2020 Air Quality Annual Status Report (ASR)

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

September 2020

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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 costs to society from poor air quality are borne across all sectors. With the increasing focus on the NHS in the current Covid impacted world it is concerning to note that the total cost to the NHS and social care through to 2025 arising from air pollution is estimated to be £60.8 million for nitrogen dioxide (NO_2) and £1.5 billion for fine particulate matter ($PM_{2.5}$). These figures rise to £2.7 billion and £2.8 billion respectively when diseases with less robust evidence are included[3]. It is important to appreciate the complexities that arise due to poor air quality, how a changing climate can change pollution trends and exacerbate symptoms and how emerging evidence suggests diseases such as Covid 19 can create more serious health outcomes where air pollution is worse. In this context it is crucial to ensure air pollution is reduced to the lowest level possible and in the shortest possible time.

The main air quality issue in Birmingham is elevated levels of nitrogen dioxide (NO2), 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. Studies identified that Birmingham would require

[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] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/708855/Estimation_of_costs_to_the_NHS_and_social_care_due_to_the_health_impacts_of_air_pollution_-_summary_report.pdf

a Class D Clean Air Zone (CAZ) with additional measures to deliver compliance in the shortest possible time. This FBC was submitted to DEFRA in 2018 and was approved in May 2019.

Throughout the year the City Council has continued to work on preparations for the CAZ to commence operation in January 2020. However due to problems with the vehicle checking website the start date has been pushed back to the summer 2020.

Birmingham city centre is undergoing significant regeneration with several major projects either underway or planned for the near future including at Paradise Circus, 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 and interested stakeholders 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, however the singular driving project that is likely to provide the greatest benefit to health from improved air quality is that of the CAZ. During 2019 the City Council worked with Government's Joint Air Quality Unit (JAQU) to progress the deployment of the CAZ. The plan to commence the CAZ in January 2020 has had to be deferred until summer 2020 due to on-going issues with the vehicle checking website and associated back office systems. Despite this, the Council continues to work on the CAZ project with the first staffing appointments having been made to ensure that the implementation of the CAZ is sufficiently resourced.

In 2019 Birmingham City Council has continued to work with Air Quality Consultants to produce a revised AQAP, so as to update measures and align with current plans including the CAZ. A draft AQAP has been completed and it is anticipated that this will be subject to public consultation in 2020.

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 and these projects are expected to complete in 2020.

Birmingham City Council has also continued to develop its wider clean air strategy and a public consultation was held in 2019. Details can be found here;

https://www.birminghambeheard.org.uk/economy/clean-air-strategy-consultation/

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, WM-Air (in conjunction with University of Birmingham), 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.

Table 2.1. indicates that NO2 concentrations have increased significantly since the AQMA was declared in 2005. This may be partly due to the significant increases in road traffic seen over the intervening years but it may also be at least in part down to changes in the Council's monitoring strategy. The level of exceedence presented in Table 2.1 also appears to be less than in 2018, however it is considered that it is difficult to discern an observable trend in concentrations over the previous 5 years and that in general levels of pollution are relatively stable.

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.

Significant improvements are being made to public transport links, with the Midland Metro extension to Centenary Square having opened in 2019, and plans moving

forward for railway expansion with the re-opening of the Camp Hill Line, linking Kings Heath, Moseley, and Stirchley with the City Centre. Plans are also in place to introduce a sprint bus network linking Walsall, Birmingham, and Birmingham airport and Solihull. It is anticipated that the Camp Hill line railway extension and Sprint bus service will become operational in time for the Commonwealth Games in 2022.

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 approved 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 to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by 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. The AQMA encompasses the whole of the Birmingham City Council area.

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	61	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 concluded that the conclusions reached are acceptable for all sources and pollutants. the appraisal commented that;

- Birmingham City Council should make review of the AQAP its top priority.
- Graphs be presented for selected diffusion tube locations.
- Provide justification for the selection of the bias adjustment factor.
- That all diffusion tube and continuous monitoring results be annualised where applicable.

These points are addressed further in this report.

Birmingham City Council has taken forward a number of direct measures during the current reporting year of 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. This table comprises those actions from our current (outdated) AQAP 2011 and those actions noted at this section in the ASR for last year (2019, containing data for 2018).

It is accepted that those measures drawn from the 2011 AQAP are dated in that many have evolved into expanded or different work-streams. A draft AQAP was completed in 2019 and it is intended that this will be subject to public consultation in 2020, prior to its formal adoption. The revised AQAP will update measures and align with current plans including the CAZ. As part of the plan we will undertake additional work to identify pollution "hotspots" located outside of the city centre.

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. The evidence base identified the need for a Class D Clean Air Zone with additional measures covering the city centre area. A second Ministerial Direction was issued on 11 March 2019 requiring the Council implement the local plan for NO2 compliance. Throughout the year the City Council has continued to work on preparations for the CAZ to commence operation in January

2020. However due to problems with the vehicle checking website the start date has been pushed back to the summer 2020.

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

Birmingham City Council's priorities for the coming year (2020) are:

- We will progress all necessary actions pursuant to delivering the introduction of a Clean Air Zone (CAZ) as mandated by Government. For 2020 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. A public consultation will be held in 2020, with a view to adopting the revised AQAP before the end of the year.
- We will continue to develop infrastructure to support the uptake of cleaner vehicle technologies within Birmingham and the wider region. This includes working towards finalising the contractual arrangements by August 2020, and setting up the work streams to develop a ‘fast & rapid’ 394 EV charge point network within 24 months; finalising the procurement process to purchase 20 hydrogen buses and contract a Bus Operator by September 2020; from the launch of the Tyseley Energy Park re-fuelling hub in October 2019, started to trial hydrogen production and dispensing to demo vehicles, and piloting grid balancing technologies.
- We will 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 PM2.5 emissions and to synergise between air pollutant and greenhouse gas emissions.

- We will continue to contribute to the WM-Air (West Midlands Air Quality Improvement Programme), a collaborative project led by the University of Birmingham and funded through the National Environment Research Council (NERC). The WM-Air project seeks to provide improved understanding of pollution sources and levels in the region, and new capability to predict air quality, health and economic impacts of potential policy measures. It will support the application of these to specific case studies across the West Midlands, ranging from major infrastructure projects such as HS2, to making effective use of Green Infrastructure (urban vegetation) across the city.
- 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 continue our representation on the project board of the Low Emissions Towns and Cities Programme (LETCP), 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.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	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)	2011-2013	BCC – TS		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	NK	BCC – EH		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	NK	BCC – TS		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	NK	BCC – TS		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	2005-2007 / 2011-2012	BCC - EH		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.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
Action 2010/6	Control of Industry	Environmental Permits	Other measure through permit systems and economic instruments	n/a	BCC – EH		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			n/a	BCC – EH		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	2008-2011	BCC – TS		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	?
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	2011	BCC - S		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	2011	BCC – S		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	2011	BCC - TS		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.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
Action 2010/12	Birmingham City Council will seek to reduce the overall age of the taxi fleet and Encourage the use of less polluting vehicles.	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2011-2015	BCC - L		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.
ASR 2019, s2.2	Progress the introduction of the CAZ (implement the local plan for NO2 compliance) in line with the Ministerial Direction dated 11 March 2019	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2019	BCC – CAZ Team	Government	CAZ M&E Plan	Reduction in concentrations of NO2 to legal levels in line with projections	Governance incl. project management confirmed. Appointment of CAZ Team underway. Early measure work commenced. Procurement tenders underway. Discussions around back office support (ANPR & charging) underway.	July 2020 for CAZ to 'go live'	On-going concern around back office support structure. This has already contributed to initial delays and pushed the 'go-live' date back from January 2020.
ASR 2019, s2.2	Progress development of a new AQAP	Policy Guidance and Development Control	Other policy	2016	BCC - EH	BCC	NIL	No direct target	On-going work with appointed consultant. Expect first draft by end of year.	Summer 2020	NIL

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
ASR 2019, s2.2	Progress development of a Clean Air Strategy for the city of Birmingham	Policy Guidance and Development Control	Other policy	2018	BCC	BCC	NIL	No direct target	Finalise draft version and publish to public consultation. Review comments, revise and issue final version.	Late autumn 2019	Resources as this is not a statutory duty and as such is not directly allowed for or funded.

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, and improvements to public transport infrastructure.
- 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.
- The University of Birmingham, largely through the WM-Air project, intends to significantly increase observational capacity for particulate matter (PM) in Birmingham. The centrepiece of this activity will be a new distributed network of a range of low-cost IoT (Internet of Things) sensors to measure PM across the city, with particular plans to locate sensors to provide insights for the proposed implementation of the Clean Air Zone. This effort will also be complemented by ongoing mobile measurements of air quality in the City.

Finally, the University is also home to one of three new Air Quality supersites which will allow the sources of PM to be quantified more effectively.

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 Council undertook automatic (continuous) monitoring at 9 sites during 2019. Table A.1 in Appendix A shows the details of the sites. The Moor Street Queensway (BCA7) continuous monitor was out of commission for the whole of 2019, due to nearby HS2 construction works. It is intended to relocate the monitor to an alternative site nearby.

