Boston Borough Council
Annual Status Report 2019

Bureau Veritas

June 2019

Move Forward with Confidence

Document Control Sheet

Identification	
Client	Boston Borough Council
Document Title	2019 Annual Status Report
Bureau Veritas Ref No.	6484995/UK/V2.0

Contact Details		
Company Name	Bureau Veritas UK Limited	Boston Borough Council
Contact Name	Hannah Smith	Nick Davis
Position	Senior Consultant	Environmental Health Officer
Address	5th Floor 66 Prescot Street London E1 8HG	Municipal Buildings West Street Boston PE21 8QR

Configuration				
Version	**Date**	**Author**	**Reason for Issue/Summary of Changes**	**Status**
V1.0	14/06/19	B Turner	-	Draft
V2.0	26/06/19	B Turner	Comments Received	Final

	Name	Job Title	Signature
Prepared By	B Turner	Assistant Consultant	
Approved By	P Bentley	Senior Consultant	

2019 Air Quality Annual Status Report (ASR)

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

June 2019

Local Authority Officer	Nick Davis
Department	Environmental and Health
Address	Municipal Buildings, West Street, Boston, PE21 8QR
Telephone	01205 314200
E-mail	Nick.Davis@boston.gov.uk
Report Reference number	6473976/2019ASR
Date	June 2019

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 billion[3].

As a whole, Boston's air quality issues derive from high usage of private vehicles for making short frequent journeys within Boston. For example, as detailed in the Boston Transport Strategy (2016-2036), nearly half of travel to work journeys start and end within Boston, and half of these journeys are made by private motor vehicles predominantly along major arterial roads (Sleaford Road, John Adams Way, Spalding Road and Splisby Road), causing peak period congestion. Currently Boston Borough Council (BBC – 'the Council') has two designated Air Quality Management Areas (AQMAs), these are located at Haven Bridge and at Bargate Bridge. Both AQMAs have been declared in relation to exceedances of the AQS annual mean objective of 40 µg/m^3 for NO_2, largely due to traffic emissions from private vehicles along Sleaford Road, John Adams Way, Spalding Road and Splisby Road which all connect to form the main transportation network within the region. However, these high-capacity roads run past residential areas where relevant exposure is apparent, thus raising public health concerns.

The two AQMAs can be seen online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=27, details of the AQMAs are provided in Table 2.1 and a boundary map presented in Appendix D.

An AQAP was completed in 2006 and was subsequently updated in 2010, within the AQAP measures are outlined to be completed in order to pursue of the annual mean objective for NO_2 thus improving air quality within the AQMAs and therefore the District

[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 a whole. In-line with Defra's recommendations, BBC are currently in the process of updating the AQAP scheduled to be published in 2019, whereby a Detailed Modelling Assessment was completed in 2018 to inform the development of the AQAP via dispersion modelling. BBC have established a steering group consisting of internal lead officers across a number of relevant departments and representatives from Lincolnshire County Council (LCC) and Public Health England. The aim of the steering group is to develop and appraise a range of measures for further consideration, across relevant policy areas, and to ensure that there is sufficient political engagement locally within BBC, whilst also regionally across Lincolnshire. Currently BBC have hosted two steering group meetings.

During 2018, BBC monitored NO_2 at 19 sites during 2018 via a network of diffusion tubes, comprising 17 roadside and 2 urban background sites. During December 2018, BBC relocated four diffusion tubes (Sites 6, 7, 10 and 15) to sites located along the London Road approach to the A16 – Spalding roundabout (Sites 18 and 19), and along the A1138 – South End (Sites 16 and 17). This relocation was in response to the findings of the 2018 Detailed Modelling Assessment which identified these areas outside of the existing AQMAs to be in exceedance of the AQS annual mean NO_2 objective limit. Further to this, based upon the conclusions of the completed Detailed Modelling Assessment and the results of monitoring during 2017, in January 2018 BBC relocated two diffusion tubes located at Sites 11 and 13 (north of Bargate Bridge AQMA), to locations adjacent to and within Haven Bridge AQMA (titled Sites 20 and 21). Both Sites 11 and 13 have historically reported stable NO_2 annual mean concentrations, and were therefore chosen to be decommissioned, in order to improve air quality reporting in and adjacent to Haven Bridge AQMA.

During 2018, four sites recorded NO_2 annual mean concentrations in excess of 40 $\mu g/m^3$, whereas seven (inclusive) reported concentrations to be above 36 $\mu g/m^3$. However, once distance correction calculations were performed (where necessary), three monitoring sites reported to exceed the AQS NO_2 annual mean objective within 2018, with a further three reporting concentrations to be within 10%. The three monitoring sites that experienced the exceedances are located within the Haven Bridge AQMA (Sites 1, 2 and 3).

Three out of the four sites which have reported exceedances of the NO_2 annual mean concentrations during 2018 (Sites 1, 2 and 3), have consistently reported

concentrations to be above 36 µg/m^3 since 2014 – with the majority exceeding 40 µg/m^3 – demonstrating the localisation of exceedances compared to improvements in monitored concentrations elsewhere within BBC.

Site 9, located within the Bargate Bridge AQMA, recorded an annual mean NO_2 concentration below 40 µg/m^3 for the first time since 2014, demonstrating progress in key areas. In addition, Site 4 and 14, which are also located within the declared AQMAs, have remained compliant since 2015. These achievements reflect the Councils continued commitment and work towards improving Boston's air quality.

In comparison to 2014, NO_2 annual mean concentrations have decreased at nine sites over a five year period, with the largest decrement observed at Site 1 and Site 2 (both of which are located within Haven Bridge AQMA) reflecting the continual commitment and progress made by Boston Borough Council to improve local air quality with the aim to revoke the declared AQMAs.

Site 3 reported the highest NO_2 annual mean concentration within Boston for the third year running (48.3 µg/m^3), down from 53.2 µg/m^3 recorded in 2017. Site 3 is located on a façade of a residential property along a stretch of the A52 – Liquorpond Street where queues are considered to be prevalent.

In accordance with Defra LAQM.TG(16), this indicates that an exceedance of the 1-hour mean objective is unlikely to have occurred at these sites throughout 2018.

Actions to Improve Air Quality

The AQAP for BBC is the main document 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 NO_2 annual mean AQS objective. However, BBC are currently in the process of updating the AQAP, scheduled to be published in 2019, whereby a Detailed Modelling Assessment was completed in 2018 to improve the Council's understanding of air quality within the region. BBC have established a steering group consisting of internal lead officers across a number of relevant departments and representatives from LCC and Public Health England. The aim of the steering group is to develop and appraise a range of measures for further consideration, across relevant policy areas, and to ensure that there is sufficient political engagement locally within BBC, whilst also regionally across Lincolnshire. Currently BBC have hosted two steering group meetings.

In recognition of the importance that transport plays, BBC, in partnership with LCC, has released a new Boston Transport Strategy (2016-2036) that builds upon the improvements delivered since the last Strategy was published in 2006 - 'The Transport Strategy for Boston 2006 – 2021 and beyond'. The strategy focuses on aligning the two disciplines together to deliver a sustainable transport network which supports the growth of Boston and helps to improve air quality. A key objective of this new strategy is to work with LCC and developers to deliver elements of the Boston Distributor Road which in the long term will provide a western link road between the A16 in the south of the town and the A16 in the north. The new road links are to serve new developments to the west of Boston, easing reliance on inner city arterial roads for journeys made beyond Boston. In parallel, objectives concentrate on providing alternative forms of transport, investing in walking, cycling and public transport infrastructure to promote a modal shift away from private vehicles for short journeys made within Boston.

Overall, the strategy includes a high level of consideration 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.

In addition, a number of actions have been completed within the Borough during 2018 (following on from progress made in previous years) designed at improving local air quality:

- Active Lincolnshire have developed a new walking app which uses GPS mapping technologies to promote walking within Lincolnshire to help its residents lead active lifestyles; and
- Boston Borough Council have undertaken a study of a number of council operated car parks with a view to provide electric vehicle charging points for public use. A funding bid is currently with the Office of Low Emission Vehicles to fund 18 electric vehicle charging points across seven sites. An example of a proposed electric vehicle charging point is presented in Figure 1 below.

