



2022 Air Quality Annual Status Report (ASR)

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

Date: June 2022

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Executive Summary: Air Quality in Our Area

Air Quality in Wychavon District Council

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

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages³, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017⁴.

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

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

Nitrogen Dioxide Concentrations & Trends across the District

There has been no exceedance of the Nitrogen Dioxide Annual Mean Objective at relevant exposure across the Wychavon District in 2021.

A comparison of monitored levels of nitrogen dioxide across the Wychavon District between 2020 and 2021 shows a general increase across the District at a majority of

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

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

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

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

locations. An average increase in concentration of 6.7% ($1.4\mu\text{g}/\text{m}^3$) can be observed across the District as a whole. It should be noted that monitoring data from 2020 does not represent a standard year with the emergence of the COVID-19 Pandemic and first lockdown in March 2020 and subsequent lockdowns that followed. With the number of vehicle journeys massively reduced much lower concentrations of nitrogen dioxide can be seen in all locations compared to previous years.

An assessment of trends over the five-year period 2017-2021 shows an average decrease in annual mean nitrogen dioxide concentrations across the District as a whole of 15.4% ($4.4\mu\text{g}/\text{m}^3$) between the period average for 2017-2020 and the 2021 average.

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

Further information regarding national trends in nitrogen dioxide concentrations can be found at [Air quality statistics - GOV.UK \(https://www.gov.uk/government/statistical-data-sets/env02-air-quality-statistics\)](https://www.gov.uk/government/statistical-data-sets/env02-air-quality-statistics)

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

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

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

No exceedance of the Nitrogen Dioxide Annual Mean Air Quality Objective occurred within the Worcester Road, Wychbold AQMA in 2021.

The highest recorded roadside annual mean concentration of nitrogen dioxide within Wychavon is within the Wychbold AQMA in 2021 with a value of $37.1\mu\text{g}/\text{m}^3$ at WyAQ1. When corrected for distance to relevant exposure the annual mean concentration of nitrogen dioxide at this location is predicted to be $25.8\mu\text{g}/\text{m}^3$.

The highest recorded annual mean concentration of nitrogen dioxide at relevant exposure within Wychavon is within the Wychbold AQMA in 2021 with a value of $30.4\mu\text{g}/\text{m}^3$ at WMD1. The tube is 2.3m from the nearest kerbside.

A comparison of monitored levels of nitrogen dioxide in the AQMA between 2020 and 2021 shows a general decrease at all locations. An average increase in concentration of 10.6% ($2.5\mu\text{g}/\text{m}^3$) can be observed in the AQMA.

An assessment of trends over the five-year period 2017-2021 shows an average decrease in annual mean nitrogen dioxide concentrations in the AQMA of 16.4% ($6.0\mu\text{g}/\text{m}^3$) between the period average for 2017-2020 and the 2021 average.

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

Actions to Improve Air Quality

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

The 2019 Clean Air Strategy⁵ sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero⁶ sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

The Wychavon District area generally enjoys good air quality. Over the four-year period 2017 to 2021 there has been a single monitored exceedance of the nitrogen dioxide annual mean air quality in the District ($40\mu\text{g}/\text{m}^3$ was monitored at EPS56 in 2018).

Reductions in nitrogen dioxide concentrations have been monitored in the AQMA over the five-year period 2017 to 2021 such that it is now uncertain as to whether the AQMA is still required. In light of this Wychavon District Council is not currently pursuing actions to improve air quality. Wychavon District Council's preferred option is to implement an automatic monitoring programme in order to gather robust and accurate data to determine whether or not the nitrogen dioxide annual mean objective is still being exceeded in the area, and therefore whether the AQMA is still necessary or requires revocation. Inherent variance and inaccuracy in diffusion tube monitoring data makes it difficult to make robust

⁵ Defra. Clean Air Strategy, 2019

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

decisions regarding the continued need, or otherwise, for an AQMA, particularly in situations where monitored nitrogen dioxide concentrations are close to the Objective, there is therefore a need to collect more accurate and robust data ahead of any decision making. Due to delays caused by Covid-19 the process of procuring a suitable monitoring station was delayed. This process recommenced in early 2022 and the Council is awaiting the outcome of any successful bids from equipment suppliers who will be able to fulfil the work on behalf of the Council. It is anticipated that commissioning and installation will commence in the autumn of 2022.

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

WRS has also experienced increased liaison with the Director of Public Health (DoPH) department within the County Council in recent years. An Air Quality Partnership led by the Director of Public Health at Worcestershire County council, and supported by WRS, was set up in 2019 to discuss potential actions to improve air quality across the County and determine an action plan for implementation. The group comprises officers from the County and District local authorities, from public health, air quality, strategic planning, sustainability, highways and transport disciplines, and also representatives from the NHS and Highways England. The group met initially in May 2019 to agree terms of reference and in September to discuss potential actions.

Conclusions and Priorities

Conclusions:

- No exceedances of the nitrogen dioxide annual mean objective were identified within or outside of the existing Wychbold AQMA in 2021.
- Monitoring continues to show reductions in nitrogen dioxide concentrations both across the District and within the AQMA compared to the four-year average 2017-2021. In some areas an increase was observed from 2020 to 2021 likely due to increased traffic following Covid lockdowns.
- All monitoring results within the existing AQMA were below the nitrogen dioxide annual mean objective. Reductions in nitrogen dioxide concentrations over the five-year period 2017 to 2021 indicate that the AQMA may no longer be required, as such no further actions have been developed for the AQAP. An automatic monitoring programme is required to gather accurate and robust data to support a decision regarding the need, or otherwise, for the AQMA.
- There are no monitoring results in excess of the nitrogen dioxide annual mean objective across the District and therefore no requirement to designate any new AQMAs.

Priorities:

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

Local Engagement and How to get Involved

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

WRS is also a member of Central England Environmental Protection Managers Group (CEEPG) which provides a strategic overview and direction for the delivery of

Environmental Protection Services across the area of Central England covered by participating authorities. CEEPG responsibilities covers all environmental health matters regarding air quality, noise, contaminated land and LAPPC/IPPC including cooperation and coordination with the Environment Agency and Public Health England.

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

- **Walk or cycle, leave your car at home:** Leaving your car at home and walking or cycling instead will benefit in three ways - increased exercise, reduced pollution exposure and will reduce individual's pollution emissions;
- Worcestershire County Council have launched a car sharing website, **LiftShare**, to help people find others journeying to the same destinations to share journeys and costs and reduce traffic and emissions. Visit this link for more information [Worcestershire Liftshare community - part of the Liftshare network](#)
- Contact Worcestershire County Council for help and advice on a **Travel Plan** for your business. General travel planning advice is available on Worcestershire County Council's website (including walking, cycling and bus maps and timetables) [Worcestershire County Council Homepage](#);
- **Hold meetings by Conference Call** by phone or using virtual meeting software rather than driving to meetings. This reduces fuel and other travel costs, vehicle maintenance and hire cost, increases productivity through reduction in hours lost through unnecessary travel;
- Facilitate **Flexible Working Arrangements** for non-front-line staff to work remotely from home or nearer home facilities for one or more days a week thus removing or reducing any journey to work. This reduces congestion which has beneficial impacts for delivery times, reduced business costs and thus economic benefits. Additionally, provides social benefits through improved work life balance for employees, reduces local air quality and reduced emergency vehicle response times.
- **Switch Fleet to Low Emission Vehicles:** low emission vehicle grants are available from the Government. Further information is available at [Low-emission vehicles eligible for a plug-in grant - GOV.UK \(www.gov.uk\)](#)
- If you have to drive follow fuel efficient driving advice, often known as '**Smarter Driving Tips**', to save on fuel and reduce your emissions. A number of websites promote such advice including:

- [Save money and emissions through ecodriving - Energy Saving Trust](#)
- [How to drive economically - Eco-driving tips | AA \(theaa.com\)](#)
- [Fuel Consumption & CO₂ Databases | Vehicle Certification Agency \(vehiclecertification-agency.gov.uk\)](#)

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

Vulnerable individuals and groups can keep informed of:

- Current levels and forecasts of air pollution from Defra at [Pollution forecast - Defra, UK](#)
- If you are sensitive to the effects of air pollution, it may be appropriate to limit the length of time spent in areas of local poor air quality – see advice from Defra at [Daily Air Quality Index - Defra, UK](#)
- If you are on social media, sign up to the WRS Twitter feed. WRS tweet when pollution is forecast by Defra to be moderate to very high.
- Further information for the general public on reducing your family’s exposure to poor air quality in Worcestershire and how individuals, business and schools can assist with reducing their impact on local air quality can currently be found at [Protecting Me and Others from Air Pollution | Worcestershire Regulatory Services \(worcsregservices.gov.uk\)](#) on WRS website.

