



2023 Air Quality Annual Status Report (ASR)

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

Date: August, 2023

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Report Reference Number	2023
Date	August 2023

Executive Summary: Air Quality in Our Area

Air Quality in Telford & Wrekin

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

The mortality burden of air pollution within the UK is equivalent to 29,000 to 43,000 deaths at typical ages³, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017⁴.

Air quality in the borough of Telford and Wrekin is overall very good however there are locations where pollutants build close to the kerbside of busy roads. The main pollutant of concern in the borough is nitrogen dioxide (NO₂) which is mainly linked to road traffic emissions.

The borough of Telford and Wrekin is a predominantly rural area on the north-eastern edge of Shropshire. The borough has a population of 185,600 (2021 census, Office for National Statistics) covering 29,000 hectares with its major settlement being Telford, which incorporated the existing towns of Dawley, Madeley, Oakengates and Wellington upon its construction as a 'new town'.

The M54 traverses the borough across the main central urban area, and the majority of the main roads within the borough are also focussed in this area, including the A41, the A518, the A5, A442, A4169, and the A4640. There is a main railway line crossing the centre of the borough, as well as an unused rail freight terminal.

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

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

³ Defra. Air quality appraisal: damage cost guidance, January 2023

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

In 2022 there were 7 Part A2 permitted processes, 1 SWIP and 55 part B permitted processes (including petrol filling stations, dry cleaners and mobile plant) within the borough, which are regulated for emissions to the environment by Telford and Wrekin Council. There are more permitted sites that are regulated by the Environment Agency.

Monitoring undertaken in 2022 for nitrogen dioxide shows that air quality within the borough is below the national objective levels set out in law. Historically there has been a hotspot for higher pollutant levels for nitrogen dioxide at the Mill Bank in Wellington, near to the Watling Street Junction and again at Coach Central, the bus station in Telford Town centre. Neither of these sites are considered to expose the public to long term exposure of pollutants such as a school or a person's home would. Levels at these locations are still below the levels recorded in 2019.

Telford and Wrekin do not have any Air Quality Management Areas but there is an Air Quality Strategy, which ensures that air quality is given due consideration and demonstrates the Council's commitment to air quality review and management. Telford & Wrekin Council have recently reviewed and updated their Air Quality Strategy to ensure that a proactive approach to Air Quality is taken within the borough, the Strategy is to be considered by Cabinet in December 2023. If approved, additional information on the outcomes and objectives of the new Air Quality Strategy will be provided in next year's ASR.

Many methods employed to improve air quality are council wide initiatives and cross over a number of teams including Public Protection, Public Health, Transport and Highways, all of these teams are considered stakeholders for the revised Air Quality Strategy and have been instrumental to developing the new strategy.

Actions to Improve Air Quality

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

The Environmental Improvement Plan⁵ sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term PM_{2.5} targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce PM_{2.5} in their areas. The Road to Zero⁶ details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

In 2016, a further five diffusion tubes were introduced on each of the roads that intersect the B5061 Junction by Watling Street, Wellington. This was to support the pre-existing monitoring location which was introduced in 2016. These locations were Mill Bank, Holyhead Road, Watling Street, Dawley Road and Watling Street/ Regent Street Junction. This decision was made as NO₂ concentrations in 2017 raised concern. The Council has obtained further data from these monitoring locations which identified Mill Bank and Watling Street/ Regent Street Junction, two of the roads that intersect this junction, as having the highest NO₂ levels within the borough. Although the NAQO was not exceeded, this has prompted the Council to take further action a part of our commitment to monitoring and striving to see improvements in air quality.

The actions taken so far at the B5061 Junction have included Intelligent Traffic Management through the introduction of intelligent signalling and also anti-idling signage. The introduction of the intelligent signalling aims to improve traffic flow at the junction by allowing the traffic lights to prioritise the roads at the intersection with the most traffic. This is to facilitate regular traffic flow and reduce the amount of time vehicles spend in this location. The aim of the anti-idling signage is to encourage motorists who do not have an auto start/stop feature to

⁵ Defra. Environmental Improvement Plan 2023, January 2023

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

turn off their engines whilst stationary at the junction in a bid to reduce preventable emissions. It is envisaged this will change motorist's behaviour.

These measures have been in place for 4 years and monitoring results from these locations have reduced below national objective levels. While there is some slight fluctuation the levels remain fairly constant in 2021 and 2022. The Council will continue to monitor at these locations to understand if the measures introduced continue to have long-term positive impact.

During 2022, as part of the air quality strategy review, Telford & Wrekin Council have undertaken a review of their diffusion tube monitoring locations to ensure that the most relevant data is being captured, the new monitoring locations will be in place from January 2023.

Although Telford & Wrekin Council are meeting national air quality objectives and do not have any Air Quality Management Areas (AQMAs) within their borough, Telford & Wrekin Council do not wish to be complacent in their approach to air quality, particularly given the expectation of new proposed development within the borough and would like to ensure a proactive approach in its efforts to improve air quality, and the inherently linked public health outcomes and narrowing health inequalities, Telford & Wrekin Council have developed a new Air Quality Strategy, awaiting cabinet approval, to achieve these aims. This is in line with DEFRA guidance which recommends that all local authorities should consider drawing up an Air Quality Strategy.

In September 2022 Telford & Wrekin Council applied for Air Quality Grant funding from Defra to complete a project to monitor air quality (NO₂, PM₁₀, PM_{2.5}, PM₁) at 4 primary schools within the borough. The project would see the development and circulation of educational materials to parents of children attending the schools, the delivery of assemblies to the children to raise awareness on Air Quality as well as a no car day where emissions will be monitored to demonstrate the impact vehicles have on air quality. The funding application also included the procurement of an electric vehicle for use by the Environmental Health Team when conducting air quality monitoring surveys, school visits and other promotional activities. Telford & Wrekin Council were successful in their bid application, the project is in the process of being developed, with a view to being completed in March 2025, further detail on this project will be included in the 2024 ASR.

Conclusions and Priorities

Monitoring data from 2022 has shown overall that air quality in relation to NO₂ concentrations is fairly stable. NO₂ concentrations are not completely stable and do fluctuate slightly year to year due to many influencing factors i.e. weather conditions and road use, however the levels have remained lower than that of 2019.

Although this year there has been no exceedances of the National Air Quality Objectives, the Council is making progress in identifying areas of poorer air quality within the borough through air quality review. The Council's main priorities for the coming year are to continue diffusion tube monitoring for NO₂. The Council will continue to take a pragmatic approach in addressing any further locations identified to have poorer air quality and where necessary liaise with DEFRA. The main aims for the coming year are;

- Implement the review of our air quality strategy which includes strengthening links between inequalities of health and air quality, a review of our current LAQM monitoring, a review of planning policy to ensure that Air Quality is appropriately considered during development and an action plan to improve air quality levels in the borough with the ambition of meeting the World Health Organisation's new Air Quality targets.
- The delivery of an air quality project within 4 schools in the borough aimed at reducing emissions from cars around schools.
- Apply for grant funding to raise awareness of particulate matter emission from domestic solid fuel burning and to allow review of our smoke control areas.
- Continue with parking enforcement across the borough with the intention that parked vehicles do not disrupt traffic flow and cause congestion.
- Continued inspection and maintenance review of the borough cycling and walking routes to identify immediate and longer term improvements as part of the £2.6m Travel Telford Sustainable Transport Fund; and
- Continued consideration and engagement with external stakeholders to improve our electric vehicle charging network across the borough;

Local Engagement and How to get Involved

To reduce air pollution and contribution to clean air everyone living, working and visit the area has the ability to contribute. Every individual and business can promote clean air and help make a difference by considering the following actions:

- Consider using walking, cycling or using public transport for trips including to school, when moving around the borough
- Utilise walking and cycling route maps (available here https://www.telford.gov.uk/downloads/file/1743/walking_and_cycling_map_of_telford_and_wrekin)
- Consider car sharing where possible
- Consider electric/low emission/hybrid vehicle as an option for your next car purchase.
- When travelling by vehicle, try to utilise less busy and congested routes.
- Switch engine off and don't leave it running when your car is waiting stationary.
- Maintain your vehicle by having it serviced regularly and ensure an optimum tyre pressure

For further information please see the information on Telford and Wrekin's website:

http://www.telford.gov.uk/info/20150/pollution/104/air_quality

https://www.telford.gov.uk/info/20465/walking/3621/cycling_and_walking_strategy

Or contact us by phone on 01952 381818

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Protection Team at Telford and Wrekin Council with the support and agreement of the following officers and departments:

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This ASR has been signed off by a Director of Public Health.

