

WARRINGTON Borough Council



2024 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 2024

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Executive Summary: Air Quality in Our Area

Air Quality in Warrington

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. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year¹.

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution².

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})	<p>Particulate matter is everything in the air that is not a gas.</p> <p>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.</p> <p>PM₁₀ refers to particles under 10 micrometres. Fine particulate matter or PM_{2.5} are particles under 2.5 micrometres.</p>

¹ UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

In order to fulfil its statutory obligations, Warrington Borough Council undertakes monitoring of air quality across the Borough. This monitoring is in the form of real time and non-automatic/passive monitoring at various locations. The results are compared against national limits, known as objectives, which have been set based on health grounds. The monitoring programme is reviewed regularly to identify the areas most affected, with new developments or changes in traffic flow identified that might impact on an area or that may introduce new receptors close to a significant source.

As part of the reporting process, the Council must assess what actions they are taking now and what planned action, if any, should be taken in the future, within an Air Quality Action Plan (AQAP). The principal pollutants of concern within Warrington are those mainly associated with road traffic, specifically Nitrogen Dioxide (NO₂), and Particulate Matter (PM).

There are two Air Quality Management Areas (AQMAs) within the Borough, which were declared because levels of NO₂ exceeded the national annual mean objective.



The predominant source of NO₂ at a local level relates to road transport. When considering vehicle miles travelled on Warrington roads, using the Department for Transport figures, traffic volumes remained relatively consistent between 2016 and 2019 for all vehicle types. Notably due to Covid impacts, the overall traffic volume reduced by 22% on average during 2020, remained 14% less during 2021 when compared to 2019, and whilst it has increased in 2023, traffic levels are still 94% of 2019.

Whilst air quality levels are compared against the national objectives, the Council recognises that health benefits can still be realised by reducing pollution levels below these limits.

Local priorities revolve around a successful economy, reducing deprivation and improving health inequalities across the wards. The Health and Wellbeing Strategy 2024-2028 (Living Well in Warrington) sets out a vision for improving health and wellbeing across the borough. This strategy sets out eight priorities including “Pursue environmental quality, sustainability and health equity together” and to “help address poor air quality, diesel buses will be replaced with electric, promoting green travel and reducing carbon emissions.”

The Council recognises the need to deliver its ambitious plans for a strong local economy, and the need for new housing provision. The local authority has an ambition to do this within a sustainable framework and in line with its duty to improve the health of the people in its area which includes improving air quality.

The Local Plan was formally adopted in December 2023. This sets out the housing and employment need for the borough until 2038/39. Detailed work carried out by the Council shows that Warrington has a need to provide 14,688 new homes and 316.26 hectares of employment land by 2038, along with the required supporting infrastructure. The associated increase in traffic, has been assessed for any impact on air quality as part of the AQAP. This concluded that levels of NO₂ are expected to improve due to the increased uptake of low emission vehicles, but that PM_{2.5} concentrations will see less of an improvement and will remain of concern.

The Council is committed to working with relevant partners, for example the Highways Agency, to develop actions to further improve air quality, and with the UK Health Security Agency to gain health evidence and advice of health impacts at a local level.

The current AQMAs, air quality reports and air quality data are available to be viewed at www.warrington.gov.uk/airquality

Going forward, the Council expects levels of NO₂ to continue to improve as long as actions within the AQAP and LTP4 are enacted and emissions from the transport sector are reduced. The same level of improvement is not expected for PM_{2.5} and the focus will need to change to concentrate on measures to reduce sources of this pollutant.

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 Plan³ 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 Strategy⁴ provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero⁵ 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.

The Warrington Air Quality Action Plan (AQAP) was formally adopted in April 2018 and revised in 2021 due to a number of actions being completed. The AQAP and related policies have been developed to ensure that measures aimed at reducing levels of NO₂ are complementary to reducing PM_{2.5}. The main priority is to try to tackle the exceedances of NO₂ and to improve air quality generally, not just within the AQMAs but across the wider borough.