⁷ <http://www.breathelondon.org/>

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

Local Responsibilities and Commitment

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

- Neil Kirby / Stephen Williams – Land and Air Quality Team, Technical Services, Worcestershire Regulatory Services
- Emily Barker - Worcestershire County Council Highways Department
- Wychavon District Council

This ASR has been approved by Worcestershire Regulatory Services

This ASR has not been signed off by a Director of Public Health.

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1 Local Air Quality Management

This report provides an overview of air quality in Wychavon District Council during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Wychavon District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Wychavon District Council can be found in Table 0.1. The table presents a description of the AQMA that is currently designated within Wychavon District Council. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of the AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO₂ annual mean.

Table 0.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Worcester Road, Wychbold	1st May 2018	NO ₂ Annual Mean	An area encompassing a number of properties surrounding strategic road network around J5 M5 and A38	YES	44.6µg/m ³	37.1µg/m ³	n/a	n/a

- Wychavon District Council confirm the information on UK-Air regarding their AQMA(s) is up to date.
- Wychavon District Council confirm that all current AQAPs have been submitted to Defra.

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

Defra's appraisal of last year's ASR concluded that the report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports.

1. Trends in air quality are presented and the report includes a detailed discussion on the observed trends, with a comparison to the 2019 monitoring results for each monitoring locations. This level of detail is encouraged in future reports.
2. The Council have identified the implementation of automatic monitoring in the AQMA as a priority and is encouraged to progress with this in the coming year.
3. The Council are advised to include the production of AQAP for the Wychbold AQMA as a priority, and present proposed measures within the ASR, given its declaration over 2 years ago and a corresponding AQAP is still outstanding.
4. The Public Health Outcomes Frameworks was mentioned and has referred specifically to indicator 3.01 (Fraction of mortality attributable to particulate air pollution). This is encouraged.
5. QA/QC of monitoring data is good. However, the national bias adjustment screen captures should be updated to show the filtered sheet and final adjustment factor applicable to the Council's monitoring.

The development of an AQAP has not been progressed in 2021 due to uncertainty as to whether an AQMA is still required in the area against a backdrop of improved nitrogen dioxide concentrations over the five-year period 2017 to 2021. 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 2021 ASR.

2.2.1 Worcester Road, Wychbold AQMA update for 2022

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

impact on emissions significant large-scale schemes would be required. Available options are limited, costly and resource intensive.

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

Improvements in nitrogen dioxide concentrations have been monitored over the five year period 2017 to 2021 such that it is now uncertain as to whether an AQMA is still required. There has been a single exceedance of the Nitrogen Dioxide Annual Mean AQO over the five year period 2017 to 2021 of $40\mu\text{g}/\text{m}^3$ 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 $36\mu\text{g}/\text{m}^3$ at relevant exposure in the AQMA since 2018 (see Section 3.2 for further discussion of long-term trends). Possible reasons for the observed improvements are discussed further in Section 3.2 of this report, and in the 2020 ASR for Wychavon District Council which is available to view via the WRS website at [Wychavon District Council | Worcestershire Regulatory Services \(worcsregservices.gov.uk\)](https://www.worcsregservices.gov.uk).

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

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

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

If it is concluded that the Objective is still being exceeded a more reliable and robust dataset will allow Wychavon District Council to make well informed decisions relating to

the degree of any required improvement and determine appropriate mitigating actions to achieve any required level of improvement.

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

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

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

2.2.2 Update on schemes indirectly improving air quality across the District

Air Quality Partnership for Worcestershire

An Air Quality Partnership led by the Director of Public Health (DoPH) at Worcestershire County council, and supported by WRS, was set up in 2019 to discuss potential actions to improve air quality across the County and determine an action plan for implementation. The group comprises officers from the County and District authorities from public health, air quality, strategic planning, sustainability, highways and transport disciplines, and also representatives from the NHS and Highways England. The group met initially in May 2019 to discuss terms and references and in September 2019 to discuss potential actions.

Further discussions and work to formalise were due to continue in 2020. However, as the Partnership is largely driven by the DoPH the response to the Covid-19 pandemic has taken priority and the business of the Partnership has been postponed indefinitely for the time being.

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

Evesham Transport Strategy

A number of options to improve the traffic flow in Evesham have been trialled and delivered. Full details are available at: <http://www.worcestershire.gov.uk/evesham>. A new active travel bridge is in development to links Hampton and Evesham, and both the bridge and the Local Cycling and Walking Infrastructure plan were open for public engagement in winter 2022. A levelling up round 1 bid was submitted for Evesham by Wychavon DC which included key active travel routes. This was unsuccessful, options are now being reviewed. The main aim of this action was to improve the flow of traffic in Evesham, including an active travel network to promote alternative ways of moving around the town.

Improvements for the Former Port Street, Evesham AQMA area

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

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

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

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

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

Electric Vehicle Charging

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

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

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

Wychavon District Council Intelligently Green Plan

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

- Reduce council-related staff travel through agile working and switch to lower emission vehicles for our small fleet.
- Work with the other Worcestershire district councils to develop a taxi licensing policy to encourage the take-up of electric and other low emission vehicles and to discourage higher polluting older vehicles.
- Ensure that cycling and walking options are an intrinsic part of all plans for new settlements in Wychavon.
- Increase car parking provision at Droitwich Spa, Honeybourne and Pershore railway stations by 31 March 2024.
- Improve connectivity between the railway stations and the towns and between Worcestershire Parkway and the surrounding areas through improving signage and piloting one or more bike hire schemes by 31 March 2022.
- Promote an already established carpooling scheme, such as BlaBla Car.
- Appoint an active travel project officer to lead work with partners on new cycle routes and the development of cycling and walking plans by 31 March 2023.
- Investigate a workplace parking levy offering discounts for low carbon transport initiatives i.e. EV charge points, bike scheme, car sharing and renewable energy installations.
- Promote the development of at least one electric forecourt in the district.

- Review EV charging points in Council owned car parks and encourage and incentivise others to install them including making installation of EV charging points a condition of grant funding for new village halls or other new community buildings and encouraging businesses and tourist destinations to consider installing EV charge points and to convert to lower emission vehicles.
- Deliver a programme of funding, mentoring and advice to improve and increase the range of community-based transport options available across the district including the ticket to ride project by 31 March 2023.
- Work with the Council's waste and street cleaning contractors to move all their fleet to low emission vehicles when technology and energy infrastructure permits.

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

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

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM_{2.5} has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

WRS has reviewed the 2018 based DEFRA national background maps to determine projected PM_{2.5} concentrations with the Wychavon District for the 2020 calendar year. The average total PM_{2.5} at 657 locations (centre points of 1km x 1km grids) across the Wychavon District is 7.8µg/m³, with a minimum concentration of 7.2µg/m³ and a maximum concentration of 9.4µg/m³.