Figure 1 - Proposed Electric Vehicle Charging Point

Conclusions and Priorities

During the 2018 reporting year, BBC demonstrated proactive steps to securing future year compliance with the NO_2 annual mean AQS objective limit. These measures include the development of an updated AQAP and establishment of an internal stakeholder steering group to ensure effective delivery of measures with sufficient political support, completion of a Detailed Modelling Assessment to inform the revised AQAP and the Council's understanding of air quality within the region and the relocation of monitoring to areas outside of a declared AQMA boundary that have been predicted to be in exceedance of the AQS annual mean NO_2 objective limit.

Monitoring of NO_2 concentrations in 2018 concluded that exceedances of the annual mean NO_2 AQS annual objective were solely located within Haven Bridge AQMA, demonstrating the challenge BBC faces with localisation of air quality hotspots in line with wider improvements to air quality across the Borough. Bargate Bridge AQMA reported as fully compliant for the second continual year. Both AQMAs are located on

the main arterial routes serving the town so improvements are dependent on delivery of AQAP measures focussing on transport, such as the Boston Distributer Road.

In comparison to 2014, NO_2 annual mean concentrations have decreased at nine sites over a five year period, with the largest decrement observed at Site 1 and Site 2 (both of which located within Haven Bridge AQMA) reflecting the continual commitment and progress made by the BBC to improve local air quality with the aim to revoke the declared AQMAs.

The highest 2018 annual mean NO_2 concentration reported in Boston (Site 3) reduced in comparison to 2017 (from 53.2 µg/m^3 to 48.3 µg/m^3) – demonstrating improvements to local air quality.

Overall, the main priority for Boston Borough Council is to concentrate efforts within Haven Bridge AQMA to ensure compliance or at least a reduction in NO_2 concentrations, and to continue the progress made at Bargate Bridge AQMA, with the aim of revocation in the coming years.

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

- Continue the development of the AQAP, with the aim of publication later this year;
- Monitor localisation of exceedances and consider the need to relocate or increase the amount of monitoring stations within Haven Bridge AQMA over the coming years to areas representative of exposure, in order to improve confidence in air quality reporting;
- Seek funding for a feasibility study for the construction of the future phases of the Boston Distributor Road;
- 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 BBC 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.

Table of Contents

List of Tables

List of Figures

1 Local Air Quality Management

This report provides an overview of air quality in Boston Borough Council during 2018. 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 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 BBC can be found in Table 2.1. 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=27 see full list at https://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.

In 2018, BBC commenced work on the scheduled updated to the AQAP – last updated in 2010. In support of this, a Detailed Modelling Assessment was completed to inform the completion of the AQAP via dispersion modelling. The Detailed Modelling Assessment found three discrete areas of exceedance relative to the NO_2 annual mean AQS objective limit, all located along sections of the main connected arterial road network within Boston (A16 - Spalding Road, A52 – Liquorpond Street, A16 - John Adams Way and Spilsby Road). These are:

- A Continuous stretch spanning Sleaford Road, Liquorpond Street, John Adams Way and South End covering parts of Haven Bridge AQMA;
- Spilsby Road approach to Wide Bargate covering Bargate Bridge AQMA; and
- A continuous stretch of the A16 – Spalding Road spanning north and south of the South Forty Foot Drain.

The Detailed Modelling Assessment found all three locations to demonstrate similarities with the ranking of total and road NO_x contributing vehicle classes and individual vehicle class contribution within all three locations - suggesting all locations exhibit similar traffic characteristics. As a result, it was therefore recommended to declare one AQMA within Boston, amalgamating all three areas of identified exceedance (and the two current AQMAs), covering the main arterial highway network within Boston, or alternatively declare three discrete AQMAs covering the three located

areas of exceedance individually. The Detailed Modelling Assessment is provided in Appendix F: 2018 Detailed Modelling Assessment.

In response to the modelled findings, BBC are to undertake additional monitoring at the locations identified to be in exceedance or near exceedance of the AQS annual mean NO_2 objective in order to validate the proposed changes to the AQMA boundaries, as recommended. This was initiated in December 2018, where four diffusion tubes (Sites 6, 7, 10 and 15) were located to sites located along the London Road approach to the A16 – Spalding roundabout (Sites 18 and 19), and along the A1138 – South End (Sites 16 and 17) – two areas outside of a declared AQMA boundary identified to be in exceedance of the AQS annual mean NO_2 objective limit.

As a result, BBC propose to keep the current two designated AQMAs in Boston Borough Council (see monitoring section) and to review the existing, and recently deployed NO_2 monitoring network surrounding these 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		
						At Declaration		Now		Name	Date of Publication	Link
Haven Bridge	10/09/01	NO_2 Annual Mean	Boston	A major highway consisting of John Adams Way (A16), Queen Street and Liquorpond Street (A52).	YES	44.7	µg/m^3	48.3	µg/m^3	BBC AQAP	2006	http://aqma.defra.gov.uk/action-plans/BostonBC%20AQAP%202006.pdf
Bargate Bridge	01/03/05	NO_2 Annual Mean	Boston	Key roundabout for the A16 and A1137.	YES	42.9	µg/m^3	32.8	µg/m^3	BBC AQAP	2006	http://aqma.defra.gov.uk/action-plans/BostonBC%20AQAP%202006.pdf

☒ **Boston Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

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

Defra's appraisal of last year's ASR confirmed that after distance correction calculations were performed, the Council recorded three exceedances of the NO_2 annual mean AQS objective limit (all of which were inside the Haven Bridge AQMA) – consistent with previous reporting years.

We are addressing Defra's recommendation in regards to undertaking a review of the monitoring strategy employed in Boston. For instance, in response to the 2018 Detailed Modelling Assessment findings, where four diffusion tubes (Sites 6, 7, 10 and 15) were located to sites located along the London Road approach to the A16 – Spalding roundabout (Sites 18 and 19), and along the A1138 – South End (Sites 16 and 17). Both areas are outside of the declared AQMA boundaries but were predicted to be in exceedance of the AQS annual mean NO_2 objective limit.

Boston Borough Council are currently updating the AQAP in response to Defra feedback. This update aims to incorporate new and revised measures to lower pollutant concentrations within the designated AQMAs, and also across the entire Borough. A Detailed Modelling Assessment was completed last year to inform the development of the AQAP via dispersion modelling.

Boston Borough Council have taken forward a number of direct measures during the current reporting year of 2018 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 BBC, Local Air Quality Management – Air Quality Action Plan (Joint AQAP update 2010), the Boston Transport Strategy (2016-2036) and Local Plan. In March 2019, the new Local Plan developed in collaboration with South Holland District Council and LCC was adopted.

Key measures which have already been undertaken include:

- Development of a transport strategy for Boston (Boston Transport Strategy 2016-2036);
- Appointment of a senior office responsible for transport related issues within BBC; and
- Production of a Council Sustainable Travel Plan.

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

- Release of an updated AQAP;
- Investigation of inland waterways as complementary distribution methods for freight;
- Seek funding opportunities for a feasibility study for further phases of the Boston Distributor road; and
- Expansion of the Community Travel Zone.

Boston Borough Council priorities for the coming year are:

- Update the AQAP;
- Construction of phase 1 of the Boston Distributor Road through the Quadrant Development;
- Encourage walking and cycling routes for new developments; and
- Discourage developments within the town-centre.

The principal challenges and barriers to implementation that BBC anticipates facing are:

- Funding: The majority of the actions mentioned above require funding to implement successfully. In particular, delivery of the Boston Distributor Road as detailed in the Boston Transport Strategy 2016-36 is reliant upon developer contributions and highway infrastructure funding. Therefore, BBC and LCC must utilise all options available for funding, prioritise measures and be cost effective to ensure our actions outlined in the AQAP are delivered.
- Conflicts with disciplines: On occasion, measures which address air quality can negatively impact other disciplines; such as business and commerce, causing delays. Therefore, when a conflict arises, BBC will exploit the use of consultation groups to help address multidisciplinary concerns in an attempt to deliver cross-channel benefit. Boston Borough Council will also proactively consider potential conflicts and combine disciplines when developing strategies to help minimize these barriers and utilise benefits from each discipline. Both of these techniques have been explored during the formation of the Boston

Transport Strategy 2016-36, where steering groups with key stakeholders were consulted to align air quality with transport to deliver multidisciplinary benefits.