An Air Quality Programme Board to oversee implementation of the AQAP has been set up, chaired by the Director of Environment & Transport, and includes Directors and senior management that oversee public health, planning, transport, procurement and climate change alongside Portfolio Council members and a representative from the Health Security Agency. The AQAP sits alongside and informs major new Council policies, specifically the new adopted Local Plan and the updated Local Transport Plan (LTP4). The focus has been on embedding air quality as a major aspect within the Local Plan and

³ Defra. Environmental Improvement Plan 2023, January 2023

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

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

the Local Transport Plan (LTP4). Actions have continued to aim at improving traffic flows, increasing cycling and use of travel planning.

Specific actions completed in 2023 are:

- **Local Plan Review**

The Local Plan was formally adopted at a meeting of the full council on 4th December 2023 and is now the statutory Development Plan for the Borough 2038/39. This replaces the Local Plan Core Strategy 2014 and will be used in the determination of planning applications.

- **Environmental Protection SPD**

A revised document has been prepared and will be adopted alongside the Local Plan.

- **Electric Taxi Strategy**

A final version of the strategy was prepared in 2023 and has been published.

- **Anti-Idling Campaign**

Several schools in Warrington took part in an Anti-Idling campaign in conjunction with Warrington Borough Council. The purpose of the campaign was to increase awareness of air quality and the impact idling vehicles can have. Pupils will be monitoring the situation and making recommendations to drivers.

Conclusions and Priorities

In 2023 the levels of NO₂ have reduced compared to 2022 at all locations. Furthermore, levels were lower than in 2020 during the pandemic at a number of locations. However, there has been a trend of gradual reduction in NO₂ levels over the last few years. The levels of NO₂ at all locations across the borough now meet the national objectives/standards, within and outside of the AQMAs. Therefore, the Council plan to revoke both AQMAs following consultation.

Unlike the reduction in levels of NO₂, there has been only a slight improvement in PM levels (PM₁₀ and PM_{2.5}) compared to previous years. This indicates that particulates are less affected by traffic and there are alternative sources such as domestic burning and transboundary influences.

Further details on the results for 2023 are provided within Appendix A.

The AQAP was first adopted in 2018 and supplemented the adopted Local Plan and the Local Transport Plan (LTP4). The Council updated the AQAP which was published in January/February 2022, following consultation during 2021. The AQAP provides detail on all completed and ongoing actions. Progress with this revised version is presented in this report.

The Council considers that actions contained within the AQAP should be prioritised and implemented, where possible, to improve air quality in order to meet the national objectives in the longer term. It is also acknowledged that actions to improve air quality have additional positive benefits by improving health and to deliver sustainable growth in the longer term. The focus of the AQAP is to improve air quality within the Warrington AQMA but also to improve concentration across the wider borough. Measures available to the Council to improve air quality though within the Motorway AQMA remain limited without support from Highways England.

Local Engagement and How to get Involved

Whilst the Council has a strategic position to improve air quality, there are many actions that can be taken individually by the public and private sector to reduce individual emissions. These include cycling and walking, improved driving style to reduce fuel cost and increased use of public transport. All these actions can have the additional benefit of improving health and wellbeing as well as making financial savings.

Additional information is available on the Council Website for Travel Warrington at:

www.warrington.gov.uk/traffic-and-travel

Additional information on air quality, including advice on smoke control areas and monitoring data, is available on the Council website at:

www.warrington.gov.uk/airquality

Further information on air quality and actions that can be taken is available by emailing the Environmental Protection team at: environmental.health@warrington.gov.uk

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Protection Team of Warrington Borough Council Local with the support and agreement of the following officers and departments:

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This ASR has been approved by: The Air Quality Programme Board

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

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

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1 Local Air Quality Management

This report provides an overview of air quality in Warrington 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 Warrington Borough 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 Warrington can be found in Table 2.1. The table presents a description of the two AQMAs that are currently designated within Warrington. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMA(s) and also the air quality monitoring locations in relation to the AQMA(s). The air quality objectives pertinent to the current AQMA designation(s) are as follows:

- NO₂ annual mean

Warrington Borough Council proposes to revoke both AQMA's after a period of consultation.