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

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

Framework⁹. The fraction of mortality attributable to particulate emissions in Worcestershire in 2020 (the most recent year available) was 5.0%. This falls below the national figure for England (5.6% in 2020) and below the figure for the West Midlands region (5.4% in 2020). Recent trend data is not available for Worcestershire due to a lack of data points with valid values.

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

[Public Health Outcomes Framework - PHE](#)

A new Air Quality Partnership led by the DoPH and supported by WRS Land and Air Quality Team was set up in 2019 to discuss potential actions to improve air quality across the County and determine an action plan for implementation. The group comprises officers from the County and District authorities from public health, air quality, strategic planning, sustainability, highways and transport disciplines and also representatives from the NHS and Highways England. The group met initially in May 2019 to discuss terms and references and in September to discuss potential actions. The group is largely driven by DoPH so, due to Covid-19 taking priority in 2020, the business of the partnership has been postponed indefinitely.

In light of the above no additional actions are currently planned by Redditch Borough Council in relation to the reduction of PM_{2.5} levels. However, it is anticipated that any actions taken to improve NO₂ levels across the Borough will likely result in a linked improvement in PM_{2.5} levels.

No additional actions are currently planned by Wychavon District Council 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 will likely result in a linked improvement in PM_{2.5} levels.

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 2021 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 2017 and 2021 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

Automatic Monitoring Sites

Wychavon District Council did not undertake automatic monitoring during 2021.

Non-Automatic Monitoring Sites

Wychavon District Council undertook non- automatic (i.e. passive) monitoring of NO₂ at 25 sites during 2021. Table A.1 in Appendix A presents the details of the non-automatic sites.

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

3.2 Individual Pollutants

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

Nitrogen Dioxide (NO₂)

Error! Reference source not found. and Table A.2 in Appendix A compare the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40µg/m³. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias

adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Changes to the Diffusion Tube Monitoring Network in 2021

There have been no changes to the diffusion tube monitoring network across the Wychavon District in 2021.

Exceedances of the Air Quality Objectives in 2021

There has been no exceedance of the Nitrogen Dioxide Annual Mean Air Quality Objective at any location across the Wychavon District area in 2021.

Trends across the Wychavon District

[Appendix A, Figure A1](#) presents annual mean nitrogen dioxide concentrations at diffusion tube monitoring locations across the District between 2017 and 2021. Please note that the concentrations presented have been bias-adjusted and annualised where necessary; they have not been corrected for distance where locations are not representative of relevant exposure and therefore cannot be directly compared with the Nitrogen Dioxide Annual Mean Air Quality Objective.

A comparison of monitored levels of nitrogen dioxide across the Wychavon District between 2020 and 2021 shows a general increase across the District at all locations. An average increase in concentration of 6.7% ($1.4\mu\text{g}/\text{m}^3$) can be observed across the District as a whole.

To further assess long-term trends average District concentrations for the five-year period 2017-2021 have been used to confirm whether levels of nitrogen dioxide are generally increasing or decreasing across the Wychavon area. Where suitably long datasets are available (18 stations) a period average of 2017-2020 bias-adjusted results has been compared with an average of 2021 bias-adjusted results for the same tubes. An average decrease of 18.7% ($5.2\mu\text{g}/\text{m}^3$) can be observed for the District as a whole between the period average for 2017-2020 and the 2021 average.

The above demonstrates that concentrations of nitrogen dioxide in the Wychavon District continue to experience a general downward trend for the period 2017 to 2021

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

Trends in the Worcester Road, Wychbold AQMA

No exceedance of the Nitrogen Dioxide Annual Mean Air Quality Objective occurred within the Worcester Road, Wychbold AQMA in 2021.

The highest recorded roadside annual mean concentration of nitrogen dioxide within Wychavon is within the Wychbold AQMA in 2021 with a value of $37.1\mu\text{g}/\text{m}^3$ at WyAQ1. When corrected for distance to relevant exposure the annual mean concentration of nitrogen dioxide at this location is predicted to be $25.8\mu\text{g}/\text{m}^3$.

The highest recorded annual mean concentration of nitrogen dioxide at relevant exposure within Wychavon is within the Wychbold AQMA in 2021 with a value of $30.4\mu\text{g}/\text{m}^3$ at WMD1. The tube is 2.3m from the nearest kerbside.

A comparison of monitored levels of nitrogen dioxide in the AQMA (EPS56, EPS58, WMD1, WyAQ1, WychAD, WychCH, WychSC, WMD2 and CROW1) between 2020 and 2021 shows a general increase at all locations. As previously discussed, the degree of increase observed between 2020 and 2021 is likely to be as a result of a return of traffic to streets in 2021 following the reduction seen as a result of Covid-19 national lockdowns. An average increase in concentration of 10.6% ($2.5\mu\text{g}/\text{m}^3$) can be observed in the AQMA as a whole. Air quality in the AQMA is largely related to traffic emissions and as such the significant reductions in traffic flow observed during national lockdowns in 2020 will have had some impact on nitrogen dioxide concentrations in 2020.

Trends for the five-year period from 2017 to 2021 have been used to further assess whether levels of nitrogen dioxide are generally increasing or decreasing in the AQMA. Monitored concentrations for the period 2017 – 2020 at three locations (i.e. those locations with sufficiently long datasets) have been averaged and compared with an average of the same three locations in 2021. This comparison shows an average decrease in annual mean nitrogen dioxide concentrations in the AQMA of 16.4% ($6.0\mu\text{g}/\text{m}^3$) between the period average for 2017-2020 and the 2021 average.

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

The above demonstrates a downward trend in annual mean concentrations of nitrogen dioxide in the AQMA. This monitored improvement in concentrations is considered to be attributable to a combination of several factors which were discussed in detail in the 2020 ASR for Wychavon District Council (available to view at [Executive summary \(worcsregservices.gov.uk\)](https://www.worcsregservices.gov.uk)). A summary of which is provided below:

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

There are currently no proposed changes to existing AQMAs in the Wychavon District. However, the requirement for an AQMA in this area will be kept under review for the next 12-24 months based on the observed significant decrease in annual mean nitrogen dioxide over the period 2017 to 2021. This is combined with the fact that there has been only a single monitored marginal exceedance of the Nitrogen Dioxide Annual Mean AQO in the Wychbold AQMA ($40\mu\text{g}/\text{m}^3$ at EPS56 in 2018) in the period 2017 - 2021 (where it should be noted that relevant exposure is at first floor level and not ground floor as represented by the diffusion tube height at this location); and no monitored concentrations above $36\mu\text{g}/\text{m}^3$ was experienced at relevant exposure since 2018. Although WMD1 and WyAQ1 (also located in the AQMA) recorded concentrations above the Nitrogen Dioxide Annual Mean AQO in the same period, they are located at roadside locations and when corrected for distance for relevant exposure the predicted concentrations are below $36\mu\text{g}/\text{m}^3$.

