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WYCHAVON
DISTRICT COUNCIL

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2023 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995
Local Air Quality Management, as amended by the
Environment Act 2021

Date: June, 2023

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Executive Summary: Air Quality in Our Area

Air Quality in 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 29,000 to 43,000 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 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.

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 (NO₂).

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, January 2023

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 the AQMA declaration and plans of the AQMA can be found on the following pages of the WRS website: [Air Quality Management Area Declarations | Worcestershire Regulatory Services \(worcsregservices.gov.uk\)](https://www.worcsregservices.gov.uk/Air-Quality-Management-Area-Declarations)

A full list of declared and revoked AQMAs can be viewed at: [Local Authority Details - Defra, UK](https://www.gov.uk/government/collections/local-authority-air-quality)

The Wychavon District area generally enjoys good air quality. Over the five-year period 2018 to 2022 there has been a single monitored exceedance of the nitrogen dioxide annual mean air quality objective in the District ($40\mu\text{g}/\text{m}^3$ was monitored at EPS56 in 2018).

No exceedance of the Nitrogen Dioxide Annual Mean Air Quality Objective occurred within the Worcester Road, Wychbold AQMA in 2022. There have been no exceedances since 2018 (when calculating back to relevant receptors).

There has been one change to the monitoring network across Wychavon District during 2022: monitoring location EPS52 has been discontinued due to reduced accessibility.

All bar one diffusion tube monitoring stations in the Wychavon District area saw an increase in annual mean NO_2 concentrations between 2021 and 2022. Monitoring data from 2021 does not represent a standard year with the continuation of the COVID-19 pandemic, associated lockdowns and restrictions affecting travel patterns and behaviours. As such, monitoring data shows an overall increase of $3.62\mu\text{g}/\text{m}^3$ (17%) in average recorded annual mean NO_2 concentrations across the Wychavon District area between 2021 and 2022 ($22.0\mu\text{g}/\text{m}^3$ in 2021 and $25.62\mu\text{g}/\text{m}^3$ in 2022). This is likely to have been caused by the increase in traffic between the two periods following the cessation of all COVID-19 regulations and restrictions in March 2022.

At this time, it is unclear if some enforced behaviours during the pandemic that led to a decrease in the number of journeys made, such as virtual meetings replacing face to face and an increase in working from home, will continue to have the beneficial impact on reducing concentrations of NO_2 in future years after 2022.

In comparing 2022 measured concentrations with pre-pandemic levels, 2018 recorded data averaged concentrations of $5.74\mu\text{g}/\text{m}^3$ and 18% higher than 2022 data across Wychavon District.

In 2022, the highest concentration of NO_2 recorded across Wychavon District was $41.70\mu\text{g}/\text{m}^3$ at WyAQ1, located in the Worcester Road, Wychbold AQMA, through this is reduced to $28.3\mu\text{g}/\text{m}^3$ when calculating back to the nearest relevant receptor. This

location has recorded the highest concentration across Wychavon District for the last 5 years with a measured concentration of 37.1 µg/m³ in 2021 and 49.6 µg/m³ in 2018.

No other diffusion tube monitoring locations have recorded concentrations within -10% of the AQS objective for annual average NO₂ in 2022. All concentrations are shown in Table B.1.

The highest concentration measured at a relevant receptor recorded in Wychavon District in 2022 is 31.23 µg/m³ at EPS56 within the Worcester Road, Wychbold AQMA.

Given the uncertainty in long term trends in NO₂ since declaration, no amendments to the Worcester Road, Wychbold AQMA are proposed at this time.

No annual means greater than 60 µg/m³ have been recorded indicating that it is very unlikely that there have been any exceedances of the 1-hour mean objective for NO₂ at any diffusion tube monitoring sites.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan⁵ sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term PM_{2.5} targets. The National Air Quality Strategy, published in April 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce PM_{2.5} in their areas. The Road to Zero⁶ details 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 five-year period 2018 to 2022 there has been a single monitored exceedance of the nitrogen dioxide

⁵ Defra. Environmental Improvement Plan 2023, January 2023

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

annual mean air quality objective in the District ($40\mu\text{g}/\text{m}^3$ was monitored at EPS56 in 2018).

Reductions in nitrogen dioxide concentrations have been monitored in the Worcester Road, Wychbold AQMA over the five-year period 2018 to 2022 such that it is now uncertain as to whether the AQMA is still required.

Factors influencing the improvement in this period include:

- The completion of proximal and significant Major Scheme enhancement works to the M5 in 2017, resulting in reduction in impacts on local network after that time.
- Low national bias adjustment factors applied to 2017 and 2019 monitoring data.
- Significant reduction in traffic during COVID-19 pandemic impacting on 2020-2022 monitoring data.
- National vehicle fleet improvements: there has been a 4.2% drop in proportion of diesel cars and a 5.5% increase in low emission vehicles during this period.
- Upgrade of buses on local route to Euro Code 6 standards.
- Milder winters resulting in lower concentrations of nitrogen dioxide over the winter months

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. 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 this and the observed improvements in measured concentrations between 2017 and 2022, Wychavon District Council is not currently pursuing specific actions to improve air quality within the AQMA at this time. 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.

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.

Due to delays caused by Covid-19 the process of procuring a suitable monitoring station was delayed. This process recommenced in early 2022 with installation and commissioning commencing in May 2023.

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

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 in 2017. Pre-pandemic WRS has enjoyed a good working relationship with the County Council's Strategic Transport Team and developed closer working ties with Public Health, Planning and Sustainability colleagues within the County and District Councils. Unfortunately, the COVID-19 pandemic, led to the suspension of existing action groups in 2020 and delayed air quality improvement projects. Additionally, there have been significant personnel turnover within the WRS, County and District Council teams in the interim period.

As we have emerged from the pandemic during 2022-23, WRS are seeking to re-engage with those teams and new colleagues from the different disciplines that have a role in improving air quality.

Key developments in 2022 are:

1. Progress on installation of automatic monitors in Worcester Road, Wychbold AQMA
2. Formation of new Air Quality Action Plan Steering Group to develop and produce a new countywide air quality action plan and strategy; this is discussed more detail below.
3. In September 2022 WRS submitted, and have been successful in, a bid for funding from Defra's Air Quality Grant to expand the real time monitoring network across Worcestershire. Further information is provided below.
4. Construction of the Pershore Northern Link Road to reduce congestion on surrounding network was completed in Autumn 2022 by Worcestershire County Council

5. Wychavon District Council introduced a taxi license fee waiver for those licensing battery electric vehicles to encourage the take-up of electric and other low emission vehicles and to discourage higher polluting older vehicles.
6. Wychavon District Council has been allocated £150k from the Governments UK Shared Prosperity Fund to be spend on active travel projects in the district over 2023/24 and 2024/25.
7. The council has approved a budget of £210,000 over the next two years to implement HVO (Hydrotreated Vegetable Oil) fuel into the waste fleet. HVO fuel reduces carbon emissions and nitrogen oxide, particulate matter, and carbon monoxide relative to diesel.

Air Quality Actions Plan and Air Quality Strategy

A new Air Quality Action Plan is required for Worcestershire in accordance with the Environment Act 2021 and revised guidance published in Aug 2022 (LAQM.TG22 and PG22). The COVID19 pandemic, unfortunately, led to the suspension of previous district AQAP working groups and public health action group's programmes in 2020. In September 2022, WRS began discussions with Worcestershire County Council colleagues with a view to forming a new Steering Group and producing a new plan of actions to improve air quality across the County, to comply with recent legislative changes.

The group membership has expanded considerably at the beginning of 2023 and is currently progressing a programme of works, outlined below, which will be reported on in the next ASR (2024).

The group currently 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.

The Action Plan will incorporate an improving Air Quality Strategy applicable across the County including districts councils that currently have no AQMAs in accordance with legislation and guidance.

The first step in action planning is to determine the contribution of sources of air pollution (source apportionment) to inform future actions. Up to date source apportionment has been completed for some parts of the County, but further work is required.

The initial Steering Group work is focussed on actions informed by the available source apportionment work in addition to countywide actions applicable to all districts.

Traffic surveys have been completed in 2023 to enable updated source apportionment work to be undertaken for Wychavon District Council from 2024 when the concurrent calendar years' monitoring data will be available in line with technical guidance.

The timeline for the various stages and delivery of the Air Quality Strategy and Action Plan is set out below.

| Timeline | Phase |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Feb – Dec 2023 | Identification of potential overarching Worcestershire County Council actions and Worcester City Council Specific actions, feasibility filter of measures, cost benefit analysis, determination of impact, timelines and funding sources, drafting of countywide action plan |
| Jan – Mar 2024 | Submission of Draft for review by Senior Management Team and approval by Political Committees at Worcester City Council and Worcestershire County Council and revisions |
| March 2024 | Submission of Draft countywide AQAP inc. local AQ strategy and Worcester City Council specific actions to DEFRA |
| April- June 2024 | 3 month Public Consultation on Draft countywide AQAP following revisions |
| July - Sept 2024 | Revisions and finalisation of countywide AQAP inc. local AQ strategy and Worcester City Council specific actions Consideration for revocation of AQMAs and source apportionment work for other AQMAs in 1) Bromsgrove DC 2) Wyre Forest DC 3) Wychavon DC |
| Sept – Oct 2024 | Submission of Finalised AQAP for review by Senior Management Team and approval by Political Committees at Worcester City Council and Worcestershire County Council and revisions |
| Sept 2024 - Mar 2025 | AQAPSG work on Bromsgrove DC and Wyre Forest DC specific actions (if required), refresh SG membership with relevant stakeholders. Identification of district specific actions, feasibility filter of measures, cost benefit analysis, determination of impact, timelines and funding sources, and draft update to AQAP. Consultation on additional chapters/amendments |
| Nov 2024 | Publication of Finalised countywide AQAP inc. local AQ strategy & Worcester City chapter and submission to DEFRA |
| Mar - May 2025 | Annual review for any amendments requiring further work. |

Real-time Air Quality Monitoring Project

In September 2022 officers from WRS submitted an application to Defra's Air Quality Grant Scheme 2022/23. The scope of the bid was to establish an enhanced real-time air quality monitoring network across the main areas of air quality concern in Worcestershire for purposes of informing the public and vulnerable groups of the status of air pollution. The scheme would see the installation of approximately 24 'low cost' Air Quality Monitors' across the county which measure NO₂, PM₁₀, and PM_{2.5} (with EA MCERTS certification for indicative particulates). This will provide important data in respect of particulate matter for which monitoring across the county has been limited previously. The results of monitoring would then be used to inform decision making and requirements for further action as necessary. Realtime information will enable a better understanding of air quality in the

district and help quantify the impacts from road traffic and other sources, such as solid fuel burning, agriculture and industry. The system will also provide an alert in the event of poor air quality so that vulnerable groups can be informed and limit exposure.

In February 2023 Defra announced that the WRS bid had been successful and the requested £248,400 was awarded. An additional 10% of funds will also be provided by each district council in Worcestershire, as per the match-funding requirement of the scheme, which equates to £27,600. Giving a grand total of £276,000 for the project.

At the time of writing the project is at the procurement stage, with the tender specification close to completion. Once a successful supplier has been appointed, exact monitoring locations will be agreed, and equipment installed. This is anticipated to be in the latter stages of 2023.

Three of the Zephyr monitors are to be deployed within the Wychavon District Council area. Locations are currently to be confirmed but are expected to represent worst case conditions in relation to road traffic and impacts from agriculture and solid fuel burning.

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.
- The council introduced a taxi license fee waiver for those licensing battery electric vehicles 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.

- 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.
- The council has been allocated £150k from the Governments UK Shared Prosperity Fund to be spend on active travel projects in the district over 2023/24 and 2024/25.
- The council has an approved budget of £210,000 over the next two years to implement HVO (Hydrotreated Vegetable Oil) fuel into the waste fleet. HVO fuel reduces carbon emissions by 90% compared to diesel, and also provides a reduction in nitrogen oxide, particulate matter and carbon monoxide relative to diesel.

