2025 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 2025

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Local Responsibilities and Commitment

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

- Worcestershire Regulatory Services
- Worcester City Council
- Worcestershire County Council Highways Department

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. The DoPH office has requested a copy of the ASR be forwarded for information post publication.

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

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Executive Summary: Air Quality in Our Area

Air Quality in Worcester City

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. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

Due to historic concentration levels of Nitrogen Dioxide (NO_2), the entire Worcester City district has been declared an Air Quality Management Area. Areas of poor air quality within Worcester City district typically coincide with the strategic road network in and around the city centre, in proximity to sensitive residential receptors. Whilst the air quality in outer Worcester falls below the national objective, there are areas in central Worcester where NO_2 concentration levels are significantly higher and at several locations, exceed

the national objective, or have in the past. These generally relate to areas in proximity to The Butts / All Saints Road / Bridge Street strategic road one way system, The Tything (A38) to The Foregate Street corridor, Lowesmoor / Rainbow Hill / Astwood Road (B4850) corridor, St Johns Bull Ring (A44) and London Road (A44).

Like many parts of the UK, poor air quality in Worcester City is linked to areas with high volumes of traffic, congestion and 'street canyon' landscapes (where height of the building is greater than width of road). Worcestershire County Council has responsibility for strategic transport issues in the county and published the fourth Local Transport Plan (LTP4) in 2017.

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.

Air pollution is associated with a variety 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 Environmental Improvement Plan[3] 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 of most harmful to human health. The Air Quality Strategy[4] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

[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. Environmental Improvement Plan 2023, January 2023

[4] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

The Road to Zero[5] 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 (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

On 11th June 2019 Worcester City Council formally declared the Worcester City AQMA (Worcester City (Political Boundary)) which encompasses the whole district area as an AQMA, for likely breach of the nitrogen dioxide annual mean. Prior to 2019, there were 3 separate AQMAs declared in Worcester City district due to exceedances of the annual average objective for nitrogen dioxide (NO_2). Following further assessment, it was concluded that there were several additional areas that should be subject to an AQMA and the decision was made for a district-wide AQMA to be declared.

Worcester City Council AQMAs Variation Order 2019 consolidated the existing 2009 and 2014 AQMAs, as detailed above, into the Worcester City AQMA (Worcester City (Political Boundary)) as of 11th June 2019.

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

The number of NOx tubes within the Worcester City district reduced from 37 to 34 in 2024 with the removal of 3 locations, due to regular recorded data below 75% of the Air Quality Objective. Two locations have been added in late 2024 to provide data for 2025 taking the total number up to 36. The new locations were determined due to local information upon existing and/or anticipated changes in sources of potential air pollution.

During 2024, 9 of the 34 sites recorded a reduction in NO_2 levels from 2023, in contrast to ASR 2023, where 29 of the 37 locations registered a decrease in annual mean NO_2 concentrations between 2022 and 2023. Given the disruptions to travel of 2020/21 due to the COVID-19 pandemic, it is difficult to draw any short-term conclusions from the data. Over the longer period the trend remains downward although during the most recent 5-

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

year period, 2020 to 2024, all of the 34 sites recorded an increase due to the comparison with the height of the covid lockdown period.

The most significant impact upon NO_2 concentration levels of the Covid restrictions, and subsequent cessation of restrictions, is likely to have been caused by the decrease and increase in traffic over the 5-year period. Interim traffic data from County Council indicates traffic increased by approximately 9 - 14% between 2021 – 2022 and returned to 98% of pre-pandemic levels across the County in 2022.

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

In 2024, the highest recorded concentration of NO_2 across Worcester City was 43.9 µg/m^3 at But2 (located in The Butts). This location has recorded the highest concentration across the city for the last 5 years with a measured concentration of 35.9 µg/m^3 in 2021 and 52.43 µg/m^3 in 2018. Two further diffusion tube monitoring locations recorded an exceedance of the AQS objective for annual average NO_2. These were:

- 42.4 µg/m^3 at location Ast3 (Astwood Road, Rainbow Hill), though this is reduced to 30.2 µg/m^3 when calculating back to the nearest relevant receptor.
- 40.6 µg/m^3 at location Fos (Foregate Street), though this is reduced to 33.7 µg/m^3 when calculating back to the nearest relevant receptor

Given the current data and trends recorded in 2024 no amendments to the Worcester City AQMA are proposed at this time.

No annual means greater than 60 µg/m^3 have been recorded indicating that it is very unlikely that there have been any exceedances of the 1-hour mean objective for NO_2 at any diffusion tube monitoring sites.

Key Developments in 2024 are:

Publication of the Worcester City Council Air Quality Action Plan 2024 – 2029 following public and statutory consultation, approved by Defra in December 2024.

Construction of a new walking and cycling bridge across the River Severn in Worcester from Gheluvelt Park to the Kepax site in St John's. The bridge is complete and has been formally opened, increasing the active travel connectivity across the City.

Installation of Electric Vehicle (EV) charge points continues to roll out across the City following the Electric Vehicle Charging Strategy (2023 - 2025): This strategy sets out Worcester City Council's approach to encouraging and accelerating the transition to electric vehicles in the city, Electric Vehicle Charging Strategy 2023-2025.

Progression of a draft Air Quality Supplementary Planning Document (SPD) in collaboration with Malvern Hills District Council and Wychavon District Council and Worcestershire County Council as part of the South Worcestershire Development Plan (SWDP). The SPD is designed to support to improvements in air quality within South Worcestershire through areas of decision and plan making in respect of new development.

Introduction of a bike hire and bike share scheme: Worcester City Council introduced a bike share scheme across Worcester comprising 225 bicycles – 175 e- bikes and 50 pedal bikes – available to hire, from over 50 parking stations across the city. In 2023, the contract to deliver a bike share scheme was awarded to experienced operator Beryl with the scheme launching in June 2024.

Active Travel Action Plan (2023 – 2025): In June 2023 Worcester City Council published their first ever Active Travel plan to increase rates of active travel in Worcester City. The aims are to increase active travel (walking, cycling, and wheeling) and reduce reliance on car journeys, aligning with the national target of 50% of urban journeys being active by 2030. The plan focuses on improving infrastructure, promoting active travel, and encouraging modal shift, with a strong emphasis on collaboration between the City Council, Worcestershire County Council, and other partners.

A local cycling and walking infrastructure plan is in development with consultation timetabled for summer 2025, alongside a number of Local Cycling and Walking Plans in South Worcestershire'

Bus service connectivity between Worcester, Pershore and Evesham has been improved with the X50 /50 service doubled in frequency to half hourly.

City Centre improvements works have been completed on Foregate Street. Phase 5 of improvement works have been completed on Foregate Street and have seen all footway areas upgraded with new natural stone paving and the signalised pedestrian crossing relocated from near Pierpoint Street to outside the rail station. Upgrades have already been completed in Angel Row, Angel Place, St Swithin's Street, Trinity Passage, The Cross, Trinity Street, St Nicholas Street and The Foregate. Final works will see an upgrade to public space on Angel Street, to include a general widening of footway areas. Full

access to the street will be permitted for cyclists and a new loading bay will be introduced from which all deliveries to the street can be made safely.

The planned construction of a new shared use path at Shrub Hill Quarter is expected to get underway shortly as part of an exciting step forward in the regeneration of this key area of Worcester.

Funded by the UK Government and delivered in partnership with Worcester City Council, the new link will significantly improve walking and cycling access in and around Shrub Hill. Designed for both cyclists and pedestrians, this shared use route will provide a safer, more accessible connection between the City Centre and key local destinations, including:

- Worcester Shrub Hill Station
- local bus services
- residential and commercial areas

The goal is to encourage more people to choose sustainable, active travel across the city.

Worcester City Council is reviewing preliminary studies for the long term development of ‘Shrub Hill’ over the next 20 years to provide a further 500 homes with a new gateway into Worcester City centre providing 2 hectares of new public space.

Worcestershire County Council has secured its full allocation from the Government’s Local Electric Vehicle Infrastructure Fund to support the transition to electric vehicles and facilitate charging for owners without off road parking. A procurement exercise is currently underway to secure a charge point operator. The Electric Vehicle Infrastructure Charging Strategy has been finalised following public consultation in 2024 and will be published in summer 2025 supporting the delivery of the charge points funded through Local Electric Vehicle Infrastructure Fund.

Worcester City Council completed the following measures over the course of the year:

- Publication of final AQAP (2024 – 2029) following statutory and public consultation.
- Activation of Public EV charge points in Tallow Hill
- Installation of 10 low-cost sensors in Worcester City providing real time data on a range of air pollutants
- Development and activation of a public access portal allowing access to the real time data to enhance public knowledge and encourage behavioural change.
- Fulfilment of a Behavioural Change Officer (BCO) post at WRS for up to 3 years.

- Implementation of a bike hire and bike share scheme in Worcester City launched in June 2024.

Conclusions and Priorities

The ASR highlights the specific areas (hotspots) in the Worcester City district where NO_2 concentration levels exceed the national objective and should be the focus of future efforts to improve air quality. These are typically in the areas around the city centre, proximal to residential and retail receptors and coinciding with the strategic road network i.e. The Butts / All Saints Road / Bridge Street strategic road one way system, The Tything (A38) to The Foregate Street corridor, Lowesmoor / Rainbow Hill / Astwood Road (B4850) corridor, St Johns Bull Ring (A44) and London Road (A44).

Over the most recent 5-year period (2020-2024), there was a substantial decrease in recorded NO_2 levels during the period of 'lockdowns' caused by the response to Covid-19, a subsequent increase following the end of restrictions and concentrations trends in 2022-2024 similar to pre-pandemic levels.

The entire district is covered by an AQMA, so all exceedances are within the AQMA. There were fewer exceedances of the national objective in 2024, but several exceedances were observed in certain areas highlighted above. In light of this, there is no intention to seek the revocation of the AQMA at this time.

An AQAP has been finalised and published during 2024 and can be found at the following link: Worcester City AQAP

The AQAP will be the focal point of the next steps in the drive to improve air quality across Worcester City. Key priorities for the next reporting year are:

- Progressing the measures within the Worcester City Air Quality Action Plan 2024 – 2029
- Developing a business case to move part or all council fleet to Hydrotreated Vegetable Oil (HVO) during 2025/26 with a report for committee presentation during Summer 2025
- Progressing with consultation (in Autumn 2025) for the proposed amendment to the relevant car parking order to remove HGV parking ahead of 2025/26
- Progressing Active Travel schemes in delivery for 2025 at Ronkswood, Diglis to The Ketch and Power Park (Norton), Diglis to Sixways and Worcester to Kempsey (County Council section)

- Encouraging uptake of the bike hire and bike share scheme in Worcester
- Publication of the Air Quality Supplementary Planning Documents in collaboration with Malvern Hills District Council and Wychavon District Council as part of the South Worcestershire Development Plan (SWDP)
- Continued monitoring of air pollutants at key locations across the district.
- Review and assessment of first calendar year's data from low-cost sensors to inform future projects and strategies to improve air quality across the 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
- Exploring a potential PM2.5 source apportionment study within Worcestershire with the University of Birmingham.
- Improving air quality information and direction to WRS webpages following recommendations of Defra's Air Quality Information Systems review
- Ensure proportionate mitigation measures are included within new developments where air quality is a relevant concern.
- Work with teams from around the county to ensure air quality is considered appropriately within local strategy and policy where appropriate.
- Maintain relationships with neighbouring authorities and institutions to stay abreast of issues and developments that could impact or benefit air quality in Worcester City 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, leave your car at home:** Leaving your car at home and walking or cycling instead will benefit in three ways - increased exercise, reduced pollution exposure and will reduce individual's pollution emissions;
- **Turn off your engine when stationary or parked,** don't 'idle', particularly outside sensitive receptors such as schools, hospitals, care homes and residential properties.
- General travel planning advice is available on Worcestershire County Council's website (including walking, cycling, bus maps and timetables, community transport and travel to school).

- **Hold meetings by Conference Call** by phone or video conference via Teams, Zoom, Skype or Facetime rather than driving to meetings. This reduces fuel and other travel costs, vehicle maintenance and hire cost, increases productivity through reduction in hours lost through unnecessary travel;
- Facilitate **Flexible Working Arrangements** for non-front-line staff to **work remotely from home** or nearer home facilities for one or more days a week thus removing or reducing any journey to work. This reduces congestion which has beneficial impacts for delivery times, reduced business costs and thus economic benefits. Additionally, provides social benefits through improved work life balance for employees, reduces local air quality and reduced emergency vehicle response times.
- **Switch Fleet to Low Emission Vehicles**: The government is currently providing grants for up to 75% of Electric Vehicle (EV) charging points, up to 40 charge points: Workplace Charging Scheme: guidance for applicants - GOV.UK
- 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:

  The AA Driving Advice-The AA - Driving Advice-environment/drive-smart

  Maximise fuel economy through efficient driving - Energy Saving Trust

  How to save fuel - the ultimate guide | RAC Drive
- **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 the impact on their health and air quality from open fires and wood burning stoves. Further information is available on the Smokeless Zones and Public Advice pages on WRS website.

Air pollution can affect all of us over our lifetime, however certain groups will be more sensitive to the effects of air pollution. Vulnerable groups include adults and children with lung or heart conditions such as asthma, chronic bronchitis, emphysema and chronic

obstructive lung disease (COPD)[6,7]. 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: UK AIR
- 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
- WRS real-time air quality monitoring information Earthsense - WRS Real-time Air Quality Monitors
- If you are on social media, sign up to the WRS X (formerly Twitter) feed. WRS tweet when pollution is forecast by Defra to be moderate to very high.

Further information for the general public on reducing your family's exposure to poor air quality in Worcestershire and how individuals, business and schools can assist with reducing their impact on local air quality is available at Protecting Me and Others from Air Pollution | Worcestershire Regulatory Services (worcsregservices.gov.uk)

[6] http://www.breathelondon.org/

[7] https://www.londonair.org.uk/LondonAir/guide/MyActionsForMe.aspx

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Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Worcester City during 2024. 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 Worcester City Council to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

A summary of AQMAs declared by Worcester City Council can be found in Table 2.1. The table presents a description of the AQMA that is currently designated within Worcester City.

Appendix D: Map(s) of Monitoring Locations and AQMAs provides a map of AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation is the NO_2 annual mean concentration.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Worcester City AQMA (Political Boundary)	11th June 2019	NO_2 Annual Mean	AQMA encompasses whole district within political boundary of Worcester City.	NO	55	43.9	Not compliant	Air Quality Action Plan (2024-29) December 2024	Visit the AQAP for Worcester City Worcester City AQAP

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

☒ **Worcester City Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Worcester City

Defra's appraisal of last year's ASR concluded that the report was accepted for all sources and pollutants on the proviso that the grammatical and formatting errors in the report are corrected prior to publication on the council's website. Following the completion of this report, Worcester City Council should submit an Annual Status Report in 2025.

Defra welcomed and appreciated:

- the good quality graphs and maps setting out the trends in recorded NO_2 annual mean concentrations and locations of each monitoring site.
- the in-depth discussion about the measures that WCC are putting into place to improve air quality within their administrative area.
- the ongoing preparation of AQAP which should be continued to be developed and should be published upon completion.

Defra's comments and recommendations from ASR24 have been absorbed into the ASR2025. The AQAP was completed and published in December 2024 and approved by Defra. The revoked AQMAs have been removed from the maps in Appendix B and additional issues raised have been updated to match for consistency and readability.

Worcester City Council has taken forward a number of direct measures during the current reporting year of 2024 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Worcester City district measures are included within Table 2.2, with the type of measure and the progress Worcester City Council have made during the reporting year of 2024 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

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Air Quality Actions Plan and Air Quality Strategy

A new Air Quality Action Plan has been produced by Worcester City Council in accordance with the Environment Act 2021 and revised guidance published in Aug 2022 (LAQM.TG22 and PG22).

A steering group was formed in February 2023 to develop a new AQAP comprising officers from Worcester City Council, Worcestershire County Council and WRS, from public health, technical pollution (air quality), strategic planning, sustainability, highways and transport disciplines, and also representation from the NHS and University of

Worcester. The Steering Group has developed an AQAP incorporating a number of improving actions to reduce NO_2 emissions within the Worcester City (Political Boundary) AQMA, which are summarised in Table 2.2. Full details of the measures and formation of the AQAP process are provided within the WCC Air Quality Action Plan 2024 – 2029, published in December 2024. The AQAP was approved by Defra in December 2024.

Development of an ambitious countywide Air Quality Strategy as reported in the last ASR, has been postponed for 2025. Progress has been delayed until local authority reorganisation, announced by government in Dec 2024, has been completed in Worcestershire. 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, 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.

Real-time Air Quality Monitoring Project

In February 2023, WRS were successful in a bid to the Defra 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 sum of £248,400 was awarded to WRS from the AQ Grant Scheme. An additional 10% of funds was provided by a contribution from each district council in Worcestershire, in accordance with the match-funding requirement of the scheme, which equates to £27,600. This produced a total sum of £276,000 for the project.

The scheme has involved the installation and operation of 26 ‘low-cost Air Quality Monitors’ which measure NO_2, PM_{10}, $PM_{2.5}$ 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 the successful supplier following a rigorous procurement process. The sensors (known as ‘Zephyrs’) are

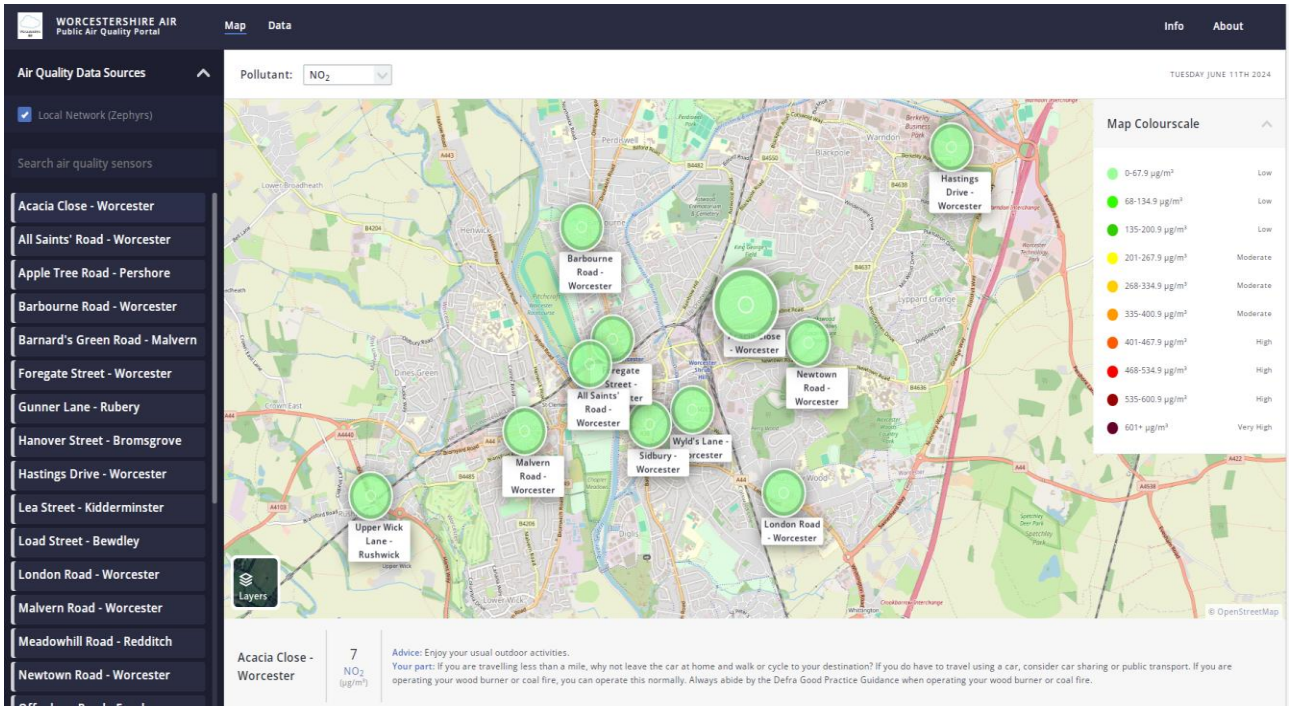
supplied, operated and serviced by Earthsense who also provide data access. Appropriate monitoring locations were determined by WRS in collaboration with Public Health, Worcestershire County Council Street Lighting team and Earthsense taking into consideration the requirements of Worcester City Council.

The locations have been chosen to maximise data capture within locations proximal to vulnerable communities and/or a range of sources of air pollution including transport, solid fuel burning, industry and agriculture.

Ten of the monitors have been deployed within the Worcester City Council area in January 2024. Earthsense and WRS have designed a publicly accessible portal to the real time monitoring data which launched in May 2024.

[Earthsense - WRS Real-time Air Quality Monitors]

Below is an image from the website showing the 10 locations of monitors in Worcestershire. One of the sites visible is not within the Worcester City district.



Worcestershire City Council are collaborating with the Malvern Hills and Wychavon districts to review the South Worcestershire Development Plan, which includes detailed policy to address the impact of air pollution from new development including prioritisation of active travel and corridor improvements. The plan was submitted to the Secretary of State for Department for Levelling Up, Housing and Communities (DLUHC) in September 2023.

Worcester City Council completed the following measures over the course of the year:

- Publication of final AQAP (2024 – 2029) following statutory and public consultation.
- Activation of Public EV charge points in Tallow Hill
- Installation of 10 low-cost sensors in Worcester City providing real time data on a range of air pollutants
- Development and activation of a public access portal allowing access to the real time data to enhance public knowledge and encourage behavioural change.
- Fulfilment of a Behavioural Change Officer (BCO) post at WRS for up to 3 years.
- Implementation of a bike hire and bike share scheme in Worcester City launched in June 2024.

Worcester City Council's priorities for the coming year are:

- Progressing measures within the Air Quality Action Plan.
- Developing a business case to move part or all council fleet to Hydrotreated Vegetable Oil (HVO) during 2025/26 with a report for committee presentation during Summer 2025
- Progressing with consultation (in Autumn 2025) for the proposed amendment to the relevant car parking order to remove HGV parking ahead of 2025/26
- Progressing Active Travel schemes in delivery for 2025 at Ronkswood, Diglis to The Ketch and Power Park (Norton), Diglis to Sixways and Worcester to Kempsey (County Council section)
- Encouraging uptake of the bike hire and bike share scheme in Worcester
- Publication of a draft Air Quality Supplementary Planning Document in collaboration with Malvern Hills District Council and Wychavon District Council.
- Continue monitoring of air pollutants at key locations across the district.
- Review and assessment of first calendar year's data from low-cost sensors to inform future projects and strategies to improve air quality across the 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
- Continue to support the WRS Behavioural Change Officer (BCO) focussing on working with schools and other community settings, providing information and advice about local air quality, and encouraging sustainable behaviours, such as switching from short car journeys to active travel modes of transport.

- Exploring a potential $PM_{2.5}$ source apportionment study within Worcestershire with the University of Birmingham.
- Improving air quality information and direction to WRS webpages following recommendations of Defra's Air Quality Information Systems review
- Ensure proportionate mitigation measures are included within new developments where air quality is a relevant concern.
- Work with teams from around the county to ensure air quality is considered appropriately within local strategy and policy where appropriate.
- Maintain relationships with neighbouring authorities and institutions to stay abreast of issues and developments that could impact or benefit air quality in Worcester City, and to ensure our work is recognised in the wider West Midlands community

The principal challenge and barrier to implementation that Worcester City Council anticipates facing is the availability of funding for potential AQAP measures to improve air quality. It is anticipated the measures outlined above and in Table 2.2 will help to achieve compliance within the lifetime of the AQAP based on assumptions and modelling outcomes outlined in the plan.