The location of the automatic monitoring sites can be viewed on the interactive map here; https://www.brumbreathes.co.uk/info/2/homepage/29/air-quality-birmingham.

Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Birmingham City Council undertook non- automatic (passive) monitoring of NO_2 at 81 sites during 2019. Table A.2 in Appendix A shows the details of the sites.

The location of the non-automatic monitoring sites can be viewed on the interactive map here; https://www.brumbreathes.co.uk/info/2/homepage/29/air-quality-birmingham.

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[4], “annualisation” (where the data capture falls below 75%), and distance correction[5]. Further details on adjustments are provided in Appendix C.

[4] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[5] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

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. Note that the concentration data presented in Table A.3 represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

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.

The annual mean for NO2 was exceeded at continuous monitoring sites BCA2 (St. Chads Queensway) and BCA3 (Lower Severn Street) with annual means of 51 µg/m3 and 43 µg/m3 respectively. These sites are located on road links identified in the PCM modelling as showing an exceedance in 2020. Concentrations at these sites show an increase on the previous year although the 2018 monitoring did not comprise a full year of results. Concentration at all other continuous monitoring sites showed annual means leass than 40 µg/m3.

It is considered that the continuous monitoring generally shows stable concentrations. A graph showing trends in continuous monitoring results is presented in Figure A.1.

The annual mean was also exceeded at many of the non-automatic monitoring sites, notably within the city centre and around the A4540 ring road. A new monitoring site has been established on the A441 (Pershore Road) which showed an annual mean of 40.0 µg/m3. All other non-automatic monitoring sites located outside of the city centre showed annual means less than the limit value. Graphs showing trends at selected diffusion tube sites (where data entends back over the previous 5 years) are shown in Figures A.2.1, A.2.2. and A.2.3.

There were no exceedences of the hourly mean air quality objective at any of the automatic monitoring sites. Annual means equal to or above 60 µg/m3 were recorded

at 2 non-automatic monitoring sites, BHM83 (Watery Lane) and BHM87 (St Chads Queensway), however nearby automatic monitors didn't show any exceedences of the hourly mean objective.

3.2.2 Particulate Matter (PM_{10})

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

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

The annual mean for PM_{10} was not exceed at either of the monitoring sites in 2019, and neither were there any occasions where the daily mean limit was exceeded.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.7 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years.

Concentrations of $PM_{2.5}$ continue to be low with annual means of 9 µg/m3, 10 µg/m3, and 10 µg/m3, recorded at the Acocks Green, A4540, and Ladywood monitoring sites respectively.

3.2.4 Sulphur Dioxide (SO_2)

No monitoring for SO_2 was carried out in 2019.

Appendix A: Monitoring Results

Table A.1 - Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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; FIDAS	43	65	3.5
BAU2	Birmingham A4540 Roadside	Roadside	408588	286470	NO2; PM10; PM2.5; O3	YES	Chemiluminescent; FIDAS	14	7	3.5
BAF1	Birmingham Ladywood	Urban Background	405653	287053	NO2; PM10; PM2.5; O3; SO2	YES	Chemiluminescent; FIDAS	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

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 (Easting)	Y OS Grid Ref (Northing)	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	NO2	YES	0	10	NO	2
BHM2	Langleys Road	Urban Background	404082	282128	NO2	YES	0	9	NO	2
BHM3	28 High Street	Roadside	407387	282131	NO2	YES	0	2	NO	2
BHM4	75 High Street	Roadside	407405	282030	NO2	YES	0	1	NO	2
BHM5	448 Stratford Road	Roadside	409147	284083	NO2	YES	0	1	NO	2
BHM6	487 Stratford Road	Roadside	409142	284054	NO2	YES	0	1	NO	2
BHM7	Broad Street - Brasshouse	Roadside	406114	286635	NO2	YES	N/A	7	NO	2
BHM8	Broad Street - O'Neils	Roadside	406036	286490	NO2	YES	N/A	1	NO	2
BHM9	Shelley Drive	Roadside	408619	291350	NO2	YES	0	26	NO	2
BHM10	Stratford Road AQ station	Roadside	408818	284591	NO2	YES	N/A	3	NO	2
BHM11	Stratford Road AQ station	Roadside	408818	284591	NO2	YES	N/A	3	NO	2
BHM12	Stratford Road AQ station	Roadside	408818	284591	NO2	YES	N/A	3	NO	2
BHM16	Childrens Hospital	Roadside	407314	287534	NO2	YES	0	6	NO	2
BHM17	Tyburn (39)	Roadside	410004	289999	NO2	YES	9.9	1	NO	2

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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)
BHM18	Tyburn (40)	Roadside	410073	290003	NO2	YES	9	1	NO	2
BHM19	Middleton Hall Road	Roadside	404739	279701	NO2	YES	8	2	NO	2
BHM20	641 Bristol Road	Roadside	404445	282885	NO2	YES	N/A	23	NO	2
BHM21	Lawley Middleway	Roadside	408195	287394	NO2	YES	1	1	NO	2
BHM23	Lower Severn Street	Roadside	406743	286539	NO2	YES	1	5	NO	2
BHM24	Great Charles Street (1)	Roadside	406621	287108	NO2	YES	N/A	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	407836	288038	NO2	YES	2	1	NO	2
BHM28	Great Charles Street (2)	Roadside	406762	287329	NO2	YES	N/A	1	NO	2
BHM29	Sufflok Street Queensway	Roadside	406583	286729	NO2	YES	N/A	1	NO	2
BHM30	Curzon Street	Roadside	407967	287151	NO2	YES	N/A	1	NO	2
BHM31	Holiday Street	Roadside	406564	286686	NO2	YES	N/A	2	NO	2
BHM33	Severn Street	Roadside	406703	286514	NO2	YES	N/A	2	NO	2
BHM34	Superdrug	Urban Centre	407114	286906	NO2	YES	N/A	2	NO	2
BHM35	Café Nero	Urban Centre	407177	286996	NO2	YES	N/A	2	NO	2

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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	407208	287064	NO2	YES	N/A	2	NO	2
BHM37	Church Road	Roadside	405380	285318	NO2	YES	30	2	NO	2
BHM39	Corporation Street	Roadside	407260	287112	NO2	YES	N/A	1	NO	2
BHM40	Priory Queensway (1)	Roadside	407407	287092	NO2	YES	N/A	1	NO	2
BHM41	Priory Queensway (2)	Roadside	407404	287080			N/A			
BHM42	MSQ - Masshouse	Roadside	407548	287107	NO2	YES	34	3	NO	2
BHM43	Masshouse Lane - Masshouse	Roadside	407618	287108	NO2	YES	14	3	NO	2
BHM44	Masshouse Lane - LP	Roadside	407638	287108	NO2	YES	24	3	NO	2
BHM45	Hotel La Tour - LP	Roadside	407582	287014	NO2	YES	N/A	2	NO	2
BHM46	Masshouse Lane Masshouse 2	Roadside	407567	287044	NO2	YES	2	2	NO	2
BHM50	MSQ - No entry post	Roadside	407435	286927	NO2	YES	N/A	2	NO	2
BHM51	Bristol Street Monaco House	Roadside	406921	285937	NO2	YES	2	2	NO	2
BHM53	MSQ - no loading	Roadside	407366	286791	NO2	YES	N/A	3	NO	2

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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)
BHM55	Moor Street corner of	Roadside	407357	286720	NO2	YES	N/A	3	NO	2
BHM56	New Meeting Street	Urban Centre	407377	286896	NO2	YES	N/A	23	NO	2
BHM57	Chantry Road	Roadside	407693	283370	NO2	YES	8	3	NO	2
BHM58	Carrs Lane High Street	Urban Centre	407255	286862	NO2	YES	N/A	5	NO	2
BHM59	Lower Bull Street corner of	Urban Centre	407274	286926	NO2	YES	N/A	3	NO	2
BHM61	St Phillips Church Yard	Urban Centre	406919	287037	NO2	YES	N/A	19	NO	2
BHM62	Snow Hill	Urban Centre	407033	287195	NO2	YES	N/A	22	NO	2
BHM63	Chapel Lane	Roadside	407510	287225	NO2	YES	N/A	2	NO	2
BHM64	Stephenson Street	Roadside	406973	286751	NO2	YES	N/A	2	NO	2
BHM65	Digbeth	Roadside	407448	286480	NO2	YES	3	1	NO	2
BHM66	Newtown middleway	Roadside	407421	288294	NO2	YES	N/A	3	NO	2
BHM67	New John Street West (1)	Roadside	407045	288318	NO2	YES	12	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	N/A	2	NO	2
BHM70	Ledsam Street	Roadside	405225	287000	NO2	YES	N/A	2	NO	2