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

Electric Vehicle Charging

Wychavon District Council has installed a total of 24 electric vehicle charging points in 5 car parks in towns across the District including Evesham, Pershore, Droitwich and Broadway. Further information can be found at [Car Parks - 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. Further information can be found at [Council tries out electric vehicles to collect waste across Wychavon - Wychavon District Council - Wychavon District Council](#)

Worcestershire County Council actions

Worcestershire County Council have implemented or taken forward a number of actions and plans that will benefit air quality within Wychavon District area:

- Improvements for the Former Port Street, Evesham AQMA area were completed in 2021 comprising updating of traffic signals at the junction of Port Street, Waterside and Bridge Street to improve efficiency and provide pedestrian crossing and Public Realm Enhancement Scheme. Further information can be found at [Port Street, Evesham | Worcestershire County Council](#)
- Construction of the Pershore Northern Link Road to reduce congestion on surrounding network was completed Autumn 2022. Further information is available here [Pershore infrastructure improvement scheme | Worcestershire County Council](#)
- A planning application has been submitted for a new walking and cycling bridge linking Hampton and Evesham
- A Local Cycling and Walking Infrastructure Plan (LCWIP) for Evesham is currently in development and due for public consultation in Summer 2023
- Pershore and Droitwich (LCWIPs) funded by Active Travel England, to be completed in 2024
- WCC and Wychavon DC are reviewing the South Worcestershire Development Plan, which includes detailed policy to address the impact of air pollution from new development including prioritisation of active travel and corridor improvements. The plan is due to be submitted to the Secretary of State for DLUHC in summer 2023.

Wychavon District Council expects the following measures to be completed over the course of the next reporting year:

- Implementation of an enhanced monitoring network across the County to provide real time data on a range of air pollutants to go live at beginning of 2024.
- Publication and implementation of Evesham LWCIP
- Submission to DLUHC of detailed policy to address the impact of air pollution from new development in South Worcestershire Development Plan

Conclusions and Priorities

The Wychavon District area generally enjoys good air quality. Over the five-year period 2018 to 2022 there has been a single monitored exceedance of the annual mean objective for nitrogen dioxide in the district.

There is currently one Air Quality Management Area (AQMA) in Wychavon District. The Worcester Road, Wychbold AQMA was declared in 2018 due to monitored and modelled exceedances of the annual mean objective for nitrogen dioxide (NO₂).

No exceedance of the Air Quality Objective occurred within the AQMA in 2022. There have been no exceedances since 2018 (when calculating back to relevant receptors).

All bar one diffusion tube monitoring stations in the Wychavon District area saw an increase in annual mean NO₂ concentrations between 2021 and 2022. This is likely to have been caused by the increase in traffic between the two periods following the cessation of all COVID-19 regulations and restrictions in March 2022.

At this time, it is unclear if some enforced behaviours during the pandemic that led to a decrease in the number of journeys made, such as virtual meetings replacing face to face and an increase in working from home, will continue to have the beneficial impact on reducing concentrations of NO₂ in future years after 2022.

In comparing 2022 measured concentrations with pre-pandemic levels, 2018 recorded data averaged concentrations of 5.74 µg/m³ and 18% higher than 2022 data across Wychavon District.

Given the uncertainty in long term trends in NO₂, no amendments to the Worcester Road, Wychbold AQMA are proposed at this time.

Wychavon District Council have not identified any new sources impacting air quality in 2022. A number of applications for new developments have been received; the proposals have been assessed as part of the planning process and are not expected to have a significant impact on local air quality when they are operational.

Wychavon District Council's priorities for the coming year are:

- Installation of additional 3 low-cost real-time Air Quality Analysers in the district monitoring NO₂ and particulate matter as part of the County enhanced monitoring network to inform future decisions and actions and provide an alert system for vulnerable individuals.

- Work will continue with development of a countywide Air Quality Strategy and Action Plan. Publication of the draft document is anticipated in Spring 2024 with a finalised version later next year following the necessary consultation process. This is to remain a 'live' document that can be added to and revised on a regular basis as planned actions evolve.
- Developing closer working ties with Public Health colleagues on variety of work streams: AQAP progression, campaigns such as Clean Air Day 2023 and establishing an alert system for vulnerable groups linked to the real time monitoring network.
- Continue monitoring of air pollutants at key locations across the district.
- Ensure proportionate mitigation measures are included within new developments where air quality is a relevant concern.
- Submission to DLUHC of detailed policy to address the impact of air pollution from new development in South Worcestershire Development Plan.

Local Engagement and How to get Involved

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;
- **Turn off your engine when stationary or parked,** don't 'idle', particularly outside sensitive receptors such as schools, hospitals, care homes and residential properties;
- General travel planning advice is available on [Worcestershire County Council's website](#) (including walking, cycling, bus maps and timetables, community transport and travel to school).
- **Hold meetings by Conference Call** by phone or video conference via Teams, Zoom, Skype or Facetime 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 currently providing grants for up to 75% of Electric Vehicle (EV) charging points, up to 40 charge points:

[Workplace Charging Scheme: guidance for applicants - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/workplace-charging-scheme)

- 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:

<http://www.theaa.com/driving-advice/fuels-environment/drive-smart>

[Maximise fuel economy through efficient driving - Energy Saving Trust](https://www.energy-saving-trust.org/energy-saving-tips/maximise-fuel-economy-through-efficient-driving)

[How to save fuel - the ultimate guide | RAC Drive](https://www.rac.co.uk/driving-tips/how-to-save-fuel)

- **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 [Smokeless Zones](#) and [Public Advice](#) pages 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 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.

⁷ <http://www.breathelondon.org/>

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

Vulnerable individuals and groups can keep informed of:

- Current levels and forecasts of air pollution from Defra at:
<https://uk-air.defra.gov.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 <https://uk-air.defra.gov.uk/air-pollution/daqj>
- 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 is available at [Protecting Me and Others from Air Pollution | Worcestershire Regulatory Services \(worcsregservices.gov.uk\)](https://www.worcsregservices.gov.uk/protecting-me-and-others-from-air-pollution) .

Local Responsibilities and Commitment

This ASR was prepared by the Worcestershire Regulatory Services for Wychavon District Council with the support and agreement of the following officers and departments:

Worcestershire Regulatory Services

Worcestershire County Council

Wychavon District Council

This ASR has been signed off by a Director of Public Health with the following comments:

We welcome the submission of these reports, continued focus on improving air quality, and installation of new real time air quality monitors which will provide ‘information for action’ across the system. We recommend inclusion in future reports to recognise ageing population and increasing long term conditions sensitive to poor air quality.

If you have any comments on this ASR please send them to:

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1 Local Air Quality Management

This report provides an overview of air quality in Wychavon District during 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. 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 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

A summary of AQMAs declared by Wychavon District Council can be found in Table 2.1. The table presents a description of the one AQMA that is currently designated within Wychavon District. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of 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 | Number of Years Compliant with Air Quality Objective | 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 | 44.6 µg/m ³ | 41.7 µg/m ³ at Roadside location: 31.2 µg/m ³ at relevant receptor | 4 years | New Countywide Action Plan & AQ Strategy in progress | Not yet published |

- 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

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

1. There is a detailed discussion of annual mean concentration trends across the district and the Worcester Road, Wychbold AQMA, with reference to the COVID-19 pandemic, this is encouraged. Observed trends are also presented clearly, this is encouraged.
2. It seems that robust and accurate QA/QC procedures have been used; the national bias adjustment has been determined. The Council could provide a screenshot of the National Diffusion Bias Adjustment Factor Spreadsheet to ensure accuracy.
3. Some of the policy text, for example around the Environment Act, which was amended in 2021, is now outdated and so could be updated
4. The Council provide clear maps showing the location of monitoring locations and the Wychbold AQMA boundary, this is welcomed.
5. Overall, this report is well detailed and concise. It is clear that Wychavon District Council is committed to maintaining good air quality, with plans to implement an automatic monitoring site 2022. Further comments on the progress of this should be included in the 2023 ASR.

WRS acknowledge the above and considered comments in the production of this ASR.

The development of an AQAP has not been progressed in 2022, or previously, due to uncertainty as to whether an AQMA is still required in the area against a backdrop of improved nitrogen dioxide concentrations over the six-year period 2017 to 2022. 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 - 2022 ASRs](#). A summary of influencing factors is provided below in section 2.2.1.

2.2.1 Worcester Road, Wychbold AQMA update for 2023

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 certain that such actions are necessary before they proceed further.

Improvements in nitrogen dioxide concentrations have been monitored over the six-year period 2017 to 2022 such that it is uncertain as to whether an AQMA is still required. There has been a single exceedance of the Nitrogen Dioxide Annual Mean AQO over the six-year period 2017 to 2022 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. Possible reasons and influencing factors for the observed improvements are discussed further in Section 3.2 of this report, and in detail in the 2020 - 2022 ASRs for Wychavon District Council which are available to view and download via the WRS website at [Wychavon District Council | Worcestershire Regulatory Services \(worcsregservices.gov.uk\)](https://www.worcsregservices.gov.uk).

A summary of influencing factors is as follows:

- Strategic road network improvements: the completion of significant Major Scheme enhancement works to the strategic road network in the area in 2017. The Scheme included the upgrade of the M5 between junctions 6 and 4a to a SMART motorway along with improved 'off-slip' capacity and the introduction of traffic signal control on the A38 at junction 5 in the AQMA. 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. Furthermore, Worcestershire County Council have advised WRS that whilst the Major Scheme works were taking place there was significant constraint on traffic flow on the M5 causing a proportion of strategic traffic to re-route onto local and regional roads including Worcester Road, Wychbold.
- Variance in diffusion tube data: the impact of low published national bias-adjustment factors for the Council's tube supplier applied to monitoring data at the

time indicates the significant decrease in concentrations observed in 2017 and 2019 cannot be relied upon as indicative of local trends.

- COVID-19 pandemic: Monitoring data from 2020 to 2021 do not represent standard years with significantly reduced traffic due to associated lockdowns and restrictions affecting travel patterns and behaviours. At this time, it is unclear if some enforced behaviours during the pandemic that led to a decrease in the number of journeys made, such as virtual meetings replacing face to face and an increase in working from home, will continue to have the beneficial impact on reducing concentrations of NO₂ in future years after 2022.
- National vehicle fleet improvements: There has been a reduction in the number of diesel vehicles in UK car fleet following a move towards petrol and LEVs/ULEVs. The most recent available [statistics published by the DfT](#) show that between Q4 2016 and Q3 2022 there was a 4.2% drop in the proportion of diesel cars in the national fleet. A similar change in the vehicle fleet on the A38 Wychbold will contribute to the observed improvement in levels of NO₂ as the source apportionment study demonstrates diesel cars contribute approximately 44% of emissions on the A38 Wychbold. DfT statistics also show a 1.3% drop in petrol cars in the national fleet between 2017 and 2022, along with a 5.5% increase in low emission vehicles (which make up 6.8% of the national car fleet as at Q3 2022).
- Bus improvements: WRS understand the main bus provider, First, with services using the A38 through Wychbold retrofitted the buses on its 144 route (Birmingham – Worcester – Birmingham) to Euro 6 standards in order to comply with the upcoming introduction of a Clean Air Zone in Birmingham during 2018 to 2020.
- Meteorological conditions: milder winters generally result in lower concentrations of nitrogen dioxide over the winter months.

Whilst measured diffusion tube data indicates that the AQMA may no longer be necessary, the uncertainties in trend data due to the reasons outlined above and inherent variance in diffusion tube data make it difficult to make a robust decision to amend or revoke the AQMA.

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.

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.

Due to delays caused by Covid-19 the process of procuring a suitable monitoring station was delayed. This process recommenced in early 2022 and commissioning and installation of both analysers has been commenced at the time of writing.

Key developments in 2022 are:

1. Progress on installation of automatic monitors in Worcester Road, Wychbold AQMA
2. Formation of new Air Quality Action Plan Steering Group to develop and produce a new countywide air quality action plan and strategy, this is discussed in more detail below.
3. In September 2022 WRS submitted, and have been successful in, a bid for funding from Defra's Air Quality Grant to expand the real time monitoring network across Worcestershire. Further information is provided below.
4. Construction of the Pershore Northern Link Road to reduce congestion on surrounding network was completed in Autumn 2022.
5. Wychavon District Council introduced a taxi license fee waiver for those licensing battery electric vehicles to encourage the take-up of electric and other low emission vehicles and to discourage higher polluting older vehicles.

6. Wychavon District Council has been allocated £150k from the Governments UK Shared Prosperity Fund to be spend on active travel projects in the district over 2023/24 and 2024/15.
7. The council has approved budget of £210,000 over the next two years to implement HVO (Hydrotreated Vegetable Oil) fuel into the waste fleet. HVO fuel reduces carbon emissions by 90% compared to diesel, and also provides a reduction in nitrogen oxide, particulate matter and carbon monoxide relative to diesel.