Table 2.2 – 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
1	Public EV Charging Points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2023	2024	WCC, City Council	On Street Residential Chargepoint Scheme and council investment	Funded	£50k-£100k	Implementation	30.4%*	Number of vehicles charging / number of new users	Kings car park completed 2023. Tallow Hill due to go operational in July 2024	
2	EV Charging Strategy	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2025	2025	WCC, City Council	LEVI capability fund	Fully Funded	£50k - £100k	Planning	30.4%*	Publication of Strategy	Funding secured	A low risk but change in central govt policy could impact the efficacy of the strategy
3	LEVI Capacity Funding	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2025	2029	WCC, City Council	£3.4m LEVI Fund	Fully Funded (subject to business case process)	>£10million	Planning	30.4%*	Number of EV chargers installed	Funding secured	Public opposition to charge point locations, Cost of deploying chargepoints, contract management etc
4	Air Quality Planning and Policy Guidance	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2025	2025	WCC, City Council, WRS	WCC, South Worcestershire Authorities, WRS	Not funded	£10k - £50k	Planning	30.4%*	Adoption of plan by South Worcestershire Councils	Updated and Final version completed May 2025. Presentation to committees June-Sept	Difficult to determine contribution of future development on improving current air quality concentrations
5	Advisory Signage	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	2025	2030	WCC	Not Yet Identified	To Be Confirmed	£100k-£500k	Planning	8.31%	Scheme delivery monitoring (e.g. City centre HGV counts)	Planning Phase	Funding availability - none currently
6	Countywide AQ Strategy - Behavioural Change Officer Post	Public Information	Via other mechanisms	2024	2026	WRS	S106	Funded	£100k - £500k	Implementation	<3%	Future Stakeholder engagement	Post fulfilled Feb 2024. Has visited 33 primary and secondary schools, undertaken 2 targeted surveys, worked directly with 11 schools across the county delivering assemblies, participation in number of events and festivals, developed AQ toolkit for schools.	
7	Countywide AQ Strategy - Encouraging awareness via Public Portal of real time monitoring data	Public Information	Via the Internet	2024	2027	WRS, Earthsense, WCC, District Councils	Defra, Districts	Fully Funded	£100k - £500k	Completed	<3%	Number of website hits on public portal	Monitors deployed Jan 2024, Public Portal available May 2024. 2000 hits from 400 users in 2024. Promotion in schools, events and campaign for CAD2025	
8	Countywide AQ Strategy - Encouraging awareness and behavioural change interventions linked to focussed real	Public Information	Via other mechanisms	2024	2027	WRS, WCC, District Councils	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	Public baseline survey followed by 2 targeted surveys with HoW college and 18 local schools in 2024. School assemblies and visits to care homes in London Road and other parts	

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
	time monitoring data												of strategic network. Presented at Global Bike Bus Summit Apr25, developed toolkit for primary schools with UoW.	
9	Bike hire and bike share	Transport Planning and Infrastructure	Public cycle hire scheme	2024	2029	City Council, WCC	Towns Fund	Fully Funded	£500k - £1 million	Implementation	<1%	Number of journeys / number of journeys replacing vehicle use	Supplier secured, Implementation Stage	4 year minimum contract, intended to be financially sustainable after the upfront capital funding
10	Bus fleet improvements (local bus services)	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2026	2029	Bus Operators,WCC,WRS	Not Yet Identified	To Be Confirmed	£1 million-£10million	Planning	14.66%	% of bus fleet Euro 6	Enhanced Partnership (EP) with bus operators formalised and published March 2025	Funding availability, Operator Agreement
11	Travel Choices	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2025	2030	WCC incl Public Health/ City Council, key stakeholders - schools, UoW	Not Yet Identified	To Be Confirmed	£500k-£1million	Planning	<3%	Number of walking, cycling, scooting and number of participating organisations and activities delivered	Planning Phase	Funding availability
12	Active Travel Guides for business	Promoting Travel Alternatives	Other	2025	2027	WCC, City Council	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
13	Countywide AQ Strategy - Raising awareness events	Public Information	Other	2023	Ongoing	WCC Public Health, WRS	Not yet identified	To be confirmed	£10k-50k	Implementation	<0.2%	Support minimum of 3 national events. Number of events attended. Number of people engaged	Heart of Worcestershire College community event and Welcome to University of Worcester in 2024, Global Bike Bus Summit Apr 2025, WRS campaign for CAD 06/2025	Reduced PH resource to support.
14	Countywide AQ Strategy - Communications Plan	Policy Guidance and Development Control	Other	2025	Ongoing	WCC Public Health, WRS	Not yet identified	To be confirmed	£10k-50k	Planning	<0.2%	Production of communication plan	Significant update to AQ info on WRS website June 2025 following AQIS review	Reduced resource to pursue a formal strategy in 2025. Delayed until outcome of LA reorganisation
15	Worcester Local Cycling and Walking Infrastructure Plan (Development)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2025	2025	WCC incl Public Heatlh/City Council/key stakeholders, Active Travel England	WCC, Active Travel England	Fully funded	£50k-£100k	Planning	<0.2%	LCWIP completed by March 2025	Planning Phase	subject to public engagement July-Sept 2025
16	Travel to school	Promoting Travel Alternatives	School Travel Plans	2025	2030	WCC incl Public Health/City Council/Schools & Colleges	Not Yet Identified	To Be Confirmed	£100k-£500k	Planning	<1%	Number of walking, cycling, scooting, car, and park & stride trips; Number of participating schools and of activities delivered	Planning Phase	Funding availability - none currently
17	Worcester City Vehicle Fleet Upgrade - Refuse Collection Vehicle	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2024	2029	City Council	City Council	Funded	£100k-£500k	Implementation	<1%	Replacement of vehicles	Rolling replacement programme	

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
18	Additional cycle parking / storage	Promoting Travel Alternatives	Promotion of Cycling	2026	2026	City Council	Not yet identified	To be confirmed	£100k-£500k	Planning	<0.2%	Number of new secure bike parking spaces provided	Planning	Funding and site availability, responsibility for ongoing maintenance
19	Bus stop infrastructure – bus shelter provision	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	2025	2030	WCC, Bus operators	Not Yet Identified	To Be Confirmed	£500k-£1million	Planning	<0.2%	Bus patronage (passenger demand)	Planning Phase	Funding availability
20	Worcester Local Cycling and Walking Infrastructure Plan (Scheme Delivery)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2025	2035	WCC incl Public Heatlh/City Council/key stakeholders, Active Travel England	Active Travel England	To Be Confirmed	>£10million	Planning	<3%	Scheme delivery monitoring (e.g. cycle counts)	Planning Phase	Funding availability
21	Remove City Centre HGV Parking	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	2025	2026	City Council	Not Funded	Not funded	£10k - £50k	Planning	<0.2%	Removal of Parking	Planning Phase	
22	Anti Idling awareness for Taxis	Traffic Management	Anti-idling enforcement	2025	Ongoing	City Council, WRS	Not Funded	Not funded	£10k - £50k	Planning	<0.2%	Reduction in penalty points issued	Included as specific penalty point in Taxi Policy	

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 Strategy[8], 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.

There were no automatic $PM_{2.5}$ monitoring stations in Worcestershire in 2024 that are recognised by Defra for measuring against ambient air quality directives. The nearest AURN $PM_{2.5}$ monitoring station is the Birmingham Ladywood site approximately 46 kilometres to the north-east of Worcester City. However, WRS have assisted the Defra AURN expansion project team with locations for two $PM_{2.5}$ monitors in Worcestershire, including one within Worcester City district. A new AURN site in the Tolladine area of Worcester is operational as of April 2025.

WRS has reviewed the DEFRA national background maps to determine projected $PM_{2.5}$ concentrations across Worcester City area for the 2024 calendar year. The annual average total $PM_{2.5}$ at 32 locations (centre points of 1km x 1km grids) across Worcester City is 6.66 (2023 – 6.72) µg/m^3, with a minimum concentration of 6.32 (2023 – 6.38) µg/m^3 and a maximum concentration of 7.17 (2023 – 7.26) µg/m^3. This indicates that $PM_{2.5}$ concentrations within the Worcester City are generally below the annual average limit value for $PM_{2.5}$ target of 10µg/m^3 to be met across England by 2040.

Following the success of the bid for funding from the Defra Air Quality Grant 2022/23, ten low-cost sensors offering publicly accessible real time monitoring data were deployed within the Worcester City Council area in 2024. The sensors, known as ‘Zephyrs’ provide data on a range of pollutants including PM_1, $PM_{2.5}$ and PM_{10}. Graphical results for 2024 are shown in the appendices and $PM_{2.5}$ averages for 2024 are summarised in table below:

[8] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

Location	2024 average $PM_{2.5}$ ($\mu g/m^3$)	Installation
All Saints Road	6.88	January 2024
Barbourne Road	7.23	January 2024
Foregate Street	7.72	January 2024
Hastings Drive	6.70	January 2024
London Road	6.55	January 2024
Malvern Road	6.83	January 2024
Newtown Road	6.57	January 2024
Rose Avenue	7.05	January 2024
Sidbury	7.12	January 2024
Wylds Lane	6.54	January 2024

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 Bromsgrove 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	2040

WRS has reviewed the fraction of mortality attributable to particulate air pollution (indicator D01) as published by Public Health England as part of the Public Health Outcomes Framework. The fraction of mortality attributable to particulate emissions in Worcester City in April 2023 (the most recent year available) was 4.3% for WCC. This falls below the national figure for England (5.2% in 2023) and below the figure for the West Midlands region (5.1% in 2023). Recent trend data is not available for the district due to a lack of data points with valid values.

The Public Health Outcomes Framework examines statistics and indicators that helps explain trends in public health. More information can be found at: Public Health Outcomes Framework - PHE

The whole district area of Worcester City Council is a Smoke Control Area. More information, maps and guides on the type of fuels that can be used can be found at:

Smoke Control Areas | Worcestershire Regulatory Services (worcsregservices.gov.uk)

WRS hold 5 records of complaints of nuisance from smoke attributable to wood burning stoves in residential developments in Worcester City in 2024 which were either unsubstantiated, not pursued or advice was offered.

In light of the above, no additional actions are currently planned by Worcester City in relation to the reduction of $PM_{2.5}$ levels. However, it is anticipated that any actions taken to improve NO_2 levels across the District as part of the updated Worcester City AQAP will likely result in a linked improvement in $PM_{2.5}$ levels. The Worcester City Council AQAP was published in 2024. It is expected that the investment in real-time monitoring of air quality (including particulate matter) by the new sensors will further inform the decision process of future reviews of local air quality.

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

This section sets out the monitoring undertaken within 2024 by Worcester City Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2020 and 2024 to allow monitoring trends to be identified and discussed.

Trend graphs are provided in the appendices below, Appendix A: Monitoring Results

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Worcester City Council did not undertake any automatic (continuous) monitoring that are recognised by Defra for measuring against ambient air quality directives during 2024

3.1.2 Non-Automatic Monitoring Sites

Worcester City Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 34 sites during 2024. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.3 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2024 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.

The number of NOx tubes within the Worcester City district reduced from 37 to 34 in 2024 with the removal of 3 locations, due to regular recorded data below 75% of the Air Quality Objective and sufficient historic dataset. Two locations have been added in late 2024 to provide data for 2025 taking the total number up to 36. The new locations were determined due to local information upon existing and/or anticipated changes in sources of potential air pollution. The data collected during the past 5 years includes 2020/21, a period impacted by significant disruption to everyday life caused by restrictions and lockdowns affecting social and commercial activity imposed due to Covid-19. The data collected during this period shows an exaggerated reduction in levels of NO_2 greater than would have been expected and is highlighted by the subsequent increase in the following year's data. It appears that the trend in recent history of a small but steady decline in NO_2 concentration levels, over the longer term, has resumed.

Monitoring data shows an overall increase in average recorded annual mean NO_2 concentrations of 0.53 µg/m^3 (3.2%) between 2023 (30.49 µg/m^3) and 2024 (31.02 µg/m3) across the Worcester City area compared to a 1.01 µg/m^3 decrease between 2022 and 2023.

During 2024, 9 of the 34 sites recorded a reduction in NO_2 levels from 2023, in contrast to ASR 2023, where 29 of the 37 locations registered a decrease in annual mean NO_2 concentrations between 2022 and 2023. Given the disruptions of 2020/21, it is difficult to draw any short-term conclusions from the data. Over the longer period the trend remains downward although during the most recent 5-year period, 2020 to 2024, all of the 34 sites recorded an increase due to the comparison with the height of the covid lockdown period.

The most significant impact upon NO_2 concentration levels of the Covid restrictions, and subsequent cessation of restrictions, is likely to have been caused by the decrease and increase in traffic over the 5-year period. Interim traffic data from County Council indicates traffic increased by approximately 9 - 14% between 2021 – 2022 and returned to 98% of pre-pandemic levels across the County by the beginning of 2023.

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

In 2024, the highest recorded concentration of NO_2 across Worcester City was 43.9 µg/m^3 at But2 (located in The Butts). This location has recorded the highest concentration across the city for the last 5 years with a measured concentration of 35.9 µg/m^3 in 2021 and 52.43 µg/m^3 in 2018. Two further diffusion tube monitoring locations recorded an exceedance of the AQS objective for annual average NO_2. These were:

- 42.4 µg/m^3 at location Ast3 (Astwood Road, Rainbow Hill), though this is reduced to 30.2 µg/m^3 when calculating back to the nearest relevant receptor.
- 40.6 µg/m^3 at location Fos (Foregate Street), though this is reduced to 33.7 µg/m^3 when calculating back to the nearest relevant receptor

A further 6 diffusion tube monitoring locations recorded concentrations within -10% of the AQS objective for annual average NO_2, although only 2 locations (Bkc at Berkeley Court and GS at George Street) recorded concentrations above 36 µg/m^3 when calculating back to the nearest relevant receptor. All concentrations are shown in Table B.1.

Given the current data and trends recorded in 2024 no amendments to the Worcester City AQMA are proposed at this time.

No annual means greater than 60 µg/m^3 have been recorded indicating that it is very unlikely that there have been any exceedances of the 1-hour mean objective for NO_2 at any diffusion tube monitoring sites.

3.2.2 Particulate Matter (PM_{10})

There were no automatic PM_{10} monitoring stations within Worcester City in 2024 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 Worcester City in 2024 that are recognised by Defra for measuring against ambient air quality directives.

3.2.4 Sulphur Dioxide (SO_2)

Worcester City Council does not undertake SO_2 monitoring.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

This is not available for Worcester City Council

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)
But1	Magdala Court, The Butts, WR1 3PB	Roadside	384776	255107	NO_2	Worcester City AQMA	0.0	1.2	No	2.5
But2	Magdala Court, The Butts, WR1 3PB	Roadside	384724	255086	NO_2	Worcester City AQMA	0.0	1.7	No	2.4
Dd1	Ambirak, Dolday 1 (opp Bus Station), WR1 3PL	Roadside	384652	254986	NO_2	Worcester City AQMA	0.0	2.2	No	2.2
DDASH	All Saints House, WR1 3NX	Roadside	384682	254924	NO_2	Worcester City AQMA	2.0	2.3	No	2.1
BrS	Bridge Street, John Gwen House, WR1 3NJ	Kerbside	384666	254818	NO_2	Worcester City AQMA	2.0	0.7	No	2.2
BrS2	Bridge Street, WR1 3NJ	Roadside	384695	254840	NO_2	Worcester City AQMA	1.0	2.0	No	2.1
Tyn3	No. 26 Upper Tything, WR1 1HT	Roadside	384679	255998	NO_2	Worcester City AQMA	0.1	2.0	No	2.2
Tyn2	Lamp & Flag PH Upper Tything (LP) 934, WR1 1JL	Roadside	384767	255606	NO_2	Worcester City AQMA	2.6	2.3	No	2.2

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
Tyn	925 - HAMMERCHILDS, Upper Tything, WR1 1JT	Roadside	384833	255461	NO_2	Worcester City AQMA	2.1	1.6	No	2.2
Fos2	Hewitt Recruitment, 35 Foregate Street, WR1 1EE	Roadside	384866	255367	NO_2	Worcester City AQMA	3.5	3.2	No	2.1
Fos3	Café Mela, 22 Foregate Street, WR1 1DN	Roadside	384899	255329	NO_2	Worcester City AQMA	2.4	2.2	No	2.5
Fos	Foregate Street junction with Shaw Street, WR1 1EB	Kerbside	384941	255140	NO_2	Worcester City AQMA	1.9	1.0	No	2.5
Crs1	29 The Cross, WR1 3PZ	Roadside	384967	255012	NO_2	Worcester City AQMA	3.6	3.4	No	2.2
Swth1	St. Swithin's Street, WR1 2PS	Roadside	385013	254987	NO_2	Worcester City AQMA	2.5	2.1	No	2.2
Lwm2	Lowesmoor 2 (City Walls Road end), WR1 2SG	Roadside	385164	255134	NO_2	Worcester City AQMA	2.1	1.9	No	2.5
Lwm1	Lowesmoor 1 Rainbow Hill End, WR1 2SE	Roadside	385268	255191	NO_2	Worcester City AQMA	1.7	1.4	No	2.6
StJ1	1A St. Johns, WR2 5AE	Roadside	384137	254510	NO_2	Worcester City AQMA	3.1	2.7	No	2.0
Brm	10 Bromyard Road, WR2 5BS	Roadside	383967	254481	NO_2	Worcester City AQMA	0.0	8.8	No	1.9
KCP	King Charles Place, WR2 5AJ	Roadside	384016	254399	NO_2	Worcester City AQMA	2.6	2.2	No	2.1
StJ2	The Fortune House, 65 St. Johns, WR2 5AG	Roadside	384013	254356	NO_2	Worcester City AQMA	2.7	2.2	No	2.0
StJ3	The Bell, 35 St. Johns, WR2 5AG	Roadside	384046	254424	NO_2	Worcester City AQMA	2.6	2.1	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
McI	McIntyre Road, WR2 5LQ	Suburban	383454	254606	NO_2	Worcester City AQMA	4.5	1.2	No	2.3
Ast4	246 Astwood Road, WR3 8HD	Roadside	386097	256565	NO_2	Worcester City AQMA	0.0	9.9	No	2.0
Ast3	Astwood Road 3 Rainbow Hill, WR3 8NL	Roadside	385764	255968	NO_2	Worcester City AQMA	6.6	1.7	No	2.3
OAK	22 Oaklands, WR5 1SL	Roadside	387810	254993	NO_2	Worcester City AQMA	0.0	7.0	No	1.9
LRW	London Road Waitrose, WR5 2JN	Kerbside	386654	253761	NO_2	Worcester City AQMA	4.0	0.5	No	1.9
LR2	London Road Royal Court LP 6561, WR5 2DL	Roadside	385428	254238	NO_2	Worcester City AQMA	3.0	1.5	No	2.2
LR3	London Road Commandery Road Junction, WR5 2DL	Roadside	385357	254272	NO_2	Worcester City AQMA	0.5	1.8	No	2.3
LR5	London Road Bus stop SL6554 opp Bath Road, WR5 2DH	Roadside	385325	254329	NO_2	Worcester City AQMA	0.3	1.5	No	2.2
LR4	London Road SL6565 adj No 61, WR5 2DS	Roadside	385525	254219	NO_2	Worcester City AQMA	3.1	1.9	No	2.1
SIDFG	Sidbury Street o/s Fisher German Estate Agents, WR1 2LS	Roadside	385146	254474	NO_2	Worcester City AQMA	6.2	2.3	No	2.2
RH	Nursery Rainbow Hill LP5196, WR3 8LX	Roadside	385420	255413	NO_2	Worcester City AQMA	7.8	1.5	No	2.4
Bkc	Berkeley Court, Foregate Street, Worcester, WR1 3QF	Roadside	384948	255111	NO_2	Worcester City AQMA	0.2	4.1	No	2.5
GS	54 George Street Worcester WR1 2DY	Roadside	385358	254969	NO_2	Worcester City AQMA	0.0	2.0	No	2.3

Notes:

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

(2) N/A if not applicable.

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
But1	384776	255107	Roadside	100.0	100.0	27.3	31.0	35.7	35.0	35.6
But2	384724	255086	Roadside	90.6	90.6	35.9	39.1	**43.9**	**44.3**	**43.9**
Dd1	384652	254986	Roadside	84.9	84.9	23.2	25.3	29.9	29.8	30.7
DDASH	384682	254924	Roadside	92.5	92.5	29.0	30.5	35.9	34.3	35.6
BrS	384666	254818	Kerbside	100.0	100.0	24.9	29.4	31.7	31.4	31.9
BrS2	384695	254840	Roadside	100.0	100.0	35.6	33.8	39.1	37.1	36.6
Tyn3	384679	255998	Roadside	92.5	92.5	23.4	26.2	31.0	28.6	27.4
Tyn2	384767	255606	Roadside	100.0	100.0	31.3	34.6	38.8	37.6	38.2
Tyn	384833	255461	Roadside	100.0	100.0	31.1	34.3	38.7	36.8	38.3
Fos2	384866	255367	Roadside	100.0	100.0	22.8	25.6	30.0	26.8	28.5
Fos3	384899	255329	Roadside	83.0	83.0	21.3	24.3	29.4	27.3	26.4
Fos	384941	255140	Kerbside	100.0	100.0	27.5	33.1	37.6	35.6	**40.6**

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
Crs1	384967	255012	Roadside	100.0	100.0	22.0	22.9	26.2	25.6	27.1
Swth1	385013	254987	Roadside	100.0	100.0	17.8	19.0	21.5	21.3	23.1
Lwm2	385164	255134	Roadside	100.0	100.0	23.1	24.5	29.2	28.0	28.4
Lwm1	385268	255191	Roadside	92.5	92.5	31.8	31.6	36.2	35.8	36.2
StJ1	384137	254510	Roadside	100.0	100.0	22.7	28.0	34.6	34.5	34.7
Brm	383967	254481	Roadside	92.5	92.5	19.1	22.0	24.9	25.0	26.5
KCP	384016	254399	Roadside	100.0	100.0	22.0	24.5	28.1	27.4	27.5
StJ2	384013	254356	Roadside	100.0	100.0	17.5	21.1	24.8	25.1	24.4
StJ3	384046	254424	Roadside	100.0	100.0	19.9	25.0	29.2	28.0	28.9
Mcl	383454	254606	Suburban	83.0	83.0	10.1	12.7	10.9	11.1	11.7
Ast4	386097	256565	Roadside	90.6	90.6	16.9	19.8	21.3	22.1	21.1
Ast3	385764	255968	Roadside	92.5	92.5	31.3	38.1	**41.5**	**42.2**	**42.4**
OAK	387810	254993	Roadside	100.0	100.0	13.1	13.1	15.6	15.2	14.5

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 2024 (%) (2)	2020	2021	2022	2023	2024
LRW	386654	253761	Kerbside	90.6	90.6	25.0	30.4	34.5	33.1	33.5
LR2	385428	254238	Roadside	100.0	100.0	25.1	32.3	32.5	31.0	31.4
LR3	385357	254272	Roadside	100.0	100.0	26.5	31.0	34.0	32.0	32.6
LR5	385325	254329	Roadside	100.0	100.0	27.5	30.5	33.2	30.4	31.7
LR4	385525	254219	Roadside	100.0	100.0	24.7	27.8	32.4	28.9	28.3
SIDFG	385146	254474	Roadside	83.0	83.0	25.9	29.7	35.6	33.6	34.1
RH	385420	255413	Roadside	90.6	90.6	21.6	27.8	30.5	28.2	29.5
Bkc	384948	255111	Roadside	100.0	100.0	29.4	32.9	38.8	36.0	37.5
GS	385358	254969	Roadside	100.0	100.0	29.4	32.5	38.3	37.6	36.1

☐ **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 µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.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 NO_2 Concentrations for Worcester City District

