2019 Air Quality Annual Status Report (ASR)

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

(November 2019)

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Executive Summary: Air Quality in Our Area

Air Quality in Birmingham

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].

The main air quality issue in Birmingham is elevated levels of nitrogen dioxide (NO_2), particularly within the City Centre area as a result of road traffic emissions. Consequently a city wide air Quality Management Area (AQMA) was declared in 2005. Details can be found on the following webpage

https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=18.

In December 2017 the Parliamentary Undersecretary of State for the DEFRA issued a Ministerial Direction on Birmingham, directing that Birmingham complete a Full Business Case (FBC) explaining how the City Council would deliver regulatory compliance and in what timeframe. This FBC was to be submitted to DEFRA by 15 September 2018.

Throughout the year the City Council worked on a feasibility study to ascertain what measures can be implements in the shortest possible time to deliver legislative compliance. This evidence base was compiled identified that Birmingham would require a Class D CAZ with additional measures to deliver compliance in the shortest possible time. In line with the Ministerial Direction this was submitted to DEFRA by the required date.

Birmingham city centre is undergoing significant regeneration with several major projects either underway or planned for the near future including at Paradise Circus,

[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

Curzon Street (HS2), and Smithfield. As a result the city centre area is in a near constant state of flux and as a result it is considered that the best way to address air quality issues is through the adoption of an area based strategy, and through working in collaboration with partner organisations such as DEFRA, the West Midlands Combined Authority, the Integrated Transport Authority, the West Midlands Low Emissions Towns & Cities Partnership, Highways England, and CENTRO.

Actions to Improve Air Quality

A number of actions have been implemented under Birmingham City Council's Air Quality Action Plan with the aim of improving air quality, such as increasing the number of park and ride schemes, the provision of charging infrastructure to encourage the take up of electric vehicles, and, in partnership with CENTRO, improvements to the bus fleet under the Statutory Bus Quality Partnership (SBQP).

Within the Council air quality has taken on increasing importance through the Brum Breathes Programme Boards which is seeking to ensure that air quality is embedded in all relevant Council decision making processes e.g. from HR through to Planning.

The City Council also maintains close working relationships with partner organisations including the other West Midlands Authorities under the aegis of the Low Emissions Towns & Cites Programme, the Combined Authority and the public transport delivery group Transport for West Midlands, as well as continuing to lobby Government through existing routes and responding to existing or emerging consultations on air quality.

Conclusions and Priorities

The City continues to have air quality breaches against the annual mean objective for NO2 with known exceedence areas being within the city centre. The primary source of air quality issues within Birmingham is road transport. However, in order to ensure that there is no risk of transferring exceedence areas during the implementation of compliance strategies the Council retains a city-wide air quality management area.

Birmingham, as a major UK city, is undergoing continual redevelopment of the urban landscape and resulting changes to the supporting transport network. This leads to challenges in balancing sustainable development of a 21st century city with providing for the health and well-being of citizens, business and visitors.

The primary focus to reduce air pollution, promote health and drive compliance in the coming year will be through progressing the Clean Air Zone (CAZ) in accordance with the submitted FBC.

The CAZ is part of a suite of measures being progressed by the City Council and to underpin these interventions air quality has been prioritised across all services and championed by relevant politicians (Cabinet Members and Committee Chairs). This updated and prioritised governance will be supported by underpinning policies, including a review of the Air Quality Action Plan.

Local Engagement and How to get Involved

Details of local consultation undertaken and how to help improve air quality can be viewed on the council's website here;

https://www.birmingham.gov.uk/info/20076/pollution.

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1 Local Air Quality Management

This report provides an overview of air quality in Birmingham during 2019. 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 Birmingham City 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 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 Birmingham City 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 https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=18. Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

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
Birmingham AQMA	05/05/2005	NO2 Annual Mean	Birmingham	Whole borough	NO	46	µg/m3	74	µg/m3	Air Quality Action Plan 2011	30/04/2011	https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=18

☒ **Birmingham City 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 Birmingham

Defra's appraisal of last year's ASR stated that the conclusions reached were acceptable for all sources and pollutants, although it was recommended that a monitoring baseline be established to validate any modelling undertaken and to give an indication of air quality throughout the city and identify any hotspots. Guidance was also given regarding the drafting of a new Action Plan. The Council was encouraged to continue working with partner organisations in developing the Clean Air Strategy and Air Quality Action Plan.

Birmingham City Council has 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. It is accepted that these measures are dated in that many have evolved into expanded or different work-streams. It is hoped that the refresh to the AQAP can capture the updated position of these measures whilst formally introducing new measures.

In December 2017 the Parliamentary Undersecretary of State for the DEFRA issued a Ministerial Direction on Birmingham, directing that Birmingham complete a Full Business Case (FBC) explaining how the City Council would deliver regulatory compliance and in what timeframe. This FBC was to be submitted to DEFRA by 15 September 2018. During the course of the year the feasibility study on air quality compliance was completed a consultation phase held including publishing the documents online at Birmingham Be Heard:
https://www.birminghambeheard.org.uk/economy/caz_individual/

https://www.birminghambeheard.org.uk/economy/caz_organisation/

Subsequent to the consultation, the FBC was completed and submitted to DEFRA by the required date. This FBC became the evidence base for the need for a Class D Clean Air Zone with additional measures covering the city centre area.

Details of the developing CAZ are now available at https://www.brumbreathes.co.uk/

Birmingham City Council's priorities for the coming year (2019) are:

- We will progress all necessary actions pursuant to delivering the introduction of a Clean Air Zone (CAZ) as mandated by Defra. For 2019 this involves progressing the full business case, specifically the deployment of infrastructure to allow operation and enforcement of the CAZ, to establish the necessary mitigations and exemptions and put schemes in place to allow the support of businesses and citizens in advance of the CAZ going live, and to prepare the method by which the CAZ will be monitored and evaluated.
- We will review and refresh our Air Quality Action Plan (AQAP), updating existing actions and building in new actions which are relevant to current challenges faced by the Council and better reflective of initiatives both proposed and underway which seek to address those challenges. This was a comment made in the ASR return for previous years. A new plan will be put in place to progress delivery of an updated AQAP.
- Maintain the current internal governance (Brum Breathes Executive and Programme Delivery Boards) to ensure air quality retains a high priority status and that actions to improve air quality throughout the Council are tracked to completion.
- We will progress our developing Clean Air Strategy to ensure actions are targeted across all wards, both within and without the city centre, and in areas where there may not be legislative requirements, including consideration of actions to reduce fine particles especially $PM_{2.5}$ [4] emissions and to synergise between air pollutant and greenhouse gas emissions.
- We will maintain our existing close working arrangements between Environmental Health and the Director of Public Health to ensure that we maximise benefits in delivering air quality improvements arising from key pollutants, namely nitrogen dioxide and fine particles.
- We will seek to work closer with the West Midlands Mayor and Combined Authority (CA) to ensure that air quality issues are considered at a regional

[4] $PM_{2.5}$ are particles with an aerodynamic diameter of 2.5 microns or less (a micron is one millionth of a metre)

level as well as at a local level. This includes working with the CA on a new regional Low Emission Strategy.

- We will continue our representation on the project board of the Low Emissions Towns and Cities Programme (LETCP)[5], and will contribute to on-going, developing and proposed work streams in partnership with other members to seek air quality gains at a regional level.
- We will continue to lobby Government through responding to consultations and through partnership working with regional and national groups.

[5] The LETCP comprises air quality specialists from the West Midlands Local Authorities, namely Birmingham City Council, Coventry City Council, Dudley Metropolitan Borough Council, Sandwell Metropolitan Borough Council, Solihull Metropolitan Borough Council, Walsall Council and Wolverhampton City Council.

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
Action 2010/1	FS into a Low Emission Zone within the City Centre	Promoting Low Emission Transport	Low Emission Zone (LEZ)	BCC – TS	2011-2013	2013-2015	Completion of the FS	No target	FS Complete	Complete	Superseded by CAZ
Action 2010/2	Detailed study on introducing Biomass in Birmingham Schools	Policy Guidance and Development Control	Other policy	BCC – EH	NK	NK	Completion of the study	No target	Study complete	Complete	Led to introduction of a Biomass Emissions Policy by Council
Action 2010/3	Extend the Red Route network and assess effectiveness	Traffic Management	Other	BCC – TS	NK	NK	Improved journey times and less congestion in specific areas	No target	Red routes have been implemented on 6 major routes into and out of the city centre (Stratford Rd, Tyburn Rd, Walsall Rd. A4540 ring road, A38, A45)	Complete	Implementation and enforcement of the red route in the worst polluted area has shown a reduction in measured NO2 to below the objective in 2013.
Action 2010/4	Build New Roads and modify existing to promote effective traffic management	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	BCC – TS	NK	NK	Improved journey times and less congestion in specific areas	No target	The Selly Oak New Road phase 1a is complete. Phase 1b is funded through Local Growth Fund.	Ongoing	Existing roads around the city centre will be amended to promote smoother flows for CAZ and HS2.
Action 2010/5	Policy on Air Quality & Planning	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	BCC - EH	2005-2007 / 2011-2012	2012 - 2014	Strategic, consistent and transparent approach to assessing planning applications on AQ grounds	No target	Extremely difficult to develop (commenced 2005-2007). Revisited within the LETCP. Best Practice Guide (BPG) issued by LETCP in 2014. Development of BDP and DM DPD both of which will have AQ links.	Ongoing	Development Management Development Plan Document (DMDPD) remains a work in progress. Air Quality Planning and Policy Guidance clearly referenced in current draft.
Action 2010/6	Control of Industry	Environmental Permits	Other measure through permit systems and economic instruments	BCC – EH	n/a	1995 to current	Annual Defra return	No target	All processes inspected annually in accord with direction from Defra	Ongoing - annual	Processes regulated to ensure emissions remain within specified limits
Action 2010/7	Control of Bonfires and other Unauthorised Fires			BCC – EH	n/a	Historic to current	Response to complaints about bonfires	No target	Complaints responded as and when generated	Ongoing	None
Action 2010/8	To increase the number and use of park & ride schemes in accord with the CENTRO Environment Strategy 2009-2014	Alternatives to private vehicle use	Rail based Park & Ride	BCC – TS	2008-2011	2018	Increase in park and ride usage	No target	New site proposed at Longbridge. Feasibility study on decking of car parks e.g. Four Oaks. Proposals related to Bus rapid Transit Routes.	2017	?