Air Quality Actions Plan and Air Quality Strategy

A new Air Quality Action Plan is required for Worcestershire in accordance with the Environment Act 2021 and revised guidance published in Aug 2022 (LAQM.TG22 and PG22). The COVID19 pandemic, unfortunately, led to the suspension of previous district AQAP working groups and public health action group's programmes in 2020. In September 2022, WRS began discussions with Worcestershire County Council colleagues with a view to forming a new Steering Group and producing a new plan of actions to improve air quality across the County, to comply with recent legislative changes.

The group membership has expanded considerably at the beginning of 2023 and is currently progressing a programme of works, outlined below, which will be reported on in the next ASR (2024).

The group currently 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.

The Action Plan will incorporate an improving Air Quality Strategy applicable across the County including districts councils that currently have no AQMAs in accordance with legislation and guidance.

The first step in action planning is to determine the contribution of sources of air pollution (source apportionment) to inform future actions. Up to date source apportionment has been completed for some parts of the County, but further work is required.

The initial Steering Group work is focussed on actions informed by the available source apportionment work in addition to countywide actions applicable to all districts.

The timeline for the various stages and delivery of the Air Quality Strategy and Action Plan is set out below.

| Timeline | Phase |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Feb – Dec 2023 | Identification of potential overarching Worcestershire County Council actions and Worcester City Council Specific actions, feasibility filter of measures, cost benefit analysis, determination of impact, timelines and funding sources, drafting of countywide action plan |
| Jan – Mar 2024 | Submission of Draft for review by Senior Management Team and approval by Political Committees at Worcester City Council and Worcestershire County Council and revisions |
| March 2024 | Submission of Draft countywide AQAP inc. local AQ strategy and Worcester City Council specific actions to DEFRA |
| April- June 2024 | 3 month Public Consultation on Draft countywide AQAP following revisions |
| July - Sept 2024 | Revisions and finalisation of countywide AQAP inc. local AQ strategy and Worcester City Council specific actions Consideration for revocation of AQMAs and source apportionment work for other AQMAs in 1) Bromsgrove DC 2) Wyre Forest DC 3) Wychavon DC |
| Sept – Oct 2024 | Submission of Finalised AQAP for review by Senior Management Team and approval by Political Committees at Worcester City Council and Worcestershire County Council and revisions |
| Sept 2024 - Mar 2025 | AQAPSG work on Bromsgrove DC and Wyre Forest DC specific actions (if required), refresh SG membership with relevant stakeholders. Identification of district specific actions, feasibility filter of measures, cost benefit analysis, determination of impact, timelines and funding sources, and draft update to AQAP. Consultation on additional chapters/amendments |
| Nov 2024 | Publication of Finalised countywide AQAP inc. local AQ strategy & Worcester City chapter and submission to DEFRA |
| Mar - May 2025 | Annual review for any amendments requiring further work. |

Real-time Air Quality Monitoring Project

In September 2022 officers from WRS submitted an application to Defra's Air Quality Grant Scheme 2022/23. The scope of the bid was to establish an enhanced real-time air quality monitoring network across the main areas of air quality concern in Worcestershire for purposes of informing the public and vulnerable groups of the status of air pollution. The scheme would see the installation of approximately 24 'low-cost Air Quality Monitors' across the county which measure NO₂, PM₁₀, and PM_{2.5} with MCERTS approval for indicative particulates. The results of monitoring would then be used to inform decision making and requirements for further action as necessary.

In February 2023 Defra announced that the WRS bid had been successful and the requested £248,400 was awarded. An additional 10% of funds will also be provided by each district council in Worcestershire, as per the match-funding requirement of the scheme, which equates to £27,600. Giving a grand total of £276,000 for the project.

At the time of writing the project is at the procurement stage, with the tender specification close to completion. Once a successful supplier has been appointed, exact monitoring

locations will be agreed, and equipment installed. This is anticipated to be in the latter stages of 2023.

Three of the real-time monitors are to be deployed within the Wychavon District Council area. Locations are currently to be confirmed but are expected to represent worst case conditions in relation to road traffic and impacts from agriculture and solid fuel burning.

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.
- The council introduced a taxi license fee waiver for those licensing battery electric vehicles 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.
- 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.
- The council has been allocated £150k from the Governments UK Shared Prosperity Fund to be spend on active travel projects in the district over 2023/24 and 2024/15.
- The council has approved budget of £210,000 over the next two years to implement HVO (Hydrotreated Vegetable Oil) fuel into the waste fleet. HVO fuel reduces carbon emissions by 90% compared to diesel, and also provides a reduction in nitrogen oxide, particulate matter and carbon monoxide relative to diesel.

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

Electric Vehicle Charging

Wychavon District Council has installed a total of 24 electric vehicle charging points in 5 car parks in towns across the District including Evesham, Pershore, Droitwich and Broadway. Further information can be found at [Car Parks - 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. Further information can be found at [Council tries out electric vehicles to collect waste across Wychavon - Wychavon District Council - Wychavon District Council](#)

Worcestershire County Council actions

Worcestershire County Council have implemented or taken forward a number of actions and plans that will benefit air quality within Wychavon District area:

- Improvements for the Former Port Street, Evesham AQMA area were completed in 2021 comprising updating of traffic signals at the junction of Port Street, Waterside and Bridge Street to improve efficiency and provide pedestrian crossing and Public Realm Enhancement Scheme. Further information can be found at [Port Street, Evesham | Worcestershire County Council](#)
- Construction of the Pershore Northern Link Road to reduce congestion on surrounding network was completed Autumn 2022. Further information is available here [Pershore infrastructure improvement scheme | Worcestershire County Council](#)

- A planning application has been submitted for a new walking and cycling bridge linking Hampton and Evesham
- A Local Cycling and Walking Infrastructure Plan (LCWIP) for Evesham is currently in development and due for public consultation in Summer 2023
- Pershore and Droitwich (LCWIPs) funded by Active Travel England, to be completed in 2024
- WCC are collaborating with Wychavon DC and other districts on review of the South Worcestershire Development Plan, which includes detailed policy for the strategic sites and new settlements including prioritisation of active travel and corridor improvements, policy requirements for travel and to address the impact of air pollution from new development. The plan is due to be submitted to the Secretary of State for DLUHC in summer 2023.

Wychavon District Council expects the following measures to be completed over the course of the next reporting year:

- Installation of NO₂ and Particulate Matter analysers in Worcester Road, Wychbold AQMA has been completed at time of writing
- Implementation of an enhanced monitoring network across the County to provide real time data on a range of air pollutants to go live at beginning of 2024.

Wychavon District Council's priorities for the coming year are:

- Installation of additional 3 low-cost Air Quality Analysers in the district monitoring NO₂ and particulate matter as part of the County enhanced monitoring network to inform future decisions and actions.
- Supporting the development of countywide Air Quality Action Plan and Air Quality Strategy. Publication of the draft document is anticipated in Spring 2024 with a finalised version later next year following the necessary consultation process. This is to remain a 'live' document that can be added to and revised on a regular basis as planned actions evolve.
- Developing closer working ties with Public Health colleagues on variety of work streams: AQAP progression, campaigns such as Clean Air Day 2023 and establishing an alert system for vulnerable groups linked to the real time monitoring network.

- Continue monitoring of air pollutants at key locations across the district
- Ensure proportionate mitigation measures are included within new developments where air quality is a relevant concern.
- Submission to DLUHC of detailed policy to address the impact of air pollution from new development in South Worcestershire Development Plan.

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), 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 that are recognised by Defra for measuring against ambient air quality directives. The nearest AURN PM_{2.5} monitoring station is the Birmingham Ladywood site approximately 20 kilometres to the north-east of Wychavon District. However, WRS have assisted the Defra AURN expansion project team with potential locations for two PM_{2.5} monitors in Worcestershire, and it is hoped these will be in place within the next 6 to 12 months.

Following success of bid for funding for low-cost sensors from Defra Air Quality Grant 2022/23, WRS are progressing implementation of up to 3 low-cost Air Quality Monitors in Wychavon District. The sensors will measure NO₂, PM₁₀, and PM_{2.5} and it is anticipated will be in place within the next 12 months.

Additionally, a continuous analyser (Model: BAM-1020) has been installed to monitor PM₁₀ within the Worcester Road, Wychbold AQMA in May 2023.

WRS has reviewed the DEFRA national background maps to determine projected PM_{2.5} concentrations across Wychavon District area for the 2022 calendar year. The annual average total PM_{2.5} at 657 locations (centre points of 1km x 1km grids) across Wychavon District is 7.68 µg/m³, with a minimum concentration of 7.11 µg/m³ and a maximum concentration of 9.28 µg/m³.

This indicates that PM_{2.5} concentrations within the Wychavon District are generally below the annual average limit value for PM_{2.5} target of 10µg/m³ to be met across England by 2040.

WRS has reviewed the fraction of mortality attributable to particulate air pollution (indicator D01) as published by Public Health England as part of the Public Health Outcomes

Framework⁹. The fraction of mortality attributable to particulate emissions in Wychavon District in 2021 (the most recent year available) was 5.0%. This falls below the national figure for England (5.5% in 2021) and below the figure for the West Midlands region (5.5% in 2021). Recent trend data is not available for the district 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](#)

There are no smoke control areas within Wychavon District.

In light of the above no additional actions are currently planned by Wychavon District in relation to the reduction of PM_{2.5} levels. However, it is anticipated that any actions taken to improve NO₂ levels across the District as part of the revised future countywide AQAP will likely result in a linked improvement in PM_{2.5} levels. Additionally, the new countywide AQAP will include the local air quality strategy for all Worcestershire districts and have due regard for the new responsibilities on local authority for PM_{2.5} outlined within the revised national Air Quality Strategy (28 April 2023) published at the time of producing this report.

⁹ [Public Health Outcomes Framework - OHID \(phe.org.uk\)](#)

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

This section sets out the monitoring undertaken within 2022 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 2018 and 2022 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 any automatic monitoring during 2022.

3.1.2 Non-Automatic Monitoring Sites

Wychavon District Council undertook non- automatic (i.e., passive) monitoring of NO₂ at 22 sites during 2022. 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: Map(s) of Monitoring Locations and AQMAs. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g., annualisation and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (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 (NO₂)

Table A.2 in Appendix A compares 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 2022 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.

There has been one change to the monitoring network across Wychavon District during 2022: monitoring location EPS52 has been discontinued due to reduced accessibility.

Monitoring data from 2021 does not represent a standard year with the continuation of the COVID-19 pandemic, associated lockdowns and restrictions affecting travel patterns and behaviours. As such, monitoring data shows an overall increase of $3.62 \mu\text{g}/\text{m}^3$ (17%) in average recorded annual mean NO_2 concentrations across the Wychavon District area between 2021 and 2022 ($22.0 \mu\text{g}/\text{m}^3$ in 2021 and $25.62 \mu\text{g}/\text{m}^3$ in 2022). All but one diffusion tube monitoring stations in the Wychavon District area saw an increase in annual mean NO_2 concentrations between 2021 and 2022. This is likely to have been caused by the increase in traffic between the two periods following the cessation of all COVID-19 regulations and restrictions in March 2022. Interim traffic data from County Council indicates traffic increased by approximately 9 - 14% between 2021 – 2022 and has returned to 98% of pre-pandemic levels across the County by the beginning of 2023.

At this time, it is unclear if some enforced behaviours during the pandemic that led to a decrease in the number of journeys made, such as virtual meetings replacing face to face and an increase in working from home, will continue to have the beneficial impact on reducing concentrations of NO_2 in future years after 2022.

Measured concentrations in 2022 are generally in line with 2019 data, on average $-0.19 \mu\text{g}/\text{m}^3$ and -1.14% below 2019 records. However, 2019 measurements were subject to application of particularly low bias adjustment factor and not considered indicative of local trends. In comparing 2022 measured concentrations with pre-pandemic levels it is considered appropriate to compare with 2018 recorded data which averages concentrations of $5.74 \mu\text{g}/\text{m}^3$ and 18% higher than 2022 data across Wychavon District.

In 2022, the highest concentration of NO_2 recorded across Wychavon District was $41.70 \mu\text{g}/\text{m}^3$ at WyAQ1, located in the Worcester Road, Wychbold AQMA, though this is reduced to $28.3 \mu\text{g}/\text{m}^3$ when calculating back to the nearest relevant receptor. This location has recorded the highest concentration across Wychavon District for the last 5 years with a measured concentration of $37.1 \mu\text{g}/\text{m}^3$ in 2021 and $49.6 \mu\text{g}/\text{m}^3$ in 2018.