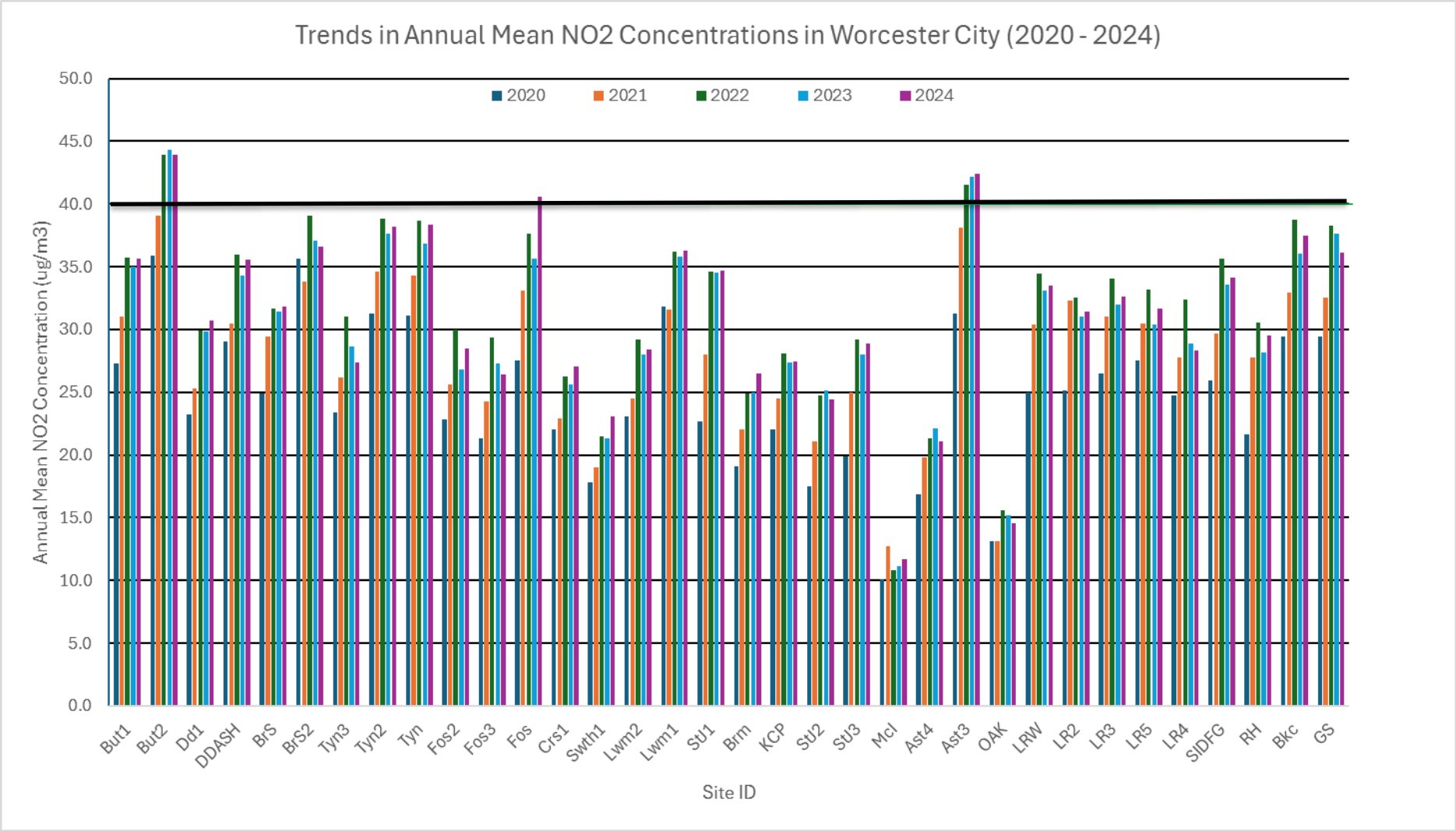
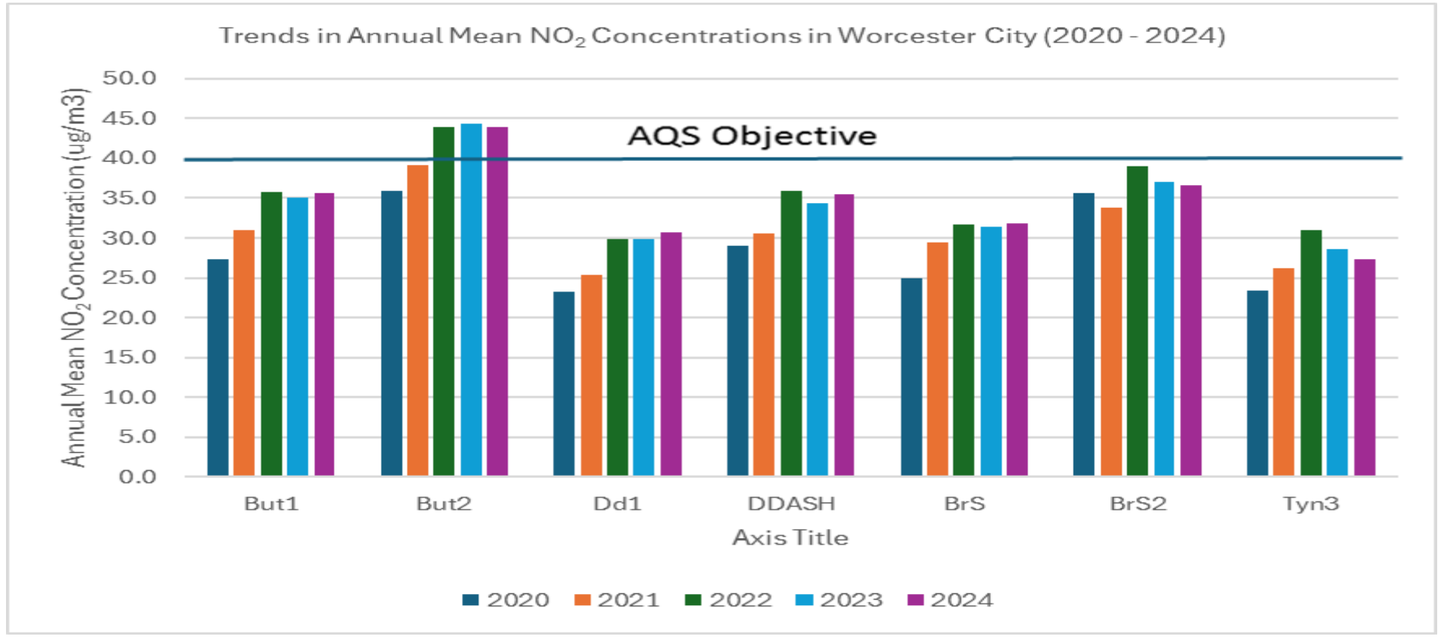
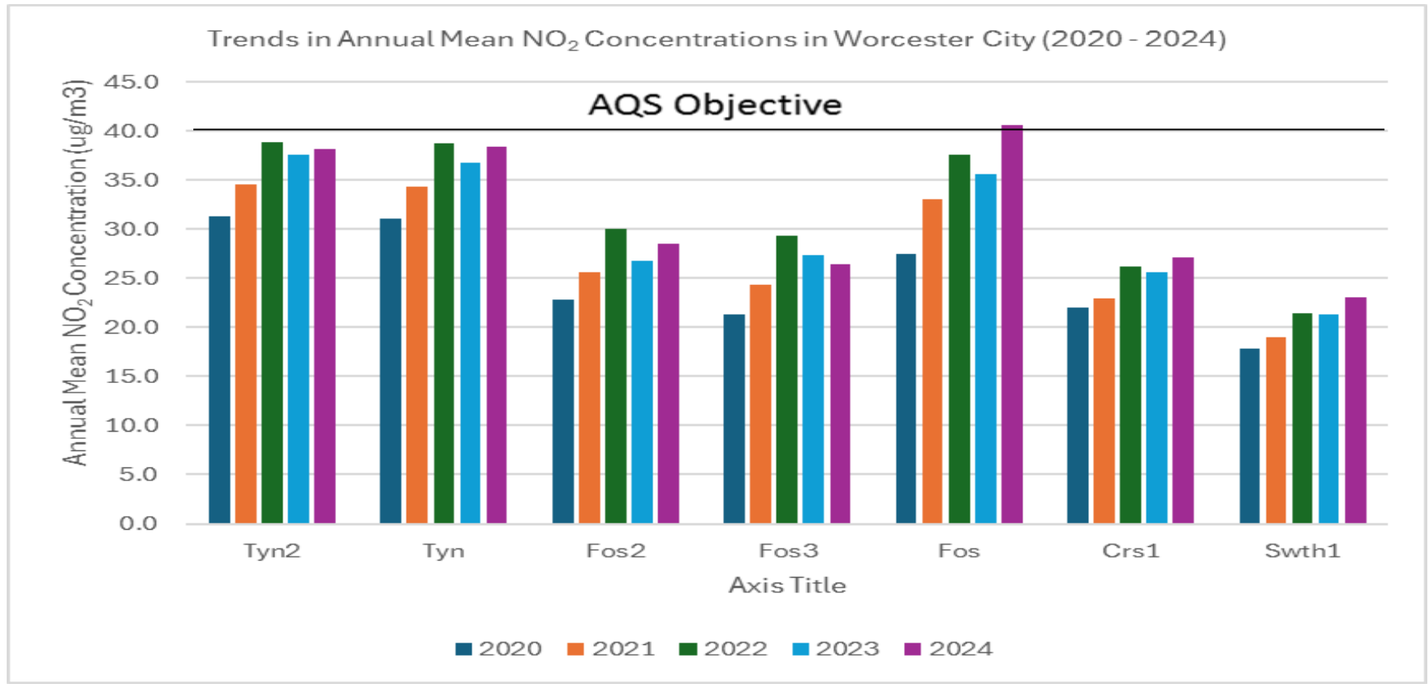
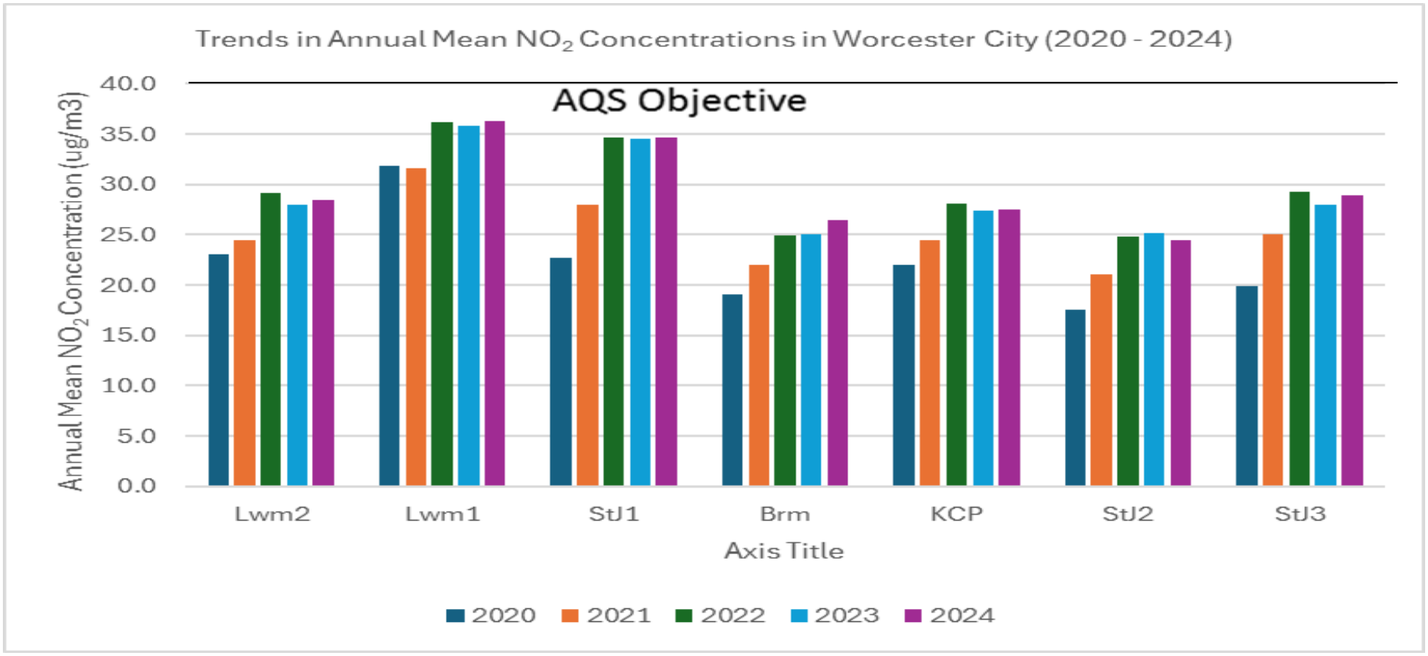
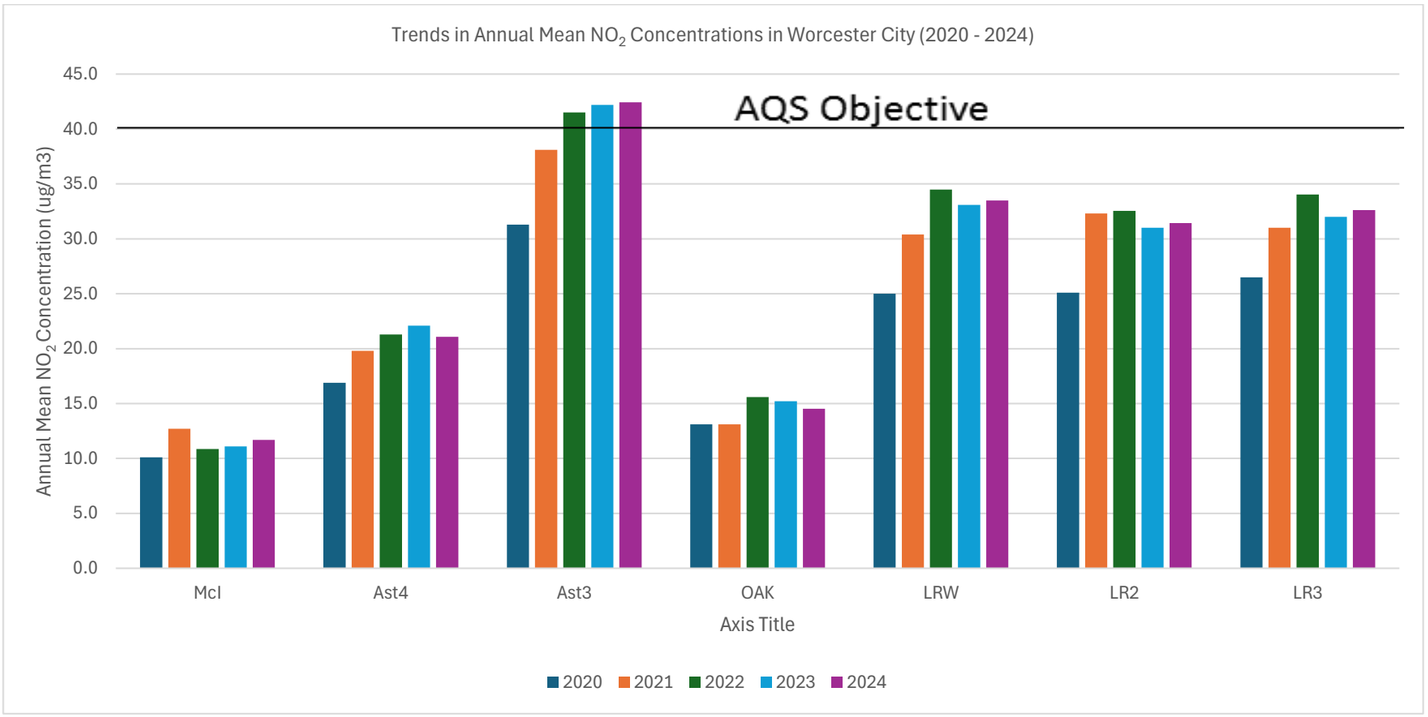


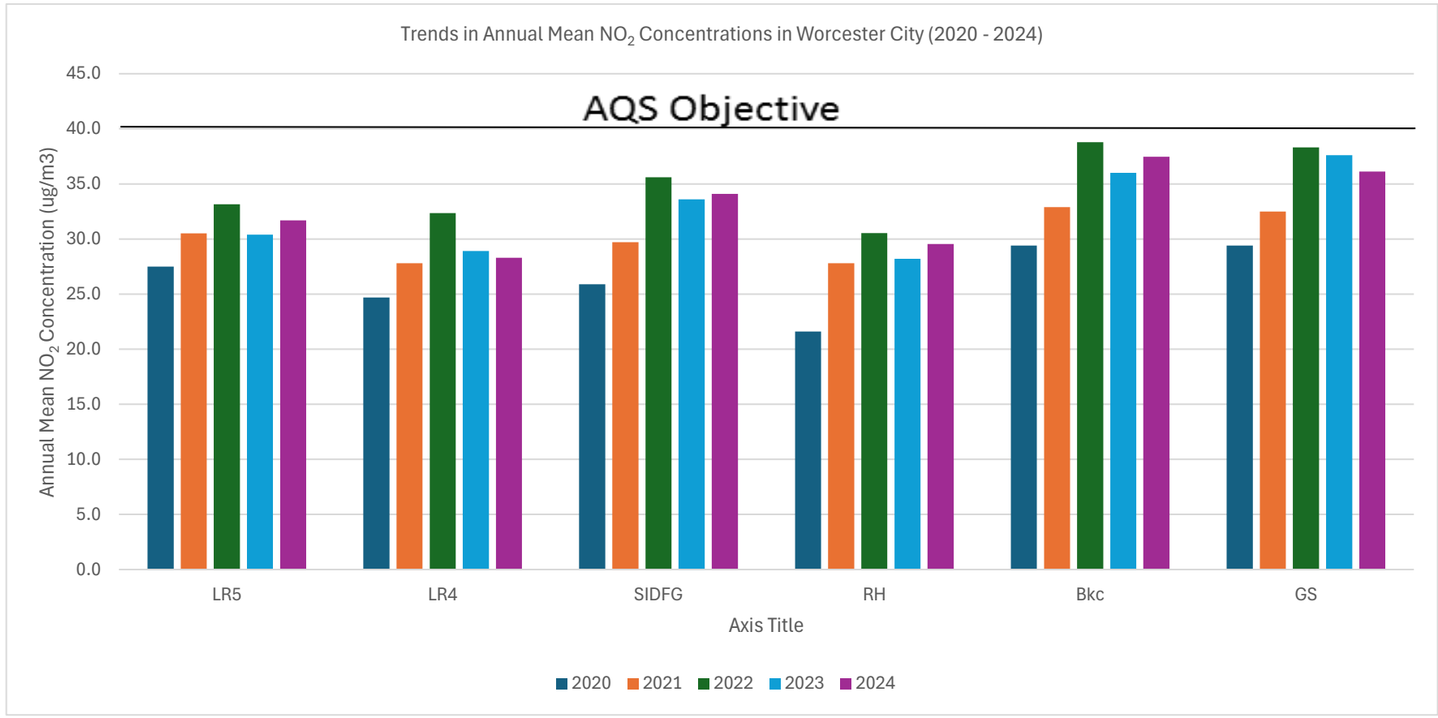
Figure A.2 – Trends in Annual Mean NO_2 Concentrations by regions






Trends in Annual Mean NO2 Concentrations in Worcester City (2020 - 2024)
AQS Objective
Annual Mean NO2 Concentration (ug/m3)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Lwm2
Lwm1
StJ1
Brm
KCP
StJ2
StJ3
Axis Title
2020
2021
2022
2023
2024


Trends in Annual Mean NO2 Concentrations in Worcester City (2020 - 2024)
AQS Objective
Annual Mean NO2 Concentration (ug/m3)
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
McI
Ast4
Ast3
OAK
LRW
LR2
LR3
Axis Title
2020
2021
2022
2023
2024


Trends in Annual Mean NO2 Concentrations in Worcester City (2020 - 2024)
AQS Objective
Annual Mean NO2 Concentration (ug/m3)
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
LR5
LR4
SIDFG
RH
Bkc
GS
Axis Title
2020
2021
2022
2023
2024

Appendix B: Full Monthly Diffusion Tube Results for 2024

Table B.1 – NO_2 2024 Diffusion Tube Results (µg/m^3)

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 1.03	Annual Mean: Distance Corrected to Nearest Exposure	Comment
But1	384776	255107	31.8	33.9	34.5	36.8	35.8	32.7	32.4	31.3	38.1	33.7	**41.6**	32.2	34.6	35.6		
But2	384724	255086	**41.5**	**43.6**	**43.8**	**50.7**	**43.4**	**42.3**	**42.9**	36.9	**44.4**	**43.1**	35.6		**42.6**	**43.9**		
Dd1	384652	254986	30.6	27.7	29.8	29.0	32.4		26.9	24.7	37.5	31.1		28.1	29.8	30.7		
DDASH	384682	254924	33.9	39.5	35.3	33.7	36.1	30.9	29.6	32.3	33.0	39.8		35.1	34.5	35.6		
BrS	384666	254818	32.6	29.9	26.3	30.7	32.7	25.2	26.7	24.2	**41.0**	33.7	37.1	30.9	30.9	31.9		
BrS2	384695	254840	35.0	**40.7**	34.8	33.6	38.9	29.5	30.3	30.0	38.5	**41.4**	38.8	34.3	35.5	36.6	33.9	
Tyn3	384679	255998	29.1	28.4	29.2		25.1	18.2	22.2	19.0	29.6	36.2	28.7	26.1	26.5	27.4		
Tyn2	384767	255606	39.4	**41.1**	38.3	35.5	35.9	33.6	32.0	32.6	36.9	39.3	**42.7**	37.4	37.0	38.2	32.7	
Tyn	384833	255461	**40.4**	**40.5**	38.0	38.5	35.0	35.7	33.0	33.9	37.1	39.9	39.9	34.4	37.2	38.3	32.9	
Fos2	384866	255367	29.1	30.3	28.7	28.0	24.9	22.1	24.2	23.0	23.2	33.0	35.2	29.8	27.6	28.5		
Fos3	384899	255329	28.6	28.7	27.5	25.5	25.0	18.1	21.6	20.6	25.8	34.8			25.6	26.4		
Fos	384941	255140	39.7	32.5	33.1	34.0	35.7	**41.4**	**42.0**	37.9	**45.8**	**42.1**	**48.1**	**40.3**	39.4	**40.6**	33.7	
Crs1	384967	255012	31.1	28.7	25.0	25.5	24.4	21.0	22.1	22.5	26.4	26.0	33.9	28.5	26.3	27.1		
Swth1	385013	254987	27.2	23.6	24.1	20.5	21.8	15.1	16.1	18.0	23.7	25.6	29.8	23.1	22.4	23.1		
Lwm2	385164	255134	32.1	29.5	28.5	24.4	26.0	20.9	22.8	22.0	30.4	32.1	33.3	28.4	27.5	28.4		
Lwm1	385268	255191	38.2	38.0	33.9	33.0	35.2	32.9	31.8	33.0		35.3	39.3	36.0	35.2	36.2	31.5	
StJ1	384137	254510	35.9	39.7	37.9	32.4	32.3	31.1	30.5	34.2	26.9	36.2	35.3	31.3	33.6	34.7		
Brm	383967	254481	32.8	32.0	28.4	21.2	21.7	17.3	19.9	20.9		28.0	28.0	32.6	25.7	26.5		
KCP	384016	254399	29.9	26.5	26.4	24.9	25.0	23.6	22.4	24.0	27.1	28.9	32.4	28.5	26.6	27.5		
StJ2	384013	254356	27.0	22.1	24.5	21.1	23.4	17.7	19.5	20.0	25.1	29.3	31.7	23.4	23.7	24.4		
StJ3	384046	254424	28.8	23.7	30.2	25.8	28.8	22.3	24.7	24.8	29.8	38.2	31.8	27.0	28.0	28.9		
McI	383454	254606	15.8	14.0	12.7			4.9	7.2	7.6	8.6	15.0	17.0	10.5	11.3	11.7		
Ast4	386097	256565	27.9	24.1	20.2	16.2		14.3	15.6	15.5	20.4	24.7	25.6	20.4	20.5	21.1		
Ast3	385764	255968	**46.8**	**43.4**	**40.3**	37.4	38.1	32.6		38.3	**42.8**	**44.9**	**47.9**	**40.3**	**41.2**	**42.4**	30.2	
OAK	387810	254993	18.5	17.9	14.3	11.2	12.4	9.3	10.6	10.4	11.6	18.4	18.6	15.9	14.1	14.5		
LRW	386654	253761	35.7	33.3	31.0	32.2	35.8	29.7	28.4	27.9	35.0	33.6	34.7		32.5	33.5		
LR2	385428	254238	32.3	33.5	31.1	28.3	28.9	26.9	26.5	26.8	31.6	34.2	35.0	31.0	30.5	31.4		
LR3	385357	254272	33.6	33.9	31.5	28.7	31.0	25.2	27.8	26.4	32.0	37.9	**40.0**	31.5	31.6	32.6		

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 1.03	Annual Mean: Distance Corrected to Nearest Exposure	Comment
LR5	385325	254329	34.7	27.8	28.3	28.0	33.0	23.8	26.6	22.8	38.3	37.2	38.2	30.2	30.7	31.7		
LR4	385525	254219	31.1	26.1	24.4	27.4	26.7	21.4	20.5	21.2	33.0	31.5	34.9	31.2	27.5	28.3		
SIDFG	385146	254474	33.9	35.6	31.9	31.3	34.1	31.3		26.5	34.5		39.2	32.4	33.1	34.1		
RH	385420	255413	30.0	30.7	26.4	23.1	25.5	22.8	32.9	24.6	25.4	31.3	**42.5**		28.7	29.5		
Bkc	384948	255111	39.5	37.6	38.6	36.7	34.1	32.4	33.0	33.1	38.3	38.3	38.4	36.2	36.3	37.5	37.2	
GS	385358	254969	**40.3**	38.7	37.7	32.7	37.2	31.5	24.2	31.9	38.8	**43.0**	30.8	33.7	35.0	36.1		

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

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

☒ **Worcester City Council confirm that all 2024 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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

A local bias adjustment factor has been determined by WRS. This has been calculated using the 'Diffusion Tube Data Processing Tool spreadsheet' which has been uploaded to the Defra LAQM portal. All calculations and data are presented within the relevant sections of the spreadsheet. The calculation details have also been provided in 'Table C.2 – Local Bias Adjustment Calculation' within the 2024 ASR. Further details are set out below under the heading Diffusion Tube Bias Adjustment Factors.