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1 Local Air Quality Management

This report provides an overview of air quality in Telford & Wrekin during 2023. 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 Telford & Wrekin 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

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.

Telford & Wrekin Council does not have any declared AQMAs.

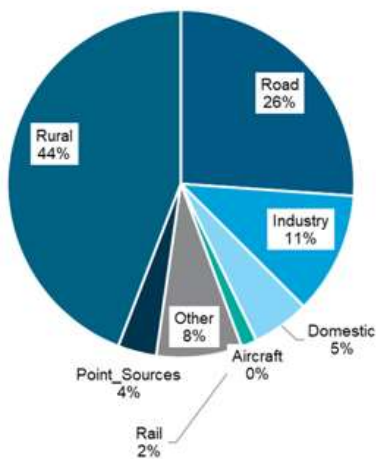
Telford & Wrekin Council monitors NO₂ using diffusion tubes for many years at a range of locations across the borough. Over the period 2016-2022, monitored concentrations ranged from 8-42 µg/m³ as an annual average. However, concentrations at the nearest exposure location were all estimated to be below national air quality objectives. As such, there are no Air Quality Management Areas (AQMAs) within the borough. This has been supported by Defra's Pollution Climate Mapping (PCM) model, which estimates concentrations on key road links. Whilst NO₂ concentrations in the borough are within national objectives, however they do exceed the WHO 2021 Guideline Level for NO₂ (10 µg/m³ as an annual mean).

Telford & Wrekin Council does not currently undertake any PM₁₀ monitoring. Defra estimates on average background PM₁₀ and PM_{2.5} concentrations in 2018 were 12.5 µg/m³ and 7.4 µg/m³ respectively, within the UK's national air quality objectives, but exceeding the WHO's 2021 Air Quality Guideline Level for PM_{2.5} (5 µg/m³ as an annual mean).

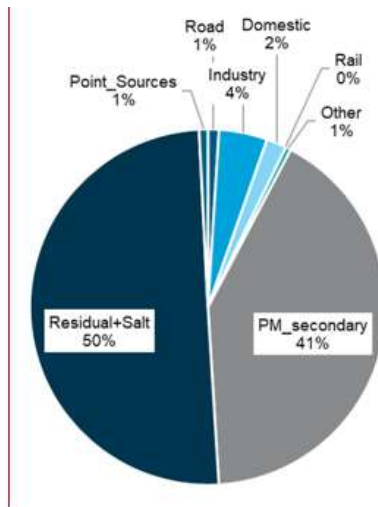
Defra also uses the background maps to calculate a 'population-weighted' annual mean PM_{2.5} concentration, by local authority area. This figure forms the basis of public health calculations in relation to particulate mortality. In 2018, the population-weighted annual mean PM_{2.5} concentration for Telford and Wrekin was 7.7 µg/m³; again, exceeding the WHO's 2021 Air Quality Guideline Level.

Source apportionment of Defra’s background concentrations shows that concentrations of NO_x, PM₁₀ and PM_{2.5} are affected both by emissions that are produced within the borough itself, as well as more regional sources from beyond the borough’s administrative boundaries. These regional sources are particularly important for PM₁₀ and PM_{2.5}, and highlight the need for collective regional, national and international action on air quality.

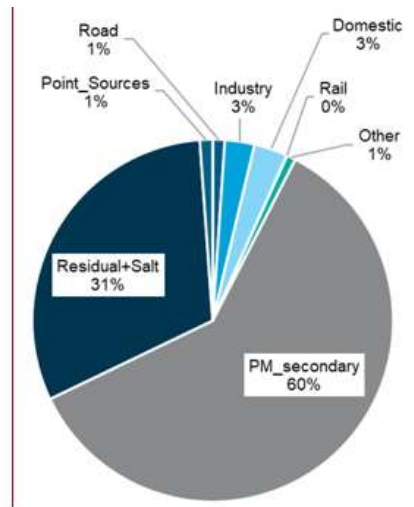
Source Apportionment of NO_x Background Concentrations within Telford & Wrekin 2018 (Defra)



Source Apportionment of PM₁₀ Background Concentrations within Telford & Wrekin 2018 (Defra)



Source Apportionment of PM_{2.5} Background Concentrations within Telford & Wrekin 2018 (Defra)



A further complication for PM₁₀ and PM_{2.5} concentrations, is that they are affected by both ‘direct’ primary emissions, as well as secondary particulates, formed through chemical reactions of precursor pollutants. For example, there is increasing recognition of the role of emissions of ammonia (primarily from agriculture) in the formation of secondary particulate matter in the atmosphere. Reducing PM₁₀ and PM_{2.5} concentrations will therefore require action across a number of sectors .

Progress and Impact of Measures to address Air Quality in Telford and Wrekin

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

1. Trends are presented. However, there is no analysis or discussion of these trends (nor any text comparing results with the air quality objectives) in this ASR. The Council is strongly encouraged to include said analysis and discussion in future ASRs.
2. Although low concentration levels are currently observed across the board, the Council show a good, continued commitment to air quality monitoring. This is particularly apparent as they provide a detailed explanation regarding an AQAP, highlighting that they are in the process of reviewing their Air Quality Strategy, which will inform said AQAP. Information about this is to be included in the 2023 ASR.
3. Robust and accurate QA/QC procedures were applied. Calculations for bias adjustment and the annualisation completed were outlined in detail which enhances the reader's understanding. The deliberation over the choice of bias adjustment used was appropriate and considered robust.
4. It is encouraged that the ASR is reviewed thoroughly for formatting issues prior to future submissions. There were several instances throughout this ASR (e.g. in the table of contents, on pages 14 and 15 of the ASR), where the following error message appears: "Error! Bookmark no defined.". These errors should be rectified.
5. Overall, the report is concise and satisfies the criteria of the relevant standards. The Council should continue their good and thorough work.

Telford and Wrekin has taken forward a single direct measure during the current reporting year of 2022 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1. one measure is included within Table 2.1, with the type of measure and the progress Telford & Wrekin Council have made during the reporting year of 2022 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.1.

Telford & Wrekin Council expects the following measures to be completed over the course of the next reporting year:

- Approve and begin to implement of the new air quality strategy which includes strengthening links between inequalities of health and air quality, a review of our current LAQM monitoring, a review of planning policy to ensure that Air Quality is appropriately considered during development and an action plan to improve Air Quality levels in the borough with the ambition of meeting the World Health Organisation's new Air Quality targets.
- Continued development of Urban Traffic Control, which is a LA funded initiative to improve traffic flow rates and reduce congestion.
- Continued inspection and maintenance review of the borough cycling and walking routes to identify immediate and longer term improvements as part of the £2.6m Travel Telford Sustainable Transport Fund.
- Ensure air quality comments continue to be provided to the development team of the Local Plan to help prioritise potential development sites and highlight methods to ensure future developments do not negatively impact the local air quality.
- Continued consideration and engagement with external stakeholders to improving our electric vehicle charging network across the borough.
- The delivery of an Air Quality project to reduce emissions at 4 schools within the borough.

Whilst the measures stated above will help to contribute towards compliance, Telford & Wrekin Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance, particularly at hotspot locations and continue to improve air quality across the Borough of Telford & Wrekin as a whole, it is hoped that this will be achieved through the implementation of our new Air Quality Strategy and associated Air Quality Action Plan.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	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	Reducing Emissions Around Schools	Promoting Travel Alternatives	School Travel Plans	2023	2025	Local Authority Environmental Health, Local Authority Highways Dept.	Defra AQ grant funding & match funding from Telford & Wrekin Council	Yes	Fully Funded	£100K - £500k	Planning	Unknown at this stage	% reduction of pollutants measured	Questionnaires sent to both pupil and parents to assess knowledge and behaviours prior to project delivery. Educational materials i.e. newsletters and lesson plans are being developed.	Due to other elements of the project (Active Travel & Road Safety) the air quality element will not be delivered until Jan-July as part of the "Love Your Environment" module. This means that project delivery and outcomes have been pushed back to be completed Jan-March 25. The procurement of AQ monitors has been slightly delayed due to the person overseeing/delivering the project being unable to commence work on the project until August 2023.