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
Motorway AQMA	Declared 2001	NO2 Annual Mean	An area 50m from roadside around the M62, M6 and M56	YES	47 µg/m ³	27.8 µg/m ³	3	Warrington Air Quality Action Plan 2022	www.warrington.gov.uk/airquality
Warrington AQMA	Declared 2016	NO2 Annual Mean	Around the town centre and major arterial roads	NO	54 µg/m ³	32.4 µg/m ³	2	Warrington Air Quality Action Plan 2022	www.warrington.gov.uk/airquality

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

2.2 Progress and Impact of Measures to address Air Quality in Warrington

Defra's appraisal of last year's ASR identified various inconsistencies/errors which were addressed.

The following amendments were acknowledged:

1. Inconsistencies between the ASR Information Tables template and submitted report have been addressed, and data provided within the two documents now match.
2. Details regarding the annualisation of CM1 have now been included within Table C.1.
3. The empty column has been removed from Table C.1.

The following comments were outlined to help inform future reports:

1. The Council has included the most recent data for the Fraction of Mortality Attributable to Particulate Pollution, including a figure comparing the Borough to surrounding areas. The Council should continue to include discussion regarding these statistics in future ASRs.
2. Figures highlight the monitoring locations clearly, with monitoring sites labelled clearly. It is easy to distinguish between automatic and passive monitoring sites. It may be useful for the Council to add a scale bar and north-arrow to the figures for completeness.
3. A discussion regarding changes in monitoring sites has been included, with details on which sites have been removed and reasoning for any sites that have been moved. One site (DT26) was moved to an area with congestion, highlighting that the Council is committed to highlighting areas where air quality may be poor. The Council should note any further changes to their monitoring network in future ASRs and continue to monitor in places where air quality may be poor.
4. There are several cross-referencing errors, including within the Table of Contents and within Appendix C.
5. The Council has provided an additional Appendix regarding traffic levels in 2022. This highlighted the reasoning behind the trends shown in monitoring data,

including reasoning for why concentrations remain lower than 2019 levels. If the Council feels that this discussion is appropriate to explain trends in concentrations in future years, this discussion should continue in future ASRs.

Warrington Borough Council has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Several measures are included within Table 2.2, with the type of measure and the progress Warrington have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective Action Plans.

Key completed measures are:

- **Local Plan Review**

The Local Plan was formally adopted at a meeting of the full council on 4th December 2023 and is not the statutory Development Plan for the Borough 2038/39. This replaces the Local Plan Core Strategy 2014 and will be used in the determination of planning applications.

- **Environmental Protection SPD**

A revised document has been prepared and will be adopted alongside the Local Plan.

- **Electric Taxi Strategy**

A draft version of the strategy was prepared in July 2022, and following amendments in September 2022 is due to be published by mid-2023.

- **Anti-Idling Campaign**

Several schools in Warrington are taking part in an Anti-Idling campaign in conjunction with Warrington Borough Council. The purpose of the campaign is to increase awareness of air quality and the impact idling vehicles can have. Pupils will be monitoring the situation and making recommendations to drivers.



- **Wood Burning Advice**

A review of existing information has been carried out, and the website updated accordingly in 2023. A further communications package is being produced to go out from Autumn 2024.

- **Council Pool Cars**

A number of pool cars are currently in use by Social Services, however further vehicles are expected to become available this year.