New or Changed Sources Identified Within Worcester Council City During 2024

Worcester City Council has not identified any new sources relating to air quality within the reporting year of 2024.

Additional Air Quality Works Undertaken by Worcester City Council During 2024

The Worcester City AQAP 2024-2029 has been presented for statutory and public consultation and subsequently published during 2024.

QA/QC of Diffusion Tube Monitoring

The following UKAS accredited company provided Worcester City Council with nitrogen dioxide diffusion tubes and analysis in 2024:

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

SO23 0RH diffusion@gradko.com

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

Gradko International Limited participate in the AIR NO_2 Proficiency Testing Scheme (AIR-PT). All monitoring undertaken has been completed in accordance with the 2024 Diffusion Tube Monitoring Calendar, i.e. on or within ± 2 days of the specified date.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Worcester City recorded data capture of 75% therefore it was not required to annualise any monitoring data.

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.

Worcester City Council have applied a local bias adjustment factor of 1.03 to the 2024 monitoring data. A summary of bias adjustment factors used by Worcester City Council over the past five years is presented in

Table C.1.

A local bias adjustment factor has been calculated using the ‘Diffusion Tube Data Processing Tool spreadsheet’ which has been uploaded to the Defra LAQM portal. All calculations and data are presented within the relevant sections of the spreadsheet as set out above.

The factor has been derived from the automatic monitoring station installed at Wyre Forest House, Finepoint Way, Kidderminster which is the head office for WRS. The installation is collocated 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 six district councils within Worcestershire and therefore the handling and processing of the diffusion tubes is the same for each area. The station is less than 15km north-north-west of Worcester City district.

The local bias adjustment factor has been used as it is more conservative compared to the national bias adjustment factor of 0.84 (Defra published National Diffusion Tube Bias Adjustment Spreadsheet Version 04/25). This approach is consistent with previous two ASRs and undertaken following consultation with Defra LAQM helpdesk and technical guidance.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2024	Local	-	1.03
2023	Local	-	0.97
2022	Local	-	0.97
2021	National	03/21	0.84
2020	National	03/21	0.81

Table C.2 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	12
Bias Factor A	1.03 (0.97 - 1.08)
Bias Factor B	-3% (-8% - 3%)
Diffusion Tube Mean (µg/m^3)	11.8
Mean CV (Precision)	2.8%
Automatic Mean (µg/m^3)	12.1
Data Capture	98%
Adjusted Tube Mean (µg/m^3)	12 (11 - 13)

Notes:

A single local bias adjustment factor has been used to bias adjust the 2024 diffusion tube results.

3.2.5 NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1 and the distance calculations are shown below in Table C.3.

Table C.3 – Non-Automatic NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

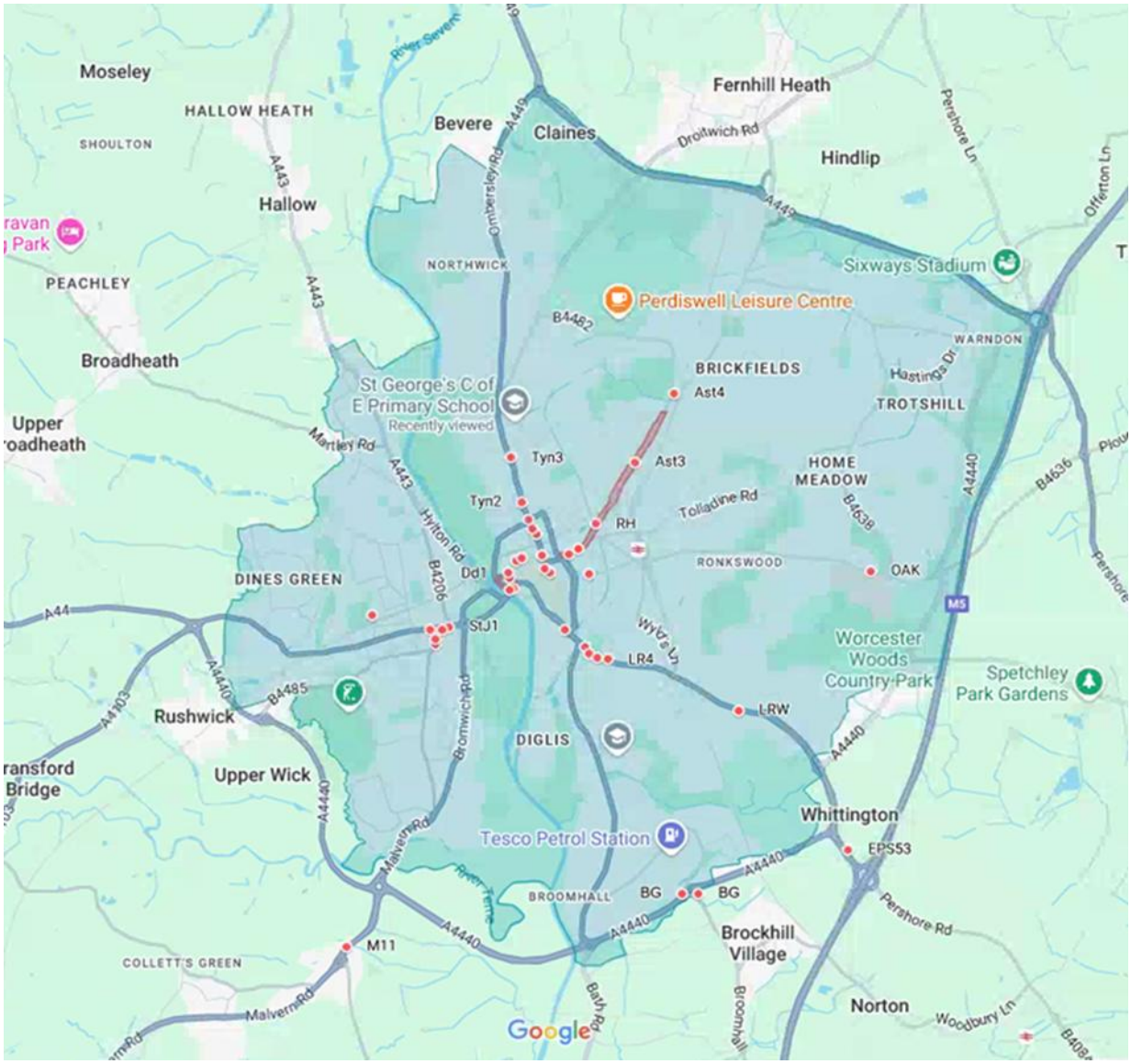
Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
BrS2	2.0	3.0	36.6	8.4	33.9	
Tyn2	2.3	4.9	38.2	8.5	32.7	
Tyn	1.6	3.7	38.3	8.5	32.9	
Fos	1.0	2.9	40.6	8.5	33.7	
Lwm1	1.4	3.1	36.2	8.4	31.5	
Ast3	1.7	8.3	42.4	8.4	30.2	
Bkc	4.1	4.3	37.5	8.5	*37.2*	*Predicted concentration at Receptor within 10% the AQS objective.*

QA/QC of Automatic Monitoring

Worcester City Council did not undertake any automatic (continuous) monitoring that are recognised by Defra for measuring against ambient air quality directives and LAQM reporting in 2024.

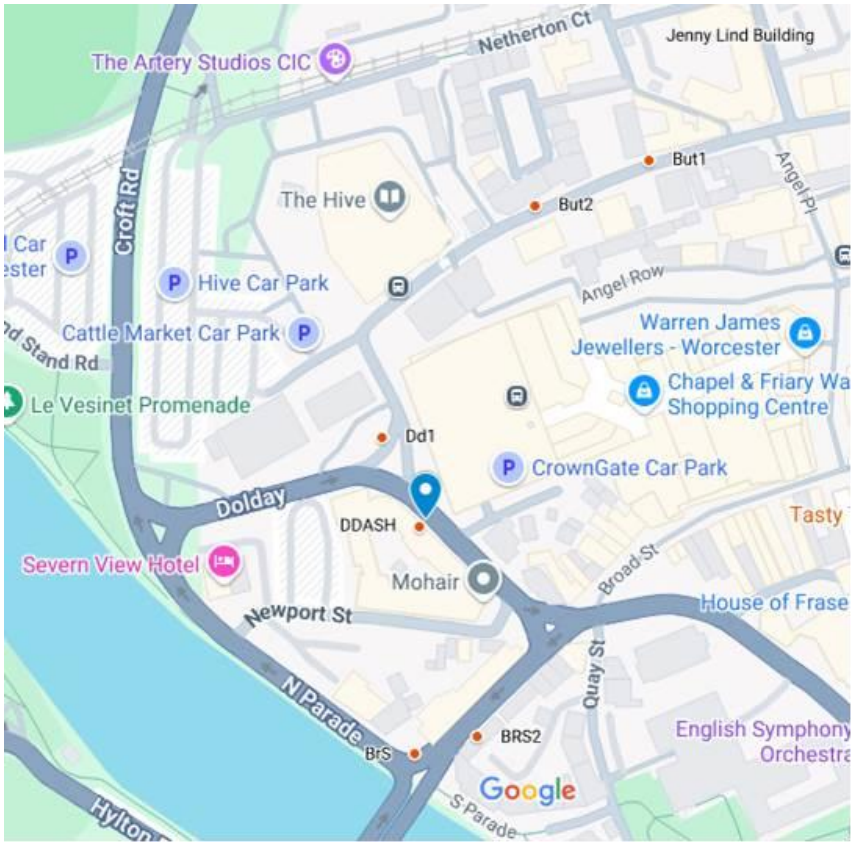
Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Maps of Non-Automatic Monitoring Sites

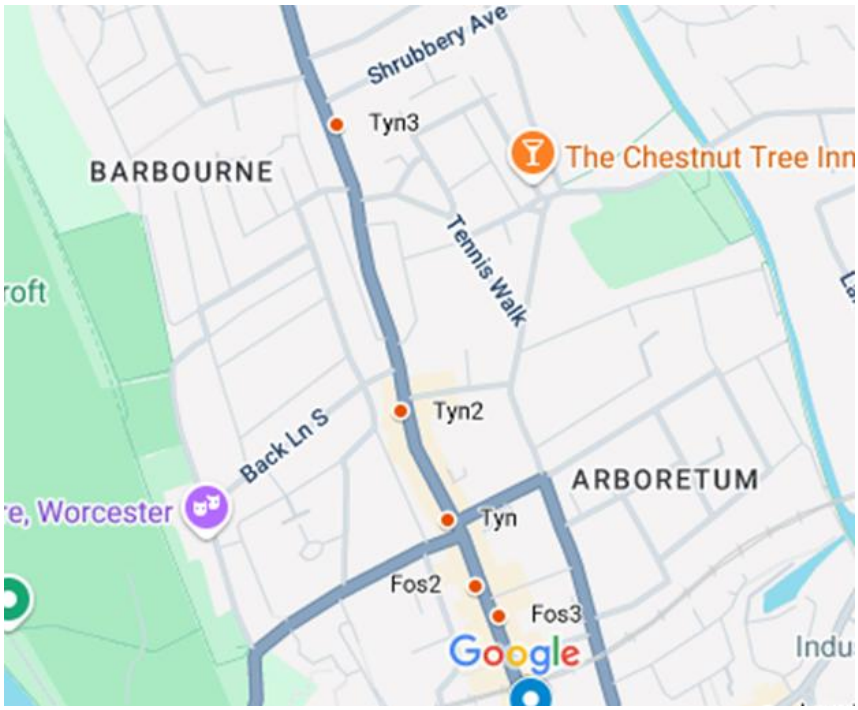


Worcester City AQMA (Political Boundary) and Overview of Monitoring Locations

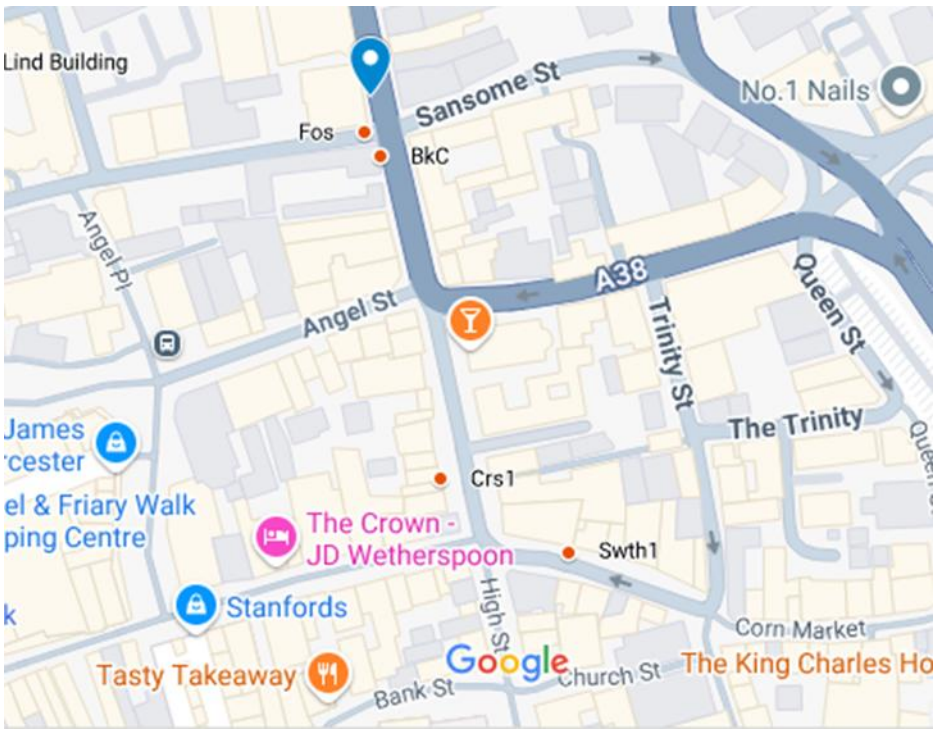
The shaded area in the map above shows the one **current** district wide AQMA



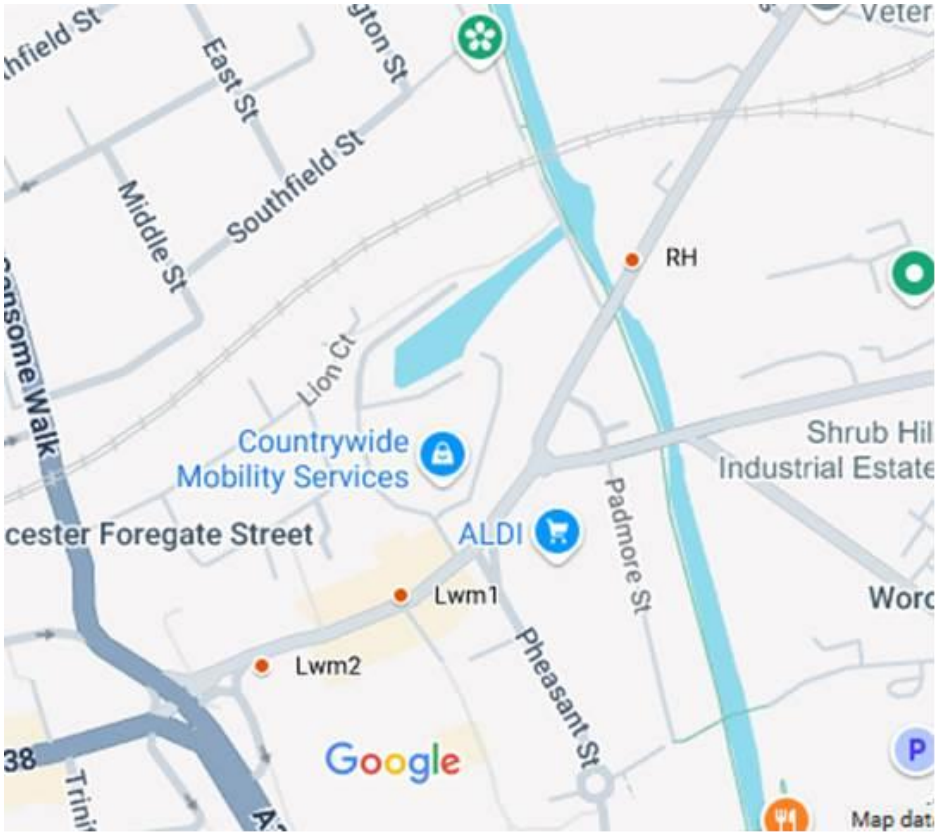
Dolday and The Butts including tubes referenced - **But1, But2, Dd1,DDASH, BrS and BRS2.**



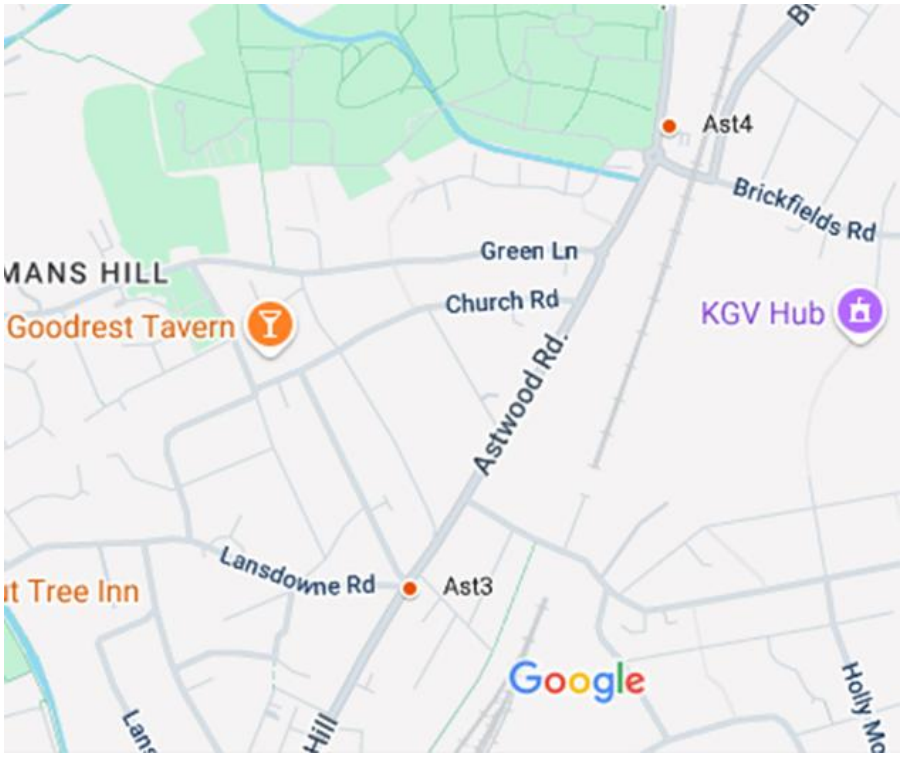
Foregate Street and the Tything including tubes referenced - **Tyn3, Tyn2, Tyn, Fos2, Fos3**



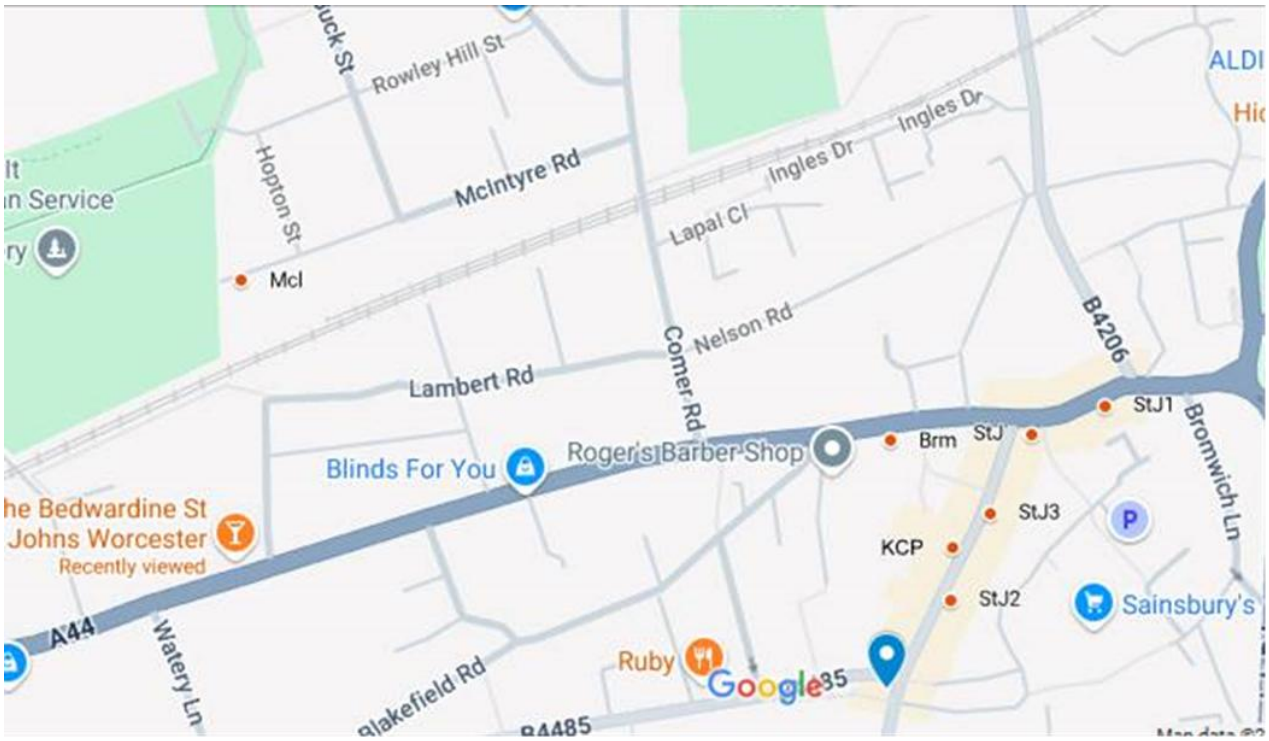
Foregate Street to St Swithins Street including tubes referenced - **Fos, BkC, Crs1, Swth1**