No other diffusion tube monitoring locations have recorded concentrations within -10% of the AQS objective for annual average NO₂ in 2022. All concentrations are shown in Table B.1.

The highest concentration measured at a relevant receptor recorded in Wychavon District in 2022 is 31.23 µg/m³ at EPS56 within the Worcester Road, Wychbold AQMA.

Given the trends recorded in 2022 and the complex history as discussed above, no amendments to the Worcester Road, Wychbold AQMA are proposed at this time.

No annual means greater than 60 µg/m³ have been recorded indicating that it is very unlikely that there have been any exceedances of the 1-hour mean objective for NO₂ at any diffusion tube monitoring sites.

3.2.2 Particulate Matter (PM₁₀)

Wychavon District Council did not undertake PM₁₀ monitoring in 2022.

3.2.3 Particulate Matter (PM_{2.5})

Wychavon District Council did not undertake PM_{2.5} monitoring in 2022.

3.2.4 Sulphur Dioxide (SO₂)

Wychavon District Council did not undertake SO₂ monitoring in 2022.

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) |
|-----------------------|------------------------------------------------------------------|-----------|-------------------------|--------------------------|----------------------|----------------------|--------------------------------------------------|-----------------------------------------------------|---------------------------------------------|-----------------|
| EPS8 | 40 High Street SL8, Pershore, WR10 1DP | Roadside | 395048 | 245527 | NO ₂ | | 2.0 | 0.5 | No | 2.3 |
| EPS9 | St. Andrews Road SL139, Pershore, WR10 1LU | Suburban | 394571 | 245377 | NO ₂ | | 6.0 | 3.0 | No | 2.3 |
| EPS14, EPS14a, EPS14b | Port Street Road Sign, Evesham, WR11 3LD | Kerbside | 404128 | 243630 | NO ₂ | | 1.7 | 0.7 | No | 2.4 |
| EPS33 | High Street SL32, Evesham, WR11 4EU | Roadside | 403753 | 244068 | NO ₂ | | 2.5 | 3.5 | No | 2.3 |
| EPS43 | Long Stay opp cinema, Port St, Evesham, WR11 3LD | Roadside | 404222 | 243598 | NO ₂ | | 0.0 | 1.9 | No | 2.4 |
| EPS44 | Camera Post opp 33, Port St, Evesham, WR11 3LD | Roadside | 404183 | 243611 | NO ₂ | | 2.6 | 1.2 | No | 2.5 |
| EPS60 | Corner of Rynal Street & De La Bere Close, Evesham SL2, WR11 4PE | Roadside | 403914 | 244046 | NO ₂ | | 5.5 | 1.1 | No | 2.1 |
| EPS61 | 1-6 The Old Dairy, Swan Lane, Evesham, WR11 4PA | Roadside | 403796 | 244006 | NO ₂ | | 0.0 | 1.9 | No | 2.0 |
| EPS62 | Bengal Dreams No 53 Façade, Evesham, WR11 4DA | Roadside | 403729 | 243971 | NO ₂ | | 1.3 | 5.4 | No | 2.2 |

| 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) |
|-------------------|-----------------------------------------------------------|-----------|-------------------------|--------------------------|----------------------|-----------------------------|--------------------------------------------------|-----------------------------------------------------|---------------------------------------------|-----------------|
| EPS63 | 60 Mayflower Road, Droitwich, WR9 8PY | Roadside | 390708 | 262863 | NO ₂ | | 0.0 | 2.5 | No | 1.9 |
| EPS27 | A38 Worcester Rd & Amphlett Way, Wychbold, WR9 7PA | Roadside | 392031 | 265624 | NO ₂ | Worcester RD, Wychbold AQMA | 15.5 | 2.3 | No | 2.1 |
| WychSC | A38 nr Sheldon Close, Worcester Road, Wychbold WR9 7PA | Roadside | 392022 | 265702 | NO ₂ | Worcester RD, Wychbold AQMA | 19.6 | 1.2 | No | 1.3 |
| EPS56 | Post Office, Worcester Road WR9 7PA | Roadside | 391983 | 265688 | NO ₂ | Worcester RD, Wychbold AQMA | 0.0 | 8.1 | No | 2.1 |
| WyAQ1 | A38 adj Rose Dene, Worcester Road, Wychbold, WR9 7PA | Roadside | 392019 | 265736 | NO ₂ | Worcester RD, Wychbold AQMA | 9.9 | 1.9 | No | 2.2 |
| EPS58 | 2 Rose Villas, Worcester Rd (S14) WR9 7PA | Roadside | 392027 | 265770 | NO ₂ | Worcester RD, Wychbold AQMA | 0.0 | 3.0 | No | 2.3 |
| WMD1 | SL363 A38 Worcester Rd/Walk Mill Drive, Wychbold, WR9 7PA | Roadside | 392050 | 265790 | NO ₂ | Worcester RD, Wychbold AQMA | 4.9 | 2.3 | No | 2.1 |
| WMD2 | Walkmill Drive adj M5, off Worcester Road, Wychbold | Roadside | 391871 | 265859 | NO ₂ | Worcester RD, Wychbold AQMA | 13.5 | 21.5 | No | 1.8 |
| WychCH | SL359 adj 6 The Council House "Amesford", Worcester | Roadside | 392160 | 265937 | NO ₂ | Worcester RD, Wychbold AQMA | 7.5 | 2.1 | No | 2.3 |

| 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) |
|-------------------|-------------------------------------------------------------------|------------------|-------------------------|--------------------------|----------------------|-----------------------------|--------------------------------------------------|-----------------------------------------------------|---------------------------------------------|-----------------|
| | Road, Wychbold WR9 7PE | | | | | | | | | |
| CROW1 | Adj Ou Est Elle, 1 Crown Lane/A38 Worcester Rd, Wychbold, WR9 7PT | Roadside | 392257 | 266043 | NO ₂ | Worcester RD, Wychbold AQMA | 4.3 | 1.3 | No | 2.3 |
| WychAD | Mill Lane Nr. "Avondale", A38 Worcester Road, Wychbold WR9 7PF | Roadside | 392384 | 266195 | NO ₂ | Worcester RD, Wychbold AQMA | n/a | 1.5 | No | 2.1 |
| EPS53 | Hillview Cottage, Whittington, WR5 2RL | Suburban | 387595 | 252533 | NO ₂ | | 0.0 | 22.0 | No | 1.7 |
| BG | West View Broomhall Green, Norton roundabout, WR5 2PF | Urban Background | 386297 | 252150 | NO ₂ | | 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.2 – 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 2022 (%) ⁽²⁾ | 2018 | 2019 | 2020 | 2021 | 2022 |
|-----------------------|-------------------------|--------------------------|-----------|-------------------------------------------------------------|--------------------------------------------|-------------|------|------|------|------|
| EPS8 | 395048 | 245527 | Roadside | 92.3 | 92.3 | 26.9 | 21.9 | 16.8 | 18.6 | 20.7 |
| EPS9 | 394571 | 245377 | Suburban | 82.7 | 82.7 | 12.0 | 10.0 | 8.6 | 8.4 | 9.4 |
| EPS14, EPS14a, EPS14b | 404128 | 243630 | Kerbside | 100 | 100.0 | 41.2 | 34.1 | 26.2 | 24.5 | 33.8 |
| EPS33 | 403753 | 244068 | Roadside | 82.7 | 82.7 | 29.9 | 23.9 | 18.6 | 21.0 | 24.7 |
| EPS43 | 404222 | 243598 | Roadside | 84.6 | 84.6 | 33.3 | 27.3 | 21.1 | 22.6 | 30.2 |
| EPS44 | 404183 | 243611 | Roadside | 90.4 | 90.4 | 31.1 | 27.5 | 21.2 | 22.3 | 29.2 |
| EPS60 | 403914 | 244046 | Roadside | 84.6 | 84.6 | 15.8 | 13.9 | 11.5 | 12.4 | 12.3 |
| EPS61 | 403796 | 244006 | Roadside | 92.3 | 92.3 | 29.7 | 25.0 | 19.1 | 20.0 | 27.2 |
| EPS62 | 403729 | 243971 | Roadside | 92.3 | 92.3 | 32.8 | 27.7 | 20.0 | 23.6 | 27.3 |
| EPS63 | 390708 | 262863 | Roadside | 100 | 100.0 | 24.8 | 18.5 | 14.8 | 14.6 | 19.4 |
| EPS27 | 392031 | 265624 | Roadside | 84.6 | 84.6 | 41.5 | 34.4 | 24.7 | 28.4 | 32.7 |
| WychSC | 392022 | 265702 | Roadside | 63.5 | 63.5 | 39.4 | 30.9 | 23.4 | 27.3 | 27.1 |
| EPS56 | 391983 | 265688 | Roadside | 100 | 100.0 | 40.0 | 32.2 | 27.0 | 27.7 | 31.2 |

| 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 2022 (%) ⁽²⁾ | 2018 | 2019 | 2020 | 2021 | 2022 |
|-------------------|-------------------------|--------------------------|------------------|-------------------------------------------------------------|--------------------------------------------|-------------|-------------|------|------|-------------|
| WyAQ1 | 392019 | 265736 | Roadside | 92.3 | 92.3 | 49.6 | 41.5 | 33.2 | 37.1 | 41.7 |
| EPS58 | 392027 | 265770 | Roadside | 100 | 100.0 | 31.9 | 26.9 | 21.9 | 24.5 | 27.4 |
| WMD1 | 392050 | 265790 | Roadside | 100 | 100.0 | 40.2 | 33.2 | - | 30.4 | 32.4 |
| WMD2 | 391871 | 265859 | Roadside | 100 | 100.0 | | 25.2 | 21.1 | 21.9 | 25.0 |
| WychCH | 392160 | 265937 | Roadside | 100 | 100.0 | 35.8 | 29.3 | 21.8 | 25.1 | 30.7 |
| CROW1 | 392257 | 266043 | Roadside | 100 | 100.0 | | 22.7 | 18.1 | 19.9 | 21.9 |
| WychAD | 392384 | 266195 | Roadside | 100 | 100.0 | 36.8 | 29.7 | 24.5 | 26.6 | 29.2 |
| EPS53 | 387595 | 252533 | Suburban | 82.7 | 82.7 | 27.7 | 23.4 | 18.9 | 20.0 | 21.3 |
| BG | 386297 | 252150 | Urban Background | 90.4 | 90.4 | 26.1 | 20.0 | 17.4 | 20.3 | 20.0 |

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

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 NO₂ annual mean objective of 40 $\mu\text{g}/\text{m}^3$ are shown in **bold**.

NO₂ annual means exceeding 60 $\mu\text{g}/\text{m}^3$, indicating a potential exceedance of the NO₂ 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.TG22 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 in Wychavon District