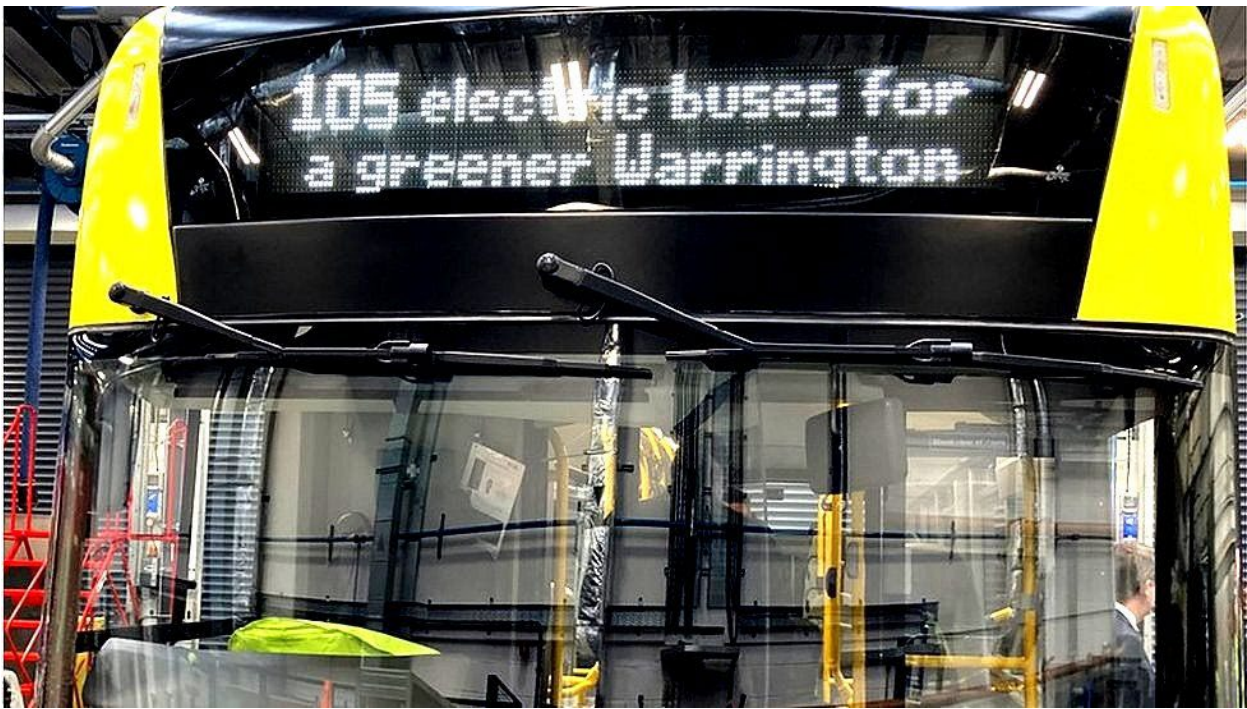
Warrington expects the following measures to be completed over the course of the next reporting year:

- **A49 Bus Service Improvement Plan Consultation**

New bus priority measures and improvement to walking and cycling are being proposed along the A50 Long Lane and the A49 Winwick Road southbound. The proposals consist of four 'bus gates' i.e. short lengths of road only buses can use.

- **All-electric bus fleet**

Warrington's Own Buses entire fleet of diesel buses to be replaced with state-of-the-art Volvo BZL Electric buses in 2024. Bus travel accounts for 1% of distance driven on Warrington's roads, yet accounts for 11% of NO_x and 5.7% of PM_{2.5} of traffic emissions. Over a 12-month period across it has been estimated that changing to an electric fleet would lead to the equivalent emissions savings of: NO_x: 48,942kg; PM_x: 854kg; CO₂: 6,670 tonnes.



Warrington Borough Council worked to implement these measures in partnership with the following stakeholders during 2023:

- Warrington & Co;
- The Highways Agency
- Warrington's Own Buses
- Department for Transport

The principal challenges and barriers to implementation that Warrington Borough Council anticipates facing are funding and resources to complete the actions. The cost-of-living crisis has created uncertainty over future funding.

Warrington Borough Council anticipates that the majority measures stated above and in Table 2.2 will achieve compliance in 2024/25.