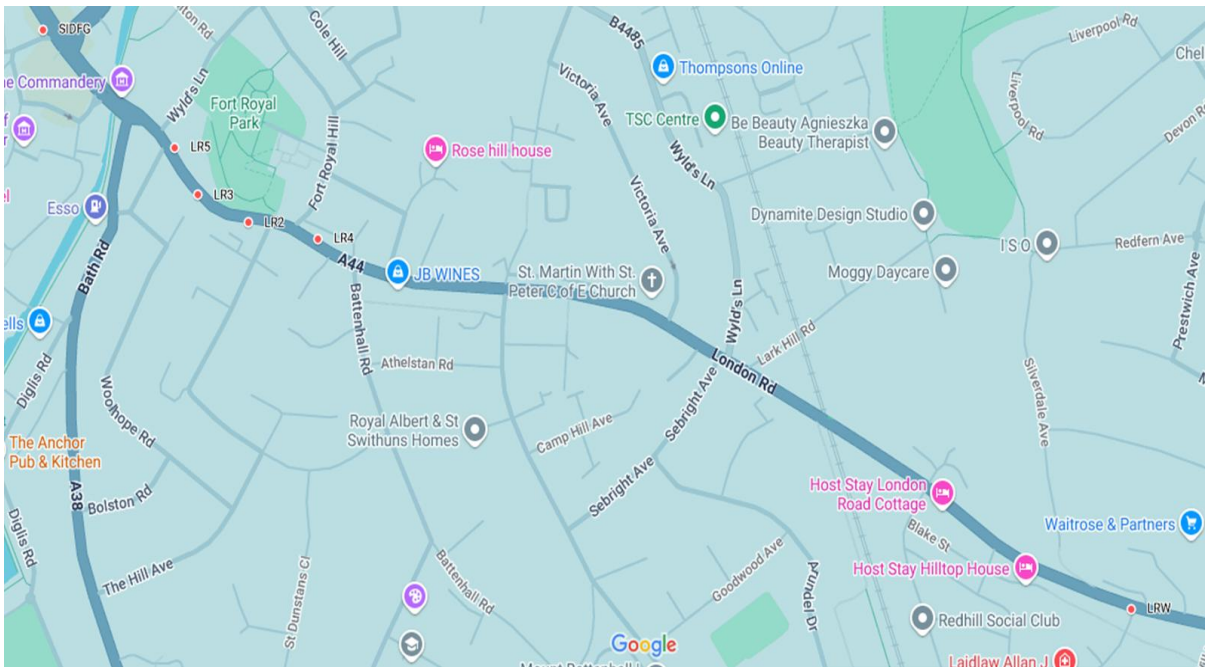
Lowesmoor including tubes referenced – **Lwm1, Lwm2, RH**



Astwood Road including tubes referenced – **Ast 3, Ast4**

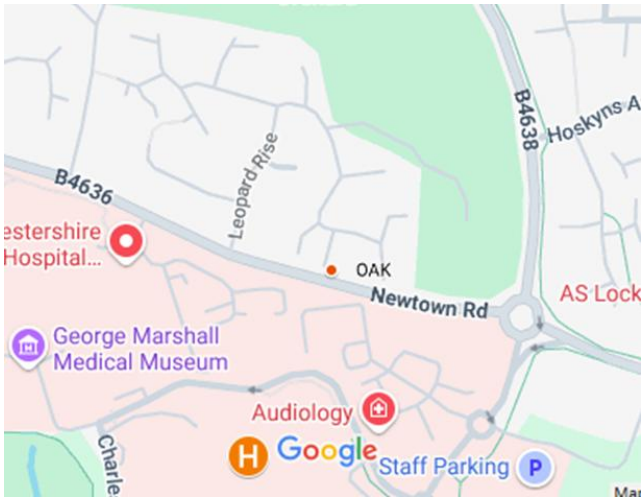


Henwick and St Johns including tubes referenced – **Mcl, StJ1, StJ2, StJ3, KCP, Brm**



London Road and Sidbury including tube references – **SIDFG, LRW, LR2, LR3, LR4, LR5**

George Street reference - **GS**



Oaklands reference - **OAK**

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[9]

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

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

Appendix F: Low-cost Sensor Results 2024

Worcestershire
Regulatory Services
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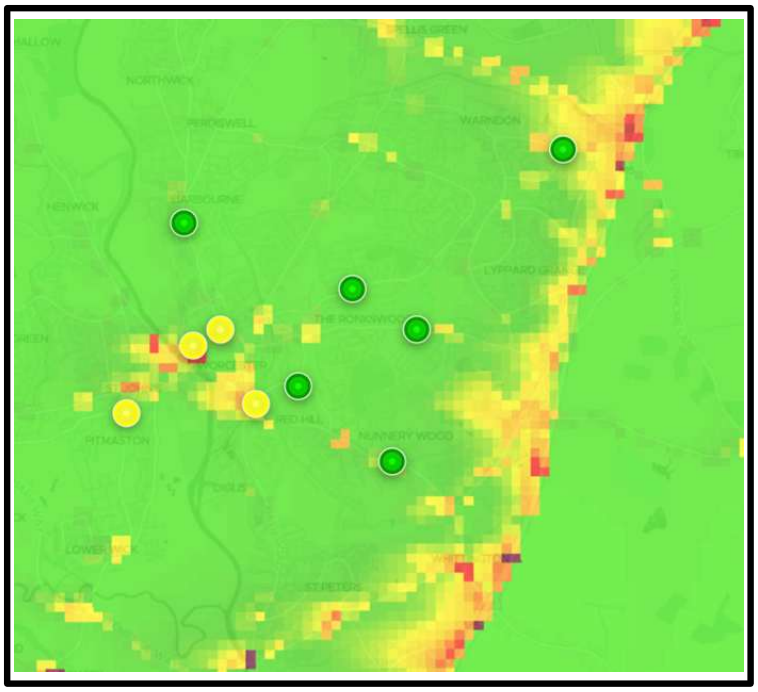
Low-Cost Air Quality Sensors Measurements 2024: Worcester



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).

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. However, Defra recognise there is growing interest in using these sensors among local authorities and are looking into producing a new FAQ on the use of low-cost sensors to make the position clearer.

All Saints Road - Worcester

Worcestershire Regulatory Services
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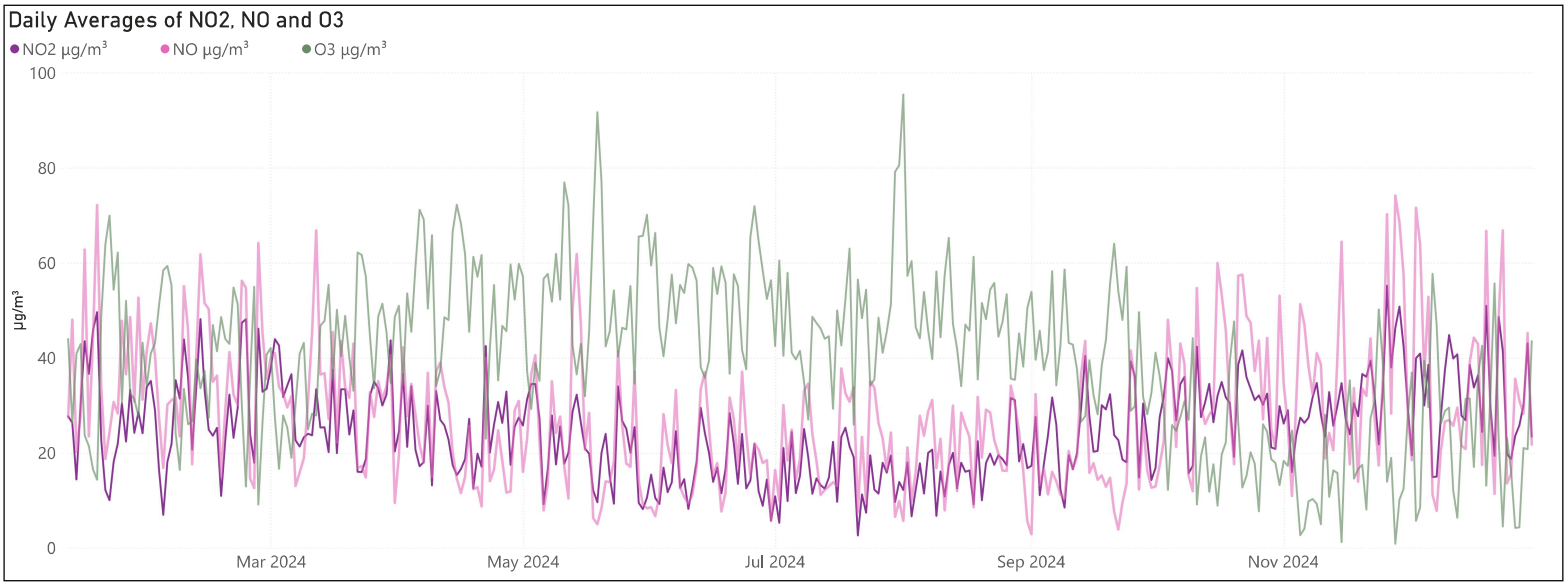

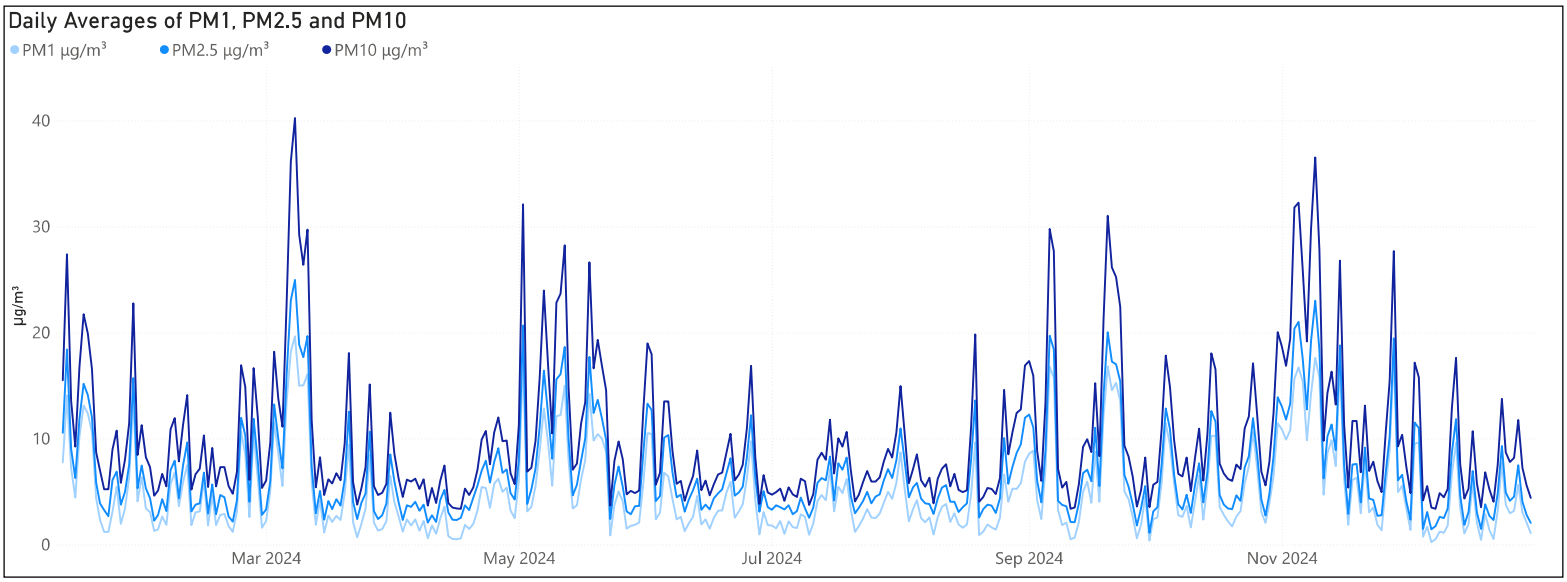

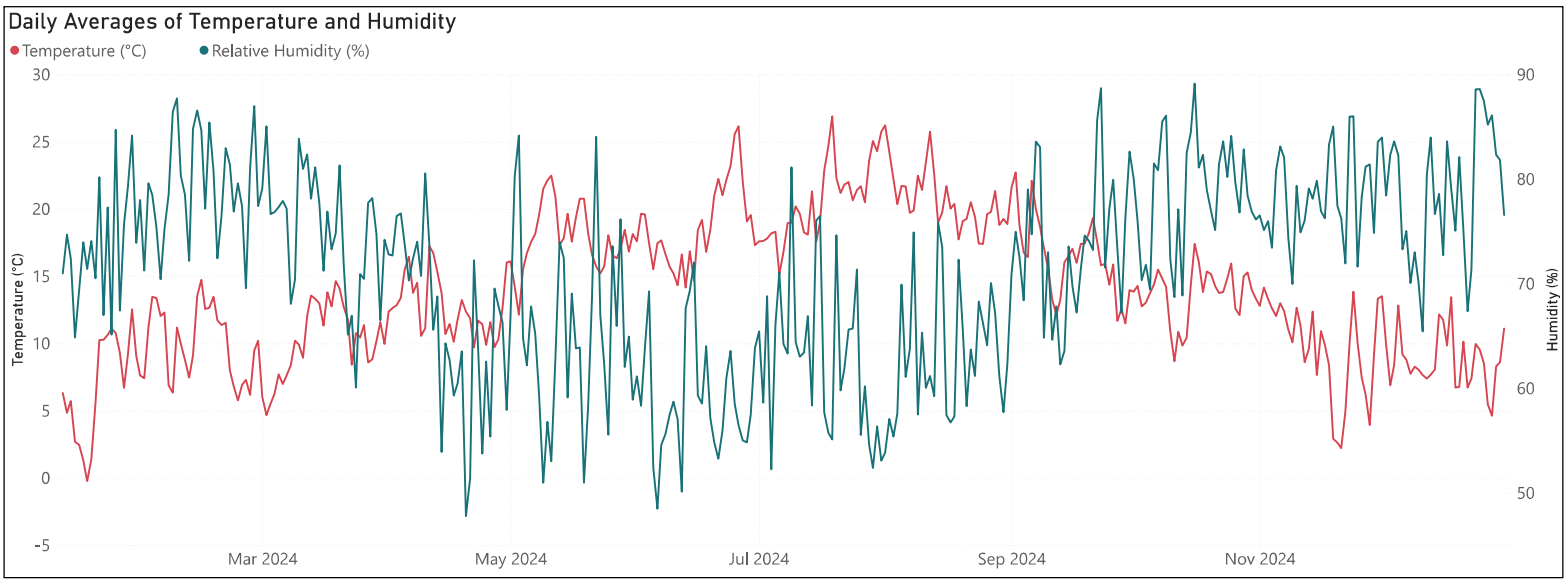

Yearly Averages

24.74 Average NO2 µg/m³	**27.88** Average NO µg/m³	**40.09** Average O3 µg/m³	**14.11** Average Temperature (°C)
5.09 Average PM1 µg/m³	**6.88** Average PM2.5 µg/m³	**10.25** Average PM10 µg/m³	**71.08** Average Relative Humidity (%)

Barbourne Road - Worcester

Worcestershire Regulatory Services
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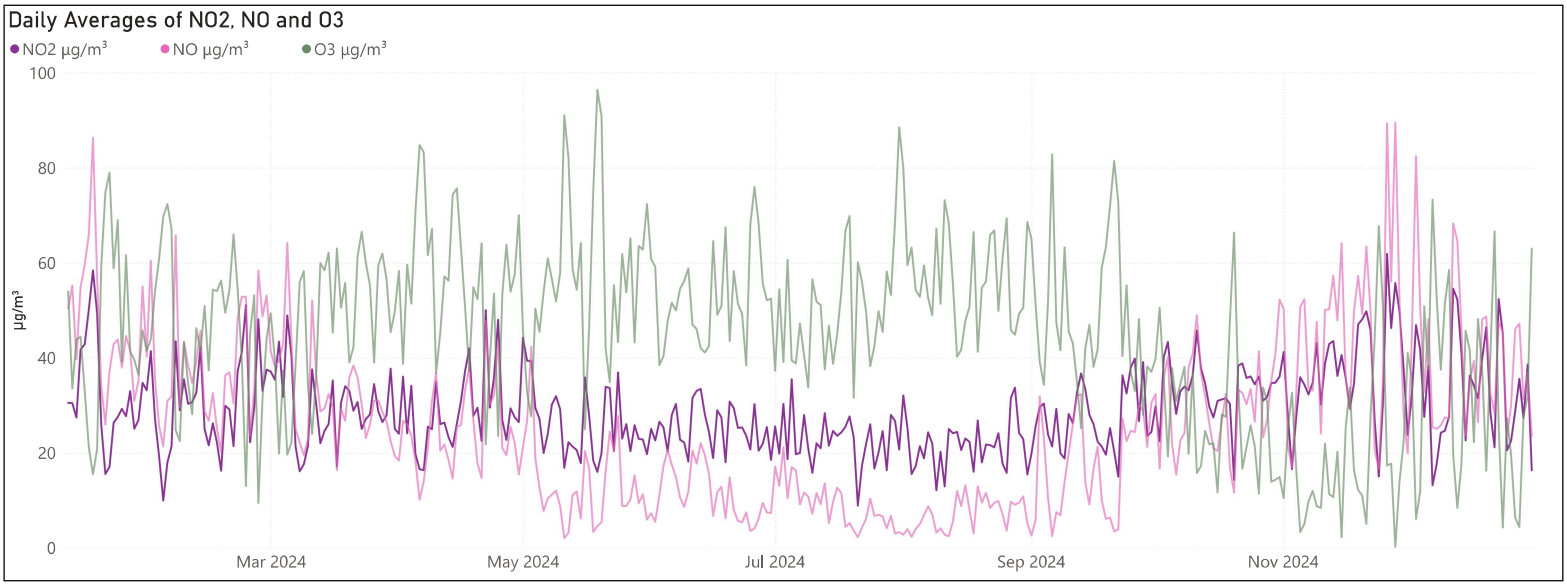

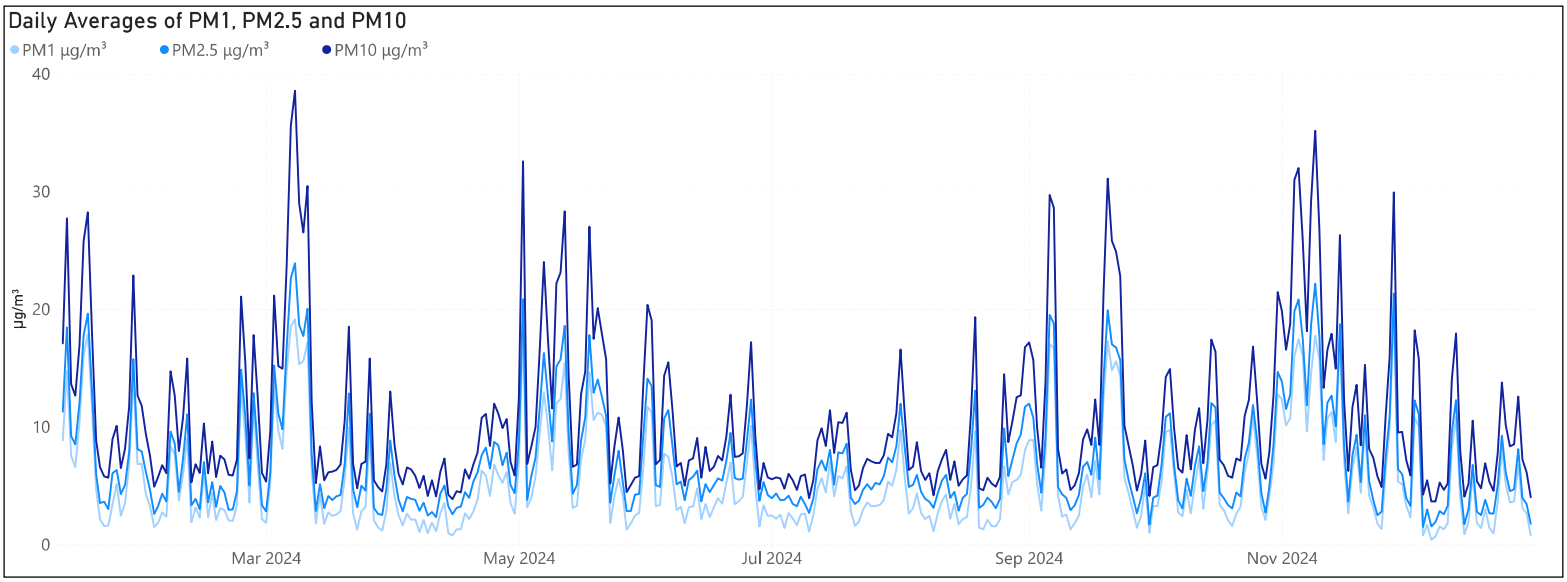

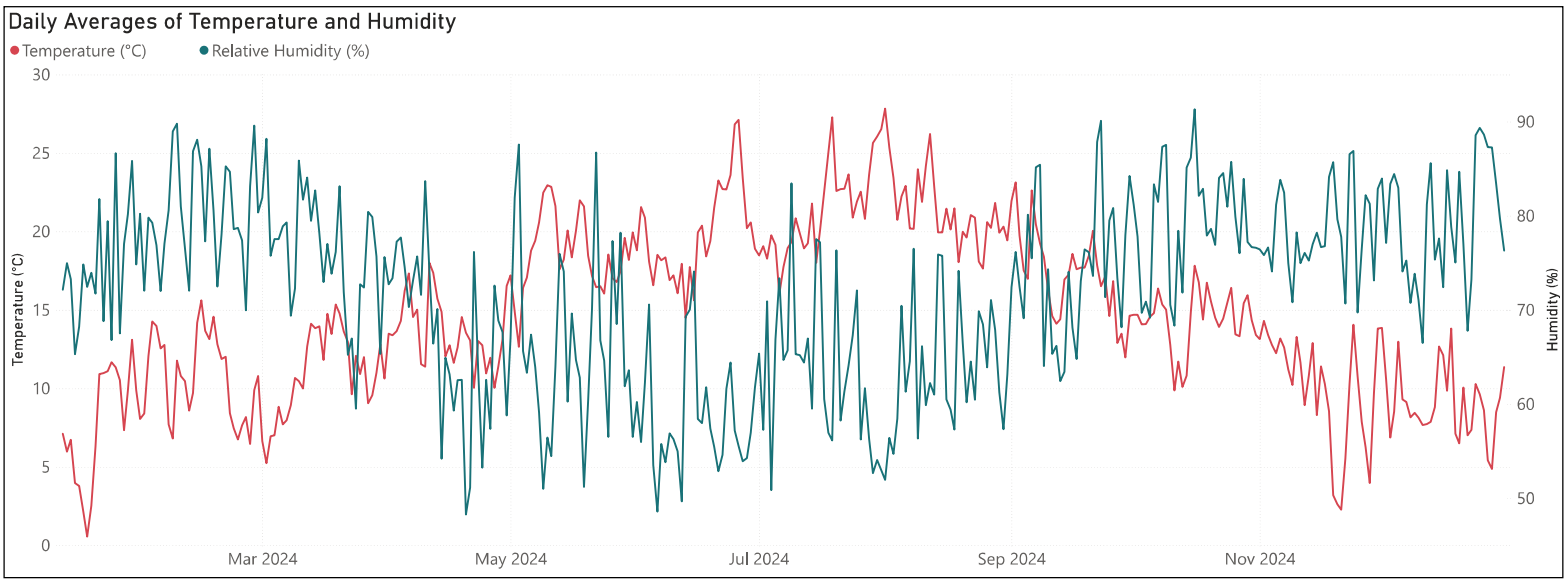

Yearly Averages

29.02 Average NO2 µg/m³	**25.57** Average NO µg/m³	**45.01** Average O3 µg/m³	**14.81** Average Temperature (°C)
5.56 Average PM1 µg/m³	**7.23** Average PM2.5 µg/m³	**10.73** Average PM10 µg/m³	**71.73** Average Relative Humidity (%)

