



Worcestershire
Regulatory Services

Supporting and protecting you

2026 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 2026

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Local Responsibilities and Commitment

This ASR was prepared by the Technical Services Department of Worcestershire Regulatory Services of Malvern Hills District Council with the support and agreement of the following officers and departments:

- Worcestershire Regulatory Services
- Malvern Hills District Council
- Worcestershire County Council

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.

This ASR has not been signed off by a Director of Public Health. A copy of ASR will be provided to the DoPH office post publication.

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Executive Summary: Air Quality in Our Area

Air Quality in Malvern Hills District Council Area

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality.

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Low-income communities are also disproportionately impacted by poor air quality, exacerbating health and social inequalities.

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

Table ES 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO ₂)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO ₂)	Sulphur dioxide (SO ₂) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM ₁₀ and PM _{2.5})	Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes. PM₁₀ refers to particles under 10 micrometres. Fine particulate matter or PM_{2.5} are particles under 2.5 micrometres.

The Malvern Hills district continues to experience relatively good levels of air quality.

There have been no Air Quality Management Areas (AQMAs) declared in this district since the review and assessment process commenced. There have been no exceedances of the air quality objective for Nitrogen Dioxide (NO₂) recorded at any locations, where monitoring has been undertaken for a full 12 months, since monitoring began.

Since 2023, local authorities that do not have any AQMAs in their areas are required to produce an Air Quality Strategy (AQS) outlining how air quality will be maintained. Production of an interim AQS for the Malvern Hills district is under development.

During 2025, concentrations of NO₂ were monitored at 9 locations across the Malvern District. The highest recorded mean concentrations were 26.4µg/m³ at M11 (in Powick), 25.4µg/m³ UP1 (located in Old Street, Upton-upon-Severn)) and 24.8µg/m³ at UP3 (located in Old Street, Upton-upon-Severn).

The lowest concentration was 7.7µg/m³ at M3N which is an urban background site in Teme Lane, Malvern. The results demonstrate that NO₂ concentrations within the Malvern Hills District area are significantly below the NO₂ air quality objective of 40µg/m³ during 2025. In comparison with 2024, the annual results are mixed with 4 locations increasing slightly, 4 locations decreasing slightly and 1 identical result. Across all locations, there is an average decrease of approximately 0.5% between 2024 and 2025.

Long term trend analysis over the 5-year period, 2021 to 2025, suggest concentrations from 2025 appear to be broadly similar to the pre-pandemic levels recorded in 2019 following a reduction in years 2020 and 2021 due to the impacts of Covid-19 restrictions on traffic and activities.

WRS has reviewed the 2021 based Defra national background maps to determine projected PM_{2.5} concentrations with the Malvern Hills District for the 2025 calendar year. The average total PM_{2.5} at 577 locations (centre points of 1km x 1km grids) across the Malvern Hills District is 5.78µg/m³, with a minimum concentration of 5.17µg/m³ and a maximum concentration of 9.08µg/m³. (This maximum concentration may be considered an outlier in that the next highest concentration is 6.78µg/m³). This indicates that PM_{2.5} concentrations within the Malvern Hills District are below the proposed annual average limit value for PM_{2.5} target of 10µg/m³ to be met across England by 2030.

Three low-cost sensors offering publicly accessible real time monitoring data were deployed within the Malvern Hills District Council area in 2024. The sensors, known as 'Zephyrs' provide data on a range of pollutants including PM₁, PM_{2.5} and PM₁₀. The monthly data for PM_{2.5} levels from the 'Zephyrs' within Malvern Hills district ranged from a minimum of 3.1µg/m³ to a maximum of 14.6µg/m³ with an average annual mean of 6.9µg/m³. The monthly data for NO₂ levels from the 'Zephyrs' within Malvern Hills district ranged from a minimum of 6.8µg/m³ to a maximum of 31.2µg/m³ with an average annual mean of 16.3µg/m³.

The results show that the level of pollution in Malvern Hills district has generally been significantly below the national objective for NO₂, PM_{2.5} and PM₁₀.

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 Plan¹ sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter (PM_{2.5}), the pollutant most harmful to human health. The National Air Quality Strategy² provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero³ details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel, and the majority of Air Quality Management Areas (AQMA) are designated due to elevated concentrations heavily influenced by transport emissions.

No specific actions have been progressed to improve air quality in the Malvern Hills district as there are currently no declared AQMA in the area and there was no requirement to do so previously. General actions to improve air quality apply across Malvern Hills district include promotion of active travel, improving cycling and walking infrastructure and increased installation of Electric Vehicle Charging Infrastructure. MHDC and Worcestershire Regulatory Services (WRS) are working with school, colleagues and the wider community promoting behaviour change and encouraging Active Travel with a view to improving air quality and reducing air pollution.

¹ Defra. Environmental Improvement Plan 2023, January 2023

² Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

³ DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Conclusions and Priorities

Increasing awareness and knowledge of air quality is evolving through Behavioural Change interactions with local schools and communities, Clean Air Day 2026 campaign and working with LA teams around the county to ensure air quality is considered appropriately within local strategy and policy.

A full rationalisation of all monitoring locations is programmed for Autumn 2026. Locations will be added and removed as deemed appropriate. WRS, on behalf of the Council will continue to review and comment on planning applications where air quality is a relevant concern.

Review and assessment of the 2025 data will be conducted to help inform future projects and strategies to improve air quality across the district. Real time information will enable a better understanding of air quality in the borough to help inform decision making and requirements for further action as necessary. In conclusion, we would summarise the ASR as follows:

- Malvern Hills district continues to have relatively good air quality.
- There were no measured exceedances of national air quality objectives within the district during 2025.
- The general trend continues to show an improvement in measured air quality.
- There are no AQMAs in the district.
- No new local sources or developments in 2025 have been identified which would significantly impact air quality concentrations within the Malvern Hills district.

Malvern Hills District Council's priorities for the next reporting year are to:

- Continue to monitor air pollutants at key locations across the district utilising the existing diffusion tube network for NO_x and real-time low-cost sensors for indicative PM_{2.5}.
- Review and assess the data from local monitoring sites and available national sources and guidance to inform future projects and strategies to improve air quality across the district.
- Produce an interim air quality strategy for the Malvern Hills District.
- Promoting public access to the Earthsense portal of real time monitoring data on a range of air pollutants to enhance public knowledge and encourage behavioural change

- Ensure proportionate mitigation measures are included within new developments where air quality is a relevant concern.
- Ensure air quality is considered appropriately within local strategy and policy where appropriate including working with Air Quality Partners.
- Maintain relationships with neighbouring authorities and institutions to stay abreast of issues and developments that could impact or benefit air quality in Malvern Hills district, and to ensure our work is recognised in the wider West Midlands community.

How to get Involved

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

- **Walk or cycle around the District instead of driving:** Leaving your car at home and walking or cycling instead will benefit in three ways - increased exercise, reduced pollution exposure and will reduce your own 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 and bus maps and timetables) and Government website:

[Travel and Highways - Worcestershire County Council](#)

[Smarter choices: changing the way we travel - GOV.UK \(www.gov.uk\)](#)

- **Hold meetings by Conference Call** by phone or video conference via Teams, Zoom 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.
- **Workplace Charging Scheme:** The government is currently providing grants for up to 75% of Electric Vehicle (EV) charging points, up to 40 charge points. Eligible

businesses, charities and public sector organisations with off street parking for staff or vehicles fleets can apply for vouchers to redeem costs of electric vehicle charge-points.

[Workplace Charging Scheme - GOV-UK Find a grant \(find-government-grants.service.gov.uk\)](https://www.gov.uk/find-a-grant)

- 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](https://www.energy-saving-trust.org/eco-driving)

[How to drive economically - Eco-driving tips | AA \(theaa.com\)](https://www.theaa.com/eco-driving-tips)

[Fuel Consumption & CO₂ Databases | Vehicle Certification Agency \(vehiclecertification-agency.gov.uk\)](https://www.vehiclecertification-agency.gov.uk/)

- **Reduce air pollution from open fires and wood-burning stoves:** Advice is available from Defra on choosing the right stove, using the right fuels and maintenance, enabling householders to reduce their impact on their health and air quality from open fires and wood burning stoves. Further information is available on the [Smokeless Zones](#) and [Public Advice](#) pages on WRS website.

WRS would highlight the Malvern Hills District Council’s website and, most relevantly, the section entitled ‘Tackling Climate Change’ using the following link – [Tackling Climate Change - Malvern Hills District Council](#)

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)^{4,5}. 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:

⁴ <http://www.breathelondon.org/>

⁵ <https://www.londonair.org.uk/LondonAir/guide/MyActionsForMe.aspx>

- Current levels and forecasts of air pollution from Defra at: [UK Air](#) and the [Earthsense website for Air Quality across Worcestershire](#).
- 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 [UK Air advice](#)
- If you are on social media, sign up to the WRS Twitter feed.

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 \(worcestershire.gov.uk\)](#)

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1 Local Air Quality Management

This report provides an overview of air quality in Malvern Hills District Council during 2025. 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 Malvern Hills 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.

Malvern Hills District Council currently does not have any declared AQMAs and there are no present plans to declare a new AQMA given the results of monitoring to date.

Therefore, no specific action is required at this time. However, Malvern Hills District Council has taken forward a number of measures during the current reporting year of 2025 in pursuit of improving local air quality. Details of all measures are summarised in Section 2.2 below.

Production of a local Air Quality Strategy is a priority action for 2026/27. However, certain potential elements of the strategy, such as improving communication of air quality, are evolving through other work streams such as Behavioural Change interactions with local schools and communities, Clean Air Day 2025 campaign and working with LA teams around the county to ensure air quality is considered appropriately within local strategy and policy.

Concentrations of Nitrogen Dioxide in Malvern Hills district continue to fall significantly below the annual mean objective at the measured locations. Maps of the Malvern Hills District Council monitoring sites are available in Appendix D.

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

Defra's appraisal of last year's ASR concluded based on the evidence provided by Malvern Hills District Council, that the report was accepted for all sources and pollutants and that a further ASR should be submitted in 2026.

Defra further commented as follows: -

1. *MHDC are commended for providing graphs outlining the trends in air quality over the past five years. Discussion of the graphs highlight that air quality in the district is good.*
2. *Monitoring sites have been identified on maps that are clear to understand.*
3. *MHDC have provided details on the diffusion tubes used and the corresponding QA/QC procedures. Justification for use of a local bias factor has been provided.*
4. *MHDC have outlined a plan to develop an AQS for 2026. An update on this would be useful for next year's submission.*
5. *MHDC have presented the data from 3 low-cost sensors during MHDC. This is welcomed and MHDC should continue to update on the results on these sensors in the next submission.*
6. *MHDC have outlined the commissioning of a new AURN site in Tolladine, MHDC should include data from this site in the next submission. MHDC should also consider use this site for developing a local bias factor, instead of the Kidderminster AURN site which is a significant distance from Malvern.*
7. *MHDC have again produced a comprehensive discussion regarding PM_{2.5} with a breakdown of modelled background concentrations from Defra and the PHOF D01 indicator. This is commended. These discussions should be continued in future ASRs to ensure that particulate matter does not become a pollutant of concern within the district.*
8. *MHDC have referenced background maps for NO₂, stating that concentrations are well below the objective values.*

It was recommended that a Director of Public Health approve all draft ASRs and an Annual Status report be submitted in 2026. The DoPH has previously declined an invitation to sign off on the ASR since the DoPH has no involvement in production or ownership of the report but have requested a copy is provided following publication.