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	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	Development Plan Context: Local Plan Review	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2018	2023	WBC Planning Policy	Local Authority funding	NO	Funded	£50k - £100k	Completed	N/A	Policy in place	Completed	Local Plan adopted December 2023
2	Environmental Protection SPD	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2018	2023	WBC Environmental Protection	Local Authority funding	NO	Funded	< £10k	Completed	N/A	Policy in place	Completed	Consultation completed December 2023. To be formally adopted June 2024
3	Electric Taxi Strategy	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2022	2023	WBC Environmental Protection	Local Authority funding	YES	Funded	£10k - 50k	Completed	N/A	Strategy in place	Completed	Final report produced 2023
4	Town Centre Last Mile Project	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2022	2022	WBC Transport Planning	Local Authority funding	NO	Funded	£10k	Completed	N/A	Strategy in place	Completed	Masterplan completed, feeds into Local Plan
5	Domestic/Public Wood Burning Advice	Public Information	Via the Internet	2022	2023	WBC Environmental Protection	Local Authority funding	NO	Funded	<£10k	Implementation	N/A	Information available	Ongoing	Website updated, comms package to go out Autumn 2024
6	Electric Vehicle Charging Points	Transport Planning and Infrastructure	Via the Internet	2022	2023	WBC Transport Planning	Local Authority funding	NO	Funded by OZEV	£700k	Implementation	<1µg/m3	Number of vehicle charging points	Various public and on-street chargers installed. 30 points installed.	Proposal for an additional 200 on-street.
7	Chester Road Cycleway	Transport Planning and Infrastructure	Cycle network	2018	2021	WBC Transport planning	LEP funded	NO	Funded	£500k - £1 million	Completed	<1 µg/m3	<1 µg/m3	Completed	Measuring usage
8	Burtonwood to Omega Cycling/walking link	Transport Planning and Infrastructure	Cycle network	2018	2021	WBC Transport Planning	DoT / developer funded	NO	Funded	£500k - £1 million	Completed	<1 µg/m3	<1 µg/m3	Completed	Measuring usage
9	Centre Park Link Road	Transport Planning and Infrastructure	Other	2018	2021	WBC Transport Planning	DoT funded	NO	Funded	£1 million - £10 million	Completed	6 µg/m3 on Chester Road and 11 µg/m3 on Wilson Patten Street monitoring points	6 µg/m3 on Chester Road and 11 µg/m3 on Wilson Patten Street monitoring points	Completed	To improve flows and reduce congestion in town centre
10	Western Link Road	Transport Planning and Infrastructure	Other	2018	2024	WBC Transport Planning	DoT/WBC funded	NO	Partially Funded	> £10 million	Planning	Further transport modelling work with AQ assessment to be undertaken.	Further transport modelling work with AQ assessment to be undertaken.	Gateway Review undertaken Sept 2021 to Sept 2022.	Inflationary pressures/high construction price inflation rates.
11	Electric Buses	Transport Planning and Infrastructure	Other	2022	2024	WBC Transport Planning	ZEBRA Funding and Local Authority Funding	NO	Funded	£20 million	Implementation	<1µg/m3	Bus depot completed. 105 electric buses in operation.	Depot constructed, awaiting EV infrastructure. 105 buses commissioned.	Delay with bus manufacture.
12	Council Pool Cars	Transport Planning and Infrastructure	Other	2023	2023	WBC Transport Planning	Local Authority Funding	NO	Not Funded	£100k - £500k	Planning	<1µg/m3	Number of vehicles	13 social service vehicles to hybrids.	Potential relocation of depot imminent.
13	Anti-Idling Campaign with Schools	Transport Planning and Infrastructure	Other	2022	2023	WBC Transport Planning	Local Authority Funding	NO	Funded	£10k	Completed	<1µg/m3	Number of schools	Schools work now in place	Lack of engagement from schools/parents.
14	Temporary Play Streets	Promoting Travel Alternatives	Other	2018	2024	WBC Public Health	Local Authority funding	NO	Partially Funded	£10k - 50k	Implementation	N/A	N/A	Two events held	Staff resources required to be allocated

Measure No.	Measure Title	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
15	PM2.5 monitoring	Policy Guidance and Development Control	Other policy	2018	2024	WBC Environmental Protection	Some funding through transport projects	NO	Partially Funded	£100k - £500k	Completed	N/A	Number of monitoring sites	Monitoring on Sankey Way and Liverpool Road now underway.	Funding through transport schemes.
16	Indoor Air Quality Projects	Policy Guidance and Development Control	Other	2022	2024	WBC Public Health/ Environmental Protection	Local Authority Funding/DEFRA	YES	Funded	£200k	Planning	N/A	Number of households reached	First draft of indoor air quality assessment toolkit. Indoor monitoring project DEFRA grant with St. Helens.	Lack of engagement