Foregate Street - Worcester

Worcestershire Regulatory Services
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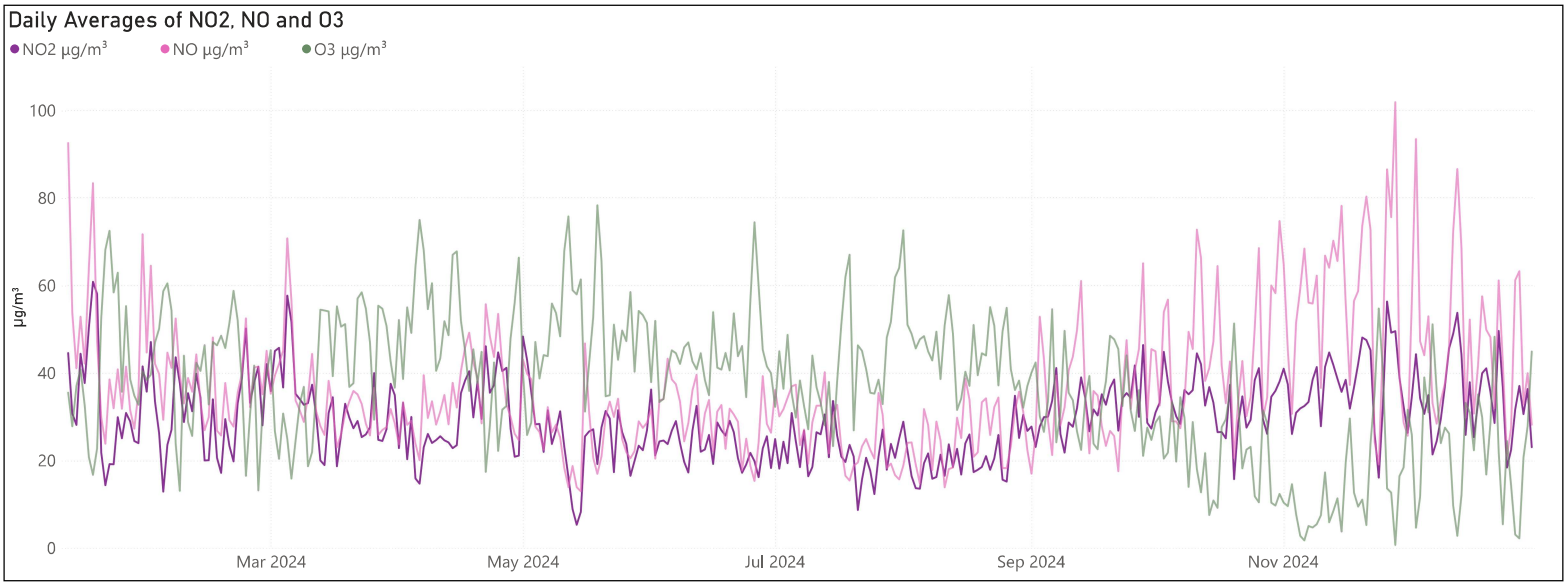
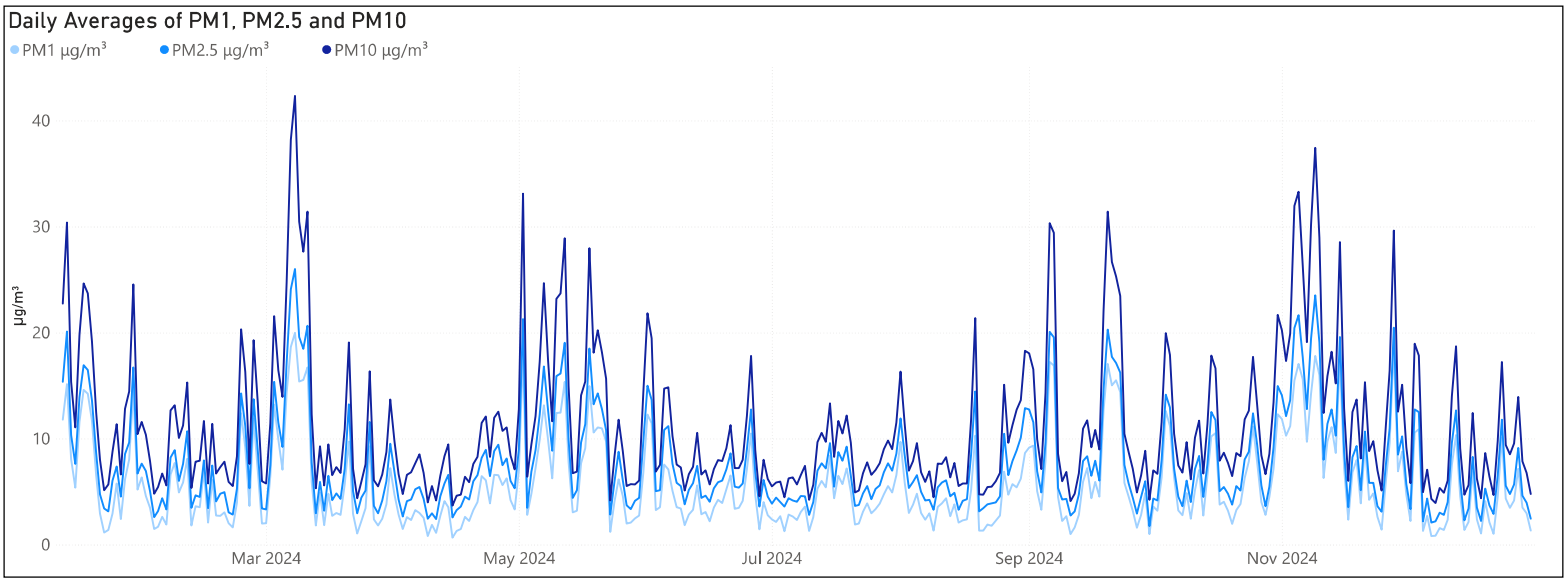
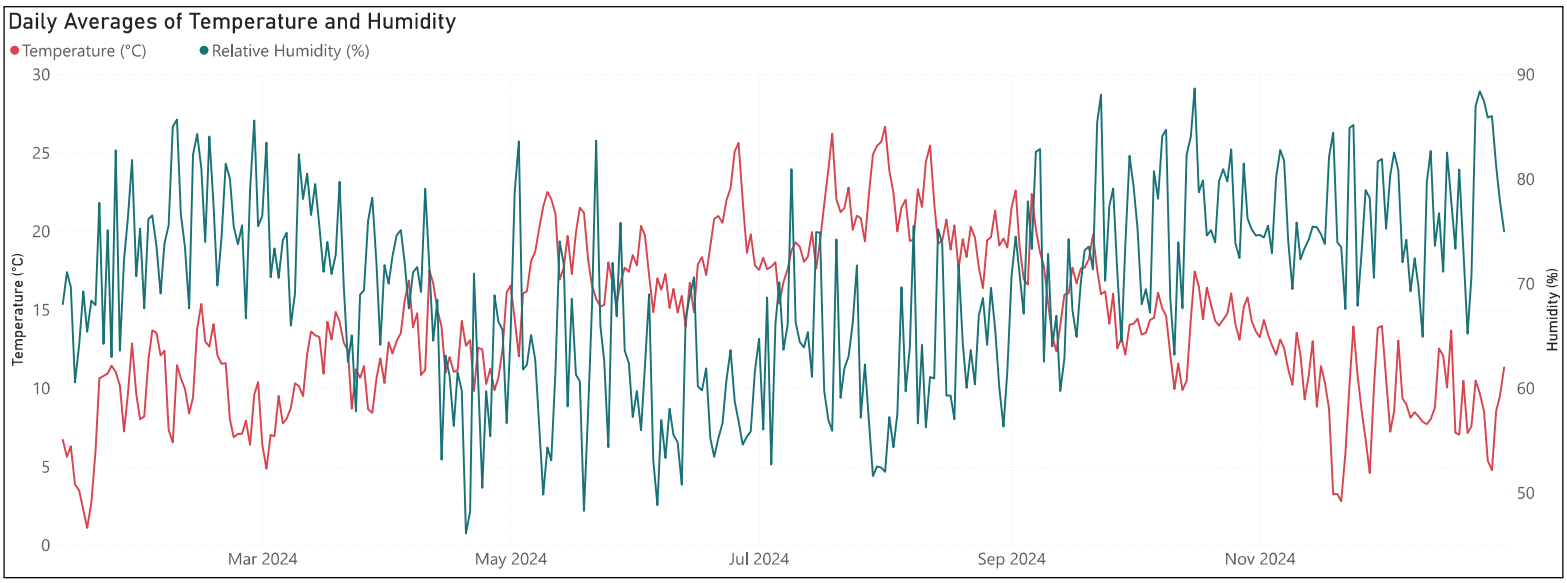




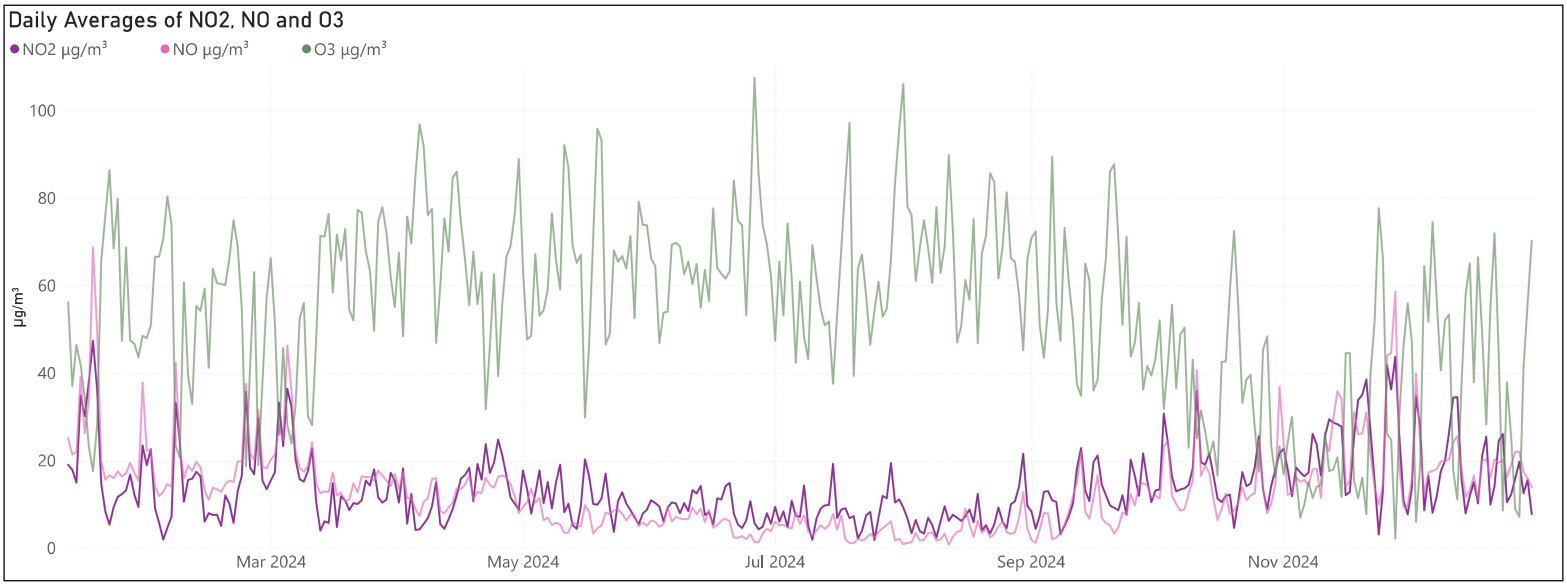


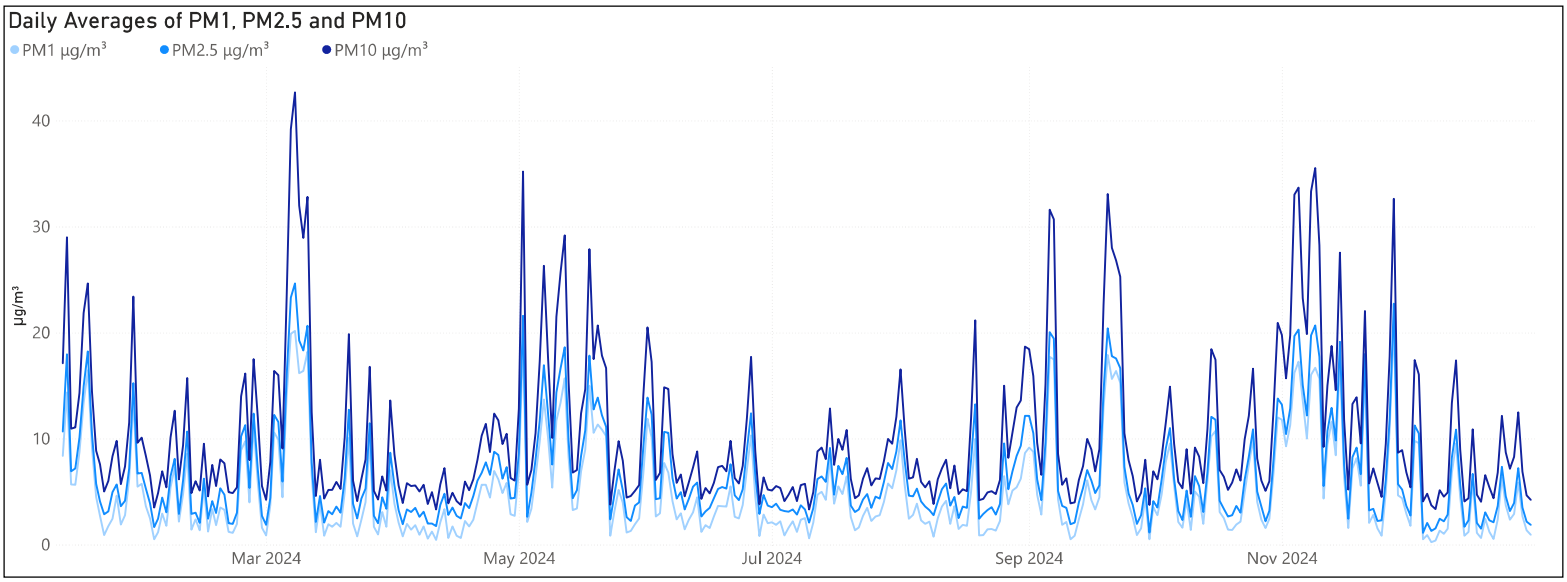
Yearly Averages

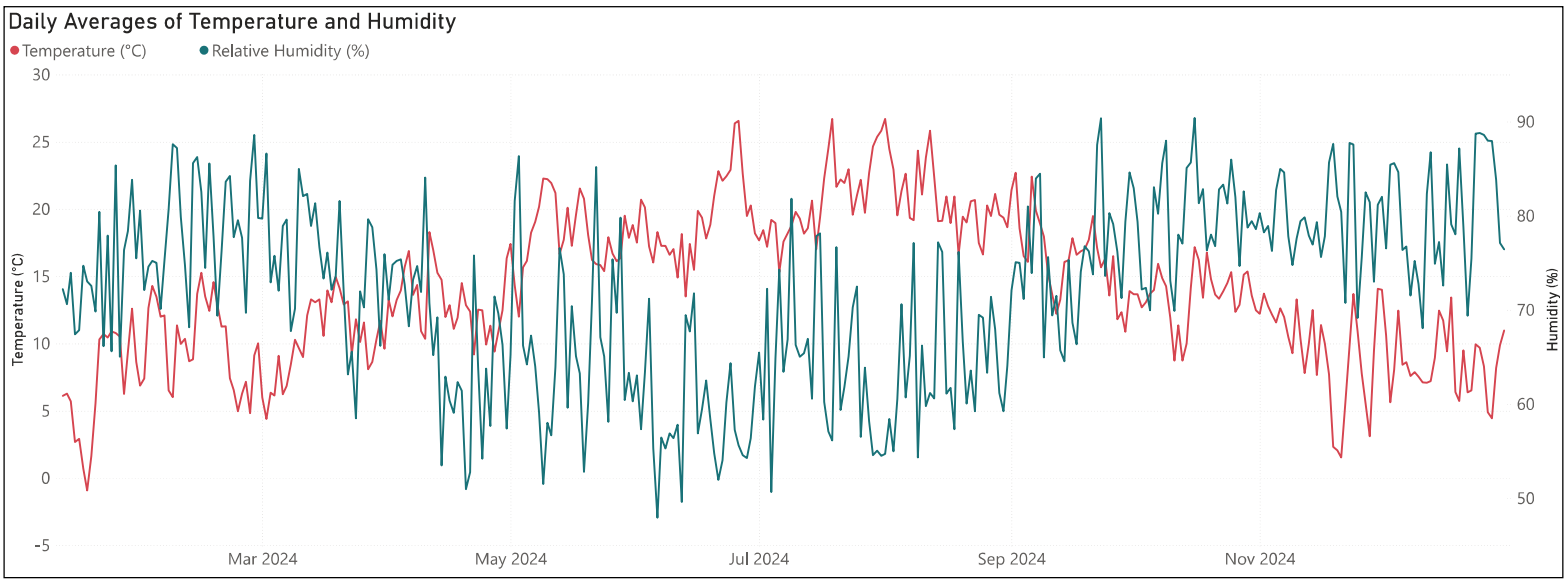
29.52 Average NO2 µg/m³	**36.90** Average NO µg/m³	**36.99** Average O3 µg/m³	**14.32** Average Temperature (°C)
5.79 Average PM1 µg/m³	**7.72** Average PM2.5 µg/m³	**11.38** Average PM10 µg/m³	**69.59** Average Relative Humidity (%)

Hastings Drive - Worcester

Worcestershire Regulatory Services
Supporting and protecting you





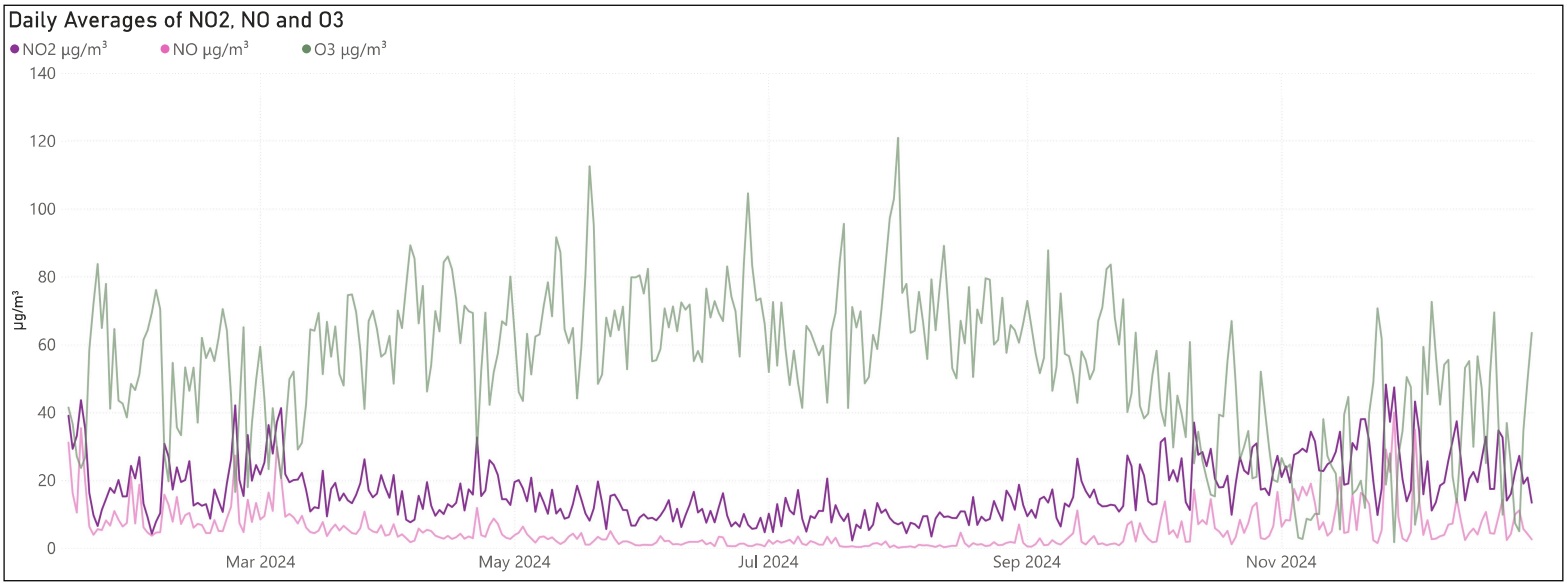


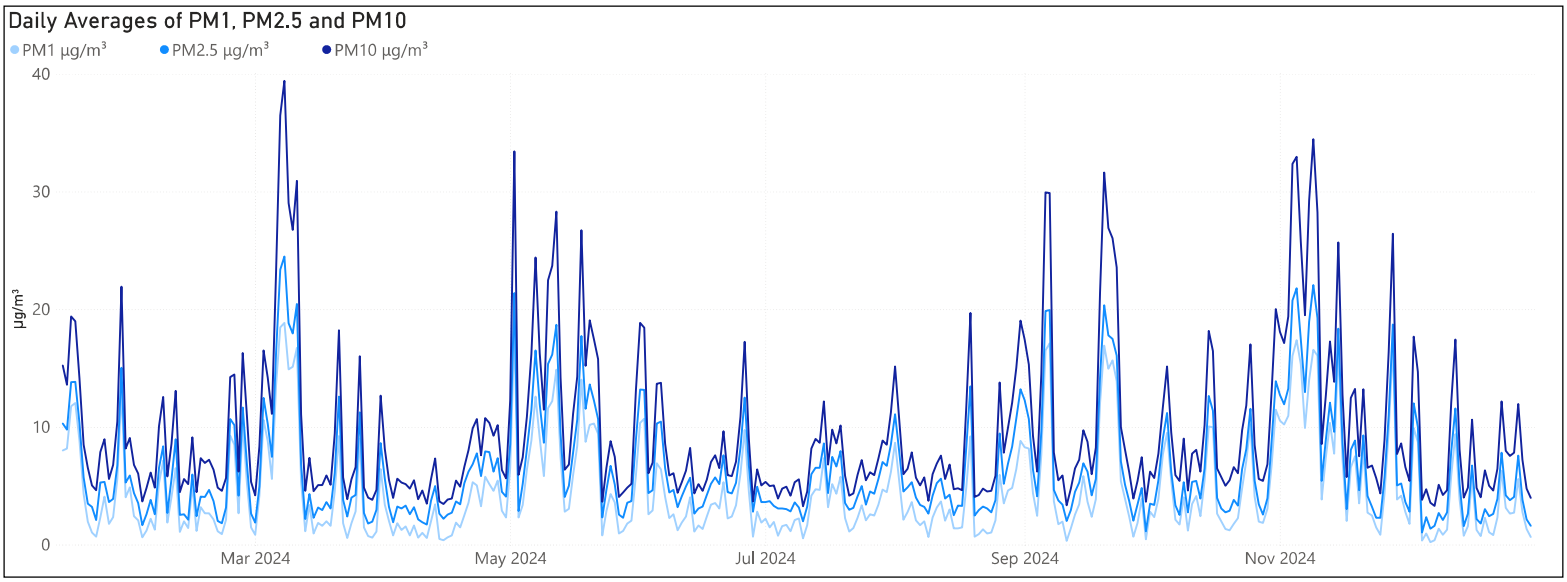
Yearly Averages

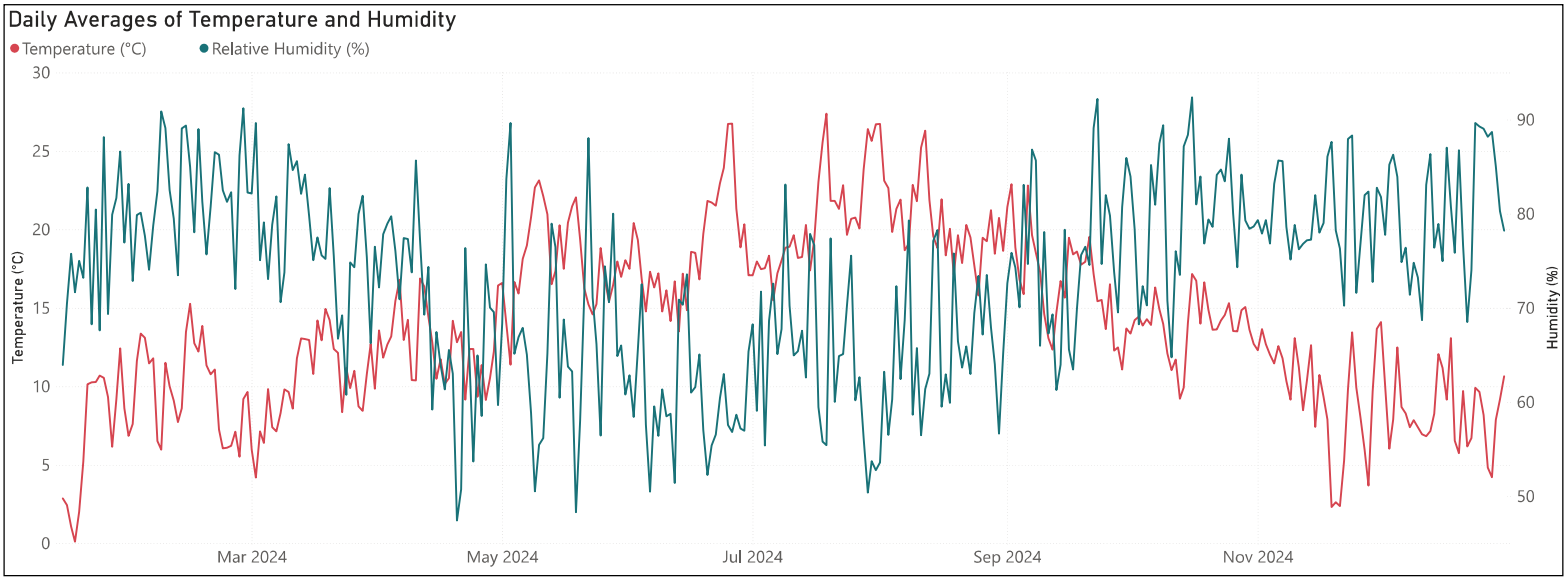
13.83 Average NO2 µg/m³	13.07 Average NO µg/m³	54.39 Average O3 µg/m³	14.16 Average Temperature (°C)
5.15 Average PM1 µg/m³	6.70 Average PM2.5 µg/m³	10.42 Average PM10 µg/m³	71.82 Average Relative Humidity (%)

