



2021 Air Quality Annual Status Report (ASR)

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

June 2021

Information	Wychavon District Council Details
Local Authority Officer	Laura Carradine
Department	Worcestershire Regulatory Services
Address	Wyre Forest House, Finepoint Way, Kidderminster, DY11 7WF
Telephone	01905 822799
E-mail	enquiries@worcsregservices.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in the Wychavon District

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 ages³, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017⁴.

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

Monitoring across the Wychavon District focuses on nitrogen dioxide via a network of diffusion tubes. Tubes are located in the main urban centres of Evesham, Pershore and Droitwich with additional tubes located within close proximity to strategic roads in Wychbold and Whittington.

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 2020

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

Nitrogen Dioxide Concentrations & Trends across the District

There has been no exceedance of the Nitrogen Dioxide Annual Mean Objective at relevant exposure across the Wychavon District in 2020.

A comparison of monitored levels of nitrogen dioxide across the Wychavon District between 2019 and 2020 shows a general decrease across the District at all locations. An average decrease in concentration of 21% ($5.7\mu\text{g}/\text{m}^3$) can be observed across the District as a whole.

An assessment of trends over the five-year period 2016-2020 shows an average decrease in annual mean nitrogen dioxide concentrations across the District as a whole of 31.4% ($9.5\mu\text{g}/\text{m}^3$) between the period average for 2016-2019 and the 2020 average.

These trends are discussed further in [Section 3.2](#) of this report.

The decreasing trends observed in the Wychavon District area are in line with national trends. Further information regarding national trends in nitrogen dioxide concentrations can be found at [Air quality statistics - GOV.UK \(www.gov.uk\)](http://www.gov.uk)

Nitrogen Dioxide Concentrations & Trends in the Worcester Road, Wychbold AQMA

There is currently one Air Quality Management Area (AQMA) in the Wychavon District. This AQMA was declared for the Worcester Road, Wychbold area on 1st May 2018 due to monitored and modelled exceedances of the annual mean objective for nitrogen dioxide (NO_2).

Details of the AQMA declaration and plans of the AQMA can be found on the following pages of the WRS website: [Air Quality Management Areas - Worcestershire Regulatory Services \(worsregservices.gov.uk\)](http://worsregservices.gov.uk)

A full list of declared and revoked AQMAs can be viewed at [List of Local Authorities with AQMAs - Defra, UK](#)

No exceedance of the Nitrogen Dioxide Annual Mean Air Quality Objective occurred within the Worcester Road, Wychbold AQMA in 2020.

The highest recorded annual mean concentration of nitrogen dioxide at relevant exposure within the AQMA in 2020 was $27.0\mu\text{g}/\text{m}^3$ at EPS56.

The highest recorded roadside annual mean concentration of nitrogen dioxide within the AQMA in 2020 was $33.20\mu\text{g}/\text{m}^3$ at WychAQ1. When corrected for distance to relevant exposure the annual mean concentration of nitrogen dioxide at this location is calculated to be $25.6\mu\text{g}/\text{m}^3$.

A comparison of monitored levels of nitrogen dioxide in the AQMA between 2019 and 2020 shows a general decrease at all locations. An average decrease in concentration of 20.8% ($6.3\mu\text{g}/\text{m}^3$) can be observed in the AQMA.

An assessment of trends over the five-year period 2016-2020 shows an average decrease in annual mean nitrogen dioxide concentrations in the AQMA of 32.3% ($13.5\mu\text{g}/\text{m}^3$) between the period average for 2016-2019 and the 2020 average.

These trends are discussed further in [Section 3.2](#) of this report.

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 Strategy⁵ sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero⁶ 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.

The Wychavon District area generally enjoys good air quality. Over the four-year period 2017 to 2020 there has been a single monitored exceedance of the nitrogen dioxide annual mean air quality in the District ($40\mu\text{g}/\text{m}^3$ was monitored at EPS56 in 2018).

During the reporting year 2020 WRS and Wychavon District Council met with relevant primary stakeholders to discuss the options that are available to Wychavon District Council in relation to the Worcester Road, Wychbold AQMA.

Reductions in nitrogen dioxide concentrations have been monitored in the AQMA over the four-year period 2017 to 2020 such that it is now uncertain as to whether the AQMA is still required. In light of this Wychavon District Council is not currently pursuing actions to improve air quality. Wychavon District Council's preferred option is to implement an automatic monitoring programme in order to gather robust and accurate data to determine whether or not the nitrogen dioxide annual mean objective is still being exceeded in the area, and therefore whether the AQMA is still necessary or requires revocation. Inherent variance and inaccuracy in diffusion tube monitoring data makes it difficult to make robust decisions regarding the continued need, or otherwise, for an AQMA, particularly in situations where monitored nitrogen dioxide concentrations are close to the Objective, there is therefore a need to collect more accurate and robust data ahead of any decision making.

Long-term trends and observed reductions in nitrogen dioxide concentrations are discussed further in [Section 3.2](#) of this report.

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

Further details regarding the automatic monitoring programme for the AQMA are discussed further in [Section 2.2](#) of this report.

Partnership Working

Worcestershire County Council has responsibility for strategic transport issues in the county and published the fourth Local Transport Plan. Over the past seven years WRS has experienced closer working ties with the County Council's Strategic Transport Team and it is anticipated that collaboration on their strategic policies and improvement schemes at the early planning stages will continue to ensure that air quality improvements remain a priority across all of Worcestershire infrastructure.

WRS has also experienced increased liaison with the Director of Public Health (DoPH) department within the County Council in recent years. An Air Quality Partnership led by the Director of Public Health at Worcestershire County council, and supported by WRS, was set up in 2019 to discuss potential actions to improve air quality across the County and determine an action plan for implementation. The group comprises officers from the County and District local authorities, from public health, air quality, strategic planning, sustainability, highways and transport disciplines, and also representatives from the NHS and Highways England. The group met initially in May 2019 to agree terms of reference and in September to discuss potential actions. Further discussions and work to formalise were due to continue in 2020. However, the Partnership is largely driven by the DoPH and as such the response to the Covid-19 pandemic has taken priority in 2020 and the business of the Partnership has been postponed indefinitely for the time being.

Conclusions and Priorities

Conclusions:

- No exceedances of the nitrogen dioxide annual mean objective were identified within or outside of existing AQMAs in 2020.
- Monitoring continues to show reductions in nitrogen dioxide concentrations both across the District and within the AQMA.
- All monitoring results within the existing AQMA were below the nitrogen dioxide annual mean objective. Reductions in nitrogen dioxide concentrations over the four-year period 2017 to 2020 indicate that the AQMA may no longer be required. An automatic

monitoring programme is required to gather accurate and robust data to support a decision regarding the need, or otherwise, for the AQMA.

- There are no monitoring results in excess of the nitrogen dioxide annual mean objective across the District and therefore no requirement to designate any new AQMAs.

Priorities:

- Implementation of automatic monitoring programme in Worcester Road, Wychbold AQMA to gather accurate and robust data. This data will be used to inform a decision regarding the need, or otherwise, for the AQMA in the area.

Local Engagement and How to get Involved

Following direct contact WRS were invited by Defra LAQM Team to join their Local Authority Air Quality Advisory Group (LAQAG), formed in 2017. The group consists of a network of local authority officials acting as an informal sounding board by Defra to enable development of better informed strategy and policy proposals across the two areas of work in air quality- local authorities and domestic combustion. It is an advisory body and not a decision-making body.

WRS is also a member of Central England Environmental Protection Managers Group (CEEPG) which provides a strategic overview and direction for the delivery of Environmental Protection Services across the area of Central England covered by participating authorities. CEEPG responsibilities covers all environmental health matters regarding air quality, noise, contaminated land and LAPPC/IPPC including cooperation and coordination with the Environment Agency and Public Health England.

There are a number of 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;
- Worcestershire County Council 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](#)

- Contact Worcestershire County Council for help and advice on a **Travel Plan** for your business. General travel planning advice is available on Worcestershire County Council's website (including walking, cycling and bus maps and timetables) [Worcestershire County Council Homepage](#);
- **Hold meetings by Conference Call** by phone or using virtual meeting software 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:** low emission vehicle grants are available from the Government. Further information is available at [Low-emission vehicles eligible for a plug-in grant - GOV.UK \(www.gov.uk\)](#)
- If you have to drive follow fuel efficient driving advice, often known as '**Smarter Driving Tips**', to save on fuel and reduce your emissions. A number of 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 \(vehicle-certification-agency.gov.uk\)](#)

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 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. 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 [Public Advice - Worcestershire Regulatory Services \(worcsregservices.gov.uk\)](#)

⁷ <http://www.breathelondon.org/>

⁸ <https://www.londonair.org.uk/LondonAir/guide/MyActionsForMe.aspx>

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1 Local Air Quality Management

This report provides an overview of air quality in Wychavon District Council during 2020. 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 Wychavon 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 [Table E.1](#).

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 Wychavon District Council can be found in [Table 2.1](#). The table presents a description of the AQMA that is currently designated within Wychavon District Council. [Appendix D: Map\(s\) of Monitoring Locations and AQMAs](#) provides maps of the AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO₂ 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 Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Worcester Road, Wychbold	1st May 2018	NO ₂ Annual Mean	An area encompassing a number of properties surrounding strategic road network around J5 M5 and A38	YES	44.6µg/m ³	Highest concentration at relevant exposure 27.0µg/m ³ (highest concentration at roadside 33.2µg/m ³)	n/a	n/a

Wychavon District Council confirm the information on UK-Air regarding their AQMA(s) is up to date

Wychavon District Council confirm that all current AQAPs have been submitted to Defra

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

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

*On the basis of the evidence provided by the local authority the conclusions reached are **accepted** for all sources and pollutants. The next step is for Wychavon District Council to progress the development of their AQAP as soon as practicable and submit an Annual Status Report (with full details of AQAP measures) in 2021.*

Commentary

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. *The Council have provided a thorough report which contains the required content.*

2. *An AQAP for the Wychbold AQMA is still yet to be produced. The ASR should have been used to demonstrate some provisional AQAP measures as sufficient time has passed that there should be some indication what these measures are likely to be. Last year's appraisal advised that, following the identification of the three main contributors to emissions associated with the A38 within the AQMA (diesel cars (43.9%), diesel LGVs (26.0%) and HGVs (15.7%)) from the source apportionment calculations presented within the Council's 2019 ASR, AQAP measures specifically targeting these source groups should be developed. The development of an AQAP within 12-18 months of declaration of an AQMA is necessary in order to comply with the requirements of LAQM. The development of an AQAP is therefore expected to be progressed during the current reporting year, and measures to be implemented **must** be outlined in Table 2.2 of the Council's 2021 ASR.*

The development of an AQAP has not been progressed in 2020 due to uncertainty as to whether an AQMA is still required in the area against a backdrop of improved nitrogen dioxide concentrations over the four-year period 2017 to 2020. Therefore Table 2.2 has not been completed. These long-term trends and possible reasons for them are discussed further in [Section 3.2](#) of this report and in the 2020 ASR.

- 3. Completion of the Options Appraisal has been identified as a key priority, which is appropriate, however the Council are advised to amend this priority to include the subsequent production of an AQAP for the Wychbold AQMA, given its declaration over 2 years ago and a corresponding AQAP is still outstanding.*

Wychavon District Council is not currently progressing with the development of an Action Plan until it has determined whether or not the AQMA at Worcester Road, Wychbold is still required against a backdrop of improved nitrogen dioxide concentrations over the four-year period 2017 to 2020. These long-term trends and possible reasons for them are discussed further in [Section 3.2](#) and in the 2020 ASR.

- 4. The report contains a brief discussion on PM_{2.5}, however more detailed discussion is encouraged. The report does not however draw links to the fraction of mortality attributable to PM_{2.5} emissions. The Council are encouraged to include this in future reports, in addition to a discussion of historical trends, a comparison between Wychavon District and England as a whole, and a comparison to neighbouring authorities. For further guidance, please refer to LAQM Technical Guidance TG16.*

Completed. See [Section 2.3](#) for further details.

- 5. Supporting evidence for bias adjustment factor calculation has been omitted from the report. This must be provided in all future reports, and whilst details of the spreadsheet version and laboratory and tube preparation method have been discussed (and could therefore be verified by the appraiser), a screen capture of the national bias adjustment factor spreadsheet depicting the appropriate factor is required.*

Completed. See [Appendix C](#) for further details.

Worcester Road, Wychbold AQMA update for 2020

During the reporting year 2020 WRS met with relevant primary stakeholders to discuss the options that are available to Wychavon District Council in relation to the Worcester Road, Wychbold AQMA. Discussions included representatives from Wychavon District Council,

Worcestershire County Council and neighbouring Bromsgrove District Council. Highways England were invited to participate but were unable to attend due to technical issues, WRS followed up with Highways England separately following the meeting.

WRS presented long-term monitoring trends, data uncertainties, basic traffic source and destination analysis based on roadside interview data, source apportionment outcomes and potential actions available to Wychavon District Council for improving air quality in the AQMA to initial stakeholders. The potential actions for improving air quality in the AQMA discussed included the following:

- Vehicle charging schemes
- Speed restrictions on the M5
- Improved monitoring

The Worcester Road, Wychbold AQMA is essentially a strategic road junction in a small village. The air quality issues identified by monitoring in the past are linked to transient traffic travelling through the area to and from other destinations. A source apportionment study of the A38, undertaken in 2018, indicates that the main source of emissions affecting NO₂ concentrations relate to diesel cars (43.9%), diesel LGVs (26.0%) and HGVs (15.7%) travelling through the area to and from other destinations. In order to have any meaningful impact on emissions significant large-scale schemes would be required. Available options are limited, costly and resource intensive.