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

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

Telford & Wrekin Council is taking the following measures to address PM_{2.5}:

PM_{2.5} emissions are regulated across the Borough through various legislative framework. This includes the LAPPC and LA-IPPC regimes under the provision of the Environmental Permitting (England and Wales) Regulations 2016 and smoke control areas brought in under the Clean Air Act 1993. More information relating on the locations of Telford and Wrekin Council Smoke Control Areas are found here:

https://www.telford.gov.uk/info/20358/pollution/1038/smoke_control_zones/2

Telford & Wrekin Council are in the process of applying for funding from Defra to undertake a project to review their smoke control areas, if funding is granted more information on this review will be provided in the ASR for 2023.

In considering the need for additional actions relating to PM_{2.5} it is noted that the Public Health Outcomes Framework Indicator number 3.01 – Fraction of mortality attributable to particulate air pollution for the borough of Telford and Wrekin was noted to be 4.7% in 2021/22-2022/23. This is the third lowest for the whole of the West Midlands region which has an average of 5.5% for 2021/22-2022/23. The two authorities, both with lower values of 4.3% in Shropshire Council and 4.6% in Herefordshire. The West Midlands figure is the same as England's average of 5.5%. As the PHOF indicator for PM_{2.5} shows the mortality due to human-made PM_{2.5}, the fraction is significantly below the national and regional levels and as such it is not considered necessary for any specific actions to be carried out while there are other non-specific interventions taking place which will contribute to reducing anthropogenic PM_{2.5}. However, evidence suggests there is no safe exposure level to PM_{2.5} and in order for Telford and Wrekin to meet national targets there is a commitment to not be complacent, particularly with regard to addressing inequalities within the borough.

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

This section sets out the monitoring undertaken within 2022 by Telford & Wrekin Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2018 and 2022 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Telford & Wrekin Council does not have any automatic monitoring sites.

3.1.2 Non-Automatic Monitoring Sites

Telford & Wrekin Council undertook non- automatic (passive) monitoring of NO₂ at 21 sites during 2021. **Error! Reference source not found.** in Appendix A shows the details of the 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.

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.

3.1.3 Nitrogen Dioxide (NO₂)

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

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

For diffusion tubes, the full 2022 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Error! Reference source not found. in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past five years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

3.1.4 Particulate Matter (PM₁₀)

Telford & Wrekin Council do not currently monitor for this pollutant. There is no evidence that PM₁₀ annual mean concentrations for the past 5 years is likely to exceed the air quality objective of 40µg/m³.

3.1.5 Particulate Matter (PM_{2.5})

Telford & Wrekin Council do not currently monitor for this pollutant.

3.1.6 Sulphur Dioxide (SO₂)

Telford & Wrekin Council do not currently monitor for this pollutant. There are no concerns that air quality objectives for SO₂ are likely to be exceeded.

Appendix A: Monitoring Results

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube Co-located with a Continuous Analyser?	Tube Height (m)
1	Uxacona Way, Oakengates	Roadside	369706	311063	NO2	No	25.0	0.0	No	2.5
2	New Road	Kerbside	370013	312166	NO2	No	13.2	0.1	No	2.4
3	Behind Bluebell Lane	Kerbside	374214	318134	NO2	No	8.0	10.0	No	2.5
4	Barrack Lane	Roadside	373202	316555	NO2	No	5.1	2.1	No	2.3
5	Horton Road	Kerbside	368742	312775	NO2	No	4.2	0.4	No	2.6
6	Apley Avenue	Roadside	365095	312402	NO2	No	41.4	2.5	No	2.4
7	Haybridge Road	Roadside	366626	311627	NO2	No	10.0	0.0	No	2.5
8	Watling Street Outside Swan	Roadside	365918	311056	NO2	No	5.4	2.3	No	2.5
9	Mill Bank	Roadside	365911	311061	NO2	No	2.8	1.2	No	2.4
10	Watling Street	Roadside	366092	311083	NO2	No	4.4	3.9	No	2.3

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube Co-located with a Continuous Analyser?	Tube Height (m)
11	Hollyhead Road	Roadside	365895	311024	NO2	No	20.0	1.6	No	2.4
12	Dawley Road	Roadside	365939	311013	NO2	No	7.8	1.6	No	2.4
13	Watling Street/Regent Street Junction	Roadside	366065	311068	NO2	No	4.4	3.9	No	2.4
14	Mossey Green Way	Roadside	368727	310040	NO2	No	5.4	2.3	No	2.4
15	Nawdale/Lawley Junction	Kerbside	367560	308854	NO2	No	11.2	1.0	No	2.5
16	Madeley Road Ironbridge	Roadside	367513	303444	NO2	No	10.0	0.0	No	2.6
17	Coach Central	Urban Centre	369893	308650	NO2	No	239.0	1.3	No	2.7
18	Dudmaston	Kerbside	370990	308497	NO2	No	7.1	0.5	No	2.5
19	Castle Farm Way	Roadside	372232	309922	NO2	No	20.0	0.0	No	2.3
20	Snedshill Way / Holly Head Road Junction	Roadside	370415	309918	NO2	No	20.0	6.5	No	2.3
21	Shifnal Road	Roadside	371319	309458	NO2	No	33.0	1.5	No	2.5

Notes:

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

(2) N/A if not applicable.

Table A.2 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2022 (%) ⁽²⁾	2018	2019	2020	2021	2022
1	369706	311063	Roadside	100.0	100.0	-	-	23.2	24.8	25.2
2	370013	312166	Kerbside	100.0	100.0	17.5	13.9	11.5	13.3	12.6
3	374214	318134	Kerbside	100.0	100.0	-	-	8.4	9.2	9.4
4	373202	316555	Roadside	100.0	100.0	18.2	17.0	12.3	12.6	12.2
5	368742	312775	Kerbside	100.0	100.0	17.4	16.2	13.0	13.2	12.2
6	365095	312402	Roadside	100.0	100.0	25.4	24.2	18.6	20.4	20.4
7	366626	311627	Roadside	100.0	100.0	-	-	24.3	24.8	22.0
8	365918	311056	Roadside	100.0	100.0	33.9	31.2	24.6	27.4	25.4
9	365911	311061	Roadside	100.0	100.0	42.2	40.0	28.4	33.5	32.1
10	366092	311083	Roadside	100.0	100.0	25.8	25.6	17.1	21.8	19.3
11	365895	311024	Roadside	100.0	100.0	20.5	20.0	16.2	16.5	15.9
12	365939	311013	Roadside	100.0	100.0	23.9	22.4	17.2	19.0	19.2

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2022 (%) ⁽²⁾	2018	2019	2020	2021	2022
13	366065	311068	Roadside	100.0	100.0	33.9	32.2	23.9	25.8	24.1
14	368727	310040	Roadside	100.0	100.0	28.5	27.5	19.9	23.9	24.3
15	367560	308854	Kerbside	100.0	100.0	19.7	15.7	11.9	12.4	11.1
16	367513	303444	Roadside	100.0	100.0	-	-	15.7	15.9	12.8
17	369893	308650	Urban Centre	100.0	100.0	37.0	36.5	25.8	29.1	31.5
18	370990	308497	Kerbside	91.7	92.3	18.3	18.3	13.0	14.7	13.1
19	372232	309922	Roadside	100.0	100.0	-	-	13.5	15.2	15.3
20	370415	309918	Roadside	100.0	100.0	-	-	17.3	18.8	17.7
21	371319	309458	Roadside	91.7	92.3	24.0	24.9	17.7	18.2	18.1

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 $\mu\text{g}/\text{m}^3$.