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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)
BHM71	Rann close	Roadside	405300	286430	NO2	YES	14	4	NO	2
BHM72	Leyburn Road	Roadside	405285	286395	NO2	YES	N/A	2	NO	2
BHM74	Islington Row (2)	Roadside	406019	285934	NO2	YES	N/A	5	NO	2
BHM75	Lee Bank MW by School	Roadside	406355	285729	NO2	YES	18	2	NO	2
BHM76	Lee Bank MW opposite School	Roadside	406367	285665	NO2	YES	47	2	NO	2
BHM77	Lee Bank MW - St Lukes	Roadside	406936	285462	NO2	YES	N/A	2	NO	2
BHM78	Lee Bank MW - opposite St Lukes	Roadside	406912	285418	NO2	YES	11	2	NO	2
BHM79	Alexandra Road	Roadside	407373	285211	NO2	YES	21	4	NO	2
BHM80	Belgrave Middleway	Roadside	407386	285241	NO2	YES	N/A	4	NO	2
BHM81	Moseley Road	Roadside	408016	285304	NO2	YES	N/A	2	NO	2
BHM82	Highgate MW	Roadside	407979	285316	NO2	YES	15	3	NO	2
BHM83	Watery Lane (2)	Roadside	408559	286447	NO2	YES	0	2	NO	2
BHM84	Lawley Middleway (2)	Roadside	408169	287377	NO2	YES	3	2	NO	2
BHM85	Dartmouth MW (2)	Roadside	407808	288037	NO2	YES	N/A	2	NO	2
BHM86	Ronald McDonald House	Roadside	407172	287562	NO2	YES	8	2	NO	2

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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)
BHM87	St Chads (2)	Roadside	407164	287599	NO2	YES	N/A	2	NO	2
BHM88	Great Charles Street (3)	Roadside	406797	287315	NO2	YES	N/A	2	NO	2
BHM89	Great Charles Street (4)	Roadside	406581	287097	NO2	YES	N/A	2	NO	2
BHM90	Lionel Street	Roadside	406716	287411	NO2	YES	N/A	2	NO	2
BHM91	Adderley Street	Roadside	409496	287938	NO2	YES	34	5	NO	2
BHM92	Bristol Street (2)	Roadside	406882	285924	NO2	YES	N/A	3	NO	2
BHM93	New John Street (2)	Urban Centre	407052	288283	NO2	YES	N/A	2	NO	2
BHM99	Pershore Road (Dogpool Hotel)	Roadside	405671	281935	NO2	YES	1.3	1.3	NO	2.5

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.3 – Annual Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
BAU1	411649	282207	Urban Background	Automatic	99	99	18	21	19	18	19
BAU2	408588	286470	Roadside	Automatic	87	87	-	43	37	32	32
BAF1	405653	287053	Urban Background	Automatic	-	-	-	-	-	-	-
BCA 1	406974	287101	Roadside	Automatic	82	82	-	-	-	38	35
BCA 2	407107	287577	Kerbside	Automatic	95	95	-	-	-	41	**51**
BCA 3	406744	286540	Roadside	Automatic	48	79	-	-	-	36	**43**
BCA 4	414574	296724	Urban Background	Automatic	44	81	16	16	16	7	19
BCA 5	404545	283020	Roadside	Automatic	54	100	29	25	30	30	28
BCA 6	408820	284591	Roadside	Automatic	89	89	33	37	34	35	36
BCA 7	407435	286891	Roadside	Automatic	-	-	45	50	53	55	-
BHM1	411211	282756	Urban Background	Diffusion Tube	100%	100%	17	15	18	-	15
BHM2	404082	282128	Urban Background	Diffusion Tube	100%	100%	17	17	18	-	14
BHM3	407386	282131	Roadside	Diffusion Tube	83%	83%	38	39	43	-	29
BHM4	407401	282032	Roadside	Diffusion Tube	67%	67%	36	41	38	-	33
BHM5	409108	284158	Roadside	Diffusion Tube	83%	83%	36	41	43	42	34
BHM6	409144	284053	Roadside	Diffusion Tube	83%	83%	38	56	62	-	39

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
BHM7	406113	286633	Roadside	Diffusion Tube	100%	100%	45	49	47	34	31
BHM8	406036	286489	Roadside	Diffusion Tube	100%	100%	41	48	45	47	35
BHM9	408618	291351	Roadside	Diffusion Tube	100%	100%	40	40	45	-	32
BHM10	408818	284591	Roadside	Diffusion Tube	92%	92%	33	37	35	33	32
BHM11	408818	284591	Roadside	Diffusion Tube	100%	100%	34	36	38	-	31
BHM12	408818	284591	Roadside	Diffusion Tube	100%	100%	33	37	38	33	32
BHM16	407321	287531	Roadside	Diffusion Tube	75%	75%	55	54	61	49	**41**
BHM17	410010	289995	Roadside	Diffusion Tube	83%	83%	43	48	50	39	34
BHM18	410072	289999	Roadside	Diffusion Tube	100%	100%	44	47	49	41	35
BHM19	404739	279701	Roadside	Diffusion Tube	100%	100%	-	48	52	-	38
BHM20	404448	282890	Roadside	Diffusion Tube	75%	75%	35	39	36	-	30
BHM21	408197	287394	Roadside	Diffusion Tube	92%	92%	-	62	68	-	**49**
BHM23	406743	286541	Roadside	Diffusion Tube	100%	100%	-	52	55	-	**40**
BHM24	406621	287108	Roadside	Diffusion Tube	100%	100%	-	49	50	42	38
BHM25	408586	286455	Roadside	Diffusion Tube	83%	83%	-	49	47	48	38

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
BHM26	405648	287041	Urban Background	Diffusion Tube	92%	92%	-	25	28	-	23
BHM27	407833	288046	Roadside	Diffusion Tube	92%	92%	-	48	43	47	35
BHM28	406762	287329	Roadside	Diffusion Tube	100%	100%	-	-	-	-	**45**
BHM29	406584	286723	Roadside	Diffusion Tube	50%	50%	-	55	60	-	**43**
BHM30	407967	287151	Roadside	Diffusion Tube	100%	100%	-	46	47	39	34
BHM31	406564	286688	Roadside	Diffusion Tube	75%	75%	-	52	52	-	35
BHM33	406701	286512	Roadside	Diffusion Tube	92%	92%	-	-	-	-	36
BHM34	407114	286906	Urban Centre	Diffusion Tube	92%	92%	30	32	32	30	26
BHM35	407177	286996	Urban Centre	Diffusion Tube	100%	100%	-	36	36	33	28
BHM36	407205	287065	Roadside	Diffusion Tube	92%	92%	46	47	45	39	32
BHM37	405383	285315	Roadside	Diffusion Tube	83%	83%	-	34	34	-	26
BHM39	407259	287110	Roadside	Diffusion Tube	33%	33%	-	-	-	-	37
BHM40	407407	287092	Roadside	Diffusion Tube	100%	100%	49	55	72	65	**47**
BHM41	407399	287078	Roadside	Diffusion Tube	92%	92%	59	45	72	65	**50**
BHM42	407548	287107	Roadside	Diffusion Tube	100%	100%	42	46	50	52	**40**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
BHM43	407611	287110	Roadside	Diffusion Tube	100%	100%	59	47	49	-	**40**
BHM44	407628	287121	Roadside	Diffusion Tube	92%	92%	-	48	53	46	39
BHM45	407582	287020	Roadside	Diffusion Tube	92%	92%	-	47	51	-	36
BHM46	407547	287047	Roadside	Diffusion Tube	100%	100%	-	67	63	61	**50**
BHM50	407433	286922	Roadside	Diffusion Tube	100%	100%	-	60	66	55	**45**
BHM51	406921	285937	Roadside	Diffusion Tube	92%	92%	-	53	46	39	35
BHM53	407355	286769	Roadside	Diffusion Tube	92%	92%	-	55	-	62	**50**
BHM55	407348	286722	Roadside	Diffusion Tube	83%	83%	61	65	70	60	**52**
BHM56	407377	286896	Urban Centre	Diffusion Tube	100%	100%	41	48	47	49	33
BHM57	407687	283370	Roadside	Diffusion Tube	75%	75%	-	30	33	30	28
BHM58	407255	286862	Urban Centre	Diffusion Tube	75%	75%	-	45	51	50	37
BHM59	407278	286931	Urban Centre	Diffusion Tube	92%	92%	-	-	-	48	37
BHM61	406919	287037	Urban Centre	Diffusion Tube	100%	100%	-	46	36	36	30
BHM62	407033	287196	Urban Centre	Diffusion Tube	100%	100%	39	38	39	40	33
BHM63	407509	287226	Roadside	Diffusion Tube	92%	92%	40	43	34	-	28