Wyre Forest House, Kidderminster was used as a co-location study because it is the closest co-located reference monitor to the jurisdiction currently available.

A local bias adjustment factor has also been used on the passive diffusion tube results for 2025. A local bias adjustment factor of 1.06 has been utilised and all results remained significantly below the Air Quality Objective.

A new AURN has been installed in the Tolladine area of Worcester City (less than 10 miles from the Malvern Hills district) during 2025 but only went live in March 2025. It is expected that a complete year's data will be available for the Worcester City Council to assist in reporting for ASR2026. The AURN is a PM_{2.5}/PM₁₀ analyser and will not assist with NO₂ data.

Net Zero/Climate Change Action

Malvern Hills District Council has a vision to become carbon neutral as soon as possible and by 2050 at the latest, targeting a minimum reduction of 50% to the district's carbon footprint by 2030. Net zero actions and policies often provide co-benefits of reducing air pollution. The Destination Zero plan identifies five priority areas for action-

- Achieve net-zero GHG emission from Malvern Hills District Council's own operations by 2030
- Climate resilient homes, businesses and communities
- Active and Low Carbon Travel
- Waste Minimisation and Re-Use
- Biodiversity and habitats

The Destination Zero report and policies to tackle climate change, can be accessed online at:

[Destination Zero 2025-2030](#)

[Destination Zero Annual Update 2024 to 2025](#)

[Tackling Climate Change - Malvern Hills District Council](#)

Active Travel Improvements/Actions

Local cycling and walking infrastructure plans are in development with consultation undertaken during the summer of 2025, alongside a number of Local Cycling and Walking Plans in South Worcestershire in concert with the Worcestershire County Council.

MHDC are working with Worcestershire Regulatory Services promoting behaviour change and encouraging Active Travel to schools, colleges and the wider community with a view to improving air quality and reducing air pollution. MHDC continues to encourage the use of bicycle travel.

The walking and cycling routes and further information can be found at the following links:

[Malvern Walking & Cycling Map \(worcestershire.gov.uk\)](https://www.worcestershire.gov.uk/malvern-walking-cycling-map)

[Journey planner | Cycling UK](#) (a good route planner which allows you to look for quieter and off-road routes, as well as the fastest and most direct route).

[Cycle Malvern – A good place to go by bike](#) (cycle parking and local information)

[Malvern Hills Car Clubs – Community Car Share \(malvernhills-carclubs.org.uk\)](https://malvernhills-carclubs.org.uk) (e-bike to work scheme and e-bike loan scheme).

A bike bus or walking bus are ideal ways to travel to school as a group. They are normally organised by parents, and both alleviate traffic congestion around schools.

[What is a bike bus and how can I set one up? - Sustrans.org.uk](https://www.sustrans.org.uk/what-is-a-bike-bus-and-how-can-i-set-one-up/)

[Organise a school walking bus - Eden Project Communities](#)

Worcestershire County Council Actions

Worcestershire County Council secured its full allocation from the Government's **Local Electric Vehicle Infrastructure** (LEVI) Fund to support the transition to electric vehicles and facilitate charging for owners without off-road parking within the Malvern Hills district. A procurement exercise was undertaken with EZO and Connected Kerb selected to assist with the transition towards electric driving.

The Electric Vehicle Infrastructure Charging Strategy was published in 2025 supporting the delivery of the charge points funded through Local Electric Vehicle Infrastructure Fund.

Southern Link Road A4440 improvements – Work on dualling of the carriageway between the Ketch and Powick roundabouts, capacity improvements to those junctions, an additional bridge over River Severn, and new foot/cycle bridges has been completed and the link road reopened. No further improvements are planned. The county completed an evaluation of the A4440 Southern Link Road Phase 4 which was published in February 2025 and can be viewed at [A4440 Southern Link Road Phase 4](#).

The successful Worcestershire Bus on Demand scheme has been further expanded within Malvern and the surrounding area which covers the majority of the district, extends into

Herefordshire and includes significant trip attractors for leisure and retail. The full map is available at:

[Worcestershire on Demand | Worcestershire County Council](#)

The **South Worcestershire Local Cycling and Walking Infrastructure Plan** was consulted on in 2025. The plan will be revised following the consultation and it is expected it will be adopted in 2026 - [Local cycling and walking infrastructure plans \(LCWIPs\) | Worcestershire County Council](#)

Passenger Transport - Bus 'on demand' services were added to a trial scheme in Malvern to provide an alternative option to the existing fixed route bus service. The Bus on Demand service enables passengers to use an 'app' to arrange flexible pick up and drop off points. The service was expanded during 2025, and further expansion is expected across Worcestershire during 2026. Further details can be viewed at the following link:

[On demand bus service launches in Malvern | Worcestershire County Council](#)

Worcestershire County Council continues to research and prioritise the planning and delivery of active travel provision for cycling, walking and wheeling routes across the County. The programme for the development of Worcestershire's **Local Cycling and Walking Infrastructure Plan** (LCWIP) and identifying proposed routes has already been supported by £160K from the Capability Building Fund given by Active Travel (GOV.UK).

Designs are in progress for the 'Hams Way Bridge to Powick' school active cycle route, subject to funding being secured for delivery, and an Active Travel England design check.

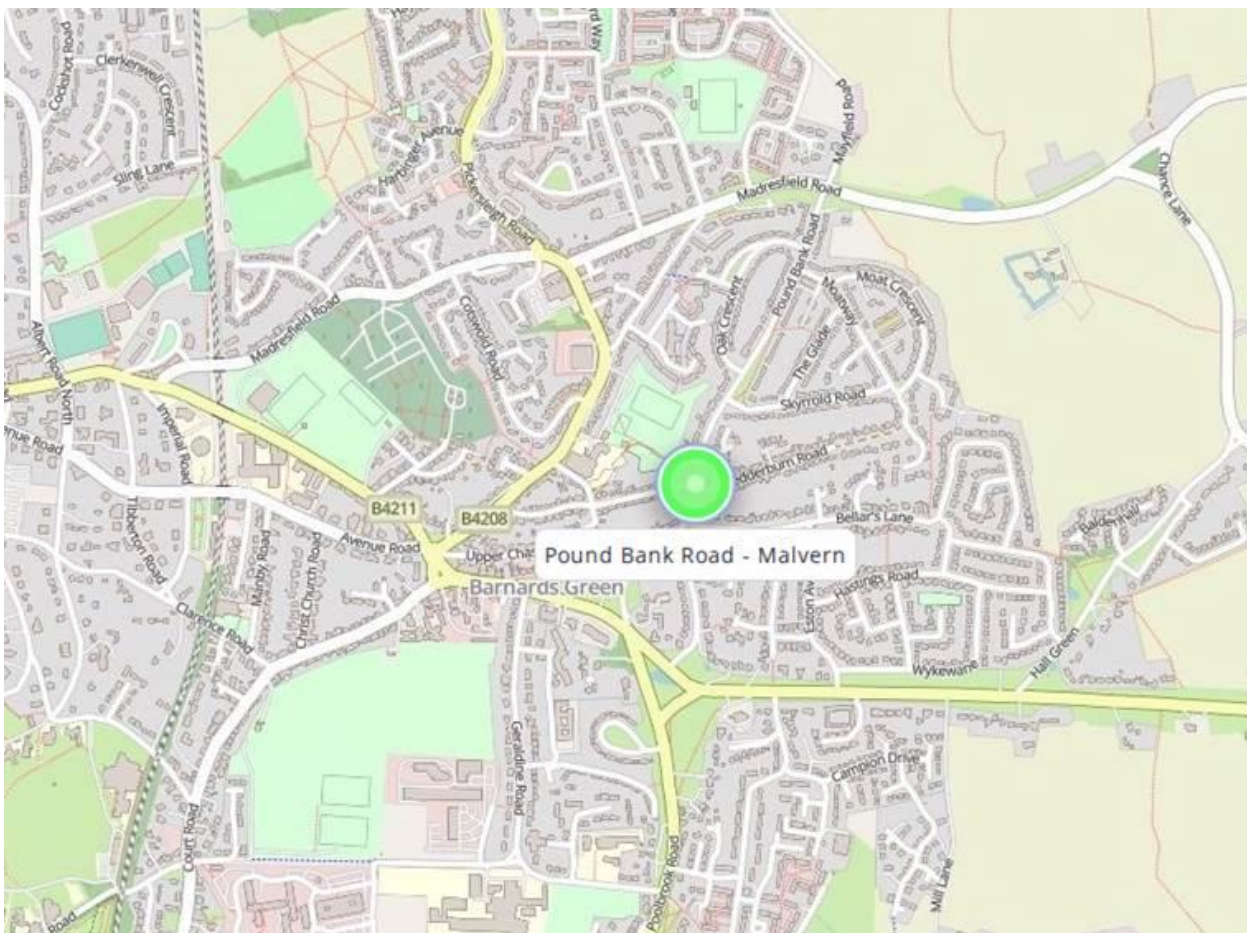
Real-time Air Quality Monitoring Project

In February 2023, WRS were successful in a bid to the Air Quality Grant Scheme 2022/23 to establish an enhanced real-time air quality monitoring network across Worcestershire. The scope of the bid was to establish a real-time air quality monitoring network across the main areas of air quality concern in Worcestershire for purposes of providing enhanced monitoring data on a range of pollutants. Additionally, the proposal included informing the public and vulnerable groups of the status of air pollution in real time to encourage behaviour change. The scheme has involved the installation of approximately 26 'low-cost Air Quality Monitors' which measure NO₂, PM₁₀, and PM_{2.5} across the county for a period of 3 years (with EA MCERTS standard accreditation as indicative ambient particulate matter devices). The results of monitoring will be used to inform decision making and requirements for further action as necessary.

In 2023 the experienced sensor provider [Earthsense](#) were appointed as successful suppliers following a rigorous procurement process. The sensors, known as '[Zephyrs](#)' are provided, operated and serviced by [Earthsense](#) who also provide data access. Appropriate monitoring locations were determined by WRS in collaboration with Public Health, Worcestershire County Council Street Lighting team and [Earthsense](#) taking into consideration requirements of Malvern Hills District Council.