- Cooperation: Sometimes, delivery of specific measures can fall under the responsibility of multiple government bodies and/or private enterprises. An example of this would be road infrastructure, where in some cases a network is controlled by several groups who all need to participate to deliver effective change. In Boston, delivery of the Boston Distributor Road is dependent on support from DfT, Regional Authorities such as Midlands Connect and the private sector. BBC and LCC will continue to lobby and explore opportunities for funding a feasibility study for the Boston Distributor Road beyond phase 1 (Quadrant Development).
- Influence: In Boston, both declared AQMAs are in areas where the air quality is influenced by roads controlled by LCC meaning sometimes our actions alone will not help address air quality within these areas. In these situations it can be incredibly tough to deliver our pledged measures, as they can cross multiple boundaries of different interest groups. In light of this, BBC has acknowledged this influence and have made a focussed effort to strengthen ties with the surrounding local authorities and infrastructure operators, such as LCC, with a view of improving regional air quality – a shared goal, with the release of the Boston Transport Strategy (2016-36) and support of the Lincolnshire Local Transport Plan.

Progress on the following measures has been slower than expected due to:

- In some cases funding has caused issues with delivery. As funding is the main tool to implement change, if the supply is cut off or reduced, this can cause stagnation in delivery. For instance, a multi storey car park was proposed as part of implementing controlling zones in attempt to dissuade the use of private vehicles within Boston town centre, however funding provided from the proposed developer ceased midway through the project causing delays to delivery.
- As BBC are midway through updating their AQAP, emphasis on completing some measures listed in the 2006 AQAP has diminished due to the risk that these may be ineffective and outdated and could potentially waste resources.

Nonetheless, BBC will still complete its obligations in helping to improve air quality within the area, as projects which are expected to be included in the revised AQAP will still be progressed.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, BBC anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of AQMA Haven Bridge and AQMA Bargate Bridge. These measures are expected to be discussed within the coming, in aide of the scheduled update of the AQAP.

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 not being pursued
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	Phase 1 Quadrant housing and retail development under construction	LCC Local Transport Plan Future Delivery to be agreed	Boston Transport Strategy 2016-2036
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	Project/funding stream required to progress	AQAP Update commenced April 2018
AQAP 4	Expansion of the Community Travel Zone	Promoting Travel Alternatives	Promotion of walking and cycling	LCC	Schemes to encourage walking and cycling implemented	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 for deliver as funding become available.	Traffic counts, non-automatic NO_2 monitoring	General public accepting change and raise awareness on different forms of sustainable transport.	Boston Community Health Walks delivers 12 health walks a week. There are 800 attendances a month	Enhanced cycling and walking facilities in Boston have been approved and are going ahead such as the Spa Trail connect and Black Sluice Path	-

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 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 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

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 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 <40 µg/m^3	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. <40 µg/m^3	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 ongoing objective when considering planning applications for new development, to achieve adequate facilities within the developments	Traffic counts at major roads	Annual mean reduction achieved. <40 µg/m^3	Implementation started 2010/2011, examples are Sleaford Road cycleway, Toucan crossing at Bargate Bridge.	Ongoing	-
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 ongoing objective when considering planning applications for new development, to achieve adequate facilities within the developments and linkages to	-	Annual mean reduction achieved. <40 µg/m^3	South East Lincolnshire Local Plan 2011-2036	Ongoing	-

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
						existing 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.	-	-	Ongoing development control	Ongoing	-
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 2011-2036	Ongoing	-
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 sub-	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	

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
					let to the East Lincolnshire Primary Care Trust 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	Ongoing	-
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. In addition, all schools in the Boston area now have an approved School Travel Plans to encourage walking, cycling and bus use.	Increase in number of participants/ partners. Traffic counts on major roads	-	Boston Community Health Walks delivers 12 health walks a week. There are 800 attendances a month	Ongoing	Boston Walking Scheme has received NHS Lincolnshire Award 2010
AQAP 22	Investigation of inland waterways as	Promoting Travel Alternatives	Promote use of rail and inland waterways	BBC	South East Lincolnshire Local	Outline planning permission has been granted for the construction of a tidal barrage	Non-automatic NO_2 monitoring	-	Lock link completed. Barrier position finalised. Boston Barrier construction	Completion 2020	-

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
	complementary distribution methods for freight				Plan 2011-2036	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.			commenced Jan 2018		
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 ongoing.	Statutory Nuisance enforcement ongoing. Recycling of green waste at 52%	-	-	Statutory nuisance enforcement ongoing. Garden Waste collection throughout the Borough	Ongoing	-
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 $\mu g/m^3$	15 Diffusion tube sites	Ongoing	-

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

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

Currently there is no monitoring of $PM_{2.5}$ completed within the Borough, as efforts are being concentrated on monitoring NO_2 levels in line with established AQMAs. However, as primary emissions of both NO_2 and particulates predominately originate from the same source, measures which attempt to reduce NO_2 levels within Boston will simultaneously reduce levels of PM_{10} and $PM_{2.5}$.

The current Defra 2018 background maps for Boston (2017 based)[4] show that all background concentrations of $PM_{2.5}$ are far below the 2020 annual mean AQS objective for $PM_{2.5}$. The highest concentration is predicted to be 9.3 µg/m^3 within the 1 x 1km grid square with the centroid grid reference of 533500, 342500. This grid square is located south of The Haven, with a heavy industrial presence.

The Public Health Outcomes Framework data tool[5] compiled by Public Heath England quantifies the mortality burden of $PM_{2.5}$ within England on a county and local authority scale. The 2017 fraction of mortality attributable to $PM_{2.5}$ pollution in Boston is 4.9%, below both the East of England and national average of 5.1%.

LAQM.TG(16) Table A.1 Action toolbox presents a list of measures that can be implemented to help reduce concentrations of $PM_{2.5}$.

Where required BBC will review any proposed actions to be implemented with the Public Health team to consider the potential impact of the actions and whether any further action is required.

[4] Defra Background Mapping data for local authorities (2017-based), available online at https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017
[5] Public Health Outcomes Framework, Public Health England. data tool available online at http://www.phoutcomes.info/public-health-outcomes-framework

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

3.1 Summary of Monitoring Undertaken

3.1.1 Non-Automatic Monitoring Sites

Boston Borough Council undertook non- automatic (passive) monitoring of NO_2 at 19 sites during 2018 comprising 17 roadside and 2 urban background sites.

During January 2018 BBC relocated two diffusion tubes supporting Sites 11 and 13 (north of Bargate Bridge AQMA), to locations adjacent to and within Haven Bridge AQMA (Sites 20 and 21). Both Sites 11 and 13 have historically reported stable NO_2 annual mean concentrations, and were therefore chosen to be decommissioned, in order to improve air quality reporting in and adjacent to Haven Bridge AQMA.

In addition during December 2018, BBC relocated four diffusion tubes (Sites 6, 7, 10 and 15) to sites located along the London Road approach to the A16 – Spalding roundabout (Sites 18 and 19), and along the A1138 – South End (Sites 16 and 17). This relocation was in response to the 2018 Detailed Modelling Assessment findings which identified these areas outside of a declared AQMA boundary to be in exceedance of the AQS annual mean NO_2 objective limit.

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: Maps of Monitoring Locations and AQMAs.

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.2 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 40 µg/m^3.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Data capture for one diffusion tube (Site 5) was below 75% and therefore annualisation (short to long term adjustment) was completed for the concentration at this location.

Results for 2018 have been bias adjusted using a national bias adjustment factor of 0.93. Full details of the bias adjustment and QA/QC procedure are provided in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC.

Table 3.1 below provides a summary of measured annual mean concentrations (annualised and bias adjusted) that were recorded for 2018. During 2018, four sites recorded NO_2 annual mean concentrations to be over 40 µg/m^3, whereas seven (inclusive) reported concentrations to be within 10% of the annual mean objective (Table 3.1). All monitoring sites reporting 2018 concentrations to be over 40 µg/m^3 are located within a declared AQMA – specifically Haven Bridge AQMA.

Table 3.1 - Summary of Measured Annual Mean NO_2 Exceedances and Near Exceedances

Site ID	Within AQMA Y/N	2018 Annual Mean Concentration (µg/m^3)
1	Y – Haven Bridge	42.4
2	Y – Haven Bridge	44.5
3	Y – Haven Bridge	48.3
4	Y – Haven Bridge	39.4
9	Y – Bargate Bridge	39.4
20 (11)	Y – Haven Bridge	46.3
14	Y – Bargate Bridge	37.8
All values presented above have been bias adjusted and annualised.		

