, AIR-PT AR012 (January to February 2016), AIR-PT AR013 (April to May 2016), AR015 (July to August 2016) and AR016 (September to October 2016), Gradko scored 100%. The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$.

Short-term to Long-term Data Adjustment

Diffusion tube data capture for 2016 was greater than 75% at all the monitoring locations except Site 2 and Site 3. The data for all these two sites have been annualised according to the method set out in LAQM TG(16) box 7.9. The details of the annualisation have been provided in the table below.

⁴ National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 06/17 published in June 2017.

Table C.1– Annualisation for Site 2 and Site 3

Site	Uncorrected Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	Leicester University AF	Nottingham Centre AF	Market Harborough AF	Average AF	Annualised Data Average $\mu\text{g}/\text{m}^3$
2	47.6	0.884	0.868	0.821	0.858	37.5
3	44.7	1.144	1.088	1.141	1.124	46.2

Fall-off Distance Correction of Sites Exceeding the NO₂ Annual Mean Objective

The NO₂ fall-off with distance calculator was used to estimate the NO₂ concentration at the nearest locations relevant for exposure for site 9. The Details for the NO₂ fall-off distance correction calculation for the site 9 are shown in Table C.2 and Figure C.

1

Table C.2 – Fall off with Distance Correction of Relevant Sites Exceeding the NO₂ Annual Mean AQS Objective

Site ID	Site Type	Within AQMA	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	2015 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)	Distance Corrected 2015 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)
9	Roadside	Yes	4	2	41.5	34.9

Figure C. 1– Fall-off Distance Correction of Sites Exceeding the NO₂ Annual Mean Objective (2015)

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Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	2	metres
Step 2	How far from the KERB is your receptor (in metres)?	6	metres
Step 3	What is the local annual mean background NO ₂ concentration (in $\mu\text{g}/\text{m}^3$)?	15.7	$\mu\text{g}/\text{m}^3$
Step 4	What is your measured annual mean NO ₂ concentration (in $\mu\text{g}/\text{m}^3$)?	41.5	$\mu\text{g}/\text{m}^3$
Result	The predicted annual mean NO ₂ concentration (in $\mu\text{g}/\text{m}^3$) at your receptor	34.9	$\mu\text{g}/\text{m}^3$

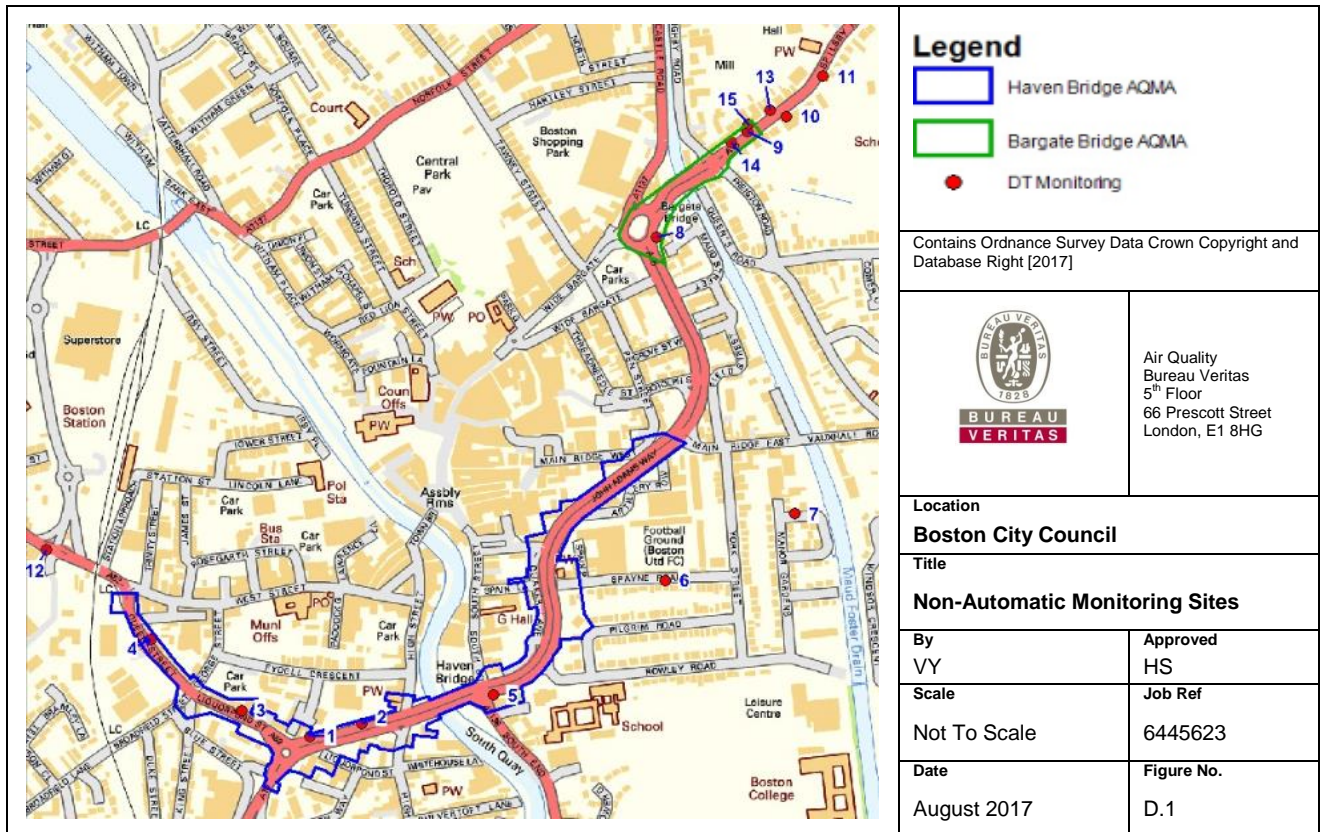
Planning Applications in 2016

B/16/0315

This planning application is located at land off Punchbowl Lane, Boston, construction of 99 dwellings, associated garages, infrastructure and public open space. No air quality assessment is required as part of the submission.

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D. 1 – Monitoring Locations and AQMAs



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/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
BBC	Boston Borough Council
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
LCC	Lincolnshire County Council
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

- Local Air Quality Management Technical Guidance LAQM.TG(16). Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG(16). Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- NO₂ Fall off With Distance Tool, available at <http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 06/17 published in June 2017.
- <https://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html> (AIR-PT Rounds 7-18, Apr 2015-Feb2017)
- Boston Borough Council 2016 Annual Status Assessment.
- Boston Borough Council 2006 Local Air Quality Management – Air Quality Action Plan.
- Boston Transport Strategy (2016-2036).
- <http://www.phoutcomes.info/public-health-outcomes-framework#page/0/gid/1000043/pat/6/par/E12000004/ati/101/are/E07000134/id/30101/age/230/sex/4>
- <http://www.boston.gov.uk/index.aspx?articleid=3736>
- The South East Lincolnshire Local Plan (2011-2036)