Bromsgrove District Council
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Worcestershire Regulatory Services
Supporting and protecting you

2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June 2022

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Executive Summary: Air Quality in Our Area

Air Quality in Bromsgrove District Council

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

Worcestershire Regulatory Services (WRS) is a shared service formed from the Environmental Health and Licensing departments of the six Worcestershire District Councils. Responsibility for managing (monitoring and reporting of) local air quality transferred from the partnership councils to WRS in April 2011.

There are currently three Air Quality Management Areas (AQMA's) within the Bromsgrove District declared for exceedances of the annual average mean objective for nitrogen dioxide (NO_2). The Kidderminster Road, Hagley AQMA was revoked in 2018 following a detailed review which identified no significant exceedances of the national objectives in over five years with measured concentrations being well below the objective.

The existing AQMAs are as follows:

- Lickey End, Bromsgrove AQMA declared 26th July 2001
- Redditch Road, Bromsgrove AMQA declared 17th February 2010
- Worcester Road, Bromsgrove AQMA declared 24th October 2011

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1 Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

2 Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

3 Defra. Air quality appraisal: damage cost guidance, July 2021

4 Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

Details of declaration and plans of the AQMAs can be found on the following pages of the WRS website: [Air Quality Management Area Declarations | Worcestershire Regulatory Services (worcsregservices.gov.uk)]

Monitoring data from 2021 does not represent a standard year with the continued issues surrounding the Covid Pandemic and lockdowns early in the year and then sudden recovery in traffic levels. The recovery in nitrogen dioxide can be seen in all locations compared to previous years.

In 2021 the highest concentrations of NO_2 recorded across the monitoring network was at the HAG5 location with a value of 32.7µg/m^3. No exceedances of the annual mean objective were recorded.

Concentrations within all AQMAs were below the objective in 2021. The highest concentration recorded within the Worcester Road AQMA was 32.3µg/m^3 at diffusion tube WR, 25.5µg/m^3 within the Redditch Road AQMA at diffusion tube 19, and 31.5µg/m^3 at in the Lickey End AQMA at diffusion tube LE4.

No exceedances were recorded within the revoked Kidderminster Road, Hagley AQMA with highest concentrations of 21.4µg/m^3 recorded at RES2 and 21.5µg/m^3 at diffusion tube '9' within the former boundary area. Following revocation of the AQMA four new monitoring locations were established in May 2018 further to the south along Worcester Road, West Hagley.

Following annualisation of 2018 data a concentration of 47µg/m^3 was recorded at one of the new locations HAG3 however there was a level of uncertainty associated with the result as it was based upon only 7 months data. The 2019 data provided a full calendar years' worth of data with a value of 33.7µg/m^3 recorded at HAG3. Two new monitoring locations**,** HAG5 and HAG6, were established in the vicinity of HAG3 for the 2020 period to provide additional certainty to air quality concentrations in the area. In 2021, NO_2 concentrations recorded at HAG5 and HAG6 were 32.7µg/m^3 and 20.6µg/m^3 respectively, as such concentrations have remained below the objective.

Three new locations were also established along the Stourbridge Road for the start of 2020 in an area that hadn't been monitored for a number of years. These are SBR1 (lamppost outside 61 Stourbridge Road, Bromsgrove), SBR2 (lamppost outside Sainsbury Local, 189 Stourbridge Road) and SBR3 (lamppost outside 285 Stourbridge Road, near to the M42 underpass). Concentrations recorded were 26.6µg/m^3 at SBR1, 20.5µg/m^3 at SBR2, and 27.8µg/m^3 at SBR3 during the 2021 period.

Monitoring data from longstanding diffusion tube monitoring location within the Bromsgrove District (BDC) area demonstrate a general downward trend in concentrations over the 5-year period 2017 – 2021. Although a trend of a slight increase can be observed in general across the borough from 2020 to 2021. This is likely to have been caused by the increase in traffic following the easing of 'lockdowns' in 2020 caused by the COVID-19 pandemic.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

In 2013, WRS produced a countywide Air Quality Action Plan (AQAP) for Worcestershire which was adopted on 13th November 2013. WRS have produced two updates to the countywide AQAP, the latest in September 2016. For details of all measures previously completed, in progress or planned, please refer to the 'Air Quality Action Plan Progress Report for Worcestershire April 2015-2016'. A copy of this, the previous update and the AQAP is available to download from the WRS website via:

Worcestershire Air Quality Action Plan (worcsregservices.gov.uk)

In 2014, WRS set up the Worcestershire Air Quality Steering Group and subsequent sub-groups to facilitate progressing implementation of prioritised actions identified in the AQAP. The Bromsgrove Urban (Steering) Sub-Group includes the Lickey End, Redditch Road, and Worcester Road AQMAs. A separate sub-group covered the Kidderminster

5 Defra. Clean Air Strategy, 2019

6 DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Road, Hagley AQMA. The sub-groups comprise representatives of WRS, Worcestershire County Council, and local County and district Councillors.

Many of the prioritised actions contained within the AQAP relate to specific highways improvements or junction enhancements. Worcestershire County Council (WCC) has previously advised that none of these actions would be implemented in isolation but may be considered as part of wider schemes. A number of proposals for major highway development packages are set out in Local Transport Plan 4 (LTP4) relating to the Bromsgrove area.

WCC's LTP4 details the following schemes in relation to the Bromsgrove District highway improvements:

Bromsgrove Route Enhancement Programme (BREP) Major Scheme

The Bromsgrove Route Enhancement Programme (BREP) is currently estimated to have a value of approximately £50 million. The scheme aims to support the sustainable growth of Bromsgrove by enhancing the A38 corridor from Lydiate Ash to Hanbury Turn and includes a series of junction/island enhancements where delay and congestion is currently experienced, and where conditions are predicted to deteriorate further without intervention.

Worcestershire County Council held public information sessions in early 2020 and work to progress the outline business case continues for submission to the DfT in Autumn 2020, under the auspices of Midlands Connect. The early scheme delivery is complete, the outline business case was submitted to the DfT in autumn 2021. Progressing with the full business case to be submitted in autumn 2022.

There are three phases of improvement works in different stages of progress:-

- Phase 1 schemes are now fully open (schemes i,ii and iii)
- Phase 2 schemes are now fully open (schemes 2a, 2b and 4)
- Phase 3 is currently in development and will be brought forward for delivery once funding has been secured (schemes A, B, C, D E, F, 1,3,5 and 6)

It is expected that improvements to the A38 corridor in Bromsgrove will reduce congestion and increase journey time reliability. Proposals include a package of active travel measures to improve opportunities for walking and cycling and reduce the severance the A38 causes in the town. This also links to the NPIF active travel network already delivered.

Further details can be found on Worcestershire County Council's website via the following link: - A38 Bromsgrove Route Enhancement Programme (BREP) | Worcestershire County Council

Lickey End (M42 Junction 1) - Major Junction Enhancement Scheme

Lickey End (M42, Junction 1) is widely recognised as operating in excess of built capacity and so is now heavily congested at peak times. The junction is the focus for an Air Quality Management Area and offers a challenging environment for non-motorised users. This scheme was included as part of Phase 1 of BREP and provides preliminary highway improvements to enhance capacity at the Junction. This scheme is now complete - an early delivery scheme for the A38 BREP. More can be found via the following link – Phase 1_A38 improvements. This scheme is expected to result in improved traffic flow on the roundabout.

Bromsgrove Transport Strategy

This scheme is part of the Strategic Transport Assessment (STA) work which will identify infrastructure and services to support planned development growth. This is part of a collaborative process between Worcestershire County Council and Bromsgrove District Council.

The scheme aims to provide a package of Public Realm Enhancements in Bromsgrove Town Centre and would be integrated with other schemes in the area (such as BREP/A38 and the Strategic Active Travel Investment Programme). The scheme is to provide a comprehensive multimodal review of network efficiency and infrastructure to identify where to focus investment to improve the operation of the local transport network. This would also include a review of Bromsgrove's highway network to explore options to improve and disperse traffic flow to increase efficiency and AQMA remediation at Worcester Road.

Bromsgrove – Strategic Active Travel Network Investment Programme (Including Catshill, Marlbrook and Lickey End)

The Active Travel Investment Programme is a systemic investment in walking and cycling links across the Bromsgrove area to create a safe, comprehensive, integrated network linking residential areas with key trip attractors, including schools, rail stations, town centres and employment locations. This includes surfacing, signage, lighting, and public realm improvements to create an attractive and coherent network.

It is understood that the scheme has been completed. A full list of updates can be accessed via the following link: - National Productivity Investment Fund

Electric Vehicle Infrastructure Strategy

The Bromsgrove Ultra Low-Emission Vehicles Strategy has been produced by officers of Bromsgrove District Council in 2019 as a framework for the development and growth of ULEV infrastructure and uptake within the district. The strategy can be viewed via:- Bromsgrove-District-Council-Ultra-Low-Emissions-Vehicles-Strategy

However, the Worcestershire wide commission on issues and options for low emissions vehicles is still in progress.

Ultra-Low Emission Taxi Infrastructure Scheme - In 2018 Bromsgrove District Council officers made a bid for funds to help deliver infrastructure to support existing taxi drivers using electrical vehicles and encourage further uptake. The bid was approved in early 2019. The scheme aims to provide a number of electric vehicle charging points for taxis and private hire vehicles equating to a total of £300,000. A ULEV Strategy for the Bromsgrove District was produced in 2019 to provide a framework for implementation of this project.

In 2020 Bromsgrove District Council appointed a company to install and operate 13 rapid chargers across the District for the next 10 years. The chargers will use 100% renewable energy purchased from UK sources

The ULEV taxi scheme now have seen the installation of 9 rapid chargers with a 10th that will be installed imminently. There are 3 more to locate and discussions are ongoing with landlords to find suitable sites for these.

To date:

- Over 122,500 kWh of renewable electricity has been dispensed by these chargers
- 96Tonnes of carbon has been saved as a result of the chargers
- In total there have been 6,825 individual charging sessions of which just over 1,100 of these were by BDC registered taxis
- BDC now have 3 registered EV taxis operating in the district

Additional actions to improve air quality following the 2021 ASR include requiring Travel Planning for all new housing developments (including car sharing) and developing the Air Quality Supplementary Planning Document (SPD). These actions are ongoing.

Conclusions and Priorities

Currently three AQMAs are in place within the Bromsgrove District area. The available data indicates that there were no exceedances of the annual mean objective at any monitoring locations across the district during 2021. The highest concentrations of NO_2 recorded was a value of 32.7µg/m^3.

In general monitoring indicated an increase from 2020 to 2021, however this was expected due to the impact of Covid-19 and subsequent lockdowns on air quality in 2020. The general trend of a period 2017-2021, made by comparing average concentrations from 2017-2020 and the 2021 average concentration where suitable datasets allow, still indicates a general trend of decreasing concentrations of NO_2.

Monitoring, review and assessment of air quality will continue within the Bromsgrove District area at all existing and former AQMAs and other relevant areas. No changes to existing AQMAs are proposed at this stage.

Local Engagement and How to get Involved

There are several ways members of the public can help to improve local air quality:

- **Walk or cycle, leave your car at home:** Leaving your car at home and walking or cycling instead will benefit in three ways - increased exercise, reduced pollution exposure and will reduce individual's pollution emissions.
- WCC have launched a car sharing website, **LiftShare**, to help people find others journeying to the same destinations to share journeys and costs, and reduce traffic and emissions. Visit this link for more information: Worcestershire Liftshare community - part of the Liftshare network
- **Turn off your engine when stationary or parked,** do not 'idle', particularly outside sensitive receptors such as schools, hospitals, care homes and residential properties.
- General **travel planning** advice is available on WCC's website (including walking, cycling and bus maps and timetables) and Government website: smarter-choices-main-report-about-changing-the-way-we-travel
- **Hold meetings by Conference Call** by phone or Skype rather than driving to meetings. This reduces fuel and other travel costs, vehicle maintenance and hire cost, increases productivity through reduction in hours lost through unnecessary travel.

- Facilitate **Flexible Working Arrangements** for non-front-line staff to work remotely from home or nearer home facilities for one or more days a week thus removing or reducing any journey to work. This reduces congestion which has beneficial impacts for delivery times, reduced business costs and thus economic benefits. Additionally, provides social benefits through improved work life balance for employees, reduces local air quality and reduced emergency vehicle response times.
- **Switch Fleet to Low Emission Vehicles**: The government is providing £80m funding to encourage installation of EV charging points. Eligible businesses, charities, and public sector organisations with off street parking for staff or vehicles fleets can apply for vouchers to redeem costs of electric vehicle charge-points. There is a limit of 1 voucher per applicant; however, applicants with a 'franchise' may apply for up to 20 franchisees. There is an approved charge points list and a list of authorised installers. Government-grants-for-low-emission-vehicles_workplace-charging-scheme
- If you must drive follow fuel efficient driving advice, often known as 'Smarter Driving Tips', to save on fuel and reduce your emissions. Several websites promote such advice including:
    - Save money and emissions through ecodriving - Energy Saving Trust
    - How to drive economically - Eco-driving tips | AA (theaa.com)
    - Fuel Consumption & CO2 Databases | Vehicle Certification Agency (vehiclecertification-agency.gov.uk)
- **Reduce air pollution from open fires and wood-burning stoves.** Advice is available from Defra on choosing the right stove, using the right fuels and maintenance enabling householders to reduce their impact on their health and air quality from open fires and wood burning stoves. Further information is available on the smoke-control-areas page on WRS website.

Air pollution can affect all of us over our lifetime however certain groups will be more sensitive to the effects of air pollution. Vulnerable groups include adults and children with lung or heart conditions Bromsgrove District Council such as asthma, chronic bronchitis, emphysema and chronic obstructive lung disease (COPD)[7,8]. Senior citizens are more likely to be affected by respiratory diseases and children are more likely to be affected by air pollution due to relatively higher breathing and metabolic rates as well as a developing lung and immune system.

Vulnerable individuals and groups can keep informed of:

- Current levels and forecasts of air pollution from Defra at Pollution forecast - Defra, UK
- If you are sensitive to the effects of air pollution, it may be appropriate to limit the length of time spent in areas of local poor air quality – see advice from Defra at Daily Air Quality Index - Defra, UK
- If you are on social media, sign up to the WRS Twitter feed @RegServs. WRS tweet when pollution is forecast by Defra to be moderate to very high.