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

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

PM_{2.5} impacts on mortality are included within the Public Health Outcomes Framework Indicator D01. The most recent figures available are for 2023, which show a slight increase to 5.5% compared to 5.2% in 2021. The Northwest regional average is 5.8%. Figure A.5, in Appendix A, shows the comparison of Warrington to other Northwest authorities. The Council has used this indicator as part of the health evidence to produce a chapter on Air Quality in the Joint Needs Strategic Assessment (JSNA) Framework that was adopted in April 2018

Warrington Borough Council considers that the measures within the AQAP to reduce levels of NO₂ will be complementary in reducing PM_{2.5} emissions.

Warrington is taking the following measures to address PM_{2.5}:

Action 1 within the AQAP for the Local Plan included a borough wide air quality assessment for PM_{2.5} levels. This concluded that whilst there will be some improvements, there will still be areas that exceed the World Health Organization guideline value, and proposed national limit, in 2036. It is accepted that further actions, through the LTP4 and other measures, will be required.

Action 2 of the AQAP is to update the Environmental Protection Supplementary Planning Document in line with the new emerging Local Plan update. The current supplementary planning document (SPD) was produced in 2013 but has since been updated. Planning

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

applications for new developments are screened for air quality and, if considered necessary, include PM_{2.5} impacts and exposure.

Action 15 within the AQAP is to carry out PM_{2.5} monitoring to gain further and robust evidence of concentrations within poor air quality areas. An additional real-time roadside monitoring site was set up on Liverpool Road in November 2022 which included PM monitoring. This was funded by the Western Link Road project.

In addition, the majority of Warrington has been covered by Smoke Control Orders since the late 1960s, except for the Hatton and Stretton Wards in the south of the borough. In recent years there has been an increase in the installation/use of wood burning stoves in domestic properties within urban areas. This is likely to cause an increase in PM_{2.5} emissions even with Defra approved appliances which may also cause a nuisance from the burning odour to neighbours, especially if used incorrectly. Due to the changes in national legislation requiring certain standards for wood burning stoves and wet wood, an action is included within the revised AQAP to provide additional information to the public via the Council's webpages (i.e. 'Ready to Burn scheme'). The information will include the legislative requirements and advice on how best to burn to reduce emissions as far as possible. It was proposed within the AQAP to assess whether the whole of Warrington should be included under one order; whilst this was not taken forward into the revised AQAP, it is to be considered as potential future action.

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

This section sets out the monitoring undertaken within 2023 by Warrington Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Warrington Borough Council undertook automatic (continuous) monitoring at 5 sites during 2023. Table A.1 in Appendix A shows the details of the automatic monitoring sites (CM1-CM5).

Monitoring data from the Selby Street AURN site is available at:

<https://uk-air.defra.gov.uk/networks/network-info?view=aurn>

The data for Chester Road, Parker Street and Sankey Way roadside sites is available from the UK Air Quality website at:

<http://www.ukairquality.net/>

The links can be accessed through the Council air quality webpage at:

<https://www.warrington.gov.uk/airquality>

Alternatively, the data can be provided by the Council on request.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Warrington Borough Council undertook non- automatic (i.e. passive) monitoring of NO₂ at 38 sites during 2023. 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 (NO₂)

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

For diffusion tubes, the full 2023 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.

In 2023, no exceedences of the annual mean objective were recorded at any of the automatic or non-automatic monitoring sites; the highest result was 31µg/m³ at CM2 and 32.4µg/m³ at DT8 on Parker Street which is located within the Town Centre AQMA.

The trends in annual mean NO₂ concentrations for roadside, urban background, and rural background are shown in Figure A within Appendix A. It should be noted that there may be significant variations and annual fluctuations in concentrations due to meteorological conditions that can affect dispersion as well as the secondary formation of pollutants. However, the general trend between 2019 and 2023 indicates that concentrations have

been declining for the roadside monitoring sites, but the extent of this is largely dependent upon location.