In order for the results to be representative of relevant exposure, therefore to be in compliance with the AQS objectives, the NO_2 fall-off with distance calculator was used to estimate the NO_2 concentration for the diffusion tube locations with non-relevant exposures where annual mean NO_2 was greater than 36 µg/m^3. Sites 1, 2, 3 and 4 are sited at locations of relevant exposure, therefore the sites meeting this criteria within 2018 were:

- Site 9 - Roadside adjacent to 30 Spilsby Road;
- Site 20 (11) - Kerbside, Haven Bridge; and
- Site 14 - Roadside adjacent to 20 Spilsby Road.

Full details of the distance correction calculations are provided in Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC.

Following the completion of distance correction, the NO_2 annual mean concentrations at Sites 9, 20 (11) and 14 were calculated to be below 36 µg/m^3. As a result of these calculations, three monitoring sites (Sites 1,2 and 3) were reported to exceed the AQS NO_2 annual mean objective within 2018, with a further site (Site 4) reporting concentrations to be within 10% (Table 3.2). All four sites are located within Haven Bridge AQMA, along neighbouring stretches of the A52 – Liquorpond Street and the A16 – John Adams Way which connect with the A16 – Spalding Road via a roundabout where queues are considered to be prevalent.

Table 3.2 - Summary of Measured Annual Mean NO_2 Exceedances and Near Exceedances after Distance Correction Calculations

Site ID	Within AQMA Y/N	2018 Annual Mean Concentration (µg/m^3)
1	Y – Haven Bridge	42.4
2	Y – Haven Bridge	44.5
3	Y – Haven Bridge	48.3
4	Y – Haven Bridge	39.4
All values presented above have been bias adjusted, annualised and distanced corrected where applicable.		

In comparison to 2014, NO_2 annual mean concentrations have decreased at nine sites over a five year period, with the largest decrement observed at Site 1 and Site 2 (both of which located within Haven Bridge AQMA).

Site 3 reported the highest NO_2 annual mean concentration within Boston for the third year running (48.3 µg/m^3), down from 53.2 µg/m^3 recorded in 2017. Site 3 is located along a stretch of the A52 – Liquorpond Street where queues are considered to be prevalent.

In accordance with Defra LAQM.TG(16), the 2018 results indicate that an exceedance of the 1-hour mean objective is unlikely to have occurred at any site within 2018.

Haven Bridge AQMA

The annual mean concentration results for the NO_2 diffusion tubes located within Haven Bridge AQMA are presented in Figure A.1. There were six monitoring locations within the AQMA in 2018, with the addition of Site 20 (11) compared to 2017 - located roadside adjacent to John Adams Way. All sites are located at locations representing relevant exposure, apart from Site 20 (11) which subsequently required distance correction to be undertaken. Three sites (Site 1, 2 and 3) reported to exceed the annual mean NO_2 objective limit, with a further site (Site 4) reporting concentrations to be within 10%. The three sites reporting exceedance of the annual mean AQS objective are all located along the connecting stretches to an inner city roundabout where three key arterial roads meet (A52 – Liquorpond Street, A16 – John Adams Way and A16 – Spalding Road). The roundabout's role as a major strategic connection within the region is believed to be the cause of the elevated NO_2 annual mean concentrations monitored at the surrounding sites.

In comparison to 2014, NO_2 annual mean concentrations have decreased at all but one site over a five year period (with available data), with the largest decrement observed at Site 1 and 2 (Figure A.1) – two sites which have historically reported the highest monitored concentration within the region. Site 4 has also remained compliant since 2015. These achievements reflect the continual commitment and progress made by the BBC to deliver the AQAP measures, alongside others, to improve local air quality within Haven Bridge AQMA.

Due to the continual exceedance recorded at Site 1, 2 and 3, it is recommended that the AQMA remain in force. However, in-line with the 2018 Detailed Modelling Assessment findings, consideration may be given to reducing the eastern span of AQMA 1 along John Adams Way if NO_2 levels recorded at Site 5 continue to stabilise below the AQS objective.

Bargate Bridge AQMA

The annual mean concentration results for the NO_2 diffusion tubes located within Haven Bridge AQMA are presented in Figure A.2. All monitoring results within the AQMA report NO_2 annual mean concentrations to be below 40.0 µg/m^3 for 2018, with two sites reporting concentrations to be within 10% of the AQS annual mean objective limit (Site 9 and 14). However, after distance correction, annual mean NO_2 concentrations predicted at the nearest point of relevant exposure relative to Site 9

and 14 were 32.8 µg/m^3 and 32.6 µg/m^3, respectively – concluding all monitoring sites within Haven Bridge AQMA were below 10% of the AQS objective limit.

In comparison to 2014, NO_2 annual mean concentrations have decreased at all sites over a five year period, with the largest decrement observed at Site 9 (Figure A.2). Site 9 recorded NO_2 annual mean concentrations to be below 40 µg/m^3 for the first time since 2014, whereas concentrations reported at Site 14 remained under 40 µg/m^3 since 2015, demonstrating progress in key areas. Based on historical and 2018 monitoring data discussed, it is recommended that BBC look to revoke Haven Bridge AQMA within the coming years if NO_2 levels continue to stabilise below the AQS objective.

In addition, due to the continual stabilised concentrations reported at Site 15, in response to the 2018 Detailed Modelling Assessment findings, Site 15 was decommissioned in December 2018, and relocated to a new site.

Outside of Declared AQMAs

The annual mean concentration results for the diffusion tubes located outside of the declared AQMAs are presented in Figure A.3. During 2018, monitoring of NO_2 was undertaken at 9 Sites outside of the declared AQMAs - with Sites 16-19 added to the network in December 2018. As a result, no annual mean NO_2 concentrations for Sites 16-19 has been presented.

No monitoring sites outside of the declared AQMA boundaries reported concentrations to exceed 36 µg/m^3 – with Site 12 reporting the highest concentration (31.8 µg/m^3).

This highlights that annual mean NO_2 concentrations recorded outside of the declared AQMAs in Boston remain well below the AQS objective limit.

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	NO_2	Y	0	1.5	N	3
2	Opposite former AQMS, North side of Haven Bridge Road	Roadside	532656	343716	NO_2	Y	0	0.5	N	3
3	Adjacent to 68 Liquorpond Street	Roadside	532470	343736	NO_2	Y	0.1	0.5	N	3
4	Adjacent to 18 Queen Street	Roadside	532331	343848	NO_2	Y	0.1	1.5	N	3
5	John Adams Way intersection with Haven Bridge	Roadside	532859	343760	NO_2	Y	3.5	2.2	N	3
6	Adjacent to 37 Spayne Road	Urban Background	533124	343939	NO_2	N	6.8	2.7	N	3
7	29 Manor Gardens	Urban Background	533324	344044	NO_2	N	10	26.8	N	3
8	Bargate Roundabout	Roadside	533112	344476	NO_2	Y	0	2.3	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)
9	Roadside adjacent to 30 Spilsby Road	Roadside	533251	344642	NO_2	Y	4	2	N	3
10	Façade of 23 Spilsby Road	Roadside	533312	344665	NO_2	N	0	5	N	3
12	Junction of New Asda Road and Sleaford Road	Roadside	532168	343987	NO_2	N	8.9	1.5	N	3
14	Roadside adjacent to 20 Spilsby Road	Roadside	533226	344624	NO_2	Y	3	2	N	3
15	Façade of 32 Spilsby Road	Roadside	533253	344653	NO_2	Y	0.1	10	N	3
16 (6)*	Entrance to South Quay Car Park	Roadside	532855	343719	NO_2	N	0	2	N	3
17 (7)*	Opposite 4-6 South End, Boston	Roadside	532877	343690	NO_2	N	0	2	N	3
18 (10)*	ATS Roundabout, London Road, Boston	Roadside	532600	342737	NO_2	N	0	2	N	3
19 (15)*	Opposite 55 London Road, Boston	Roadside	532630	342760	NO_2	N	0	2	N	3
20 (11)*	Kerbside, Haven Bridge	Roadside	532744	343719	NO_2	Y	16	2	N	3
21 (13)*	36 Sleaford Road, Boston	Roadside	532024	344060	NO_2	N	8	1.5	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.