Further information for the general public on reducing your family's exposure to poor air quality in Worcestershire and how individuals, business and schools can assist with reducing their impact on local air quality can currently be found at protecting-me-and-others-from-air-pollution on WRS website.

Local Responsibilities and Commitment

This ASR was prepared by Ricardo PLC for Worcestershire Regulatory Services on behalf of Bromsgrove District Council with the support and agreement of the following officers and departments:

Stephen Williams / Neil Kirby – Land and Air Quality Team, Technical Services, Worcestershire Regulatory Services

Worcestershire County Council Highways Department

Worcester City Council

This ASR has been approved by Worcestershire Regulatory Services. This ASR has not been signed off by a Director of Public Health. If you have any comments on this ASR please send them to:

The Land and Air Quality Team, Worcestershire Regulatory Services, Wyre Forest House

Finepoint Way, Kidderminster, Worcestershire, DY11 7WF

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Email - wrsenquiries@worcsregservices.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in Bromsgrove District Council during 2021. 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 Bromsgrove District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in **Error! Reference source not found.**.

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 should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Bromsgrove District Council can be found in Table 2.1. The table presents a description of the 3 AQMA that are currently designated within Bromsgrove District Council. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Lickey End, Bromsgrove AQMA	26th July 2001	NO_2 Annual Mean	Residential properties along four roads emanating from the Junction 1 M42	YES	45.7 µg/m^3	31.5 µg/m^3	Air Quality Action Plan for Worcestershire 2013	Air Quality Action Plan for Worcestershire (2013) http://www.worcsregservices.gov.uk/pollution/air-quality/air-quality-action-plan.aspx
Redditch Road, Bromsgrove AQMA	17th February 2010	NO_2 Annual Mean	Long stretch of the A38 including a number of residential properties	YES	45.6 µg/m^3	25.5 µg/m^3	Air Quality Action Plan for Worcestershire 2013	Air Quality Action Plan for Worcestershire (2013) http://www.worcsregservices.gov.uk/pollution/air-quality/air-quality-action-plan.aspx
Worcester Road, Bromsgrove AQMA	24th October 2011	NO_2 Annual Mean	Comprises mainly the B4091 Worcester Road single carriageway southwest of the town centre	NO	56 µg/m^3	32.3 µg/m^3	Air Quality Action Plan for Worcestershire 2013	Air Quality Action Plan for Worcestershire (2013) http://www.worcsregservices.gov.uk/pollution/air-quality/air-quality-action-plan.aspx

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

☒ **Bromsgrove District Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Bromsgrove District Council

Defra's appraisal of last year's ASR concluded:

"The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports.

1. Good QA/QC procedures were applied for all passive monitoring sites. Calculations for bias adjustment and annualisation factors were outlined in detail. **However, before the report should be published, they should ensure that results for Site ID 255 is omitted as this site had very low data capture required for annualisation below the 33% threshold for the year.**
2. No distance-correction was required for any of the sites.
3. All comments from the previous ASR appraisal have been mentioned and addressed. This is welcomed, and we encourage this to continue in future ASRs.
4. However, the need for an updated AQAP was mentioned in last years' ASR appraisal, and this has not yet been adopted. The Council is encouraged to adopt a revised AQAP in the next reporting year.
5. Regarding the Public Health Outcomes Frameworks was missing in the previous ASR and this was rectified in the current report. The Council have referred specifically to indicator D01, which is the fraction of mortality attributable to particulate air pollution, and this is encouraged.
6. Council have provided a clear map of the diffusion tube monitoring network
7. Trends are shown in the report and a thorough discussion is provided for each AQMA; this is welcomed.
8. COVID-19 impacts have been discussed in Appendix F, and we welcome the detailed information provided by the council surrounding impacts of the pandemic on air quality in the district.
9. Overall, the report is detailed, concise and satisfies the criteria of relevant standards. The Council should continue their good and thorough work."

Bromsgrove District Council has taken forward most of the recommendations made by Defra but are yet to publish an AQAP following last year's ASR. Exceedances of the annual mean objective in the AQMAs were last observed in 2019 and air quality levels are

yet to return to the pre-covid levels. Bromsgrove District Council will continue to review future monitoring data to ascertain whether the AQMAs are still required and whether there is still a need for an AQAP.

Bromsgrove District Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 36 measures are included within Table 2.2, with the type of measure and the progress Bromsgrove District Council have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective Action Plans. Key completed measures are:

Bromsgrove Route Enhancement Programme (BREP) Major Scheme

The early scheme delivery is complete, the outline business case was submitted to the DfT in autumn 2021. Progressing with the full business case to be submitted in autumn 2022. Ful details of the A38 BREP can be found at: - https://www.worcestershire.gov.uk/a38improvements

The full business case aims to make improvements to A38 corridor in Bromsgrove to reduce congestion and increase journey time reliability. Proposals include a package of active travel measures to improve opportunities for walking and cycling and reduce the severance the A38 causes in the town. This also links to the NPIF active travel network already delivered.

Further details can be found on Worcestershire County Council's website via the following link: - https://www.worcestershire.gov.uk/info/20679/a38_bromsgrove_improvements/2163/bomsgrove_route_enhancement_programme

Lickey End (M42 Junction 1) - Major Junction Enhancement Scheme

Complete, an early delivery scheme for the A38 BREP. More can be found via the following link - https://www.worcestershire.gov.uk/info/20679/a38_bromsgrove_improvements/2162/phase_1_a38_improvements

Action is expected to result in improved traffic flow on the roundabout.

Bromsgrove Transport Strategy

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Bromsgrove – Strategic Active Travel Network Investment Programme (Including Catshill, Marlbrook and Lickey End)

National Productivity Fund active travel network to facilitate working and cycling through a network of active travel routes through the town to provide an alternative to vehicular modes, reducing congestion and increasing physical activity. Delivery complete. Details of this can be found at: https://www.worcestershire.gov.uk/info/20055/strategies_plans_and_bids/1417/national_productivity_investment_fund

A full list of updates can be accessed via the following link: -

https://www.worcestershire.gov.uk/news/article/1817/bromsgrove_walking_and_cycling_scheme_latest_updates

Electric Vehicle Infrastructure Strategy – The Bromsgrove Ultra Low-Emission Vehicles Strategy has been produced by officers of Bromsgrove District Council in 2019 as a framework for the development and growth of ULEV infrastructure and uptake within the district. The strategy can be viewed via:- https://www.bromsgrove.gov.uk/media/4929912/Bromsgrove-District-Council-Ultra-Low-Emissions-Vehicles-Strategy.pdf

Worcestershire wide commission on issues and options for low emissions vehicles in progress.

Ultra-Low Emission Taxi Infrastructure Scheme –

In 2018 Bromsgrove District Council officers made a bid for funds to help deliver infrastructure to support existing taxi drivers using electrical vehicles and encourage further uptake. The bid was approved in early 2019. The scheme is aiming to provide a number of electric vehicle charging points for taxis and private hire vehicles equating to a total of £300,000. A ULEV Strategy for the Bromsgrove District was produced in 2019 to provide a framework for implementation of this project.

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To date:

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- In total there have been 6,825 individual charging sessions of which just over 1,100 of these were by BDC registered taxis
- BDC now have 3 registered EV taxis operating in the district

All Electric Bus Town Scheme –
Worcestershire County Council submitted an Expression of Interest to the DfT All Electric Bus Town process (Phase 1) in June 2020. The bid is primarily to cover Bromsgrove but with ‘synergies’ with Redditch and the wider Worcestershire area. The bid was unsuccessful.

Delivery of demand responsive transport (DRT) for the train station –

A public transport link from Bromsgrove to the train station, providing connectivity from all of the town to the station was developed. This measure was delivered. More information can be found via this link - https://www.worcestershire.gov.uk/worcestershireondemand

Other actions that have either been completed or are ongoing are as follows: -

Freight Quality Partnership - On-going work with satellite navigation companies to route HGVs around AQMAs.

Installing electric vehicle charging points - Recommendations for the installation of EV Charging Points are routinely recommended by WRS to the planning authorities for planning applications meeting relevant criteria.

Greening Council and Business Fleets - Worcestershire County Council Local Transport Plan (LTP4) was formally adopted in November 2017 and incorporates policy on alterative fuels and associated infrastructure:

http://www.worcestershire.gov.uk/downloads/file/9024/worcestershire_s_local_transport_plan_ltp_2018_-_2030

Travel Planning - Travel planning is a requirement for all new housing developments. This work will be commissioned for Perryfields and Whitford Road development once development commences, and formed part of the permission for Norton Farm and the Stoke Prior developments. Personalised travel planning program planned as part of wider health improvement drives from the County Council who have developed a “one-stop-shop” online travel portal:

http://www.worcestershire.gov.uk/info/20007/travel_and_roads

Car Sharing - A Liftshare scheme is currently in operation for Worcestershire

https://liftshare.com/uk/community/worcestershire

Air Quality Supplementary Planning Document (SPD) - WRS officers drafted the SPD in 2017 and updated it in 2018 and 2020. The document includes guidance on requirements for air quality assessments, standard recommendations expected for air quality mitigation measures, and advice relating to good practice for new development. The document has been sent to the relevant planning authorities for consideration. Local planning authority (district council) leads on SPD's, the adoption of them links to local plan review timetables, however County Council and WRS are developing an air quality SPD with the intention that this is rolled out across the county.

The principal challenges and barriers to implementation that Bromsgrove District Council face are numerous. Some of these challenges relate to the specific site conditions at each AQMA. The Lickey End AQMA is located around the A38 where it meets Junction 1 of the M42. There are numerous properties within the vicinity of this major junction and arterial route. The Redditch Road AQMA relates to another stretch of the A38. The main measured exceedances of the objective have been recorded where properties are located very close to the carriageway. Exceedances were last recorded here in 2016 and were marginal. The area of the Worcester Road AQMA where regular exceedances of the

objectives occur is best described as a ‘street canyon’, consisting of narrow streets with continuous buildings on either side and is a major route for traffic in and out of Bromsgrove. On average approximately 16000 vehicles use this route every day during ‘normal’ circumstances. Although the Kidderminster Road, Hagley AQMA has been revoked the area remains a major arterial route where congestion is still a significant issue. Approximately 36000 vehicles travel daily along this route on average. Securing funding for improvement schemes is a key factor. Ensuring uptake of greener methods of transport and changes in behaviour are also difficult to achieve without incentives or a lack of alternative options being in place.

Large scale residential development is also proposed within the Bromsgrove District and wider area in future years. Consequently, solving the problem of poor air quality at problem locations within the district is proving to be difficult. Even without further development, and increasing numbers of vehicles, the current road network is already stretched with significant congestion.

Some priority actions relevant to the three Bromsgrove AQMAs highlighted within the original action plan relate to specific highway actions. Historically the County Council have stated that these actions would not be considered for progression in isolation but may be considered as part of one of the larger schemes set out in LTP4. Now that more detail of the LTP4 scheme is known it is unlikely that some of these actions will be considered further however numerous other carriageway improvements in these areas are proposed. It is anticipated that the Action Plan for the Bromsgrove District area will need to be updated in the future to reflect these changes and to consider other viable options. The original action plan for Worcestershire was drafted in 2013 and updated in 2016. Since this time changes have occurred locally and nationally.

The coronavirus pandemic and subsequent lockdowns has obviously had a positive impact on air quality concentrations with fewer journeys being undertaken and more people working from home. It also impacted the rollout of some of the prescribed measures such as installation of the EV taxi charge point scheme and various highways works . However, the delays are not considered to be overly significant in respect of timeframes and works on confirmed schemes have resumed. Concentrations of NO_2 were well below national objectives in 2020 but circumstances are not representative of previous or future years and therefore cannot be used for decision making in respect of existing AQMAs. Similarly this also explains that the general increase observed from 2020

to 2021 should also be considered carefully regarding decision making in respect of existing AQMAs.

Progress on the outlined measures has been slower than expected due to the impact of the coronavirus pandemic and the impact it had regarding the progression of various measures which have been developed slower or halted due to issues raised during national lockdowns and pandemic recovery.

Measures stated above and in Table 2.2 will help to contribute towards compliance, Bromsgrove District Council and enable the revocation of all the AQMAs.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
LICKEY END, BROMSGROVE AQMA PRIORITY ACTIONS															
BREP1	A38 Bromsgrove Route Enhancement Programme	Traffic Management	UTC, Congestion management, traffic reduction	2017	2025	WCC DFT	WLEP	NO	Partially Funded	> £50 million	Implementation	unknown	Improved traffic flow and less queuing	Phase 1 completed subject to landscaping / snagging. Phase 2 to commence Spring 2021 onwards. Phase 3 outline business case submitted Autumn 2021, Full Business Case to be submitted autumn 2022. Full details of the A38 BREP can be found at: HTTPs://www.worcestershire.gov.uk/a38improvements	Phase 1 of scheme complete and funding secured for Phase 2 commencing 2021 onwards. Remaining phases of scheme subject to securing funding.
5.1.1	Alteration to phasing of traffc light systems	Traffic Management	UTC, Congestion management, traffic reduction	2013	2025	WCC DFT	WLEP	NO	Partially Funded	> £10 million	Completed	unknown	Improved traffic flow in the area	Phase 1 of the A38 improvement scheme which specifically includes changes to the A38/M42 J1 (AQMA) has been completed subject to snagging / landscaping. Resulting in an improved traffic flow on the roundabout.	Phase 1 of scheme complete and funding secured for Phase 2 commencing 2021 onwards. Remaining phases of scheme subject to securing funding.
LE4	Narrowing of two lanes into one causes bottleneck at top of A38 south	Traffic Management	UTC, Congestion management, traffic reduction	2013	2025	WCC DFT	WLEP	NO	Not Funded	> £10 million	Planning	unknown	Improved traffic flow in the area	Not included as Phase 1 of the A38 scheme but Scheme F proposes revision of road markings and road widening to provide one lane northbound and two lanes southbound to remove bottleneck.	Later part of schemes subject to funding
LE6	Traffic exiting Barnsley Hall Road right - no right turn restriction.	Traffic Management	UTC, Congestion management, traffic reduction	2013		WCC		NO	Not Funded	£50k - £100k	Aborted	unknown	Improved traffic flow in the area	Not progressed. Not part of the A38 package of enhancements.	Not part of the A38 package of enhancements.
LE7	Turn right into Harvester PH from A38 south. Action no right turn restriction.	Traffic Management	UTC, Congestion management, traffic reduction	2013		WCC		NO	Not Funded	£50k - £100k	Aborted	unknown	Improved traffic flow in the area	Not progressed. Not part of the A38 package of enhancements.	Not part of the A38 package of enhancements.
REDDITCH ROAD, BROMSGROVE AQMA PRIORITY ACTIONS															
5.3.4	Promote Flexible Working arrangements	Promoting Travel Alternatives	Encourage / Facilitate homeworking	2013		WCC BDC	Various	NO	Not Funded	£50k - £100k	Implementation	unknown	Increase in number of people able to work from home	County Council have pushed for maximum coverage of fibre optic broadband. Ongoing - 96% coverage as of December 2019.	Reliant on uptake from private sector companies
5.1.1	Alteration to phasing of traffic light systems	Traffic Management	UTC, Congestion management, traffic reduction	2013	2030	DFT WCC	WLEP	NO	Not Funded	> £10 million	Planning	unknown	Improved traffic flow in the area	Improvements within the AQMA included within A38 enhancement package which includes 12 schemes along the A38 corridor.	Scheme B1 relates to AQMA. Subject to formal planning and funding.
RR7	Two in road bus stops on carriageway either side of central street canyon	Traffic Management	UTC, Congestion management, traffic reduction	2013	2030	DFT WCC	WLEP	NO	Not Funded	> £10 million	Planning	unknown	Improved traffic flow in the area	Improvements within the AQMA included within A38 enhancement package which includes 12 schemes along the A38 corridor.	Scheme B1 relates to AQMA. Subject to formal planning and funding.
5.3.4	Promote flexible working arrangements	Promoting Travel Alternatives	Encourage/facilitate home-working	2013		WCC BDC	Various	NO	Not Funded	£50k - £100k	Implementation	unknown	Increase in number of people able to work from home	County Council have pushed for maximum coverage of fibre optic broadband. Ongoing - 96% coverage as of December 2019.	Reliant on uptake from private sector companies