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
Action 2010/9	All vehicles procured by Birmingham City Council will by 2015 be either electrically powered or run on LPG	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	BCC - S	2011	2012-2014	Replacement of council fleet vehicles through procurement strategy	No target	Green Fleet Review completed. Identified all vehicles, mileage, fuel costs, etc.	NK	?
Action 2010/10	Introduction of low carbon/electric Vehicles	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	BCC – S	2011	2012-2016	Infrastructure to encourage the use of electric and gas powered vehicles	No target	Green Fleet Review completed. Identified infrastructure requirements, gaps and barriers.	NK	?
Action 2010/11	Improvement of the Public Service Fleet - Birmingham City Council will support the programme for replacement buses as outlined by CENTRO's Environmental Strategy 2009 – 2014.	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	BCC - TS	2011	2012-2022	Replacement of the bus fleet with low emitting vehicles	No target	SBQP introduced and now under review	COMPLETE	Overtaken by CAZ proposals. All buses operating within city centre to be Euro VI by the time the CAZ becomes operational.
Action 2010/12	Birmingham City Council will seek to reduce the overall age of the taxi fleet and	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	BCC - L	2011-2015	2016-2020	Replacement of taxi fleet with vehicles with low emissions	No target	The City Council has a taxi age policy of hackney carriage not older than 14 years and private hire not older than 8 years and is developing a specific emissions related policy	Ongoing	Public consultation on Taxi Emissions Policy complete. Awaiting final approval. Taxis operating within city centre will have to meet CAZ requirements.

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.

Birmingham City Council is taking the following measures to address $PM_{2.5}$:

- The primary emission source for $PM_{2.5}$ within Birmingham is from the exhausts of road vehicles. Accordingly, action taken to reduce vehicle usage and incentivise the uptake of cleaner vehicle technology will deliver reductions in $PM_{2.5}$. The actions will be set out in the revised AQAP (see section 2.2).
- The CAZ will consider the benefits that can be gained from reductions in $PM_{2.5}$ arising from reduced vehicle usage and modal shift as a consequence of the introduction of the CAZ.
- The Brum Breathes programme will seek to ensure that any new air pollutant for which the local authority has responsibility, including $PM_{2.5}$, will be considered holistically and built into existing work programmes and / or new work programmes developed.
- A Clean Air Strategy is being developed, and will incorporate the views of the citizens and business and organisations of Birmingham, to consider what actions can be taken to improve air quality beyond legal limits and across all areas of the city.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

Birmingham City undertook Council automatic (continuous) monitoring at 10 sites during 2018. Table A.1 in Appendix A shows the details of the sites. The former Birmingham Tyburn monitoring site has now been installed at its new location at St Marks Crescent in Ladywood. Monitoring for particulates has commenced during the current reporting year. It is anticipated that monitoring for nitrogen dioxide, sulphur dioxide, and ozone will commence during 2019. Birmingham City Council has also established 2 new automatic monitoring sites on the A38 in the city centre. These are at St Chads Queensway and Lower Severn Street (close to Suffolk Street Queensway). These are key locations of exceedence with respect to the incoming CAZ and will monitor NO2 only. A further automatic monitoring site, funded by the Colmore Business Improve District, has been established on Colmore Row in the City Centre. This site will monitor NO2 only and has been set up to assess the impact of changes to the bus routing in the area.

Maps showing the location of the monitoring sites are provided in Appendix D.

3.1.2 Non-Automatic Monitoring Sites

Birmingham City Council undertook non- automatic (passive) monitoring of NO_2 at 86 sites during 2018. Table A.2 in Appendix A shows the details of the sites.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

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

It should be noted that for a number of the diffusion tube monitoring sites a bias adjusted annual mean is not presented in Table A.3. Due to staffing and resource issues the data capture rate at many locations was poor. It was not possible to calculate an annual mean for sites where the data capture rate less than 75%. This was due to having insufficient data from a comparable continuous monitoring location. Data capture rates from these sites was also poor. For reference the raw data for all diffusion tube locations is presented in Table B.1.

The annual mean for NO2 was exceeded at the automatic monitoring sites BCA7 (Moor Street Queensway) and BCA2 (St Chads Queensway) with annual means of 55 and 48 µg/m^3 respectively. The annual mean at BCA7 again showed an increase on the previous year although it is considered that there is presently no relevent exposure at this location. In the first year of monitoring at this location the automatic site at BCA2 recorded an annual mean of 48 µg/m^3. The monitor is located at kerbside and allowing for fall off with distance the predicted annual mean concentration at the façade of the nearest building with relevant exposure is indicated to be 45 µg/m^3.

All other automatic monitoring sites showed annual means less than 40µg/m^3 and continued to show generally declining trends. The site BCA6 (Stratford Road) did however show a marginal increase in 2018 with an annual mean of 35 µg/m^3 as opposed to 34 µg/m^3 in 2017. A graph showing 5 year trends is presented as Figure A.1.

The annual mean was also exceeded at many of the non-automatic (diffusion tube) monitoring sites, notably within the city centre and around the A4540 ring road. Exceedances of the annual mean were also recorded on Tyburn Road, and Stratford Road. Monitoring also indicated that the annual mean may be exceeded at Middleton Hall Road in Cotteridge although there was insufficent data capture to calculate an annual mean for this site.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There were no exceedances of the hourly mean air quality objective at any of the automatic monitoring sites. Annual means in excess of 60 µg/m^3 were recorded at 8 of the non-automatic monitoring sites. These were located on the Ring Road, and within the city centre on Moor Street Queensay, Priory Queensway and the A38 (St Chads Queensway). It is considered that that at these locations an individual is unlikey to be exposed for more than one hour. However Birmingham City Council will continue to assess locations where diffusion tubes show annual means in excess of 60 µg/m^3 to determine whether exposure is likley to occur.

3.2.2 Particulate Matter (PM_{10})

Error! Reference source not found. in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

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

The annual mean for PM_{10} was not exceeded at either the Birmingham A4540 or Birmingham Ladywood monitoring sites, and neither were there any occasions where the daily mean was exceeded.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.6 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years.

$PM_{2.5}$ concentrations continue to be low at all monitoring locations with annual means of 10 µg/m^3, 12 µg/m^3, and 11 µg/m^3 recorded at the Acocks Green, Birmingham A4540, and Birmingham Ladywood monitoring sites respectively.

3.2.4 Sulphur Dioxide (SO_2)

Table A.7 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2018 with the air quality objectives for SO_2.

No monitoring for SO2 was undertaken during the year. It is anticipated that SO2 monitoring will recommence at the Birmingham Ladywood site in 2019.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
BAU1	Acocks Green	Urban Background	411649	282207	NO2; PM10; PM2.5; O3	YES	Chemiluminescent; TEOM FDMS	43	65	3.5
BAU2	Birmingham A4540 Roadside	Roadside	408506	286470	NO2; PM10; PM2.5; O3	YES	Chemiluminescent; TEOM FDMS	14	7	3.5
BAF1	Birmingham Ladywood	Urban Background	405653	287053	NO2; PM10; PM2.5; O3; SO2	YES	Chemiluminescent; TEOM FDMS	92	6	3.5
BCA 1	Colmore Row	Roadside	406974	287101	NO2	YES	Chemiluminescent	N/A	3.1	1.3
BCA 2	St Chads Queensway	Kerbside	407107	287577	NO2	YES	Chemiluminescent	11.1	0.7	1.3
BCA 3	Lower Severn Street	Roadside	406744	286540	NO2	YES	Chemiluminescent	0	3.8	1.3
BCA 4	New Hall	Urban Background	414574	296724	NO2	YES	Chemiluminescent	41	20	2.5
BCA 5	Selly Oak (Bristol Road)	Roadside	404545	283020	NO2	YES	Chemiluminescent	27	9	2.5
BCA 6	Stratford Road	Roadside	408820	284591	NO2	YES	Chemiluminescent	5	5	2.5
BCA 7	Moor Street Queensway	Roadside	407435	286891	NO2	YES	Chemiluminescent	65	6	1.5
BAU1	Acocks Green	Urban Background	411649	282207	NO2; PM10; PM2.5; O3	YES	Chemiluminescent; TEOM FDMS	43	65	3.5

Notes:

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

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
BHM1	Fox Green Crescent	Urban Background	411211	282756	NO_2	YES	0	10	NO	2
BHM2	Langleys Road	Urban Background	404082	282128	NO_2	YES	0	9	NO	2
BHM3	28 High Street	Roadside	407386	282131	NO_2	YES	5	2	NO	2
BHM4	75 High Street	Roadside	407401	282032	NO_2	YES	13	1	NO	2
BHM5	448 Stratford Road	Roadside	409108	284158	NO_2	YES	0	4	NO	2
BHM6	487 Stratford Road	Roadside	409144	284053	NO_2	YES	0	4	NO	2
BHM7	Broad Street - Brasshouse	Roadside	406113	286633	NO_2	YES	61	7	NO	2
BHM8	Broad Street - O'Neils	Roadside	406036	286489	NO_2	YES	24	1	NO	2
BHM9	Shelley Drive	Roadside	408618	291351	NO_2	YES	0	26	NO	2
BHM10	Stratford Road AQ station	Roadside	408818	284591	NO_2	YES	21	3	NO	2
BHM11	Stratford Road AQ station	Roadside	408818	284591	NO_2	YES	21	3	NO	2
BHM12	Stratford Road AQ station	Roadside	408818	284591	NO_2	YES	21	3	NO	2
BHM16	Childrens Hospital	Roadside	407321	287531	NO_2	YES	0	6	NO	2
BHM17	Tyburn (39)	Roadside	410010	289995	NO_2	YES	7	1	NO	2
BHM18	Tyburn (40)	Roadside	410072	289999	NO_2	YES	7	1	NO	2
BHM19	Middleton Hall Road	Roadside	404739	279701	NO_2	YES	8	2	NO	2
BHM20	641 Bristol Road	Roadside	404448	282890	NO2	YES	23	23	NO	2
BHM21	Lawley Middleway	Roadside	408197	287394	NO2	YES	1	1	NO	2
BHM22	Sheepcote Street	Roadside								
BHM23	Lower Severn Street	Roadside	406743	286541	NO2	YES	3	5	NO	2
BHM24	Great Charles Street (1)	Roadside	406621	287108	NO2	YES	26	4	NO	2
BHM25	Watery Lane Middleway	Roadside	408586	286455	NO2	YES	16	3	NO	2
BHM26	Nelson JI	Urban Background	405648	287041	NO2	YES	98	2	NO	2
BHM27	Waterlinks	Roadside	407833	288046	NO2	YES	2	1	NO	2
BHM29	Suffolk Street Queensway	Roadside	406584	286723	NO2	YES	94	1	NO	2
BHM30	Curzon Street	Roadside	407967	287151	NO2	YES	33	1	NO	2
BHM31	Holiday Street	Roadside	406564	286688	NO2	YES	75	2	NO	2
BHM34	Superdrug	Urban Centre	407114	286906	NO2	YES	0	2	NO	2
BHM35	Café Nero	Urban Centre	407177	286996	NO2	YES	0	2	NO	2

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)
BHM36	Corporation Street Sq Peg	Roadside	407205	287065	NO2	YES	20	2	NO	2
BHM37	Church Road	Roadside	405383	285315	NO2	YES	36	2	NO	2
BHM40	Priory Queensway (1)	Roadside	407407	287092	NO2	YES	46	1	NO	2
BHM42	MSQ - Masshouse	Roadside	407548	287107	NO2	YES	34	3	NO	2
BHM43	Masshouse Lane - Masshouse	Roadside	407611	287110	NO2	YES	14	3	NO	2
BHM44	Masshouse Lane - LP	Roadside	407628	287121	NO2	YES	24	3	NO	2
BHM45	Hotel La Tour - LP	Roadside	407582	287020	NO2	YES	30	2	NO	2
BHM46	Masshouse Lane Masshouse 2	Roadside	407547	287047	NO2	YES	2	2	NO	2
BHM48	Millenium Post MSQ	Roadside	407510	286963	NO2	YES	96	2	NO	2
BHM50	MSQ - No entry post	Roadside	407433	286922	NO2	YES	63	2	NO	2
BHM51	Bristol Street Monaco House	Roadside	406921	285937	NO2	YES	2	2	NO	2
BHM55	Moor Street corner of	Roadside	407348	286722	NO2	YES	139	3	NO	2
BHM56	New Meeting Street	Urban Centre	407377	286896	NO2	YES	12	23	NO	2
BHM57	Chantry Road	Roadside	407687	283370	NO2	YES	8	3	NO	2
BHM58	Carrs Lane High Street	Urban Centre	407255	286862	NO2	YES	13	5	NO	2
BHM61	St Phillips Church yard	Urban Centre	406919	287037	NO2	YES	91	19	NO	2
BHM62	Snow Hill	Urban Centre	407033	287196	NO2	YES	70	22	NO	2
BHM63	Chapel Lane	Roadside	407509	287226	NO2	YES	67	2	NO	2
BHM64	Stephenson Street	Roadside	406973	286751	NO2	YES	70	2	NO	2
BHM65	Digbeth	Roadside	407446	286478	NO2	YES	3	1	NO	2
BHM67	New John Street West (1)	Roadside	407056	288318	NO2	YES	15	3	NO	2
BHM68	Icknield Street (1)	Roadside	405781	288131	NO2	YES	12	4	NO	2
BHM69	Icknield Street (2)	Roadside	405806	288116	NO2	YES	38	2	NO	2
BHM70	Ledsam Street	Roadside	405221	287000	NO2	YES	129	2	NO	2
BHM71	Rann close	Roadside	405300	286430	NO2	YES	14	4	NO	2
BHM72	Leyburn Road	Roadside	405285	286395	NO2	YES	12	2	NO	2
BHM73	Islington Row (1)	Roadside	406038	285961	NO2	YES	45	2	NO	2
BHM74	Islington Row (2)	Roadside	406014	285936	NO2	YES	26	5	NO	2
BHM75	Lee Bank MW by School	Roadside	406355	285729	NO2	YES	21	2	NO	2
BHM76	Lee Bank MW opposite School	Roadside	406354	285676	NO2	YES	51	2	NO	2
BHM77	Lee Bank MW - St Lukes	Roadside	406936	285461	NO2	YES	59	2	NO	2

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)
BHM78	Lee Bank MW - opposite St Lukes	Roadside	406912	285418	NO2	YES	11	2	NO	2
BHM79	Alexandra Road	Roadside	407373	285211	NO2	YES	25	4	NO	2
BHM80	Belgrave Middleway	Roadside	407385	285240	NO2	YES	21	4	NO	2
BHM81	Moseley Road	Roadside	408014	285305	NO2	YES	51	2	NO	2
BHM82	Highgate MW	Roadside	407981	285315	NO2	YES	15	3	NO	2
BHM83	Watery Lane (2)	Roadside	408558	286452	NO2	YES	0	2	NO	2
BHM84	Lawley Middleway (2)	Roadside	408171	287377	NO2	YES	3	2	NO	2
BHM85	Dartmouth MW (2)	Roadside	407802	288047	NO2	YES	39	2	NO	2
BHM86	Ronald McDonald House	Roadside	407163	287561	NO2	YES	8	2	NO	2
BHM87	St Chads (2)	Roadside	407162	287601	NO2	YES	15	2	NO	2
BHM88	Great Charles Street (3)	Roadside	406799	287314	NO2	YES	132	2	NO	2
BHM89	Great Charles Street (4)	Roadside	406594	287117	NO2	YES	5	2	NO	2
BHM90	Lionel Street	Roadside	406626	287304	NO2	YES	58	2	NO	2
BHM91	Adderley Street	Roadside	409496	287938	NO2	YES	34	5	NO	2
BHM93	New John Street (2)	Roadside	407052	288283	NO2	YES	47	2	NO	2