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

NO₂ annual means exceeding $60\mu\text{g}/\text{m}^3$, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

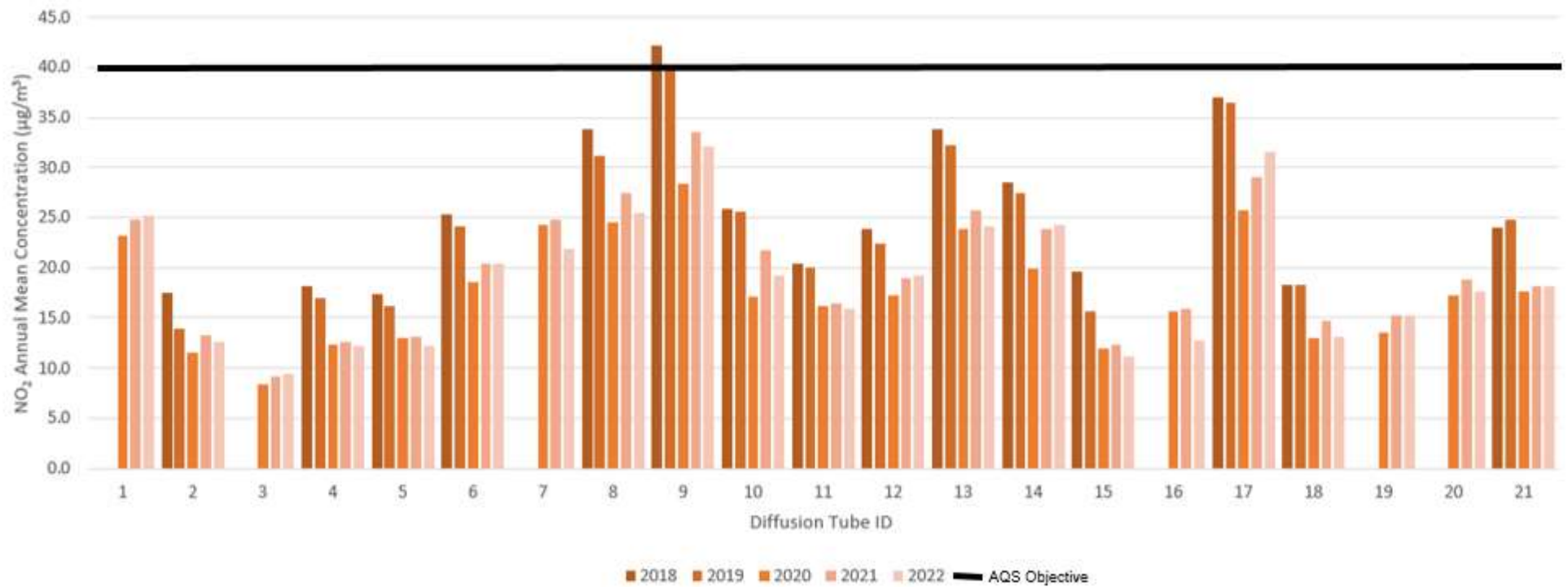
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Figure A.1 – Trends in Annual Mean NO₂ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO₂ 2022 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1	369706	311063	36.0	24.1	41.9	26.4	24.5	23.3	27.2	25.6	28.8	31.9	37.1	37.1	30.3	25.2		
2	370013	312166	19.7	11.5	22.6	16.8	11.6	9.3	12.1	14.9	15.5	12.1	15.3	20.7	15.2	12.6		
3	374214	318134	12.9	7.4	21.9	10.8	6.3	5.1	8.5	9.9	9.9	11.1	14.0	17.7	11.3	9.4		
4	373202	316555	18.9	13.6	17.7	14.3	12.7	11.4	12.9	14.4	15.3	12.5	14.7	18.7	14.8	12.2		
5	368742	312775	22.8	12.5	22.0	12.0	10.1	8.7	10.5	11.1	14.0	14.2	18.1	20.9	14.7	12.2		
6	365095	312402	17.8	20.1	34.1	24.5	21.5	16.4	21.8	23.6	25.5	28.6	31.3	30.5	24.6	20.4		
7	366626	311627	32.5	22.2	32.5	26.5	21.7	20.2	24.9	26.4	28.4	24.1	28.1	30.0	26.5	22.0		
8	365918	311056	23.7	29.4	40.1	32.3	27.2	24.5	29.8	31.1	32.4	27.8	34.2	35.3	30.6	25.4		
9	365911	311061	45.9	37.5	48.6	37.0	34.9	30.4	37.5	37.7	37.8	37.6	39.2	40.6	38.7	32.1		
10	366092	311083	30.2	20.0	30.2	22.3	19.3	15.1	19.6	21.6	29.9	18.9	24.3	27.4	23.2	19.3		
11	365895	311024	24.9	15.0	27.5	19.0	14.0	11.8	15.4	17.8	18.2	18.1	22.5	26.2	19.2	15.9		
12	365939	311013	27.2	17.3	30.6	24.1	19.6	18.6	22.0	23.3	25.5	19.7	23.4	26.0	23.1	19.2		
13	366065	311068	32.1	25.8	39.0	30.1	25.6	22.9	27.9	28.2	22.4	28.3	33.2	33.1	29.1	24.1		
14	368727	310040	34.0	22.5	39.0	27.8	22.8	21.7	26.1	26.9	26.9	30.6	36.1	36.8	29.3	24.3		
15	367560	308854	19.4	10.2	21.0	13.8	9.8	9.3	10.4	12.0	13.0	9.9	13.5	18.9	13.4	11.1		
16	367513	303444	25.1	14.0	13.6	9.9	9.9	13.4	14.9	14.6	10.8	15.0	19.7	23.9	15.4	12.8		
17	369893	308650	45.1	36.6	46.6	30.8	33.2	32.0	36.2	32.0	33.3	40.1	46.6	43.5	38.0	31.5		
18	370990	308497		9.8	26.1	16.7	9.5	8.9	12.2	16.7	17.5	14.7	17.2	24.0	15.8	13.1		
19	372232	309922	26.6	12.9	26.2	17.9	13.2	11.9	15.0	15.4	17.3	18.9	19.6	26.5	18.4	15.3		
20	370415	309918	31.8	16.4	30.0	18.7	12.7	16.2	17.4	18.9	21.7	22.1	24.7	24.8	21.3	17.7		
21	371319	309458	29.5	23.4		19.0	18.4	15.8	18.3	15.8	18.4	25.3	26.8	29.5	21.8	18.1		

- All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1.
- Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.
- Local bias adjustment factor used.
- National bias adjustment factor used.
- Where applicable, data has been distance corrected for relevant exposure in the final column.
- Telford & Wrekin Council confirm that all 2022 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Telford & Wrekin During 2022

Telford & Wrekin Council has not identified any new sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by Telford & Wrekin During 2022

During 2022, as part of the air quality strategy review, Telford & Wrekin Council have undertaken a review of their LAQM monitoring, the review has been included in Appendix F. The review identified that diffusion tube monitoring locations should be changed to ensure that the most relevant data is being captured, the new monitoring locations will be in place from January 2023.

QA/QC of Diffusion Tube Monitoring

Details in relation to the aspects of non-automatic (i.e. passive) monitoring using diffusion tubes are as follows:

- Supplier – Gradko
- Preparation method - 20% TEA in water;
- Monitoring has been completed in adherence with the 2021 Diffusion Tube Calendar

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Telford and Wrekin recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR has been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Telford & Wrekin Council have applied a national bias adjustment factor of 0.83 to the 2022 monitoring data. A summary of bias adjustment factors used by Telford & Wrekin Council over the past five years is presented in Table C.1.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	03/23	0.83
2021	National	03/22	0.84
2020	National	03/21	0.81
2019	National	06/20	0.92
2018	National	06/19	0.92

NO₂ Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO₂ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO₂ concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO₂ monitoring locations within Telford & Wrekin Council required distance correction during 2022.

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

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



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁷

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

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

Appendix F: Review of Existing Air Quality Monitoring Programme

1. Introduction

Air quality monitoring strategies need to change over time to adapt to emerging issues specific to the administrative area. This includes expanding monitoring, moving existing sites to new hotspot areas or removed altogether where continued compliance can be demonstrated. This Technical Note (TN) has been prepared by Atkins in response to Telford & and Wrekin Councils request to review its existing local air quality monitoring strategy.