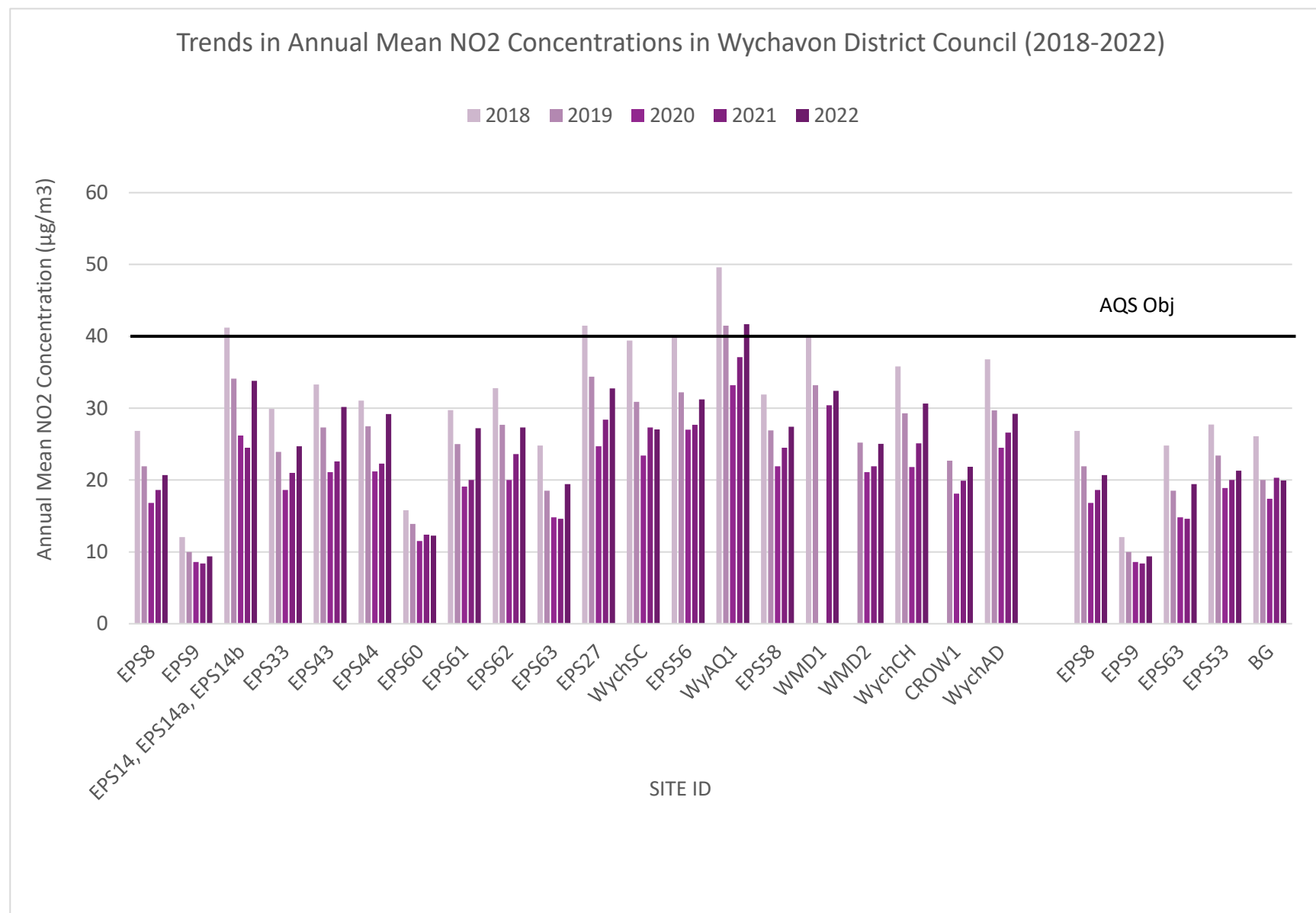


Figure A.2 – Trends in Annual Mean NO₂ Concentrations in Worcester Road, Wychbold AQMA

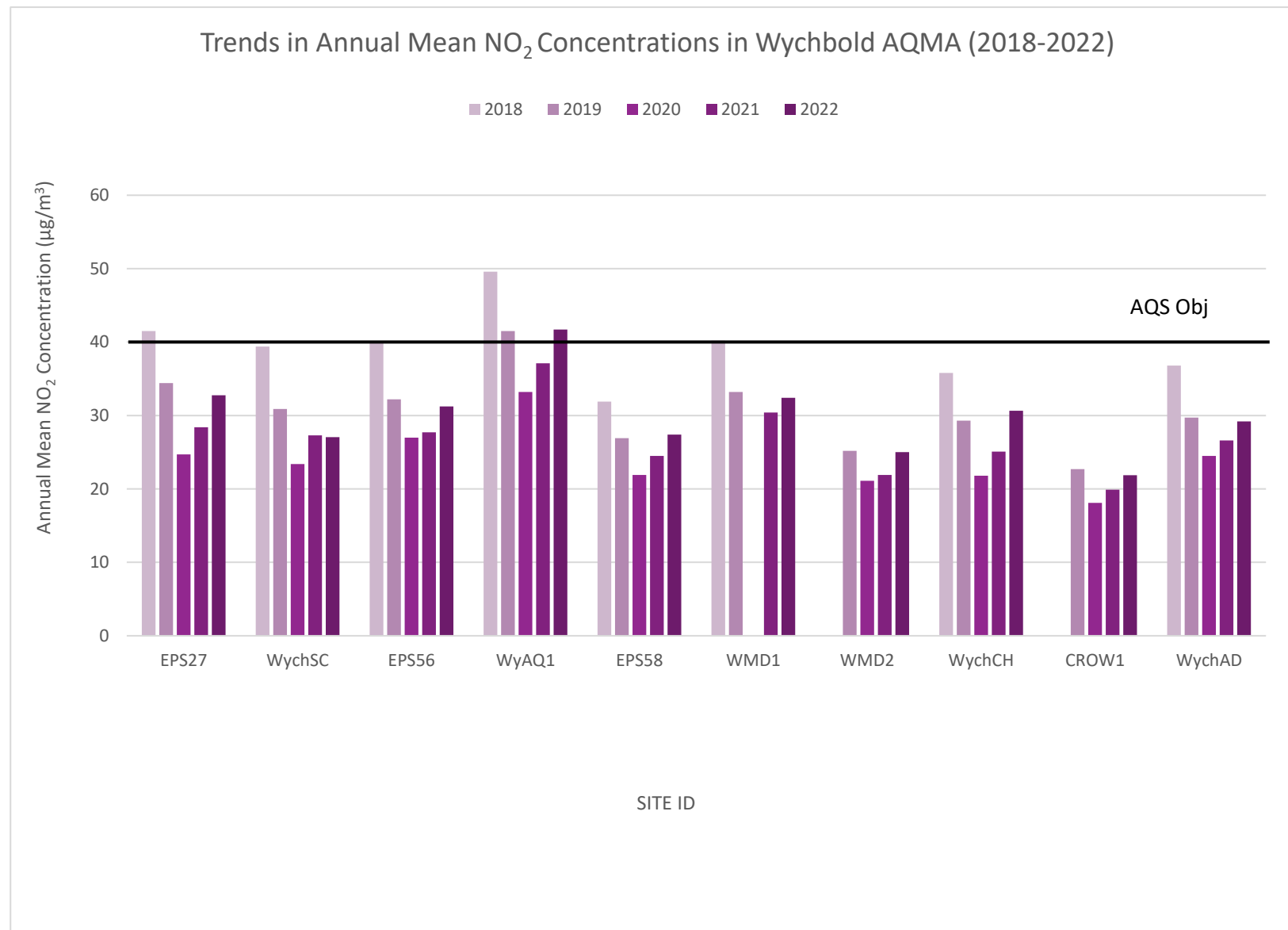


Figure A.3 – Trends in Annual Mean NO₂ Concentrations in Evesham

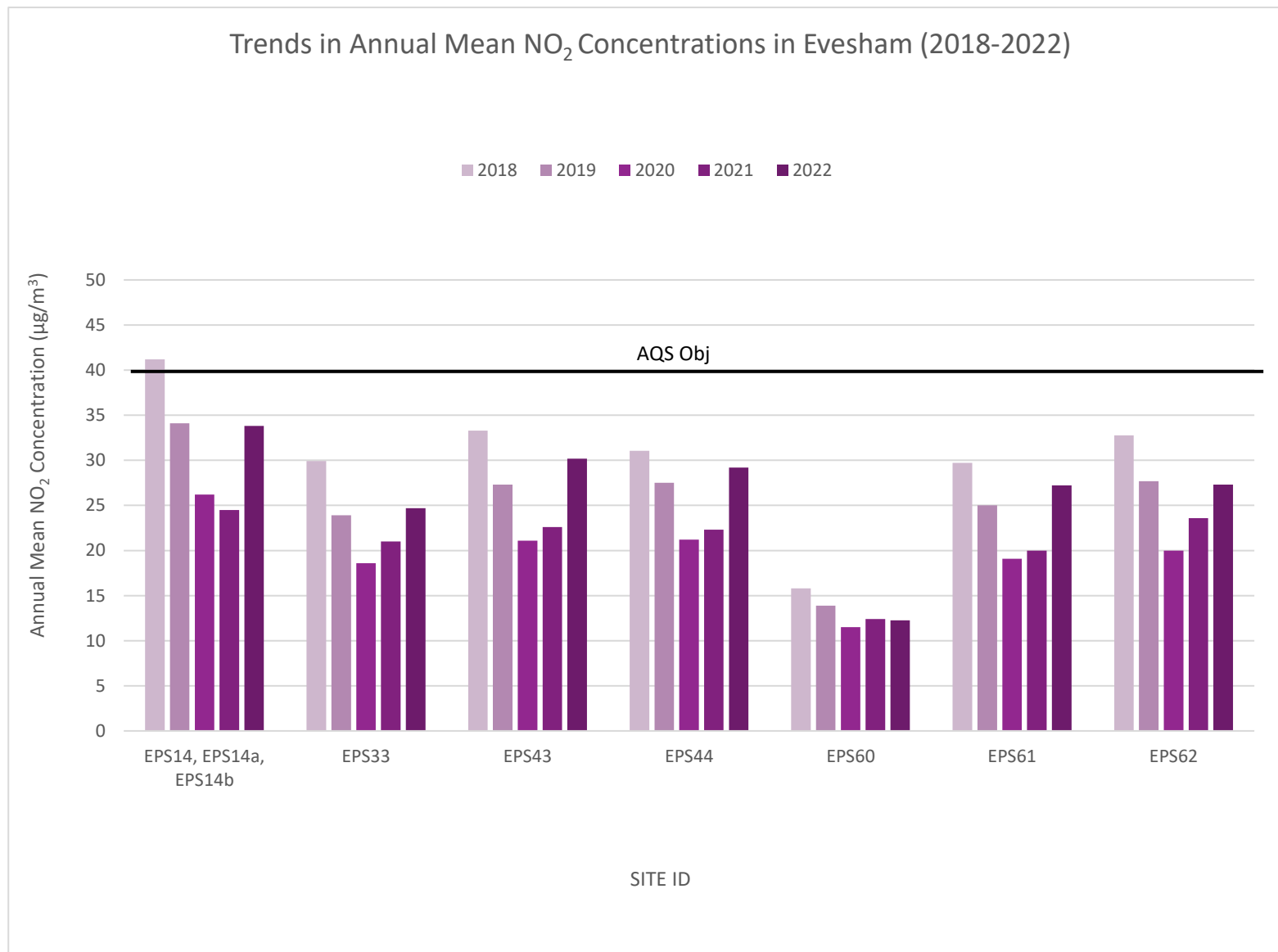
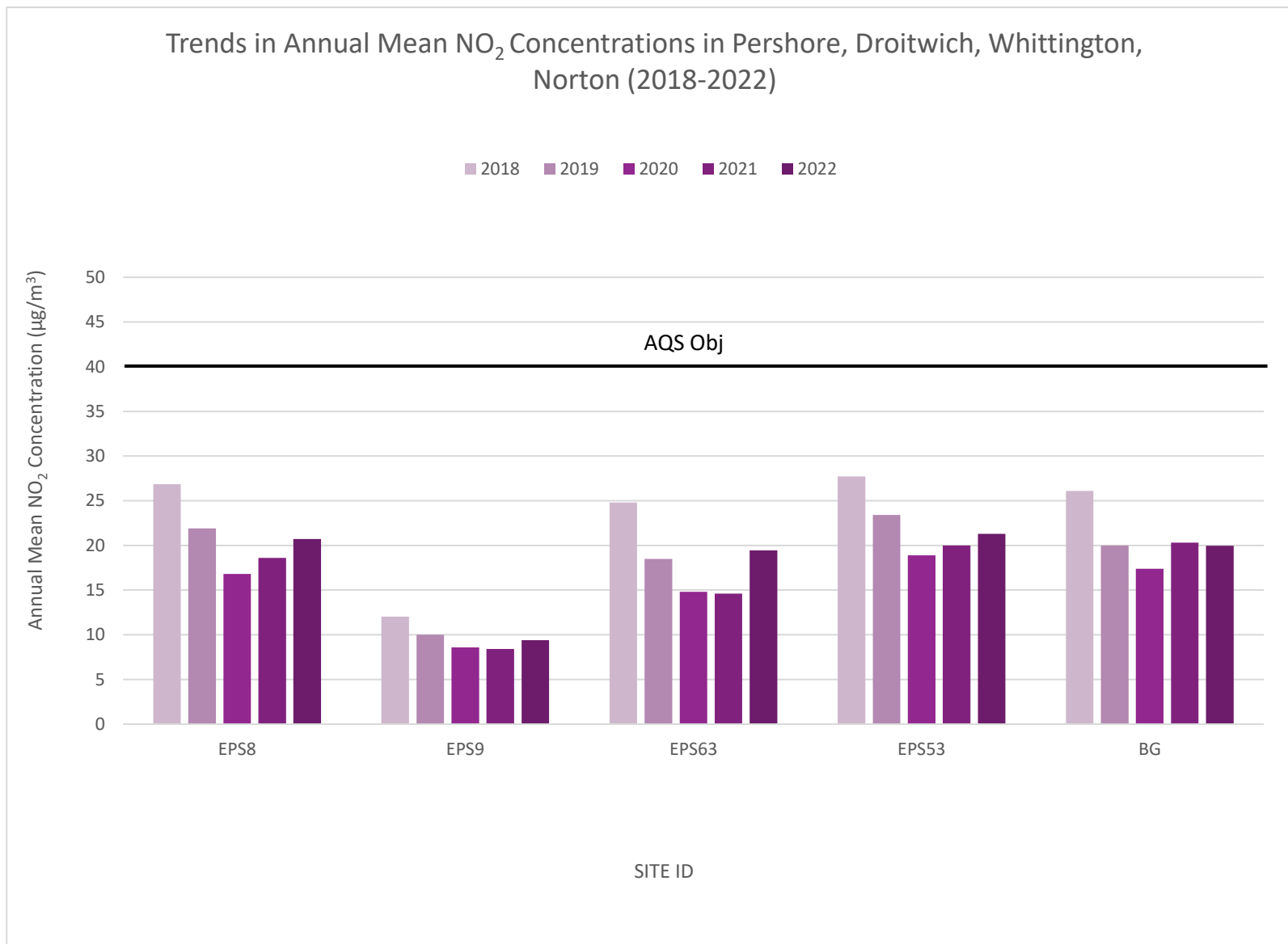