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2014	2015	2016	2017	2018
BAU1	Urban Background	Automatic	97	97	-	18	21	19	18
BAU2	Roadside	Automatic	98	98	-	-	43	37	32
BAF1	Urban Background	Automatic	-	-	-	-	-	-	-
BCA 1	Roadside	Automatic	61.3	61.3	-	-	-	-	31
BCA 2	Kerbside	Automatic	48.1	48.1	-	-	-	-	**48**
BCA 3	Roadside	Automatic	31.2	31.2	-	-	-	-	36
BCA 4	Urban Background	Automatic	28.5	28.5	17	16	16	16	7
BCA 5	Roadside	Automatic	84	84	34	29	25	30	30
BCA 6	Roadside	Automatic	72.4	72.4	36	33	37	34	35
BCA 7	Roadside	Automatic	64.8	64.8	43	45	50	53	**55**
BHM1	Urban Background	Diffusion Tube	-	-	17	17	15	18	-
BHM2	Urban Background	Diffusion Tube	-	-	17	17	17	18	-
BHM3	Roadside	Diffusion Tube	-	-	41	38	39	43	-
BHM4	Roadside	Diffusion Tube	-	-	43	36	41	38	-
BHM5	Roadside	Diffusion Tube	83.3	83.3	40	36	41	43	**42**
BHM6	Roadside	Diffusion Tube	-	-	40	38	56	62	-
BHM7	Roadside	Diffusion Tube	83.3	83.3	49	45	49	47	34
BHM8	Roadside	Diffusion Tube	83.3	83.3	49	41	48	45	**47**
BHM9	Roadside	Diffusion Tube	-	-	41	40	40	45	-
BHM10	Roadside	Diffusion Tube	75.0	75.0	36	33	37	35	33
BHM11	Roadside	Diffusion Tube	-	-	36	34	36	38	-
BHM12	Roadside	Diffusion Tube	83.3	83.3	36	33	37	38	33
BHM13	Urban Background	Diffusion Tube	-	-	30	31	29	30	-
BHM14	Urban Background	Diffusion Tube	-	-	30	31	30	29	-
BHM15	Urban Background	Diffusion Tube	-	-	31	31	29	30	-
BHM16	Roadside	Diffusion Tube	83.3	83.3	55	55	54	61	**49**
BHM17	Roadside	Diffusion Tube	83.3	83.3	42	43	48	50	39
BHM18	Roadside	Diffusion Tube	83.3	83.3	47	44	47	49	**41**
BHM19	Roadside	Diffusion Tube	-	-	-	-	48	52	-
BHM20	Roadside	Diffusion Tube	-	-	37	35	39	36	-
BHM21	Roadside	Diffusion Tube	-	-	-	-	62	68	-
BHM23	Roadside	Diffusion Tube	-	-	-	-	52	55	-
BHM24	Roadside	Diffusion Tube	83.3	83.3	-	-	49	50	**42**
BHM25	Roadside	Diffusion Tube	75.0	75.0	-	-	49	47	**48**
BHM26	Urban Background	Diffusion Tube	83.3	83.3	-	-	25	28	-
BHM27	Roadside	Diffusion Tube	75.0	75.0	-	-	48	43	**47**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
					2014	2015	2016	2017	2018
BHM29	Roadside	Diffusion Tube	-	-	-	-	55	60	-
BHM30	Roadside	Diffusion Tube	83.3	83.3	-	-	46	47	39
BHM31	Roadside	Diffusion Tube	-	-	-	-	52	52	-
BHM34	Urban Centre	Diffusion Tube	83.3	83.3	31	30	32	32	30
BHM35	Urban Centre	Diffusion Tube	83.3	83.3	-	-	36	36	33
BHM36	Roadside	Diffusion Tube	75.0	75.0	50	46	47	45	39
BHM37	Roadside	Diffusion Tube	-	-	-	-	34	34	-
BHM40	Roadside	Diffusion Tube	83.3	83.3	50	49	55	72	**65**
BHM41	Roadside	Diffusion Tube	83.3	83.3	50	59	45	72	**65**
BHM42	Roadside	Diffusion Tube	83.3	83.3	45	42	46	50	**52**
BHM43	Roadside	Diffusion Tube	-	-	58	59	47	49	-
BHM44	Roadside	Diffusion Tube	75.0	75.0	-	-	48	53	**46**
BHM45	Roadside	Diffusion Tube	-	-	-	-	47	51	-
BHM46	Roadside	Diffusion Tube	75.0	75.0	-	-	67	63	**61**
BHM47	Roadside	Diffusion Tube	75.0	75.0	-	-	67	-	**50**
BHM48	Roadside	Diffusion Tube	-	-	-	-	50	47	-
BHM50	Roadside	Diffusion Tube	83.3	83.3	-	-	60	66	**55**
BHM51	Roadside	Diffusion Tube	75.0	75.0	-	-	53	46	39
BHM53	Roadside	Diffusion Tube	75.0	75.0	-	-	55	-	**62**
BHM55	Roadside	Diffusion Tube	75.0	75.0	66	61	65	70	**60**
BHM56	Urban Centre	Diffusion Tube	75.0	75.0	43	41	48	47	**49**
BHM57	Roadside	Diffusion Tube	75.0	75.0	-	-	30	33	30
BHM58	Urban Centre	Diffusion Tube	83.3	83.3	-	-	45	51	**50**
BHM59	Urban Centre	Diffusion Tube	75.0	75.0	-	-	N/A	-	**48**
BHM61	Urban Centre	Diffusion Tube	83.3	83.3	-	-	46	36	36
BHM62	Urban Centre	Diffusion Tube	83.3	83.3	36	39	38	39	40
BHM63	Roadside	Diffusion Tube	-	-	39	40	43	34	-
BHM64	Roadside	Diffusion Tube	-	-	33	36	36	50	-
BHM65	Roadside	Diffusion Tube	83.3	83.3	-	-	51	52	**48**
BHM67	Roadside	Diffusion Tube	83.3	83.3	-	-	56	40	39
BHM68	Roadside	Diffusion Tube	83.3	83.3	-	-	-	44	40
BHM69	Roadside	Diffusion Tube	83.3	83.3	-	-	-	43	**48**
BHM70	Roadside	Diffusion Tube	83.3	83.3	-	-	-	29	29
BHM71	Roadside	Diffusion Tube	83.3	83.3	-	-	-	31	31
BHM72	Roadside	Diffusion Tube	75.0	75.0	-	-	-	26	27
BHM73	Roadside	Diffusion Tube	-	-	-	-	-	51	-
BHM74	Roadside	Diffusion Tube	83.3	83.3	-	-	-	66	**63**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2014	2015	2016	2017	2018
BHM75	Roadside	Diffusion Tube	83.3	83.3	-	-	-	47	**42**
BHM76	Roadside	Diffusion Tube	75.0	75.0	-	-	-	31	33
BHM77	Roadside	Diffusion Tube	83.3	83.3	-	-	-	41	**46**
BHM78	Roadside	Diffusion Tube	-	-	-	-	-	43	-
BHM79	Roadside	Diffusion Tube	83.3	83.3	-	-	-	37	**44**
BHM80	Roadside	Diffusion Tube	83.3	83.3	-	-	-	41	37
BHM81	Roadside	Diffusion Tube	75.0	75.0	-	-	-	49	**46**
BHM82	Roadside	Diffusion Tube	75.0	75.0	-	-	-	39	**44**
BHM83	Roadside	Diffusion Tube	-	-	-	-	-	73	-
BHM84	Roadside	Diffusion Tube	-	-	-	-	-	67	-
BHM85	Roadside	Diffusion Tube	83.3	83.3	-	-	-	61	**60**
BHM86	Roadside	Diffusion Tube	83.3	83.3	-	-	-	46	**46**
BHM87	Roadside	Diffusion Tube	75.0	75.0	-	-	-	78	**74**
BHM88	Roadside	Diffusion Tube	-	-	-	-	-	62	-
BHM89	Roadside	Diffusion Tube	-	-	-	-	-	56	-
BHM90	Roadside	Diffusion Tube	75.0	75.0	-	-	-	35	34
BHM91	Roadside	Diffusion Tube	-	-	-	-	-	44	-
BHM92	Roadside	Diffusion Tube	75.0	75.0	-	-	-	-	**50**
BHM93	Roadside	Diffusion Tube	83.3	83.3	-	-	-	50	**52**

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

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

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

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

(4) Annualisation has not been carried out for sites where data capture was <75% (see Section 3.2.1. for explanation).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

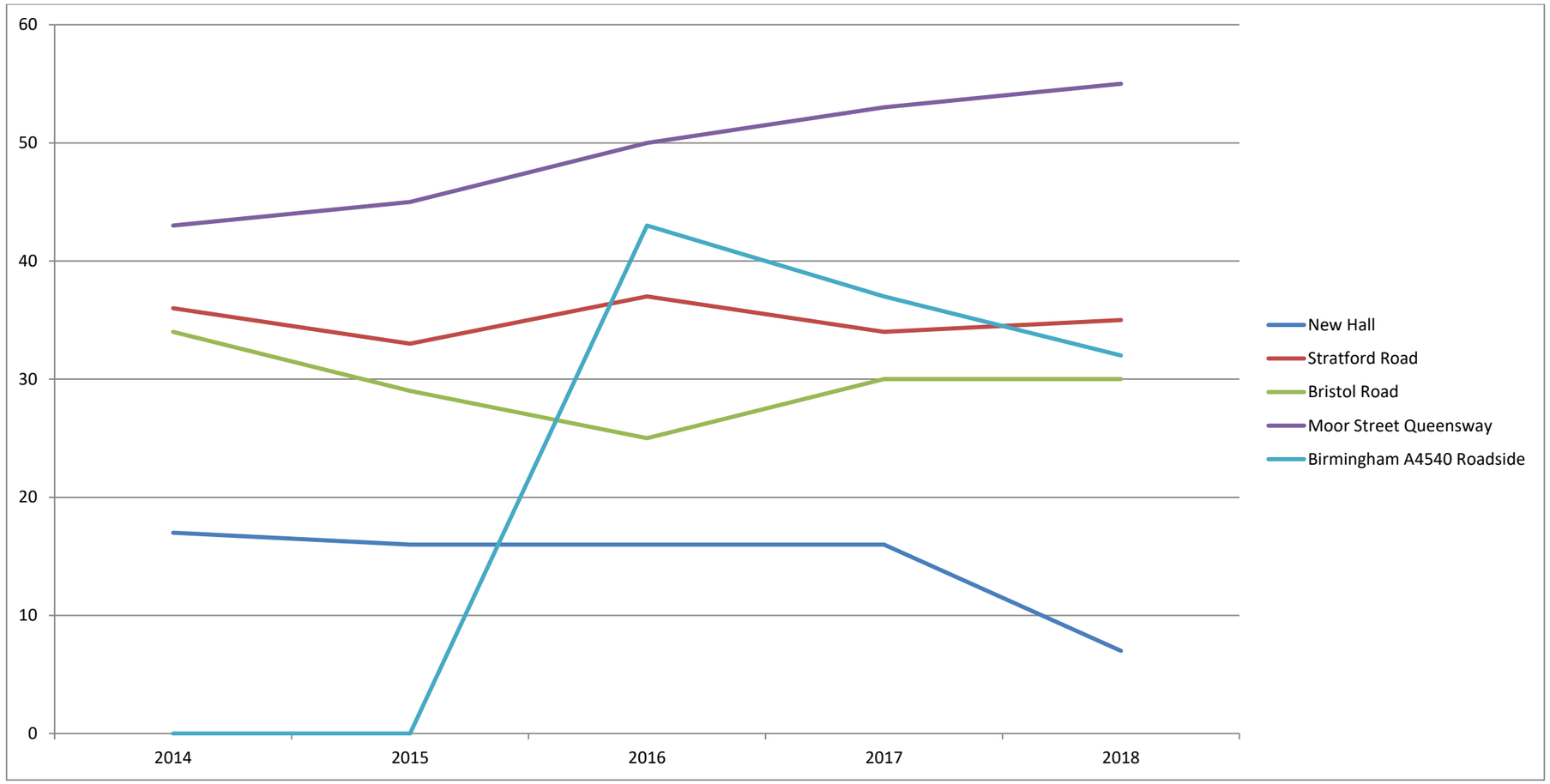


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
BAU1	Urban Background	Automatic	97	97	0	0	0	0	0
BAU2	Roadside	Automatic	98	98	0	0	0	0	0
BCA 1	Roadside	Automatic	61.3	61.3	0	0	0	0	0
BCA 2	Kerbside	Automatic	48.1	48.1	0	0	0	0	0
BCA 3	Roadside	Automatic	31.2	31.2	0	0	0	0	0
BCA 4	Urban Background	Automatic	28.5	28.5	0	0	0	0	0
BCA 5	Roadside	Automatic	84	84	0	0	0	0	0
BCA 6	Roadside	Automatic	72.4	72.4	0	0	0	0	0
BCA 7	Roadside	Automatic	64.8	64.8	0	0	0	0	0