The review of the air quality monitoring programme was carried out and evaluated against guidance provided in the Defra Local Air Quality Management Technical Guidance (TG16). Additionally, information obtained from the emissions calculations undertaken as part of the interrogation of the base traffic model to identify any potential air quality hotspots has been used to inform this review.

The potential to include low-cost sensors or other monitoring types as part of the recommended air quality monitoring regime has also been considered.

In addition, consideration has been given to future issues of concern, particularly given that the WHO has recently published new guidelines, and the Environment Act requires the setting of at least one new PM_{2.5} target.

2. Review of the Existing Air Quality Monitoring Programme

This chapter presents a review of the existing air quality monitoring programme against guidance provided in TG16 **Error! Bookmark not defined.** and focuses on the components as detailed below:

- Air pollutants of concern
- Monitoring method and equipment required
- Duration of monitoring
- Monitoring site locations, including the representativeness of human exposure and whether the tubes are in a worst-case location
- Process and evaluation of monitoring results

2.1 Air Pollutants of Concern

Air quality in the borough is relatively good, with all pollutants considered under local air quality management meeting national air quality objectives at relevant locations of exposure. However, it has been acknowledged that there are locations where concentrations of nitrogen dioxide are elevated e.g. close to the kerbside of busy roads. Therefore, the main pollutant of concern in the borough is nitrogen dioxide (NO₂) linked to road traffic emissions.

Telford & Wrekin Council acknowledges the evidence that particulate matter (PM₁₀ and PM_{2.5}) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases. Telford & Wrekin Council do not currently undertake any PM₁₀ monitoring, since there is no evidence that PM₁₀ annual mean concentrations for the past 5 years is likely to exceed the air quality objective of 40µg/m³. However, in line with guidance provided in TG16, Telford & Wrekin Council work towards reducing anthropogenic (human-made) particulate matter emissions in areas associated with vehicle use. The actions detailed in the latest Annual Status Report (ASR) 2021, which aim to reduce congestion are anticipated to additionally result in a decrease in emissions of PM_{2.5}.

2.2 Monitoring Method

Passive monitoring using diffusion tubes is currently undertaken to measure nitrogen dioxide (NO₂) in the borough. Diffusion tubes are a cost-effective technique for measuring NO₂. The low cost per tube permits sampling at a number of points in the area of interest; which is useful in highlighting “hotspots” of high concentrations, such as where people are exposed alongside roads.

No Continuous Monitoring Stations (CMS) are operated by the Telford & Wrekin Council. However, as part of DEFRA’s Automatic Urban and Rural Network (AURN), one CMS (Telford Hollinswood) is located within the Council’s administrative area. Telford Hollinswood is an urban background site, located approximately 48m back from the Dale Acre Way⁸ in the Hollinswood area of Telford, and which measures concentrations of NO₂. It has been in operation since 2017, and concentrations of NO₂ are reported on the UK-AIR website. Annual

⁸ UK AIR, Site information for Telford Hollinswood, Available at: https://uk-air.defra.gov.uk/networks/site-info?uka_id=UKA00648

mean concentrations to date have been well below the air quality objective, ranging between 11 $\mu\text{g}/\text{m}^3$ (reported in 2020, a year affected by the COVID pandemic) and 16 $\mu\text{g}/\text{m}^3$ in 2018.

2.3 Monitoring Duration

Diffusion tubes take samples over an approximately 1-month exposure period. As such they are useful for comparison with the national NO_2 annual objective of $40\mu\text{g}/\text{m}^3$ but cannot be used to analyse the number of hours greater than $200\mu\text{g}/\text{m}^3$, to compare with the national NO_2 1-hour objective. However, this is not thought to be of concern given that the peak hourly mean NO_2 concentrations rarely exceed the objective, except at some congested urban roadside sites in the UK. There were no reported exceedances at the Telford Hollinswood urban background site in any year. Furthermore as noted in LAQM TG16, previous research has identified that exceedances of the 1-hour mean standard are unlikely to occur where the annual mean is below $60\mu\text{g}/\text{m}^3$, and this advice from DEFRA will be kept under review.

The latest publicly available data from 2020 as found in ASR 2021 showed that all diffusion tube monitoring sites had a data capture of more than 75% throughout the calendar year, which is the recommended amount for the data to be considered representative of an annual average concentration.

Data for the Telford Hollinswood continuous analyser is available on the UK-AIR website and information is provided on 1-hour mean concentrations. The analyser achieved data capture rates of over 95% in every year since 2018.

2.4 Monitoring Site Locations

Monitoring should ideally be installed at locations relevant for public exposure to avoid the need to undertake corrections for distance.

Passive monitoring of nitrogen dioxide concentrations using diffusion tubes is undertaken by Telford & Wrekin Council at 21 locations within the Council's administrative area as presented in **Error! Reference source not found.** in Appendix A.1, and detailed in **Error! Reference source not found.**, Appendix **Error! Reference source not found.**.

Out of the 21 sites in the Telford & Wrekin Council's diffusion tube monitoring network, 15 are classified as roadside, five as kerbside and one as urban centre. There are no urban background diffusion tube sites, however the Telford Hollinswood AURN CMS is classed as

an urban background site. Urban background monitoring is particularly useful to monitor long term trends in pollutant concentrations given that is less likely to be affected by local factors.

Table 2.1 provides information on the locations of the monitoring sites, with comparison against TG16 screening criteria and site type classifications. There are some questions over the site classifications, and exact locations, however recommendations have been made where possible. If further deployment is available, then consideration could be given to locating diffusion tubes near to schools in the borough.

Table 2-1 - Recommendation Summary and Action Taken

Diffusion Tube ID	Information from ASR 2021	Comparison against the screening criteria presented in TG.16, Table 7.1 and Table 7.7 Site Type Classification	Recommendation	Action
1 Uxacona Way 369706, 311063	<ul style="list-style-type: none"> - New monitoring location in 2020 - Annual mean NO₂ concentration measured 23.2 µg/m³ in 2020 - Site classed as roadside 	<ul style="list-style-type: none"> - Traffic flow is less than 5,000 AADT on Uxacona Way and more than 10,000 AADT Queensway. - Monitoring site is in proximity to sensitive residential receptors which are more than 5 m back from Uxacona Way 	<p>Consider relocating to a location representative of sensitive receptors within closer proximity to Queensway, and on the east side of Queensway which would have higher concentrations due to prevailing wind direction from south west</p> <p>Consider reclassification of site type - to be classed as roadside, the site should ideally be located within 1 to 5 metres of a busy road</p>	Diffusion tube to be decommissioned for 2023 monitoring

Diffusion Tube ID	Information from ASR 2021	Comparison against the screening criteria presented in TG.16, Table 7.1 and Table 7.7 Site Type Classification	Recommendation	Action
2 New Road 370013, 312166	<ul style="list-style-type: none"> - Measured annual mean NO₂ concentrations of between 11.5 and 17.9 µg/m³, between 2016 and 2020 - Site classed as kerbside 	<ul style="list-style-type: none"> - The nearest residential properties to the monitoring site are over 10m back from New Road. - Traffic flow is more than 10,000 AADT on B4373 Wrockwardine Wood Way, which is located over 25 m from monitoring site 	<p>Consider relocating to a location either representative of The Telford Priory School on the other side of the B4373 or in proximity to residential properties closer to the B4373, such as those to the north of this site near Chapel Terrace.</p> <p>Consider reclassification of site type – a kerbside site should be within 1 metre of a busy road</p>	Diffusion tube to be decommissioned for 2023 monitoring
3 Behind Bluebell Lane 374214, 318134	<ul style="list-style-type: none"> - New monitoring location in 2020 - Annual mean NO₂ concentration measured 8.4 µg/m³ in 2020 - Site classed as kerbside 	<ul style="list-style-type: none"> - Traffic flow on Wellington Road is less than 5,000 AADT - Monitoring site is in close proximity to residential property, 10m back from the road. 	<p>Consider relocating to a location representative of sensitive receptors e.g. in proximity to Moorfield Primary School or Newport Girls High School Academy</p> <p>Consider reclassification of site type – a kerbside site should</p>	Diffusion tube to be decommissioned for 2023 monitoring