The locations have been chosen to maximise data capture within locations proximal to vulnerable communities and/or from a range of sources of air pollution including transport, solid fuel burning, industry and agriculture. Three of the 26 monitors were deployed within the Malvern Hills district area between January and May 2024. Earthsense and WRS have designed a publicly accessible portal to the real-time monitoring data which launched in May 2024 and this can be viewed at the [Earthsense website for Air Quality across Worcestershire](#). Two of the three 'Zephyrs' were re-located on 1st August 2025 to provide improved assessment of potential sources distant to road impacts, domestic wood burning (Pound Bank Road) and agriculture (Bransford). The revised monitor locations can be seen on the maps (below) taken from the Earthsense portal:-

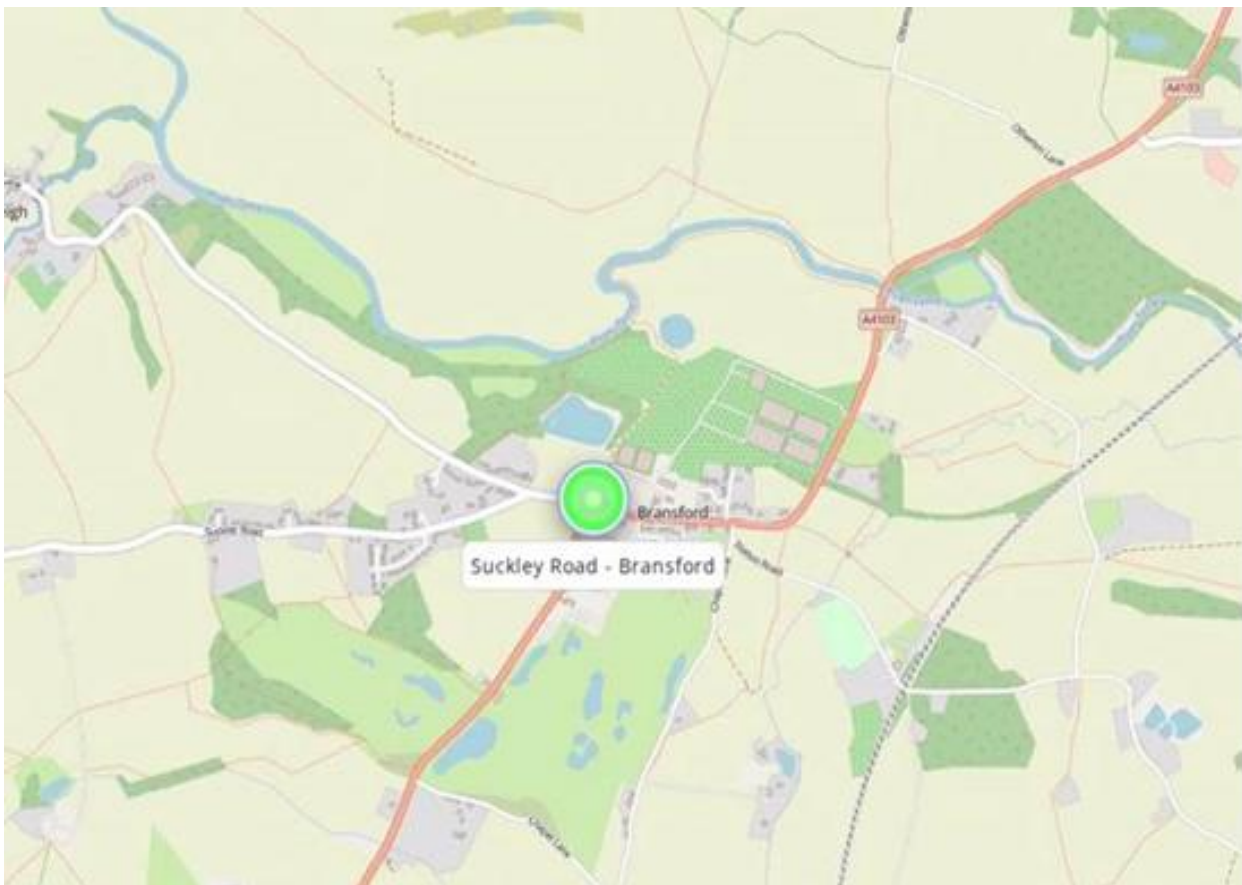
Pound Bank Green, Malvern



School Lane, Upton-upon-Severn



Suckley Road, Bransford



Key Progress in 2025

Malvern Hills District Council has:

- Continued to promote active travel.
- Continued and expanded use of Hydrotreated Vegetable Oil (HVO) in all compatible vehicles as a lower carbon alternative to diesel which has mutual benefits with reduced NO₂ from internal combustion engines.
- Increased the energy efficiency of District Council buildings, including at the Council House and Malvern Theatres with plans to install solar panels.
- Worked with Worcestershire County Council on the development and delivery of Local Cycling & Walking Infrastructure Plans.
- Supported the roll out of electric vehicle charging infrastructure, including supporting Worcestershire County Council on the roll out the LEVI scheme.

A considerable barrier to active travel is the availability of a network of safe and convenient routes. Too often cycle infrastructure in particular, when it is present, is disjointed, inconvenient and of a low quality. This does not encourage people to walk and cycle, and reinforces car dependence.

Behavioural Change Officer (BCO) work and Improving Air Quality Communication

During 2025, the BCO at WRS supported by Technical Officers and the Air Quality Lead have undertaken a range of direct and indirect interactions to raise awareness of air pollution and encourage behavioural change to improve local air quality including:

- 1 primary school visited in Malvern Hills district and actively engaged in BC activities (Great Malvern Primary School)
- Developed the freely available Breathe Better Worcestershire Air Quality toolkit for primary schools with the University of Worcester
- Presented BC work at the International Bike Bus Summit held in Worcester in April 2025
- Produced a local promotional campaign to raise awareness of air quality, encourage use of the public portal to real-time air quality monitoring and behavioural change for Clean Air Day 2025
- The [Air Quality pages on WRS website](#) have undergone significant transformation to update information displayed and improve user friendliness following best practice examples identified in the Air Quality Information System publications

Actions and information on all BC activities have been published [here](#). The BC work highlighted above has since been recognised nationally and included on Defra's Air Quality Hub providing guidance for local authorities across the UK.

Air Quality Strategy

From 2023, local authorities that do not have any AQMAs in their areas are required to produce an Air Quality Strategy outlining how air quality will be maintained. Production of an interim air quality strategy for the Malvern Hills District has been delayed until late 2026 due to other priorities across the county. However, certain potential elements of the strategy, such as improving communication of air quality, are evolving through other work streams for example Behavioural Change interactions with local schools and communities, annual Clean Air Day campaigns and working with local authority teams around the county to ensure air quality is considered appropriately within local strategy and policy.

WRS continue to monitor air quality in the Malvern Hills District and across Worcestershire on behalf of the six districts.

Malvern Hills District Council's priorities for the coming year are:

- Production of an interim Air Quality Strategy
- Continued monitoring to inform the Air Quality Strategy
- Promoting behavioural change through awareness and Clean Air Day campaigns

The principal challenges and barriers to implementation that Malvern Hills District Council anticipates facing are:

- Available resource and competing priorities
- Lack of school and community response to invitations to participate

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
Priority Air Quality Actions														
1	AQS	Public Information	Via other mechanisms	N/a	2026/27	WRS, MHDC	Not Yet Identified	To Be Confirmed	£10k-50k	Planning	<1%	Number of responses to survey, hits on website, data captured. Changed behaviour identified from repeat survey in future	Not Yet Identified	Resources and other priorities
2	Promote Active Travel	Promoting Travel Alternatives	Other	N/a	2027	MHDC and WCC	Not yet identified	To be confirmed	£10k-50k	Planning	<0.2%	Number of businesses engaged, number of downloads of guides or website hits, behavioural change confirmed through surveys	Planning	Funding availability
3	Promote Behaviour Change through interaction with schools and colleges	Promoting Travel Alternatives	Other	N/a	2024 - 2028	WRS	WRS	Fully funded	£100 - £500k	Feedback	No data	Feedback and engagement	Ongoing visits to schools and colleges across the County	Schools and community engagement
4	Clean Air Day	Promoting Travel Alternatives	Other	N/a	2024 - 2027	WRS	Not yet identified	To be confirmed	<£10k	Feedback	N/a	Feedback and engagement	Undertaken each year	Funding availability
5	Assessment and re-location of 'zephyrs'.	Monitoring	Other	N/a	2024 -	WRS	Not yet identified	To be confirmed	<£10k	Results of monitoring and assessment	Measure results	Monitoring results	Undertaken each year	Ongoing process

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy⁶, local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter (PM_{2.5}). There is clear evidence that PM_{2.5} (particulate matter smaller 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Prior to 2025 there were no automatic scientific reference methods for PM_{2.5} monitoring stations in Worcestershire that are recognised by Defra for measuring against ambient air quality directives. In March 2025 the first of two planned AURN PM_{2.5} monitoring stations in Worcestershire, was installed in Worcester City. The Worcester Tolladine site is less than 10km to the north of Malvern Hills district. The first full year's data from the site will be available for next year's ASR.

WRS has reviewed the 2021 based Defra national background maps to determine projected PM_{2.5} concentrations with the Malvern Hills District for the 2025 calendar year. The average total PM_{2.5} at 577 locations (centre points of 1km x 1km grids) across the Malvern Hills District is 5.78µg/m³, with a minimum concentration of 5.17µg/m³ and a maximum concentration of 9.08µg/m³. This maximum concentration may be considered an outlier in that the next highest concentration is 6.78µg/m³. This indicates that PM_{2.5} concentrations within the Malvern Hills District are below the proposed annual average limit value for PM_{2.5} target of 10µg/m³ to be met across England by 2040.

Three low-cost sensors offering publicly accessible real time monitoring data were deployed within the Malvern Hills District Council area in 2024. The sensors, known as 'Zephyrs' provide data on a range of pollutants including PM₁, PM_{2.5} and PM₁₀. Two of the 'Zephyrs' were relocated during 2025 to target domestic burning (1593*) and agricultural (1591*) sources. Graphical results for 2025 are shown in the appendices and PM_{2.5} averages for 2025 are summarised in table below:

⁶ Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

Location	2024 Average PM _{2.5} (µg/m ³)	2025 Average PM _{2.5} (µg/m ³)	Installation/Relocation Date
School Lane, Upton-upon-Severn (1595)	7.7	8.3	January 2024
Barnards Green Road, Malvern (1593)	6.45	9.1*	January 2024/August 2025
Pounds Bank Road, Malvern (1593*)	N/a	4.9^	August 2025
Upper Wick Lane, Rushwick (1591)	6.15	8.8*	January 2024/August 2025
Suckley Road, Bransford (1591*)	N/a	4.3^	August 2025

*Average from January – July 2025 only, relocated 1st August 2025

^Average from August to December 2025 only

These low-cost sensors have been certified as suitable for indicative monitoring for particulate matter within the UK using the Environment Agency's Indicative instrument certification scheme (MCERTS). However, the following advice from Defra is acknowledged: 'While low-cost sensors can provide useful indicative data, at present they are not approved for use in statutory legal reporting (LAQM) of data against the National air quality objectives as they are not accurate enough to meet the expanded uncertainty requirements of equivalent [scientific reference] instruments.'

The measured data from the low-cost sensor network and Defra background pollution maps indicate that PM_{2.5} concentrations within the Malvern Hills District are well below the interim and legally binding targets set out in the Air Quality Strategy (England) 2023:

Pollutant and Metric	Target	Target Year
PM_{2.5} annual mean concentration	Interim target: 12µg/m ³	2028
PM_{2.5} annual mean concentration	Legally binding target: 10µg/m ³	2030

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 Framework. The fraction of mortality attributable to particulate air pollution in Malvern Hills District in 2024 (the most recent year available) was 4.4% MHDC. This falls below the national figure for England (5.3% in 2024) and below the figure for the West Midlands region (5.3% in 2024). Further information on the Public Health Outcomes Framework that examines indicators that help us understand trends in public health can be found at [Public Health Outcomes Framework - OHID \(phe.org.uk\)](https://phe.org.uk)

There are currently no declared smoke control areas operating within the Malvern District Council area. More information, maps on SCA's in Worcestershire and guidance on approved fuels for domestic burning can be found at: [Smoke Control Areas | Worcestershire Regulatory Services \(worcsregservices.gov.uk\)](https://www.worcsregservices.gov.uk)

WRS hold no records of substantiated complaints of nuisance from smoke attributable to wood burning stoves in residential developments in Malvern Hills district in 2025.