Notes:

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

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

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
BAU2	Birmingham A4540 Roadside	93	93	-	-	14	15	18
BAF1	Birmingham Ladywood	26	26	-	-	-	-	16

☐ **Annualisation has been conducted where data capture is <75% (confirm by selecting in box)**

Notes:

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

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

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

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

Table A.5 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} 24-Hour Means > 50µg/m³ (3)				
				2014	2015	2016	2017	2018
BAU2	Roadside	93	93	-	-	0	0	0
BAF1	Urban Background	26	26	-	-	-	-	0

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold.**

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

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

(3) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

Table A.6 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
BAU1	Urban Background	98	98	12	12	10	11	11
BAU2	Roadside	94	94	-	-	17	11	12
BAF1	Urban Background	36	36	-	-	-	-	10

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

Notes:

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

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

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

Table A.7 – SO_2 Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	Number of Exceedances 2018 (percentile in bracket) [3]		
				15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)

Notes:

Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

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

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

(3) If the period of valid data is less than 85%, the relevant percentiles are provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2018

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)
BHM01	24	-	-	-	-	-	-	-	-	-	-	24	24	-	-
BHM02	20	-	-	-	20	-	-	14	15	21	22	21	19	-	-
BHM03	-	-	-	-	-	-	-	-	-	31	35	43	36	-	-
BHM04	39	-	-	-	37	24	40	34	37	42	47	-	38	-	-
BHM05	41	51	-	-	58	59	45	35	34	44	39	42	45	42	36
BHM06	-	-	-	-	-	-	-	-	-	-	-	55	55	-	-
BHM07	42	42	-	-	32	27	36	33	36	44	37	45	37	34	N/A
BHM08	51	51	-	-	48	38	58	50	44	49	55	52	50	47	N/A
BHM09	-	42	-	-	-	25		39	41	36	45	47	39	-	-
BHM10	35	40	-	-	38	26	32	28	-	37	44	38	35	33	N/A
BHM11	-	-	-	-	-	-	-	-	-	-		41	41	-	-
BHM12	41	40	-	-	39	24	35	31	28	40	43	42	36	33	N/A
BHM16	59	52	-	-	49	43	58	49	49	55	59	61	53	49	49
BHM17	50	43	-	-	38	28	40	38	39	44	47	50	42	39	35
BHM18	54	46	-	-	37	35	44	40	44	45	43	54	44	41	37

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)
BHM19	46	-	-	-	51	35		40	43	46	47	50	45	-	-
BHM20	45	-	-	-	-	-	-	28	30	31	39	36	35	-	-
BHM21	74	-	-	-	-	30	-	52	46	48	57	66	53	-	-
BHM22	-	-	-	-	-	-	-	-	-	-	-	42	42	-	-
BHM23	62	53	-	-	-	-	-	-	-	-	-	61	59	-	-
BHM24	51	47	-	-	50	29	49	42	39	41	50	50	45	42	N/A
BHM25	58	43	-	-	41	-	61	47	50	54	55	60	52	48	40
BHM26	29	31	-	-	26	15	20	19	21	29	32	31	25	23	N/A
BHM27	51	47	-	-	46	32	45	37	-	98	51	49	51	47	43
BHM28	62	-	-	-	-	59	74	58	65	66	84	57	66	-	-
BHM29	-	57	-	-	-	-	-	-	-	-	-	50	53	-	-
BHM30	51	44	-	-	40	27	37	38	38	39	48	56	42	39	N/A
BHM31	57	58	-	-	-	69	29	-	-	-	-	-	53	-	-
BHM33	45	41	-	-	46	26	42	-	71	-	-	46	45	-	-
BHM34	41	32	-	-	30	22	32	22	31	30	36	40	32	30	30
BHM35	43	38	-	-	39	23	32	28	33	36	35	45	35	33	N/A
BHM36	49	-	-	-	50	40	39	40	33	42	37	45	42	39	N/A
BHM37	-	-	-	-	-	-	-	-	-	38	42	33	37	-	-
BHM39	55	50	-	-	44	-	40	-	44	45	-	50	47	-	-
BHM40	89	66	-	-	63	58	71	73	73	72	58	79	70	65	N/A

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)
BHM41	83	71	-	-	66	44	73	68	70	67	81	75	70	65	N/A
BHM42	59	47	-	-	42	109	52	48	45	51	52	56	56	52	45
BHM43	57	-	-	-	-	93	-	41	53	48	51	-	57	-	-
BHM44	63	-	-	-	48	34	41	38	48	54	57	63	49	46	42
BHM45	-	57	-	-	46	38	55	-	115	46	102	65	65	-	-
BHM46	77	-	-	-	60	58	71	62	66	74	52	74	66	61	51
BHM47	59	57	-	-	55	39	-	37	52	64	64	64	54	50	N/A
BHM48	57	-	-	-	40	37	-	-	-	-	-	-	45	-	-
BHM49	-	-	-	-	-	35	52	-	-	-	-	-	43	-	-
BHM50	75	66	-	-	53	37	66	52	59	55	63	64	59	55	N/A
BHM51	41	-	-	-	49	42	45	39	39	36	41	42	42	39	36
BHM52	-	-	-	-	52	-	67	41	64	-	-	-	56	-	-
BHM53	84	66	-	-	61	51	74	-	70	60	65	73	67	62	N/A
BHM55	81	68	-	-	55	49	31	70	54	-	84	81	64	60	N/A
BHM56	52	-	-	-	46	54	78	35	40	45	82	48	53	49	N/A
BHM57	36	-	-	-	42	27	28	24	25	35	40	33	32	30	25
BHM58	58	61	-	-	66	53	42	41	45	57	61	59	54	50	N/A
BHM59	55	60	-	-	54	42	44	-	44	56	54	55	52	48	N/A
BHM61	47	45	-	-	33	26	34	31	34	45	51	42	39	36	N/A
BHM62	49	48	-	-	41	36	38	39	37	47	47	48	43	40	N/A

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)
BHM63	47	-	-	-	29	22	35	31	-	38	41	44	36	-	-
BHM64	65	-	-	-	-	-	47	35	48	43	57	48	49	-	-
BHM65	54	55	-	-	57	52	52	47	41	58	52	54	52	48	41
BHM66	-	-	-	-	-	-	-	-	-	-	-	51	51	-	-
BHM67	49	46	-	-	40	29	42	31	37	41	50	52	42	39	36
BHM68	50	42	-	-	41	33	44	38	41	39	53	49	43	40	34
BHM69	58	52	-	-	66	62	52	44	41	44	51	53	52	48	N/A
BHM70	35	40	-	-	34	22	29	22	28	36	34	35	31	29	N/A
BHM71	38	40	-	-	30	21	30	30	28	36	40	40	33	31	29
BHM72	31	37	-	-	30	26	26	-	20	32	30	31	29	27	N/A
BHM73	61	60	-	-	42	35	-	-	-	50	58	57	52	-	-
BHM74	56	81	-	-	91	49	78	72	58	43	74	76	68	63	N/A
BHM75	63	49	-	-	41	33	47	32	45	51	52	36	45	42	32
BHM76	35	44	-	-	38	36	30	25	26	36	-	57	36	33	N/A
BHM77	52	47	-	-	27	99	46	40	43	42	48	48	49	46	38
BHM78	-	130	-	-	-	-	57	39	40	47	51	51	59	-	-
BHM79	50	52	-	-	40	34	44	44	46	45	56	58	47	44	33
BHM80	32	52	-	-	38	39	70	27	25	45	34	40	40	37	N/A
BHM81	-	52	-	-	70	57	63	31	35	41	53	38	49	46	N/A
BHM82	-	65	-	-	34	22	37	51	48	54	52	61	47	44	N/A

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)
BHM83	71	84	-	-	83	-	128	78	-	82	71	81	85	-	-
BHM84	66	74	-	-	77	39	-	-	-	-	-	60	63	-	-
BHM85	61	81	-	-	48	45	63	58	68	58	81	77	64	60	N/A
BHM86	53	57	-	-	45	39	47	41	49	48	55	56	49	46	43
BHM87	71	-	-	-	79	61	86	78	81	90	79	93	80	74	N/A
BHM88	82	-	-	-	93	-	62	-	-	-	-	84	80	-	-
BHM89	-	-	-	-	61	43	-	40	52	57	52	62	52	-	-
BHM90	39	43	-	-	35	26	30	27	-	41	44	47	37	34	N/A
BHM91	44	-	-	-	-	25	34	33	-	46	41	41	38	-	-
BHM92	54	-	-	-	56	43	64	50	56	54	57	48	54	50	N/A
BHM93	54	68	-	-	59	51	58	46	54	55	64	52	56	52	N/A

☐ **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.