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
BHM64	406973	286751	Roadside	Diffusion Tube	83%	83%	36	36	50	-	34
BHM65	407446	286478	Roadside	Diffusion Tube	100%	100%	-	51	52	48	37
BHM66	407452	288296	Roadside	Diffusion Tube	100%	100%	-	-	-	-	33
BHM67	407056	288318	Roadside	Diffusion Tube	92%	92%	-	56	40	39	32
BHM68	405781	288131	Roadside	Diffusion Tube	83%	83%	-	-	44	40	32
BHM69	405806	288116	Roadside	Diffusion Tube	100%	100%	-	-	43	48	38
BHM70	405221	287000	Roadside	Diffusion Tube	92%	92%	-	-	29	29	25
BHM71	405300	286430	Roadside	Diffusion Tube	100%	100%	-	-	31	31	25
BHM72	405285	286395	Roadside	Diffusion Tube	83%	83%	-	-	26	27	23
BHM74	406014	285936	Roadside	Diffusion Tube	100%	100%	-	-	66	63	**53**
BHM75	406355	285729	Roadside	Diffusion Tube	100%	100%	-	-	47	42	34
BHM76	406354	285676	Roadside	Diffusion Tube	100%	100%	-	-	31	33	25
BHM77	406936	285461	Roadside	Diffusion Tube	100%	100%	-	-	41	46	31
BHM78	406912	285418	Roadside	Diffusion Tube	83%	83%	-	-	43	-	32
BHM79	407373	285211	Roadside	Diffusion Tube	100%	100%	-	-	37	44	28

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2015	2016	2017	2018	2019
BHM80	407385	285240	Roadside	Diffusion Tube	100%	100%	-	-	41	37	36
BHM81	408014	285305	Roadside	Diffusion Tube	92%	92%	-	-	49	46	**41**
BHM82	407981	285315	Roadside	Diffusion Tube	75%	75%	-	-	39	44	29
BHM83	408558	286452	Roadside	Diffusion Tube	100%	100%	-	-	73	-	**61**
BHM84	408171	287377	Roadside	Diffusion Tube	92%	92%	-	-	67	-	38
BHM85	407802	288047	Roadside	Diffusion Tube	100%	100%	-	-	61	60	**48**
BHM86	407163	287561	Roadside	Diffusion Tube	92%	92%	-	-	46	46	34
BHM87	407162	287601	Roadside	Diffusion Tube	100%	100%	-	-	78	74	**60**
BHM88	406799	287314	Roadside	Diffusion Tube	100%	100%	-	-	62	-	**58**
BHM89	406594	287117	Roadside	Diffusion Tube	100%	100%	-	-	56	-	39
BHM90	406626	287304	Roadside	Diffusion Tube	100%	100%	-	-	35	34	27
BHM91	409496	287938	Roadside	Diffusion Tube	83%	83%	-	-	44	-	27
BHM92	406883	285916	Roadside	Diffusion Tube	100%	100%	-	-	-	50	**40**
BHM93	407052	288283	Urban Centre	Diffusion Tube	67%	67%	-	-	50	52	**41**
BHM99	405671	281935	Roadside	Diffusion Tube	83%	83%	-	-	-	-	**40**

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

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

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance adjustment**

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) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