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
WORCESTER ROAD, BROMSGROVE AQMA PRIORITY ACTIONS															
5.2.2	Freight Quality Partnership	Traffic Management	UTC, Congestion management, traffic reduction	2013	2018	WCC	WCC	NO	Partially Funded	£50k - £100k	Completed	unknown	Fewer HGVs travelling through AQMA	On-going duty under Traffic Management	Can take time for information to filter down to users. HGVs may still need to travel through AQMAs on major arterial routes.
BR1	Bromsgrove Town Centre Network Review (Bromsgrove Transport Strategy)	Traffic Management	UTC, Congestion management, traffic reduction	2017	2025	WCC BDC	WCC	NO	Funded	> £10 million	Planning	unknown	Improved traffic flow through Bromsgrove town centre and improved journey times	This is now part of the Strategic Transport Assessment (STA) work which will identify infrastructure and services to support planned development growth; this is a collaborative process with WCC and BDC.	Subject to funding
5.3.8	Promote and support walking and cycling initiatives in Worcestershire	Traffic Management	Cycle network	2013	2021	WCC BDC	WCC DFT	NO	Not Funded	> £10 million	Completed	unknown	Increased uptake of alternative modes of transport	The Active Travel Investment Programme is a systemic investment in walking and cycling links across the Bromsgrove area to create a safe, comprehensive, integrated network linking residential areas with key trip attractors, including schools, rail stations, town centre's and employment locations	Scheme now complete, but the additional provision alongside the A38 will complement and enhance the network especially the links across the town to the east and west.
WR3	Zebra crossing at Hanover Street/Worcester Road junction causes congestion	Traffic Management	UTC, Congestion management, traffic reduction	2013	2022	WCC BDC	WCC BDC	NO	Partially Funded	£100k - £500k	Implementation	unknown	Improved traffic flow in the area	Proposals for crossing to be upgraded to Puffin / Toucan crossing as part of improvements to walking and cycling.	
WR9	Local school traffic causes congestion exiting Shrubbery Road – requires junction review	Traffic Management	UTC, Congestion management, traffic reduction	2013	2030	WCC	WCC BDC	NO	Not Funded	£50k - £100k	Planning	unknown	Improved traffic flow in the area	County Council have included package of improvements within LTP4. WCC has commissioned a Strategic Transport Assessment (STA) to support the BDC local plan process and ultimately identify infrastructure schemes to support local plan growth.	Cost of scheme reliant on successful funding bids.
GENERIC ACTIONS APPLICABLE TO ALL AQMAS															
ULEVTIS	Ultra Low Emission Taxi Infrastructure Scheme	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2019	2021	BDC	ULEV taxi infrastructure grant	NO	Funded	£100k - £500k	Implementation	unknown	Increased uptake of electric taxis	BDC successful funding bid in 2018 for taxi electric vehicle charging points of £300,000. A ULEV Strategy for the Bromsgrove District was produced in 2019. Company appointed in 2020 to install/operate 13 rapid chargers for next 10 years. Sites identified and roll out of installation beginning in 2021.	Aimed for completion in 2020 but Covid-19 situation impacted delivery. Anticipated to have all charge points installed by the end of 2021.
5.2.2	Freight Quality Partnership	Traffic Management	UTC, Congestion management, traffic reduction	2013	2018	WCC	WCC	NO	Partially Funded	£50k - £100k	Completed	unknown	Fewer HGVs travelling through AQMA	On-going duty under Traffic Management	Can take time for information to filter down to users. HGVs may still need to travel through AQMAs on major arterial routes.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
5.2.5	Greening Council and Business Fleets	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2013	2032	BDC WCC	BDC WCC	NO			Implementation	unknown	Increase in number of Council fleet and contractors vehicles of higher Euro Standard and/or utilising alternative fuels	Ongoing	Reliant on uptake from private sector companies
5.2.10	Installing electric vehicle charging points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2013		BDC WRS	As part of development	NO	Partially Funded	£100k - £500k	Implementation	unknown	Increase in availability of EV charging points and corresponding increase in use of electric vehicles	Standard recommendation for installation of EV Charging Points on relevant planning consents is ongoing. Formalised in SPD but not adopted by BDC planning authority. Electrical charging points for taxi scheme installed 2021 onwards.	
5.3.2	Car Sharing	Alternatives to private car use	Car and lift sharing schemes	2013		WCC	WCC	NO	Not Funded	£10k - 50k	Implementation	unknown	Increase in number of people car sharing	Liftshare website scheme launched Autumn 2015. Currently in operation	Following an initial surge in interest from public, use of service has slowed down
5.3.4	Promote Flexible Working arrangements	Promoting Travel Alternatives	Encourage / Facilitate homeworking	2013		WCC BDC	Various	NO	Not Funded	£50k - £100k	Implementation	unknown	Increase in number of people able to work from home	County Council have pushed for maximum coverage of fibre optic broadband. Ongoing - 96% coverage as of December 2019.	Reliant on uptake from private sector companies
5.5.1	Produce Air Quality Supplementary Planning Document	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2013	2018	WRS	WRS BDC	NO	Not Funded	< £10k	Completed	unknown	Formal adoption and use by BDC planning authority	SPD drafted by WRS and provided to Council late 2017. Not yet by BDC planning authority. Updated in 2018 to reflect new NPPF. Likely to be adopted by other Worcs districts. Document is live for use as technical planning and updated periodically.	Conflicting views on SPD from 6 different local authorities hampering adoption of single document.
5.5.4	Encourage developers to provide sustainable transport facilities and links serving new developments	Promoting Travel Alternatives	Personalised travel planning	2013		BDC WCC WRS	WCC BDC	NO	Not Funded	£50k - £100k	Implementation	unknown	Increased uptake of alternative modes of transport	WCC is delivering PTP services on behalf of developers. Building on best practice developed by the Council this proven tool encourages modal shift in new developments towards more sustainable and space efficient forms of transport. WRS make recommendation for standard AQ mitigation measures on all relevant planning apps.	
5.6.3	Air Quality Networks	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2013		WRS CEEPG DEFRA BDC	Officer time (WRS)	NO	Not Funded	< £10k	Implementation	unknown	Improved cross boundary working between local authorities in West Midlands	WRS are member of regional environmental protection managers group (CEEPG) and member of Defra LAQM Team Local Authority Advisory Group both formed in 2017.	Differing AQ issues, priorities and resources in regional authorities. Largely on hold due to global Covid pandemic.
5.6.8	Forge closer links with local health agencies	Other	Other	2013		WRS WCC PHE	DoPH, Officer time (WRS)	NO	Not Funded	< £10k	Implementation	unknown	Increase participation of Public Health in Worcestershire Air Quality issues and action groups	County Air Quality Partnership set up May 2019 by DoPH supported by WRS	On hold due to global Covid pandemic
5.3.1	Travel Planning	Promoting Travel Alternatives	Personalised travel planning	2013		WCC	WCC	NO	Not Funded	On-going	Implementation	unknown	Increased uptake of alternative	WCC is delivering PTP services on behalf of developers. Building on best practice developed by the Council this proven tool encourages	On-going

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
													modes of transport	modal shift in new developments towards more sustainable and space efficient forms of transport.	
5.3.6 (5.3.8 and 5.3.9)	Improve cycling and walking routes in local areas	Promoting Travel Alternatives	Promotion of cycling	2013	2021	WCC BDC	WCC DFT	NO	Not Funded	> £10 million	Completed	unknown	Increased uptake of alternative modes of transport	The Active Travel Investment Programme is a systemic investment in walking and cycling links across the Bromsgrove area to create a safe, comprehensive, integrated network linking residential areas with key trip attractors, including schools, rail stations, town center and employment locations	Scheme now complete, but the additional provision alongside the A38 will complement and enhance the network especially the links across the town to the east and west.
5.4.4	Make air quality information more available and accessible	Public Information	Via the Internet	2013		WRS	Officer time (WRS)	NO	Not Funded	£10k - 50k	Implementation	unknown	Website hits and enquiries for information	All existing LAQM reports and details of AQMAs are available to public on WRS website. WRS use Twitter account to release information.	Ongoing
5.4.2	Provide link to real time air quality information	Public Information	Via the Internet	2013		WRS WCC PHE	Officer time (WRS)	NO	Not Funded	£10k - 50k	Implementation	unknown	Increase in WRS Twitter subscribers	System put in place at WRS to tweet alerts when Air pollution is moderate or worse in any given 5 day forecast on Defra Daily Air Quality Index and shared with County Public Health representative	Limited to Twitter users. Ongoing.
5.45	Raise the profile and increase awareness of air quality within the region	Other	Other	2013		WRS CEEPG MJAC DEFRA	Officer time (WRS)	NO	Not Funded	£10k - 50k	Implementation	unknown	Improved cross boundary knowledge sharing between local authorities in West Midlands	WRS held position of Air Quality technical coordinator for MJAC, member of CEEPG and member of Defra LAQM Team Local Authority Advisory Group both formed in 2017.	WRS was MJAC AQ Technical Coordinator 201417. MJAC/CEEPG Knowledge Hub group set up in 2017 delivered by joint working between WRS and Cannock Chase DC. Member of LA advisory group to Defra LAQM team following invitation 2017.
5.4.1	Smarter Driving Tips	Public Information	Via the Internet	2013		WRS & WCC	Officer time (WRS)	NO	Not Funded	£10k - 50k	Implementation	unknown	Increase in website hits	Advice page created for all groups affected by and impacting air quality and shared with County Public Health.	Created Mar 2017, Updated Mar-19
FORMER KIDDERMINSTER ROAD HAGLEY AQMA															
5.1.1/KR5	Alteration to phasing of traffic light systems/Junction review	Traffic Management	UTC, Congestion management, traffic reduction	2013	2016	WCC	WCC	NO	Funded	Completed	Completed	Unknown	Improved traffic flow in the area	Signals have been upgraded to latest MOVA technology.	Completed
5.1.4	Variable Message Systems	Traffic Management	UTC, Congestion management, traffic reduction	2013		WCC	WCC	NO	Not Funded	£500k - £1 million	Aborted	Unknown	Raise awareness of AQMAs	AQMA Revoked in 2018/19	
5.1.8	Introduction of signals at roundabout	Public Information	Other	2013	2016	WCC	WCC	NO	Funded	Completed	Completed	Unknown	Improved traffic flow in the area	Signals installed and various revisions made to junction marking	Completed
5.2.2	Freight Quality Partnership	Traffic Management	UTC, Congestion management, traffic reduction	2013	2018	WCC	WCC	NO	Partially Funded	£50k - £100k	Completed	unknown	Fewer HGVs travelling through AQMA	On-going duty under Traffic Management	Can take time for information to filter down to users. HGVs may still need to travel through AQMAs on major arterial routes.

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.

There are currently no automatic $PM_{2.5}$ monitoring stations in Worcestershire. The nearest AURN $PM_{2.5}$ monitoring station is the Birmingham Acocks Green site approximately 16 miles to the northeast of the Bromsgrove District Council area. WRS has reviewed the DEFRA national background maps to determine projected $PM_{2.5}$ concentrations within the Bromsgrove District area for the 2021 calendar year. The average total $PM_{2.5}$ at 218 locations (centre points of 1km x 1km grids) across the Bromsgrove District is 8.14µg/m^3, with a minimum concentration of 7.42µg/m^3 and a maximum concentration of 9.44µg/m^3. This indicates that $PM_{2.5}$ concentrations within the Bromsgrove District are well below the proposed annual average limit value for $PM_{2.5}$ target of 10µg/m^3 to be met across England by 2040.

WRS has reviewed the fraction of mortality attributable to particulate air pollution (indicator 3.01) as published by Public Health England (as raised in point 6 above of Defra's appraisal of last year's ASR). The fraction of mortality attributable to particulate emissions in Worcestershire in 2019 (the most recent year available) was 4.8%. This falls below the national figure for England (5.1% in 2019) and below the figure for the West Midlands region (5.3% in 2019). Recent trend data is not available for Worcestershire due to a lack of data points with valid values.