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)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
EPS8	40 High Street Street Light 8, Pershore	Kerbside	395048	245527	NO ₂	No	2.0	0.5	No	2.3
EPS9	St. Andrews Road Street light 139, Pershore	Suburban	394571	245377	NO ₂	No	6.0	3.0	No	2.3
EPS14	Port Street Road Sign, Evesham	Kerbside	404128	243630	NO ₂	No	1.7	0.7	No	2.4
EPS14a	Port Street Road Sign, Evesham	Kerbside	404128	243630	NO ₂	No	1.7	0.7	No	2.4
EPS14b	Port Street Road Sign, Evesham	Kerbside	404128	243630	NO ₂	No	1.7	0.7	No	2.4
EPS27	Worcester Rd, Wychbold	Roadside	392031	265624	NO ₂	Yes. Worcester Road, Wychbold AQMA	15.5	2.3	No	2.1
EPS33	High Street Streetlight LP 32, Evesham	Roadside	403753	244068	NO ₂	No	2.5	3.5	No	2.3
EPS43	Long Stay opp. cinema, Port St, Evesham	Roadside	404222	243598	NO ₂	No	0.0	1.9	No	2.4
EPS44	Camera Post opp. 33, Port St, Evesham	Roadside	404183	243611	NO ₂	No	2.6	1.2	No	2.5

EPS52	The Bungalow, Whittington	Roadside	387598	252511	NO ₂	No	0.0	12.0	No	2.0
EPS53	Hillview Cottage, Whittington	Suburban	387595	252533	NO ₂	No	0.0	22.0	No	1.7
EPS56	Post Office, Worcester Rd, Wychbold	Roadside	391983	265688	NO ₂	Yes. Worcester Road, Wychbold AQMA	0.0	8.1	No	2.1
EPS58	Façade 2 Rose Villas, Worcester Road, Wychbold	Roadside	392027	265770	NO ₂	Yes. Worcester Road, Wychbold AQMA	0.0	8.1	No	2.3
EPS60	Corner of Rynal Street & De La Bere Close, Evesham SL2	Roadside	403914	244046	NO ₂	No	5.5	1.1	No	2.1
EPS61	1-6 The Old Dairy, Swan Lane, Evesham	Roadside	403796	244006	NO ₂	No	0.0	1.9	No	2.0
EPS62	Bengal Dreams No 53 Façade, Evesham	Roadside	403729	243971	NO ₂	No	0.0	5.4	No	2.2
EPS63	60 Mayflower Road, Droitwich	Roadside	390708	262863	NO ₂	No	0.0	2.5	No	1.9
WMD1	Walk Mill Drive, Wychbold LP363	Roadside	392050	265790	NO ₂	Yes. Worcester Road, Wychbold AQMA	4.9	2.3	No	2.1
WyAQ1	Lamppost outside Rose Dene, Worcester Road, Wychbold	Roadside	392019	265736	NO ₂	Yes. Worcester Road, Wychbold AQMA	9.9	1.9	No	2.2
WychAD	Lamppost between BP Garage and Mill Lane Junction	Roadside	392384	266195	NO ₂	Yes. Worcester Road,	NA	1.5	No	2.1

						Wychbold AQMA				
WychCH	Lamppost outside 6 Council Houses, Worcester Road, Wychbold	Roadside	392160	265937	NO ₂	Yes. Worcester Road, Wychbold AQMA	7.5	2.1	No	2.3
WychSC	Street light on A38 within vicinity of property on Sheldon Close	Roadside	392022	265702	NO ₂	Yes. Worcester Road, Wychbold AQMA	19.6	1.2	No	2.3
WMD2	Highways England land at end of Walkmill Drive adj. M5, off Worcester Road, Wychbold	Roadside	391871	265859	NO ₂	Yes. Worcester Road, Wychbold AQMA	13.5	21.5	No	1.8
CROW1	Road sign outside Ou Est Elle, 1 Crown Lane, Wychbold, WR9 7PT	Roadside	392257	266043	NO ₂	Yes. Worcester Road, Wychbold AQMA	4.3	1.3	No	2.3
BG	West View, Broomhall Green, Norton Roundabout	Urban Background	386297	252150	NO ₂	No	0.0	36.0	No	1.9

Notes:

- (1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).
(2) N/A if not applicable.

Table A.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 2021 (%) ⁽²⁾	2017	2018	2019	2020	2021
EPS8	395048	245527	Kerbside	82.7	82.7	22.9	26.9	21.9	16.8	18.6
EPS9	394571	245377	Suburban	73.1	73.1	10.5	12.0	10.0	8.6	8.4
EPS14	404128	243630	Kerbside	100.0	100.0	35.2	40.9	33.4	25.3	24.1
EPS14a	404128	243630	Kerbside	100.0	100.0	37.0	42.0	34.4	27.1	24.1
EPS14b	404128	243630	Kerbside	100.0	100.0	36.2	40.9	34.5	26.2	25.3
EPS27	392031	265624	Roadside	100.0	100.0	39.5	41.5	34.4	24.7	28.4
EPS33	403753	244068	Roadside	80.8	80.8	24.5	29.9	23.9	18.6	21.0
EPS43	404222	243598	Roadside	92.3	92.3	27.3	33.3	27.3	21.1	22.6
EPS44	404183	243611	Roadside	100.0	100.0	28.4	31.1	27.5	21.2	22.3
EPS52	387598	252511	Roadside	48.1	48.1	30.8	31.6	26.3	20.4	20.3
EPS53	387595	252533	Suburban	90.4	90.4	25.8	27.7	23.4	18.9	20.0
EPS56	391983	265688	Roadside	100.0	100.0	36.4	40.0	32.2	27.0	27.7
EPS58	392027	265770	Roadside	100.0	100.0	-	35.1	26.9	21.9	24.5
EPS60	403914	244046	Roadside	92.3	92.3	15.3	15.8	13.9	11.5	12.4
EPS61	403796	244006	Roadside	82.7	82.7	27.2	29.7	25.0	19.1	20.0
EPS62	403729	243971	Roadside	75.0	75.0	29.6	32.8	27.2	20.0	23.6
EPS63	390708	262863	Roadside	69.2	69.2	18.9	24.8	18.5	14.8	14.6
WMD1	392050	265790	Roadside	73.1	73.1	40.2	40.2	33.2	-	30.4
WyAQ1	392019	265736	Roadside	73.1	73.1	44.2	49.6	41.5	33.2	37.1
WychAD	392384	266195	Roadside	100.0	100.0	-	36.8	29.7	24.5	26.6
WychCH	392160	265937	Roadside	100.0	100.0	-	35.8	29.3	21.8	25.1
WychSC	392022	265702	Roadside	100.0	100.0	-	39.4	30.9	23.4	27.3
WMD2	391871	265859	Roadside	92.3	92.3	-	-	25.2	21.1	21.9
CROW1	392257	266043	Roadside	100.0	100.0	-	-	22.7	18.1	19.9
BG	386297	252150	Urban Background	67.3	67.3	22.3	26.1	20.4	17.4	20.3

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

☒ Diffusion tube data has been bias adjusted.

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

Notes:

The annual mean concentrations are presented as µg/m³.

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**.