* Represents a relocated diffusion tube, with the former site ID detailed within brackets (x)

Table A.2 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
1	Roadside	Diffusion Tube	91.7	91.7	**51.7**	**49.7**	**45.8**	**49.4**	**42.4**
2	Roadside	Diffusion Tube	66.7	66.7	**53.7**	**50.1**	37.5	**44.5**	**44.5**
3	Roadside	Diffusion Tube	41.7	41.7	**45.3**	**46.0**	**46.2**	**53.2**	**48.3**
4	Roadside	Diffusion Tube	100	100	**40.2**	36.4	38.6	38.0	39.4
5	Roadside	Diffusion Tube	100	100	36.1	34.9	34.6	36.8	34.7
6	Urban Background	Diffusion Tube	91.7	91.7	17.0	17.1	17.8	18.6	17.2
7	Urban Background	Diffusion Tube	100	100	15.9	16.3	17.0	17.9	16.4
8	Roadside	Diffusion Tube	100	100	34.2	31.1	31.1	31.3	32.5
9	Roadside	Diffusion Tube	100	100	**46.6**	**44.2**	**41.5**	**43.6**	39.4
10	Roadside	Diffusion Tube	100	100	31.7	28.5	28.2	27.7	27.9
12	Roadside	Diffusion Tube	100	100	30.7	28.6	26.8	27.6	31.8
14	Roadside	Diffusion Tube	100	100	**41.6**	36.6	36.7	37.1	37.8
15	Roadside	Diffusion Tube	100	100	25.2	21.4	21.8	22.5	21.8
16 (6) *	Roadside	Diffusion Tube	100	8.3	-	-	-	-	-

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2014	2015	2016	2017	2018
17 (7) *	Roadside	Diffusion Tube	100	8.3	-	-	-	-	-
18 (10) *	Roadside	Diffusion Tube	100	8.3	-	-	-	-	-
19 (15) *	Roadside	Diffusion Tube	100	8.3	-	-	-	-	-
20 (11)	Roadside	Diffusion Tube	91.7	91.7	-	-	-	-	**46.3**
21 (13)	Roadside	Diffusion Tube	100	100	-	-	-	-	30.0

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

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

Notes:

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

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

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

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

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

* Diffusion tubes deployed in December 2018 – therefore no historical or current annual mean NO_2 concentration reported

Figure A.1 – Trends in Annual Mean NO_2 Concentrations Measured at Monitoring Sites: Haven Bridge AQMA

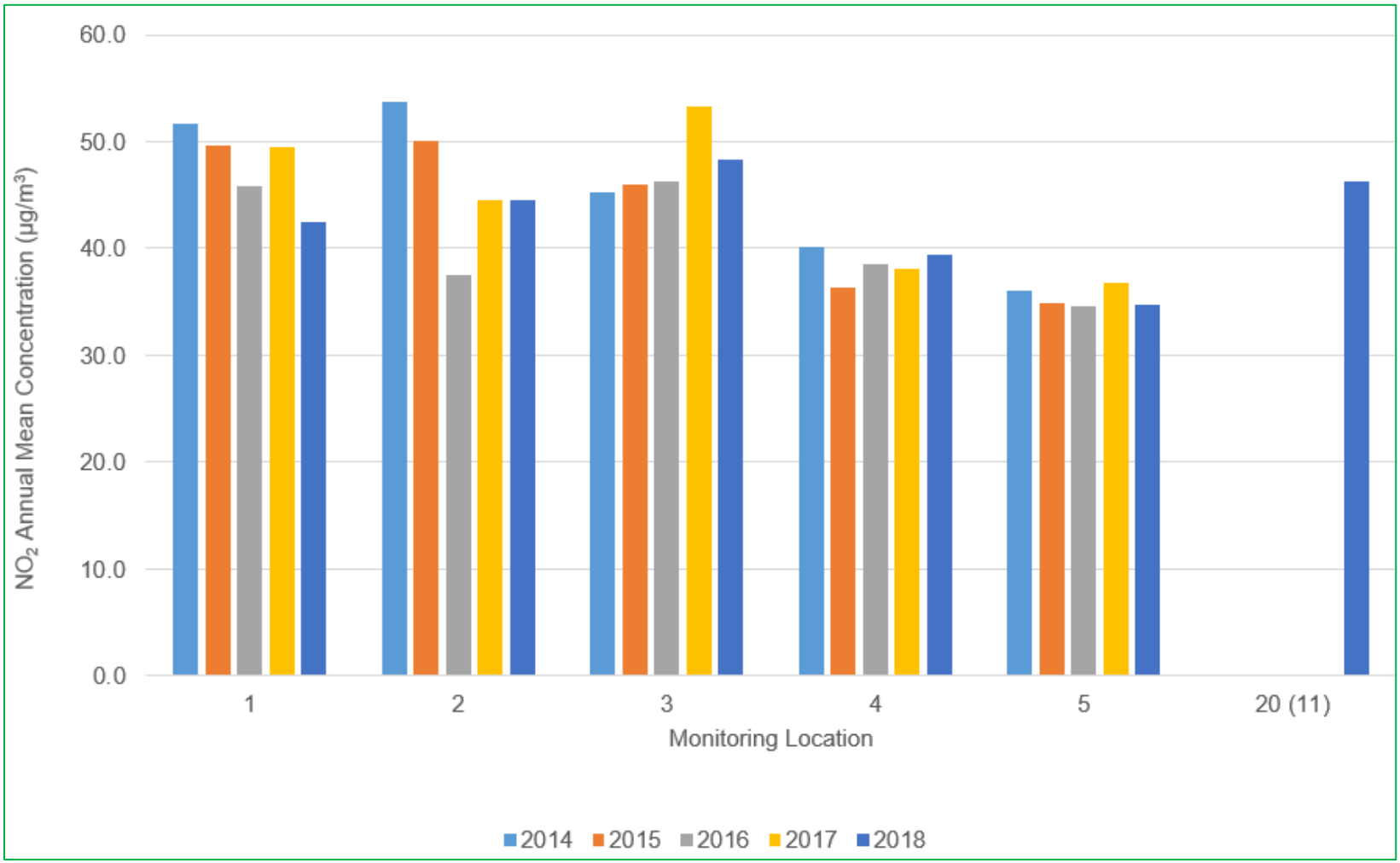


Figure A.2 – Trends in Annual Mean NO_2 Concentrations Measured at Monitoring Sites: Bargate Bridge AQMA