In light of the above, no additional actions are currently planned by Malvern Hills District Council in relation to the reduction of PM_{2.5} levels. However, it is anticipated that any action taken to improve NO₂ levels across the region, will likely result in a linked improvement in PM_{2.5} levels. Additionally, an interim Air Quality Strategy will pay due regard to the new responsibilities on local authorities for PM_{2.5}, outlined within the revised national Air Quality Strategy (25 August 2023) which can be found at [National Air Quality Strategy](https://www.gov.uk/government/publications/national-air-quality-strategy).

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

This section sets out the monitoring undertaken within 2025 by Malvern Hills District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2021 and 2025 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Malvern Hills District Council did not undertake any automatic (continuous) monitoring that are recognised by Defra for measuring against ambient air quality directives during 2025.

3.1.2 Non-Automatic Monitoring Sites

Malvern Hills District Council undertook non-automatic (i.e. passive) monitoring of NO₂ at 9 sites during 2025. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

The results of the 2025 monitoring have not increased the likelihood of an AQMA being declared in the Malvern Hills District as air pollutant concentrations remain substantially below current air quality objectives and standards.

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.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40µg/m³. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2025 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.

During 2025, concentrations of NO₂ were monitored at 9 locations across the Malvern District. The highest recorded mean concentrations were 26.4µg/m³ at M11 (in Powick), 25.4µg/m³ UP1 (located in Old Street, Upton-upon-Severn)) and 24.8µg/m³ at UP3 (located in Old Street, Upton-upon-Severn).

The lowest concentration was 7.7µg/m³ at M3N which is an urban background site in Teme Lane, Malvern. The results demonstrate that NO₂ concentrations within the Malvern Hills District area are significantly below the NO₂ air quality objective of 40µg/m³ during 2025. In comparison with 2024, the annual results are mixed with 4 locations increasing slightly, 4 locations decreasing slightly and 1 identical result.

The impact upon concentration levels, given the restrictions on traffic and general commercial/social activity that were in place due to Covid-19 within the 5-year period (2021-2025) are reflected in the lower concentration levels for 2021. Across all locations, there is an average decrease of approximately 0.5% between 2024 and 2025.

Long term trend analysis over the 5-year period, 2021 to 2025, suggest concentrations from 2024 appear to be broadly similar to the pre-pandemic levels recorded in 2019 following a reduction in years 2020 and 2021.

No annual mean averages greater than 60µg/m³ have been recorded indicating that it is extremely unlikely that there have been any exceedances of the 1-hour mean objective for NO₂ at any monitoring sites. The concentrations recorded across the district in 2025 are all below 50% of this indicative level (as outlined within LAQM.TG22).

A new location (M20) was established near to the signalised crossroads at Graham Road/Church Street, Great Malvern in early 2023 following concerns raised by members of the public that the busiest area in Malvern was not being monitored. Historical

monitoring has taken place in that vicinity over a number of years, ceasing 2016 and no exceedances have been recorded. The monitoring location has been reinstated to ascertain current conditions at the site. The annual mean concentration during 2023 at this new site (M20) was $18.8\mu\text{g}/\text{m}^3$ dropping to $18.7\mu\text{g}/\text{m}^3$ in 2024, rising to $20\mu\text{g}/\text{m}^3$ in 2025

A new location (BNG1) was established near to the roundabout at Barnards Green, Malvern in early 2024, a busy area for traffic in an area of residential properties above retail premises and in proximity to two schools. Early indications from 2024 and 2025 results do not suggest any heightened concern with recorded levels of $19.9\mu\text{g}/\text{m}^3$ and $19.7\mu\text{g}/\text{m}^3$ respectively.

3.2.2 Particulate Matter (PM₁₀)

There were no automatic PM₁₀ monitoring stations within Malvern Hills District in 2025 that are recognised by Defra for measuring against ambient air quality directives.

3.2.3 Particulate Matter (PM_{2.5})

There were no automatic PM_{2.5} monitoring stations within Malvern Hills District in 2025 that are recognised by Defra for measuring against ambient air quality directives.

3.2.4 Sulphur Dioxide (SO₂)

SO₂ concentrations have not been monitored within the district in 2025.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Malvern Hills District does not have any certified Automatic Monitoring Sites.

Table A.2 – 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)
UP1	2 Old Street, WR8 0HA	Roadside	385171	240555	NO ₂	No	0m	2m	No	2.10m
UP3	15 Old Street, Upton, WR8 0HN	Roadside	385157	240508	NO ₂	No	0m	1.25m	No	1.98m
M3N	Teme Avenue, WR14 2XA	Urban Background	379790	245677	NO ₂	No	7m	1m	No	2.20m
M2	Outside Santler Court, Howsell Road, Malvern Link, WR14 1US (Give way sign 445)	Roadside	378320	247570	NO ₂	No	5m	1m	No	2.20m
M5N	Richmond Road, Malvern Link, WR14 1NE	Roadside	378520	247753	NO ₂	No	0.1m	4.5m	No	2.30m
M11	Old Post Office, Powick (on LP 233 opp Murco Garage, WR2 4QR	Roadside	383231	251684	NO ₂	No	7m	2.1m	No	2.10m

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)
M14	278 Worcester Road, Malvern, WR14 1BD on drainpipe next to bay window	Roadside	379156	248248	NO ₂	No	0m	5.9	No	3.2m
M20	On sign o/s Koko Nail Boutique, Graham Road	Roadside	377701	246066	NO ₂	No	0m	2.0m	No	2.0m
BNG1	Barnards Green Road Malvern (Lampost by Co-op), WR14 3LY	Roadside	378791	245601	NO ₂	No	0m	3.4m	No	2.2m

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results: Automatic Monitoring (µg/m³)

Malvern Hills District does not have any certified Automatic Monitoring Sites for NO₂.

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2025 (%) ⁽²⁾	2021	2022	2023	2024	2025
UP1	385171	240555	Roadside	100.0	100.0	23.0	27.2	26.0	27.7	25.4
UP3	385157	240508	Roadside	100.0	67.3	22.7	27.4	25.6	25.3	24.8
M3N	379790	245677	Urban Background	100.0	100.0	6.5	7.7	7.1	7.5	7.7
M2	378320	247570	Roadside	100.0	92.3	17.3	20.2	19.6	19.6	20.5
M5N	378520	247753	Roadside	100.0	100.0	18.7	22.3	21.3	21.9	21.4
M11	383231	251684	Roadside	100.0	100.0	21.4	25.4	26.1	26.4	26.4
M14	379156	248248	Roadside	100.0	100.0	16.1	17.7	17.5	17.4	18.4
M20	377701	246066	Roadside	100.0	100.0	-	-	18.8	18.7	20.0
BNG1	378791	245601	Roadside	100.0	100.0	-	-	-	19.9	19.7

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

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

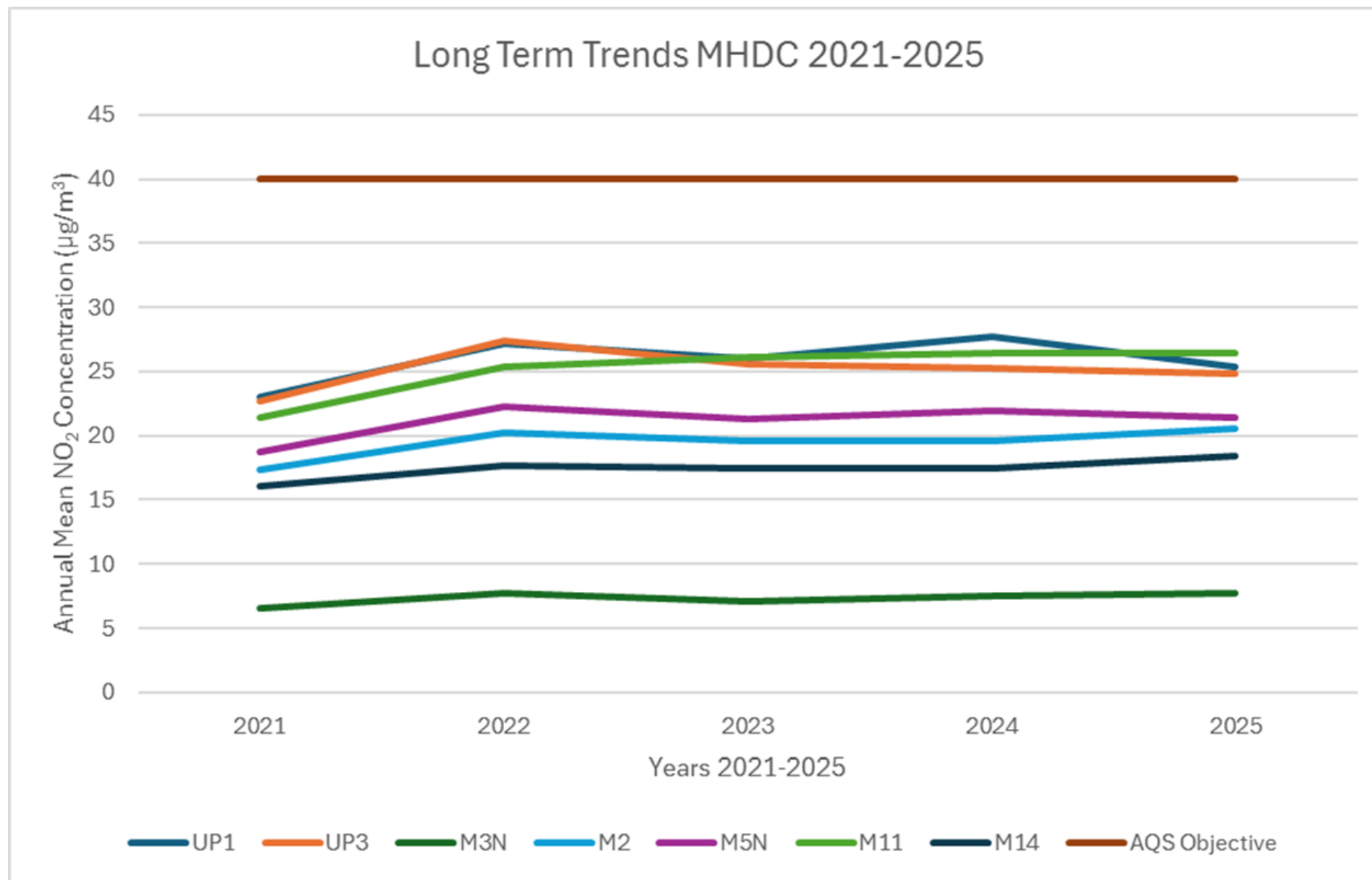
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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



Appendix B: Full Monthly Diffusion Tube Results for 2025

Table B.1 – NO₂ 2025 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 <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
UP1	385171	240555	30.3	25.8	26.4	23.4	20.5	23.2	19.3	22.7	20.9	22.6	27.7	23.8	23.9	25.4		
UP3	385157	240508	27.2	29.4	27.7	26.3	23.7	18.5	21.4	-	-	-	-	24.1	24.8	24.8		
M3N	379790	245677	11.5	12.1	9.9	7.9	5.0	3.4	2.9	4.8	6.2	5.9	8.9	8.3	7.2	7.7		
M2	378320	247570	19.6	24.3	26.0	23.0	19.8	-	12.9	16.7	17.0	17.2	18.9	16.2	19.2	20.5		
M5N	378520	247753	24.8	25.2	22.1	22.3	17.6	17.7	15.7	17.3	19.2	19.1	20.9	19.3	20.1	21.4		
M11	383231	251684	27.5	33.4	30.0	26.4	20.0	19.1	14.1	23.1	25.3	26.2	26.4	26.0	24.8	26.4		
M14	379156	248248	21.6	24.6	24.7	21.4	15.1	11.8	10.0	14.5	15.0	15.3	17.8	15.1	17.2	18.4		
M20	377701	246066	21.5	23.1	21.3	23.3	17.4	17.0	13.2	17.7	16.5	17.9	19.2	18.0	18.8	20.0		
BNG 1	378791	245601	24.0	25.0	21.6	19.2	14.7	17.7	12.7	15.8	16.9	18.3	19.8	17.2	18.6	19.7		

- ☒ 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
- ☒ Malvern Hills District Council confirm that all 2025 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 Malvern Hills District Council During 2025

Malvern Hills District Council has not identified any new sources relating to air quality within the reporting year of 2025.