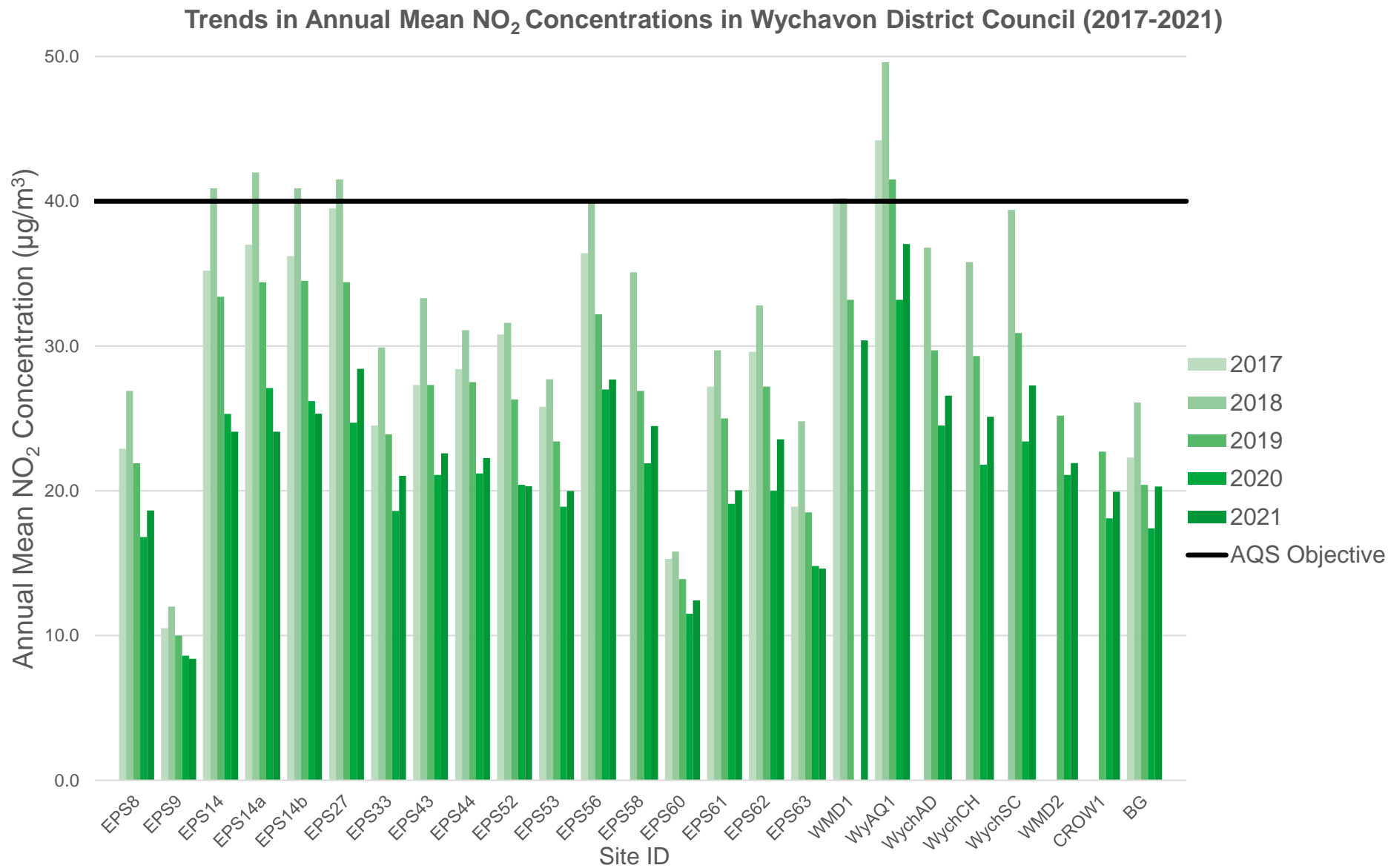
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Figure A.1 – Trends in Annual Mean NO₂ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO₂ 2021 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting g)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
EPS8	395048	245527	28.4	22.3	-	-	20.3	18.2	19.5	17.0	21.7	21.1	31.4	22.0	22.2	18.6		
EPS9	394571	245377	14.5	12.7	-	-	6.5	8.2	7.8	6.8	8.7	8.8	15.9	-	10.0	8.4		
EPS14	404128	243630	37.6	36.8	31.0	35.5	19.4	17.3	18.4	16.6	27.2	32.7	41.5	30.3	28.7	24.1		
EPS14a	404128	243630	40.5	35.9	32.4	38.0	21.9	16.8	18.1	17.2	32.1	15.7	40.6	34.7	28.7	24.1		
EPS14b	404128	243630	40.2	35.3	33.9	38.2	21.8	17.2	19.4	19.3	30.9	30.9	40.9	33.8	30.1	25.3		
EPS27	392031	265624	38.6	31.6	40.7	34.1	29.2	33.4	27.8	30.4	30.6	37.1	38.5	34.1	33.8	28.4		
EPS33	403753	244068	26.8	27.0	21.9	29.6	23.5	19.3	-	22.6	27.3	-	26.9	25.5	25.0	21.0		
EPS43	404222	243598	32.3	-	27.8	36.1	19.7	16.4	18.3	15.7	33.7	25.5	40.9	29.6	26.9	22.6		
EPS44	404183	243611	34.5	27.9	27.1	37.3	19.1	15.3	16.4	14.1	33.8	26.2	38.3	28.1	26.5	22.3		
EPS52	387598	252511	31.8	27.5	26.6	24.6	23.0	21.4	-	-	-	-	-	-	25.8	20.3		
EPS53	387595	252533	28.6	23.4	24.4	23.2	19.6	19.8	-	18.6	26.1	26.0	29.0	22.9	23.8	20.0		
EPS56	391983	265688	36.5	31.1	34.6	32.8	28.5	32.4	31.2	30.5	30.7	34.6	42.2	30.4	33.0	27.7		
EPS58	392027	265770	34.5	28.5	30.3	29.0	28.2	27.7	25.7	28.6	27.9	31.0	29.9	28.5	29.1	24.5		
EPS60	403914	244046	20.4	17.7	14.9	14.1	9.6	10.1	10.6	10.7	-	15.6	21.5	17.5	14.8	12.4		
EPS61	403796	244006	27.0	22.1	21.8	-	19.6	18.8	23.6	20.2	-	25.2	32.2	28.1	23.9	20.0		
EPS62	403729	243971	33.8	24.8	27.4	23.7	25.8	-	-	23.4	-	30.0	34.5	29.1	28.0	23.6		
EPS63	390708	262863	22.3	24.6	15.5	23.7	-	-	17.8	-	-	19.6	16.6	16.6	19.6	14.6		
WMD1	392050	265790	44.6	36.7	37.2	-	32.9	-	29.5	33.1	30.0	40.5	41.1	-	36.2	30.4		
WyAQ1	392019	265736	52.0	44.3	49.6	44.9	41.2	40.4	41.4	42.2	41.0	-	-	-	44.1	37.1	25.8	
WychAD	392384	266195	36.3	33.5	29.5	31.6	29.6	30.4	27.7	32.0	30.3	32.2	36.6	30.0	31.6	26.6		
WychCH	392160	265937	33.0	28.4	29.6	27.8	26.6	29.1	25.5	29.4	28.0	30.5	38.5	32.3	29.9	25.1		
WychSC	392022	265702	41.8	37.4	34.8	36.1	24.6	28.8	26.5	30.8	30.6	26.0	39.7	32.6	32.5	27.3		
WMD2	391871	265859	29.4	22.8	30.6	23.6	26.4	25.5	24.5	25.5	25.0	30.3	-	23.3	26.1	21.9		
CROW1	392257	266043	29.4	25.6	23.9	24.4	20.4	19.5	18.9	21.3	21.8	25.3	29.0	25.1	23.7	19.9		
BG	386297	252150	36.1	29.0	31.4	28.8	16.2	-	-	-	-	23.4	28.4	29.7	27.9	20.3		

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.TG16.

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 2021 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 Council During 2021

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

Additional Air Quality Works Undertaken by Wychavon District Council During 2021

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

QA/QC of Diffusion Tube Monitoring

Diffusion Tube Annualisation

Three (EPS52, EPS63, BG) of the diffusion tube monitoring locations recorded a data capture of less than 75% in Wychavon District Council. Therefore, the monitoring data has been annualised using monitoring data from three automatic monitors. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/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 national bias adjustment factor of 0.84 to the 2021 monitoring data. A summary of bias adjustment factors used by Wychavon District Council over the past five years is presented in Table C.1. WRS has determined the appropriate national bias adjustment factor using Version 03/22 of the Defra published National Diffusion Tube Bias Adjustment Spreadsheet using 32 Gradko studies for the relevant diffusion tubes (20% TEA in water) for 2021.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	03/21	0.84
2020	National	03/20	0.78
2019	National	03/19	0.89
2018	National	03/18	0.77
2017	National	03/17	0.89