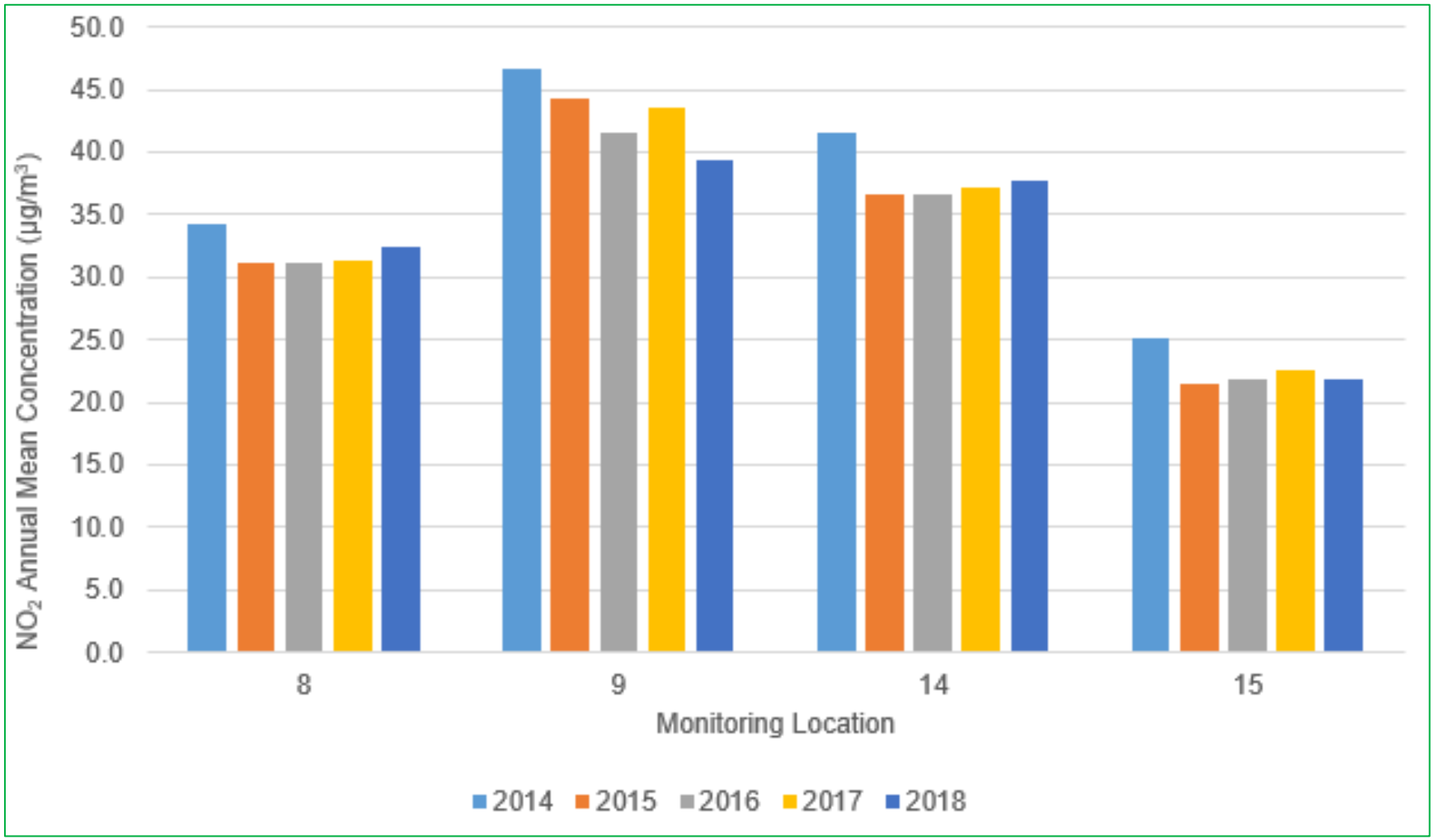
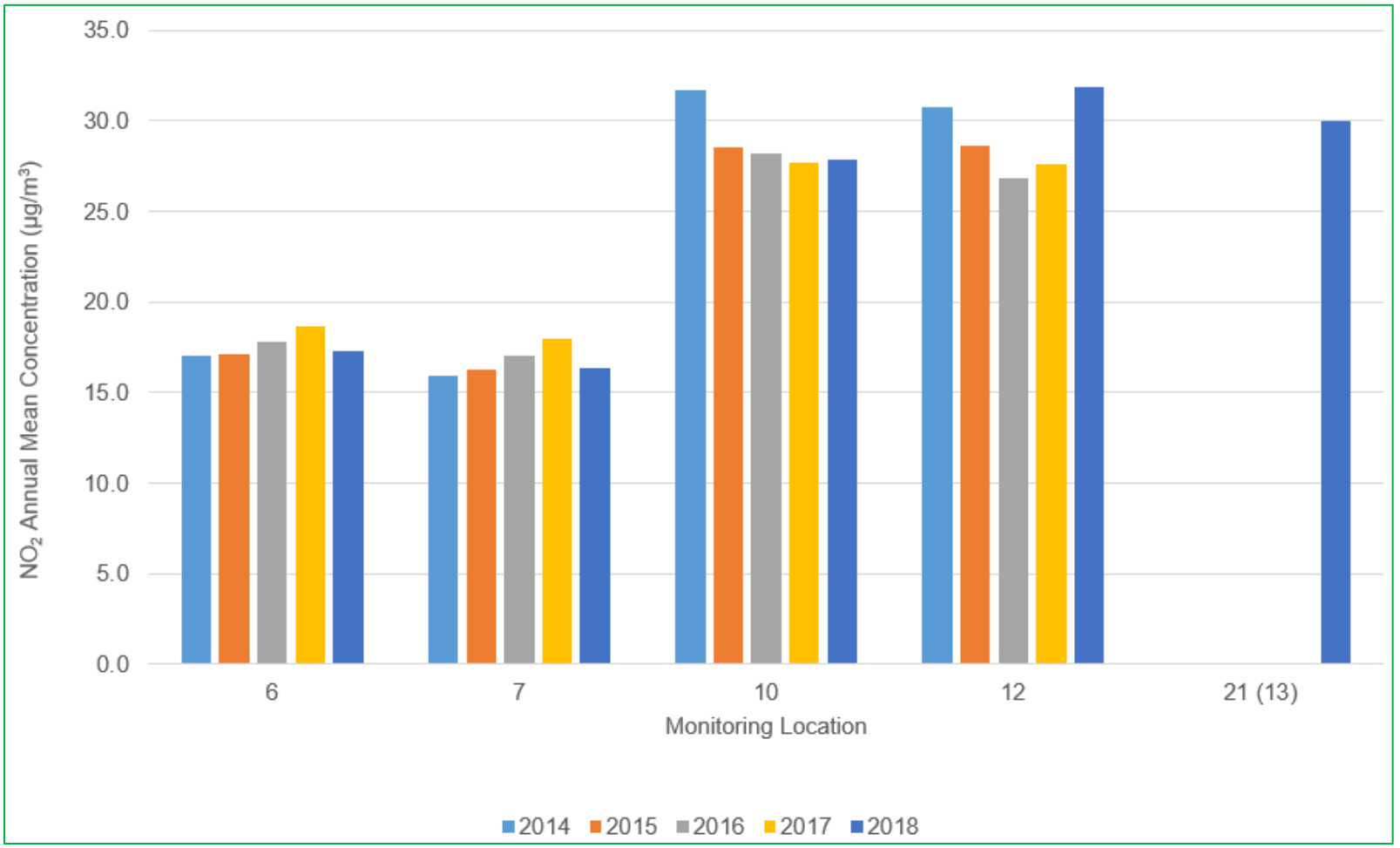


Figure A.3 – Trends in Annual Mean NO_2 Concentrations Measured at Monitoring Sites: Outside of AQMAs



Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results

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 (0.93) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
1	57.6	51.8	56.9	56.6	35.1	27.2	55.1	37.3	39.3	35.8	33.5	61.0	45.6	**42.4**	-
2	46.3	35.0	45.2	42.6	48.6	47.3	40.9	56.1	59.2	62.2	45.6	45.4	47.9	**44.5**	-
3	49.8	49.2	49.5	56.5	47	42.7	50.6	51	-	62.6	47	65.8	52.0	**48.3**	-
4	39.1	47.1	52.1	47.3	46.1	40.9	41.7	35.9	31.3	37.4	42.6	46.8	42.4	39.4	-
5	-	42.3	38.8	38.6	-	-	-	35.5	39.2	38.4	36.9	49.3	39.9	34.7	-
6	26.2	24.8	20.6	17.9	14.1	9.8	12.3	15.5	19.5	20.9	22.4	-	18.5	17.2	-
7	25.3	23.4	20.1	15.9	12.1	9.4	10.4	14.3	19.2	19.7	24	-	17.6	16.4	-
8	38.2	36.4	37.1	36.1	36.8	29.2	31.2	31.8	34.3	31.7	35.8	40.8	35.0	32.5	-
9	51.2	40	42.9	44.1	40.8	36.7	34.1	41.4	43.6	47.2	38.5	48.2	42.4	39.4	32.8
10	35.7	35.8	33.1	32.5	25.9	26.5	27.6	27.7	26.1	24.7	33.9	-	30.0	27.9	27.9
12	31.3	40.1	40.3	31.7	36.6	34.1	33.7	24.7	26.4	36.6	38	37.4	34.2	31.8	-
14	42.6	-	38.9	43.4	43.2	39.1	34.6	36.5	41.5	43.9	38.6	44.3	40.6	37.8	-
15	-	27.2	27	25.1	19.9	17.9	20.8	20.8	23.4	23.6	29.1	-	23.5	21.8	-
16 (6)	-	-	-	-	-	-	-	-	-	-	-	40.8	-	-	-
17 (7)	-	-	-	-	-	-	-	-	-	-	-	38.7	-	-	-
18 (10)	-	-	-	-	-	-	-	-	-	-	-	42.9	-	-	-

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.93) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
19 (15)	-	-	-	-	-	-	-	-	-	-	-	35.4	-	-	-
20 (11)	54	-	45.3	55.8	61.4	52.9	47.8	42.2	45.2	49.7	41.4	52.1	49.8	**46.3**	28.5
21 (13)	33.8	35.3	36.5	33.2	-	-	28.6	31.1	28.8	31	32	-	32.3	30.0	-

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

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

Notes:

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

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

(1) 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 0.93 for the year 2018 (based on 30 studies) has been derived from the national bias adjustment calculator[6].