More information on the Public Health Outcomes Frameworks that examines indicators that help us understand trends in public health can be found at:

Public Health Outcomes Framework - PHE

As outlined in Policy Guidance LAQM.PG16, WRS have discussed the role of the DoPH, and the details of $PM_{2.5}$ levels across the County, with the DoPH at Worcestershire County Council. In 2019 a new Air Quality Partnership led by the DoPH and supported by WRS Land and Air Quality Team was set up to discuss potential actions to improve air quality across the County and determine an action plan for implementation. The group comprised

officers from the County and District authorities from public health, air quality, strategic planning, sustainability, highways and transport disciplines, and representatives from the NHS and Highways England. The group met initially in May 2019 to discuss terms and references and in September to discuss potential actions. The group is largely driven by DoPH, but due to Covid-19 taking priority in 2020/21, the business of the partnership was postponed indefinitely but is anticipated to restart later this year.

No additional actions are currently planned by Bromsgrove District Council in relation to the reduction of $PM_{2.5}$ levels. It is anticipated however that any actions taken to improve NO_2 levels across the District will result in a linked improvement to $PM_{2.5}$ levels.

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

This section sets out the monitoring undertaken within 2021 by Bromsgrove District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Bromsgrove District Council did not undertake automatic (continuous) monitoring during 2021.

3.1.2 Non-Automatic Monitoring Sites

Bromsgrove District Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 44 sites during 2021. Table A.1 in Appendix A presents the details of the non-automatic sites.

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

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.4 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that

the concentration data presented 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 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data present in Table B.1 (NO2 Diffusion Tube Results) includes distance corrected values, only where relevant.

Whilst the Bromsgrove District has experienced general downward trends in nitrogen dioxide over the five-year period 2017 and 2021 it should be noted that the degree of reduction in nitrogen dioxide concentrations observed between 2019 and 2020 is highly likely to have been impacted by the Covid-19 pandemic. National lockdowns experienced during 2020 resulted in significant reductions in traffic flows, and as air quality in the Bromsgrove District is largely related to traffic emissions, nitrogen dioxide results for 2020 will be impacted to some extent by these changes. This explains the appearance of an upward trend in some monitoring locations from 2020 to 2021 data, with an upward trend being as a result of a significant increase in traffic from 2020 to 2021. Therefore it is significant to note that the comparison between the average nitrogen dioxide levels during the period 2017-2020 and the 2021 data gives a clearer view regarding the trend in nitrogen dioxide levels than a comparison between 2021 and 2020 data.

In 2021 the highest concentrations of NO_2 recorded across the monitoring network was at the HAG5 location with a value of 32.7µg/m^3. No exceedances of the annual mean objective were recorded.

Concentrations within all AQMAs were below the objective in 2021. The highest concentration recorded within the Worcester Road AQMA was 32.3µg/m^3 at diffusion tube WR, 25.5µg/m^3 within the Redditch Road AQMA at diffusion tube 19, and 31.5µg/m^3 at in the Lickey End AQMA at diffusion tube LE4.

No exceedances were recorded within the revoked Kidderminster Road, Hagley AQMA with highest concentrations of 21.4µg/m^3 recorded at RES2 and 21.5µg/m^3 at diffusion tube ‘9’ within the former boundary area. Following revocation of the AQMA four new monitoring locations were established in May 2018 further to the south along Worcester Road, West Hagley.

Following annualisation of 2018 data a concentration of 47µg/m^3 was recorded at one of the new locations HAG3 however there was a level of uncertainty associated with the result as it was based upon only 7 months data. The 2019 data provided a full calendar

years' worth of data with a value of 33.7µg/m^3 recorded at HAG3. Two new monitoring locations**,** HAG5 and HAG6, were established in the vicinity of HAG3 for the 2020 period to provide additional certainty to air quality concentrations in the area. In 2021, NO_2 concentrations recorded at HAG5 and HAG6 were 32.7µg/m^3 and 20.6µg/m^3 respectively, as such concentrations have remained below the objective.

Three new locations were also established along the Stourbridge Road for the start of 2020 in an area that hadn't been monitored for a number of years. These are SBR1 (lamppost outside 61 Stourbridge Road, Bromsgrove), SBR2 (lamppost outside Sainsbury Local, 189 Stourbridge Road) and SBR3 (lamppost outside 285 Stourbridge Road, near to the M42 underpass). Concentrations recorded were 26.6µg/m^3 at SBR1, 20.5µg/m^3 at SBR2, and 27.8µg/m^3 at SBR3 during the 2021 period.

Monitoring data from longstanding diffusion tube monitoring location within the Bromsgrove District (BDC) area demonstrate a general downward trend in concentrations over the 5-year period 2017 – 2021. Although a trend of a slight increase can be observed in general across the borough from 2020 to 2021. This is likely to have been caused by the increase in traffic following the easing of 'lockdowns' in 2020 caused by the COVID-19 pandemic.

3.2.2 Particulate Matter (PM_{10})

PM_{10} has not been monitored in 2021.

3.2.3 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ has not been monitored in 2021.

3.2.4 Sulphur Dioxide (SO_2)

SO_2 has not been monitored in 2021.

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
FL1	2C Fox Lane B61 7NL behind Greyhound Pub (second house past pub)	Roadside	395079	269797	NO_2	No	0.0	7.0	No	2.1
FL2	new houses close to road on Fox Lane B61 7NG near to Rock Hill junction	Roadside	395118	269721	NO_2	No	4.7	1.4	No	2.1
RH1	8 Rock Hill, Bromsgrove B61 7LJ	Roadside	395243	269844	NO_2	No	0.0	6.3	No	2.2
WR4	188 Worcester Road, Bromsgrove B61 7AZ	Roadside	395312	269938	NO_2	Worcester Road AQMA	0.0	7.5	No	2.2
WR2	Downpipe of 159 Worcester Road, B61 7HN	Roadside	395511	270180	NO_2	Worcester Road AQMA	0.0	2.2	No	2.2
WR3	Downpipe of 138 Worcester Road, B61 7AS	Roadside	395501	270190	NO_2	Worcester Road AQMA	0.0	4.4	No	2.5
BC	Downpipe on Ye Olde Black Cross, 70 Worcester Road, B61 7AG	Roadside	395685	270424	NO_2	Worcester Road AQMA	0.0	2.1	No	2.3
BCX	Downpipe of 16 Hanover Place, Worcester Road, B61 7AG	Roadside	395807	270549	NO_2	Worcester Road AQMA	0.0	2.7	No	5.3

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
WR	Downpipe of 14 Hanover Street, B61 7JH	Roadside	395702	270423	NO_2	Worcester Road AQMA	0.0	6.4	No	1.4
BG1	Wall of Davenal House Doctors Surgery, top of The Strand, B61 8AB	Roadside	396238	271108	NO_2	No	10.0	2.6	No	2.6
BR	Downpipe on 35 Birmingham Road, B61 0DR	Roadside	396292	271210	NO_2	No	0.0	3.4	No	2.2
LE7	Near 371 Birmingham Road, Lickey End B61 0EY	Urban Background	396916	273014	NO_2	Lickey End AQMA	0.0	15.9	No	2.1
1	Downpipe of 3a Alcester Road, Lickey End, B60 1JT	Roadside	396999	272979	NO_2	Lickey End AQMA	0.0	11.7	No	1.8
LE4	Harvester Pub Birmingham Road, Lickey End B61 0EZ. Traffic sign	Roadside	396935	272949	NO_2	Lickey End AQMA	11.0	1.4	No	2.1
LIK1	288 Birmingham Road (next to Harvester)	Roadside	396939	272934	NO_2	Lickey End AQMA	0.0	10.0	No	1.5
LIK 2	1 Old Birmingham Road Lickey End B60 1DD	Roadside	396995	273129	NO_2	Lickey End AQMA	0.0	5.5	No	1.5
LE5	5 Old Birmingham Road, Lickey End B60 1DD	Roadside	396999	273143	NO_2	Lickey End AQMA	0.0	6.5	No	1.9
LE6	308 Birmingham Road, Lickey End B61 0HJ	Urban Background	396958	273157	NO_2	Lickey End AQMA	0.0	18.3	No	2.1
F1	J1 M42 roundabout, Street light LP 4957 at junction with Old B'ham Rd, B60 1DD	Kerbside	397010	273112	NO_2	Lickey End AQMA	20.0	2.3	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
TS	Up past Blue Cross, The Smallholdings, off Wildmoor Lane, B61 0RJ	Rural	396613	275085	NO_2	No	0.0	51.0	No	1.8
RUB 1	Library Way Way off New Road, LP at end of Library Way backs onto A38 B45 9JS	Roadside	398555	277200	NO_2	No	12.0	2.0	No	1.6
RES 1	26 Stourbridge Road, Hagley DY9 0QT Downpipe Front of Property	Roadside	391445	281179	NO_2	No	0.0	15.0	No	2.1
RES 2	21 Birmingham Road, Hagley, DY9 9JZ	Roadside	391556	281042	NO_2	No	0.0	15.0	No	2.2
9	Fence to side of 78 Kidderminster Road, DY9 0QL	Roadside	391210	280668	NO_2	No	0.0	8.3	No	2.0
KR62	62 Kidderminster Rd DY9 0QL	Roadside	391182	280631	NO_2	No	0.0	7.0	No	2.0
RES 3	104 Kidderminster Road South, Hagley, DY9 0JJ Downpipe Front of Property	Roadside	389827	279590	NO_2	No	0.0	14.3	No	2.0
HAG 4	On Lamppost 162 by Bus Stop opposite Shell Garage on Worcester Road, West Hagley	Roadside	389850	279588	NO_2	No	1.0	5.5	No	2.0
HAG 3	1 Cross Keys Mews , Worcester Road, West Hagley, DY9 0LG	Roadside	389909	279629	NO_2	No	0.0	3.0	No	1.6
RES 4	23 Worcester Road, Hagley DY9 0LF Downpipe Front of Property	Roadside	390025	279765	NO_2	No	0.0	14.5	No	2.1

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
HAG 2	69 Worcester Road, West Hagley, DY9 0LF	Roadside	390203	279945	NO_2	No	0.0	13.0	No	1.8
HAG 1	79 Worcester Road, Hagley, DY9 0LF	Roadside	390247	279996	NO_2	No	0.0	12.0	No	1.9
11	Downpipe on corner of 74 Worcester Road, DY9 0NJ	Roadside	390295	280043	NO_2	No	0.0	2.8	No	1.9
HAG5	On low roadside road sign immediately past 4 Cross Keys Mews	Roadside	389929	279650	NO_2	No	7.3	4.5	No	1.6
HAG6	On Drainpipe of 1 SpoutSomething Cottage, between Cross Keys Mews and Hagley Motors	Roadside	389939	279664	NO_2	No	0.0	5.0	No	1.8
SBR1	On lamppost outside 61 Stourbridge Road, Bromsgrove B61 0AL	Roadside	396127	271516	NO_2	No	4.8	2.2	No	1.9
SBR2	On lamppost outside Sainsbury Local 189 Stourbridge Road B61 0AR	Roadside	395996	272063	NO_2	No	0.0	3.5	No	2.0
SBR3	On lamppost outside 285 Stourbridge Road, B61 Last house on left before M42 underpass	Roadside	395825	272841	NO_2	No	12.0	1.0	No	1.9
KEN	Lamppost 3 o/s 12 & 14 Kendal Close B60 2HW	Roadside	396683	270354	NO_2	No	0.0	1.7	No	2.4
SR	Downpipe of 2 Stoke Road, Aston Fields, B60 3EJ	Roadside	396780	269450	NO_2	No	0.0	4.9	No	1.9

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
18	Downpipe on corner of 84 Redditch Road, B60 4JR	Roadside	395180	268549	NO_2	Redditch Road AQMA	0.0	1.6	No	2.0
19	Downpipe through gate at 93 Redditch Road, B60 3JP	Roadside	395188	268564	NO_2	Redditch Road AQMA	0.0	2.7	No	1.9
HR	52 Hanbury Road, Stoke Heath B60 4LU	Roadside	394772	268441	NO_2	Redditch Road AQMA	0.0	5.0	No	2.2
16	Downpipe of 58 Redditch Road, B60 4JN	Roadside	394701	268444	NO_2	Redditch Road AQMA	0.0	2.3	No	2.2
255	255 Worcs Road (Roundabout) B61 7JD	Roadside	394408	268417	NO_2	No	0.0	12.0	No	2.3

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 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
FL1	395079	269797	Roadside	67.3	67.3	17.7	21.2	16.4	13.9	13.0
FL2	395118	269721	Roadside	100.0	100.0	30.5	37.2	29.1	24.8	27.2
RH1	395243	269844	Roadside	100.0	100.0	27.4	31.1	23.7	20.4	22.0
WR4	395312	269938	Roadside	100.0	100.0	26.9	31.2	24.4	19.3	21.4
WR2	395511	270180	Roadside	100.0	100.0	29.3	36.7	31.0	22.4	25.6
WR3	395501	270190	Roadside	92.3	92.3	28.6	30.8	24.6	20.0	21.5
BC	395685	270424	Roadside	100.0	100.0	39.7	**44.0**	38.0	27.7	31.5
BCX	395807	270549	Roadside	100.0	100.0	34.5	**44.0**	36.5	26.3	29.6
WR	395702	270423	Roadside	100.0	100.0	32.2	37.9	31.5	29.4	32.3
BG1	396238	271108	Roadside	92.3	92.3	27.3	32.5	26.3	19.6	23.1
BR	396292	271210	Roadside	100.0	100.0	22.8	29.2	23.5	18.9	21.1
LE7	396916	273014	Urban Background	92.3	92.3	25.8	33.4	23.6	17.7	20.0
1	396999	272979	Roadside	100.0	100.0	22.3	27.0	19.4	15.4	22.0
LE4	396935	272949	Roadside	100.0	100.0	**46.4**	**50.9**	**40.1**	29.1	31.5
LIK1	396939	272934	Roadside	100.0	100.0			26.9	23.7	22.3
LIK 2	396995	273129	Roadside	100.0	100.0			26.2	22.0	21.5
LE5	396999	273143	Roadside	100.0	100.0	31.4	32.5	26.9	20.2	21.0
LE6	396958	273157	Urban Background	100.0	100.0	27.4	29.7	23.0	17.5	23.6
F1	397010	273112	Kerbside	100.0	100.0	**46.4**	**50.9**	**43.4**	27.8	28.5
TS	396613	275085	Rural	100.0	100.0	19.9	23.6	18.2	15.2	16.3
RUB 1	398555	277200	Roadside	100.0	100.0			23.6	18.5	21.0
RES 1	391445	281179	Roadside	100.0	100.0	17.9	20.7	17.1	13.9	14.2
RES 2	391556	281042	Roadside	92.3	92.3	27.8	30.7	24.6	19.5	21.4
9	391210	280668	Roadside	100.0	100.0	27.4	30.9	23.7	19.5	21.5
KR62	391182	280631	Roadside	100.0	100.0	27.7	31.1	24.0	17.8	20.0
RES 3	389827	279590	Roadside	100.0	100.0	17.0	19.6	15.7	12.1	15.8
HAG 4	389850	279588	Roadside	100.0	100.0		33.9	25.1	18.8	22.9
HAG 3	389909	279629	Roadside	100.0	100.0		**47.0**	33.7	27.2	26.7
RES 4	390025	279765	Roadside	100.0	100.0	27.9	32.4	24.7	20.3	22.6
HAG 2	390203	279945	Roadside	100.0	100.0		28.4	21.4	17.3	17.9
HAG 1	390247	279996	Roadside	100.0	100.0		24.5	21.3	17.1	17.0
11	390295	280043	Roadside	100.0	100.0	23.2	27.7	22.0	18.0	18.4
HAG5	389929	279650	Roadside	100.0	100.0				29.5	32.7
HAG6	389939	279664	Roadside	100.0	100.0				16.6	20.6
SBR1	396127	271516	Roadside	92.3	92.3				24.9	26.6