Table A.5 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. No exceedances of the 1 hour mean objective have been recorded in 2023. Annual mean results from diffusion tubes that are above 60µg/m³ may indicate a likely exceedance of the hourly objective (as per LAQM.TG16 technical guidance). In 2023, NO₂ concentrations at all non-automatic sites were less than 60µg/m³, which would indicate that an exceedance of the 1-hour mean objective is unlikely.

A comparison of NO₂ monthly and hourly means in the local network against nearby AURN at various sites between 2019 and 2023 is presented in Figure A.5. The seasonality in monitoring data is clearly demonstrated; levels in summer months tend to be lower than winter months when cold, calm conditions tend to lessen the dispersion of pollutants emitted near ground level (i.e. vehicles exhausts).

Warrington AQMA

The monitoring data for 2023 indicate a decrease in NO₂ concentration at all locations within the Town Centre AQMA compared to 2022, with the exception of Wilderspool Causeway 2 and Latchford Village. This may be attributed to the slightly altered location of DT17 adjacent to traffic lights.

At the majority of locations within the AQMA the NO₂ concentration was lower than in 2020, during the pandemic, excluding Parker Street (CM2 and DT8), Baxter Street (DT11), Chester Road (CM3), Wilderspool Causeway 3 (DT15) and Latchford 2 & 3 (DT23 & DT24). This is possibly the result of modal shift, the continued transition to electric vehicles and improvements in exhaust emissions (Euro 6). An overall reduction of 18-38% in NO₂ concentrations has been observed between 2019 and 2023 within the Town Centre AQMA. All locations/monitoring sites within the AQMA recorded an annual mean below the national objective.

There has been consistent compliance over the last two years and the Council plans to revoke this AQMA given the trend of continuing improvement.

Motorway AQMA

The non-automatic monitoring sites located within the Motorway AQMA are DT5 (M6), DT6 (M62) and DT7 (M6 Howshoots Farm). The monitoring data for 2023 indicate a decrease in the annual mean NO₂ concentrations at all locations compared to 2022, and concentrations were also lower than 2020 for DT5 and DT6. All concentrations are below the national objective.

There has been consistent compliance over the last three years and the Council plans to revoke this AQMA.

Area Outside AQMAs

The annual mean concentrations for monitoring sites located outside of the AQMAs were all lower in 2023 compared to 2022, with the exception of Long Lane and Grange Avenue 2. All concentrations were significantly less than those recorded in 2019 and all remained below the national objective. On average, 2023 concentrations at monitoring locations outside of the AQMAs have reduced by around 30% compared to 2019.

The real time analyser/continuous monitor at Selby Street (CM1) is part of the AURN and measures concentrations for urban background. In 2023, the mean annual concentration was 12.6µg/m³.

There is no evidence of any locations outside of the current AQMAs that might have a risk of exceedance that would require further investigation at this time.

3.2.2 Particulate Matter (PM₁₀)

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past five years with the air quality objective of 40µg/m³.

Table A.7 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past five years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year.

During 2023, PM₁₀ was measured at three sites within Warrington. A BAM type analyser is used to measure PM₁₀ concentrations at the Selby Street AURN site and a diode laser /optical mass instrument is used at the Sankey Way and Liverpool Road sites. In 2023, no exceedances of the annual mean objective were recorded, which is consistent with previous years. Figure A.3 shows the trend in PM₁₀ annual mean concentrations between 2019 and 2023.

The annual mean concentration at the Selby Street site, which is indicative of urban background, was $14\mu\text{g}/\text{m}^3$, which is greater than 2021 but less than 2019 and 2022. The increased concentrations observed in 2020, and 2022 may be attributed to trans-boundary pollution and possibly an increase in domestic burning. The annual average concentration at the roadside sites was $10\mu\text{g}/\text{m}^3$ for Sankey Way (CM4) and $13\mu\text{g}/\text{m}^3$ for Liverpool Road (CM5) which are less than the background concentration, suggesting that traffic/exhaust emissions are less likely to have an impact on PM_{10} . The traffic on Sankey Way and Liverpool Road is generally free flowing. The results indicate no exceedences of the objective value of $40\mu\text{g}/\text{m}^3$.