In light of the above Wychavon District Council need to be very certain that such actions are necessary before they proceed further.

Improvements in nitrogen dioxide concentrations have been monitored over the four-year period 2017 to 2020 such that it is now uncertain as to whether an AQMA is still required. There has been a single exceedance of the Nitrogen Dioxide Annual Mean AQO over the four-year period 2017 to 2020 of 40µg/m³ at EPS56 in 2018 (it should be noted that this location is commercial with residential accommodation at first floor level above; the monitored exceedance is at ground floor level and as such may not translate to a true exceedance at relevant exposure above). In addition, there has been no other monitored concentration above 36µg/m³ at relevant exposure in the AQMA since 2018 (see [Section 3.2](#) for further discussion of long-term trends). Possible reasons for the observed improvements are

discussed further in [Section 3.2](#) of this report, and in the 2020 ASR for Wychavon District Council which is available to view via the WRS website at [Local Air Quality Progress Reports - Worcestershire Regulatory Services \(worcsregservices.gov.uk\)](#).

Wychavon District Council is not currently proposing to pursue actions to improve air quality. The preferred option chosen by Wychavon District Council is the implementation of an automatic monitoring programme to confirm the need, or otherwise, for an AQMA in the area.

Whilst diffusion tube data indicates that the AQMA may no longer be necessary uncertainties and inherent variance in diffusion tube data make it difficult to make a robust decision. Tube data has an inherent variance of up to 25%, making it difficult to be certain whether levels are exceeding an Objective or not, particularly where recorded diffusion tube concentrations are close to the Objective.

An automatic monitoring program will allow Wychavon District Council to gather an accurate and robust dataset. This dataset can then be used to draw better informed, robust conclusions as to whether the nitrogen dioxide annual mean objective is still likely to be exceeded at relevant exposure in the area, i.e. whether the AQMA is still required or whether it requires revocation.

If it is concluded that the Objective is still being exceeded a more reliable and robust dataset will allow Wychavon District Council to make well informed decisions relating to the degree of any required improvement, and determine appropriate mitigating actions to achieve any required level of improvement.

In 2020 WRS presented Wychavon District Council with proposals and costings for the installation of two roadside automatic monitors on the A38. Automatic monitoring for NO₂ was proposed in order to confirm the need, or otherwise, for the AQMA. Particulate matter automatic monitoring has been proposed as an additional option to Wychavon District Council to inform its understanding in relation to PM concentrations in its District as currently no PM monitoring is undertaken in the area.

WRS also approached Highways England to discuss the possibility of Highways England funding a third automatic monitor in the immediate vicinity of the M5 to quantify the motorway contribution to nitrogen dioxide concentrations in the area. The contribution of the M5 to local NO₂ concentrations is anticipated to be considerable based on previous modelling outputs and this factor will become key to progressing any action planning should automatic monitoring on the A38 show that an AQMA is still required in the area. WRS advised it would be prudent to gather this data now in order to minimise future delays should the AQMA be shown to still be required. Highways England has declined WRS's proposal and states that a monitoring station at junction 5 of the M5 would not provide any further information other than to confirm data from other monitors operated by Highways England within proximity to the M5 carriageway at Frankley Service Station (17km to the north-east) and Gloucester Motorway Services (53km to the south). Highways England did not provide any further information other than to confirm annual figures for NO₂ that are from an unverified source.

At the time of writing of this report Wychavon District Council has not progressed with the installation of automatic monitors at the Worcester Road, Wychbold AQMA.

Update on schemes indirectly improving air quality across the District

Air Quality Partnership for Worcestershire

An Air Quality Partnership led by the Director of Public Health (DoPH) at Worcestershire County council, and supported by WRS, was set up in 2019 to discuss potential actions to improve air quality across the County and determine an action plan for implementation. The group comprises officers from the County and District authorities from public health, air quality, strategic planning, sustainability, highways and transport disciplines, and also representatives from the NHS and Highways England. The group met initially in May 2019 to discuss terms and references and in September 2019 to discuss potential actions. Further discussions and work to formalise were due to continue in 2020. However, as the Partnership is largely driven by the DoPH the response to the Covid-19 pandemic has taken priority and the business of the Partnership has been postponed indefinitely for the time being.

One of the items discussed by the Partnership was the development of an Air Quality SPD for South Worcestershire strategic planning; this is currently being formulated.

Evesham Transport Strategy

As reported in the 2020 ASR, Phase I of the Evesham Transport Strategy has now been completed. The objective of Phase I was to ensure that maximum capacity is being achieved from the towns existing road network. This has resulted in the easing of traffic flows and reduction of congestion within existing constraints. Measures delivered as part of Phase I include the installation of more efficient traffic signal controllers, painting of box junctions and the extension of parking restriction to improve traffic flow on the towns key north-south corridor.

Phase 2 of the Strategy includes the following:

- The creation of a walking and cycling network in Evesham. Worcestershire County Council notes that a lot of trips in Evesham are relatively short, i.e. starting and finishing within the town. The created of a walking and cycling network will give people the opportunity to swap some of these short trips currently being made in cars for 'active travel' such as walking and cycling. The benefits of this include obvious benefits for health along with reductions in congestion and associated levels of air pollution.
- Capacity improvements for the A46 and the associated route into and out of Evesham town. Worcestershire County Council is currently working in partnership with Midlands Connect to assess what can be done to improve the Evesham stretch of the A46.
- Bringing state of the art traffic monitoring to Evesham. Evesham's traffic signal monitoring and respond to traffic demand. Currently this monitoring cannot distinguish between different types of vehicles. New technology now allows each unique traffic movement to be captured which will allow traffic flows to be managed more effectively in the town along with allowing the effectiveness of each transport scheme that is implemented to be captured.

In January 2020 Worcestershire County Council submitted an application for Pinchpoint Funding for Phase 2 of the Evesham Transport Strategy. The Pinchpoint Fund was subsequently subsumed into the Levelling Up Fund. Worcestershire County Council are currently working with Wychavon District Council to identify other funding sources.

Full details relating to the Evesham Transport Strategy can be viewed on the Worcestershire County Council website at

[Evesham Transport Strategy | Evesham Transport Strategy | Worcestershire County Council](#)

Improvements for the Former Port Street, Evesham AQMA area

As reported in the 2020 ASR Worcestershire County Council confirmed that several elements were being developed for the enhancement of Port Street, Evesham. These overlapped with the Evesham Transport Strategy and included:

- Updating of traffic signals at the junction of Port Street, Waterside and Bridge Street to improve efficiency and provide pedestrian crossing.
- A Public Realm Enhancement Scheme to improve Port Streets footways
- The development of cycle routes to link local routes and the National Cycle Network to Port Street.

Worcestershire County Council have confirmed that the above work commenced in April 2021 to deliver the following 5 objectives:

- Improvement of street aesthetics
- Improvement of footfall, time spent in the street and encouraging non-vehicular traffic
- Safety improvements for all users
- Reduction congestion on Port Street and Waterside
- Reduced delays through Port Street and Waterside.

Worcestershire County Council expect the work to take 24 weeks to complete.

Electric Vehicle Charging

Wychavon District Council has installed a total of 24 electric vehicle charging points in car parks in towns across the District including Evesham, Pershore, Droitwich and Broadway.

Further information can be found at [£150,000 for new electric vehicle chargers - Wychavon District Council - Wychavon District Council](#)

In addition, Wychavon District Council provide an electric pool car for staff use and are also investigating the replacement of a number of other council fleet vehicles with low emission alternatives.

Wychavon District Council Intelligently Green Plan

Wychavon District Council has adopted its Intelligently Green Plan. The carbon reduction plan commits the Council to a range of actions over the next five to ten years, many of which will have a positive impact on general air quality across the District. The main commitments included in the plan are listed below:

- Reduce council-related staff travel through agile working and switch to lower emission vehicles for our small fleet.
- Work with the other Worcestershire district councils to develop a taxi licensing policy to encourage the take-up of electric and other low emission vehicles and to discourage higher polluting older vehicles.
- Ensure that cycling and walking options are an intrinsic part of all plans for new settlements in Wychavon.
- Increase car parking provision at Droitwich Spa, Honeybourne and Pershore railway stations by 31 March 2024.
- Improve connectivity between the railway stations and the towns and between Worcestershire Parkway and the surrounding areas through improving signage and piloting one or more bike hire schemes by 31 March 2022.
- Promote an already established carpooling scheme, such as BlaBla Car.
- Appoint an active travel project officer to lead work with partners on new cycle routes and the development of cycling and walking plans by 31 March 2023.
- Investigate a workplace parking levy offering discounts for low carbon transport initiatives i.e. EV charge points, bike scheme, car sharing and renewable energy installations.
- Promote the development of at least one electric forecourt in the district.
- Review EV charging points in Council owned car parks and encourage and incentivise others to install them including making installation of EV charging points a condition of grant funding for new village halls or other new community buildings and encouraging businesses and tourist destinations to consider installing EV charge points and to convert to lower emission vehicles.
- Deliver a programme of funding, mentoring and advice to improve and increase the range of community-based transport options available across the district including the ticket to ride project by 31 March 2023.
- Work with the Council's waste and street cleaning contractors to move all their fleet to low emission vehicles when technology and energy infrastructure permits.

Further details relating to Wychavon District Council's Intelligently Green Plan can be found at [Intelligently Green - Wychavon District Council](#)

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.

WRS has reviewed the 2018 based DEFRA national background maps to determine projected PM_{2.5} concentrations with the Wychavon District for the 2020 calendar year. The average total PM_{2.5} at 657 locations (centre points of 1km x 1km grids) across the Wychavon District is 7.9µg/m³, with a minimum concentration of 7.3µg/m³ and a maximum concentration of 9.5µg/m³.

This indicates that PM_{2.5} concentrations within the Wychavon District are well below the annual average EU limit value for PM_{2.5} of 25µg/m³.

WRS has reviewed the fraction of mortality attributable to particulate air pollution (indicator 3.01) as published by Public Health England as part of the Public Health Outcomes Framework. 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. Further information is available at [Public Health Profiles - PHE](#)

There are no smoke control areas in the Wychavon District area.

As outlined in Policy Guidance LAQM.PG16 WRS has discussed the role of the DoPH, and the details of PM_{2.5} levels across the County, with the Director of Public Health at Worcestershire County Council. An Air Quality Partnership led by the Director of Public Health at Worcestershire County council, and supported by WRS, was set up in 2019 to discuss

potential actions to improve air quality across the County and determine an action plan for implementation. The group comprises officers from the County and District authorities from public health, air quality, strategic planning, sustainability, highways and transport disciplines, and also 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. Further discussions and work to formalise were due to continue in 2020. However, as the Partnership is largely driven by the DoPH the response to the Covid-19 pandemic has taken priority in 2020 and the business of the Partnership has been postponed indefinitely for the time being.

No additional actions are currently planned by Wychavon District Council in relation to the reduction of PM2.5 levels. However, it is anticipated that any actions taken to improve NO₂ levels across the District will likely result in a linked improvement in PM2.5 levels.

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

This section sets out the monitoring undertaken within 2020 by Wychavon District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Wychavon District Council did not undertake automatic monitoring during 2020.

3.1.2 Non-Automatic Monitoring Sites

Wychavon District Council undertook non- automatic (i.e. passive) monitoring of NO₂ at 23 sites during 2020. [Table A.2](#) 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 33%), and distance correction. Further details on adjustments are provided in [Appendix C](#).

3.2.1 Nitrogen Dioxide (NO₂)

[Table A.3](#) and [Table A.4](#) in [Appendix A](#) compare the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40µg/m³. 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 2020 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.

Changes to the Diffusion Tube Monitoring Network in 2020

There have been no changes to the diffusion tube monitoring network across the Wychavon District in 2020.

Exceedances of the Air Quality Objectives in 2020

There has been no exceedance of the Nitrogen Dioxide Annual Mean Air Quality Objective at any location across the Wychavon District area in 2020.

Trends across the Wychavon District

[Appendix A, Figure A1 Chart 1](#) presents annual mean nitrogen dioxide concentrations at diffusion tube monitoring locations across the District between 2016 and 2020. Please note that the concentrations presented have been bias-adjusted and annualised where necessary; they have not been corrected for distance where locations are not representative of relevant exposure and therefore cannot be directly compared with the Nitrogen Dioxide Annual Mean Air Quality Objective.

A comparison of monitored levels of nitrogen dioxide across the Wychavon District between 2019 and 2020 shows a general decrease across the District at all locations. An average decrease in concentration of 21.0% ($5.7\mu\text{g}/\text{m}^3$) can be observed across the District as a whole.