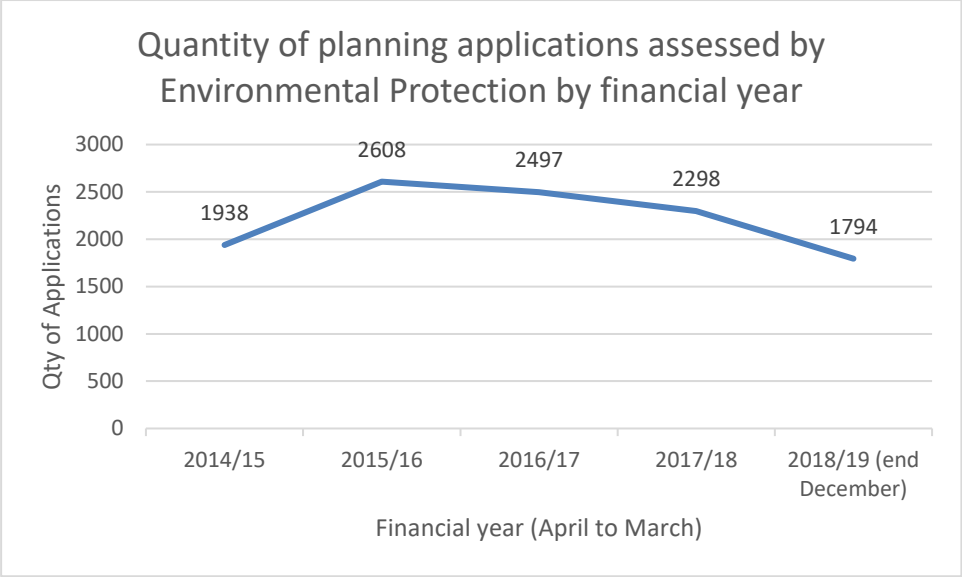
Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

Review and Assessment

It is considered that there have been no significant changes to sources in the reporting year. Road traffic remains the dominant source of emissions. No dispersion modelling has been undertaken to support the LAQM process during the reporting year. It is proposed to review our approach to identifying sites of possible exceedance outside of the city centre having regards to producing an updated model or some alternate methodology which will be reported in the revised AQAP. The scope of the council's monitoring strategy will be reviewed as necessary once this process is complete.

Officers from Environmental Protection act as a non-statutory consultee to the Planning Service by providing input on the environmental merits of planning applications lodged with the City Council. These range from minor schemes through to major developments. Officers consider emissions to almost all environmental media e.g. land, air, as noise and whilst not all of these applications involved air quality considerations, a significant number will have done so, especially given the continuing focus on increasing residential development within the city centre area. Officers continue to make use of the Good Practice Air Quality Planning Guidance published by the Low Emissions Towns and Cities Partnership (May 2014) when making their response.

The following graph shows the quantity of planning applications commented upon by EP officers over the last five years.



Diffusion Tube information

All diffusion tubes are prepared, supplied and analysed by:

Gradko International Limited
St. Martins House,
77 Wales Street
Winchester,
Hampshire
SO23 0RH
England

Tubes supplied with 20% TEA in water (see the appended technical data sheet). The Gradko laboratory is UKAS accredited, which ensures conformance with the requirements of ISO/IEC 17025 and participates in several national quality schemes such as WASP, LEAP and Field Intercomparison. Results of the WASP scheme (obtained from https://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html) are appended.

Technical Data Sheet: TDS 1

DIF 100 RTU - NITROGEN DIOXIDE (NO_2)

This tube is designed for passively monitoring gaseous airborne Nitrogen dioxide.

Description: Acrylic tube fitted with coloured and white thermoplastic rubber caps. The coloured cap contains the absorbent.

The concentrations of Nitrite ions and hence NO_2 chemically adsorbed are quantitatively determined by UV/ Visible Spectrophotometry with reference to a calibration curve derived from the analysis of standard nitrite solutions (UKAS Accredited Methods).

Suitable for carrying out spatial or localized assessments for NO_2 in ambient air or workplace monitoring. It can be used for co-location projects alongside an automatic analyzer to obtain bias correction factors.

Clips and straps are not included and must be ordered separately.

Tube Dimensions: 71.0mm length x 11.0mm internal diameter.

Absorbent: Two preparations of Triethanolamine (TEA) absorbent are available:

20% Triethanolamine / De-ionised Water - *GREY CAP
50% Triethanolamine / Acetone – *RED CAP

Recommended Exposure Periods: 2 -4 weeks.

Air Velocity: Influence of Wind Speed < 10% between 1.0 and 4.5 $msec^{-1}$ (* based on original data).

Storage: Store in a dark, cool environment preferably between 5-10°C.

Shelf Life: 12 weeks from preparation date.

Desorption Efficiency: d = 0.98 (determined using N.I.S.T. Standard Analytes).

Limit of detection:

- 20%TEA/Water – less than 1.5 ugm^{-3} over a 4-week exposure period. Specific values available upon request.
- 50%TEA/Acetone – less than 2 ugm^{-3} over a 4-week exposure period. Specific values available upon request.

Analytical Expanded Measurement Uncertainty: available upon request.

Relevant Standards: BS EN 13528 Parts 1-3: 2002/3

Reference document: ED48673043 Issue-1A Feb 2008 – AEA Energy and Environment

Special Factors: Potential interference from Nitrous Acid , Peroxy Acetyl Nitrate, which could increase levels of nitrate.

LAQM Helpdesk – February 2019

Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (April 2017 – February 2019).

Reports are prepared by LGC for BV/NPL on behalf of Defra and the Devolved Administrations.

Background

AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combined two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme.

AIR offers a number of test samples designed to test the proficiency of laboratories undertaking analysis of chemical pollutants in ambient indoor, stack and workplace air. One such sample is the AIR NO_2 test sample type that is distributed to participants in a quarterly basis.

AIR NO_2 PT forms an integral part of the UK NO_2 Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). With consent from the participating laboratories, LGC Standards provides summary proficiency testing data to the LAQM Helpdesk for hosting on the web-pages at http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html. This information will be updated on a quarterly basis following completion of each AIR PT round.

Defra and the Devolved Administrations advise that diffusion tubes used for Local Air Quality Management should be obtained from laboratories that have demonstrated satisfactory performance in the AIR PT scheme. Laboratory performance in AIR PT is also assessed, by the National Physical Laboratory (NPL), alongside laboratory data from the monthly NPL Field Intercomparison Exercise carried out at Marylebone Road, central London.

The information is used to help the laboratories to identify if they have problems and may assist devising measures to improve their performance and forms part of work for Defra and the Devolved Administrations under the Local Air Quality Management Services Contract.

AIR NO_2 PT Scheme overview

Purpose of scheme

The AIR PT scheme uses laboratory spiked Palmes type diffusion tubes to test each participating laboratory's analytical performance on a quarterly basis and continues the format used in the preceding WASP PT scheme. Such tubes are not designed to test other parts of the measurement system e.g. sampling. Every quarter, roughly January, April, July and October each year, each laboratory receives four diffusion tubes doped with an amount of nitrite, known to LGC Standards, but not the participants. At least two of the tubes are usually duplicates, which enables precision, as well as accuracy, to be assessed. The masses of nitrite on the spiked tubes are different each quarter, and reflect the typical analytical range encountered in actual NO_2 ambient monitoring in the UK.

Preparation of test samples

Diffusion tubes are spiked using a working nitrite solution prepared from a stock solution. The concentration of this stock solution is initially assayed using a titrimetric procedure. All steps in the subsequent test sample production process, involving gravimetric and volumetric considerations, are undertaken using calibrated instruments employing traceable standards. As an additional cross check, 12 spiked Palmes tubes are picked at random from each spike loading level and submitted to a third party laboratory which is accredited to ISO 17025 to undertake this analysis using an ion chromatographic procedure.

In summary, the tube spiking precision is calculated to be better than 0.5 %, expressed as a standard deviation, and this is derived from repeat gravimetric checking of the pipette device used to spike the test samples. The calculated spike values, derived from titrimetric, gravimetric and volumetric considerations, are found to be typically within ± 3 % of results obtained by the third party laboratory using an ion chromatographic analytical procedure.

Scheme operation

The participants analyse the test samples and report the results to LGC Standards via their on-line PORTAL data management system. LGC Standards assign a performance score to each laboratory's result, based on how far their results deviate from the assigned values for each test samples. The assigned values are best estimates of the levels of nitrite doped onto the test sample tubes and are calculated from the median of participant results, after the removal of test results that are inappropriate for statistical evaluation, e.g. miscalculations, transpositions and other gross errors. At the completion of the round, laboratories receive a report detailing how they have performed and how their results relate to those of their peers.

Performance scoring

The z-score system is used by LGC to assess the performance of laboratories participating in the AIR PT NO_2 scheme.

The Z_{score}, may be defined as:

$$Z_{score} = \frac{\left(x_{lab} - \bar{x}_{assigned}\right)}{\sigma_{SDPA}}$$

Where:

x_{lab} = participant result from a laboratory

$\bar{x}_{assigned}$ = assigned value

σ_{SDPA} = standard deviation for performance assessment (currently set at 7.5 % of $\bar{x}_{assigned}$)

Performance score interpretation

A Z_{score} is interpreted as described below:

$\|Z_{score}\| \leq 2$	indicates satisfactory laboratory performance
$2.0 < \|Z_{score}\| < 3$	indicates questionable (warning) laboratory performance
$\|Z_{score}\| \geq 3$	indicates unsatisfactory (action) laboratory performance

As a general rule of thumb, provided that a laboratory does not have systematic sources of bias in their laboratory measurement system, then on average, 19 out of every 20 z-scores should be $\leq \pm 2$. In this scheme each laboratory receives 4 test samples per round and therefore submits 4 z-scores per round. Hence over 5 rounds laboratories would receive 20 test samples and report 20 z-scores.