Figure A.4 – Trends in Annual Mean NO₂ Concentrations in Pershore and other areas



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO₂ 2022 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 (0.97) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|--------|-------------------------|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------------|--------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------|
| EPS8 | 395048 | 245527 | 33.2 | 21.1 | | 15.8 | 16.1 | 16.1 | 20.5 | 19.3 | 21.2 | 21.2 | 22.4 | 27.8 | 21.3 | 20.7 | - | |
| EPS9 | 394571 | 245377 | 16.9 | 6.5 | | 7.2 | 6.2 | 5.9 | 7.1 | 8.8 | 9.1 | | 11.3 | 17.8 | 9.7 | 9.4 | - | |
| EPS14 | 404128 | 243630 | 43.1 | 37.8 | 31.3 | 33.1 | 31.2 | 33.2 | 34.3 | 32.2 | 32.3 | 34.2 | 39.2 | 39.6 | - | - | - | Triplicate Site with EPS14, EPS14a and EPS14b - Annual data provided for EPS14b only |
| EPS14a | 404128 | 243630 | 42.2 | 31.8 | 32.3 | 31.2 | 33.1 | 34.3 | 34.7 | 29.0 | 30.8 | | 40.4 | 39.1 | - | - | - | Triplicate Site with EPS14, EPS14a and EPS14b - Annual data provided for EPS14b only |
| EPS14b | 404128 | 243630 | 44.1 | 31.4 | 35.8 | 33.1 | 31.4 | 33.8 | 33.9 | 30.4 | 33.3 | 33.6 | 40.5 | 39.3 | 34.9 | 33.8 | - | Triplicate Site with EPS14, EPS14a and EPS14b - Annual data provided for EPS14b only |
| EPS33 | 403753 | 244068 | 32.7 | 18.7 | 30.8 | | 18.9 | 18.2 | | 26.0 | 26.1 | 24.1 | 26.7 | 32.4 | 25.5 | 24.7 | - | |
| EPS43 | 404222 | 243598 | 42.1 | 22.0 | 36.7 | 27.7 | 26.6 | | 30.4 | 30.1 | 31.6 | 27.7 | | 36.2 | 31.1 | 30.2 | - | |
| EPS44 | 404183 | 243611 | 43.6 | 22.1 | 33.1 | | 26.4 | 26.1 | 30.0 | 29.1 | 30.5 | 26.4 | 29.4 | 34.4 | 30.1 | 29.2 | - | |
| EPS60 | 403914 | 244046 | | 13.9 | | 11.9 | 9.6 | 9.2 | 10.6 | 9.5 | 12.0 | 12.7 | 15.2 | 21.9 | 12.6 | 12.3 | - | |
| EPS61 | 403796 | 244006 | 36.0 | 27.2 | 26.9 | 22.8 | 26.5 | | 26.6 | 21.9 | 24.4 | 27.3 | 35.2 | 33.9 | 28.1 | 27.2 | - | |
| EPS62 | 403729 | 243971 | 40.7 | 28.0 | 23.7 | 24.7 | 26.1 | 25.4 | | 25.0 | 25.0 | 28.6 | 30.0 | 32.6 | 28.2 | 27.3 | - | |
| EPS63 | 390708 | 262863 | 22.6 | 12.9 | 32.1 | 21.3 | 13.5 | 12.0 | 14.7 | 23.0 | 19.4 | 21.0 | 22.9 | 25.2 | 20.0 | 19.4 | - | |
| EPS27 | 392031 | 265624 | 43.2 | 32.2 | 33.0 | 31.5 | 29.2 | 30.9 | 33.8 | | | 32.2 | 33.4 | 38.1 | 33.8 | 32.7 | - | |
| WychSC | 392022 | 265702 | 42.3 | 29.7 | 37.5 | 31.8 | | 24.0 | | 18.3 | 25.9 | | 31.3 | | 30.1 | 27.1 | - | |
| EPS56 | 391983 | 265688 | 40.3 | 28.4 | 33.6 | 29.6 | 29.8 | 28.6 | 32.3 | 31.4 | 34.8 | 32.0 | 32.7 | 33.1 | 32.2 | 31.2 | - | |
| WyAQ1 | 392019 | 265736 | 53.5 | | 28.1 | 38.6 | 37.6 | 38.0 | 43.4 | 41.1 | 47.2 | 47.6 | 48.0 | 49.8 | 43.0 | 41.7 | 28.3 | |
| EPS58 | 392027 | 265770 | 34.8 | 24.6 | 29.0 | 27.5 | 23.7 | 22.4 | 26.8 | 27.4 | 29.3 | 29.6 | 31.8 | 32.3 | 28.3 | 27.4 | - | |
| WMD1 | 392050 | 265790 | 44.0 | 29.5 | 38.3 | 30.0 | 26.1 | 28.6 | 29.9 | 31.1 | 31.5 | 34.9 | 37.9 | 39.1 | 33.4 | 32.4 | - | |

| 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 (0.97) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|--------|-------------------------|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------------|--------------------------------------------------|-----------------------------------------------------|---------|
| WMD2 | 391871 | 265859 | 30.9 | 28.0 | 20.6 | 23.2 | 26.4 | 25.7 | 28.0 | 21.6 | 25.8 | 26.6 | 26.9 | 26.0 | 25.8 | 25.0 | - | |
| WychCH | 392160 | 265937 | 42.4 | 28.9 | 34.8 | 29.8 | 26.2 | 23.5 | 26.6 | 28.7 | 29.1 | 31.7 | 38.0 | 39.5 | 31.6 | 30.7 | - | |
| CROW1 | 392257 | 266043 | 29.1 | 18.1 | 27.0 | 22.2 | 16.6 | 16.6 | 19.1 | 20.0 | 20.7 | 23.8 | 26.6 | 30.7 | 22.5 | 21.9 | - | |
| WychAD | 392384 | 266195 | 36.0 | 26.3 | 32.7 | 28.9 | 24.8 | 22.8 | 27.6 | 32.3 | 27.1 | 31.6 | 34.5 | 36.8 | 30.1 | 29.2 | - | |
| EPS53 | 387595 | 252533 | 33.8 | 22.9 | 21.4 | 18.0 | 20.1 | 18.3 | 20.1 | 16.6 | | 22.4 | 26.0 | | 22.0 | 21.3 | - | |
| BG | 386297 | 252150 | 33.5 | 26.7 | 27.6 | 22.4 | 16.6 | 14.1 | 17.8 | 16.7 | 17.6 | 14.3 | 19.1 | | 20.6 | 20.0 | - | |

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 >25% in line with LAQM.TG22.

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 2022 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 2022

Wychavon District Council has not identified any new sources impacting air quality within the reporting year of 2022

Applications for a number of new developments have been identified within the Wychavon District area. The proposals have been assessed as part of the planning process and are not expected to have a significant impact on local air quality when they are operational.

Details of applications for significant developments received by Wychavon District Council in year are as follows:

| Application Number | Location | Description of development |
|--------------------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| W/22/02308/RM | Land off Boat Lane, Evesham | Erection of 200 residential dwellings with parking, internal access roads, landscaping and all other details required by Condition 2 relating to the reserved matters for layout, scale, appearance and landscaping pursuant to planning permission 18/00549/OUT |
| W/22/01597/FUL | Land At (Os 9566 4743) Wyre Road Pershore | Development of 111 dwellings, including 40% affordable homes, and associated access, drainage and green infrastructure |

Additional Air Quality Works Undertaken by Wychavon District Council During 2022

Wychavon District Council has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

The following UKAS accredited company provided Wychavon District Council with nitrogen dioxide diffusion tubes and analysis in 2022:

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).

All monitoring undertaken has been completed in accordance with the 2022 Diffusion Tube Monitoring Calendar, i.e. on or within ± 2 days of the specified date.

Diffusion Tube Annualisation

One of the diffusion tube monitoring locations (WychSC) recorded a data capture of less than 75% in Wychavon District in 2022. Therefore, the monitoring data has been annualised using monitoring data from four automatic monitors. In addition, any sites with a data capture below 25% do not require annualisation.

Table C.1 – Annualisation Summary (concentrations presented in $\mu\text{g}/\text{m}^3$)

| Site ID | Annualisation Factor Birmingham Ladywood | Annualisation Factor Leamington Spa | Annualisation Factor Leominster | Annualisation Factor West Bromwich Kenrick Park | Average Annualisation Factor | Raw Data Annual Mean | Annualised Annual Mean |
|---------|------------------------------------------|-------------------------------------|---------------------------------|-------------------------------------------------|------------------------------|----------------------|------------------------|
| Wych SC | 0.9203 | 0.9108 | 0.9737 | 0.9017 | 0.9266 | 30.1 | 27.9 |

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 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.TG22 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/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Wychavon District Council have applied a local bias adjustment factor of 0.97 to the 2022 monitoring data. A summary of bias adjustment factors used by Wychavon District Council over the past five years is presented in Table C.2.

WRS has determined the appropriate local bias adjustment factor utilising the Diffusion Tube Data Processing Tool v3.0. The site used was the colocation study at Wyre Forest House, Kidderminster. The local bias adjustment factor has been used as more conservative compared with the national bias adjustment factor (0.83, Defra published National Diffusion Tube Bias Adjustment Spreadsheet Version 03/23), following consultation with Defra LAQM helpdesk and technical guidance.

Table C.2 – Bias Adjustment Factor

| Monitoring Year | Local or National | If National, Version of National Spreadsheet | Adjustment Factor |
|-----------------|-------------------|----------------------------------------------|-------------------|
| 2022 | Local | - | 0.97 |
| 2021 | National | 03/21 | 0.84 |
| 2020 | National | 03/20 | 0.78 |
| 2019 | National | 03/19 | 0.89 |
| 2018 | National | 03/18 | 0.77 |

Table C.3 – Local Bias Adjustment Calculation

| | Local Bias Adjustment Input 1 | Local Bias Adjustment Input 2 | Local Bias Adjustment Input 3 | Local Bias Adjustment Input 4 | Local Bias Adjustment Input 5 |
|--------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Periods used to calculate bias | 11 | | | | |
| Bias Factor A | 0.97 (0.92 - 1.04) | | | | |
| Bias Factor B | 3% (-4% - 9%) | | | | |
| Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$) | 13.0 | | | | |
| Mean CV (Precision) | 2.7% | | | | |
| Automatic Mean ($\mu\text{g}/\text{m}^3$) | 12.7 | | | | |
| Data Capture | 100% | | | | |
| Adjusted Tube Mean ($\mu\text{g}/\text{m}^3$) | 13 (12 - 14) | | | | |

Notes:

A single local bias adjustment factor has been used to bias adjust the 2022 diffusion tube results.

NO₂ Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure

has been estimated using the Diffusion Tube Data Processing Tool/NO₂ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO₂ concentrations corrected for distance are presented in Table B.1. Concentrations were corrected for distance at one location, WyAQ1 - a roadside site in the Wychbold AQMA.