To further assess long-term trends average District concentrations for the five-year period 2016-2020 have been used to confirm whether levels of nitrogen dioxide are generally increasing or decreasing across the Wychavon area. Where suitably long datasets are available a period average of 2016-2019 bias-adjusted results has been compared with an average of 2020 bias-adjusted results for the same tubes. An average decrease of 31.4%

(9.5µg/m³) can be observed for the District as a whole between the period average for 2016-2019 and the 2020 average:

Comparison 2016-2019 Average District NO2 Concentration with 2020 Average District Concentration								
Tube ID	2016	2017	2018	2019	2016-2019 Average	2020	Difference 2016-2019 Average to 2020	% Change
EPS8	28.6	22.9	26.9	21.9	25.1	16.8	-8.3	-32.9%
EPS9	13.3	10.5	12.0	10.0	11.4	8.6	-2.9	-25.1%
EPS14	40.8	35.2	40.9	33.4	37.6	25.3	-12.3	-32.8%
EPS14a	42.0	37.0	42.0	34.4	38.8	27.1	-11.7	-30.2%
EPS14b	41.8	36.2	40.9	34.5	38.4	26.2	-12.1	-31.6%
EPS27	44.5	39.5	41.5	34.4	40.0	24.7	-15.2	-38.1%
EPS33	32.6	24.5	29.9	23.9	27.7	18.6	-9.2	-33.0%
EPS43	33.8	27.3	33.3	27.3	30.4	21.1	-9.4	-30.8%
EPS44	35.3	28.4	31.1	27.5	30.6	21.2	-9.4	-30.6%
EPS52	33.8	30.8	31.6	26.3	30.6	20.4	-10.3	-33.5%
EPS53	30.0	25.8	27.7	23.4	26.7	18.9	-7.8	-29.3%
EPS56	45.6	36.4	40.0	32.2	38.5	27.0	-11.6	-30.0%
EPS60	16.6	15.3	15.8	13.9	15.4	11.5	-3.9	-25.6%
EPS61	29.6	27.2	29.7	25.0	27.9	19.1	-8.8	-31.6%
EPS62	34.4	29.6	32.8	27.2	31.0	20.0	-11.0	-35.4%
EPS63	24.9	18.9	24.8	18.5	21.8	14.8	-7.0	-32.0%
WyAQ1	52.0	44.2	49.6	41.5	46.8	33.2	-13.6	-29.1%
BG	24.3	22.3	26.1	20.0	23.2	17.4	-5.8	-24.9%
District Average 2016 - 2019 (ug/m3)				30.1				
District Average 2020 (ug/m3)				20.7				
Difference (ug/m3)				-9.5				
% Change				-31.4%				

The above demonstrates that concentrations of nitrogen dioxide in the Wychavon District continue to experience a general downward trend for the period 2016 to 2020. [Appendix A, Figure A1 Chart 2](#) presents best fit trend lines for nitrogen dioxide concentrations for all monitoring locations across the District. A clear downward trend for the period 2016 to 2020 can be seen at all monitoring locations in the District.

Whilst the Wychavon District has experienced general downward trends in nitrogen dioxide over the five-year period 2016 and 2020 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 Wychavon District is largely related to traffic emissions nitrogen dioxide results for 2020 will be impacted to some extent by these changes. The impact of the Covid-19 pandemic on Wychavon District's LAQM work is discussed further in [Appendix F](#).

Trends in the Worcester Road, Wychbold AQMA

[Appendix A, Figure A1 Chart 3](#) presents nitrogen dioxide concentrations at monitoring locations in the Worcester Road, Wychbold AQMA between 2012 and 2020. Please note that concentrations presented have been bias-adjusted and annualised where necessary, they have not been corrected for distance where monitoring locations are not representative of relevant exposure and therefore cannot be directly compared with the Nitrogen Dioxide Annual Mean Air Quality Objective.

[Appendix A, Figure A1 Chart 4](#) presents nitrogen dioxide concentrations at monitoring locations in the Worcester Road, Wychbold AQMA between 2012 and 2020. The concentrations here have been bias-adjusted, annualised and corrected for distance where monitoring locations are not representative of relevant exposure. Distance correction has been completed for data in this chart despite concentrations being below 36ug/m³ in 2020 to allow direct comparison with the Nitrogen Dioxide Annual Mean Air Quality Objective, i.e. to demonstrate concentrations at relevant exposure.

No exceedance of the Nitrogen Dioxide Annual Mean Air Quality Objective occurred within the Worcester Road, Wychbold AQMA in 2020.

The highest recorded annual mean concentration of nitrogen dioxide at relevant exposure in the AQMA in 2020 was 27.0µg/m³ at EPS56. It should be noted that the ground floor of this building is commercial. The tube height at this location is 2.13m with relevant exposure somewhat higher at first floor level.

The highest recorded roadside annual mean concentration of nitrogen dioxide within the AQMA in 2020 was 33.20µg/m³ at WychAQ1. When corrected for distance to relevant exposure the annual mean concentration of nitrogen dioxide at this location is predicted to be 25.6µg/m³.

A comparison of monitored levels of nitrogen dioxide in the AQMA between 2019 and 2020 shows a general decrease at all locations. An average decrease in concentration of 20.8% (6.3µg/m³) can be observed in the AQMA as a whole. As previously discussed the degree of

reduction observed between 2019 and 2020 is likely to have been impacted to some extent by the Covid-19 pandemic. Air quality in the AQMA is largely related to traffic emissions and as such the significant reductions in traffic flow observed during national lockdowns in 2020 will have had some impact on nitrogen dioxide concentrations in 2020. The impact of the Covid-19 pandemic on Wychavon District's LAQM work is discussed further in [Appendix F](#).

Trends for the five-year period 2016 to 2020 have been used to further assess whether levels of nitrogen dioxide are generally increasing or decreasing in the AQMA. Monitored concentrations for the period 2016 – 2019 at three locations (i.e. those locations with sufficiently long datasets) have been averaged and compared with an average of the same three locations in 2020. This comparison shows an average decrease in annual mean nitrogen dioxide concentrations in the AQMA of 32.3% ($13.5\mu\text{g}/\text{m}^3$) between the period average for 2016-2019 and the 2020 average.

Comparison 2016-2019 Average AQMA NO2 Concentration with 2020 Average AQMA Concentration								
Tube ID	2016	2017	2018	2019	2016-2019 Average	2020	Difference 2016-2019 Average to 2020	% Change
EPS27	44.5	39.5	41.5	34.4	40.0	24.7	-15.2	-38.1%
EPS56	45.6	36.4	40.0	32.2	38.5	27.0	-11.6	-30.0%
WyAQ1	52.0	44.2	49.6	41.5	46.8	33.2	-13.6	-29.1%
AQMA Average 2016 - 2019 (ug/m3)				41.8				
AQMA Average 2020 (ug/m3)				28.3				
Difference (ug/m3)				-13.5				
% Change				-32.3%				

Similar downward trends were presented in the 2020 ASR for Wychavon District Council (i.e. pre-Covid-19 pandemic) with an average decrease in annual mean nitrogen dioxide concentration in the AQMA of 21.0% ($8.8\mu\text{g}/\text{m}^3$) between the period average for 2015-2018 and the AQMA average for 2019. Please refer to the 2020 Wychavon District Council ASR for further details [Local Air Quality Progress Reports - Worcestershire Regulatory Services \(wocrsregservices.gov.uk\)](http://wocrsregservices.gov.uk)

The above demonstrates a downward trend in annual mean concentrations of nitrogen dioxide in the AQMA. This downward trend appears to be most significant from 2017 onwards with a single monitored exceedance of the annual mean objective at relevant exposure recorded between 2017 and 2020 ($40\mu\text{g}/\text{m}^3$ was monitored at EPS56 in 2018, where it should also be

noted that relevant exposure is at first floor level and not the ground floor level represented by the height of the tube).

This monitored improvement in concentrations is considered to be attributable to a combination of several factors which were discussed in detail in the 2020 ASR for Wychavon District Council (available to view at [Local Air Quality Progress Reports - Worcestershire Regulatory Services \(worcsregservices.gov.uk\)](https://www.worcsregservices.gov.uk)). A summary of which is provided below:

- Variance in diffusion tube data.
- Meteorological conditions, namely milder winters over the period 2017 to 2019.
- The completion, mid-2017, of Major Scheme enhancement works to the M5 between junctions 4a and 6 along with improved 'off-slip' capacity at the introduction of traffic signal control at junction 5 in the AQMA and very close to those monitoring location which have, in the past, exceeded the Nitrogen Dioxide Annual Mean AQO.
- Bus improvements; the main bus operator using the A38 through Wychbold has retrofitted buses on its 144 route (Birmingham – Worcester – Birmingham) to meet Euro 6 standards in order to comply with the upcoming Birmingham Clean Air Zone.
- National vehicle fleet improvements; the most recent statistics published by the Department for Transport (Table VEH0203) show that between 2019 and 2020 there was a 0.9% drop in the proportion of diesel cars in the national fleet. If this figure translates locally to the AQMA this 0.9% drop will be contributing to the observed improvement in concentrations of nitrogen dioxide because source apportionment shows that diesel cars on the A38 contribute approximately 44% of emissions.

There are currently no proposed changes to existing AQMAs in the Wychavon District. However, the requirement for an AQMA in this area will be kept under review for the next 12-24 months based on the observed significant decrease in annual mean nitrogen dioxide over the period 2016 to 2020. This is combined with the fact that there has been only a single monitored marginal exceedance of the Nitrogen Dioxide Annual Mean AQO ($40\mu\text{g}/\text{m}^3$ at EPS56 in 2018) in the period 2017 - 2020 (where it should be noted that relevant exposure is at first floor level and not ground floor as represented by the diffusion tube height at this location); and no monitored concentrations above $36\mu\text{g}/\text{m}^3$ at relevant exposure since 2018.

Appendix A: Monitoring Results

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

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	Height (m)
EPS8	40 High Street Street Light 8, Pershore	Kerbside	395048	245527	NO2	No	2.0	0.5	No	2.3
EPS9	St. Andrews Road Street light 139, Pershore	Suburban	394571	245377	NO2	No	6.0	3.0	No	2.3
EPS14	Port Street Road Sign, Evesham	Kerbside	404128	243630	NO2	No	1.7	0.7	No	2.4
EPS14a	Port Street Road Sign, Evesham	Kerbside	404128	243630	NO2	No	1.7	0.7	No	2.4
EPS14b	Port Street Road Sign, Evesham	Kerbside	404128	243630	NO2	No	1.7	0.7	No	2.4
EPS27	Worcester Rd, Wychbold	Roadside	392031	265624	NO2	Yes. Worcester Road, Wychbold AQMA	15.5	2.3	No	2.1
EPS33	High Street Streetlight LP 32, Evesham	Roadside	403753	244068	NO2	No	2.5	3.5	No	2.3
EPS43	Long Stay opp. cinema, Port St, Evesham	Roadside	404222	243598	NO2	No	0.0	1.9	No	2.4
EPS44	Camera Post opp. 33, Port St, Evesham	Roadside	404183	243611	NO2	No	2.6	1.2	No	2.5

EPS52	The Bungalow, Whittington	Roadside	387598	252511	NO2	No	0.0	12.0	No	2.0
EPS53	Hillview Cottage, Whittington	Suburban	387595	252533	NO2	No	0.0	22.0	No	1.7
EPS56	Post Office, Worcester Rd, Wychbold	Roadside	391983	265688	NO2	Yes. Worcester Road, Wychbold AQMA	0 (resi at 1st floor)	8.1	No	2.1
EPS58a	Façade 2 Rose Villas, Worcester Road, Wychbold	Roadside	392027	265770	NO2	Yes. Worcester Road, Wychbold AQMA	0.0	8.1	No	2.3
EPS60	Corner of Rynal Street & De La Bere Close, Evesham SL2	Roadside	403914	244046	NO2	No	5.5	1.1	No	2.1
EPS61	1-6 The Old Dairy, Swan Lane, Evesham	Roadside	403796	244006	NO2	No	0.0	1.9	No	2.0
EPS62	Bengal Dreams No 53 Façade, Evesham	Roadside	403729	243971	NO2	No	0 (resi at 1st floor)	5.4	No	2.2
EPS63	60 Mayflower Road, Droitwich	Roadside	390708	262863	NO2	No	0.0	2.5	No	1.9
WMD1	Walk Mill Drive, Wychbold LP363	Roadside	392050	265790	NO2	Yes. Worcester Road, Wychbold AQMA	4.9	2.3	No	2.1
WyAQ1	Lamppost outside Rose Dene, Worcester Road, Wychbold	Roadside	392019	265736	NO2	Yes. Worcester Road, Wychbold AQMA	9.9	1.9	No	2.2
WychAD	Lamppost between BP Garage	Roadside	392384	266195	NO2	Yes. Worcester	n/a	1.5	No	2.1

	and Mill Lane Junction					Road, Wychbold AQMA				
WychCH	Lamppost outside 6 Council Houses, Worcester Road, Wychbold	Roadside	392160	265937	NO2	Yes. Worcester Road, Wychbold AQMA	7.5	2.1	No	2.3
WychSC	Street light on A38 within vicinity of property on Sheldon Close	Roadside	392022	265702	NO2	Yes. Worcester Road, Wychbold AQMA	19.6	1.2	No	2.3
WMD2	Highways England land at end of Walkmill Drive adj. M5, off Worcester Road, Wychbold	Roadside	391871	265859	NO2	Yes. Worcester Road, Wychbold AQMA	13.5	21.5	No	1.8
CROW1	Road sign outside Ou Est Elle, 1 Crown Lane, Wychbold, WR9 7PT	Roadside	392257	266043	NO2	Yes. Worcester Road, Wychbold AQMA	4.3	1.3	No	2.3
BG	West View, Broomhall Green, Norton Roundabout	Urban Background	386297	252150	NO2	No	0.0	36.0	No	1.9

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.4 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

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 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
EPS8	395048	245527	Kerbside	100	51.9	28.6	22.9	26.9	21.9	16.8
EPS9	394571	245377	Suburban	100	51.9	13.3	10.5	12.0	10.0	8.6
EPS14	404128	243630	Kerbside	83	44.2	40.8	35.2	40.9	33.4	25.3
EPS14a	404128	243630	Kerbside	100	51.9	42.0	37.0	42.0	34.4	27.1
EPS14b	404128	243630	Kerbside	100	51.9	41.8	36.2	40.9	34.5	26.2
EPS27	392031	265624	Roadside	83	42.3	44.5	39.5	41.5	34.4	24.7
EPS33	403753	244068	Roadside	100	51.9	32.6	24.5	29.9	23.9	18.6
EPS43	404222	243598	Roadside	100	51.9	33.8	27.3	33.3	27.3	21.1
EPS44	404183	243611	Roadside	83	44.2	35.3	28.4	31.1	27.5	21.2
EPS52	387598	252511	Roadside	100	51.9	33.8	30.8	31.6	26.3	20.4
EPS53	387595	252533	Suburban	100	51.9	30.0	25.8	27.7	23.4	18.9
EPS56	391983	265688	Roadside	100	51.9	45.6	36.4	40.0	32.2	27.0
EPS58a	392027	265770	Roadside	100	51.9			35.1	26.9	21.9

EPS60	403914	244046	Roadside	100	51.9	16.6	15.3	15.8	13.9	11.5
EPS61	403796	244006	Roadside	100	51.9	29.6	27.2	29.7	25.0	19.1
EPS62	403729	243971	Roadside	83	42.3	34.4	29.6	32.8	27.2	20.0
EPS63	390708	262863	Roadside	83	44.2	24.9	18.9	24.8	18.5	14.8
WMD1	392050	265790	Roadside	33	17.3	46.3	40.2	40.2	33.2	
WyAQ1	392019	265736	Roadside	83	42.3	52.0	44.2	49.6	41.5	33.2
WychAD	392384	266195	Roadside	100	51.9			36.8	29.7	24.5
WychCH	392160	265937	Roadside	100	51.9			35.8	29.3	21.8
WychSC	392022	265702	Roadside	100	51.9			39.4	30.9	23.4
WMD2	391871	265859	Roadside	100	51.9				25.2	21.1
CROW1	392257	266043	Roadside	100	51.9				22.7	18.1
BG	386297	252150	Urban Background	100	51.9	24.3	22.3	26.1	20.4	17.4

Annualisation has been conducted where data capture is <75% and >33% 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 $\mu\text{g}/\text{m}^3$.