Assessing the performance of a laboratory

End users that avail of analytical services from laboratories should satisfy themselves that such laboratories meet their requirements. A number of factors ideally need to be considered including

- Expertise and skills of staff within the laboratory?
- Does the laboratory follow accepted measurement standards, guidance?
- Does the laboratory operate a robust internal quality control system?
- Is the laboratory third party accredited to relevant standards such as ISO 17025?
- Does the laboratory successfully participate in relevant external proficiency testing schemes?
- How good is their customer care (communication, turnaround times, pricing etc)?

Participation therefore, in an external proficiency-testing scheme such as AIR PT, represents but one factor in such considerations.

Participation in a single round of an external proficiency-testing scheme represents a “snap-shot” in time of a laboratory’s analytical quality. It is more informative therefore to consider performance over a number of rounds.

Following on from above, therefore over a rolling five round AIR PT window, one would expect that 95 % of laboratory results should be $\leq \pm 2$. If this percentage is substantially lower than 95 % for a particular laboratory, within this five round window, then one can conclude that the laboratory in question has significant sources of error within their analytical procedure.

A summary of the performance, for each laboratory participating in the AIR PT scheme, is provided in Table 1. This table shows the percentage of results where the absolute z-score, for each laboratory, was less than or equal to 2, i.e. those results which have been assessed as satisfactory.

Contacts

Further **specific** information on the LGC AIR NO_2 PT scheme is available from LGC proficiency testing on 0161 7622500 or by email at customerservices@lgcgroup.com.

For **general** questions about the scheme within the context of wider LAQM activities please contact Nick Martin at NPL on 0208 943 7088 or nick.martin@npl.co.uk.

Table 1: Laboratory summary performance for AIR NO_2 PT rounds AR0019, 21, 22, 24, 25, 27, 28 and 30

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of $\leq \pm 2$ as defined above.

AIR PT Round	**AIR PT AR019**	**AIR PT AR021**	**AIR PT AR022**	**AIR PT AR024**	**AIR PT AR025**	**AIR PT AR027**	**AIR PT AR028**	**AIR PT AR030**
Round conducted in the period	April – May 2017	July – August 2017	September – October 2017	January – February 2018	April – May 2018	July – August 2018	September – October 2018	January – February 2019
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	75 %
Cardiff Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
SOCOTEC	100 % [1]	100 % [1]	100 % [1]	100 % [1]	100 % [1]	100 % [1]	100 % [1]	87.5 % [1]
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	50 %	0 %	100 %	100 %	100 %	50 %	100 %	100 %
Gradko International [1]	100 % [1]	100 % [1]	100 % [1]	100 % [1]	100 %	100 %	100 %	75 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Lambeth Scientific Services	NR [2]	NR [2]	100 %	NR [2]	NR [2]	NR [2]	25 %	50 %
Milton Keynes Council	75 %	0 %	75 %	100 %	75 %	100 %	100 %	100 %
Northampton Borough Council	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Somerset Scientific Services	100 %	100 %	75 %	100 %	100 %	100 %	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Staffordshire County Council	100 %	100 %	100 %	50 %	100 %	100 %	100 %	100 %
Tayside Scientific Services (formerly Dundee CC)	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %
West Yorkshire Analytical Services	100 %	100 %	100 %	50 %	75 %	100 %	100 %	100 %

[1] Participant subscribed to two sets of test results (2 x 4 test samples) in each AIR PT round.
[2] NR No results reported
[3] Northampton Borough Council, Kent Scientific Services, Cardiff Scientific Services, Kirklees MBC and Exova (formerly Clyde Analytical) no longer carry out NO2 diffusion tube monitoring and therefore did not submit results.

Bias adjustment

Diffusion tube results have been bias adjusted using the national bias adjustment factor obtained from here; https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html.

The national factor has been used in the absence of a co-location study being undertaken in the reporting year.

Distance correction

Where appropriate diffusion tube results have been distance corrected to account for public exposure at the façade of a building where relevant exposure needs to be considered. However due to the relationship between the diffusion tube location, the carriage way, and the nearest building where exposure is relevant, it is not always possible to undertake the distance correction calculation. Further consideration of those monitoring locations where exceedences have been measured and the application of distance correction is appended. The distance correction has been calculated using the latest version of the tool available here; https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html.

PM Monitoring Adjustment

All monitoring in Birmingham for particulate matter (PM) is contained within the AURN network. The data from this monitoring is collected and where necessary adjusted by Bureau Veritas. The data from the monitoring sites is considered to be representative of the Birmingham area and includes both background and roadside locations.

QA/QC of automatic monitoring

QA/QC for the Birmingham A4540 Roadside and Acocks Green AURN sites is completed by Bureau Veritas.

The remaining Birmingham monitoring stations have QA/QC procedures completed in-house. All data from the sites is collected remotely onto the SMHI Airviro system. The data is reviewed daily to check for obvious errors or analyser faults. Manual calibrations and filter checks are completed regularly. All calibration gases are of traceable standard, and the servicing and maintenance is provided by Horiba.

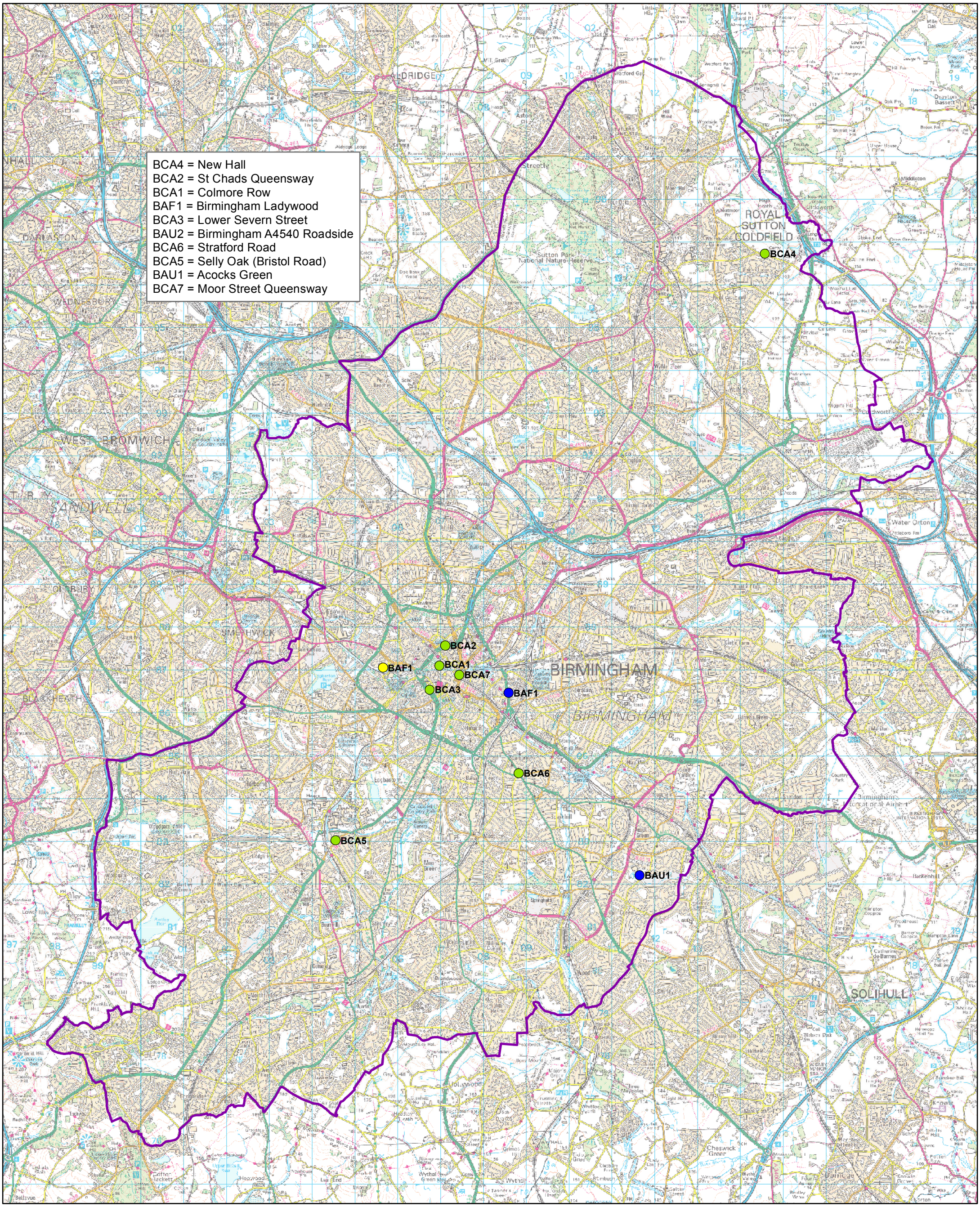
Enter data into the pink cells

Site Name/ID	Distance (m)		NO_2 Annual Mean Concentration ($\mu g/m^3$)			Comment
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor	
BHM05	0.9	4.8	24.8	41.9	*36.3*	Predicted concentration at Receptor within 10% the AQS objective.
BHM17	2.4	9.2	27.5	39.1	35.3	
BHM18	3.9	10.1	27.5	40.9	*37.4*	Predicted concentration at Receptor within 10% the AQS objective.
BHM42	2.8	10.3	32.0	52.1	**45.4**	Predicted concentration at Receptor above AQS objective.
BHM44	1.3	4.9	32.0	45.6	**41.8**	Predicted concentration at Receptor above AQS objective.
BHM46	0.9	5.5	32.0	61.4	**50.9**	Predicted concentration at Receptor above AQS objective.
BHM51	2.0	4.2	23.5	39.1	*36.4*	Predicted concentration at Receptor within 10% the AQS objective.
BHM57	1.0	9.9	19.9	29.8	25.2	
BHM65	0.9	5.6	28.9	48.4	**41.4**	Predicted concentration at Receptor above AQS objective.