Table C.4 – NO₂ Fall off With Distance Calculations (concentrations presented in µg/m³)

| Site ID | Distance (m): Monitoring Site to Kerb | Distance (m): Receptor to Kerb | Monitored Concentration (Annualised and Bias Adjusted) | Background Concentration | Concentration Predicted at Receptor | Comments |
|---------|---------------------------------------|--------------------------------|--------------------------------------------------------|--------------------------|-------------------------------------|----------|
| WyAQ1 | 1.9 | 11.8 | 41.7 | 10.0 | 28.3 | |

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

Figure D.1 – Map of Non-Automatic Monitoring Site: Worcester Road, Wychbold AQMA

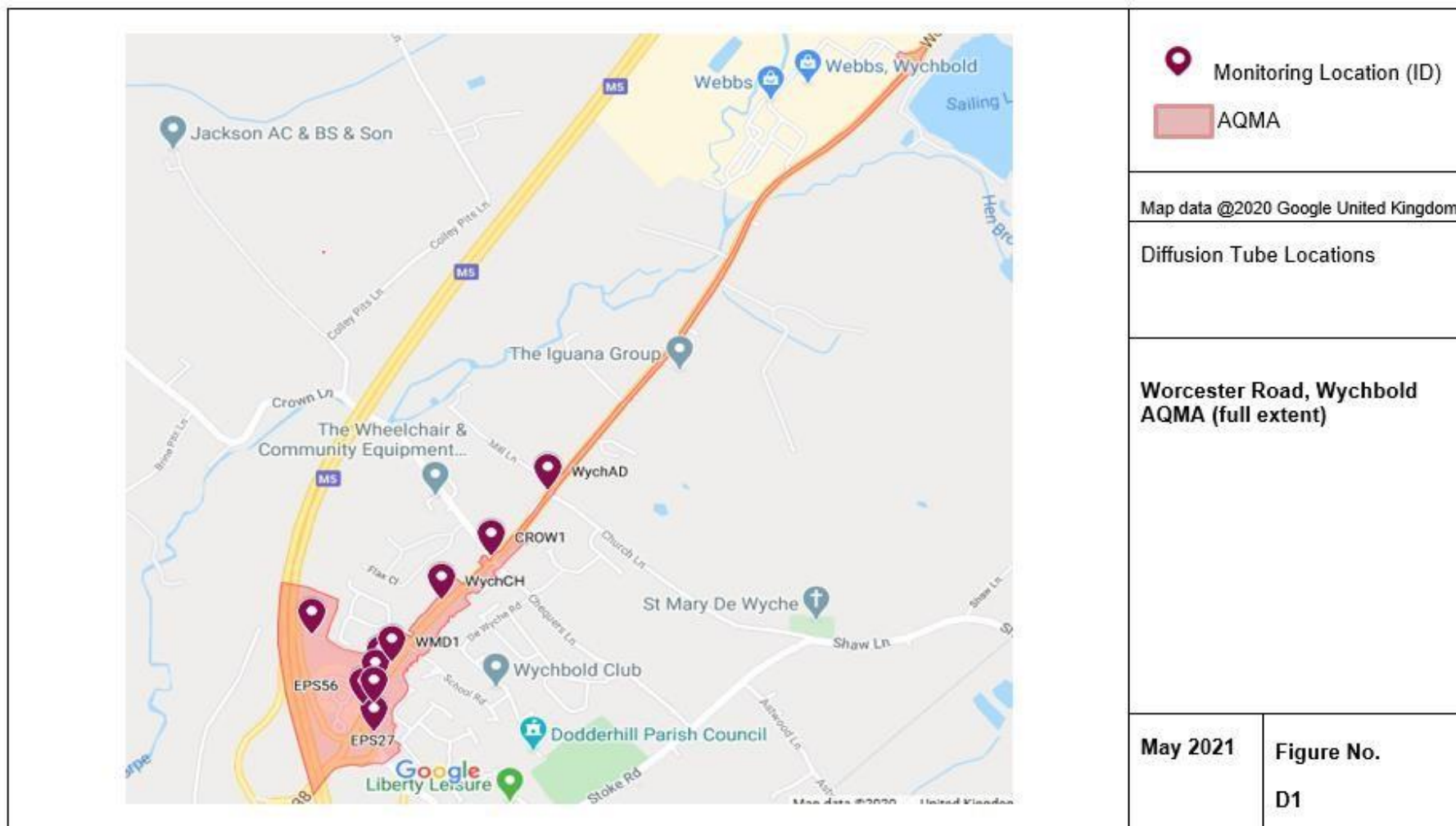


Figure D.2 – Map of Non-Automatic Monitoring Site: Worcester Road, Wychbold AQMA, southern section