Diffusion Tube ID	Information from ASR 2021	Comparison against the screening criteria presented in TG.16, Table 7.1 and Table 7.7 Site Type Classification	Recommendation	Action
			be within 1 metre of a busy road	
4 Barrack Lane 373202, 316555	- Measured annual mean NO ₂ concentrations of between 12.3 and 24.6 µg/m ³ , between 2016 and 2020 -Site classed as roadside	- Monitoring site is located approximately 2m from Barrack Lane and 7m from A518 Wellington Road. - Traffic flow on Wellington Road is over 10,000 AADT - The nearest residential properties are located 20 m back from Wellington Road, and 10 m from Barrack Lane	Consider relocation of monitoring site to be closer to Wellington Road - to be classed as roadside, the site should ideally be located within 1 to 5 metres of a busy road	Move to lamppost on Wellington Road, at the entrance to Barrack Lane for 2023 monitoring
5 Horton Road 368742, 312775	- Measured annual mean NO ₂ concentrations of between 13.0 and 17.4 µg/m ³ , between 2016 and 2020 - Site classed as kerbside	- No traffic data for Horton Road are available, but a flow of more than 5,000 AADT is not expected - The monitoring site is in a residential area	Consider relocating to a location representative of sensitive receptors in proximity to Trench Lock Roundabout or the A518, which would be worst-case Consider reclassification of site type – a kerbside site should be within 1 metre of a busy road	Diffusion tube to be decommissioned for 2023 monitoring
6 Apley Avenue 365095,	- Measured annual mean NO ₂ concentrations of between 18.6	- Traffic flow on Apley Avenue is more than 10,000 AADT - The monitoring site is in proximity to Charlton School	Consider the possibility of relocating even closer to the school	Tube to be relocated closer to relevant exposure of

Diffusion Tube ID	Information from ASR 2021	Comparison against the screening criteria presented in TG.16, Table 7.1 and Table 7.7 Site Type Classification	Recommendation	Action
312402	and 25.4 µg/m ³ , between 2016 and 2020 - Site classed as roadside			sensitive receptors at Charlton school
7 Haybridge Road 366626, 311627	- New monitoring location in 2020 - Measured annual mean NO ₂ concentration of 24.3 µg/m ³ in 2020 - Site classed as roadside	- Traffic flow on Haybridge Road is more than 10,000 AADT - Monitoring site is in a residential area	Consider relocating to closer to the junction with the A5223 Whitchurch Drive	No Change
8 Watling Street 365918, 311056	- Measured annual mean NO ₂ concentrations during 2016-2020 ranged between 24.6-34.6 µg/m ³ - Site classed as roadside	- Monitoring site is on a junction with a combined flow of more than 10,000 AADT - There is exposure within 10 m of the kerb	This site is in close proximity to site 9, but has consistently recorded lower concentrations than site 9. Consider relocating to be representative of a sensitive location such as a residential property	No Change
9 Mill Bank	- Measured annual mean	- Traffic flow on Mill Bank is more than 10,000 AADT	No change. This site is in close proximity	No Change

Diffusion Tube ID	Information from ASR 2021	Comparison against the screening criteria presented in TG.16, Table 7.1 and Table 7.7 Site Type Classification	Recommendation	Action
365821, 311095	NO ₂ concentrations during 2017-2020 ranged between 28.4 and 42.2 µg/m ³ - Site classed as roadside	- There is exposure within 5 m of the kerb	to site 8, but has consistently recorded higher concentrations than site 8.	
10 Watling Street 366018, 311063	- Measured annual mean NO ₂ concentrations of between 18.1 and 25.8 µg/m ³ , between 2017 and 2020 - Site classed as roadside	- Traffic flow on B5061 Watling Street is more than 5,000 AADT - Monitoring site is in close proximity to residential property within 10m from the road.	This site is in close proximity to site 13, but has consistently recorded lower concentrations, consider removing this site, given that measured concentrations have been 25.8 µg/m ³ or lower	Diffusion tube to be decommissioned for 2023 monitoring
11 Holyhead Road 365843, 311041	- Measured annual mean NO ₂ concentrations of between 16.2 and 20.5 µg/m ³ , between 2017 and 2020 - Site classed as roadside	- Monitoring site is close to a junction with a combined flow of more than 10,000 AADT - Holyhead Road has a traffic flow of less than 5,000 AADT movements - Monitoring site is set back from the junction	Consider this site could be relocated nearer to site of relevant exposure such as the properties on south side of B5061 or discontinued given measured concentrations of 20.5 µg/m ³ or lower	Diffusion tube to be decommissioned for 2023 monitoring
12	- Measured annual mean NO ₂	- Traffic flow on Dawley Road is less than 10,000 AADT movements	Consider this site could be relocated nearer to junction at	Diffusion tube to be decommissioned for 2023 monitoring

Diffusion Tube ID	Information from ASR 2021	Comparison against the screening criteria presented in TG.16, Table 7.1 and Table 7.7 Site Type Classification	Recommendation	Action
Dawley Road 365933, 311008	concentrations of between 17.2 and 23.9 µg/m ³ , between 2017 and 2020 - Site classed as roadside	- There is exposure within 10 m of the kerb	a site of relevant exposure such as the properties on east side of Dawley Road, or discontinued given measured concentrations of 23.9 µg/m ³ or lower	
13 Watling Street/ Regent Street Junction 366096, 311071	- Measured annual mean NO ₂ concentrations between 2016 and 2020 ranged between 23.9 and 33.9 µg/m ³ - Site classed as roadside	- Monitoring site is close to a junction with a combined flow of more than 10,000 AADT - Traffic flow on B5061 Watling Street is more than 5,000 AADT	No change. This site is in close proximity to site 10, but has consistently recorded higher concentrations than site 10	No Change
14 Mossey Green Way 368666, 310315	- Annual mean NO ₂ concentrations during 2016-2020 ranged between 19.9 and 38.2 µg/m ³ - Site classed as roadside	- Traffic flow on B4373 Mossey Green Way is more than 10,000 AADT movements - Monitoring site is not in close proximity to sensitive receptors	Consider relocating to a location in proximity to housing such as that which is closer to the M54 to the south	Diffusion tube to be decommissioned for 2023 monitoring

Diffusion Tube ID	Information from ASR 2021	Comparison against the screening criteria presented in TG.16, Table 7.1 and Table 7.7 Site Type Classification	Recommendation	Action
15 Newdale/ Lawley Junction 367521, 308766	<ul style="list-style-type: none"> - Annual mean NO₂ concentrations during 2016-2020 range between 11.9 – 32.0 µg/m³ - Site classed as kerbside 	<ul style="list-style-type: none"> - Monitoring site is close to a junction with a combined flow of more than 10,000 AADT - Monitoring site is in close proximity to Lawley Village Primary Academy 	<p>No change.</p> <p>Consider reclassification of site type - to be classed as kerbside, the site should ideally be located within 1 metre of a busy road</p>	No Change
16 Madeley Road Ironbridge 367513, 303444	<ul style="list-style-type: none"> - New monitoring location in 2020 - Measured annual mean NO₂ concentration of 15.7 µg/m³ in 2020 - Site classed as roadside 	<ul style="list-style-type: none"> - Traffic flow on Madeley Road is less than 5,000 AADT movements - Monitoring site is not in close proximity to sensitive receptors 	Consider relocating to other side of the road in proximity to housing or to another sensitive receptor such as a school within Ironbridge	Diffusion tube to be decommissioned for 2023 monitoring
17 Coach Central 369893, 308650	<ul style="list-style-type: none"> - Measured annual mean NO₂ concentrations during 2016-2020 ranged between 25.8 - 37.0 µg/m³ - Site classed as urban centre 	<ul style="list-style-type: none"> - Traffic flow on Northfield St is more than 5,000 AADT 	This site is in proximity to the bus station, rather than being representative of an urban centre such as a pedestrian shopping street. Consider relocating to a location representative of a	Diffusion tube to be decommissioned for 2023 monitoring