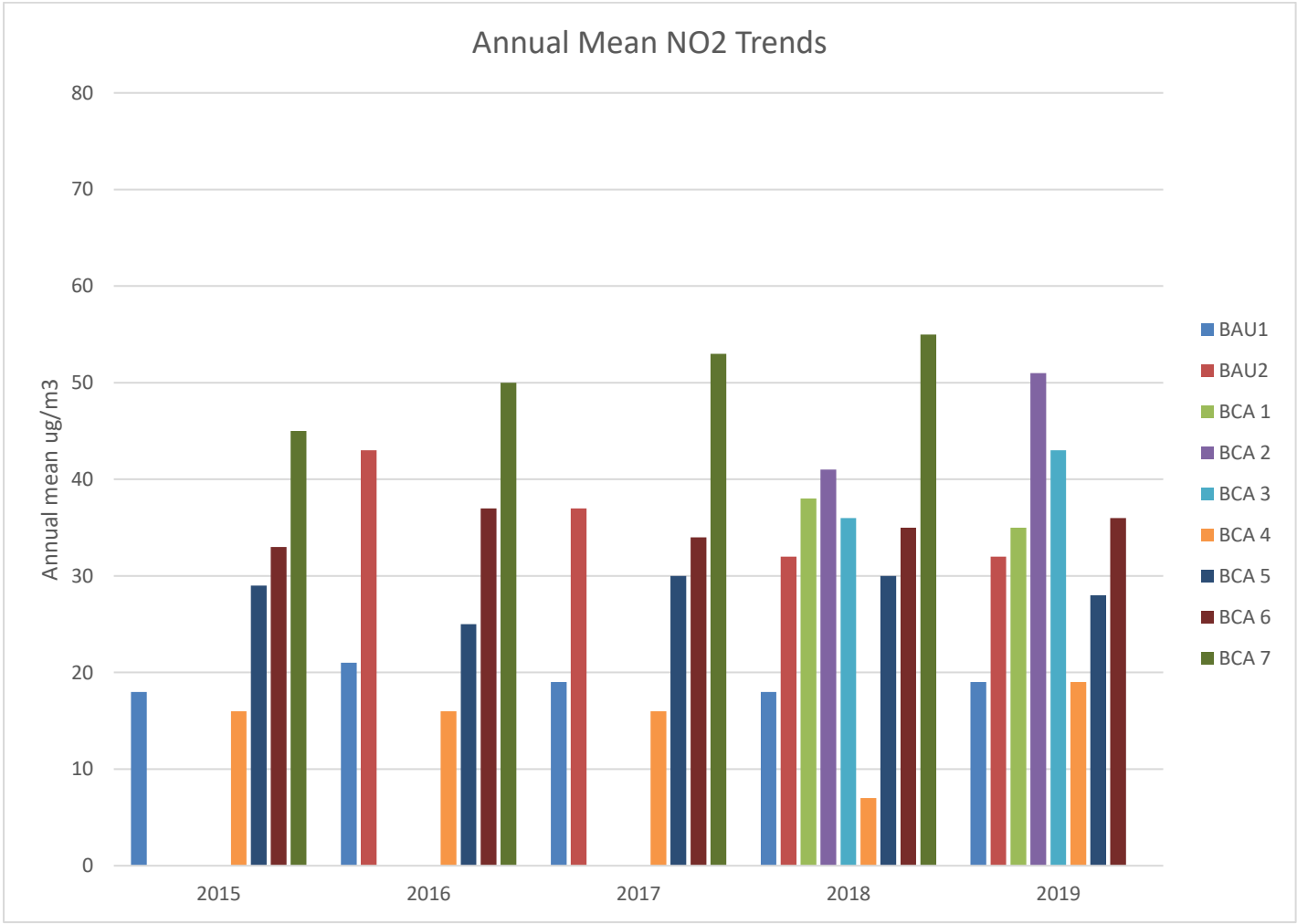


Figure A.2.1. – Trends in Annual Mean NO_2 Concentrations

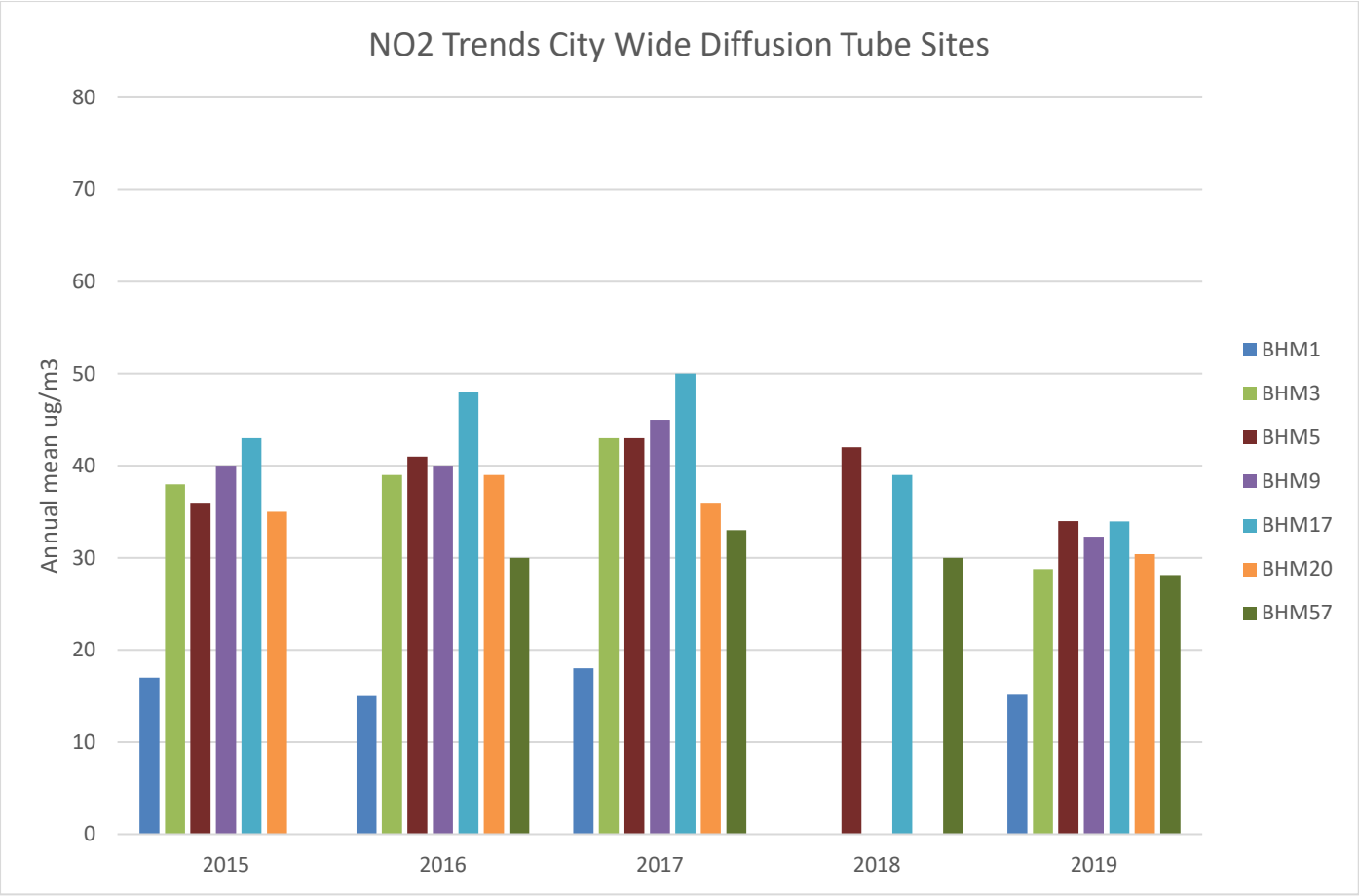


Figure A.2.2. – Trends in Annual Mean NO_2 Concentrations

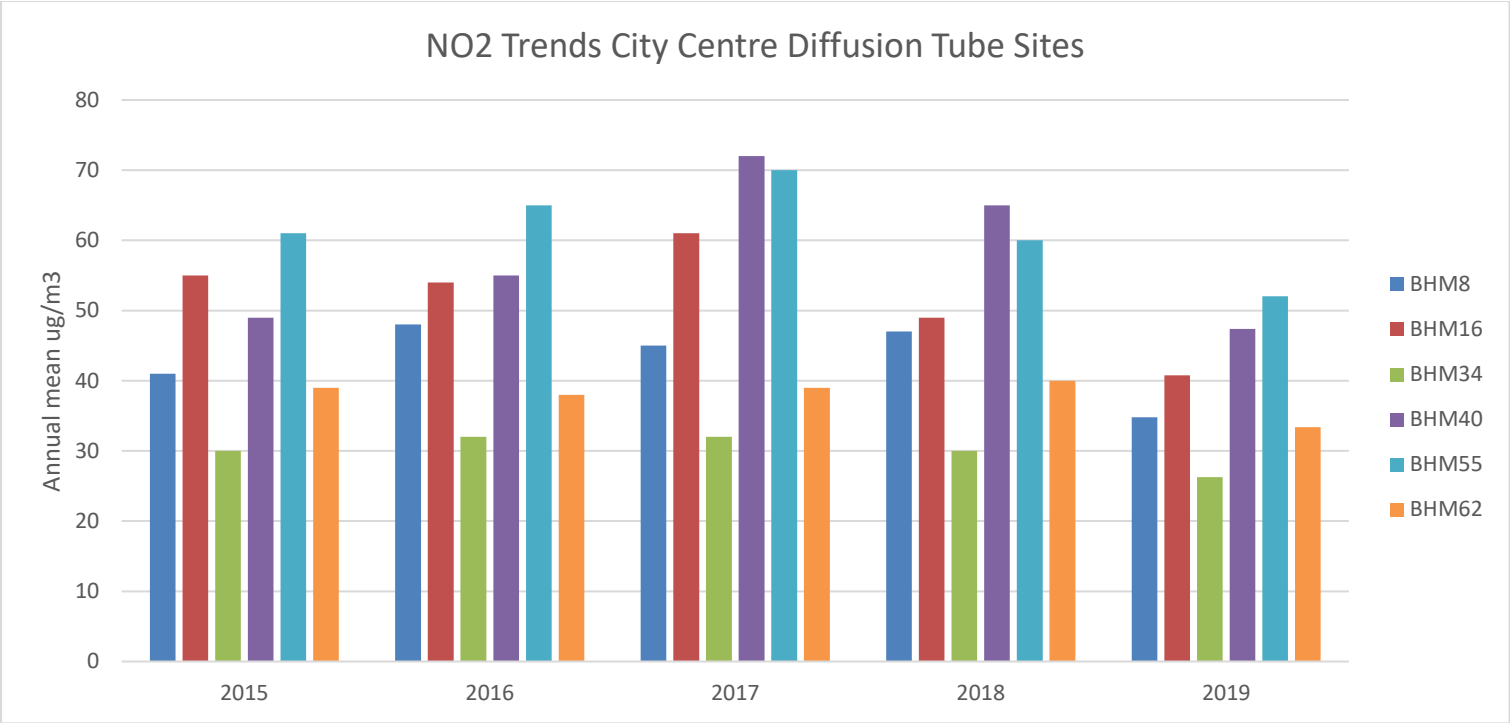


Figure A.2.3. – Trends in Annual Mean NO_2 Concentrations

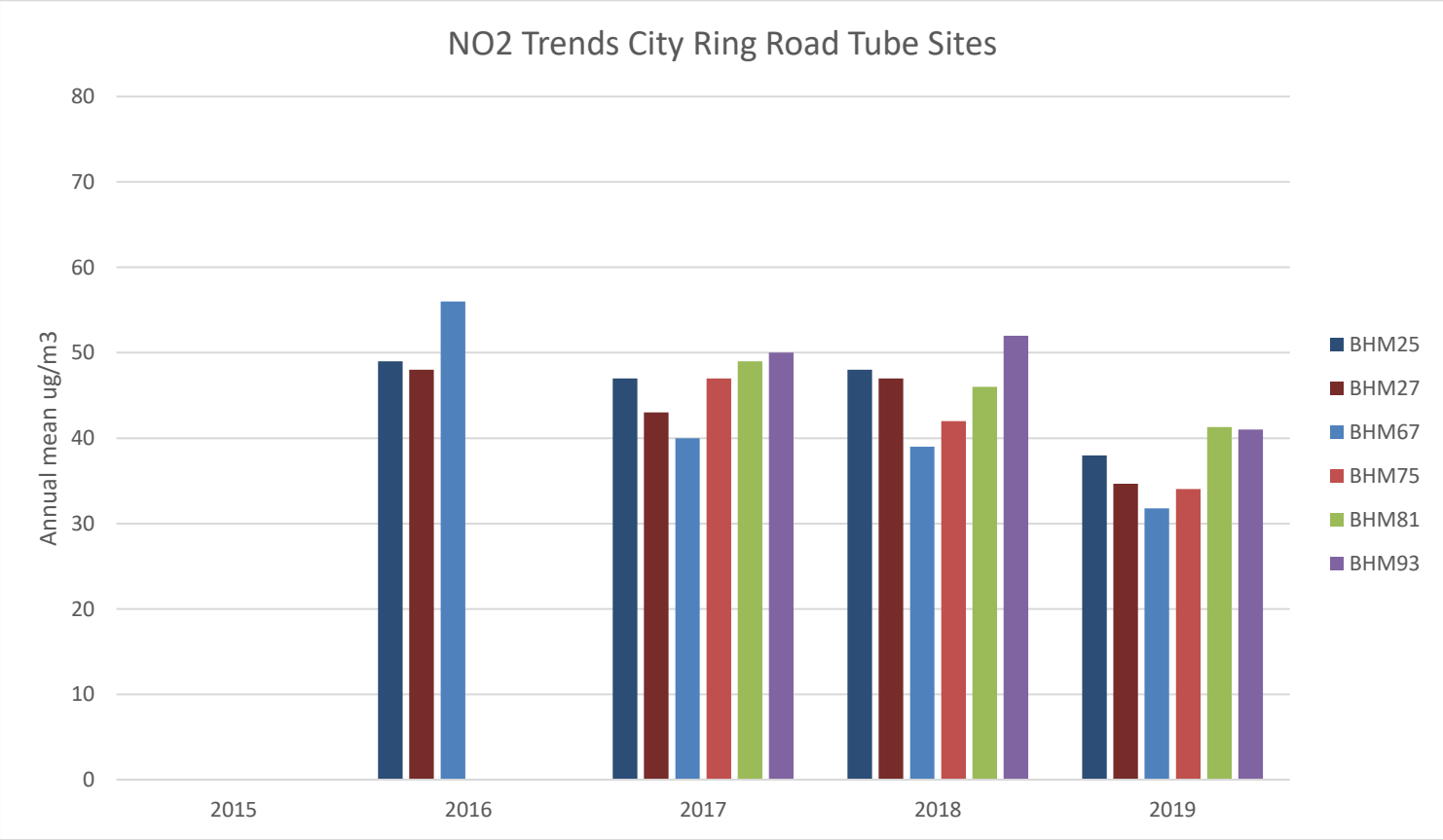


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 1-Hour Means > 200µg/m³ (3)				
							2015	2016	2017	2018	2019
BAU1	411649	282207	Urban Background	Automatic	99	99	0	0	0	0	0
BAU2	408588	286470	Roadside	Automatic	87	87	0	0	0	0	0
BAF1	405653	287053	Urban Background	Automatic	-	-	-	-	-	-	-
BCA 1	406974	287101	Roadside	Automatic	82	82	0	0	0	0	0
BCA 2	407107	287577	Kerbside	Automatic	95	95	0	0	0	0	0
BCA 3	406744	286540	Roadside	Automatic	48	79	0	0	0	0	0
BCA 4	414574	296724	Urban Background	Automatic	44	81	0	0	0	0	0
BCA 5	404545	283020	Roadside	Automatic	54	100	0	0	0	0	0
BCA 6	408820	284591	Roadside	Automatic	89	89	0	0	0	0	0
BCA 7	407435	286891	Roadside	Automatic	-	-	0	0	0	0	-