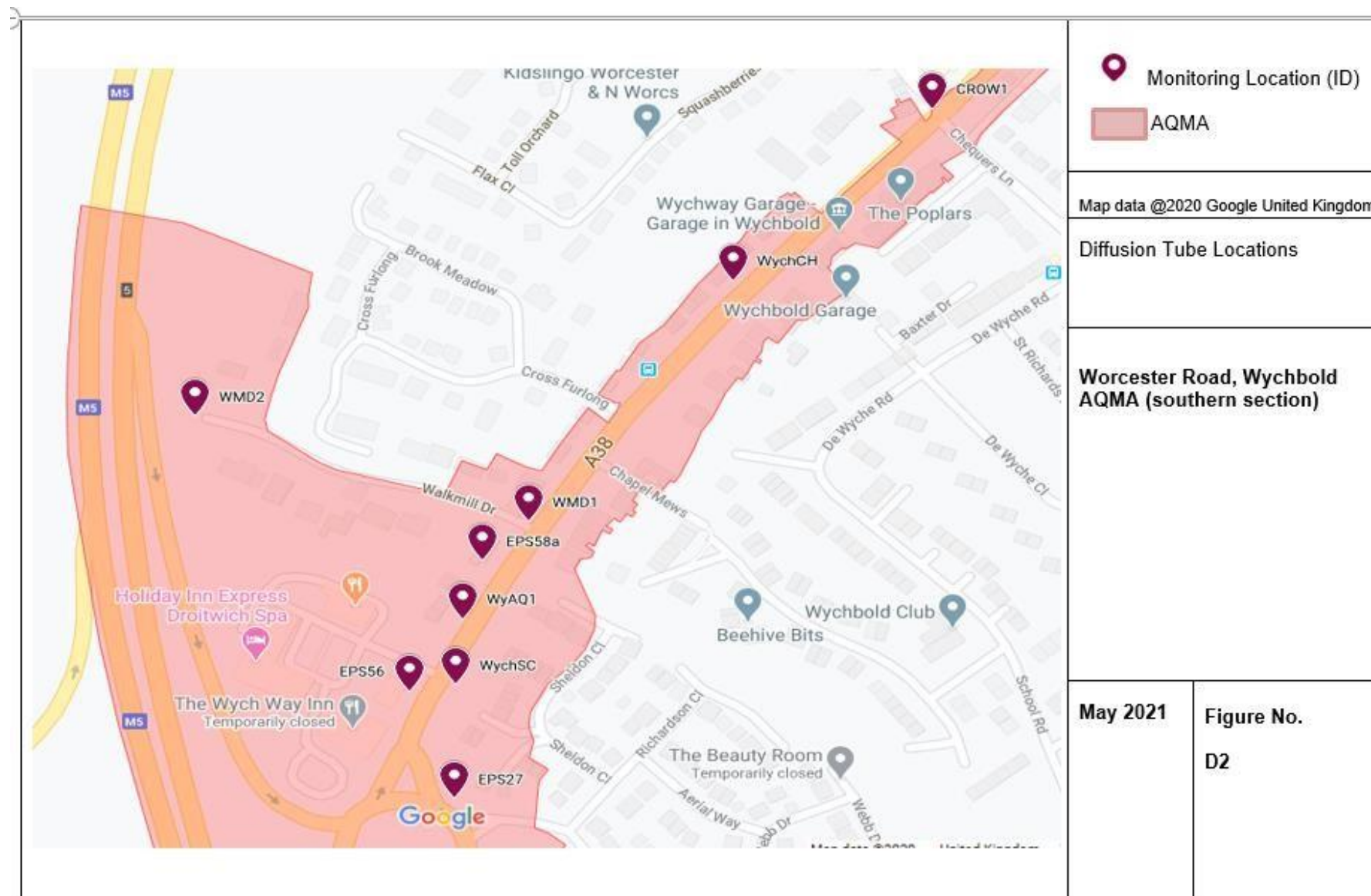


Figure D.3 – Map of Non-Automatic Monitoring Site: Pershore

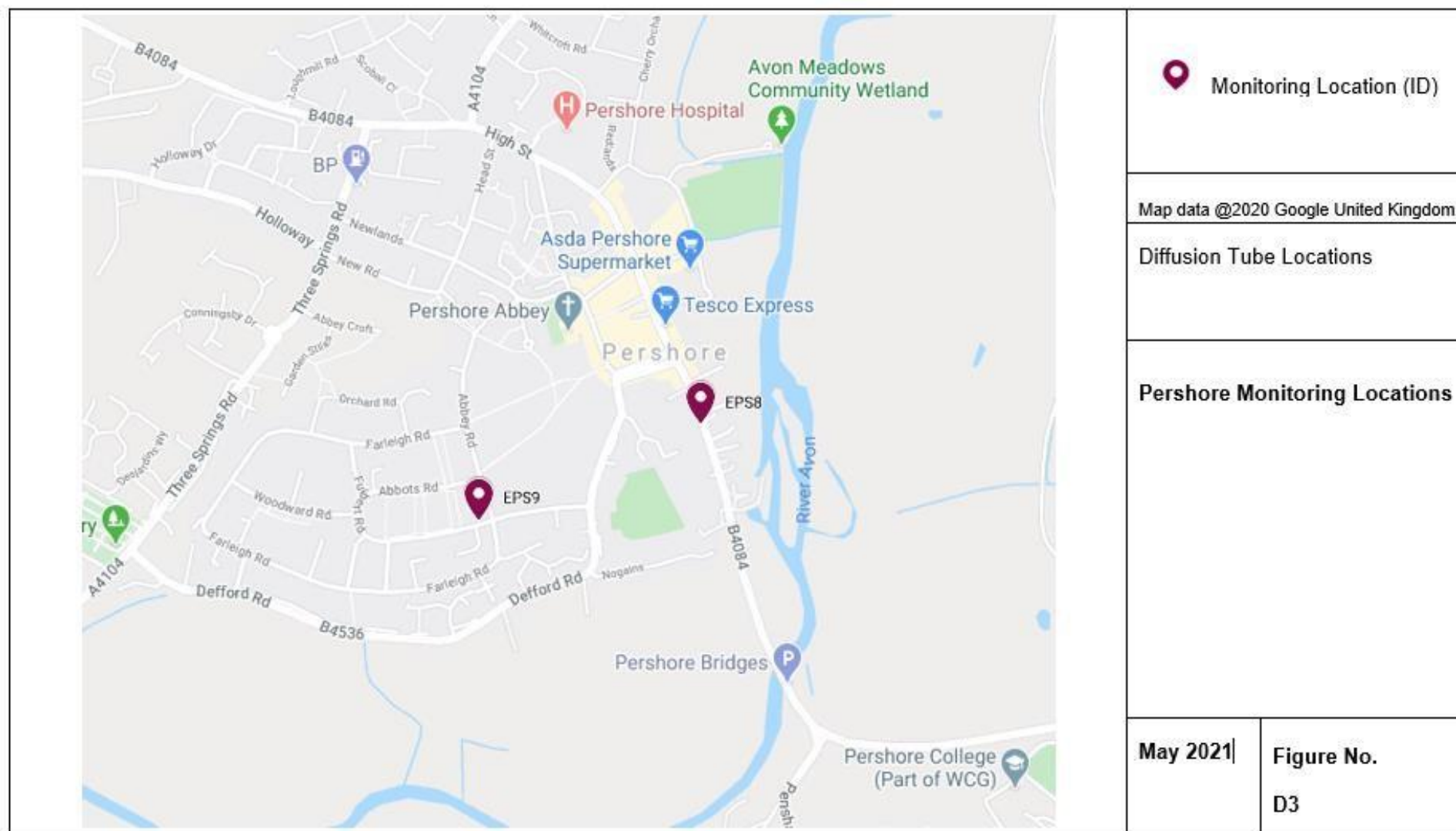


Figure D.4 – Map of Non-Automatic Monitoring Site: Evesham

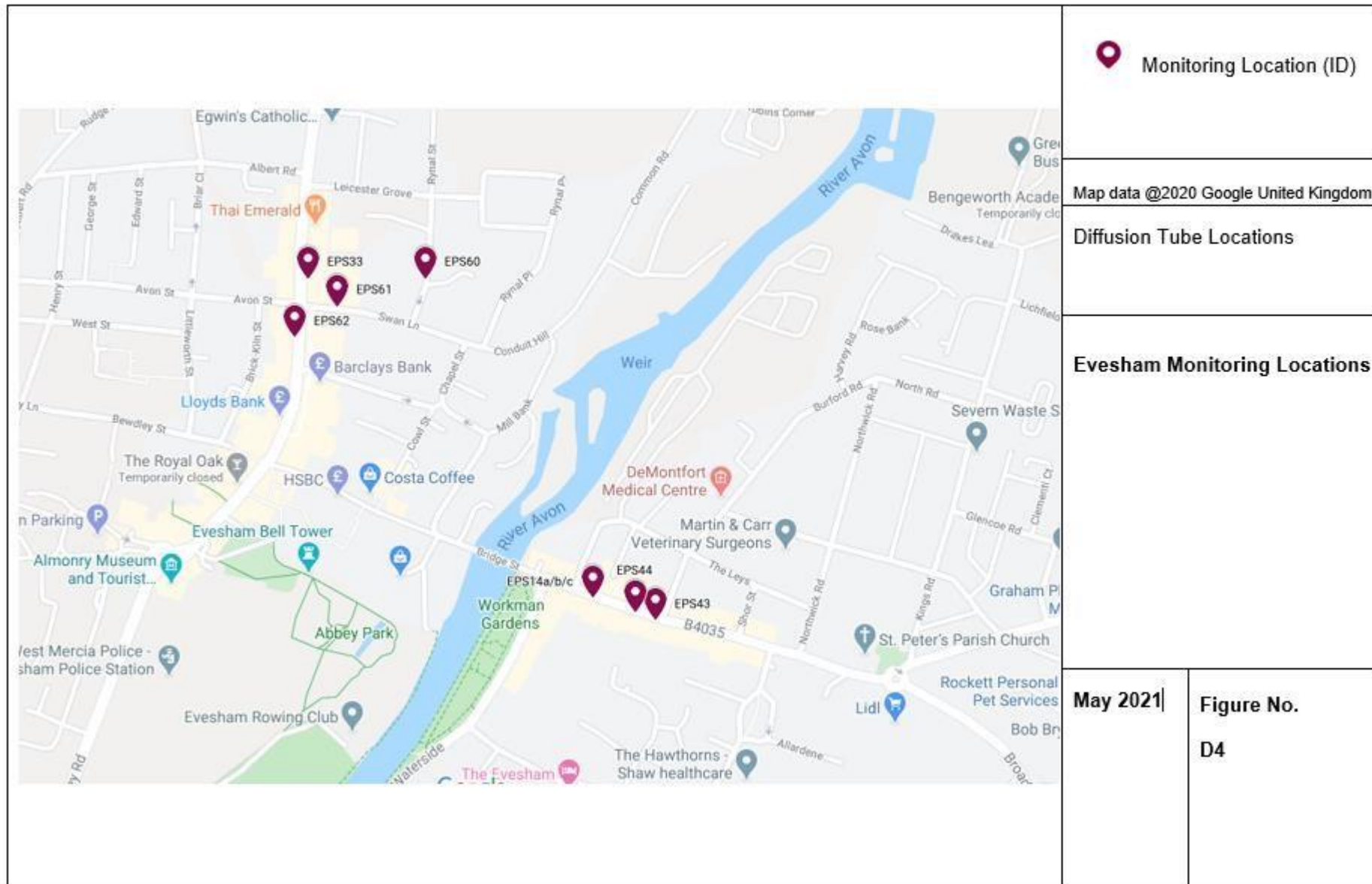


Figure D.5 – Map of Non-Automatic Monitoring Site: Droitwich

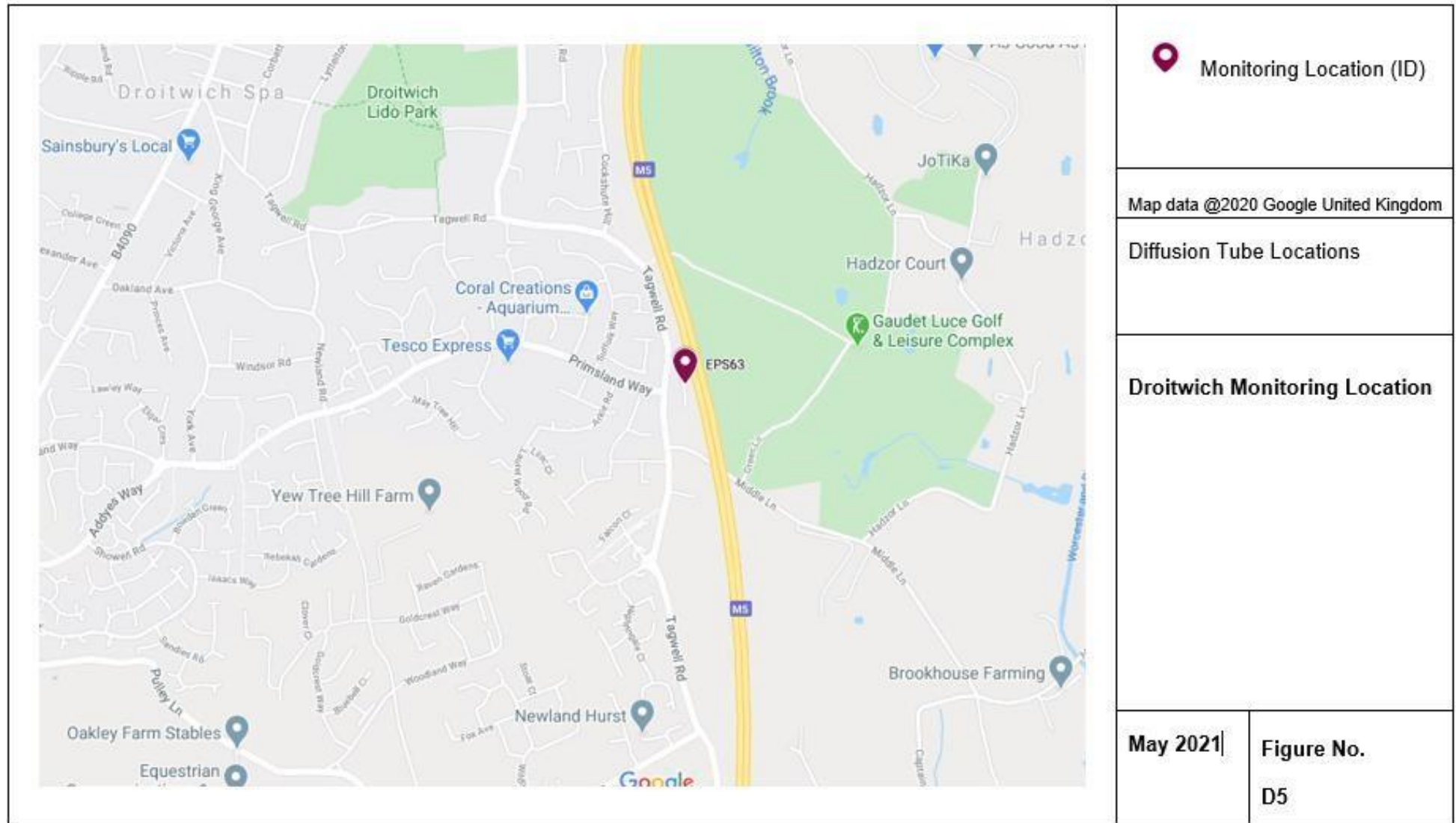


Figure D.6 – Map of Non-Automatic Monitoring Site: Whittington

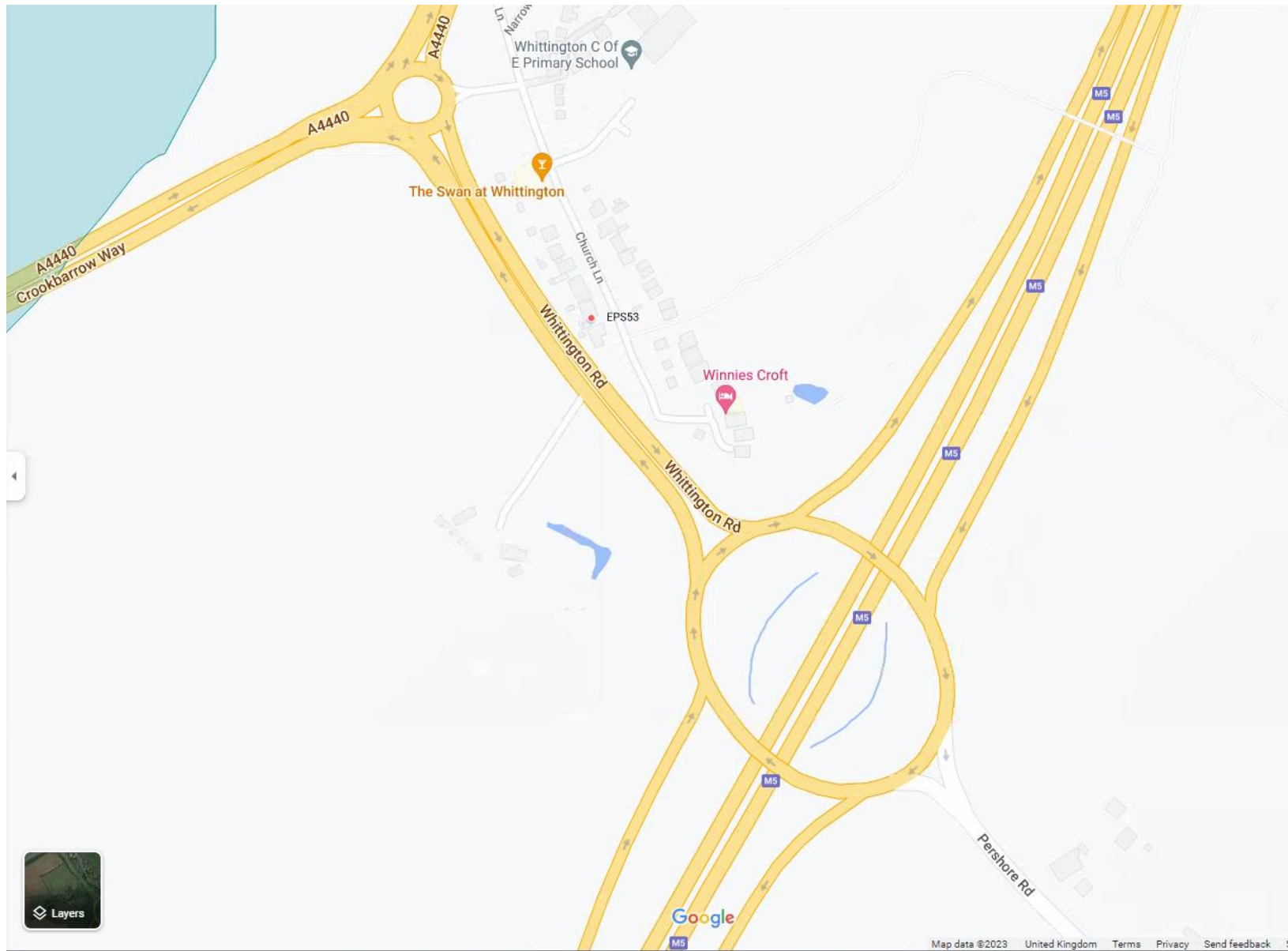


Figure D.7 – Map of Non-Automatic Monitoring Site: Norton Road



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England¹⁰

| 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 |

¹⁰ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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' |
| AQAPSG | Air Quality Action Plan Steering Group |
| 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 |
| AURN | Automatic Urban and Rural Network (Defra) - UK's largest automatic monitoring network and is the main network used for compliance reporting against the Ambient Air Quality Directives (by Gov't) |
| Defra | Department for Environment, Food and Rural Affairs |
| DoPH | Director of Public Health |
| DLUHC | Department of Levelling Up, Housing and Communities |
| HVO | Hydrotreated Vegetable Oil |
| LAQM | Local Air Quality Management |
| LCWIP | Local Cycling and Walking Infrastructure Plan |
| LEP | Local enterprise partnerships – These are non-statutory bodies responsible for local economic development in England. They are business-led partnerships bringing together the private sector, local authorities and academic and voluntary institutions |
| MJAC | Midland Joint Advisory Council |
| NHS | National Health Service |
| 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 |
| SPD | Supplementary Planning Document |
| SWDP | South Worcestershire Development Plan |

| Abbreviation | Description |
|--------------|------------------------------------|
| WCC | Worcestershire County Council |
| WDC | Wychavon District Council |
| WRS | Worcestershire Regulatory Services |

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