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SBR2	395996	272063	Roadside	92.3	92.3				18.4	20.5
SBR3	395825	272841	Roadside	92.3	92.3				25.9	27.8
KEN	396683	270354	Roadside	92.3	92.3		21.3	17.6	15.3	16.5
SR	396780	269450	Roadside	73.1	73.1	19.6	26.4	21.7	17.2	19.0
18	395180	268549	Roadside	100.0	100.0	30.6	33.7	26.5	22.4	25.1
19	395188	268564	Roadside	100.0	100.0	33.1	35.1	27.6	23.1	25.5
HR	394772	268441	Roadside	100.0	100.0	26.5	32.9	25.5	20.4	23.5
16	394701	268444	Roadside	100.0	100.0	28.2	28.2	25.0	20.4	21.8
255	394408	268417	Roadside	100.0	100.0	21.3	23.8	16.8	15.9	17.3

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Diffusion tube data has been bias adjusted.**

☒ **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 correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

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**.

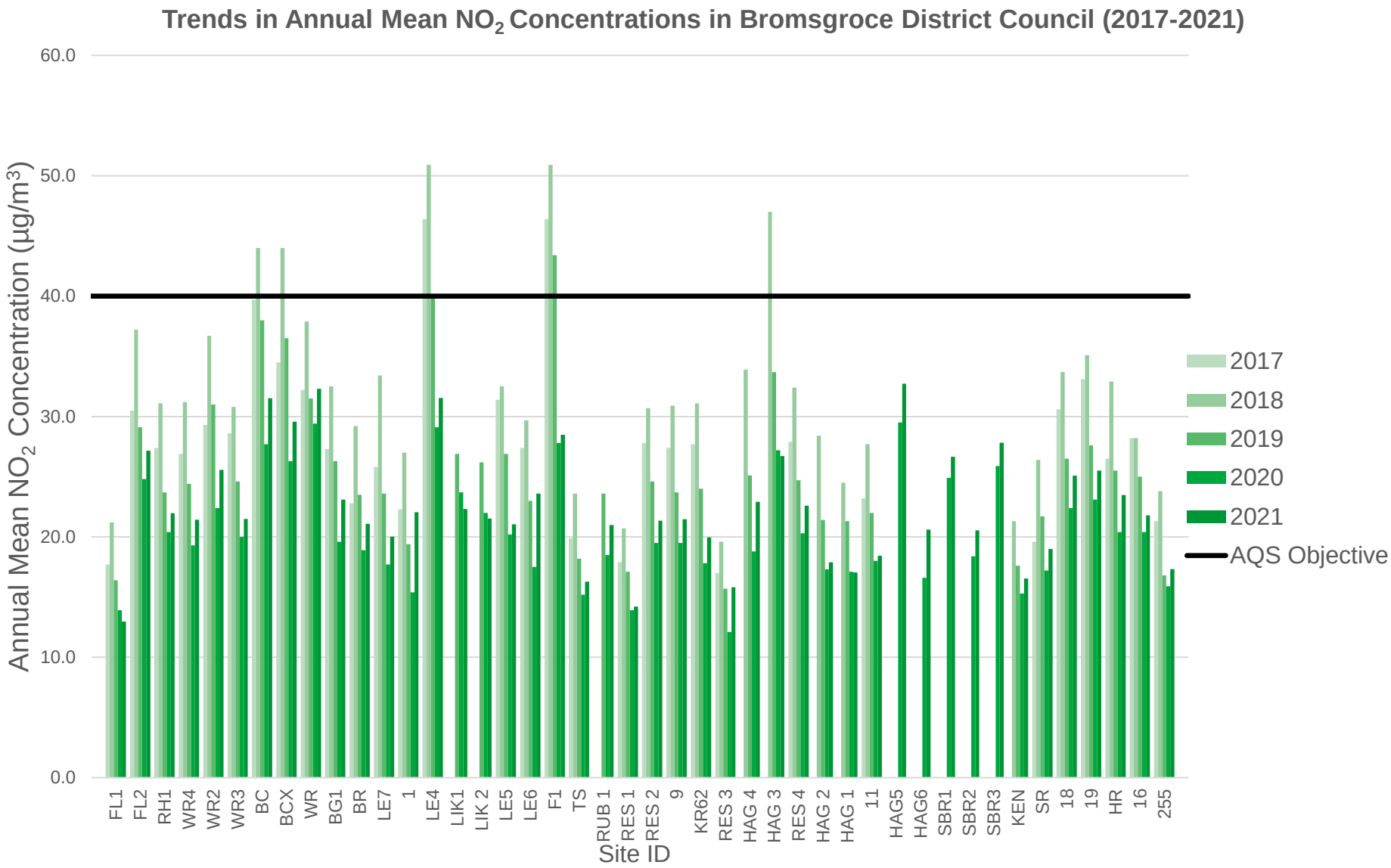
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

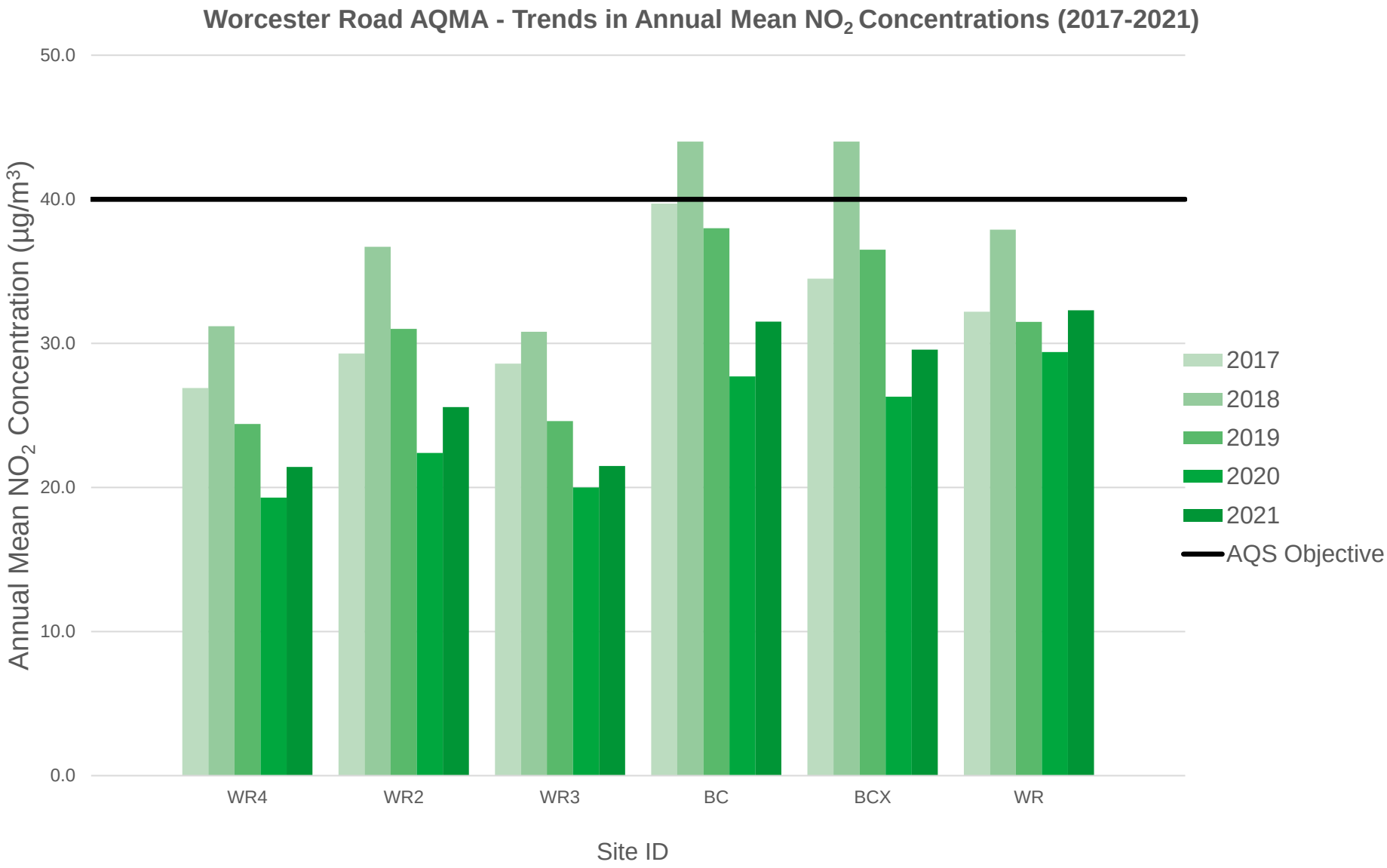
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

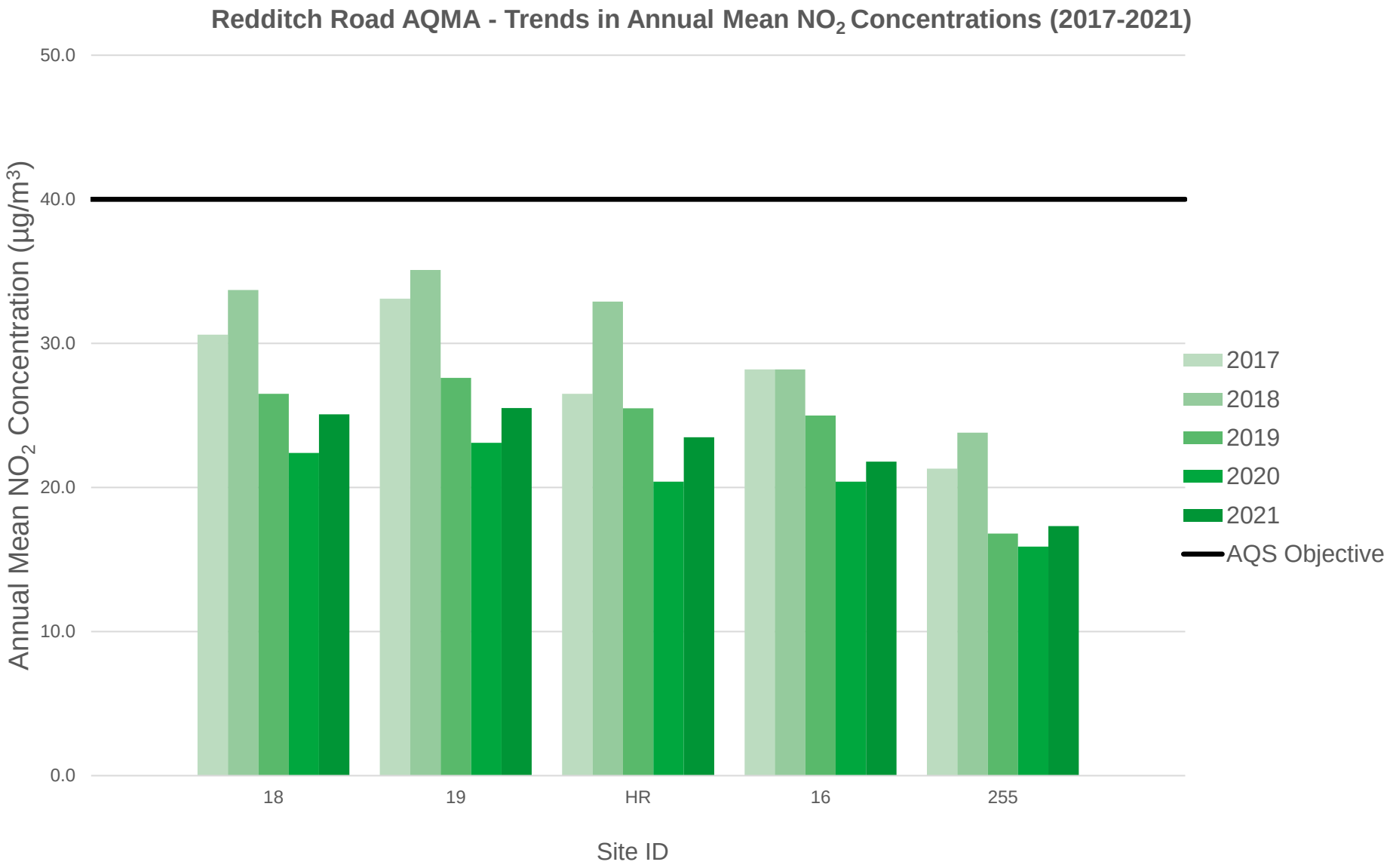
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