Exceedances of the NO_2 annual mean objective of $40\mu\text{g}/\text{m}^3$ are shown in **bold**.

NO_2 annual means exceeding $60\mu\text{g}/\text{m}^3$, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

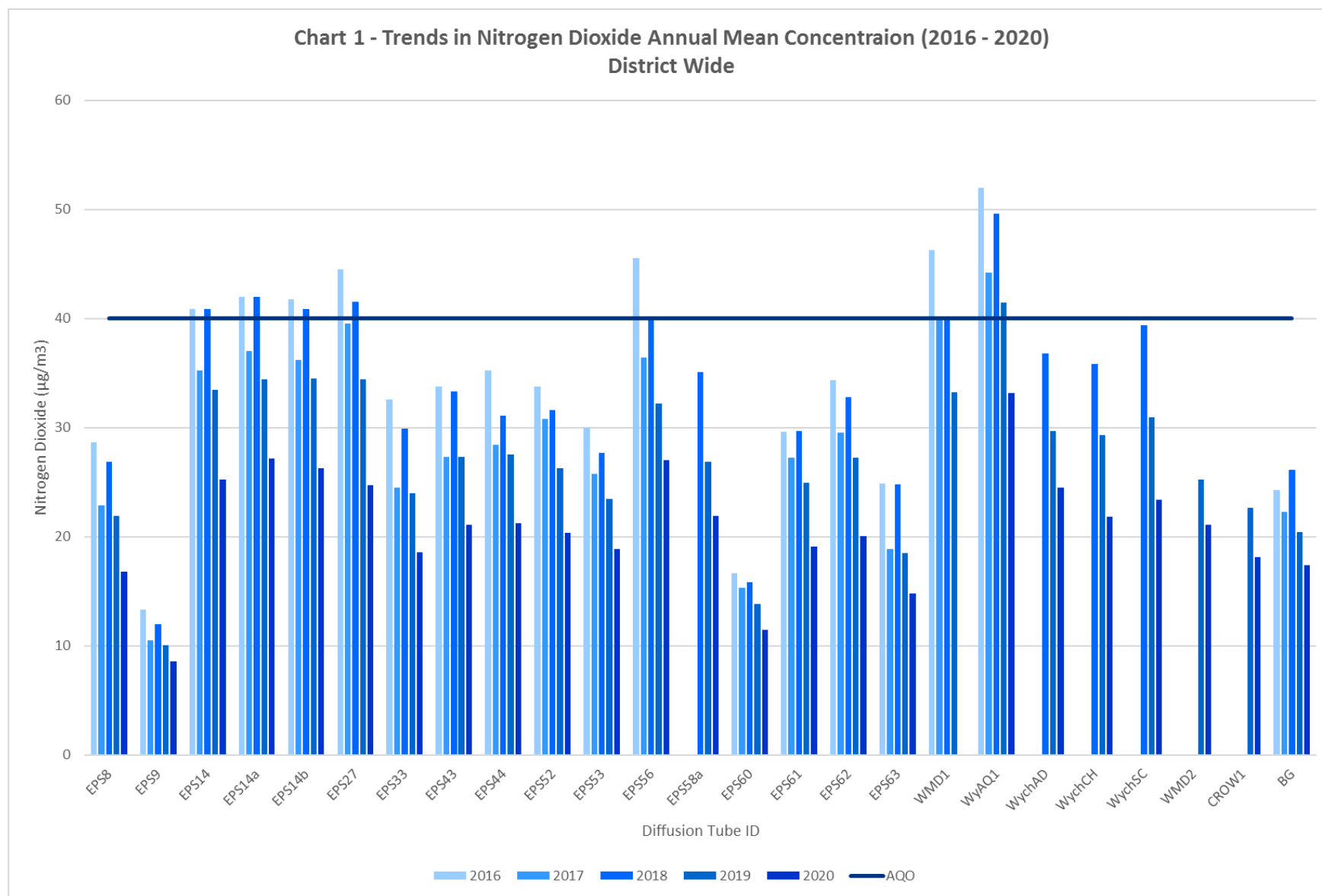
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

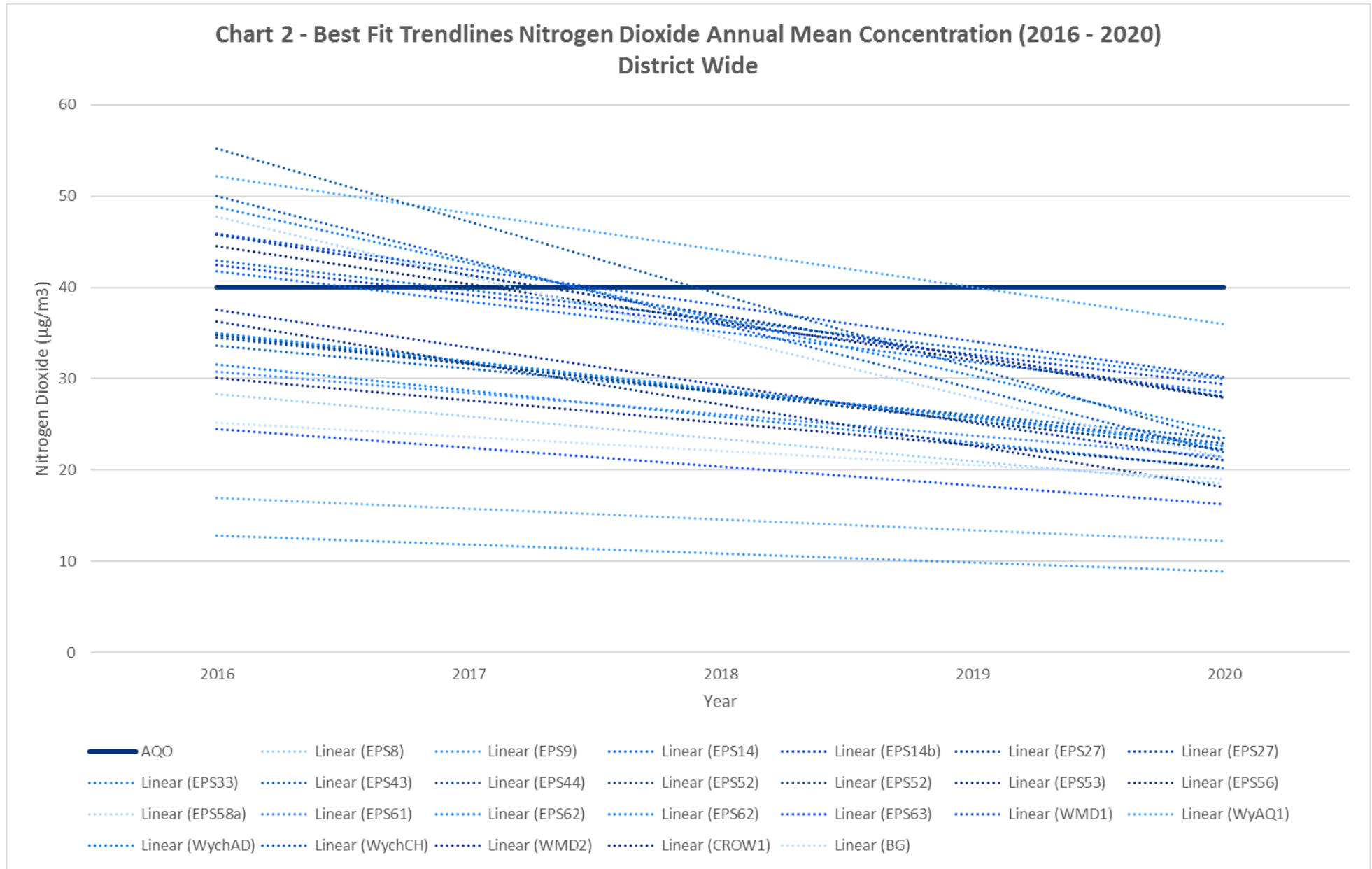
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(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



**Chart 2 - Best Fit Trendlines Nitrogen Dioxide Annual Mean Concentration (2016 - 2020)
District Wide**



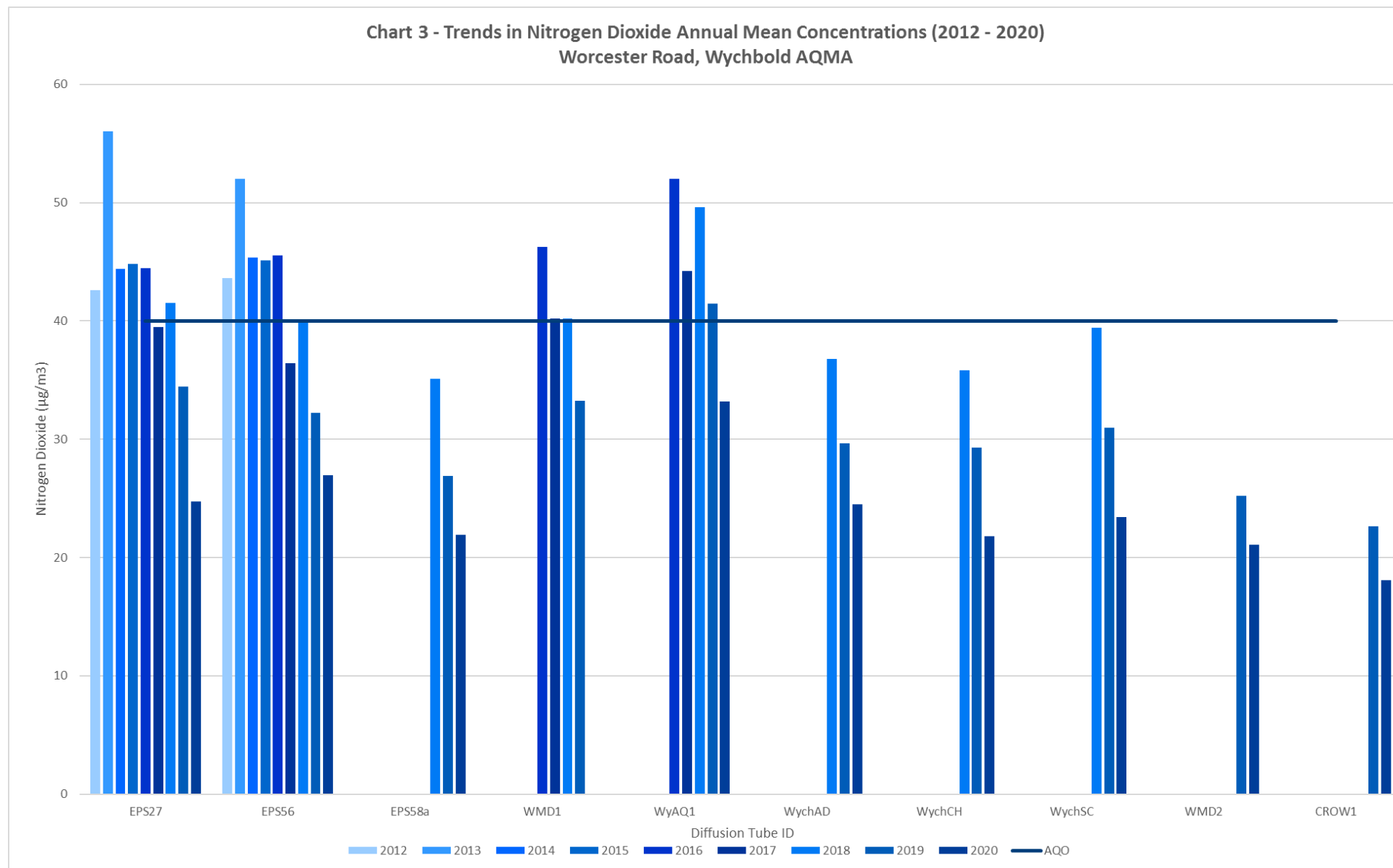
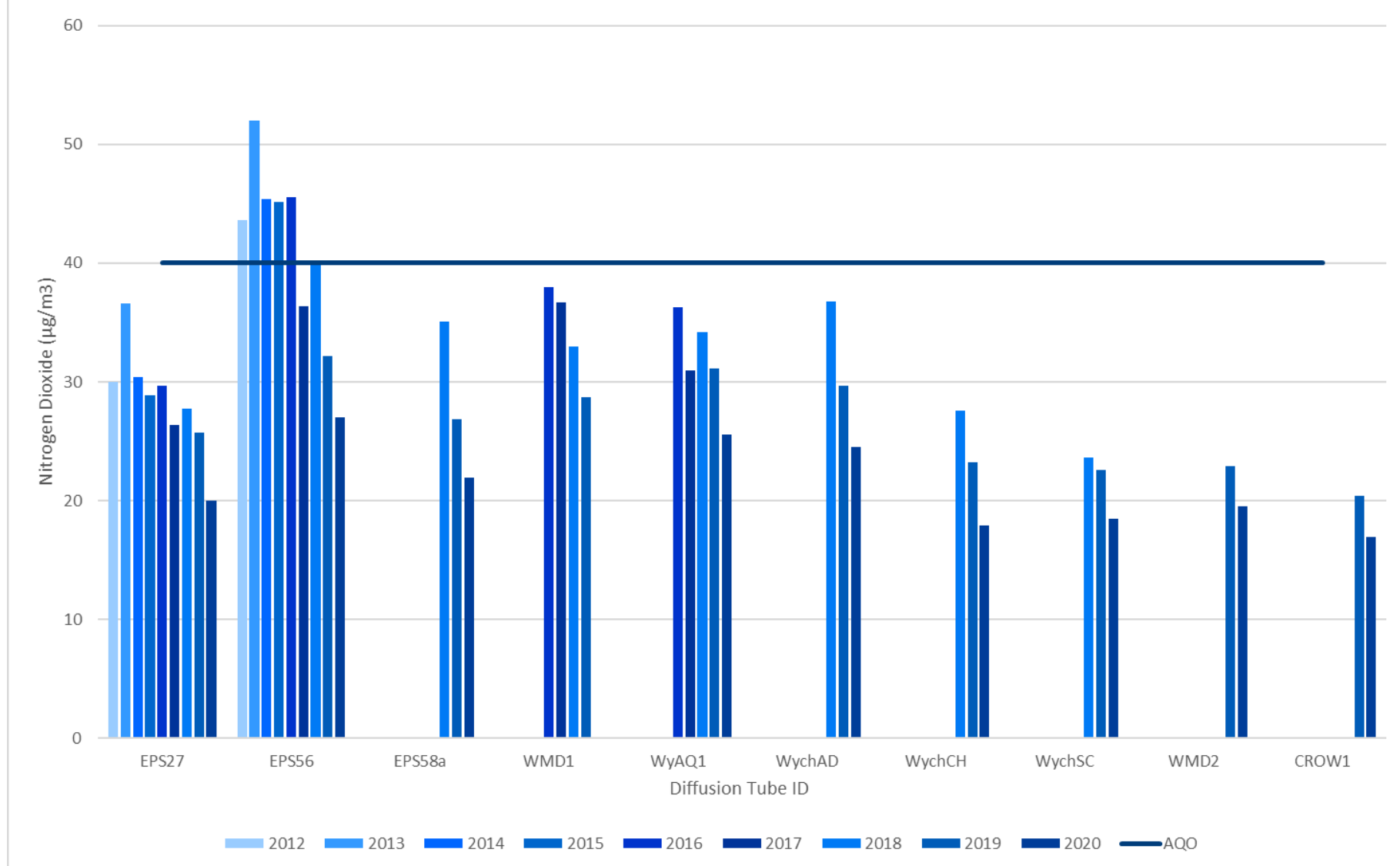