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

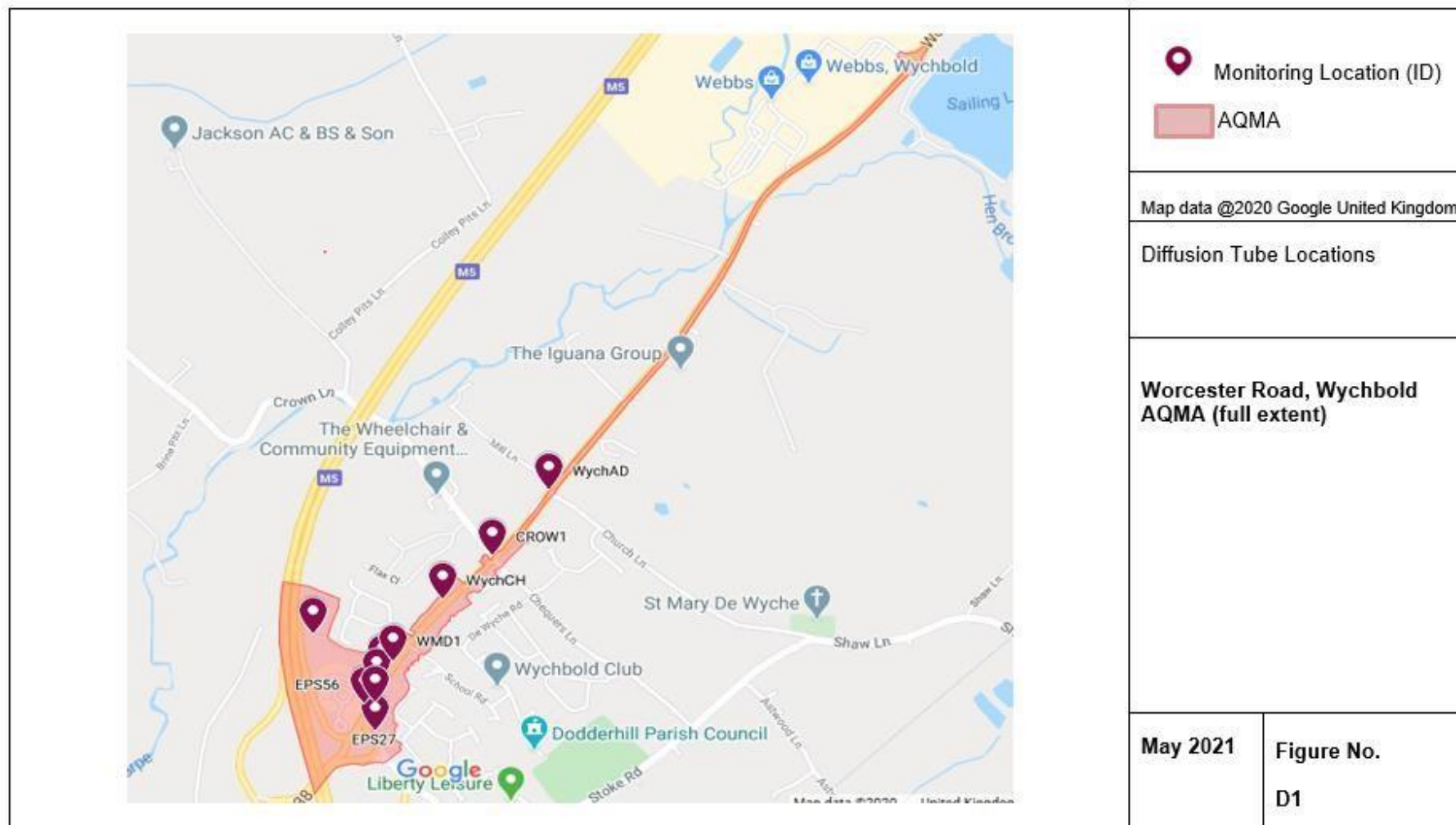
Site ID	Annualisation Factor Leamington Spa	Annualisation Factor Leominster	Annualisation Factor Birmingham Ladywood	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
EPS52	0.9823	0.8973	0.9307	0.9368	25.8	24.3	
EPS63	0.8883	0.8807	0.8944	0.8878	19.6	17.4	
BG	0.8604	0.8598	0.8811	0.8671	27.9	24.2	

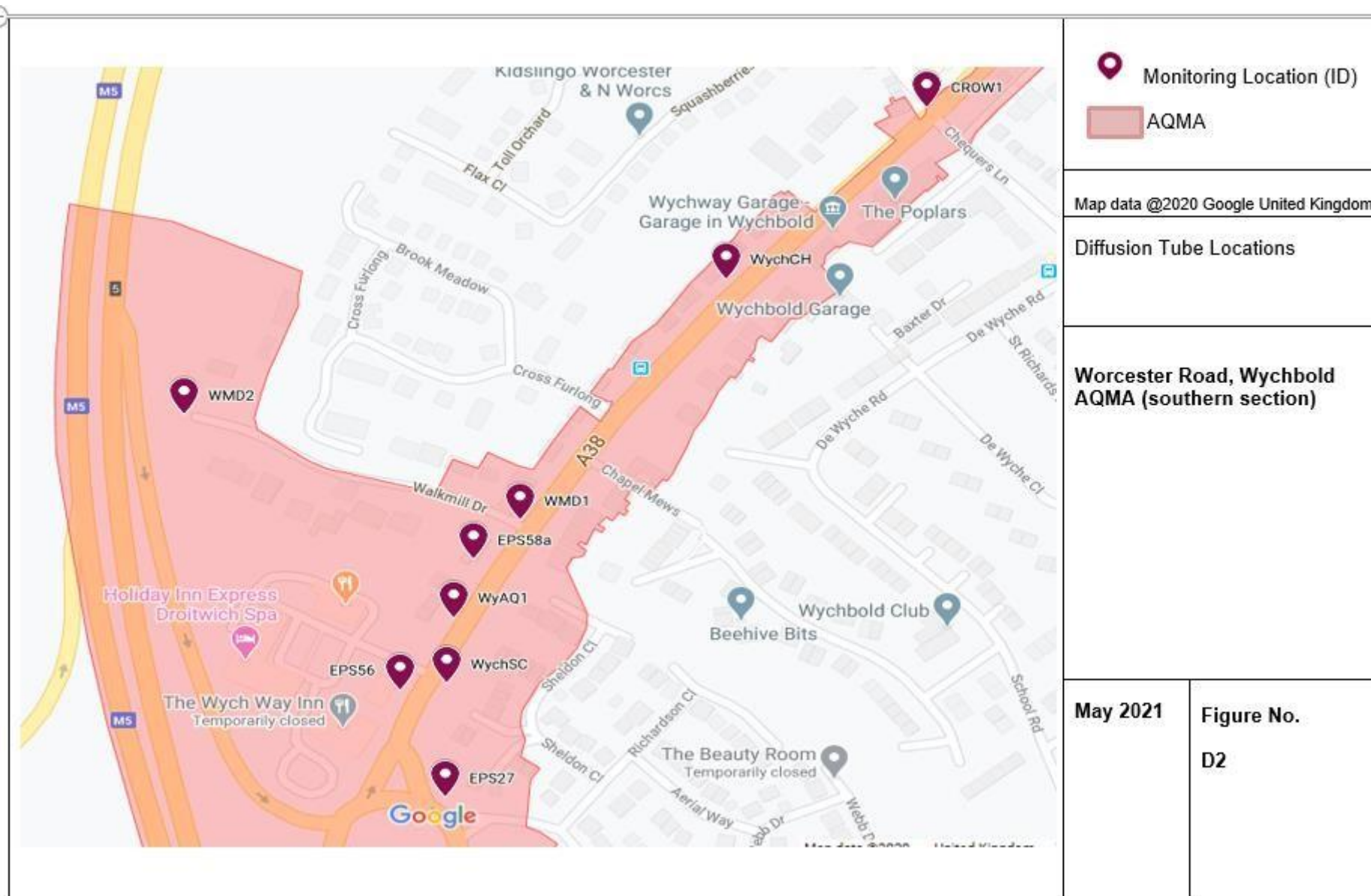
Table C.3 – NO₂ Fall off With Distance Calculations (concentrations presented in µg/m³)