Additional Air Quality Works Undertaken by Malvern Hills District Council During 2025

Malvern Hills District Council has not completed any additional works within the reporting year of 2025.

QA/QC of Diffusion Tube Monitoring

The following UKAS accredited company provided Malvern Hills District Council with nitrogen dioxide diffusion tubes and analysis in 2025:

Gradko International Limited, St. Martins House, 77 Wales Street, Winchester

SO23 0RH

Email: 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 2025 Diffusion Tube Monitoring Calendar, i.e. on or within ± 2 days of the specified date.

Diffusion Tube Annualisation

With the exception of the diffusion tube located at 15 Old Street, Upton (UP3), all diffusion tube monitoring locations within Malvern Hills District recorded data capture in excess of 75%. It was necessary to annualise the monitoring data at UP3 and the results of this annualization are summarised below. Any sites with a data capture below 25% do not require annualization. Annualisation is the process of estimating annual means from the extrapolation of short-term monitoring results. The methodology consists of using

concentration data from nearby continuous monitoring sites to assist in estimating annual mean concentrations at the site(s) in question.

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

Site ID	Annualisation Factor Leominster	Annualisation Factor Leamington Spa	Annualisation Factor Birmingham Hall Green	Annualisation Factor Cwmbran Browbridge	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
UP3	0.9191	0.9605	0.9379	0.9401	0.9394	24.8	23.3

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2025 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/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Malvern Hills District Council have applied a local bias adjustment factor of 1.06 to the 2025 monitoring data. A summary of bias adjustment factors used by Malvern Hills 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 v6.0. The site used for the colocation study is at Wyre Forest House, Kidderminster which is the Head Office for WRS. The installation is co-located with three diffusion tubes and is largely run and managed for the purpose of undertaking a local bias adjustment factor for the county. WRS are responsible for maintaining the monitoring network across the 6 district councils within Worcestershire and therefore the handling and processing of the diffusion tubes is the same for each area.

The local bias adjustment factor has been used as it is more conservative compared with the national bias adjustment factor (0.89, Defra published National Diffusion Tube Bias Adjustment Spreadsheet Version 03/26). This approach is consistent with the three previous ASRs and undertaken 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
2025	Local	-	1.06
2024	Local	-	1.03
2023	Local	-	0.97
2022	Local	-	0.97
2021	National	03/22	0.84

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	12
Bias Factor A	1.06 (1.01 - 1.12)
Bias Factor B	--6% (-11% - -1%)
Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	12.3
Mean CV (Precision)	3.2%
Automatic Mean ($\mu\text{g}/\text{m}^3$)	13.1
Data Capture	98%
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 2025 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. No diffusion tube NO₂ monitoring locations within Malvern Hills District required distance correction during 2025.

QA/QC of Automatic Monitoring

No automatic monitoring has been undertaken within the Malvern Hills District in 2025.

Summary of Low Cost Air Quality Sensor Monitoring

Table C.4– Details of Low Cost Sensor Sites (Nb* denotes relocated monitoring site)

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	Sensor Type	In AQMA?	Which AQMA? ⁽¹⁾	Distance to Relevant Exposure (m) ^(1,2)	Distance to kerb of nearest road (m) ⁽¹⁾	Inlet Height (m)
1595	School Lane, Upton	Roadside	385282	240332	NO, NO ₂ , O ₃ , PM ₁ , PM _{2.5} , PM ₁₀	Earthsense Zephyr	No	-	11.5	1.5	0.235
1593	Barnards Green Road, Malvern	Roadside	378745	245658	NO, NO ₂ , O ₃ , PM ₁ , PM _{2.5} , PM ₁₀	Earthsense Zephyr	No	-	1	2	0.235
1593*	Pound Bank Road, Malvern	Roadside	379234	245813	NO, NO ₂ , O ₃ , PM ₁ , PM _{2.5} , PM ₁₀	Earthsense Zephyr	No	-	13.5	3	0.235
1591	Upper Wick Lane, Rushwick	Roadside	382302	253664	NO, NO ₂ , O ₃ , PM ₁ , PM _{2.5} , PM ₁₀	Earthsense Zephyr	No	-	47	2	0.235
1591*	Suckley Road, Bransford	Roadside	379594	252680	NO, NO ₂ , O ₃ , PM ₁ , PM _{2.5} , PM ₁₀	Earthsense Zephyr	No	-	8	2	0.235

* From 1st August to December 2025

Table C.5 – Monthly Low-Cost Sensor Monitoring Results presented in $\mu\text{g}/\text{m}^3$ **1hr monthly average for PM_{2.5} (^incomplete data available for the site at Pound Bank Road (1593*) in October/November 2025)**

Site ID	X OS Grid Ref (Eastin g)	Y OS Grid Ref (Northi ng)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean Data
1595	385282	240332	13.5	13.7	14.6	10.7	7.4	6.0	5.3	6.0	4.1	6.0	5.5	6.6	8.3
1593	378745	245658	10.5	12.8	13.1	10	6.7	5.5	4.9	-	-	-	-	-	9.1
1593*	379234	245813	-	-	-	-	-	-	-	5.5	3.5	7.3^	4.0^	5.6	4.9
1591	382302	253664	11.1	12.0	12.7	9.5	6.3	5.2	4.7	-	-	-	-	-	8.8
1591*	379594	252680	-	-	-	-	-	-	-	5.2	3.1	4.8	3.5	4.8	4.3

1hr monthly average for PM₁₀ (^incomplete data available for the site at Pound Bank Road (1593*) in October/November 2025)

Site ID	X OS Grid Ref (Eastin g)	Y OS Grid Ref (Northi ng)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean Data
1595	385282	240332	21.7	22.9	23.2	16.4	10.5	8.9	7.7	8.8	6.8	10.1	9.3	11.4	13.1
1593	378745	245658	15.9	19.6	19.5	14.4	9.2	7.9	6.8	-	-	-	-	-	13.3
1593*	379234	245813	-	-	-	-	-	-	-	7.6	5.7	11.1^	7.3^	10.2	7.8
1591	382302	253664	16.5	18.1	18.7	13.4	8.5	7.2	6.4	-	-	-	-	-	12.7
1591*	379594	252680	-	-	-	-	-	-	-	7.2	5.1	7.7	6.3	8.2	6.9

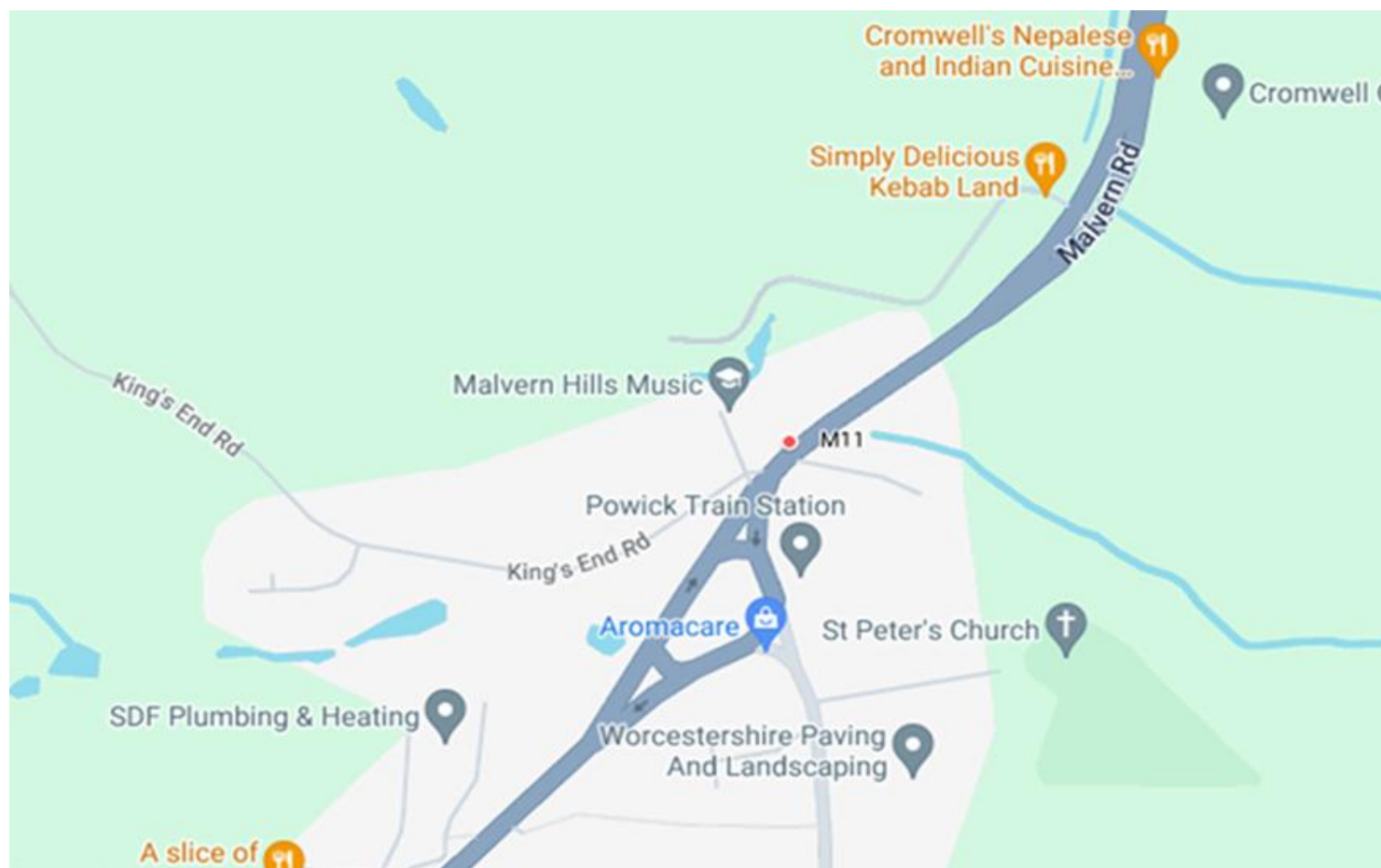
1hr monthly average for NO₂ (^incomplete data available for the site at Pound Bank Road (1593*) in October/November 2025)