London Road - Worcester

Worcestershire Regulatory Services
Supporting and protecting you





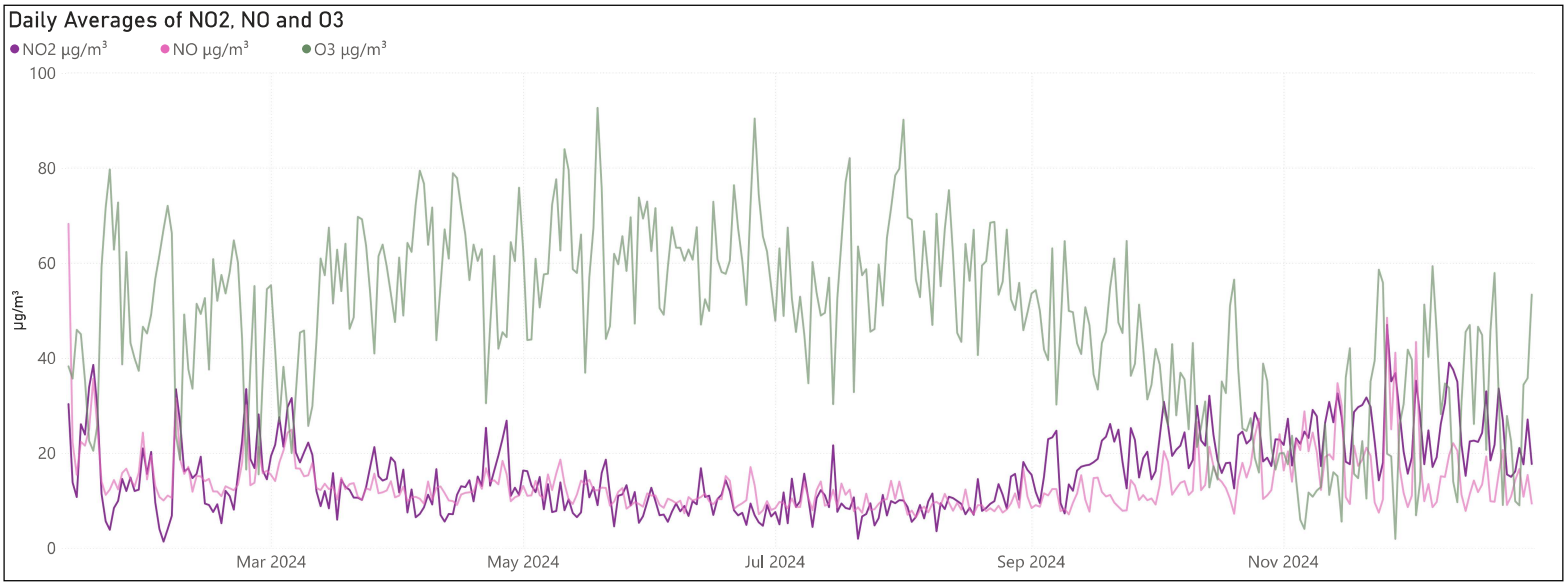


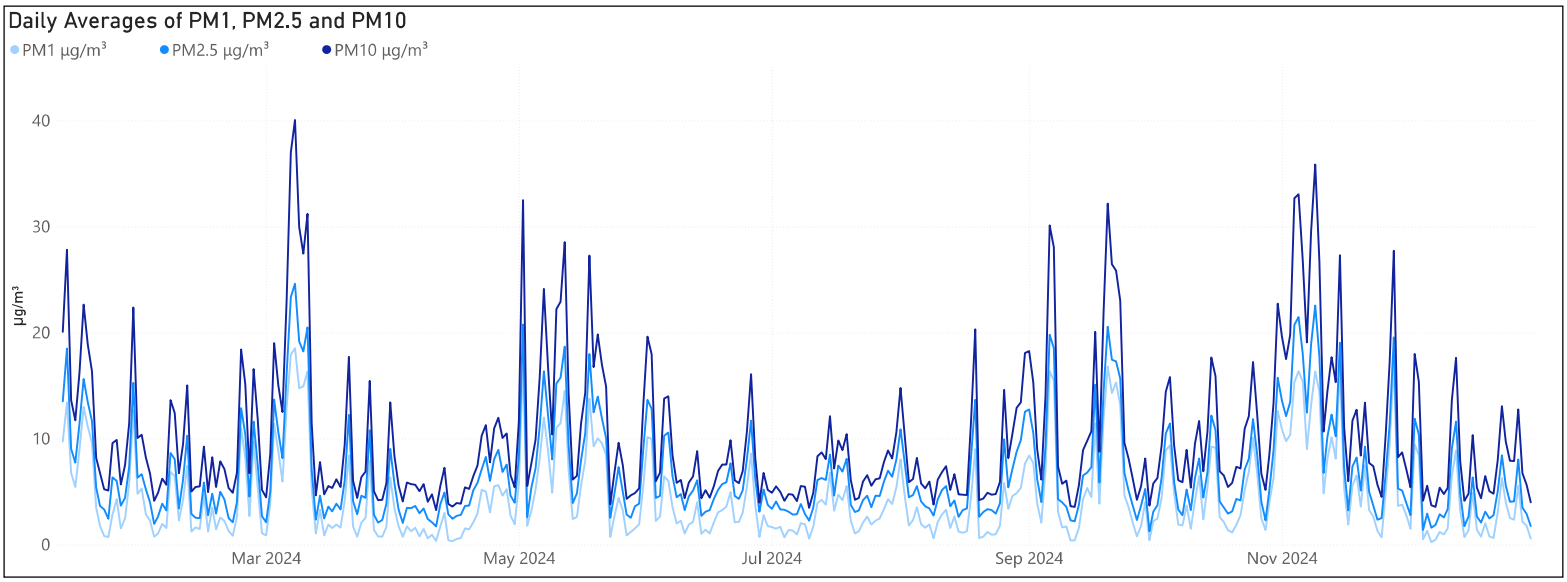
Yearly Averages

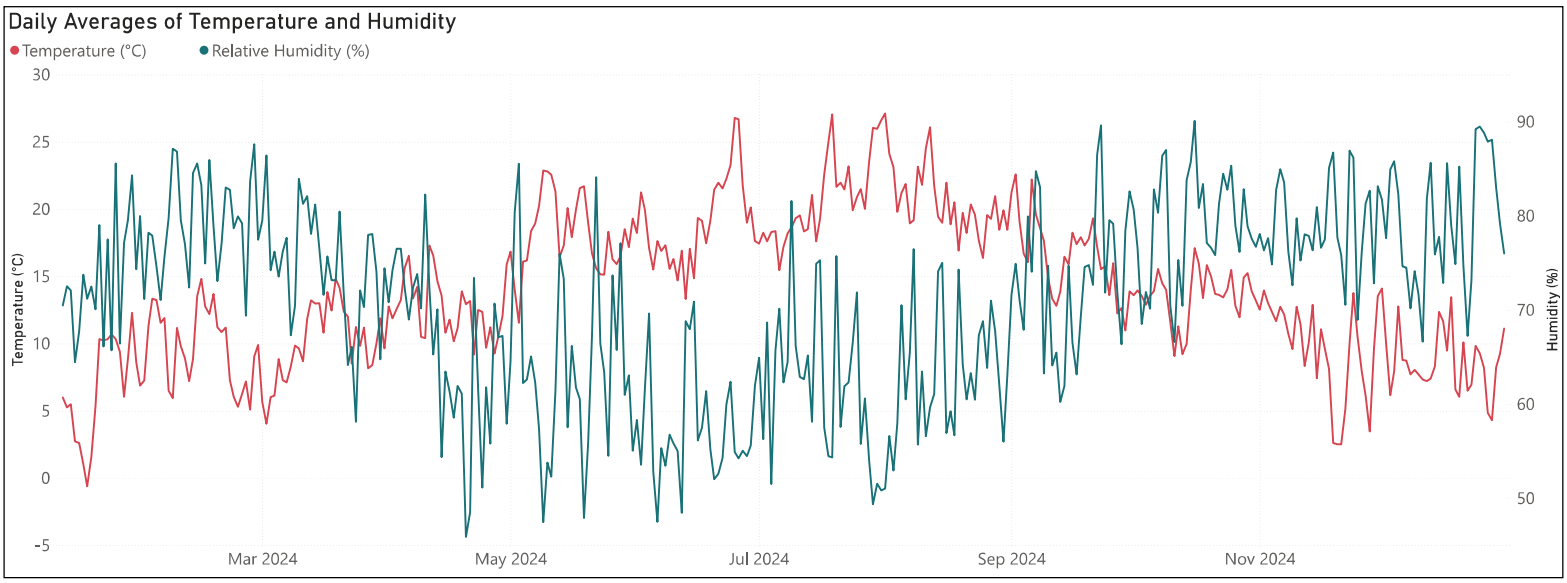
16.99 Average NO2 µg/m³	**5.61** Average NO µg/m³	**54.23** Average O3 µg/m³	**14.15** Average Temperature (°C)
4.69 Average PM1 µg/m³	**6.55** Average PM2.5 µg/m³	**9.84** Average PM10 µg/m³	**73.02** Average Relative Humidity (%)

Malvern Road - Worcester

Worcestershire Regulatory Services
Supporting and protecting you





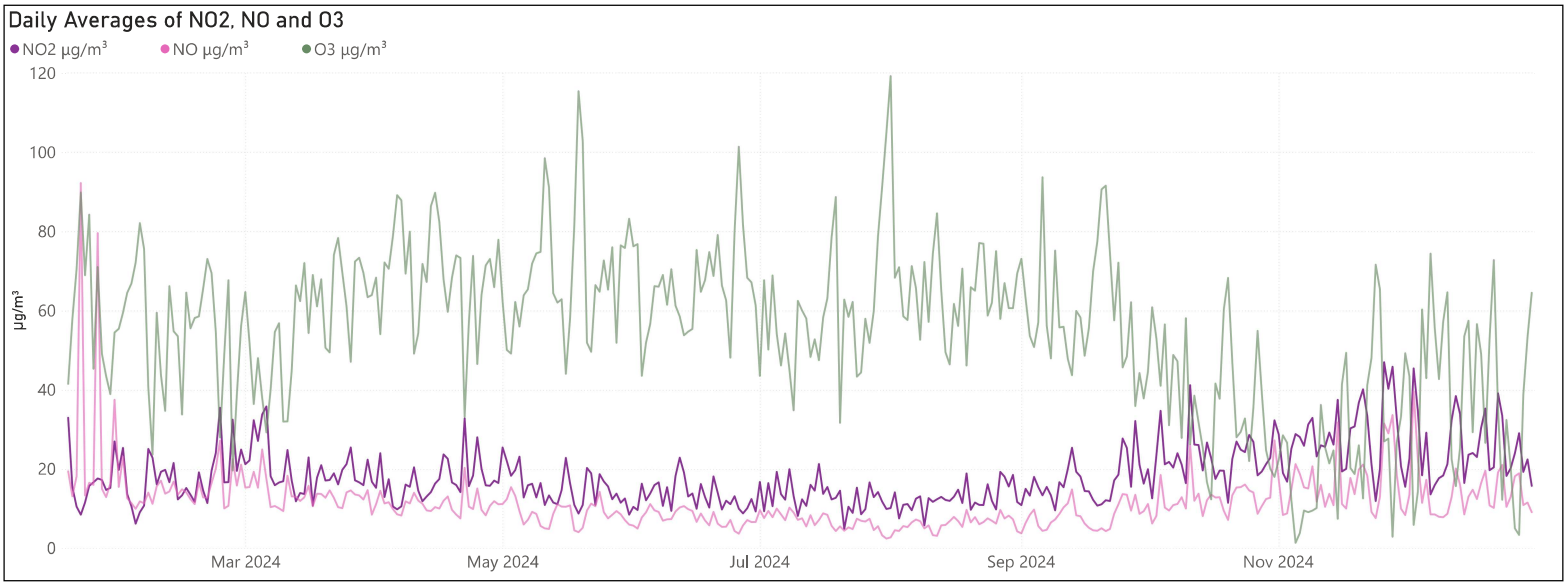


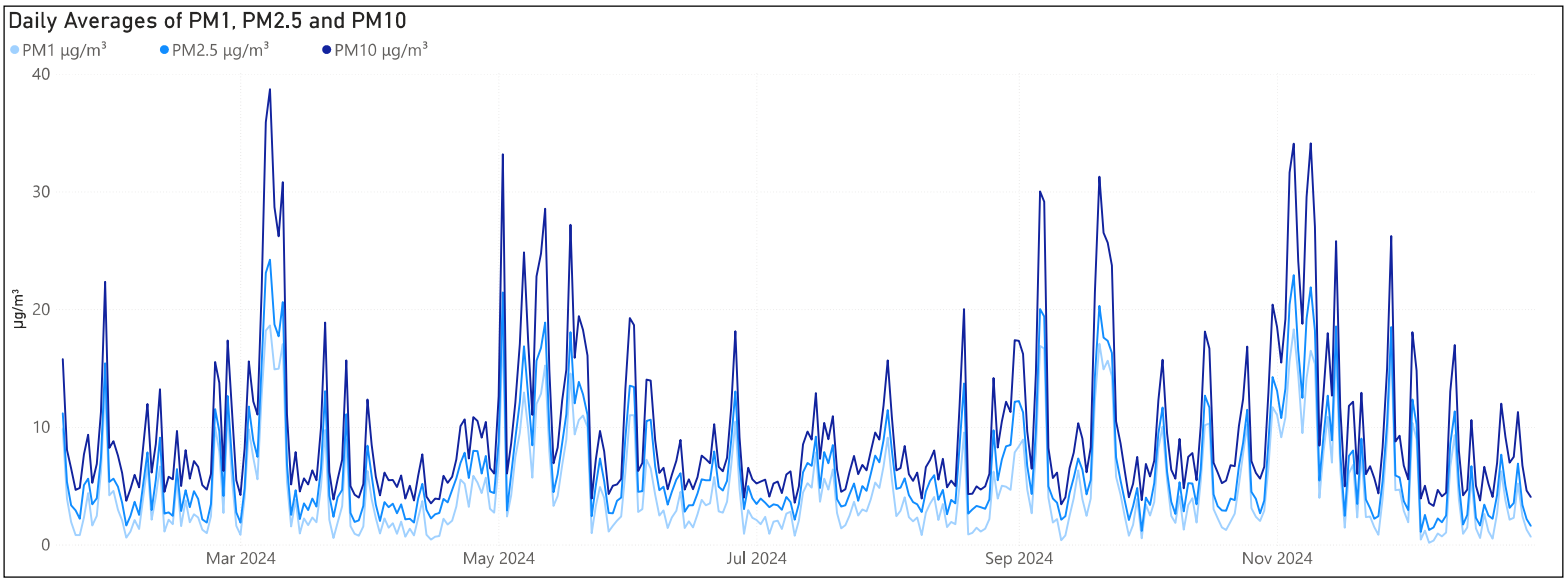
Yearly Averages

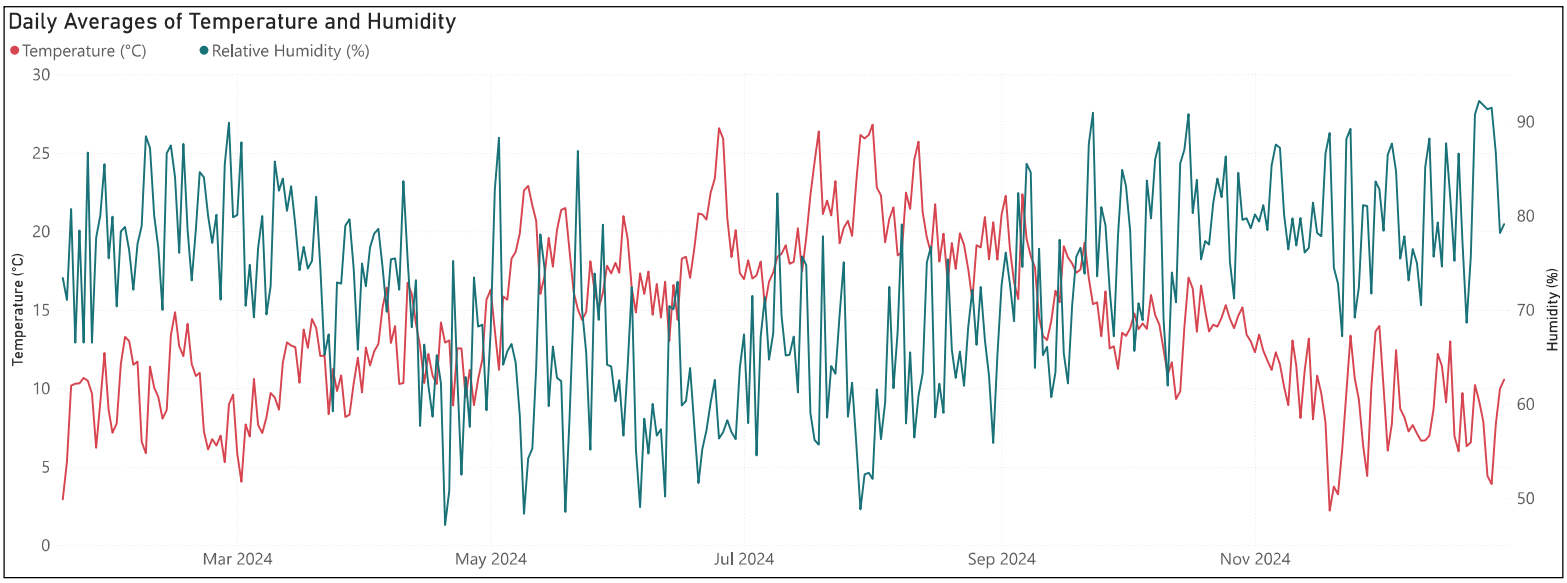
15.87	13.55	48.05	14.07
Average NO2 µg/m³	Average NO µg/m³	Average O3 µg/m³	Average Temperature (°C)
4.62	6.83	10.29	70.73
Average PM1 µg/m³	Average PM2.5 µg/m³	Average PM10 µg/m³	Average Relative Humidity (%)