Discussion of Choice of Factor to Use

Historically BBC 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 Scheme (a continuation of the Workplace Analysis Scheme for Proficiency (WASP) for NO_2 tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations are reported to a high level of accuracy. The lab follows the procedures set out in the Harmonisation Practical Guidance.

In the 2018 AIR-PT results, AIR-PT AR024 (January to February 2018), AIR PT AR025 (April to May 2018), AIR PT AR027 (July to August 2018) and AIR PT AR028 (September to October 2018), 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 2018 was greater than 75% at all the monitoring locations except for Site 5. The data for Site 5 has been annualised according to the method set out in LAQM TG(16) box 7.9. Details of the annualisation have been provided in Table C.1 and Table C.2.

[6] National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/19 published in March 2019.

Table C.1 - Annualisation of Data from Nearby Continuous Monitoring Sites

Site 3				
Site	**Site Type**	**Annual Mean ($\mu g/m^3$)**	**Period Mean ($\mu g/m^3$)**	**Ratio Annual Mean / Period Mean**
Leicester University	Urban Background	23.5	25.0	0.939
Nottingham Centre	Urban Background	27.8	29.4	0.944
Wicken Fen	Rural Background	8.1	8.7	0.925
Average Ratio				**0.936**

Table C.2 Annualisation for Site 5

Site	Uncorrected Diffusion Tube Mean ($\mu g/m^3$)	Leicester University AF	Nottingham Centre AF	Wicken Fen AF	Average AF	Annualised Data Average $\mu g/m^3$	Bias Adjusted (0.93) $\mu g/m^3$
5	39.9	0.939	0.944	0.925	0.936	37.3	34.7

Fall-off With Distance Correction

In accordance with Defra's TG(16), distance correction calculations, using the NO_2 fall-off with distance calculator, was performed at sites 9, 20 (11) and 14 to estimate the NO_2 concentration at the nearest locations representative of relevant exposure, as annual mean NO_2 concentrations recorded at these sites in 2018 were greater than 36 $\mu g/m^3$. Distance correction calculations was completed using the 2018 (2017 reference year) Defra background mapped concentrations for the relevant 1km x 1km grid squares within BBC (i.e. those within which the monitoring locations are located). The details for the NO_2 fall-off distance correction calculation for sites 9, 20 (11) and 14 are shown in Figure C.1.

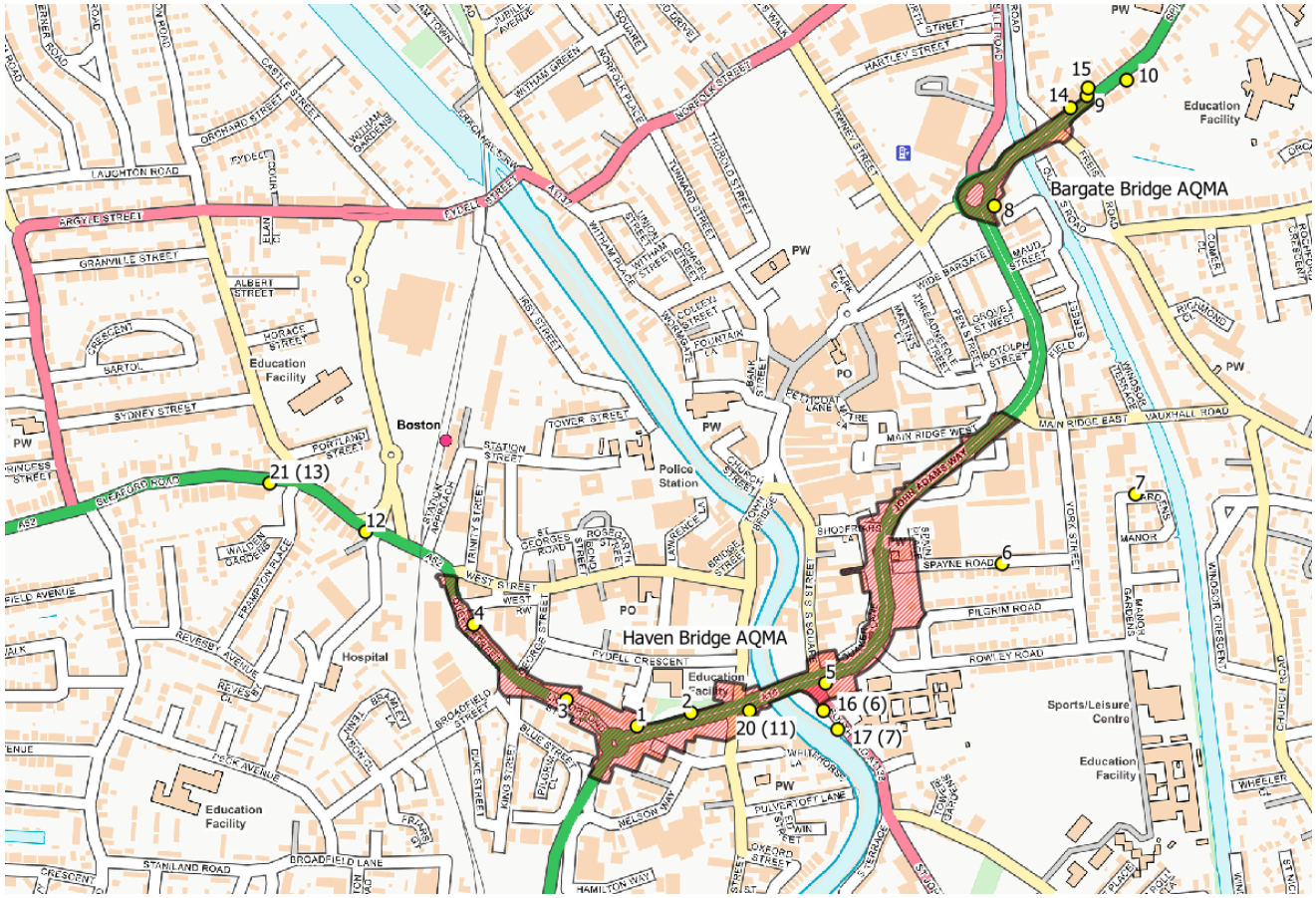
Figure C.1 - Fall off Distance Correction Calculations for Site 9, 20(11) and 14

Enter data into the pink cells

Site Name/ID	Distance (m)		NO_2 Annual Mean Concentration ($\mu g/m^3$)		
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor
9.0	2.0	6.0	13.8	39.4	32.8
20 (11)	2.0	18.0	14.0	46.3	29.7
14.0	2.0	5.0	13.8	37.8	32.6