Site ID	X OS Grid Ref (Eastin g)	Y OS Grid Ref (Northi ng)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean Data
1595	385282	240332	19.3	17.4	16.7	14.9	13.1	12.3	11.8	12.3	13.4	13.3	14.7	16.6	14.6
1593	378745	245658	31.2	28.5	27.9	24.6	19.3	14.8	12.6	-	-	-	-	-	22.7
1593*	379234	245813	-	-	-	-	-	-	-	11.4	13	15.3^	12.7^	16.8	13.7
1591	382302	253664	25.9	24.1	21.7	16.0	11.2	7.5	6.8	-	-	-	-	-	16.2
1591*	379594	252680	-	-	-	-	-	-	-	8.3	11.4	12.7	17.3	20.7	14.1

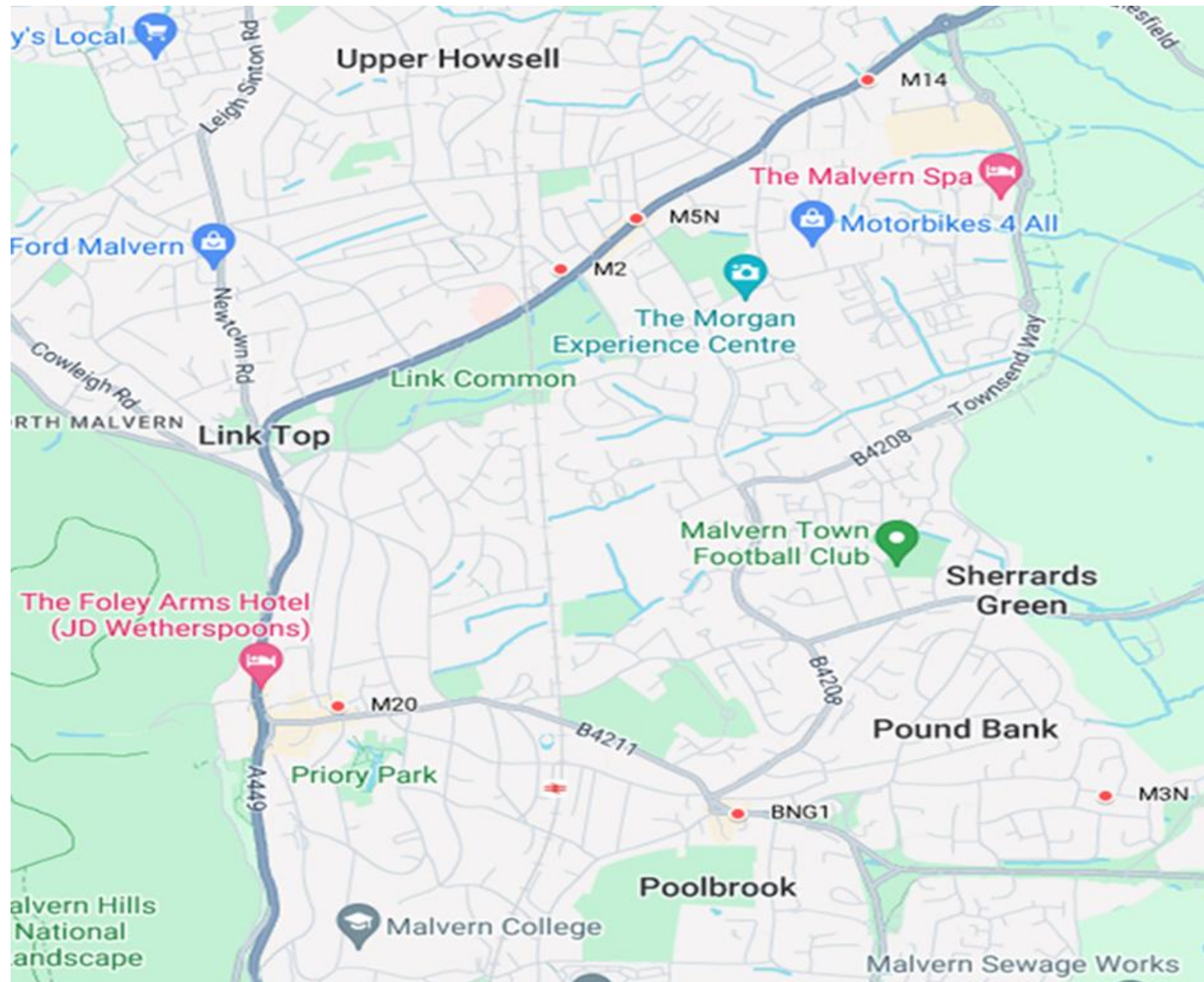
Appendix D: Map(s) of Monitoring Locations and AQMAs

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

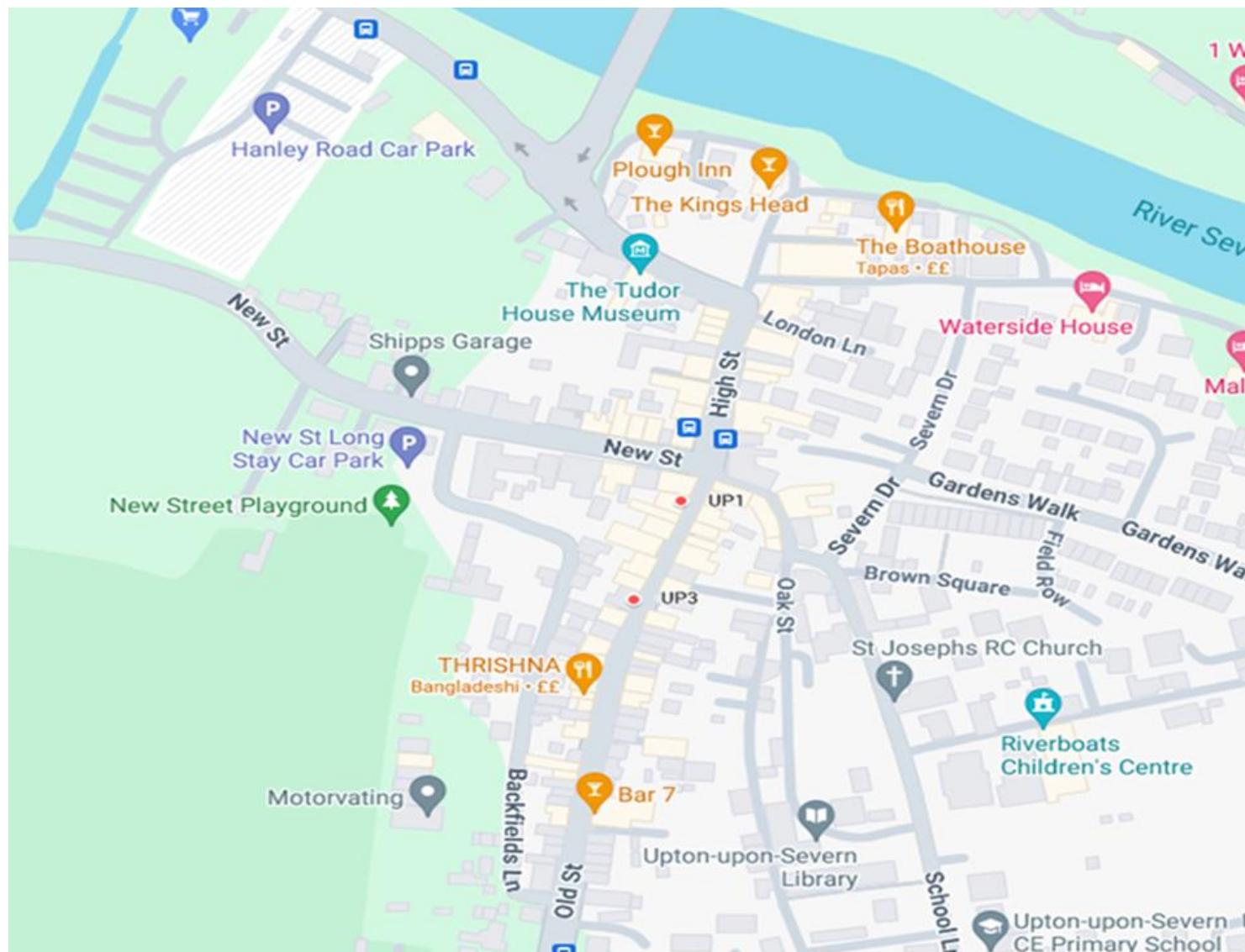
M11 is on Malvern Road near Powick and marked on the map below



M2, M3N, M5N, M14, M20, BNG1 are located on the map below



UP1 and UP3 are positioned in Old Street, Upton and marked in the map below



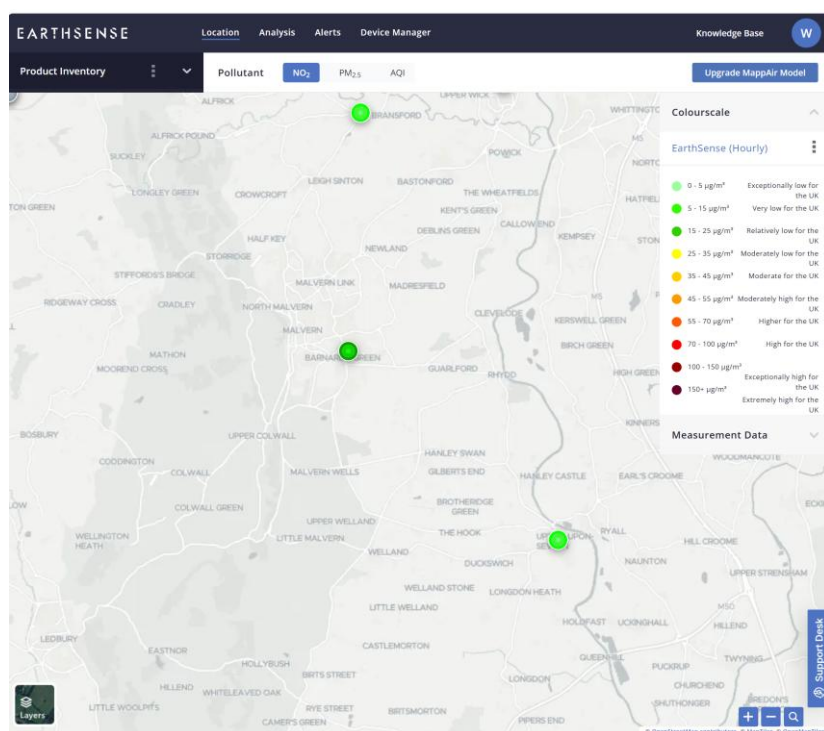
Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁷

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO ₂)	200µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO ₂)	40µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM ₁₀)	40µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO ₂)	125µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO ₂)	266µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁷ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Appendix F: Low-cost Sensor Results for 2025



Public Portal: [Worcestershire Air | EarthSense](#)

Project Information

Real time air quality monitoring for 3-year period funded by Defra Air Quality Grant (2022-23) and 10% match funding by each Worcestershire district council. Low-cost sensors (Zephyrs) installed and maintained by Earthsense who also provide real time data portal. Sensors were installed between January and May 2024.

General information

Zephyrs are one of the available low-cost sensors that have been certified as suitable for indicative monitoring for particulate matter within the UK using the Environment Agency's Indicative instrument certification scheme (MCERTS).