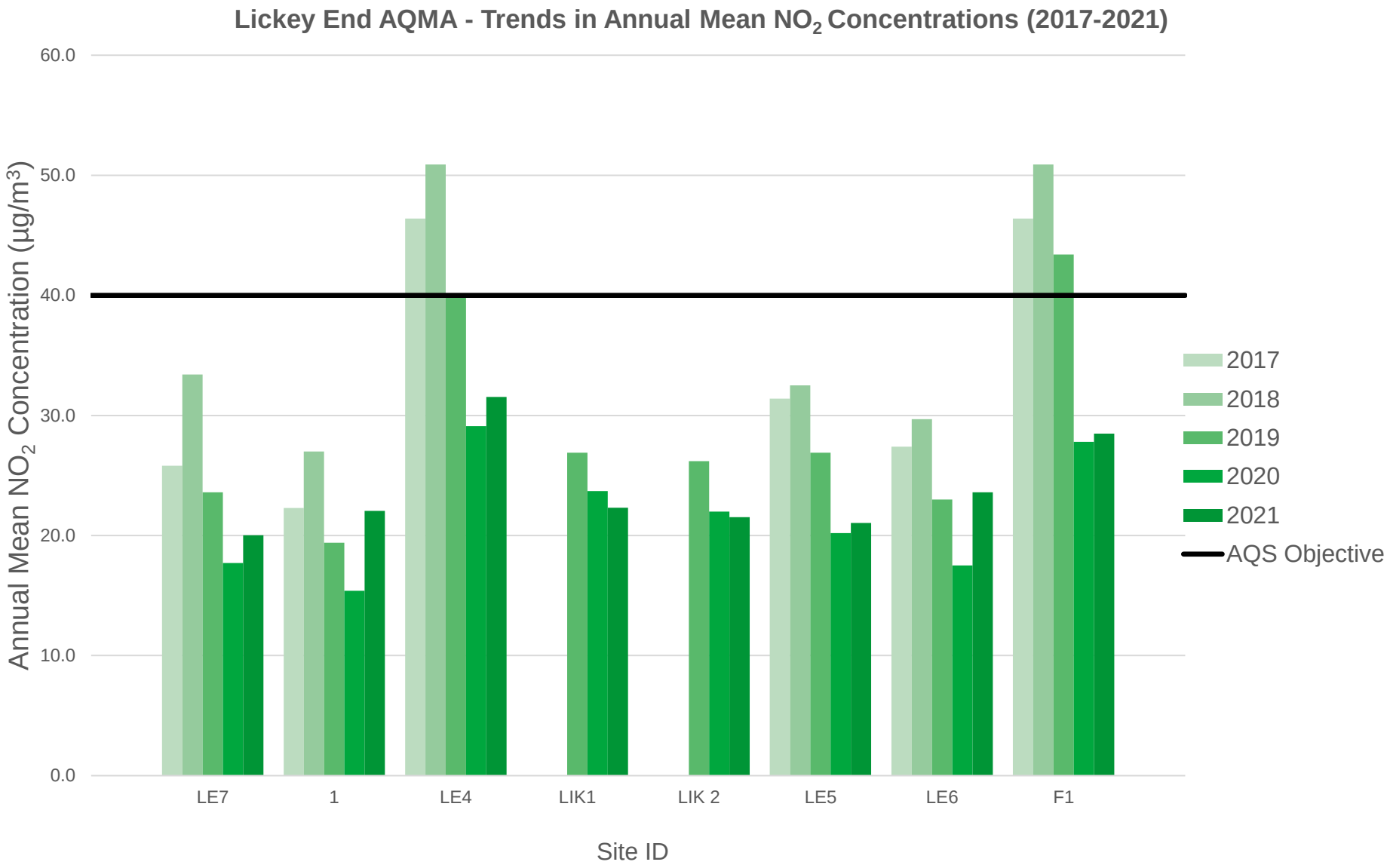
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

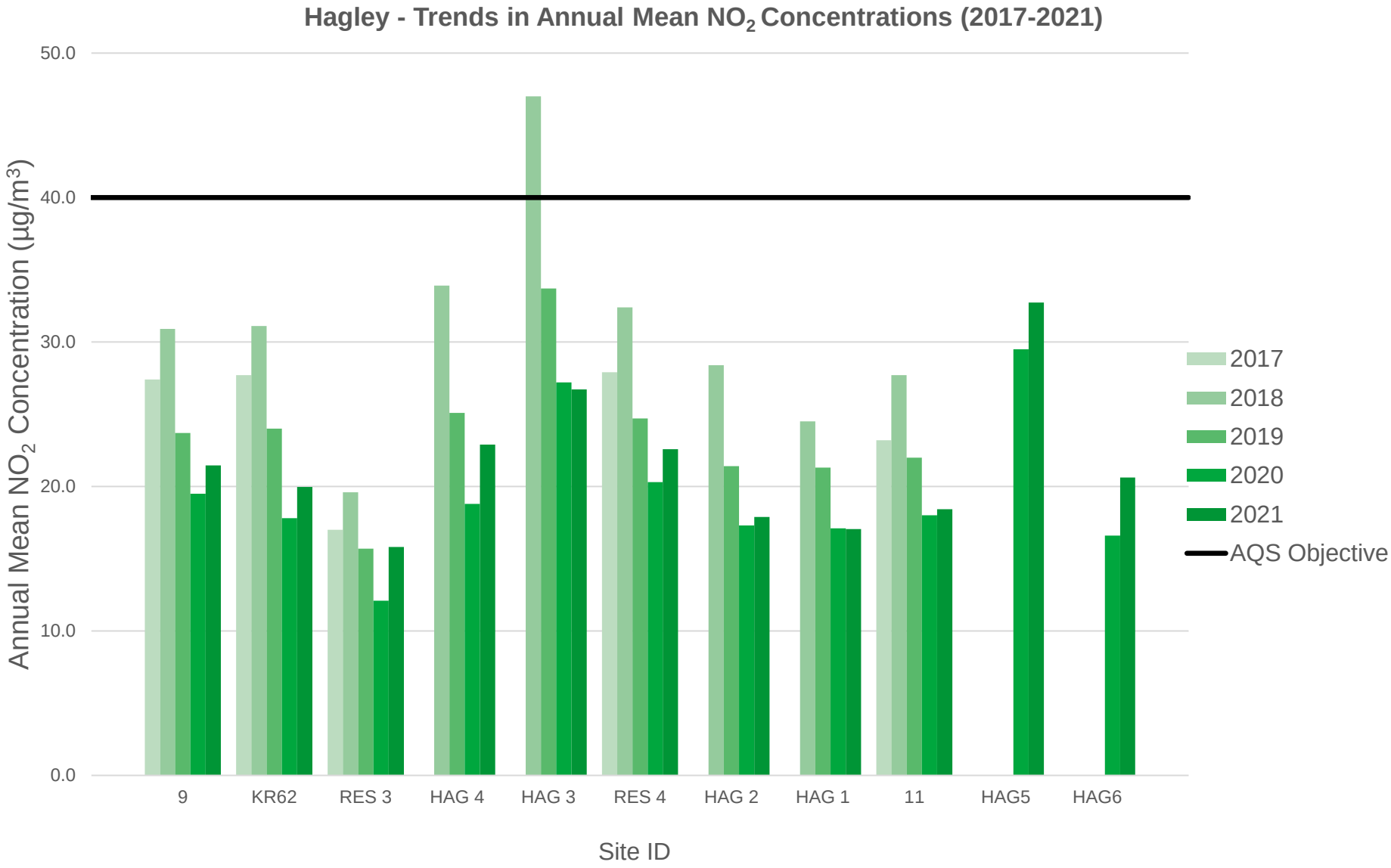
Figure A.1 – Trends in Annual Mean NO2 Concentrations

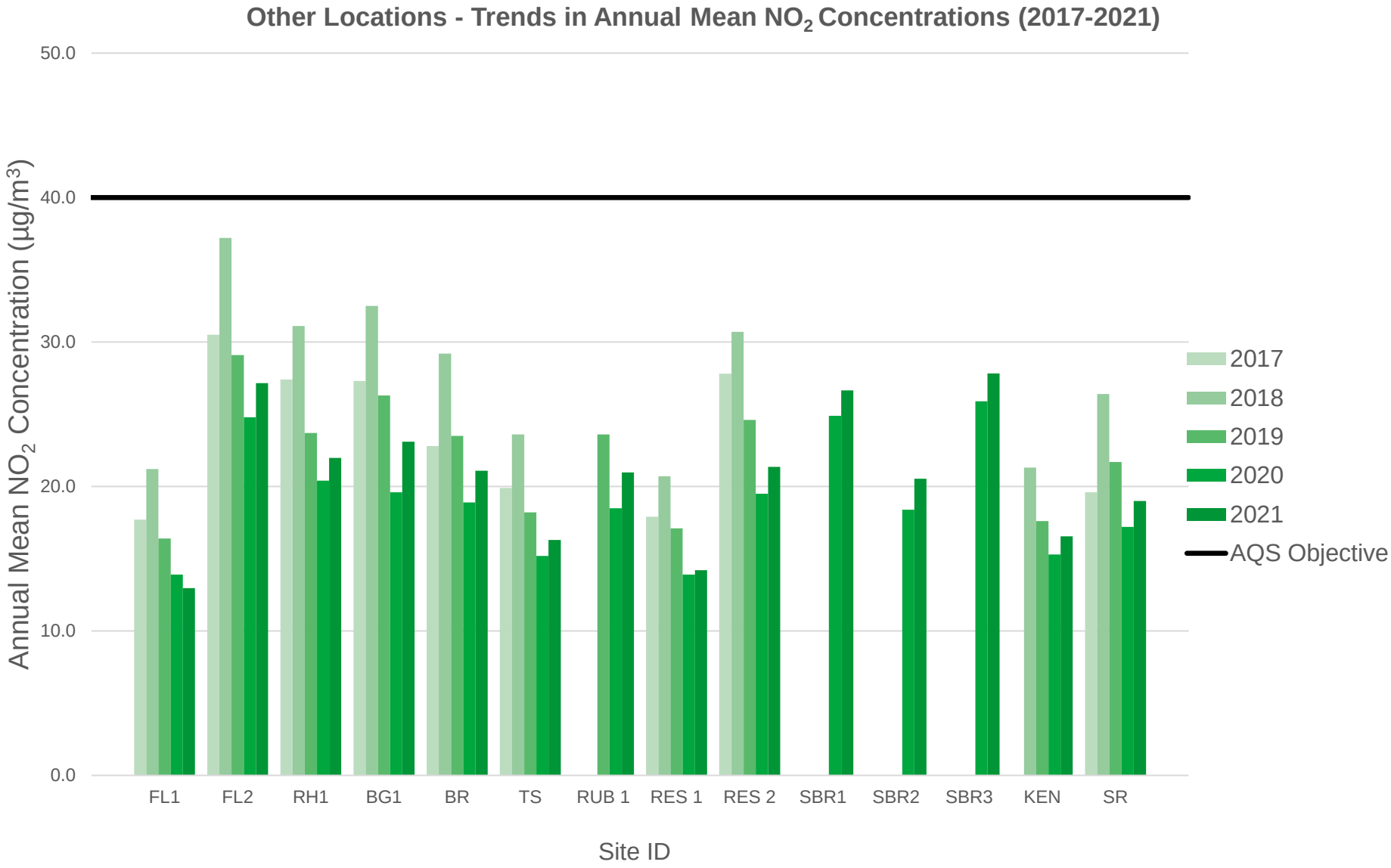



Worcester Road AQMA - Trends in Annual Mean NO2 Concentrations (2017-2021)
Annual Mean NO2 Concentration (µg/m3)
50.0
40.0
30.0
20.0
10.0
0.0
WR4
WR2
WR3
BC
BCX
WR
Site ID
2017
2018
2019
2020
2021
AQS Objective


Redditch Road AQMA - Trends in Annual Mean NO2 Concentrations (2017-2021)
Annual Mean NO2 Concentration (µg/m3)
50.0
40.0
30.0
20.0
10.0
0.0
18
19
HR
16
255
Site ID
2017
2018
2019
2020
2021
AQS Objective


Lickey End AQMA - Trends in Annual Mean NO2 Concentrations (2017-2021)
Annual Mean NO2 Concentration (µg/m3)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
LE7
1
LE4
LIK1
LIK 2
LE5
LE6
F1
Site ID
2017
2018
2019
2020
2021
AQS Objective


Hagley - Trends in Annual Mean NO2 Concentrations (2017-2021)
Annual Mean NO2 Concentration (µg/m3)
50.0
40.0
30.0
20.0
10.0
0.0
9
KR62
RES 3
HAG 4
HAG 3
RES 4
HAG 2
HAG 1
11
HAG5
HAG6
Site ID
2017
2018
2019
2020
2021
AQS Objective


Other Locations - Trends in Annual Mean NO2 Concentrations (2017-2021)
50.0
40.0
30.0
20.0
10.0
0.0
Annual Mean NO2 Concentration (µg/m3)
FL1
FL2
RH1
BG1
BR
TS
RUB 1
RES 1
RES 2
SBR1
SBR2
SBR3
KEN
SR
Site ID
2017
2018
2019
2020
2021
AQS Objective