Newtown Road - Worcester

Worcestershire Regulatory Services
Supporting and protecting you





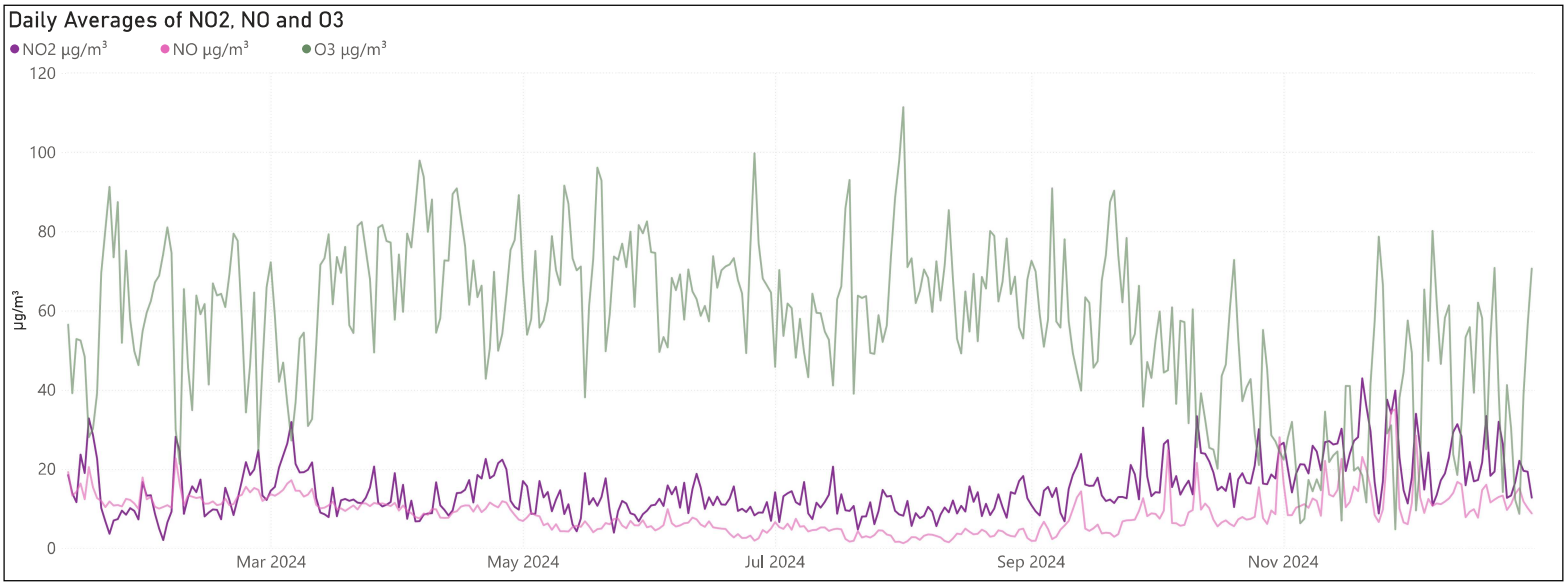


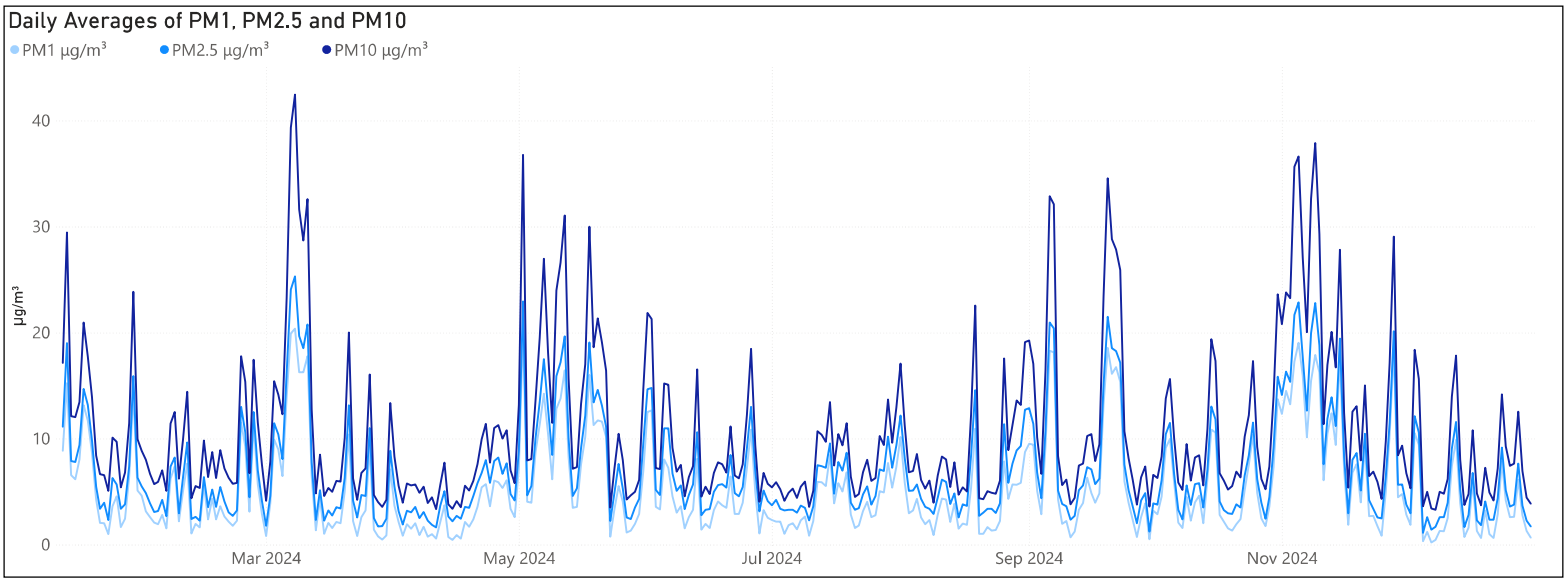
Yearly Averages

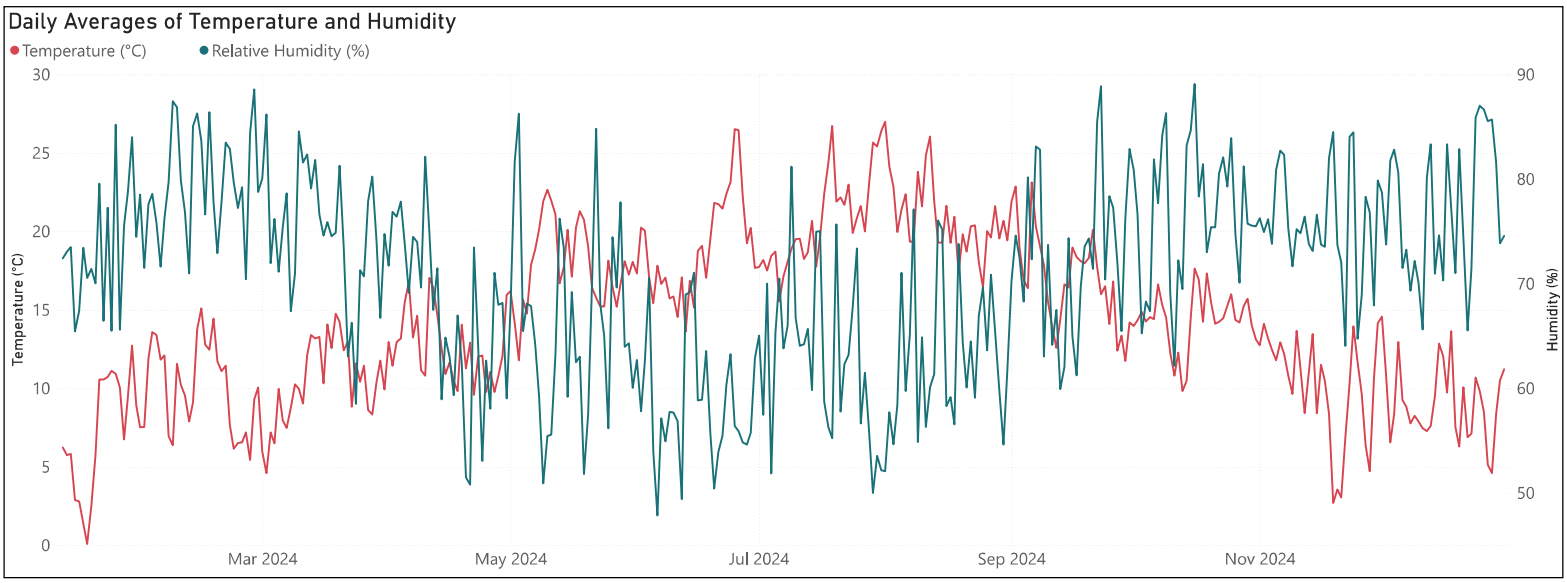
18.36 Average NO2 µg/m³	**11.67** Average NO µg/m³	**55.15** Average O3 µg/m³	**14.19** Average Temperature (°C)
4.78 Average PM1 µg/m³	**6.57** Average PM2.5 µg/m³	**9.89** Average PM10 µg/m³	**72.12** Average Relative Humidity (%)

Rose Avenue - Worcester

Worcestershire Regulatory Services
Supporting and protecting you





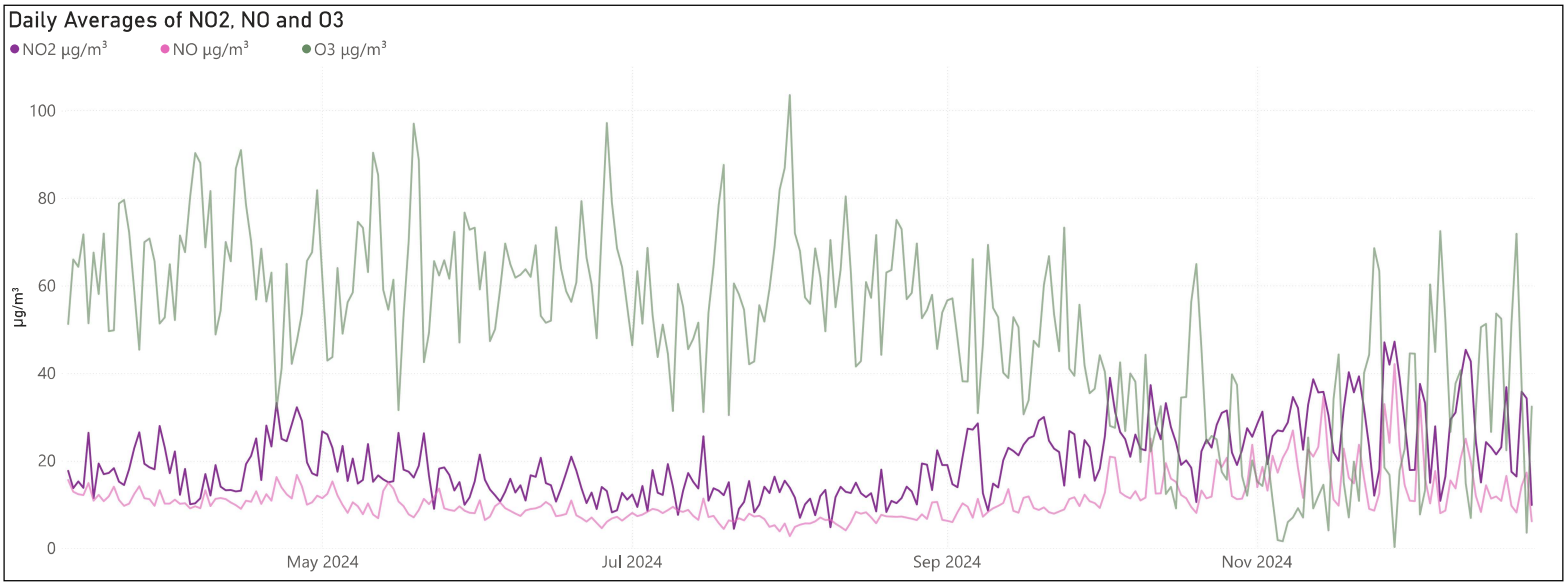


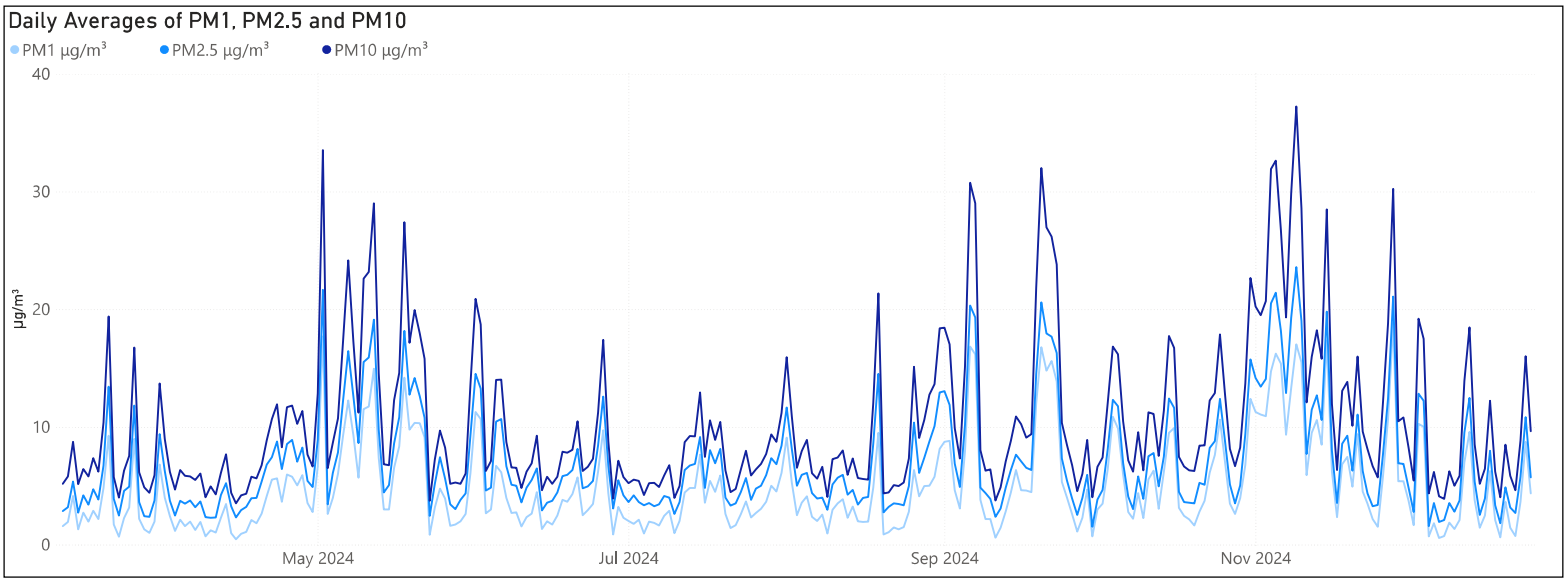
Yearly Averages

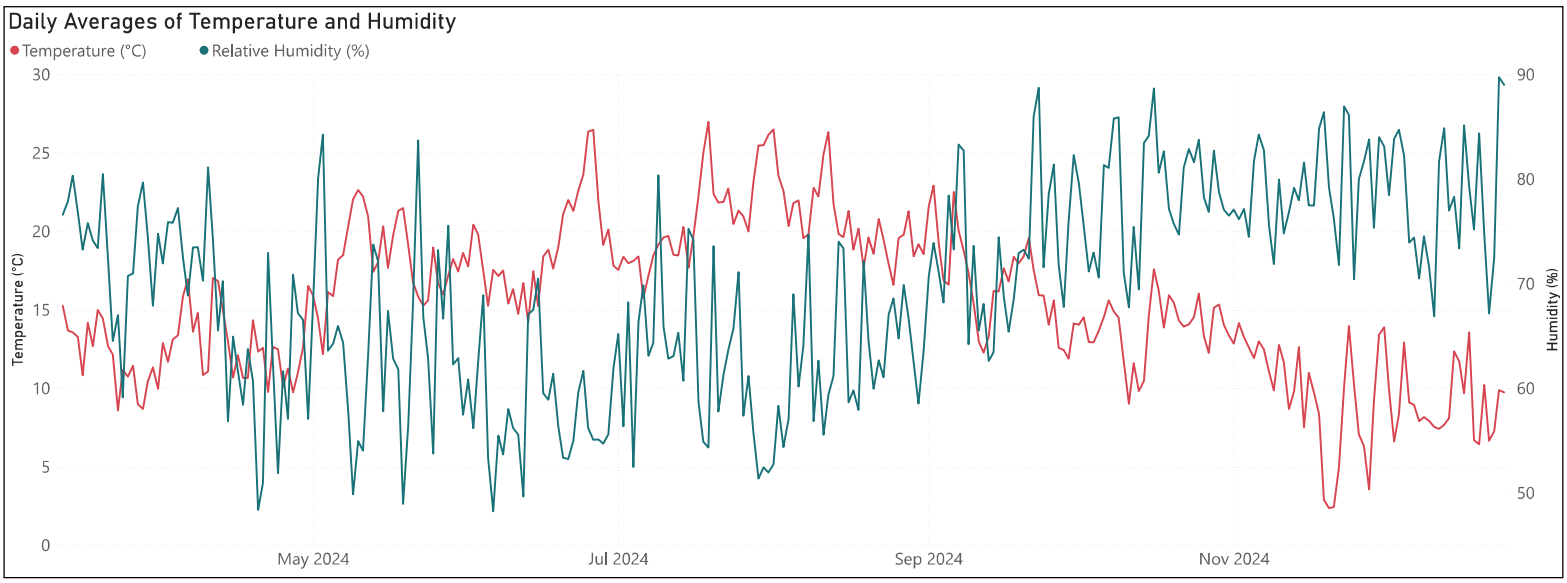
15.09 Average NO2 µg/m³	**8.98** Average NO µg/m³	**57.38** Average O3 µg/m³	**14.33** Average Temperature (°C)
5.39 Average PM1 µg/m³	**7.05** Average PM2.5 µg/m³	**10.80** Average PM10 µg/m³	**70.59** Average Relative Humidity (%)

Sidbury - Worcester

Worcestershire Regulatory Services
Supporting and protecting you





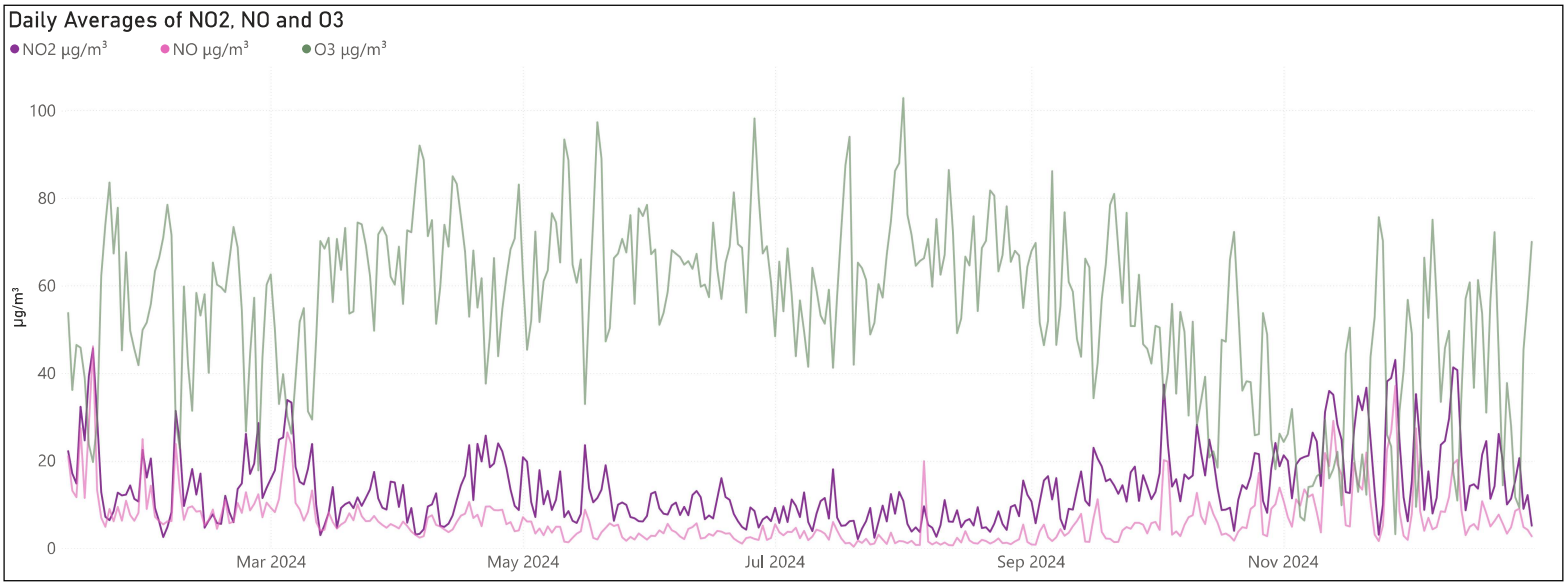


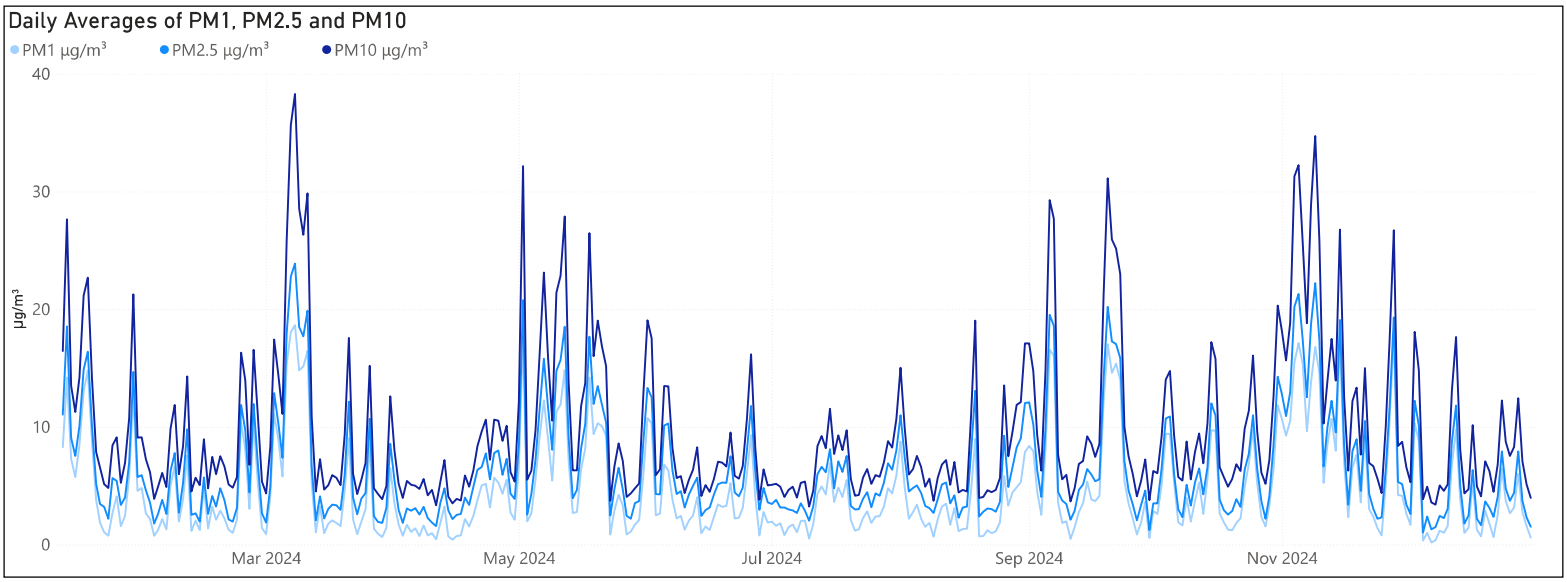
Yearly Averages

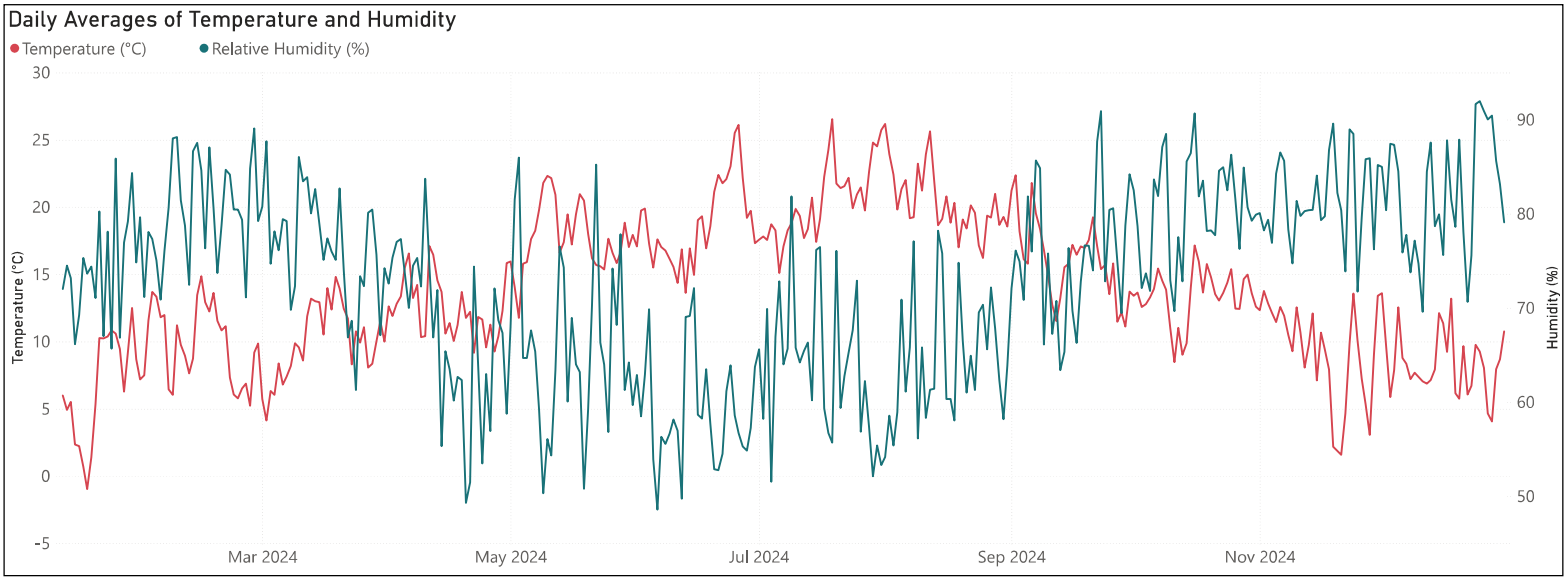
19.80 Average NO2 µg/m³	**11.26** Average NO µg/m³	**50.67** Average O3 µg/m³	**15.54** Average Temperature (°C)
4.98 Average PM1 µg/m³	**7.12** Average PM2.5 µg/m³	**10.50** Average PM10 µg/m³	**69.38** Average Relative Humidity (%)

Wyld's Lane - Worcester

Worcestershire Regulatory Services
Supporting and protecting you







Yearly Averages

13.72 Average NO2 µg/m³	6.66 Average NO µg/m³	55.05 Average O3 µg/m³	13.85 Average Temperature (°C)
4.77 Average PM1 µg/m³	6.54 Average PM2.5 µg/m³	9.88 Average PM10 µg/m³	72.52 Average Relative Humidity (%)

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
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
WRS	Worcestershire Regulatory Services

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