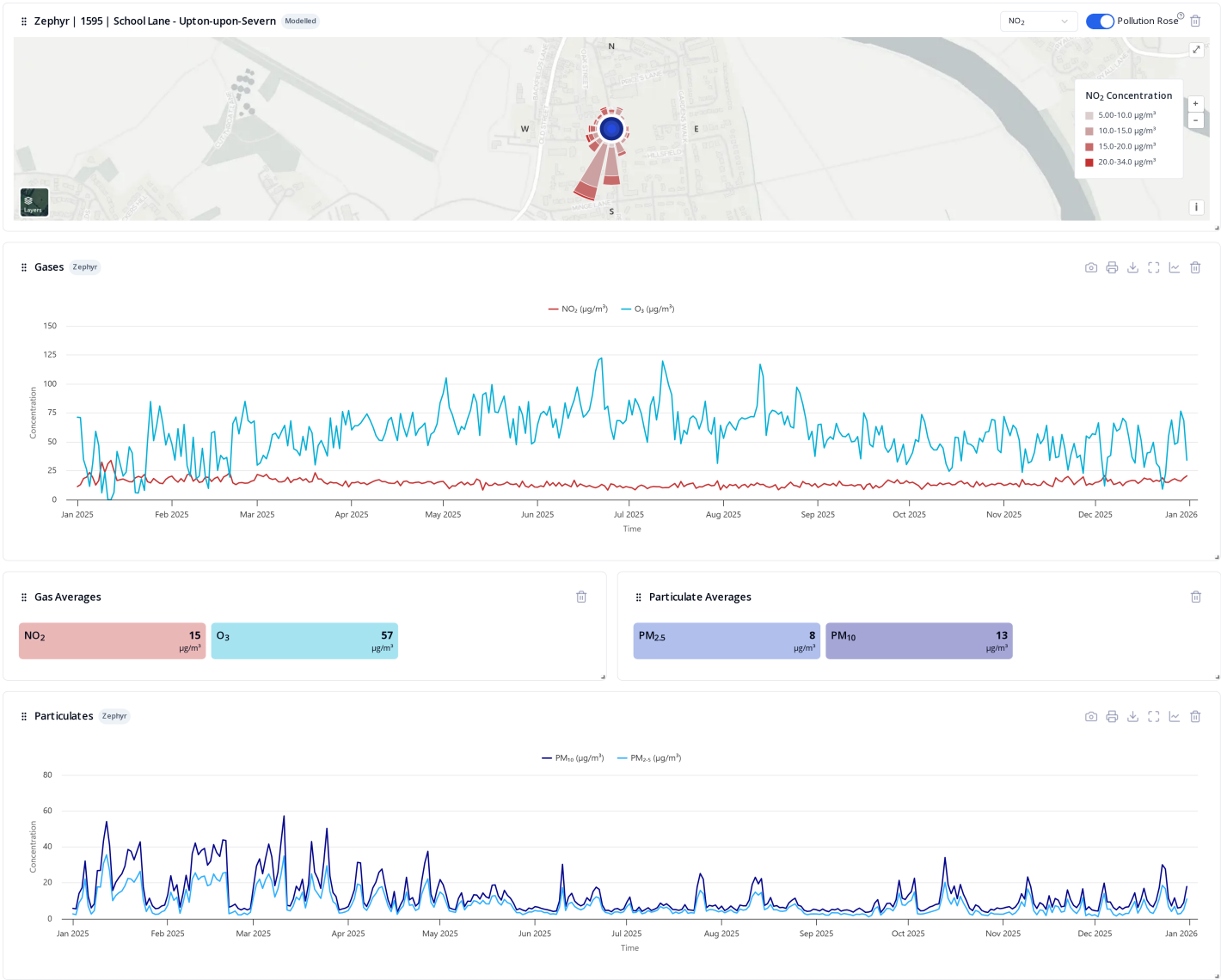
These low-cost sensors have been certified as suitable for indicative monitoring for particulate matter within the UK using the Environment Agency's Indicative instrument certification scheme (MCERTS). However, the following advice from Defra is acknowledged: 'While low-cost sensors can provide useful indicative data, at present they are not approved for use in statutory legal reporting (LAQM) of data against the National air quality objectives as they are not accurate enough to meet the expanded uncertainty requirements of equivalent [scientific reference] instruments.'

MyAir Analysis Report

Device: School Lane - Upton-upon-Severn

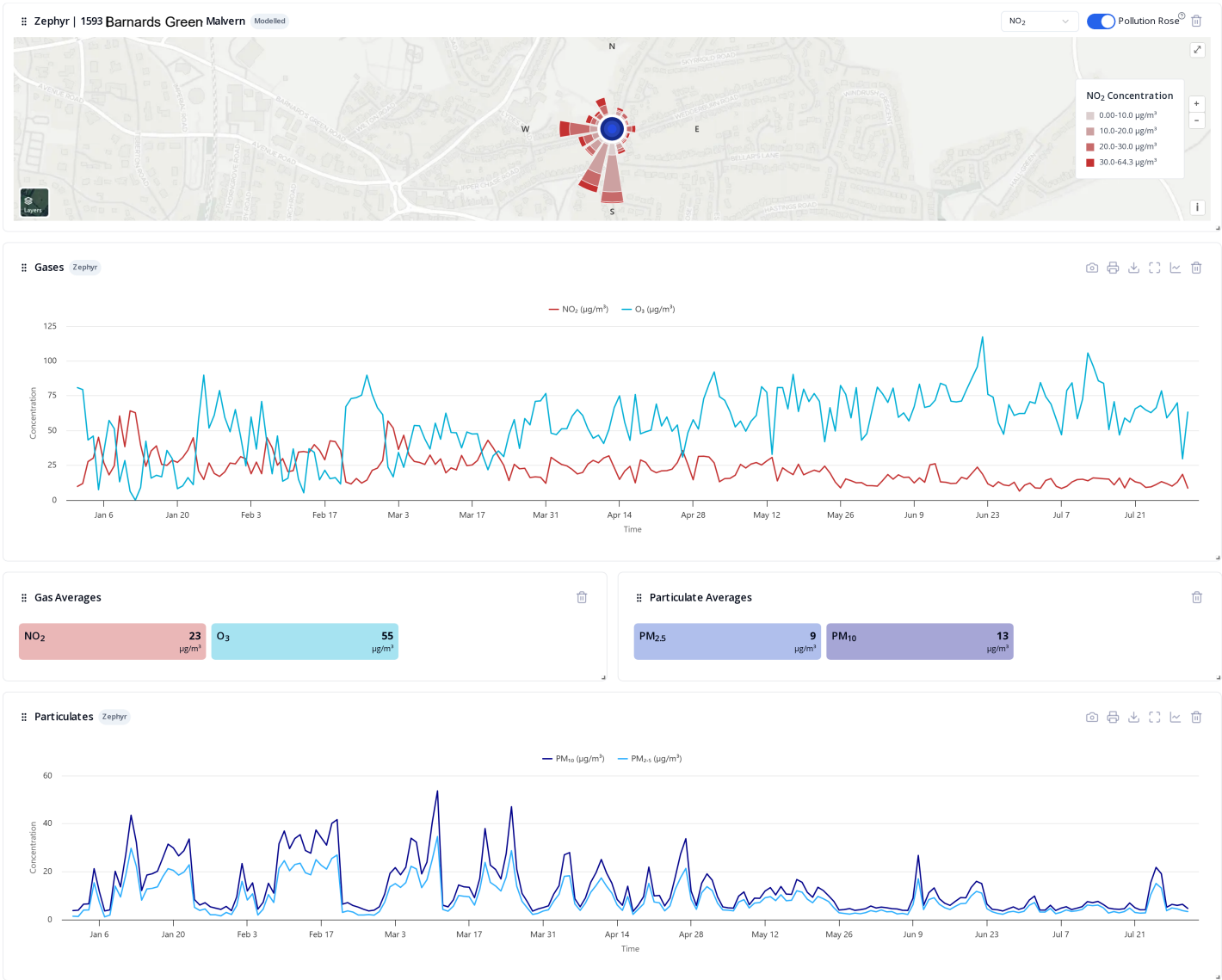
Time Period: 1 Jan 2025 - 1 Jan 2026

Time Average: 24 Hour



MyAir Analysis Report

Device: Barnards Green - Malvern
Time Period: 1 Jan 2025 - 1 Aug 2025
Time Average: 24 Hour

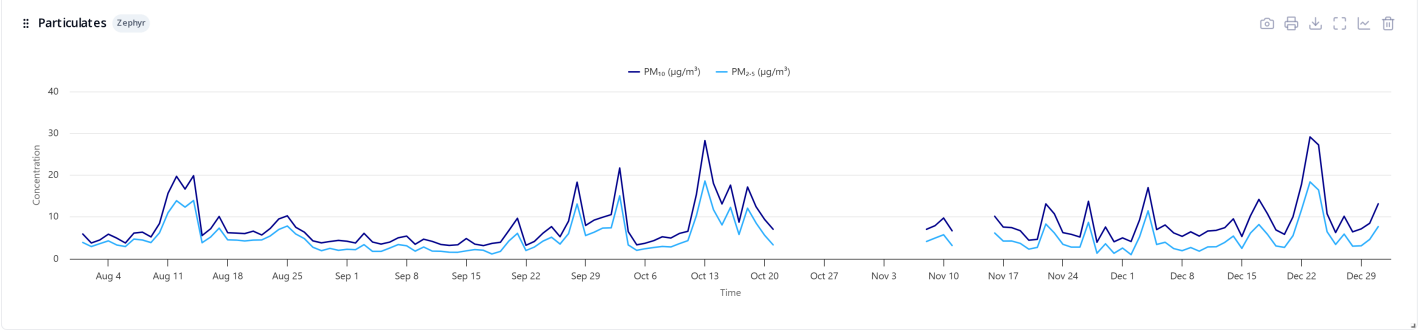
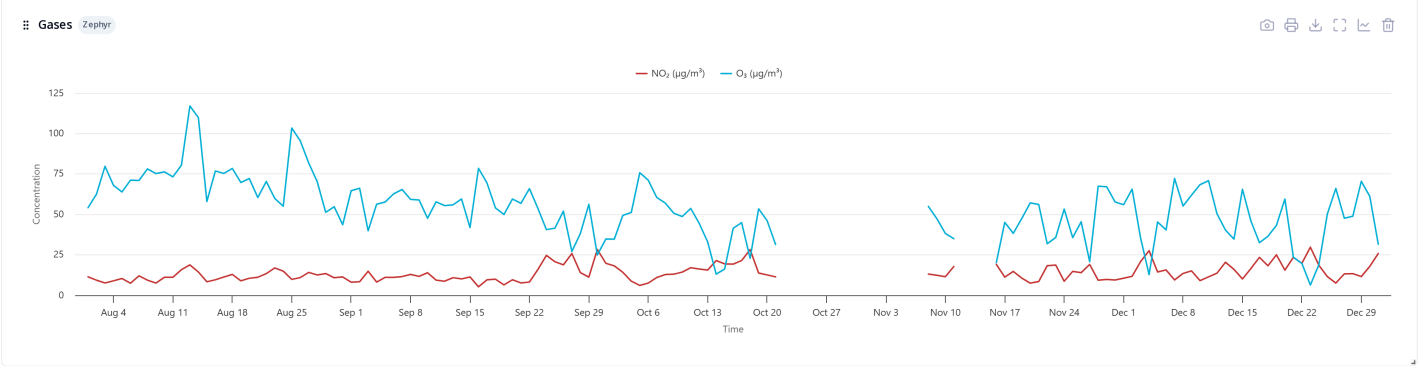
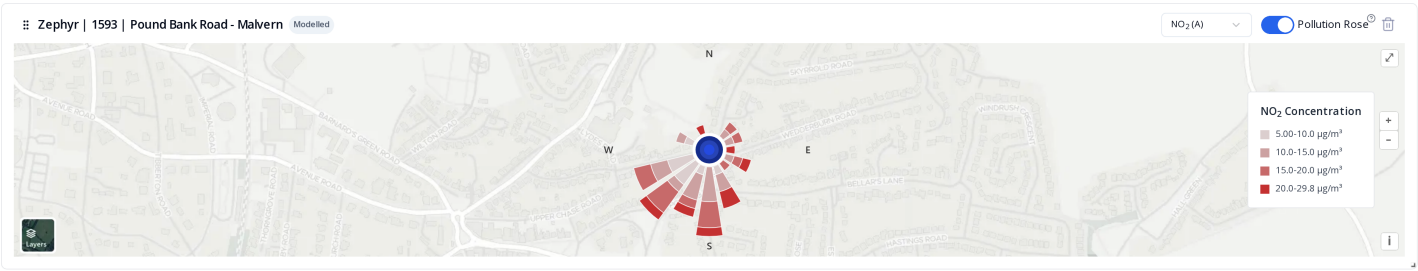