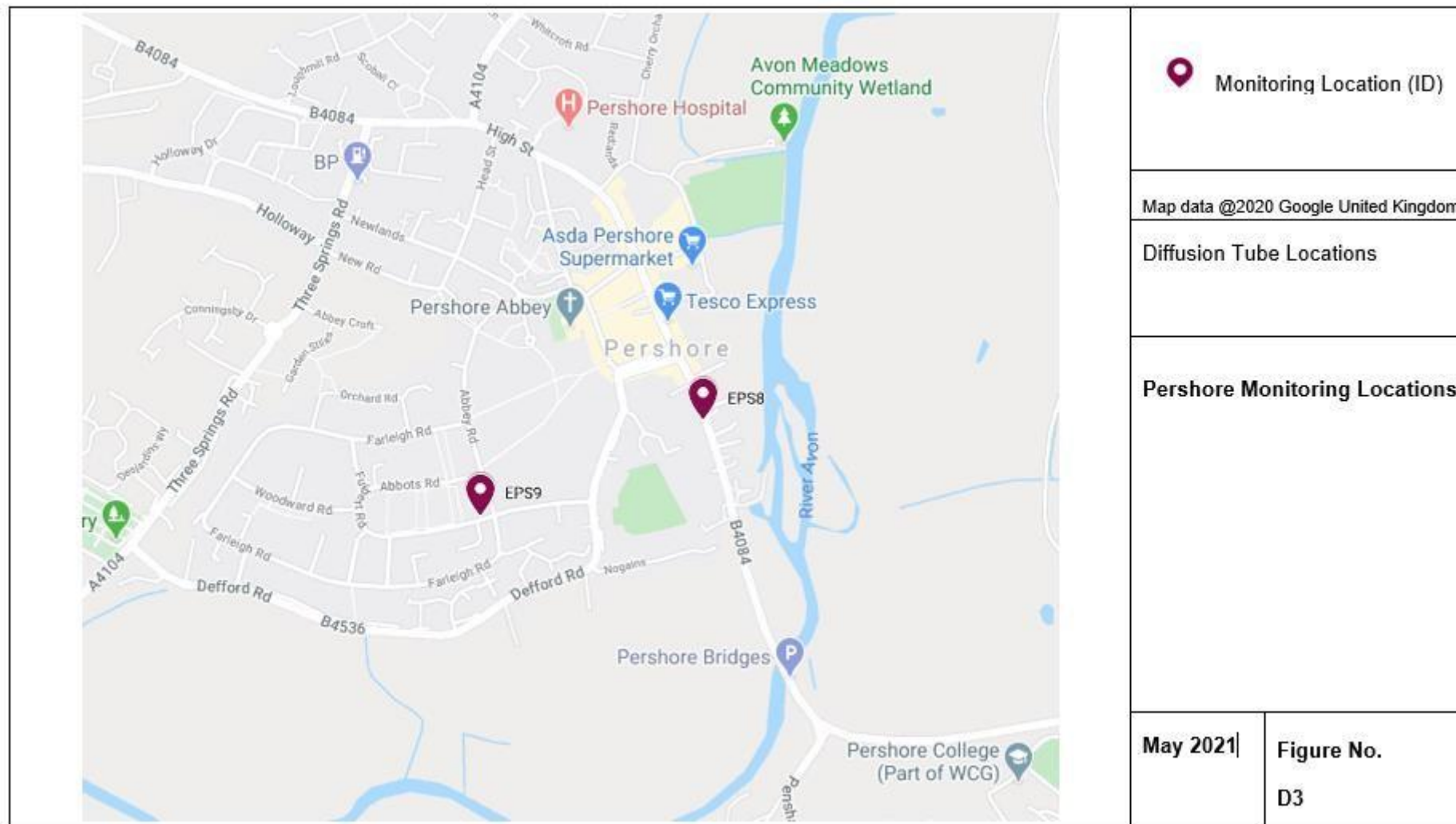
Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted)	Background Concentration	Concentration Predicted at Receptor	Comments
WyAQ1	1.9	11.8	37.1	10.5	25.8	

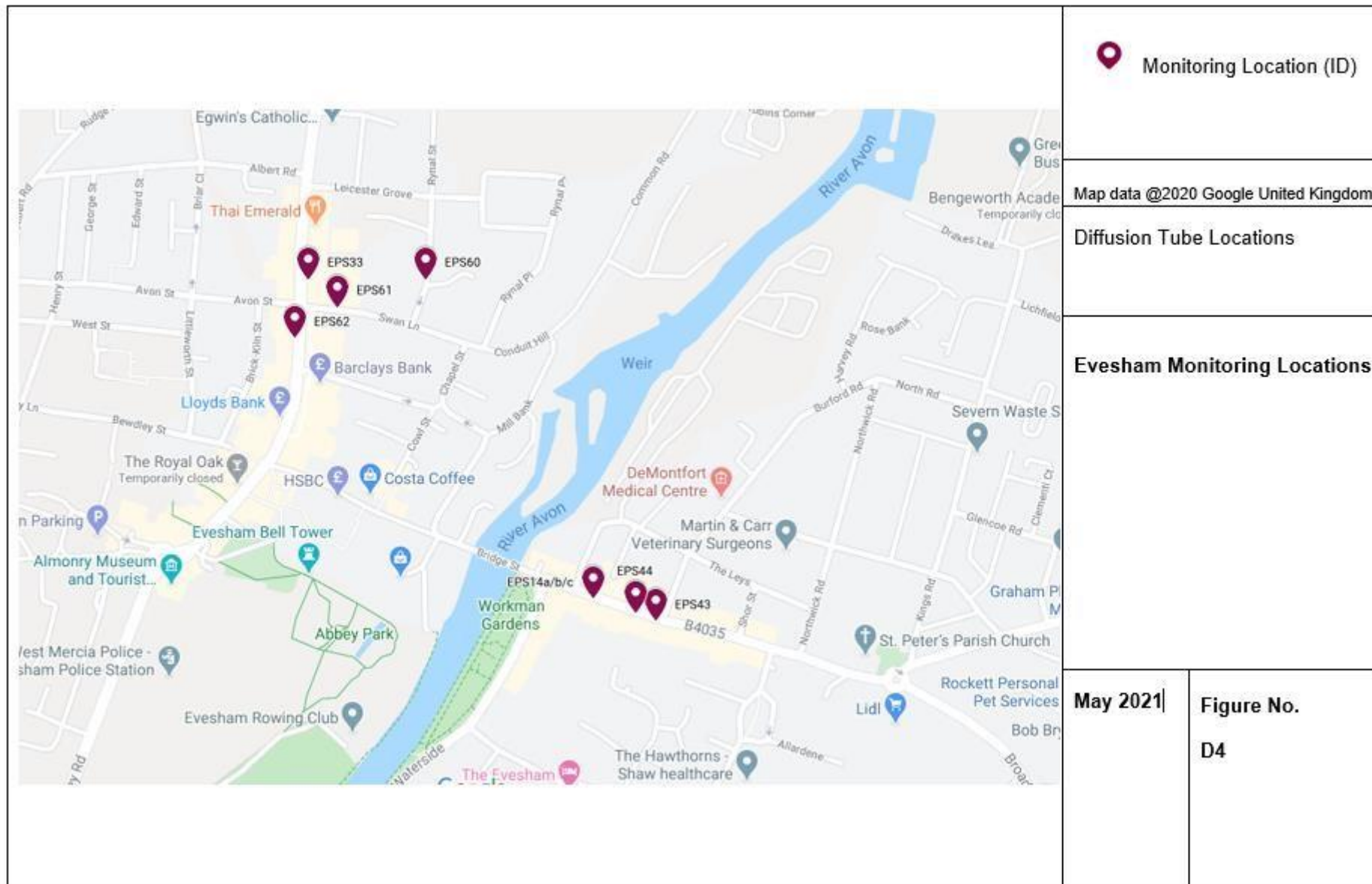
Appendix D: Map(s) of Monitoring Locations and AQMAs