Notes:

Exceedances of the NO_2 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold.**

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

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

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

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
						2015	2016	2017	2018	2019
BAU1	411649	282207	Urban Background	Automatic	63	-	-	-	-	11
BAU2	408588	286470	Roadside	Automatic	99	-	14	15	18	15
BAF1	405653	287053	Urban Background	Automatic	92	-	-	-	16	15

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

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.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} 24-Hour Means > 50µg/m³ (3)				
						2015	2016	2017	2018	2019
BAU1	411649	282207	Urban Background	Automatic	63	-	-	-	-	0
BAU2	408588	286470	Roadside	Automatic	99		0	0	0	0
BAF1	405653	287053	Urban Background	Automatic	92	-	-	-	-	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.7 – $PM_{2.5}$ Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
						2015	2016	2017	2018	2019
BAU1	411649	282207	Urban Background	Automatic	93	12	10	11	11	9
BAU2	408588	286470	Roadside	Automatic	99	-	17	11	12	10
BAF1	405653	287053	Urban Background	Automatic	97	-	-	-	10	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.8 – SO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for monitoring Period (%) [1]	Valid Data Capture 2019 (%) [2]	Number of Exceedances 2019 (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 2019

Table B.1 - NO_2 Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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 (0.8) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
BHM1	411211	282756	25.3	23.0	18.1	19.1	15.5	15.2	14.9	11.9	16.6	19.6	28.5	19.7	18.9	15.1	15.1
BHM2	404082	282128	28.5	17.6	16.5	21.0	14.3	15.1	12.4	9.6	17.9	18.3	27.1	17.9	18.0	14.4	14.4
BHM3	407386	282131	52.26	35.06	35.42	32.44	-	34.81	-	35.1	13.6	38.99	43.36	38.83	36.0	28.8	28.8
BHM4	407401	282032	-	-	-	-	32.63	31.52	26.23	30.93	38.03	42.79	47.57	46.99	41.0	32.8	32.8
BHM5	409108	284158	47.81	41.13	36.22	53.24	43.51	-	42.91	30.55	35.88	42.15	51.66	-	42.5	34.0	30.7
BHM6	409144	284053	62.11	48	52.99	39.48	43.28	44.45	53.71	48.79	46.05	51.63	-	-	49.0	39.2	33.1
BHM7	406113	286633	50.22	42.09	35.42	38.61	34.02	35.11	32.85	30.53	28.76	45.56	52.48	39.41	38.8	31.0	-
BHM8	406036	286489	60.75	54.59	49.53	42.52	44.84	36.73	27.16	29.07	40.15	50.78	43.87	41.86	43.5	34.8	-
BHM9	408618	291351	55.59	50.19	37.14	29.6	27.86	33.11	36.14	44.55	41.12	40.38	40.28	48.46	40.4	32.3	32.3
BHM10	408818	284591	56.97	41.57	34.29	45.98	32.57	36.95	32.16	-	34.91	42	48.41	32.77	39.9	31.9	-
BHM11	408818	284591	53.75	45.32	34.81	44.26	32.37	34.78	26.35	28.8	33.09	44.24	50.62	39.23	39.0	31.2	-
BHM12	408818	284591	53.33	38.82	36.07	38.95	33.49	35.72	33.44	30.51	37.33	40.81	53.27	41.15	39.4	31.5	-
BHM16	407321	287531	-	-	56.76	50.24	-	45.32	50.88	49.99	40.84	56.33	53.06	55.31	51.0	40.8	40.8
BHM17	410010	289995	53.14	52.28	42.28	41.87	28.78	34.6	39.16	42.24	-	46.72	-	43.34	42.4	34.0	33.9

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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 (0.8) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
BHM18	410072	289999	63.73	53.65	51.54	39.39	35.2	37.72	38.23	37.74	32.25	45.05	47.7	47.83	44.2	35.3	34.9
BHM19	404739	279701	53.59	53.92	41.43	49.56	43.48	46.3	49.86	42.11	44.21	51.36	51.15	45.35	47.7	38.2	29.9
BHM20	404448	282890	-	45.47	36.86	50.63	33.57	-	-	27.99	30.43	38.78	43.46	34.85	38.0	30.4	
BHM21	408197	287394	86.74	68.44	65.48	53.99	55.83	53.21	62.36	49.81	51.1	62.68	57.52	-	60.7	48.5	39.9
BHM23	406743	286541	53.35	44.86	35.86	44.79	51.97	49.69	51.5	44.24	46.4	55.72	63.42	51.98	49.5	39.6	39.6
BHM24	406621	287108	64.07	52.8	46.75	48.69	38.52	41.96	39.28	37.11	42.31	51.41	58.14	45.64	47.2	37.8	-
BHM25	408586	286455	62.78	58.63	50.64	38.81	47.18	43.16	48.02	-	-	50.83	50.24	24.23	47.5	38.0	-
BHM26	405648	287041	36.26	31.35	21.43	27.96	20.37	21.35	-	15.77	23.55	24.01	35.74	56.79	28.6	22.9	-
BHM27	407833	288046	57.63	58.95	42.39	43.01	39.06	40.46	37.81	-	39.56	47.91	48.19	21.6	43.3	34.7	33.7
BHM28	406762	287329	67.88	62.41	59.16	53.36	39.97	51.89	51.66	50.78	50.83	53.37	59.62	68.83	55.8	44.7	-
BHM29	406584	286723	-	-	35.9	60.01	55.85	53.9	49.34	49.52	-	-	-	-	54.0	43.2	-
BHM30	407967	287151	56.13	56.95	42.5	38.04	34.05	36.01	35.22	36.23	39.13	43.43	51.23	46.99	43.0	34.4	-
BHM31	406564	286688	-	-	29.38	68.42	40.16	50.05	41.72	-	42.03	48.25	34.79	40.3	43.9	35.1	-
BHM33	406701	286512	69.31	63.01	53.86	53.66	37.72	-	33.94	32.44	30.5	41.82	47.31	33.09	45.2	36.1	-
BHM34	407114	286906	42.74	43.11	28.51	34.35	27.02	29.65	24.01	-	23.22	29.45	41.3	37.93	32.8	26.3	-
BHM35	407177	286996	44.9	43.7	25.7	41.25	32.44	30.46	29.07	25.07	30.65	39.31	44.74	36.67	35.3	28.3	-
BHM36	407205	287065	49.78	48.05	38.06	40.78	-	35.6	34.72	30.88	34.23	41.7	45.28	40.15	39.9	31.9	-
BHM37	405383	285315	41.2	36.41	28.1	40.35	-	-	25.77	24.07	27.21	34.56	43.61	27.21	32.8	26.3	-
BHM39	407259	287110	55.13	-	46.74	-	-	-	-	35.42	-	-	-	38.92	46.0	36.8	-

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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 (0.8) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
BHM40	407407	287092	94.86	66.93	68.54	53.46	52.79	53.24	46.71	48.08	48.31	61.12	63.31	53.42	59.2	47.4	-
BHM41	407399	287078	83.08	79.65	71.54	65.35	52.66	59.29	47.39	58.28	49.91	-	55.45	70.43	63.0	50.4	-
BHM42	407548	287107	61.09	63.4	52.68	48.07	42.34	42.96	40.03	42.18	43.18	51.99	57.23	51.1	49.7	39.8	36.9
BHM43	407611	287110	63.21	66.9	43.77	42.64	42.47	41.66	40.42	39.67	44.31	53.07	67.06	47.81	49.4	39.5	37.9
BHM44	407628	287121	70.79	54.59	48.87	-	43.45	40.29	35.89	36.3	41.42	44.95	65.68	53.77	48.7	39.0	36.8
BHM45	407582	287020	-	54.68	50.26	41.57	43.05	41.58	41.47	38.42	39.95	41.71	48.57	47.08	44.4	35.5	-
BHM46	407547	287047	83.32	64.06	66.67	52.7	59.3	57.08	59.7	54.283	61.06	64.38	79.5	48.66	62.6	50.0	43.2
BHM50	407433	286922	70.72	73.17	58.68	56.09	41.95	45.37	51.95	45.33	48.48	56.5	62.64	58.91	55.8	44.7	-
BHM51	406921	285937	47.67	-	39.71	61.96	39.88	43.85	36.16	33.57	37.62	45.17	53.9	47.21	44.2	35.4	33.2
BHM53	407355	286769	72.5	73.03	66.58	60.5	48.63	56.28	54.07	70.83	50.84	-	65.25	68.61	62.5	50.0	-
BHM55	407348	286722	70.83	78.73	-	74.81	58.93	62.68	60.5	57.51	54.63	-	69.35	62.65	65.1	52.0	-
BHM56	407377	286896	45.54	59.02	40.45	47.57	38.04	37.03	32.04	32.96	36.93	37.42	53.26	39.78	41.7	33.3	-
BHM57	407687	283370	-	38.66	25.42	38.76	-	27.09	23.98	-	28.48	60.46	41.91	31.89	35.2	28.1	24.0
BHM58	407255	286862	55.59	56.1	40.42	-	-	-	35.85	32.15	38.54	45.72	61.81	45.85	45.8	36.6	-
BHM59	407278	286931	62.8	52.9	44.76	52.37	38.44	37.49	38.35	34.55	42.81	45.72	61.07	-	46.5	37.2	-
BHM61	406919	287037	57.48	49.21	37.2	37.73	23.55	31.02	27.57	25.46	31.1	38.73	46.94	40.23	37.2	29.7	-
BHM62	407033	287196	57.48	47.56	42.83	47.32	37.49	35.26	34.85	30.18	37.02	36.05	52.6	42.27	41.7	33.4	-
BHM63	407509	287226	44.49	46.88	33.16	34.91	28.12	27.83	25.91	26.87	31.55	-	51.54	39.81	35.6	28.4	-
BHM64	406973	286751	-	-	45.49	47.14	32.37	41.3	33.98	39.32	39.2	41.12	48.4	52.18	42.1	33.6	-