Chart 4 - Trends in Nitrogen Dioxide Annual Mean Concentrations (2012 - 2020)
Worcester Road, Wychbold AQMA
(concentrations calculated back to relevant exposure)



Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO₂ 2020 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
EPS8	395048	245527							19.1	19.5	22.2	23.5	21.3	25.1	21.7	16.8		
EPS9	394571	245377							6.0	7.8	10.1	10.9	15.2	16.5	11.1	8.6		
EPS14	404128	243630								32.3	34.2	35.6	38.6	38.1	35.7	25.3		
EPS14a	404128	243630							28.2	32.9	35.7	37.9	36.9	38.8	35.1	27.1		
EPS14b	404128	243630							27.1	32.9	33.6	33.1	38.0	38.7	33.9	26.2		
EPS27	392031	265624							30.2		35.1	32.2	38.3	34.9	34.1	24.7		
EPS33	403753	244068							13.6	27.8	23.1	23.7	27.1	28.8	24.0	18.6		
EPS43	404222	243598							20.9	26.8	26.8	29.1	29.9	30.0	27.2	21.1		
EPS44	404183	243611								26.0	30.9	28.7	33.1	31.4	30.0	21.2		
EPS52	387598	252511							21.4	23.1	28.2	25.8	32.8	26.7	26.3	20.4		
EPS53	387595	252533							17.9	19.3	25.2	24.5	28.7	31.0	24.4	18.9		
EPS56	391983	265688							29.5	33.0	35.8	37.8	36.6	36.6	34.9	27.0		
EPS58a	392027	265770							22.8	25.6	29.1	27.4	33.5	31.4	28.3	21.9		
EPS60	403914	244046							7.7	10.9	14.1	15.6	21.6	19.0	14.8	11.5		
EPS61	403796	244006							19.4	22.2	25.7	25.0	26.4	29.3	24.7	19.1		
EPS62	403729	243971							22.5	24.2	27.8		30.7	23.9	25.8	20.0		
EPS63	390708	262863								20.1	20.4	18.7	21.4	24.1	20.9	14.8		
WMD1	392050	265790											44.5	40.5	-	-		

WyAQ1	392019	265736							36.6	40.6	42.3		46.4	47.8	42.7	33.2		
WychAD	392384	266195							20.8	32.2	30.9	34.1	37.2	34.8	31.7	24.5		
WychCH	392160	265937							24.5	24.7	28.2	30.3	31.5	29.9	28.2	21.8		
WychSC	392022	265702							24.2	27.1	31.3	30.2	32.4	36.2	30.2	23.4		
WMD2	391871	265859							27.0	24.6	28.5	28.5	28.0	26.9	27.3	21.1		
CROW1	392257	266043							16.5	21.0	23.1	23.7	26.4	29.6	23.4	18.1		
BG	386297	252150							12.3	16.7	20.2	25.2	27.4	33.3	22.5	17.4		

- All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1
- Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16
- Local bias adjustment factor used
- National bias adjustment factor used
- Where applicable, data has been distance corrected for relevant exposure in the final column
- Wychavon District Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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 Wychavon District During 2020

Wychavon District Council has not identified any new sources relating to air quality within the reporting year of 2020.

Additional Air Quality Works Undertaken by Wychavon District Council in 2020

Wychavon District Council has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

The following UKAS accredited company provided Wychavon District Council with nitrogen dioxide diffusion tubes and analysis in 2020:

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

diffusion@gradko.com

The 20% Triethanolamine (TEA) / De-ionised Water preparation method is used.

Gradko International Limited participate in the AIR NO₂ Proficiency Testing Scheme (AIR-PT). The most recent results for Gradko International Limited under the AIR-PT Scheme demonstrated performance was 75% satisfactory for the periods January to February 2020 and September to October 2020. No results were reported to the AIR-PT Scheme for Gradko International Limited for the periods May to June 2020 and July to August 2020 due to the impact of the Covid-19 pandemic. Tube precision was 'Good' throughout 2020.

All monitoring undertaken has been completed in accordance with the 2020 Diffusion Tube Monitoring Calendar, i.e. on or within ± 2 days of the specified date.

Excluded Diffusion Tube Data

District Wide

In 2020 Wychavon District Council changed diffusion tube supplier part way through the calendar year. In addition, Wychavon District Council experienced several months where diffusion tubes were not exposed due to the impact of the Covid-19 pandemic.

Tubes were exposed as follows:

Months	Tubes Exposed?	Tube Supplier
Jan- Feb	Yes	Somerset Scientific Services
March – June	No	n/a
July – December	Yes	Gradko International Limited

Diffusion tube data for January to February 2020 has been omitted from diffusion tube data processing and reporting. Data capture for tubes supplied by Somerset Scientific Services during 2020 is <33% and as such it cannot be annualised in accordance with the methodology outlined in LAQM.TG.16 and subsequently cannot be bias-adjusted in accordance with the methodology for bias-adjusting data from two laboratories as outlined in LAQM.TG.16.

Confirmation regarding this approach was sought from the LAQM Helpdesk which confirmed via email on 20th May 2021 that the January to February diffusion tube data for 2020 should be excluded from data processing and reporting due to insufficient data capture.

For information the raw diffusion tube data for January to February 2020 is provided below:

Diffusion Tube ID	Raw Nitrogen Dioxide Concentration ($\mu\text{g}/\text{m}^3$)	
	January 2020	February 2020
EPS8	30.6	22.6
EPS9	14.0	6.4
EPS14	47.1	38.6
EPS14a	47.6	41.0
EPS14b	49.3	43.7
EPS27	47.8	46.5
EPS33	31.3	21.4
EPS43	36.9	
EPS44	38.2	29.8
EPS52	40.1	27.3
EPS53	34.3	23.8
EPS56	42.7	32.8
EPS58a	33.2	28.0
EPS60	21.9	15.0
EPS61	38.3	34.8
EPS62	41.5	37.4
EPS63	21.1	15.5
WMD1		38.5
WyAQ1	57.0	48.0
WychAD	45.6	31.5
WychCH	43.6	38.2
WychSC	43.0	41.6
WMD2	38.1	
CROW1	29.7	26.7
BG	33.3	28.3

Tube data for July to December 2020 represents >33% data capture for tubes supplied by a single laboratory (Gradko International Limited) and as such has been annualised and bias-adjusted in accordance with the methodologies prescribed by LAQM.TG.16. Further information is provided below.

Diffusion Tube Location WMD1

Four months of data were gathered for this tube between July 2020 and December 2020 with Gradko International as tube supplier. In August and September the diffusion tube was noted as being 'found on the ground'. A review of concentrations for these months, including a comparison of concentrations at this location for August and September in 2017, 2018 and 2019, indicates that the 2020 results for August and September are likely to be erroneous. The 2020 results are between approximately 17ug/m³ and 19ug/m³ lower than the average concentration at the same location for the three years 2017, 2018 and 2019:

WMD1	Un-adjusted raw monthly NO ₂ concentration (µg/m ³)			
	2017	2018	2019	2020
August	40.9	40.7	40.8	23.2
September	39.0	42.7	37.8	21.4

Due to the above the 2020 results for August and September at location WMD1 are considered to be erroneous and have been removed from the dataset.

This reduces data capture for this location to <33% and as such results could not be annualised in accordance with the methodology outlined in LAQM.TG16 and are therefore not included in reporting. Raw diffusion tube data for location WMD1 for July to December 2020 is provided below for information:

	Un-adjusted raw monthly NO ₂ concentration (µg/m ³)					
	July	August	September	October	November	December
WMD1		23.2	21.4		44.5	40.5

Diffusion Tube Annualisation

In 2020, with the exception of WMD1, all diffusion tube monitoring locations within the Wychavon District had data capture of more than 33% but less than 75% and therefore all required annualisation.

Annualisation calculations have been carried out using the Diffusion Tube Data Processing Tool (v1.0). Hourly NO₂ data for the period 8th January 2020 to 6th January 2021 from four AURN background automatic monitoring sites within a distance of less than 50 miles has been selected for use in the Tool. The selected AURN automatic monitoring sites are:

- West Bromwich Kendrick Park (urban background)
- Birmingham Ladywood (urban background)
- Leominster (suburban background)
- Leamington Spa (urban background)

A summary of annualisation factors and results are provided in [Table C.2](#) below.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 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 regarding 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/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

WRS have applied a national bias adjustment factor of 0.81 to the 2020 monitoring data using the Diffusion Tube Data Processing Tool (v1.0). A summary of bias adjustment factors used by WRS for the Wychavon District over the past five years is presented in [Table C.1](#).