MyAir Analysis Report

Device: Pound Bank Road - Malvern

Time Period: 1 Aug 2025 - 1 Jan 2026

Time Average: 24 Hour

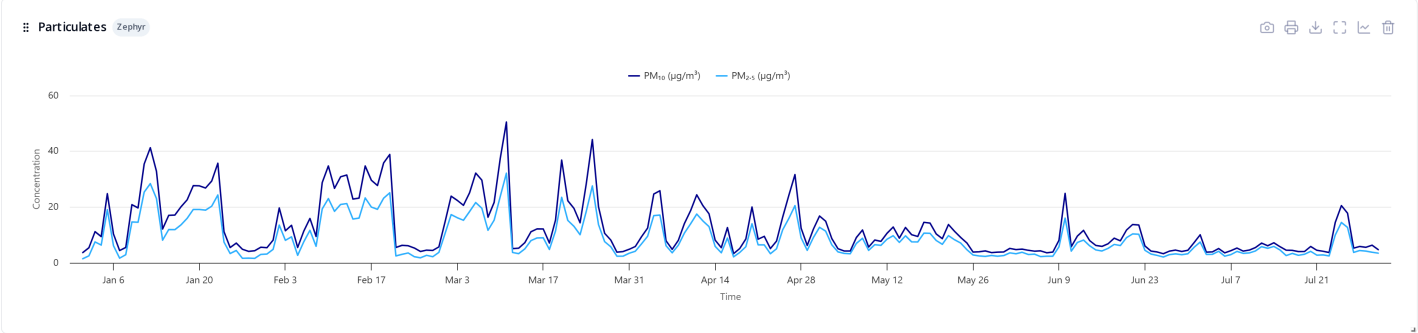
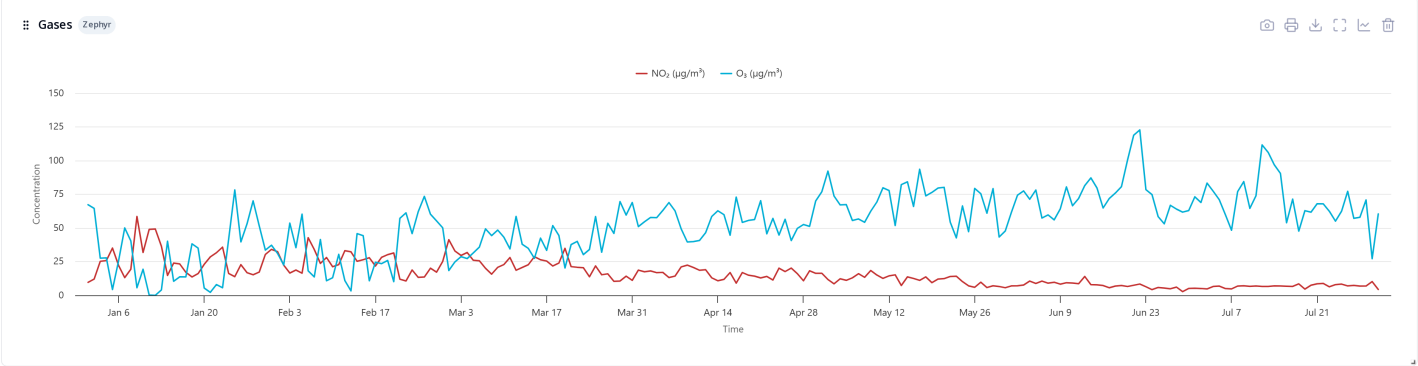
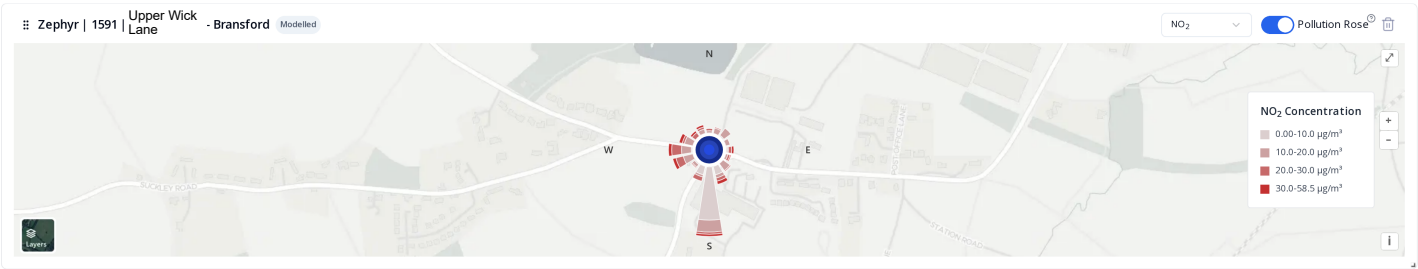


MyAir Analysis Report

Device: Upper Wick Lane - Bransford

Time Period: 1 Jan 2025 - 1 Aug 2025

Time Average: 24 Hour

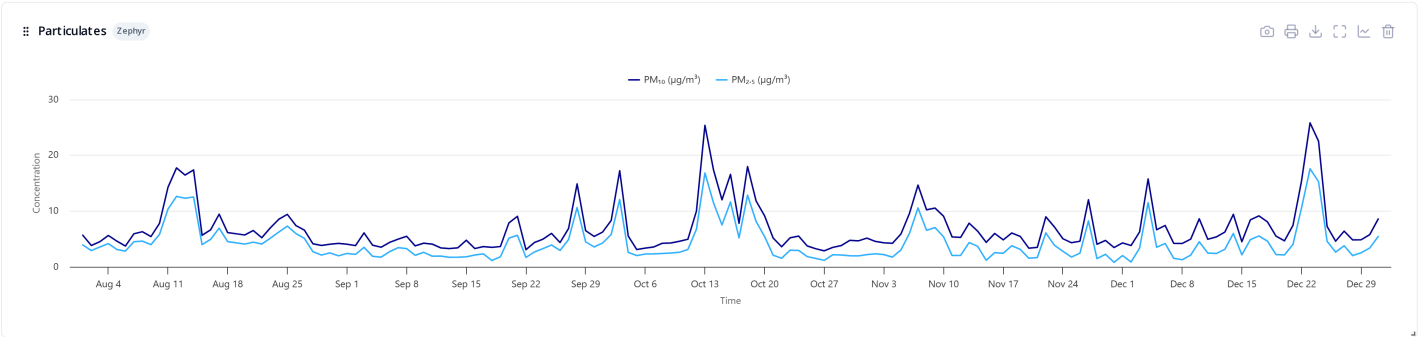
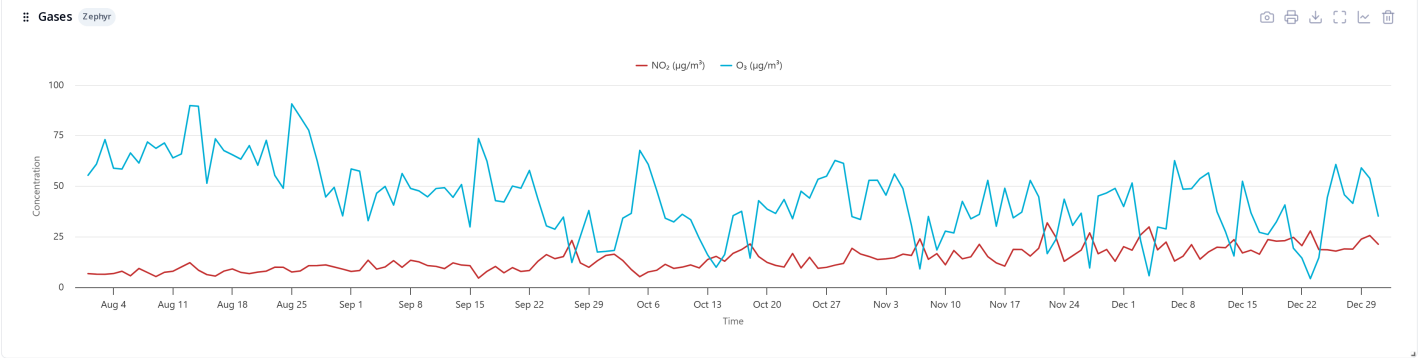
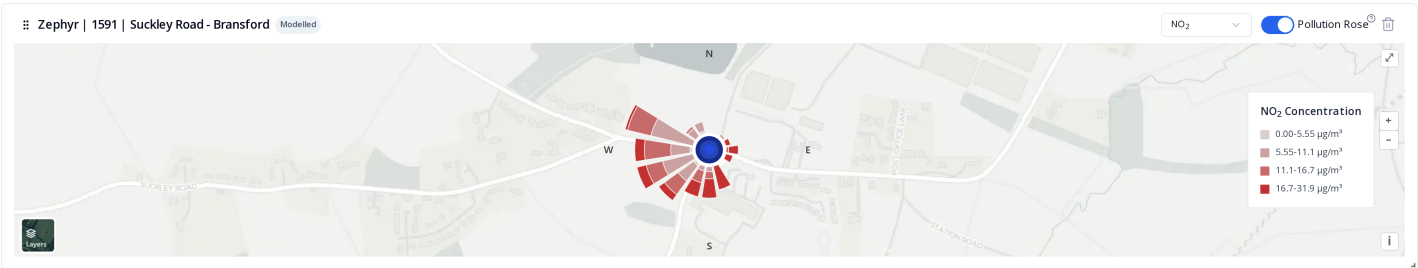


MyAir Analysis Report

Device: Suckley Road - Bransford

Time Period: 1 Aug 2025 - 1 Jan 2026

Time Average: 24 Hour



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
AQS	Air Quality Strategy
ASR	Annual Status Report
AURN	Automatic Urban and Rural Network
Defra	Department for Environment, Food and Rural Affairs
DoPH	Director of Public Health
EV	Electric Vehicles
LAQM	Local Air Quality Management
MHDC	Malvern Hills District Council
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide
WRS	Worcestershire Regulatory Services

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022.
Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022.
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- Air Quality Strategy – Framework for Local Authority Delivery. August 2023.
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- DEFRA Background Mapping for Local Authorities
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- DEFRA Environmental Improvement Plan 2023, January 2023
- Department for Transport The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018
- Worcestershire Regulatory Services (2013) 'Air Quality Action Plan for Worcestershire'
- The Public Health Outcomes Framework