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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 (0.8) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
BHM65	407446	286478	55.2	48.73	48.46	62.24	45.81	41.12	39.48	30.72	39.06	48.78	58.1	37.15	46.2	37.0	33.8
BHM66	407452	288296	48.41	42.04	39.66	46.3	33.66	38.66	33.71	34.31	41.51	46.02	50.54	43.28	41.5	33.2	-
BHM67	407056	288318	48.6	-	38.47	45.02	33.53	37.81	34.21	30.72	37.65	40.53	53.43	36.86	39.7	31.8	31.2
BHM68	405781	288131	50.77	-	42.16	47.49	27.63	37.86	-	33.43	34.19	42.16	51.01	38	40.5	32.4	28.9
BHM69	405806	288116	55.64	41.5	52.52	57.1	44.73	49.52	40.98	33.37	44.8	46.49	57.81	40.23	47.1	37.6	-
BHM70	405221	287000	37.55	36.41	30.2	33.67	25.32	26.31	24.27	-	28.1	33.69	41.69	32.26	31.8	25.4	-
BHM71	405300	286430	40.58	38.54	32.05	32.59	24.89	29	23.7	23.47	28.91	34.98	39.44	33.24	31.8	25.4	-
BHM72	405285	286395	35.63	31.14	25.09	33.37	-	-	21.8	17.5	25.91	31.98	40.4	22.8	28.6	22.8	-
BHM74	406014	285936	67.74	68.09	69.7	84.65	60.4	69.89	55.38	48.03	78.59	62.9	70.2	53.1	65.7	52.6	-
BHM75	406355	285729	55.78	54.94	46.6	40.79	36.84	42.09	35.62	28.9	43.26	41.77	50.53	33.48	42.6	34.0	-
BHM76	406354	285676	35.03	28.12	29.37	42.7	25.68	31.37	24.26	20.14	30.8	31.19	43.05	30.3	31.0	24.8	-
BHM77	406936	285461	44.93	48.59	39.56	33.98	29.63	34.95	31.06	32.35	35	42.64	48.31	38.37	38.3	30.6	-
BHM78	406912	285418	45.26	-	42.54	38.2	30.76	-	31.99	32.21	37.01	42.14	51.56	44.42	39.6	31.7	29.9
BHM79	407373	285211	54.93	29.52	35.06	48.86	30.33	33.88	28.33	19.42	31.28	30.3	47.89	25.36	34.6	27.7	-
BHM80	407385	285240	45.24	61.59	45.4	43.33	36.51	39.96	41.31	38.87	44.86	38.97	55.88	41.05	44.4	35.5	-
BHM81	408014	285305	62	51.3	56.49	58.92	-	51.22	48.47	44.02	55.91	46.83	63.23	29.24	51.6	41.3	-
BHM82	407981	285315	44.93	-	33.68	-	-	24.37	27.11	26.06	34.77	36.06	51.51	43.06	35.7	28.6	-
BHM83	408558	286452	83.98	89.51	76.45	73.32	61.85	76.43	68.36	64.51	80.92	81.72	86.24	72.34	76.3	61.0	61.0
BHM84	408171	287377	58.03	64.22	47.89	60.61	36.21	44.75	36.86	29.65	45.28	43.83	58.82	-	47.8	38.3	36.3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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 (0.8) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
BHM85	407802	288047	62.44	86.98	54.43	69.65	46.22	57.38	49.23	48	59.84	57.71	59.69	68.87	60.0	48.0	-
BHM86	407163	287561	44.44	-	46.8	56.46	32.21	35.49	33.09	31.97	43.33	44.04	56.83	39.28	42.2	33.7	-
BHM87	407162	287601	74.3	83.82	86.17	73.52	61.39	67.9	70.7	64.56	82.86	71.13	87.65	70.38	74.5	59.6	-
BHM88	406799	287314	61.83	95.97	71.55	101.34	52.19	75.96	56.43	64.61	63.37	75.65	77.32	75.42	72.6	58.1	-
BHM89	406594	287117	61.24	68.02	51.05	47.25	32.96	43.63	39.17	38.12	47.22	48.99	66.19	46.86	49.2	39.4	-
BHM90	406626	287304	46.3	42.85	35.81	41.35	25.23	30.26	23.9	25.12	26.54	34.11	46.64	29.72	34.0	27.2	-
BHM91	409496	287938	-	41.97	37.26	31.58	26.12	28.52	-	28.93	32.8	34.01	49.59	28.52	33.9	27.1	-
BHM92	406883	285916	70.69	57.6	52.85	50.91	40.88	48.92	43.34	28.97	51.13	53.29	66.44	38.38	50.3	40.2	-
BHM93	407052	288283	68.09	-	-	-	40.8	50.93	44.34	-	46.66	49.54	60.27	40.56	51.0	40.8	-
BHM99	405671	281935	68.9	61.01	46.9	50.09	41.47	47.15	-	-	43.28	43.54	54.02	44.01	50.0	40.0	39.0

☒ **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 in the final column**

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.

Environmental Protection officers assessed 2925 planning applications in 2019.

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.

Annualisation

Data capture rates from automatic monitoring sites was improved compared to 2018. However at some sites this was still less than 75%. This was due to a delay in appointing a new contractor for the serving and maintenance contract and teething problems when implementing a new data capture method. Data capture rates were much better in the period from June to December when these issues were resolved, and at all sites was in excess of 90% at all sites.

Where data capture for automatic monitoring sites was less than 75% then annualisation of the results was performed in accordance with Box 7.9 of TG(16). Data was obtained from UK-Air for the Acocks Green, Leamington Spa, Coventry Allesley, and Walsall Woodlands AURN background monitoring sites which are all located within 50 km of Birmingham. Details of the calculations are appended.

Where data capture from non- automatic monitoring sites was less than 75% then annualisation was performed in accordance with Box 7.10 of TG(16). Data was obtained from UK-Air for the Acocks Green AURN background monitoring site and the annualisation factors calculated against this site. Details of the calculations are appended.

Bias adjustment

In 2019 a co-location study was undertaken by locating triplicate tubes alongside the inlet at the Stratford Road automatic monitoring station. The bias and accuracy of the tubes was assessed using the spreadsheet tool available from the LAQM website (https://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html).

The bias and accuracy of the study was judged as being good overall. The output from the Bias and Accuracy spreadsheet is appended. A local bias adjustment factor of 0.8 was derived. This factor was used to adjust the annualised diffusion tube results in preference to the national bias adjustment factor (0.93). Having regard to the guidance in TG(16) it is considered appropriate to use the local bias adjustment factor.

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 Ladywood, 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 We Care For Air. All analysers were serviced and calibrated on a 6 monthly basis.

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 – November 2019

Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (January 2018 – November 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 AR0024, 25, 27, 28, 30, 31, 33 and 34

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 AR024**	**AIR PT AR025**	**AIR PT AR027**	**AIR PT AR028**	**AIR PT AR030**	**AIR PT AR031**	**AIR PT AR033**	**AIR PT AR034**
Round conducted in the period	January – February 2018	April – May 2018	July – August 2018	September – October 2018	January – February 2019	April – May 2019	July – August 2019	September – November 2019
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	75 %	100 %	100 %	100 %
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 %	NR [2]	100 %	25 %
SOCOTEC	100 % [1]	100 % [1]	100 % [1]	100 % [1]	87.5 % [1]	100 % [1]	100 % [1]	100 % [1]
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	100 %	100 %	50 %	100 %	100 %	100 %	100 %	50 %
Gradko International [1]	100 % [1]	100 %	100 %	100 %	75 %	100 %	100 %	100 %
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]	NR [2]	25 %	50 %	100 %	50 %	100 %
Milton Keynes Council	100 %	75 %	100 %	100 %	100 %	100 %	50 %	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 %	100 %	100 %	100 %	100 %	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	100 %	100 %	100 %	100 %	75 %
Staffordshire County Council	50 %	100 %	100 %	100 %	100 %	75 %	75 %	75 %
Tayside Scientific Services (formerly Dundee CC)	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]
West Yorkshire Analytical Services	50 %	75 %	100 %	100 %	100 %	100 %	100 %	50 %

[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.