Diffusion Tube ID	Information from ASR 2021	Comparison against the screening criteria presented in TG.16, Table 7.1 and Table 7.7 Site Type Classification	Recommendation	Action
			location where the public could spend an hour or more	
18 Dudmaston 370990, 308947	<ul style="list-style-type: none"> - Measured annual mean NO₂ concentrations of between 13.0 and 18.3 µg/m³, between 2016 and 2020 - Site classed as kerbside 	<ul style="list-style-type: none"> - Traffic flow on Dudmaston is not known - Monitoring site is in close proximity to sensitive receptors 	<p>Consider this site could be discontinued given measured concentrations of 18.3 µg/m³ or lower</p> <p>Consider reclassification of site type – a kerbside site should be within 1 metre of a busy road</p>	Diffusion tube to be decommissioned for 2023 monitoring
19 Castle Farm Way 372232, 309922	<ul style="list-style-type: none"> - New monitoring location in 2020 - Annual mean NO₂ concentration of 13.5 µg/m³ measured in 2020 - Site classed as roadside 	<ul style="list-style-type: none"> - Traffic flow on Castle Farm Way is more than 10,000 AADT - Monitoring site is in close proximity to sensitive receptors 	Consider relocating this site to the residential area in proximity to the A5/A4640 junction, particularly if the 2021 average concentration is lower than 20 µg/m ³	Diffusion tube to be decommissioned for 2023 monitoring
20 Snedshill/ Holyhead Road Junction	<ul style="list-style-type: none"> - New monitoring location in 2020 - Annual mean NO₂ concentration of 	<ul style="list-style-type: none"> - Traffic flow on Snedshill Way/Holyhead Road Junction is more than 10,000 AADT movements - There is exposure within 20 m of the monitoring site 	Consider relocating this site to a nearby school such as Priorslee Primary School, St. George's CoE Primary	Diffusion tube to be decommissioned for 2023 monitoring

Diffusion Tube ID	Information from ASR 2021	Comparison against the screening criteria presented in TG.16, Table 7.1 and Table 7.7 Site Type Classification	Recommendation	Action
370415, 309918	17.3 µg/m ³ measured in 2020 - Site classed as roadside		School, or Wombridge Primary School, particularly if the 2021 average concentration is lower than 20 µg/m ³	
21 Shifnal Road 371319, 309365	- Measured annual mean NO ₂ concentrations of between 17.7 and 25.5 µg/m ³ , between 2017 and 2020 - Site classed as roadside	- Traffic flow on Shifnal Road is more than 5,000 AADT movements - Monitoring site is not in close proximity to sensitive receptors	Consider relocating this site to a nearby sensitive receptor or school such as Priorslee House Care Home, Priorslee Primary School, St. George's CoE Primary School, or Wombridge Primary School, given measured concentrations of 25.5 µg/m ³ or lower	Diffusion tube to be decommissioned for 2023 monitoring

Table 2.2 details the new monitoring sites for 2023, including rationales for their locations.

Table 2-2 – New Monitoring Locations for 2023

Diffusion Tube ID	Site Name	New or Existing Site	Rationale
1	Stafford Road, Oakengates	New	Representative of relevant exposure of sensitive receptors in close proximity to A442.
2	Station Hill, Oakengates	New	Representative of relevant exposure of sensitive receptors in close proximity to A442. New location to the East side of

Diffusion Tube ID	Site Name	New or Existing Site	Rationale
			A442 as prevailing wind South Westerly so pollution likely to be higher.
3	Chapel Terrace	New	Site NW of B4373, prevailing wind is South westerly. Representative of exposure to sensitive receptors. Couldn't identify a suitable location nearer Telford Priory School.
4	Barrack Lane	Existing	Tube has been relocated in this area as per the recommendations in table 2.1
5	Wellington Road, Newport	New	Outside Newport Girls High School which is next to Moorfield Primary school. Both are representative of relevant exposure but location outside High school is more suitable siting.
6	Apley Avenue	Existing	Tube has been relocated in this area as per the recommendations in table 2.1
7	Haybridge Road	Existing	No Change
8	Watling Street Outside Swan	Existing	No Change
9	Mill Bank	Existing	No Change
10	Trench Road	New	Taken into account worst case scenario and siting closer to the Trench Lock Roundabout.
11	Ryebank Road, Ketley Bank	New	Representative of residential properties (sensitive receptors) in close proximity to M54 (North of M54)
12	Garfield Road, Overdale	New	Representative of residential properties (sensitive receptors) in close proximity to M54 (North of M54)
13	Watling Street/Regent Street Junction	Existing	No Change
14	Ironbridge Road, Madeley	New	Closest location near Woodlands Primary and Nursery School. Relevant exposure of sensitive receptors

Diffusion Tube ID	Site Name	New or Existing Site	Rationale
15	Newdale/Lawley Junction	Existing	No Change
16	Southwater	New	Allows data for exposure where public could spend an hour or more.
17	Berkeley Close, Priorslee	New	Residential area located in close proximity to A5 and A4640 (Castle Farm Way)
18	Priorslee Avenue, Priorslee	New	Relevant for exposure of sensitive receptors at the school.
19	Shifnal Road, Priorslee	New	Relevant for exposure of sensitive receptors at the Care Home.
20	A41 Newport	New	Relevant exposure for particularly vulnerable age group at Children's World Nursery
21	Downmead, Hollinswood	New	Relevant exposure of vulnerable group at Hollinswood & Priorslee Medical Centre
22	Bridge Road, Horsehay	New	Local concern raised recently about the emissions from the steam railway.
23	Grainger Drive, Apley Castle	New	Relevant exposure at The Princess Royal Hospital and hospital.

2.5 Process and Evaluation of Monitoring Results

The latest publicly available monitoring results for Telford & Wrekin Council have been processed as per guidance provided in TG16. Annualisation is conducted where data capture was less than 75% and more than 33%, although in 2020, all monitoring sites achieved an annual data capture of 75%. Results have been bias adjusted using a national factor and where applicable have been distance corrected to the nearest location relevant for exposure in line with TG16.

It is considered best practice to co-locate diffusion tubes in triplicate with a nearby automatic monitoring station to help provide a local bias adjustment factor.

3. Hotspot Identification

The 2019 emissions inventory has shown that the highest NO_x emissions from traffic sources (g/km/s) are located along the M54 and A442 Queensway (between Randlay Roundabout and Stirchly Roundabout). Other locations with elevated emission relative to the local road network are along A roads within Telford including the A5223 (at Arleston and Leegomery), the A41, the A518 and further sections of the A442 within Telford.

The highest PM₁₀ emissions from traffic sources (g/km/s) are located along the A5, A5223 at Telford College, A518 at Lilleshall and A41 at the A518 Stafford Road junction.

Approximate receptor counts in close proximity to the road links with the highest emissions (NO_x and PM₁₀) and those identified as at or approaching V/C in the Telford Strategic Transport Model – Model Forecasting Report are shown in Table . Table 3.1 also provides recommendations after consideration of the current air quality monitoring strategy.

Table 3-1 - Receptors in relation to road links with the highest emissions

Source	Road link	Approx. number of Receptors within 100 m	Approx. number of Receptors within 200 m	Location of Monitoring Sites and Sensitive Receptors
2019 Emissions Inventory NOx emissions	M54	740 (inc Ecoll Wood Academy) The Wrekin & the Ercall SSSI ecological receptor	1,672 (inc 6 educational facilities) The Wrekin & the Ercall SSSI ecological receptor	Monitoring Site 21 is approximately 30m back from the M54. Queenswood Primary School and Nursery, and Ercall Wood Academy are approximately 20m and 50m back from the M54, respectively and monitoring is advised.
	A442 Queensway (between Randlay Roundabout and Stirchly Roundabout)	30	110	There are no roadside or kerbside monitoring sites alongside this road link Residential receptors approximately 50m back from A442, on Havenwood or Owen Close.
2019 Emissions Inventory PM ₁₀ emissions	A5	5	8	There are no roadside or kerbside monitoring sites alongside the A5.
	A5223 at Telford College	32	130 (inc Telford College)	Monitoring Site 7 is a kerbside location on Haybridge Road and approximately 75m back from the A5223. There are residential properties and Telford College in close proximity to Whitchurch Drive
	A518 at Lilleshall	5	30	Monitoring Site 5 is a kerbside location on Horton Road and approximately 110m back from the A518

Source	Road link	Approx. number of Receptors within 100 m	Approx. number of Receptors within 200 m	Location of Monitoring Sites and Sensitive Receptors
	A41 at the A518 Stafford Road junction	45 (in ChildrensWorld Newport)	195 (in ChildrensWorld Newport)	There are no roadside or kerbside monitoring sites in the vicinity. There are residential properties near to the junction. Consider monitoring at the location of the nursery
Telford Strategic Transport Model – Model Forecasting Report Link V/C	A518 between Telford and Newport	26	60	Monitoring Site 4 is a roadside location on Barrack Lane and approximately 7 m back from the A518
	M54 Junction 6 eastbound onslip	1	34	There are no roadside or kerbside monitoring sites in the vicinity. There are no receptors within 100m of the M54 Junction 6
	A442, through the Hollinswood Interchange	34	180	Monitoring Site 18 is a kerbside location on Dudmaston and approximately 45 m back from the A442.
	A442 Tweedale Interchange	29	130	There are no roadside or kerbside monitoring sites in the vicinity. There are residential properties in proximity to the Tweedale Interchange.
	A41 at the A518 Stafford Road junction	50 (inc ChildrensWorld Newport)	295 (in ChildrensWorld Newport)	There are no roadside or kerbside monitoring sites in the vicinity.