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
FL1	395079	269797					15.7	14.3	14.7	13.4	18.9	0.5	13.4	17.6	13.6	13.0		
FL2	395118	269721	38.9	33.2	27.7	30.8	32.1	30.4	28.6	28.2	33.2	34.1	38.9	31.9	32.3	27.2		
RH1	395243	269844	31.9	25.2	25.9	25.8	24.0	24.4	24.7	21.6	25.7	27.1	33.0	24.6	26.2	22.0		
WR4	395312	269938	31.5	23.9	25.0	26.9	24.6	23.3	23.2	20.0	27.7	25.0	30.5	24.5	25.5	21.4		
WR2	395511	270180	37.5	31.6	28.2	31.5	30.4	25.7	28.7	24.6	27.6	30.4	37.9	31.4	30.4	25.6		
WR3	395501	270190	28.5	22.4	25.8	25.2	24.8	24.5	24.2	21.0	35.3	25.1		24.9	25.6	21.5		
BC	395685	270424	36.7	37.4	30.7	35.9	34.0	31.7	39.8	35.4	39.7	43.5	47.7	37.7	37.5	31.5		
BCX	395807	270549	44.3	42.0	38.1	31.4	39.0	29.2	31.2	27.1	38.1	31.8	37.4	33.0	35.2	29.6		
WR	395702	270423	44.2	36.1	34.0	39.6	40.0	40.0	34.7	31.7	43.2	36.4	43.2	38.3	38.4	32.3		
BG1	396238	271108	34.9	26.9	25.3	29.0	28.5	24.1	26.6	23.9	31.7	26.7		24.8	27.5	23.1		
BR	396292	271210	32.1	23.3	22.9	25.7	21.8	22.6	22.8	21.2	27.9	25.1	31.7	24.3	25.1	21.1		
LE7	396916	273014	26.7	27.9	21.9	27.9		22.2	22.3	19.4	27.3	20.4	25.6	20.7	23.8	20.0		
1	396999	272979	23.1	19.1	20.3	39.9	40.8	26.3	20.0	18.1	19.7	17.7	52.2	17.8	26.2	22.0		
LE4	396935	272949	47.8	36.3	42.4	26.2	27.5	41.4	41.8	36.6	43.1	41.0	38.5	27.8	37.5	31.5		
LIK1	396939	272934	34.4	26.1	27.4	23.0	17.3	19.3	25.7	24.0	28.1	29.9	26.6	36.9	26.6	22.3		
LIK 2	396995	273129	33.8	24.0	26.1	23.8	19.4	22.1	21.8	21.4	26.8	27.0	35.0	26.3	25.6	21.5		
LE5	396999	273143	32.9	23.4	26.6	19.5	23.4	22.3	23.4	22.5	24.5	27.9	30.2	23.9	25.0	21.0		
LE6	396958	273157	46.3	23.8	26.6	37.1	41.9	18.5	19.8	19.2	23.6	26.4	29.9	24.1	28.1	23.6		
F1	397010	273112	32.4	40.2	25.5	22.2	24.5	32.2	35.0	32.7	44.4	40.8	44.6	32.6	33.9	28.5		
TS	396613	275085	23.8	24.7	17.1	22.7	17.6	16.5	15.8	16.5	23.5	16.3	20.5	17.9	19.4	16.3		
RUB 1	398555	277200	28.7	21.5	24.2	26.0	21.5	25.8	24.0	24.6	26.1	21.3	33.4	22.7	25.0	21.0		
RES 1	391445	281179	22.6	18.1	16.5	15.7	14.9	13.8	15.1	14.4	15.9	16.6	22.3	17.0	16.9	14.2		
RES 2	391556	281042	28.1	24.0	27.1	28.9	26.4	22.3	24.5	21.9		23.3	30.8	22.4	25.4	21.4		
9	391210	280668	31.2	25.3	25.8	27.8	24.3	23.6	24.1	24.9	26.4	22.2	30.7	20.3	25.5	21.5		
KR62	391182	280631	25.8	22.7	25.4	25.7	22.3	21.9	20.9	23.6	22.7	24.0	28.8	21.4	23.8	20.0		
RES 3	389827	279590	21.2	17.8	37.4	29.1	15.0	12.5	12.6	12.7	17.9	15.9	18.2	15.6	18.8	15.8		
HAG 4	389850	279588	28.1	23.6	27.3	47.1	26.2	25.1	21.2	24.6	29.1	24.7	28.6	21.7	27.3	22.9		
HAG 3	389909	279629	36.3	32.4	15.7	19.2	34.5	33.4	36.5	34.6	37.1	33.5	38.9	29.7	31.8	26.7		
RES 4	390025	279765	30.6	27.5	30.0	31.6	27.8	24.5	23.8	23.1	24.2	24.1	31.6	23.8	26.9	22.6		
HAG 2	390203	279945	26.7	20.9	24.7	22.4	19.5	19.2	19.2	17.2	21.8	18.8	25.0	20.3	21.3	17.9		
HAG 1	390247	279996	27.5	20.6	22.6	26.2	16.6	16.4	16.0	15.9	19.9	19.8	23.2	18.9	20.3	17.0		
11	390295	280043	29.5	24.8	21.1	23.5	18.7	17.4	17.5	17.3	24.6	21.1	26.4	21.4	21.9	18.4		
HAG5	389929	279650	39.7	37.8	24.0	35.5	48.9	44.2	43.3	41.2	44.0	32.5	43.8	32.8	39.0	32.7		
HAG6	389939	279664	28.2	25.3	32.8	26.3	22.4	20.9	20.3	20.9	27.5	21.8	25.1	23.0	24.5	20.6		
SBR1	396127	271516	37.4	29.8	30.9	32.4	32.3	29.7	32.7	27.1		31.7	38.6	26.3	31.7	26.6		
SBR2	395996	272063	32.1	25.2	24.8	23.4		20.2	20.7	17.8	25.1	23.4	32.3	24.0	24.5	20.5		
SBR3	395825	272841	37.1	31.5	29.6	36.8	37.9	32.6	33.3	26.7		29.8	39.6	29.5	33.1	27.8		
KEN	396683	270354	26.9	17.9	20.4	20.7	14.2		15.9	15.5	18.0	18.1	28.5	20.6	19.7	16.5		
SR	396780	269450	28.2	21.6	25.3	23.4	20.9	21.9		19.8	21.0	21.5			22.6	19.0		
18	395180	268549	38.6	33.0	31.0	34.7	26.7	24.7	25.3	25.0	30.8	27.0	34.3	27.4	29.9	25.1		
19	395188	268564	36.2	28.9	27.2	37.3	29.7	29.0	28.6	25.1	30.0	29.8	37.6	25.2	30.4	25.5		
HR	394772	268441	32.2	25.8	29.8	26.6	24.9	27.8	28.2	27.0	25.6	26.4	36.1	25.1	28.0	23.5		
16	394701	268444	32.7	28.8	24.7	34.9	21.8	21.3	20.7	19.2	27.6	26.1	30.9	22.8	25.9	21.8		
255	394408	268417	26.6	25.8	22.8	23.1	15.8	15.8	15.2	16.8	17.8	20.1	24.8	23.0	20.6	17.3		

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **National bias adjustment factor used.**

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column.**

☒ **Bromsgrove District Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

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**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Bromsgrove District Council During 2021

Bromsgrove District Council has not identified any new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by Bromsgrove District Council During 2021

Bromsgrove District Council has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

Diffusion Tube Annualisation

Annualisation was required for one station in Bromsgrove District Council area (FL1) as recorded data capture was <75% during 2021. Data from three AURN monitoring sites; Leamington Spa, Leominster and Birmingham Ladywood, was used to provide location specific diffusion tube average annualisation factors to apply to the raw data annual mean, giving an annualised annual mean for each location. Details on annualisation methodology is presented in Table C.2.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2

continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Bromsgrove District Council have applied a national bias adjustment factor of 0.84 to the 2021 monitoring data. A summary of bias adjustment factors used by Bromsgrove District Council over the past five years is presented in Table C.1. WRS has determined the appropriate national bias adjustment factor using Version 03/22 of the Defra published National Diffusion Tube Bias Adjustment Spreadsheet using 32 Gradko studies for the relevant diffusion tubes (20% TEA in water) for 2021.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	03/21	0.84
2020	National	03/21	0.81
2019	National	03/20	0.78
2018	National	03/19	0.89
2017	National	09/18	0.77

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1 (NO2 2021 Diffusion Tube Results).

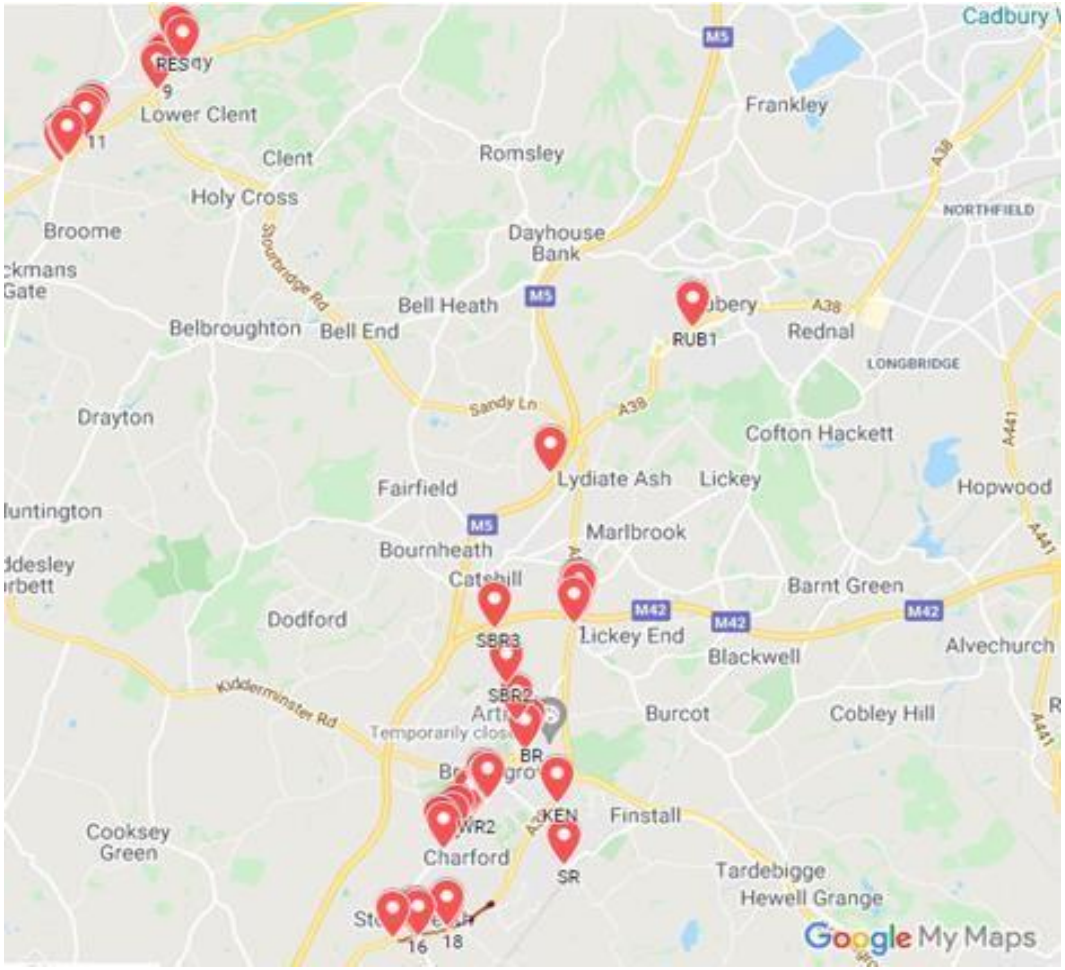
No diffusion tube NO_2 monitoring locations within Bromsgrove District Council required distance correction during 2021.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Leamington Spa	Annualisation Factor Leominster	Annualisation Factor Birmingham Ladywood	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
FL1	1.0838	1.1982	1.1341	1.1387	13.6	15.4	

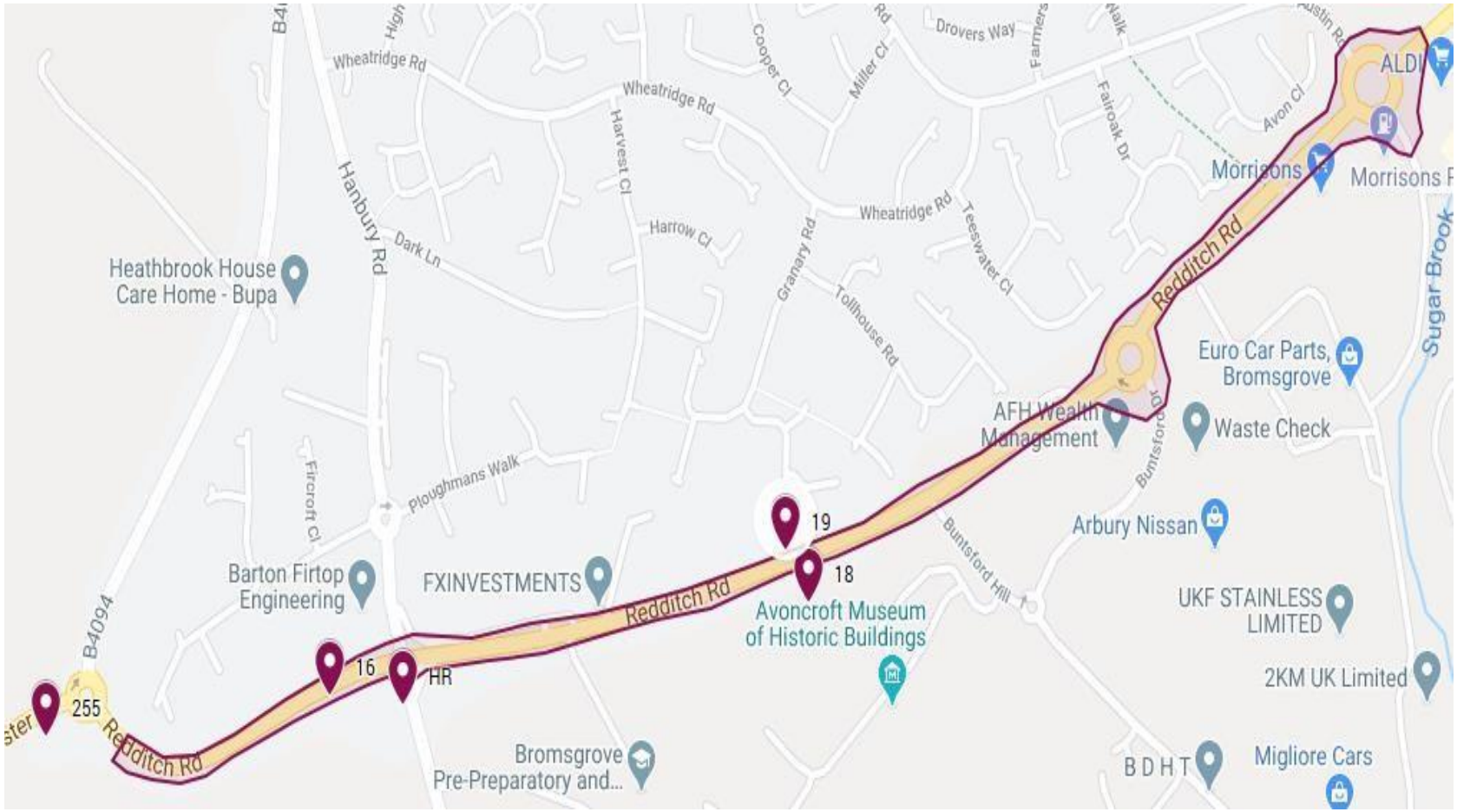
Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Map of Non-Automatic Monitoring Site