Selly Oak Annualisation

Site	Annual mean 2019	Period Mean	Ratio
		18/06/19 to 31/12/19	
Acocks Green	18	16.8	1.1
Coventry Allesley	20	19.2	1.0
Walsall Woodlands	16	15.1	1.1
Leamington spa	18	16.5	1.1
Average Ra			**1.1**
Selly Oak Annualised mean = 25.84x1.1 =		**28.4**	

New Hall AQMS Annualisation

Site	Annual mean 2019	Period Mean 1	Ratio 1	Period Mean 2	Ratio 2
		18/06/19 to 07/08/20		13/9/20 to 31/12/20	
Acocks Green	18	11.6	1.5	20.7	0.9
Coventry Allesley	20	13.3	1.5	25.8	0.8
Walsall Woodlands	16	9.3	1.7	19.7	0.8
Leamington spa	18	9.9	1.8	20.9	0.9
Average Ra			**1.6**		**0.8**
New Hall Annualised mean = 16.03 x 1.2 =		**19.24**			

Lower Severn Street Annualisation

Site	Annual mean 2019	Period Mean 1	Ratio 1	Period Mean 2	Ratio 2
		01/06/19 to 07/08/20		18/9/20 to 31/12/20	
Acocks Green	18	11.3	1.6	20.8	0.9
Coventry Allesley	20	13.3	1.5	23.8	0.8
Walsall Woodlands	16	10.5	1.5	20.0	0.8
Leamington spa	18	10.1	1.8	21.0	0.9
Average Ra			**1.6**		**0.8**
New Hall Annualised mean = 35.55 x 1.2 =		**42.66**			

Diffusion Tube Annualisation

	B1	D1	B1 When D1 is available
	Acocks Green	BHM4	
Jan	41.1	-	
Feb	36.8	-	
Mar	30.7	-	
April	41.2	-	
May	35.2	32.63	35.2
June	26.9	31.52	26.9
July	25.3	26.23	25.3
Aug	21.9	30.93	21.9
Sept	29.9	38.03	29.9
Oct	30.8	42.79	30.8
Nov	35.8	47.57	35.8
Dec	29.2	46.99	29.2
	32.1	**37.1**	**29.4**
Annualisation Factor	**1.1**		
Annualised Mean	**40.5**		

	B1	D1	B1 When D1 is available
	Acocks Green	BHM29	
Jan	41.1	-	
Feb	36.8	-	
Mar	30.7	35.9	30.7
April	41.2	60.01	41.2
May	35.2	55.85	35.2
June	26.9	53.9	26.9
July	25.3	49.34	25.3
Aug	21.9	49.52	21.9
Sept	29.9	-	
Oct	30.8	-	
Nov	35.8	-	
Dec	29.2	-	
	32.1	**50.8**	**30.2**
Annualisation Factor	**1.1**		
Annualised Mean	**53.9**		

	B1	D1	B1 When D1 is available
	Acocks Green	BHM39	
Jan	41.1	55.13	41.1
Feb	36.8	-	-
Mar	30.7	46.74	30.7
April	41.2	-	-
May	35.2	-	-
June	26.9	-	-
July	25.3	-	-
Aug	21.9	35.42	21.9
Sept	29.9	-	-
Oct	30.8	-	-
Nov	35.8	-	-
Dec	29.2	38.92	29.2
	32.1	**44.1**	**30.7**
Annualisation Factor	**1.0**		
Annualised Mean	**46.0**		

	B1	D1	B1 When D1 is available
	Acocks Green	BHM93	
Jan	41.1	68.09	41.1
Feb	36.8	-	-
Mar	30.7	-	-
April	41.2	-	-
May	35.2	40.8	35.2
June	26.9	50.93	26.9
July	25.3	44.34	25.3
Aug	21.9	-	-
Sept	29.9	46.66	29.9
Oct	30.8	49.54	30.8
Nov	35.8	60.27	35.8
Dec	29.2	40.56	29.2
	32.1	**50.1**	**31.8**
Annualisation Factor	**1.0**		
Annualised Mean	**50.6**		

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	08/01/2019	06/02/2019	57.0	53.8	53.3	55	2.0	4	4.9	41.1	100	Good	Good
2	06/02/2019	11/03/2019	41.6	45.3	38.8	42	3.3	8	8.1	36.8	100	Good	Good
3	11/03/2019	08/04/2019	34.3	34.8	36.1	35	0.9	3	2.3	30.7	99.9	Good	Good
4	08/04/2019	30/04/2019	46.0	44.3	39.0	43	3.7	9	9.1	41.2	100	Good	Good
5	30/04/2019	13/06/2019	32.6	32.4	33.5	33	0.6	2	1.5	35	35.5	Good	or Data Capture
6	13/06/2019	03/07/2019	37.0	34.8	35.7	36	1.1	3	2.7	27	54.6	Good	or Data Capture
7	03/07/2019	06/08/2019	32.2	26.4	33.4	31	3.8	12	9.4	25	100	Good	Good
8	06/08/2019	03/09/2019		28.8	30.5	30	1.2	4	10.9	22	100	Good	Good
9	03/09/2019	07/10/2019	34.9	33.1	37.3	35	2.1	6	5.3	30	100	Good	Good
10	07/10/2019	05/11/2019	42.0	44.2	40.8	42	1.7	4	4.3	31	100	Good	Good
11	05/11/2019	03/12/2019	48.4	50.6	53.3	51	2.4	5	6.0	35.8	93.8	Good	Good
12	03/12/2019	06/01/2020	32.8	39.2	41.2	38	4.4	12	10.9	29.2	100	Good	Good
13													
												Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey -->

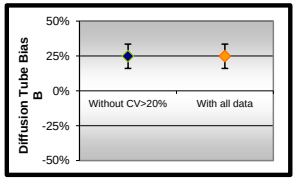
Site Name/ ID:	Stratford Road

Precision	12 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 10 periods of data	
Bias factor A	0.8 (0.75 - 0.87)
Bias B	24% (16% - 33%)
Diffusion Tubes Mean:	**40 µgm^{-3}**
Mean CV (**Precision**):	**7**
Automatic Mean:	**32 µgm^{-3}**
Data Capture for periods used:	**99%**
Adjusted Tubes Mean:	**32 (30 - 35) µgm^{-3}**

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 10 periods of data	
Bias factor A	0.8 (0.75 - 0.87)
Bias B	24% (16% - 33%)
Diffusion Tubes Mean:	**40 µgm^{-3}**
Mean CV (**Precision**):	**7**
Automatic Mean:	**32 µgm^{-3}**
Data Capture for periods used:	**99%**
Adjusted Tubes Mean:	**32 (30 - 35) µgm^{-3}**



Jaume Targa, for AEA
Version 04 - February 2011

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	
BHM5	0.9	4.8	23.9	34.0	30.7	
BHM6	0.9	6.8	23.9	39.2	33.1	
BHM17	2.4	9.2	33.8	34.0	33.9	
BHM18	3.9	10.1	33.8	35.3	34.9	
BHM19	0.7	8.9	20.9	38.2	29.9	
BHM21	0.7	7.0	28.7	48.5	*39.9*	Predicted concentration at Receptor within 10% the AQS objective.
BHM27	1.3	3.9	30.3	34.7	33.7	
BHM42	2.8	10.3	31.0	39.8	*36.9*	Predicted concentration at Receptor within 10% the AQS objective.
BHM43	3.8	7.4	31.0	39.5	*37.9*	Predicted concentration at Receptor within 10% the AQS objective.
BHM44	4.3	13.0	31.0	39.5	*36.8*	Predicted concentration at Receptor within 10% the AQS objective.
BHM46	0.9	5.5	31.0	50.0	**43.2**	Predicted concentration at Receptor above AQS objective.
BHM51	2.0	4.2	22.6	35.4	33.2	
BHM57	1.0	9.9	19.2	28.1	24.0	
BHM65	0.9	5.6	28.0	37.0	33.8	
BHM67	4.1	18.6	30.3	31.8	31.2	
BHM68	2.2	9.9	22.7	32.4	28.9	

BHM78	2.0	5.5	22.6	31.7	29.9	
BHM84	1.9	4.7	28.6	38.3	*36.3*	Predicted concentration at Receptor within 10% the AQS objective.
BHM89	3.6	7.5	29.4	27.2		Error: Measured concentration must be above background concentration.
BHM99	1.9	2.3	17.5	40.0	*39.0*	Predicted concentration at Receptor within 10% the AQS objective.

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 micrograms 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