WRS has used a national bias adjustment factor as no co-location automatic monitoring studies are conducted in the vicinity and as such it is not possible to derive a local bias adjustment factor. WRS has determined the appropriate national bias adjustment factor using Version 03/21 of the Defra published National Diffusion Tube Bias Adjustment Spreadsheet. Eighteen studies are applicable to the national bias adjustment factor for the laboratory used in 2020. A screenshot of the National Bias-Adjustment Factor Spreadsheet (v03/21) depicting the appropriate adjustment factor is provided below:

National Diffusion Tube Bias Adjustment Factor Spreadsheet				Spreadsheet Version Number: 03/21							
Follow the steps below in the correct order to show the results of relevant co-location studies							This spreadsheet will be updated at the end of June 2021				
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods							Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet				
This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.							LAQM Helpdesk Website				
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.				Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.							
Step 1:		Step 2:		Step 3:		Step 4:					
Select the Laboratory that Analyses Your Tubes from the Drop-Down List		Select a Preparation Method from the Drop-Down List		Select a Year from the Drop-Down List		Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.					
If a laboratory is not chosen, we have no data for this laboratory.		If a preparation method is not chosen, we have no data for this method at this laboratory.		If a year is not chosen, we have no data		If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953					
Analysed By ¹	Method	Year ²	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ³	Bias Adjustment Factor (A) (C ₁₀₋₃)	
Aberdeen Scientific Services	20% TEA in water	2020		Overall Factor ⁴ (7 studies)				Use	0.77		
Edinburgh Scientific Services	50% TEA in acetone	2020		Overall Factor ⁴ (2 studies)				Use	0.88		
Glasgow Scientific Services	20% TEA in water	2020		Overall Factor ⁴ (10 studies)				Use	0.96		
Gradko	20% TEA in water	2020		Overall Factor ⁴ (18 studies)				Use	0.81		
Gradko	50% TEA in acetone	2020		Overall Factor ⁴ (14 studies)				Use	0.82		
Lambeth Scientific Services	50% TEA in acetone	2020		Overall Factor ⁴ (5 studies)				Use	0.96		
Milton Keynes Council	20% TEA in water	2020		Overall Factor ⁴ (4 studies)				Use	0.83		
SOCOTEC Didcot	20% TEA in water	2020		Overall Factor ⁴ (6 studies)				Use	0.74		
SOCOTEC Didcot	50% TEA in acetone	2020		Overall Factor ⁴ (22 studies)				Use	0.77		
SOCOTEC Glasgow	20% TEA in water	2020		Overall Factor ⁴ (1 study)				Use	0.79		
SOCOTEC Glasgow	50% TEA in acetone	2020		Overall Factor ⁴ (1 study)				Use	0.79		
Somerset County Council	20% TEA in water	2020		Overall Factor ⁴ (2 studies)				Use	0.76		
South Yorkshire Air Quality Samplers	50% TEA in acetone	2020		Overall Factor ⁴ (1 study)				Use	0.77		
Staffordshire Scientific Services	20% TEA in water	2020		Overall Factor ⁴ (15 studies)				Use	0.85		
Tayside Scientific Services	20% TEA in water	2020		Overall Factor ⁴ (1 study)				Use	0.75		

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.81
2019	National	03/20	0.78
2018	National	03/19	0.89
2017	National	03/18	0.77
2016	National	03/17	0.89

NO₂ Fall-off with Distance from the Road

No diffusion tube monitoring locations within Wychavon District required distance correction during 2020.

However, WRS undertook distance correction for tube locations not representative of relevant exposure in the Worcester Road, Wychbold AQMA to allow for direct comparison with the Nitrogen Dioxide Annual Mean Objective and the discussion of long-term trends at relevant exposure. NO₂ fall-off with distance from road calculations were completed using v4.2 of the Bureau Veritas NO₂ Fall-Off with Distance From Road Calculator and are copied below:

Site Name/ID	Distance (m)		NO ₂ Annual Mean Concentration (µg/m ³)		
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor
WyAQ1	1.9	11.8	15.2	33.2	25.6
WychCH	2.1	9.6	11.0	21.8	17.9
WychSC	1.2	20.8	15.2	23.4	18.5
CROW1	1.3	5.6	14.3	18.1	16.9
WMD1	2.3	7.2	15.2	22.4	20.4
EPS27	2.3	17.8	15.2	24.7	20.0
WMD2	21.5	36.0	15.2	21.1	19.5

Please note that predicted concentrations at receptors associated with monitoring locations WychSC and WMD2 should be treated with caution as receptors are more than 20m further from the kerb than at these monitoring locations.

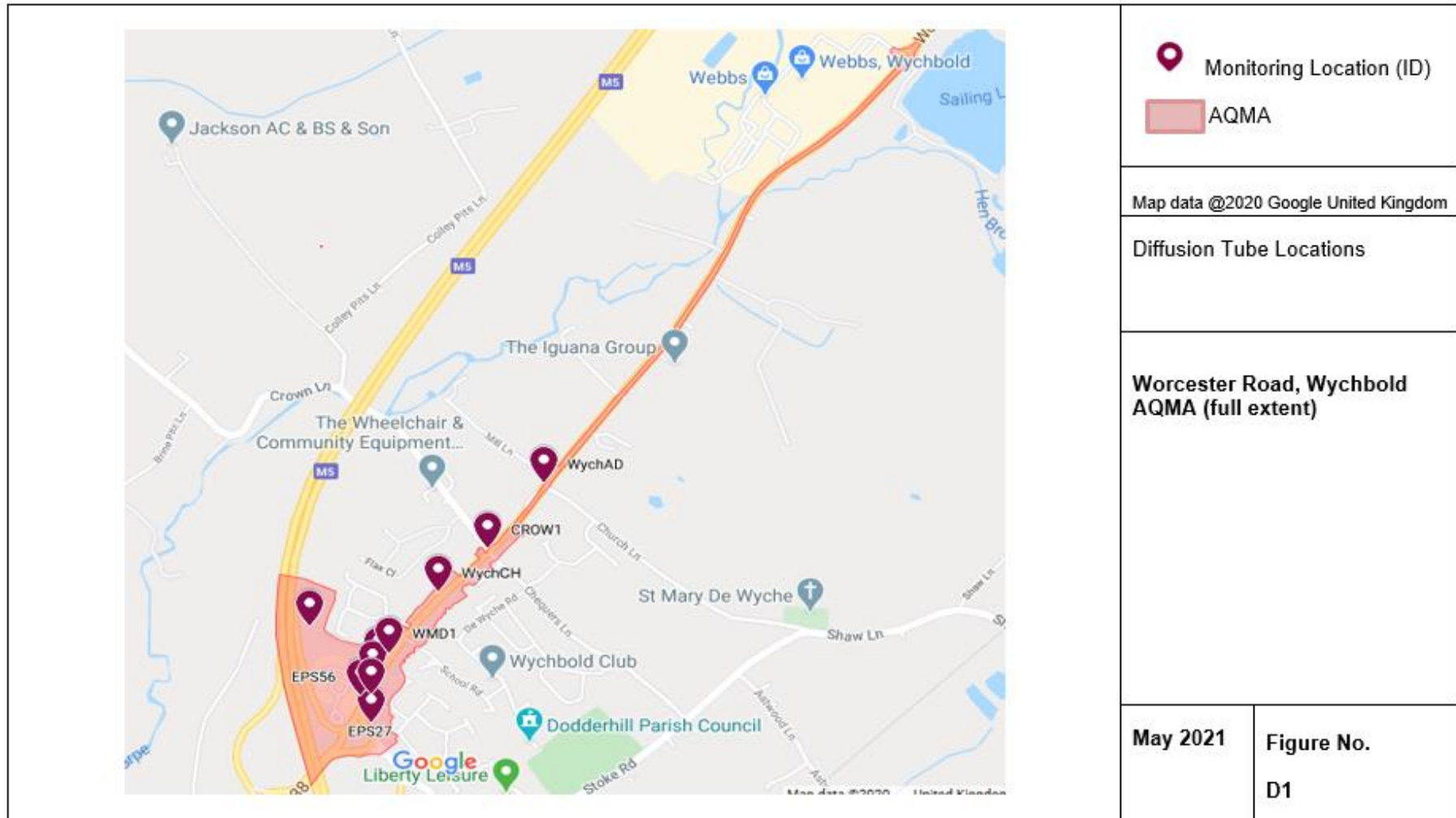
Table C.2 – Annualisation Summary (concentrations presented in $\mu\text{g}/\text{m}^3$)

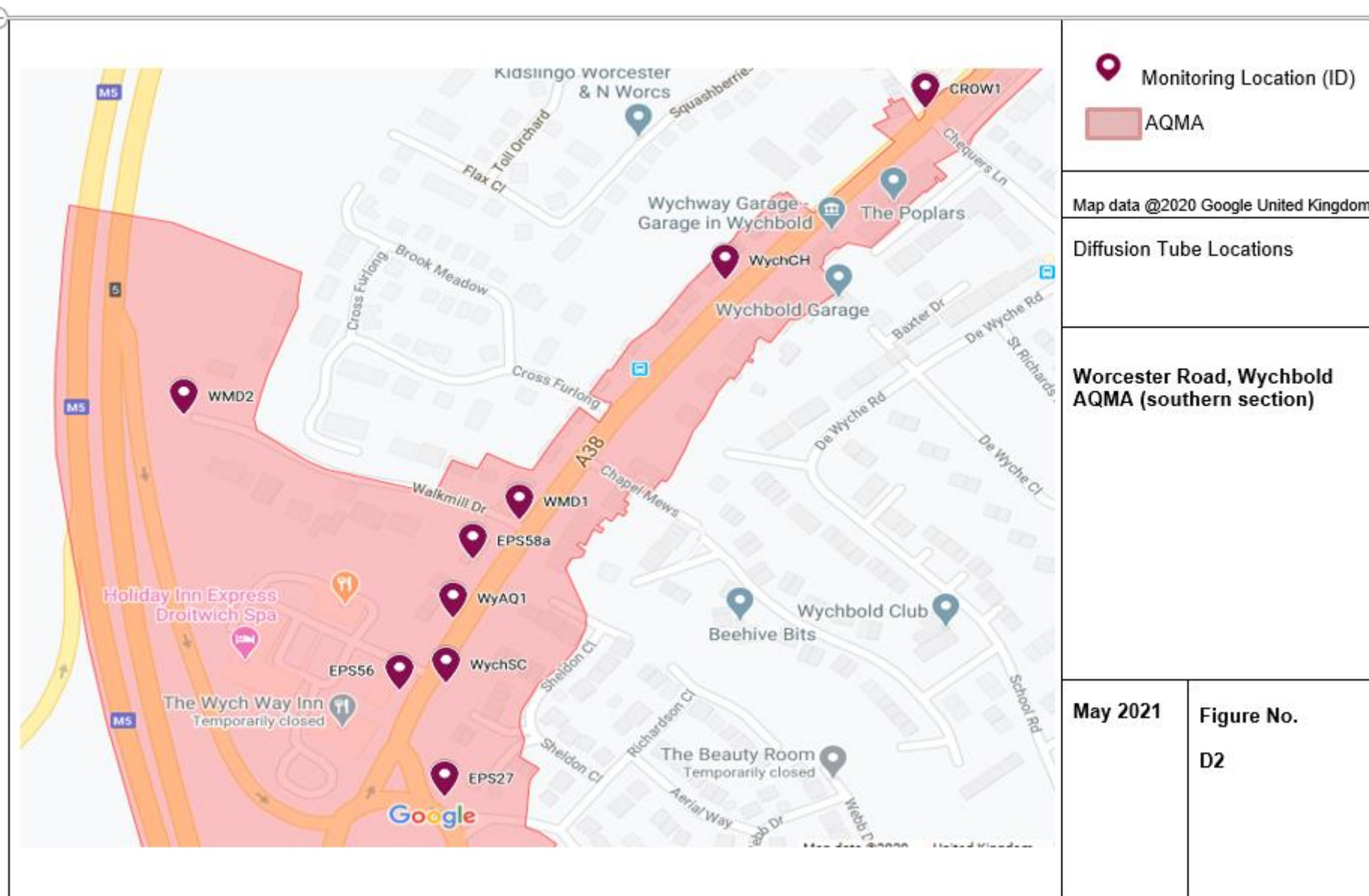
Site ID	Annualisation Factor West Bromwich Kendrick Park	Annualisation Factor Birmingham Ladywood	Annualisation Factor Leominster	Annualisation Factor Leamington Spa	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
EPS8	0.9526	0.9258	1.0072	0.9350	0.9551	21.7	20.8	
EPS9	0.9526	0.9258	1.0072	0.9350	0.9551	11.1	10.6	
EPS14	0.8751	0.8487	0.9004	0.8650	0.8723	35.7	31.2	
EPS14a	0.9526	0.9258	1.0072	0.9350	0.9551	35.1	33.5	
EPS14b	0.9526	0.9258	1.0072	0.9350	0.9551	33.9	32.4	
EPS27	0.9014	0.8655	0.9563	0.8549	0.8945	34.1	30.5	
EPS33	0.9526	0.9258	1.0072	0.9350	0.9551	24.0	22.9	
EPS43	0.9526	0.9258	1.0072	0.9350	0.9551	27.2	26.0	
EPS44	0.8751	0.8487	0.9004	0.8650	0.8723	30.0	26.2	
EPS52	0.9526	0.9258	1.0072	0.9350	0.9551	26.3	25.1	
EPS53	0.9526	0.9258	1.0072	0.9350	0.9551	24.4	23.3	
EPS56	0.9526	0.9258	1.0072	0.9350	0.9551	34.9	33.3	
EPS58a	0.9526	0.9258	1.0072	0.9350	0.9551	28.3	27.0	
EPS60	0.9526	0.9258	1.0072	0.9350	0.9551	14.8	14.2	