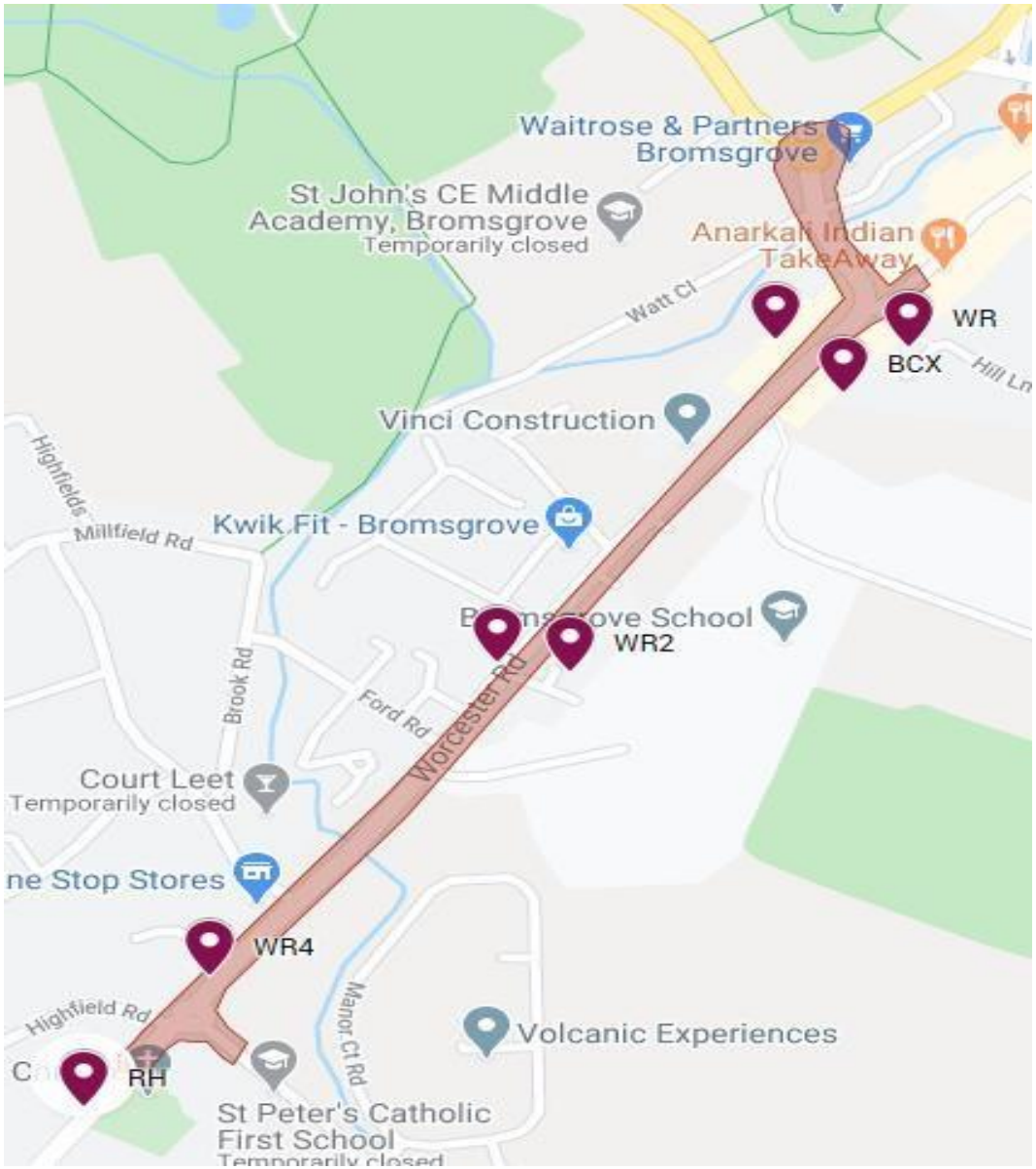


All Monitoring Locations within Bromsgrove District (fig D.1a)

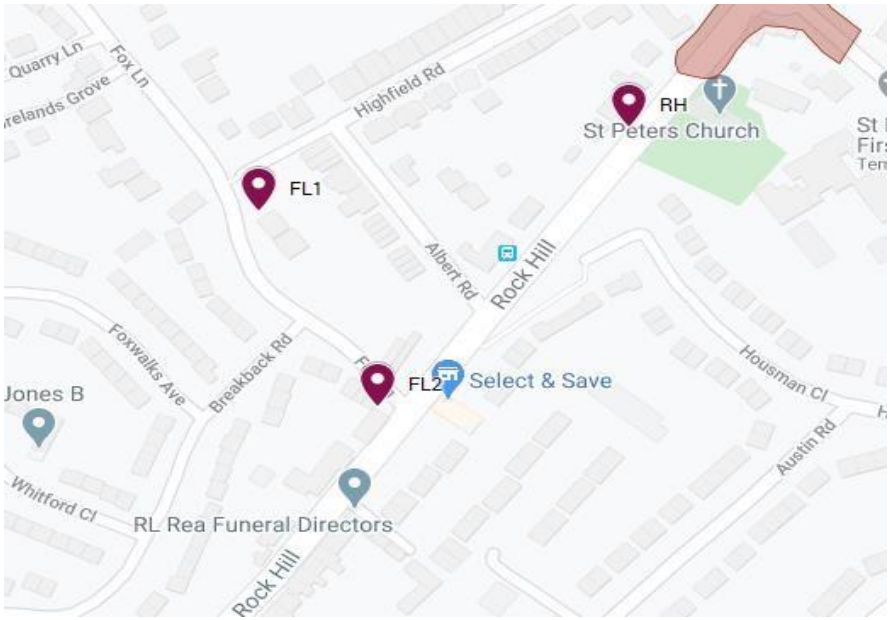
Lickey End AQMA and Monitoring Locations (LE5, LE6, LIK2, F1, LE7, 1, LE4, LIK1) (fig D.1b)



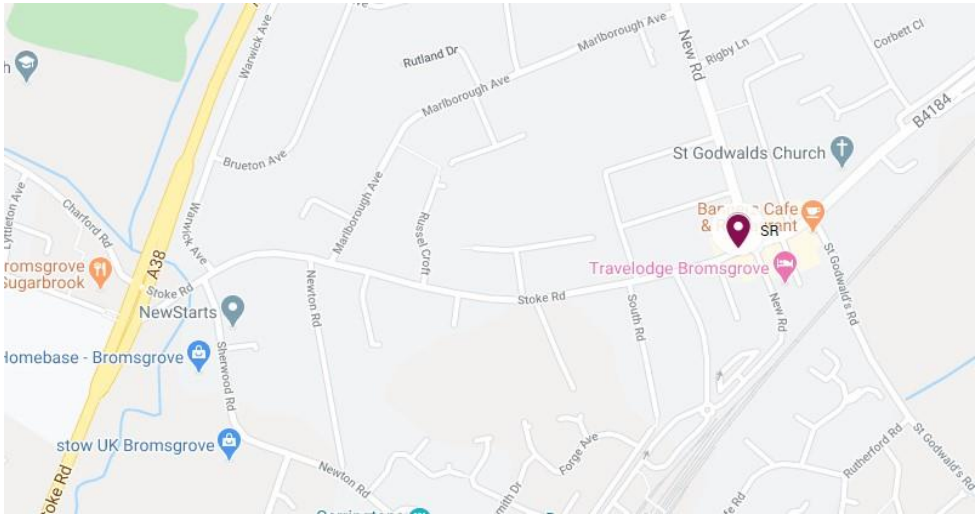
Redditch Road AQMA and Monitoring Locations (19, 18, HR, 16, 255) (fig D.1c)



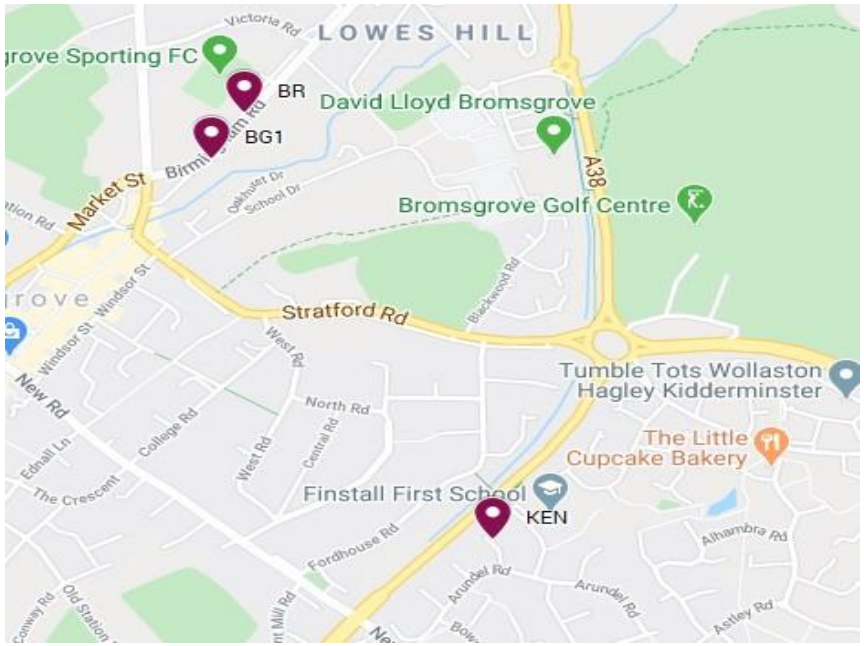
Worcester Road AQMA and Monitoring Locations (WR, BC, BCX, WR2, WR3, WR4, RH) (fig D.1d)



Rock Hill, Bromsgrove Monitoring Locations (FL1, FL2, RH) (fid D.1e)

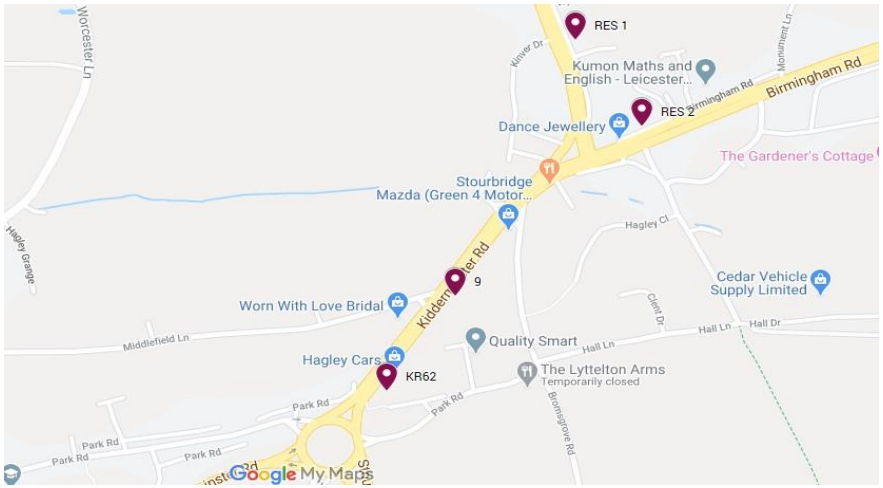


Aston Fields, Bromsgrove Monitoring Location (SR) (Fig D.2f)



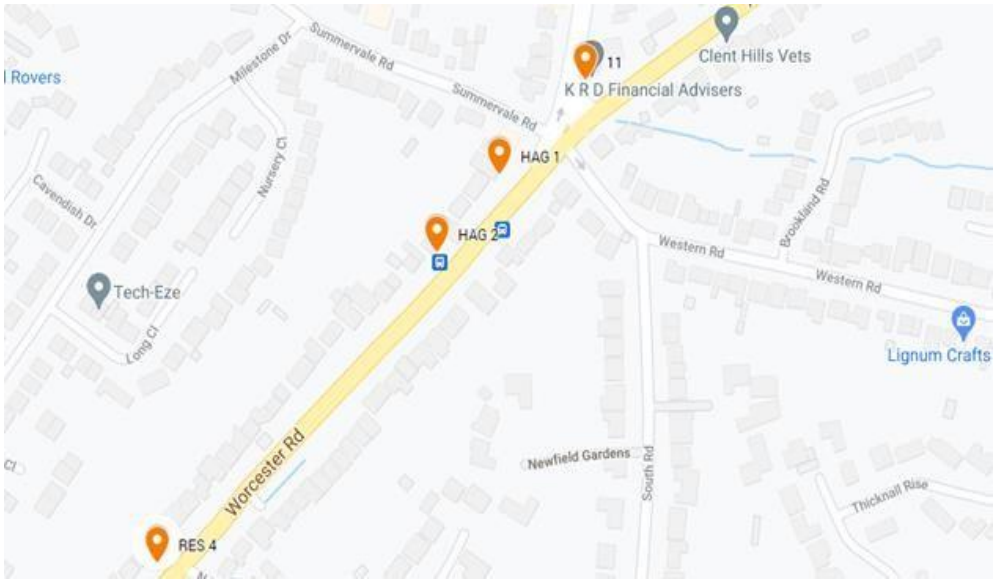
Bromsgrove Monitoring Locations (BR, BG1, KEN) (fig D.1g)

Wildmoor, Bromsgrove Monitoring Location (TS) (fig D.1h)



Monitoring Locations Former Hagley AQMA (RES1, RES2, 9, KR62) (fig D.1i)

West Hagley Monitoring Locations (HAG6, HAG5, HAG3, HAG4, RES3) (fig D.1j)



West Hagley Monitoring Locations (11, HAG1, HAG2, RES4) (fig D.1k)

Rubery Monitoring Location (RUB1) (fig D.1l)

Stourbridge Road, Bromsgrove Monitoring Locations (SBR1, SBR2, SBR3) (fig D.1m)

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO_2)	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM_{10})	40µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO_2)	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO_2)	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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

Glossary of Terms

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

References

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- DEFRA (2022) National Diffusion Tube Bias Adjustment Factor Spreadsheet v.03/22
- DEFRA (2018) Background Mapping for Local Authorities
- Worcestershire Regulatory Services (2013) 'Air Quality Action Plan for Worcestershire'
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- Public Health Outcomes Framework. 2022. Public Health England.