BHM67	4.1	18.6	31.5	39.1	35.9	
BHM68	2.2	9.9	23.9	40.0	34.2	
BHM71	5.3	13.6	25.5	30.7	29.2	
BHM75	2.0	21.7	23.5	41.9	31.6	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
BHM77	2.5	10.0	23.5	45.6	*38.0*	Predicted concentration at Receptor within 10% the AQS objective.
BHM79	1.7	21.8	25.1	43.7	33.0	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
BHM86	3.2	7.3	32.0	45.6	**42.6**	Predicted concentration at Receptor above AQS objective.
BHM25	2.6	13.2	28.6	48.4	**40.4**	Predicted concentration at Receptor above AQS objective.
BHM27	1.0	4.4	31.5	47.4	**42.7**	Predicted concentration at Receptor above AQS objective.

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

Locations of Automatic Monitoring Sites

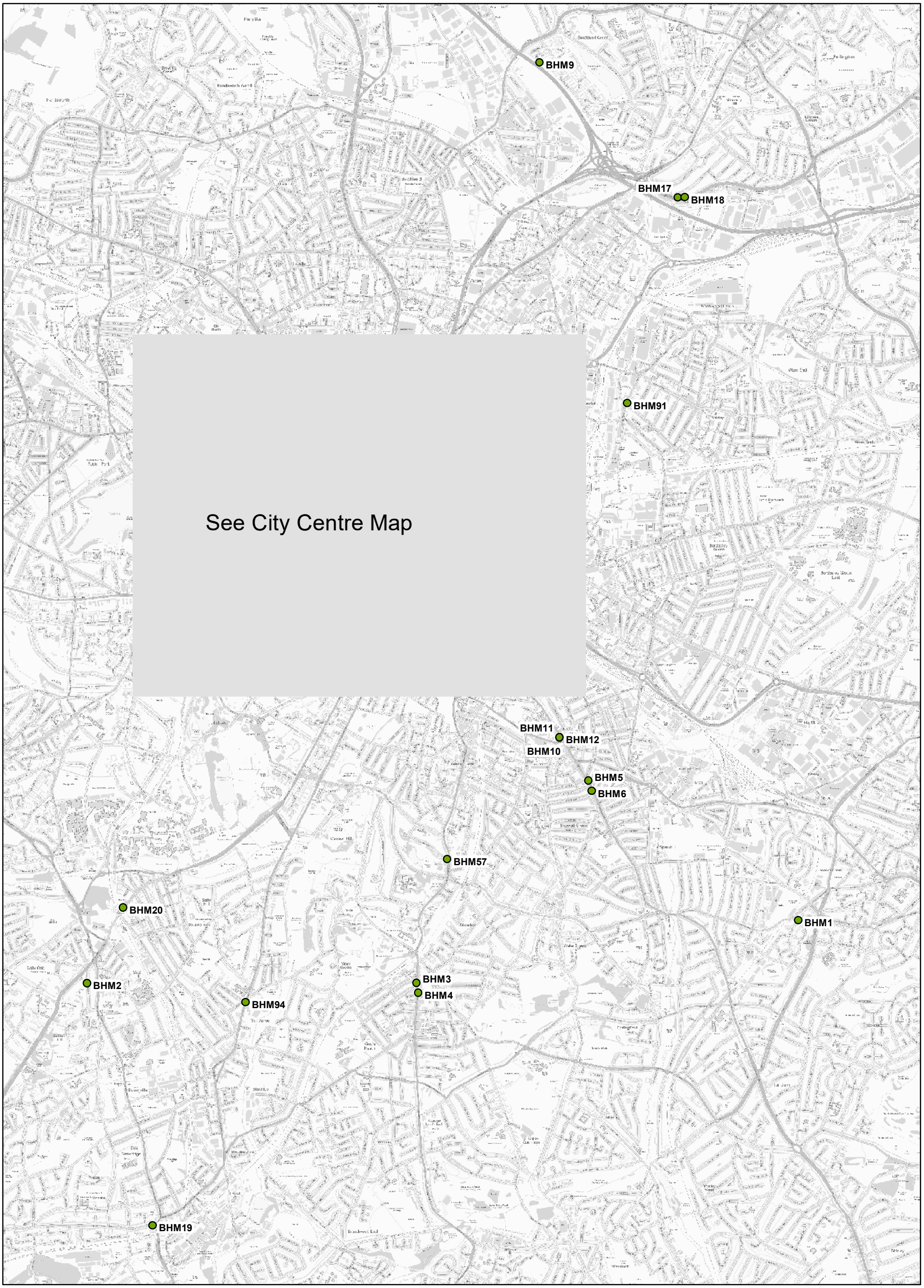


Sites coloured blue are in the AURN network.
Sites coloured yellow are affiliated into the AURN network.
Sites coloured green are BCC operated sites.

0 0.5 1 2 3 4 Kilometers

N

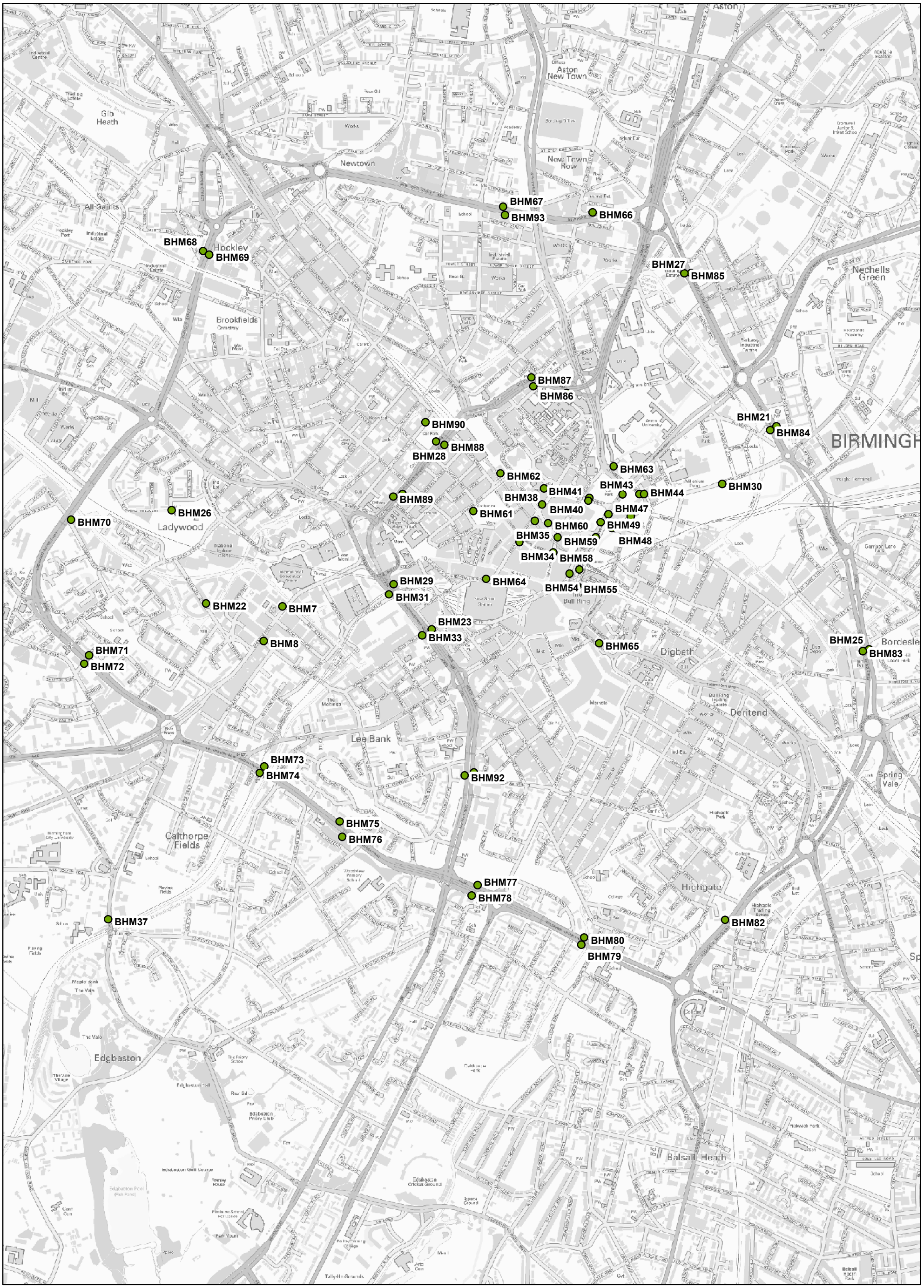
Diffusion Tube Monitoring Locations (City Wide)



0 0.275 0.55 1.1 1.65 2.2
Kilometers

N

Diffusion Tube Monitoring Locations (City Centre)



0 0.125 0.25 0.5 0.75 1 Kilometers

N

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[6]	
	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

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

Glossary of Terms

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