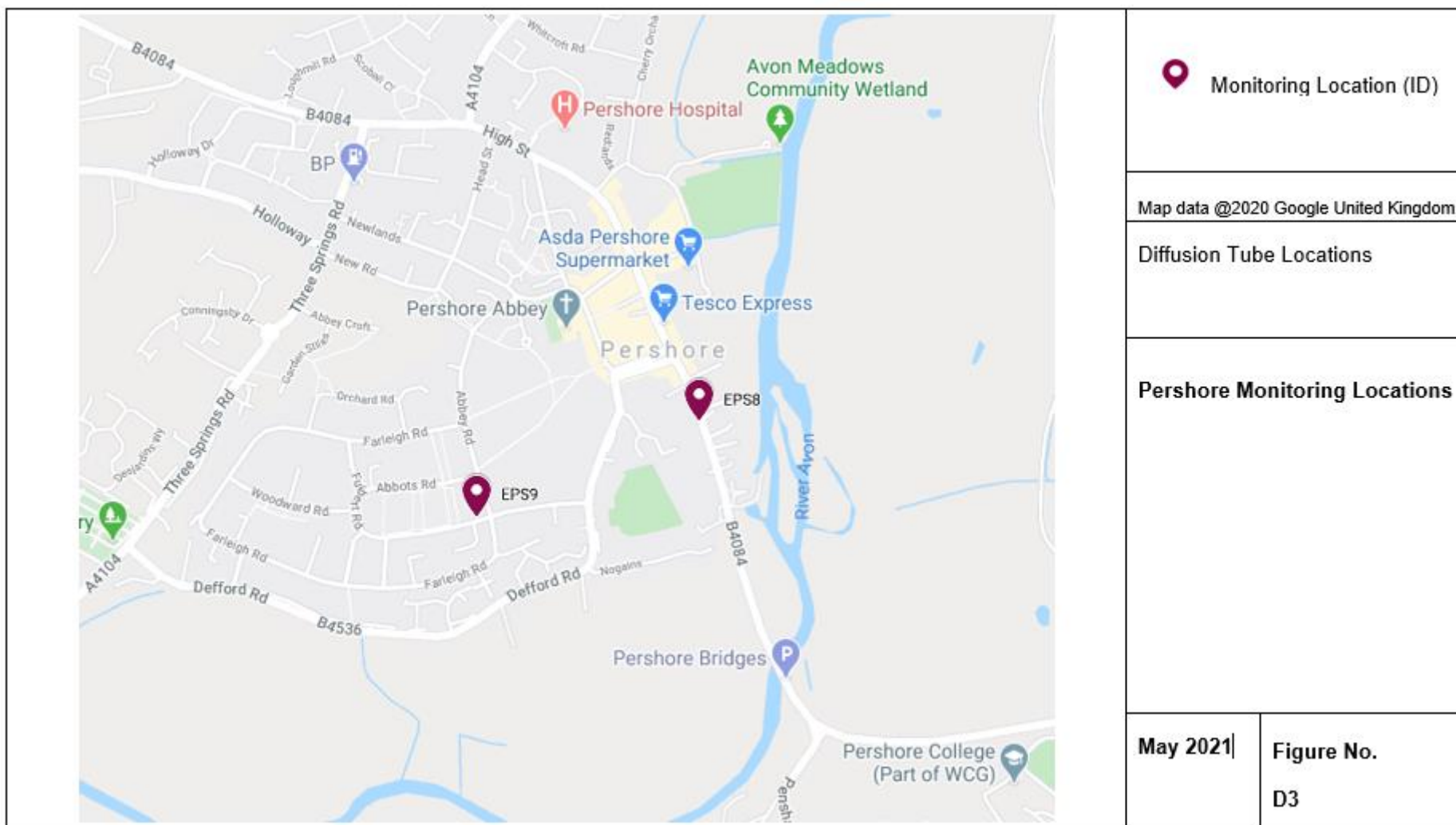
Site ID	Annualisation Factor West Bromwich Kendrick Park	Annualisation Factor Birmingham Ladywood	Annualisation Factor Leominster	Annualisation Factor Leamington Spa	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
EPS61	0.9526	0.9258	1.0072	0.9350	0.9551	24.7	23.6	
EPS62	0.9621	0.9170	0.9977	0.9561	0.9582	25.8	24.7	
EPS63	0.8751	0.8487	0.9004	0.8650	0.8723	20.9	18.3	
WyAQ1	0.9621	0.9170	0.9977	0.9561	0.9582	42.7	41.0	
WychAD	0.9526	0.9258	1.0072	0.9350	0.9551	31.7	30.2	
WychCH	0.9526	0.9258	1.0072	0.9350	0.9551	28.2	26.9	
WychSC	0.9526	0.9258	1.0072	0.9350	0.9551	30.2	28.9	
WMD2	0.9526	0.9258	1.0072	0.9350	0.9551	27.3	26.0	
CROW1	0.9526	0.9258	1.0072	0.9350	0.9551	23.4	22.3	
BG	0.9526	0.9258	1.0072	0.9350	0.9551	22.5	21.5	

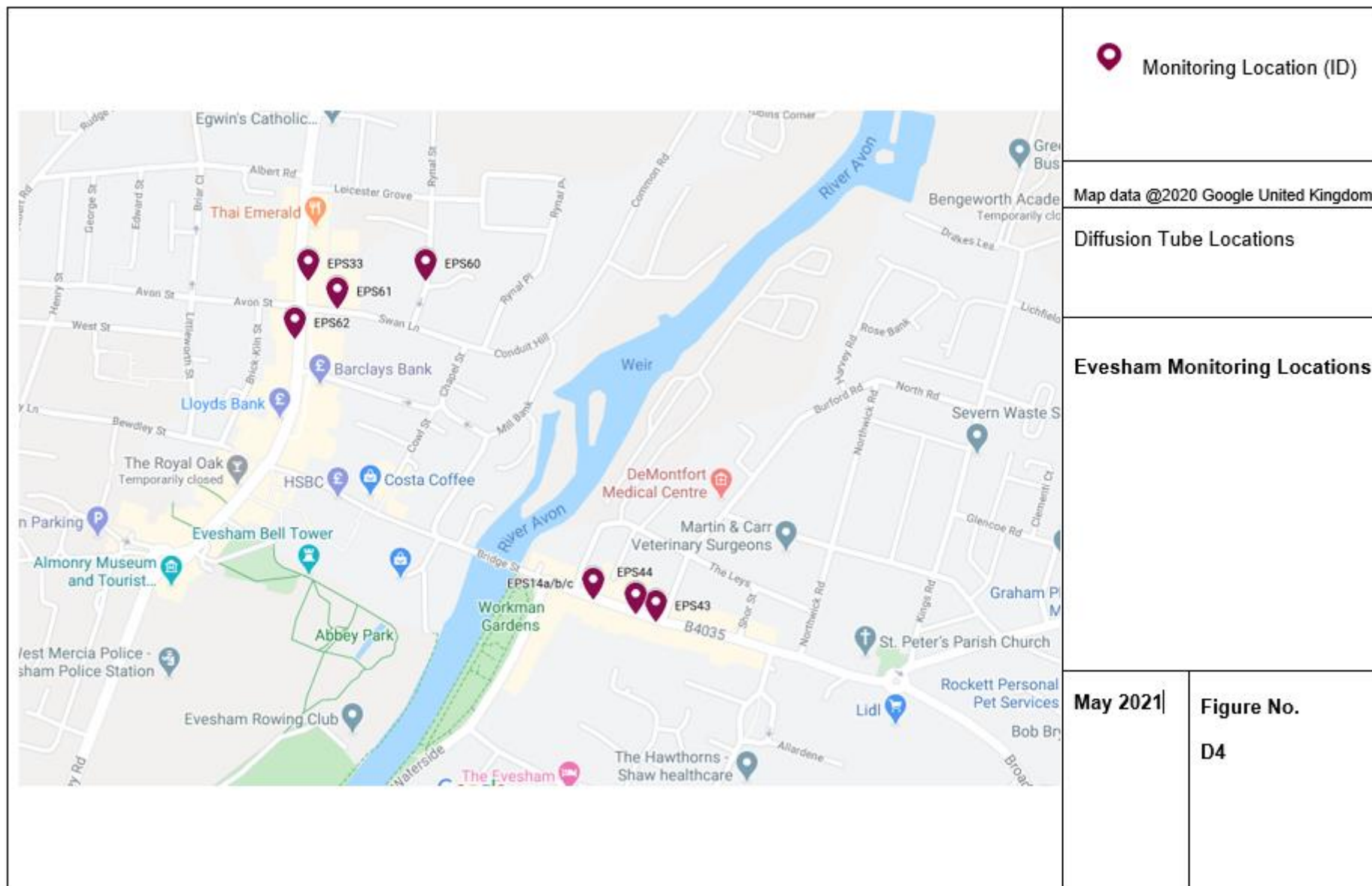
Appendix D: Map(s) of Monitoring Locations and AQMAs

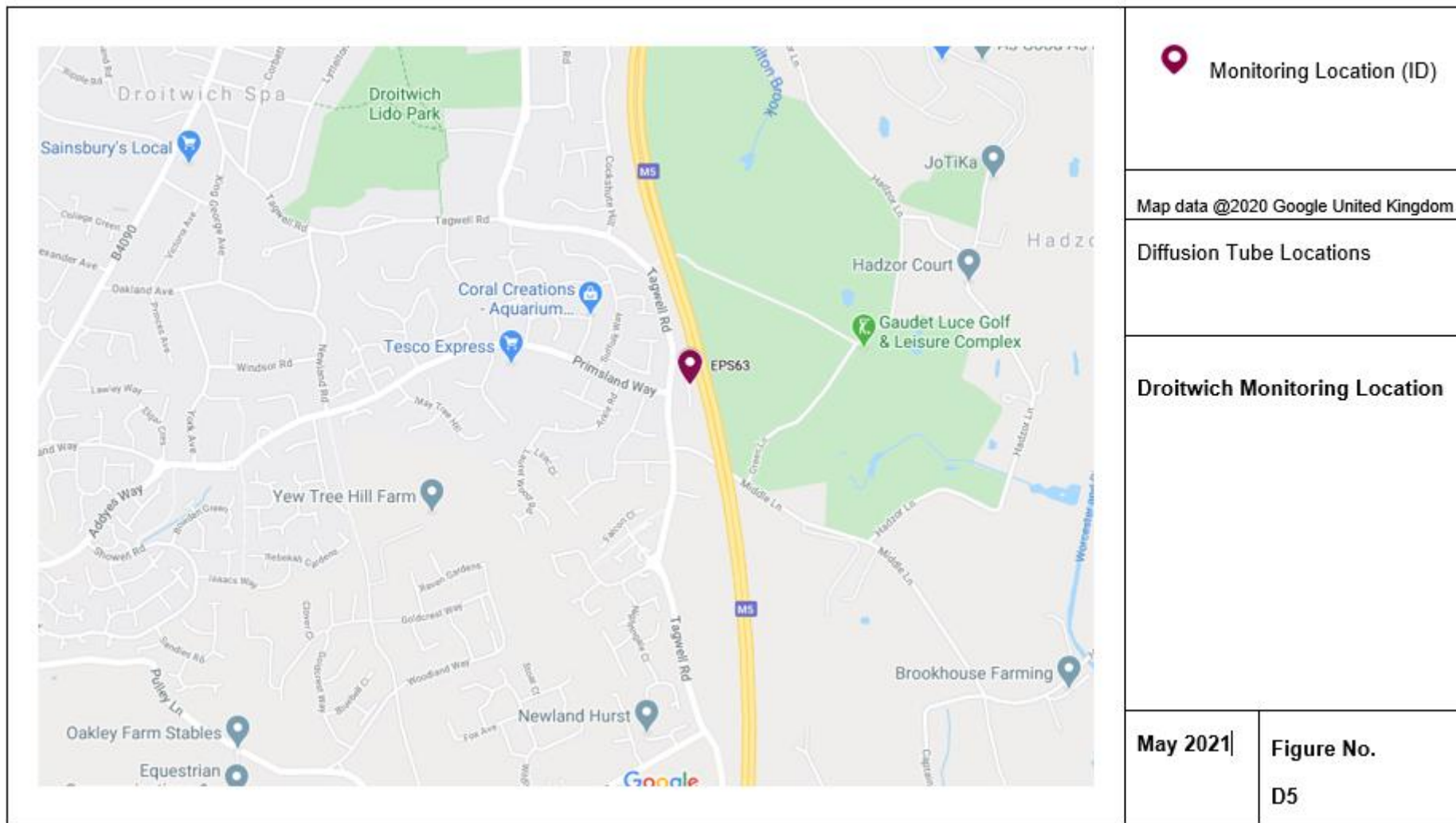
Figure D.1 – Map of Non-Automatic Monitoring Site