Appendix D: Maps of Monitoring Locations and AQMAs

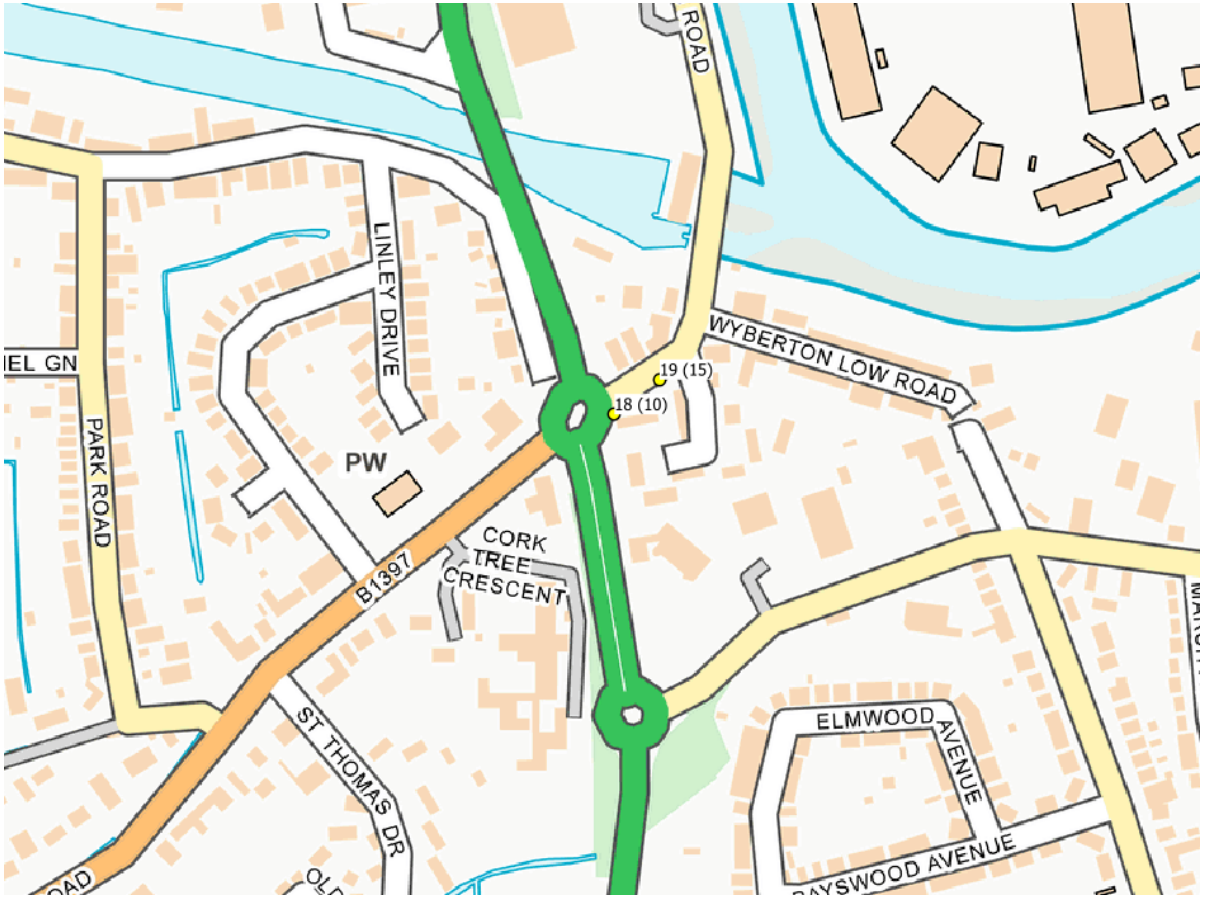
Figure D.1 – Non-Automatic Monitoring Sites Located Within and Adjacent to the Two Declared AQMAs



Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location Boston Borough Council	
Title Non-Automatic Monitoring Sites Located Within and Adjacent to the Two Declared AQMAs	
By BT	**Approved** PB
Scale Not To Scale	**Job Ref** 6484995
Date June 2019	**Figure No.** D.1

Figure D.2 – Non-Automatic Monitoring Sites Located South of the South Forty-Foot Drain



Legend

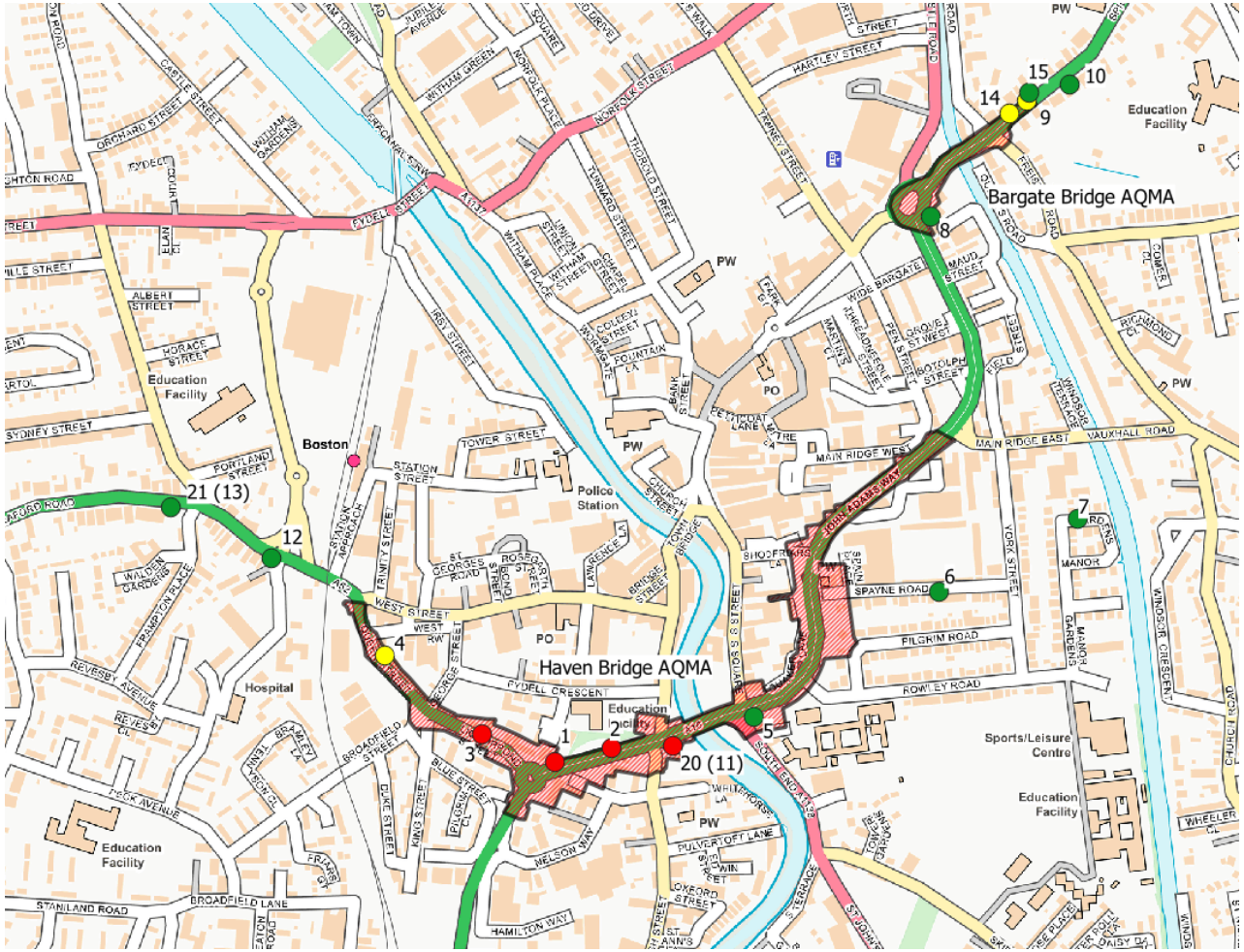
Diffusion Tube

Contains Ordnance Survey Data Crown Copyright and Database Right [2019]

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location Boston Borough Council	
Title Non-Automatic Monitoring Sites Located South of the South Forty-Foot Drain	
By BT	**Approved** BT
Scale Not To Scale	**Job Ref** 6484995
Date June 2019	**Figure No.** D.2

Figure D.3 – Spatial Representation of 2018 Annual Mean NO_2 Concentrations Recorded in Boston



Legend

Diffusion Tube

- 0.0 - 36.0 µg/m3
- 36.0 - 40.0 µg/m3
- >40.0 µg/m3
- AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location Boston Borough Council	
Title Spatial Representation of 2018 Annual Mean NO_2 Concentrations Recorded in Boston	
By BT	**Approved** PB
Scale Not To Scale	**Job Ref** 6484995
Date June 2019	**Figure No.** D.3

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

[7] 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
BBC	Boston Borough Council
LCC	Lincolnshire County Council

References

- Local Air Quality Management Technical Guidance LAQM.TG(16). February 2018. 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). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- NO_2 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 03/19 published in March 2019.
- AIR-PT-Rounds 19 to 30 (Apr 2017 - Feb 2019)
- Boston Borough Council 2018 Annual Status Assessment.
- Boston Borough Council 2006 Local Air Quality Management – Air Quality Action Plan.
- Boston Transport Strategy (2016-2036).

Appendix F: 2018 Detailed Modelling Assessment