Source	Road link	Approx. number of Receptors within 100 m	Approx. number of Receptors within 200 m	Location of Monitoring Sites and Sensitive Receptors
				<p>There are residential properties in proximity to the junction and a nursery.</p> <p>Consider monitoring at the location of the nursery</p>
Telford Strategic Transport Model – Model Forecasting Report Junction V/C	The Cherry Pink and International Centre car park junction with St Quentin Gate	4	130	Monitoring Site 17 is an urban centre location, located approximately 5m back from Northfield Street and 100 to the west of this link.
	A442 Hollinswood Interchange near A5 Telford Way	0	2 (inc a nursery and a medical facility)	<p>There are no roadside or kerbside monitoring sites in the vicinity.</p> <p>There are no residential receptors immediately adjacent this road link</p> <p>Consider monitoring at the location of the nursery</p>
	Victoria Road / The Parade junction, Wellington	28	265 (inc Wellington Medical Practice)	<p>There are no roadside or kerbside monitoring sites in the vicinity.</p> <p>There are no residential receptors immediately adjacent to the junction.</p>

4. Potential for Using Low Cost Sensors for Future Monitoring

4.1 Low Cost Sensors

There has been a significant growth in the development of low-cost sensor systems capable of measuring air pollutants in recent years, which are typically cheaper to purchase and operate when compared to a continuous analyser. As such they represent an alternative method of monitoring given that they can be deployed in more locations. However, there is a trade-off with the accuracy and precision of the measurements made.

Low cost sensors typically deployed by other local authorities include AQ Mesh, most notably throughout London as part of the Breathe London pilot project and Zephyrs⁹, used in cities such as Coventry, Leicester and Liverpool.

Both types of sensor measure NO₂ using electrochemical sensors and PM using a light-scattering optical particle counter. LAQM TG16 provides information on additional monitoring techniques and notes that these types of monitors are not currently approved for NO₂, but they may be suitable as supplementary monitoring.

DEFRA have approved a number of other types of monitoring techniques for measuring PM, although none of these include the AQ Mesh and Zephyr sensors. Light scattering monitors which can be used to provide indicative measurements of PM_{2.5} and PM₁₀ are certified using the Environment Agency's MCERTS scheme. However, these instruments are not considered sufficiently accurate to allow comparison with air quality objectives and are typically used over short-term periods at construction sites to identify any peaks in concentrations.

4.2 Source Apportionment

The source apportionment studies of the mapped background concentrations in the borough show that, other than regional sources, the largest contribution to NO_x is from road sources (26%), while for PM, the contribution from primary sources is less than 10%.

This suggests that the focus for NO₂ should continue to be road sources, while there is possibly little merit in monitoring PM within the borough given the high component of sources outside of the control of Telford & Wrekin Council.

⁹ [Zephyr Air Quality Monitor | EarthSense](#)

4.3 New WHO Guidelines

However, it is recognised that there is no safe limit for PM concentrations, and the latest WHO guidelines recommend stringent levels of $15 \mu\text{g}/\text{m}^3$ and $5 \mu\text{g}/\text{m}^3$ for PM_{10} and $\text{PM}_{2.5}$ respectively, with interim targets of $20 \mu\text{g}/\text{m}^3$ and $10 \mu\text{g}/\text{m}^3$. Additionally, the Environment Act requires the introduction of new criteria for $\text{PM}_{2.5}$, as well as a review of the National Air Quality Strategy. Hence it will be important to ensure consideration of $\text{PM}_{2.5}$ is undertaken in some manner.

Given that DEFRA has added more $\text{PM}_{2.5}$ monitors to its AURN monitoring sites, one potential solution to include $\text{PM}_{2.5}$ monitoring within the borough would be to include $\text{PM}_{2.5}$ monitoring at the Telford Hollinsworth site. Given that this is an urban background site, it would be in an optimal location to consider trends in concentrations over time.

4.4 West Midlands Data

Measured annual mean $\text{PM}_{2.5}$ concentrations at AURN sites in the West Midlands are provided in Table 4.1. These data show that concentrations at some sites were above the interim $10 \mu\text{g}/\text{m}^3$ target in years up to 2019, but met this target in 2020, presumably as a result of the reduction in traffic during the COVID pandemic, but also in 2021, when there were fewer restrictions. In 2020, however, even with the reduction in traffic, $\text{PM}_{2.5}$ concentrations were still above the latest WHO guideline of $5 \mu\text{g}/\text{m}^3$, suggesting that further measures will be necessary to meet this stringent guideline.

Table 4-1 – Measured Annual Mean $\text{PM}_{2.5}$ Concentrations at AURN sites in the West Midlands, $\mu\text{g}/\text{m}^3$

2015	2016	2017	2018	2019	2020	2021
9-12	10-17	9-12	9-12	9-10	7-8	7-9

Similarly, measured annual mean PM_{10} concentrations at AURN sites in the West Midlands are provided in Table 4.2. These data show that concentrations at all sites were meeting or were below the interim $20 \mu\text{g}/\text{m}^3$ target in years up to 2019, but all sites were below this target in 2020, presumably as a result of the reduction in traffic during the COVID pandemic, but also in 2021, when there were fewer restrictions. In 2020, however, even with the

reduction in traffic, PM₁₀ concentrations were still above the latest WHO guideline of 15 µg/m³ at some sites, suggesting that further measures may still be necessary to meet this stringent guideline.

Table 4-2 – Measured Annual Mean PM₁₀ Concentrations at AURN sites in the West Midlands, µg/m³

2015	2016	2017	2018	2019	2020	2021
15-18	15-20	15-18	14-19	11-20	11-17	10-18

Measured annual mean NO₂ concentrations at AURN sites in the West Midlands are provided in Table 4.3. These data show a wide range in concentrations, given that these are representative of all site types in the West Midlands, with some sites exceeding the 40 µg/m³ objective in all years up to 2019. However, all sites were below this target in 2020, presumably as a result of the reduction in traffic during the COVID pandemic, but also in 2021 when there were fewer restrictions. In 2020, however, even with the reduction in traffic, NO₂ concentrations were still above the latest interim WHO targets of 10, 20 and 30 µg/m³, suggesting that further measures will be necessary at the majority of sites to meet these stringent guidelines. Only one site, Leominster, a suburban background site, has recorded NO₂ concentrations below 10 µg/m³ in all years since 2015.

Table 4-3 – Measured Annual Mean NO₂ Concentrations at AURN sites in the West Midlands, µg/m³

2015	2016	2017	2018	2019	2020	2021
8-61	8-61	6-56	8-53	9-51	7-36	7-38

4.5 Summary

Analysis of data in the West Midlands region indicates that the WHO interim targets for PM₁₀ and PM_{2.5} can be met, particularly with the reduction in traffic seen during the 2020 pandemic, although it will be harder to meet the more stringent WHO guidelines at some sites. However, meeting the WHO interim targets and guideline for NO₂ may be a considerable challenge, and therefore it is still recommended that monitoring of NO₂ should continue.

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.