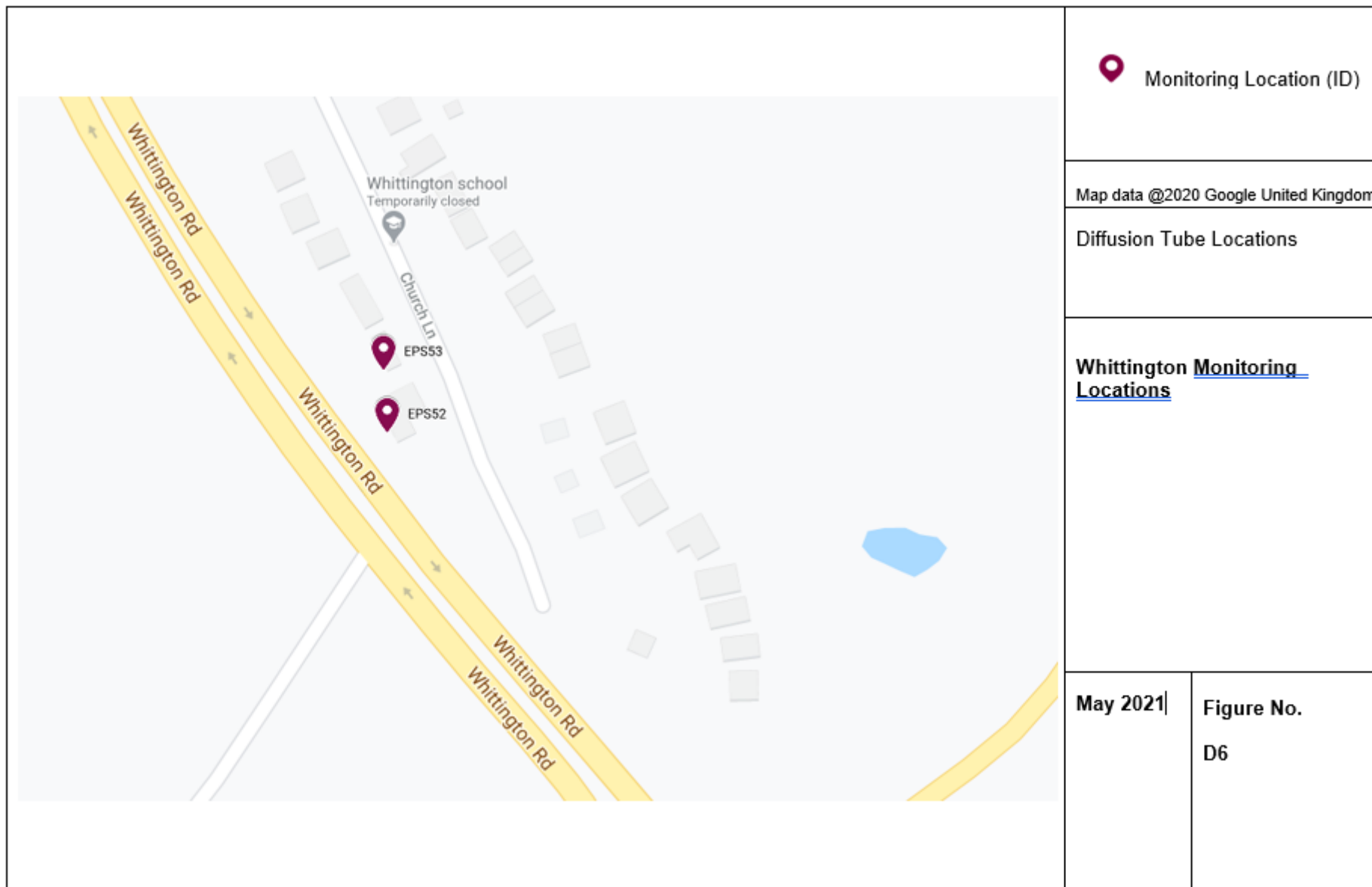


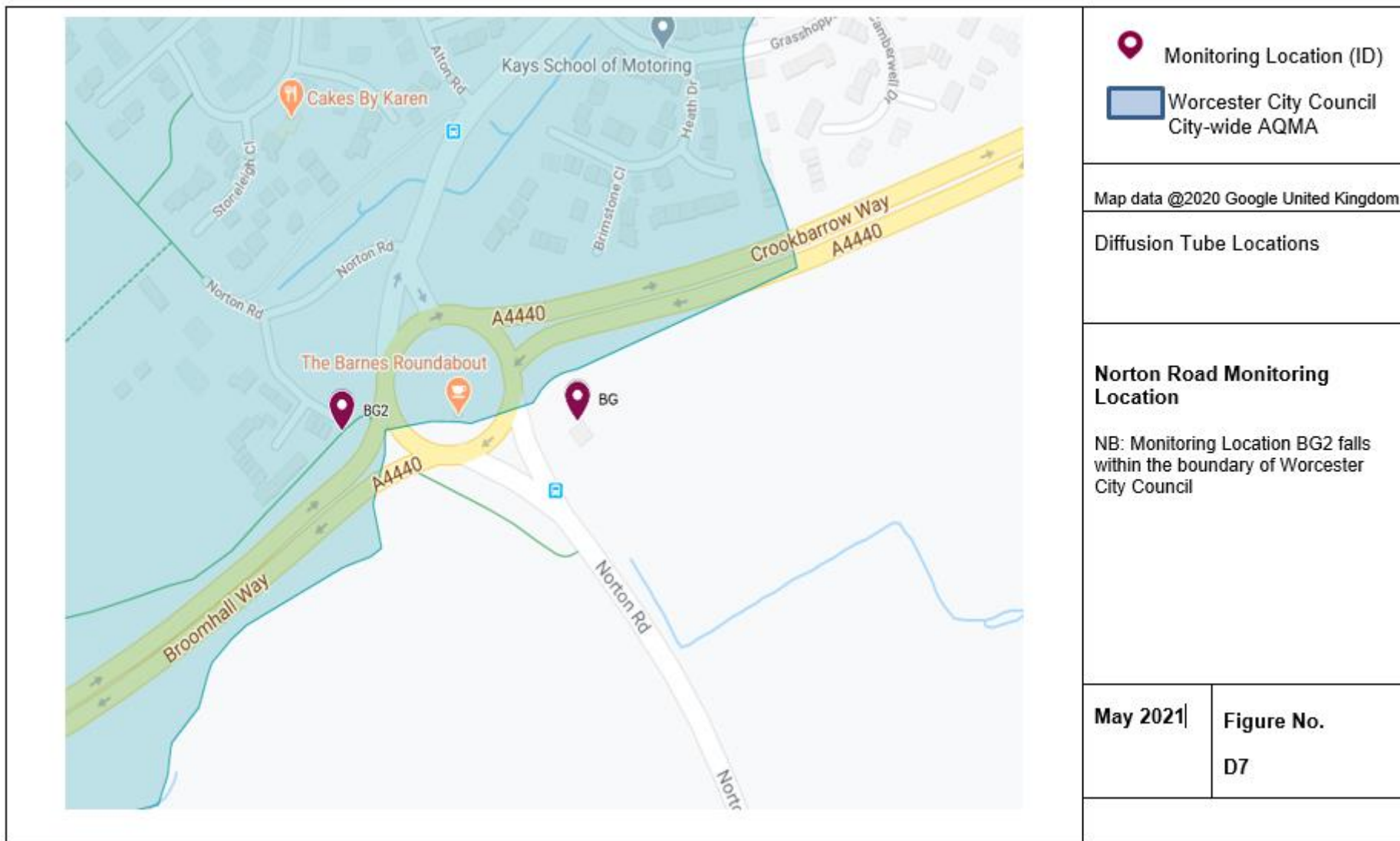












Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁹

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

⁹ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO₂) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data¹⁰ suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air

¹⁰ Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

Quality Expert Group (AQEG)¹¹ has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO₂ annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which represents an absolute reduction of between 10 to 20µg/m³ if expressed relative to annual mean averages. During this period, changes in PM_{2.5} concentrations were less marked than those of NO₂. PM_{2.5} concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that PM_{2.5} concentrations during the initial lockdown period are of the order 2 to 5µg/m³ lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Wychavon District Council Area

Traffic Data

Nitrogen Dioxide concentrations in the Worcester Road, Wychbold AQMA are largely linked to road traffic due to the presence of Junction 5 of the M5 with the A38.

During the Covid-19 pandemic Worcestershire County Council has collated travel and traffic data for the County. This data has been compared with normal baseline data to give an indication of the impact of Covid-19 lockdowns and restrictions on traffic flows and travel behaviours. Data was gathered from County and DfT sources and included nine live traffic monitors in the Worcester City area and nine further monitors across the County.

County traffic data shows that changes in traffic flows and patterns largely followed the trends seen nationally.

¹¹ Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

Traffic volumes across the County dropped as low as 34% of normal baseline conditions during the March/April 2020 lockdown and as low as 63% of normal baseline conditions during December 2020.

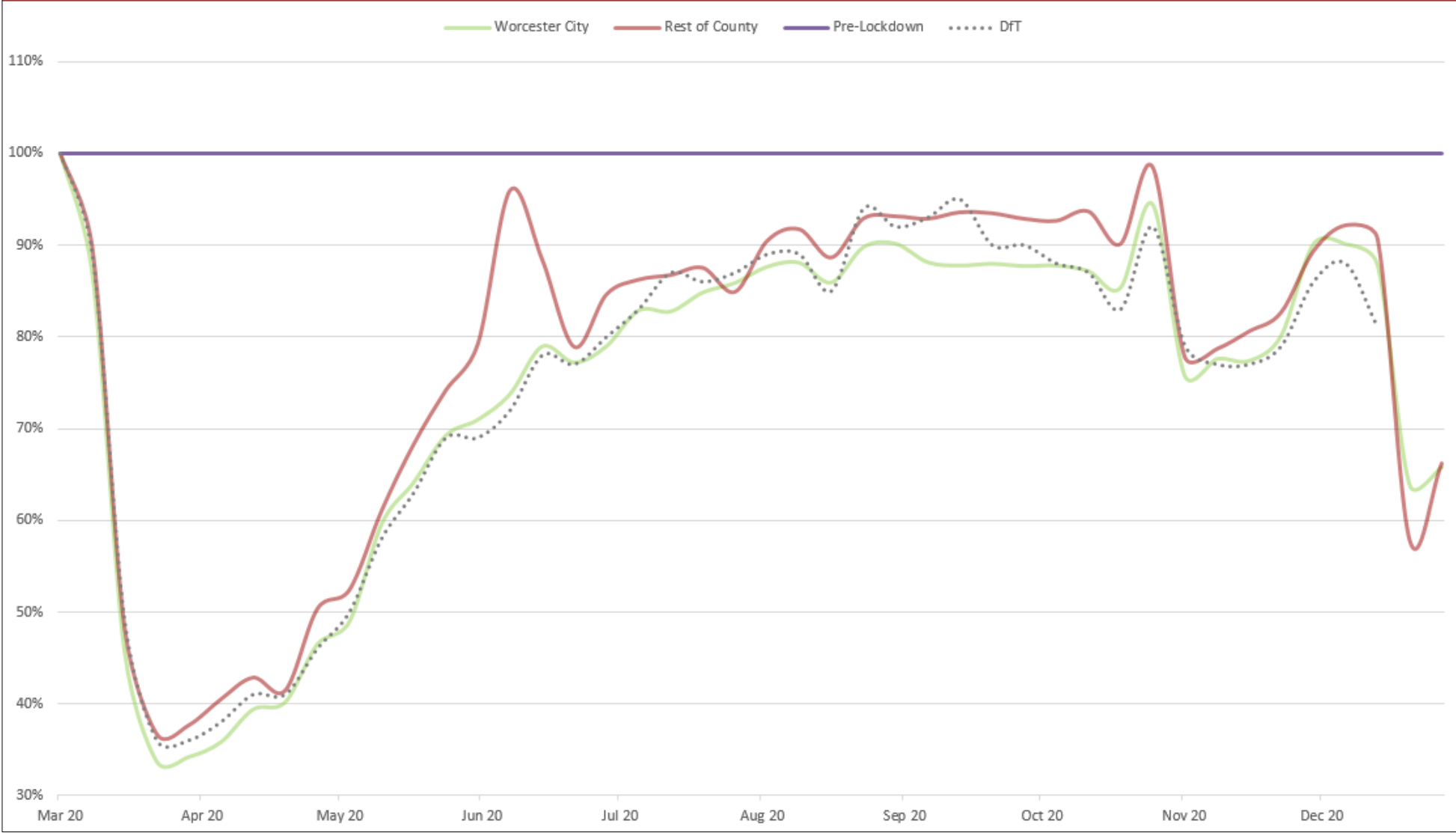
Due to a combination of Covid-19 restrictions and a change of laboratory diffusion tube data for January to June 2020 is not available for the Wychavon District and as such it is not possible to comment on any monthly changes in nitrogen dioxide concentrations for the first six months of 2020; including any changes experienced as a result of reductions in traffic associated with the first national lockdown.

A comparison of annual mean nitrogen dioxide concentrations across the Wychavon District between 2019 and 2020 shows a general decrease across the District at all locations, including within the AQMA.

Whilst Covid-19 restrictions and subsequent reductions in traffic volumes will have influenced nitrogen dioxide concentrations the AQMA has experienced a general downward trend in annual mean nitrogen dioxide concentrations over the period 2016 to 2019 and as such it is not possible to quantify the impact of traffic changes as a result of Covid-19 restrictions on nitrogen dioxide concentrations locally with the data available.



Percentage Traffic Flow Compared to Normal – Countywide site data



Opportunities Presented by COVID-19 upon LAQM within the Wychavon District

No LAQM specific related opportunities have arisen as a consequence of Covid-19 within the Wychavon District.

Challenges and Constraints Imposed by COVID-19 upon LAQM within the Wychavon District

The following challenges and constraints imposed by Covid-19 impacted the LAQM work of the Council:

- Passive monitoring Data Capture – diffusion tubes were not exposed for the months March 2020 to June 2020 due to a combination of laboratory closures and a decision not to deploy officers to change tubes due to Covid-19 restrictions. This has affected data capture during 2020, resulting in data from all monitoring sites having to be annualised. **Small/Medium impact**
- Defra Diffusion Tube Exposure Calendar - during months where diffusion tubes were exposed the calendar was adhered to. **No impact**
- Diffusion Tube Storage - during months where diffusion tubes were sent for analysis they were stored and analysed in accordance with laboratory guidance. **No impact**
- Diffusion tube bias-adjustment - in 2019 diffusion tubes were supplied and analysed by Somerset Scientific Services and the national bias-adjustment factor for that laboratory used. The 2019 bias-adjustment factor for Somerset Scientific Services was based on 2 studies. Between July and December 2020 diffusion tubes were supplied and analysed by Gradko International Limited and the national bias-adjustment factor for Gradko used. The 2020 bias-adjustment factor for Gradko is based on 18 studies. **No impact**

- The work of the Worcestershire Air Quality Partnership was due to continue in 2020 however at the time of report writing the work of the group has been postponed indefinitely due to the Covid-19 pandemic. **Small/medium impact.** A small/medium impact is assigned in this case as there has been only a single marginal exceedance of the AQO in the District since 2018 and as such any delay to the work of the group is not currently considered to have a large impact on air quality in the Wychavon District area.

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: High
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

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 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 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
WRS	Worcestershire Regulatory Services

References

- Evesham Transport Strategy. Worcestershire County Council.
- Intelligently Green Plan 2020-2030. 2020. Wychavon District Council.
- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- National Diffusion Tube Bias-Adjustment Spreadsheet (v03/21). March 2021. Published by Defra.
- Public Health Outcomes Framework. 2019. Public Health England.
- Travel and Transport Data Covid-19. January 2021. Worcestershire County Council.
- Worcester Road, Wychbold Source Apportionment Exercise. 2018. Worcestershire Regulatory Services
- Wychavon District Council Annual Status Report 2020. June 2020. Worcestershire Regulatory Services.