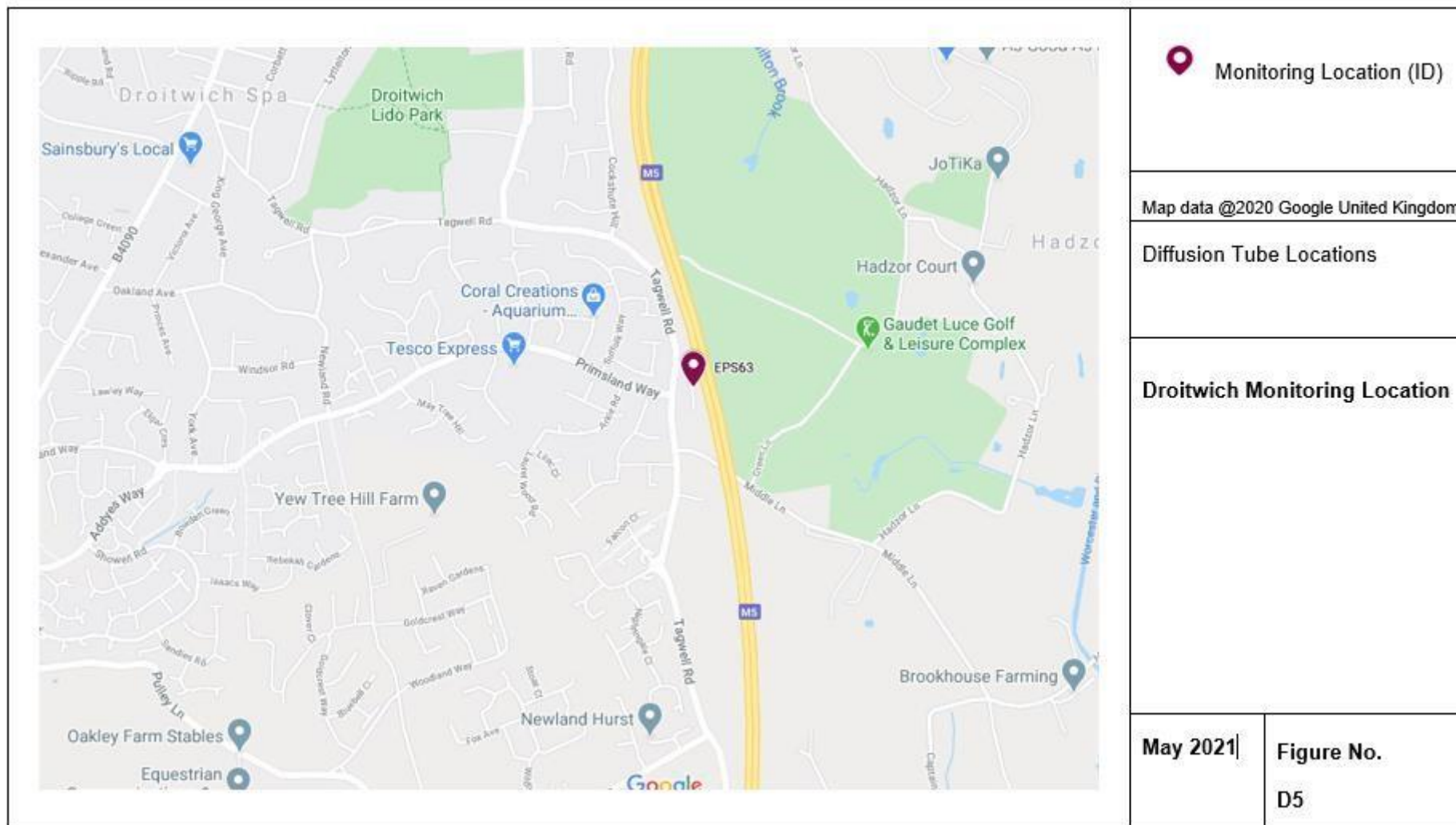
Figure D.1 – Map of Non-Automatic Monitoring Site

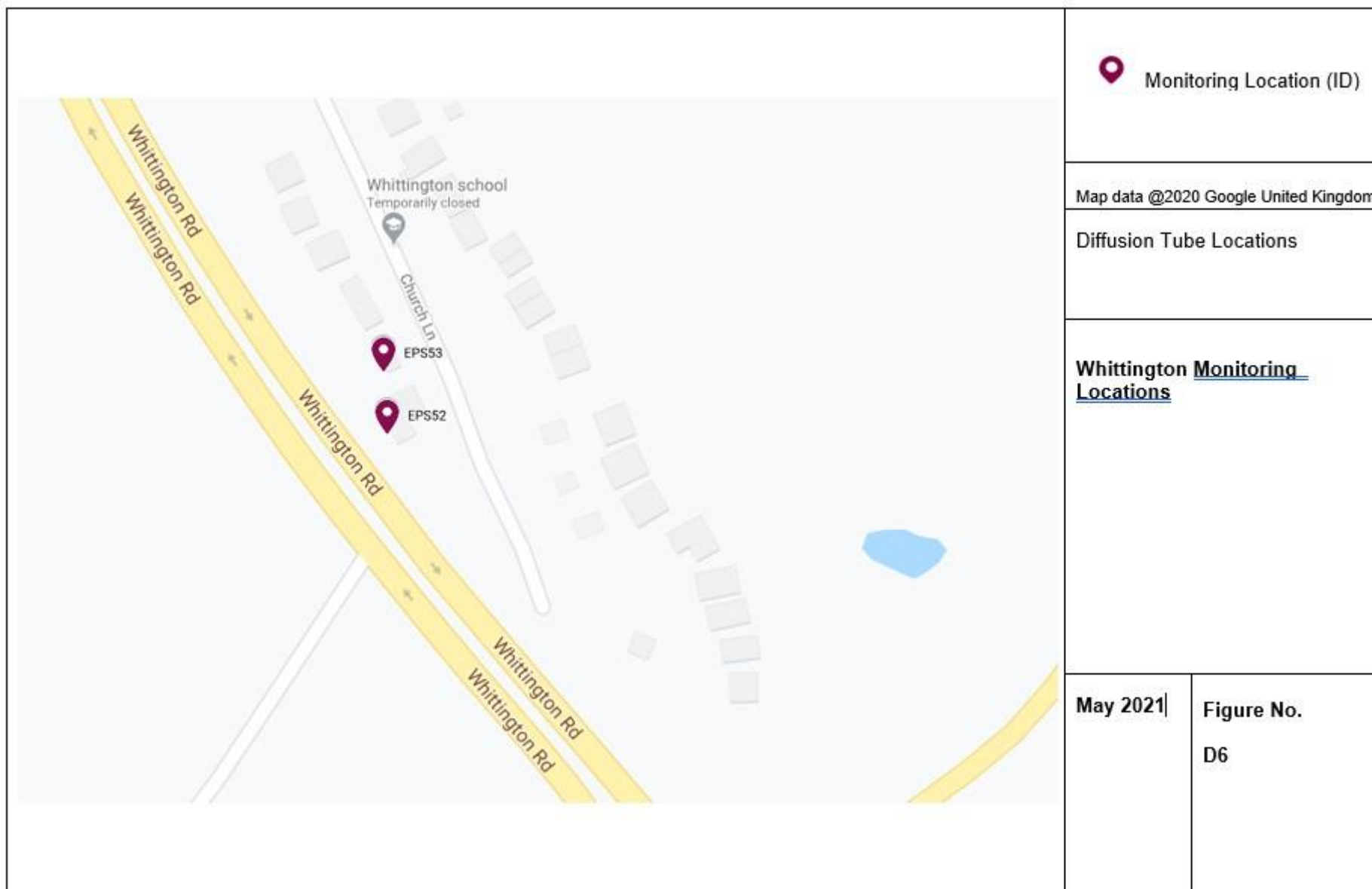














Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in 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'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

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