The 24 hour mean objective of $50\mu\text{g}/\text{m}^3$ is not to be exceeded more than 35 times a year. During 2023, no exceedences were recorded at Selby Street, Sankey Way or Liverpool Road.

3.2.3 Particulate Matter ($\text{PM}_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $\text{PM}_{2.5}$ annual mean concentrations for the past five years.

During 2023, $\text{PM}_{2.5}$ was measured at three sites within Warrington. A BAM type analyser is used to measure $\text{PM}_{2.5}$ concentrations at the Selby Street AURN site and a diode laser/optical mass instrument is used at the Sankey Way and Liverpool Road sites. In 2023, no exceedences of the annual mean objective were recorded, which is consistent with previous years. The annual mean concentration at Selby Street was $8\mu\text{g}/\text{m}^3$ which is higher than 2022 but lower than 2019 and 2020. The annual mean concentration at the Sankey Way (CM4) site was $8\mu\text{g}/\text{m}^3$ and at the Liverpool Road (CM5) site was $9\mu\text{g}/\text{m}^3$. The results indicate no exceedences of the objective value $25\mu\text{g}/\text{m}^3$ or the new objective value of $10\mu\text{g}/\text{m}^3$; however, the levels are in excess of the new recommended WHO guideline value of $5\mu\text{g}/\text{m}^3$.

The most recent figures available for the Public Health Outcomes Framework Indicator D01 are from 2023, which show a slight increase to 5.5% compared to 5.2% in 2021. The Northwest regional average is 5.8%. Figure A.5, in Appendix A, shows the comparison of Warrington to other Northwest authorities.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
CM1	Selby Street	Urban Background	359151	388218	NO ₂ , PM _{2.5} , PM ₁₀	NO	Chemiluminescent; FDMS/BAM	22	50	2.5
CM2	Parker Street	Roadside	360015	387907	NO ₂	YES	Chemiluminescent	1	2	1.5
CM3	Chester Road	Roadside	360331	386454	NO ₂	YES	Chemiluminescent	1	2	1.5
CM4	Sankey Way	Roadside	358390	388105	NO ₂ , PM _{2.5} , PM ₁₀	NO	Chemiluminescent; Diode Laser	0	3.8	1.5
CM5	Liverpool Road	Roadside	358391	388106	NO ₂ , PM _{2.5} , PM ₁₀	NO	Chemiluminescent; Diode Laser	0	4.5	1.5

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 – 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)
DT1	Risley Moss	Rural	366708	392164	NO2	No	0.0	0.0	No	2.0
DT2	Selby Street	Urban Background	359152	359218	NO2	No	0.0	50.0	Yes	2.5
DT3	Selby Street	Urban Background	359152	359218	NO2	No	0.0	50.0	Yes	2.5
DT4	Selby Street	Urban Background	359152	359218	NO2	No	0.0	50.0	Yes	2.5
DT5	M6 Manchester Road	Roadside	366081	389204	NO2	Motorway AQMA	0.0	26.5	No	2.5
DT6	M62 Elm Road	Roadside	360466	391853	NO2	Motorway AQMA	0.0	11.0	No	2.5
DT7	Howshoots Farm	Roadside	360233	381994	NO2	Motorway AQMA	17.0	17.0	No	2.5
DT8	Parker Street	Roadside	360044	388048	NO2	Warrington AQMA	2.0	1.5	No	2.5
DT9	Wilson Patten Street	Roadside	360309	387848	NO2	Warrington AQMA	4.5	1.0	No	2.5
DT10	Crosfield Island 2	Roadside	359509	388235	NO2	Warrington AQMA	2.0	1.0	No	2.5
DT11	Baxter Street	Roadside	359447	388112	NO2	Warrington AQMA	2.0	1.0	No	2.5
DT12	Liverpool Road 4	Roadside	359430	387947	NO2	No	4.0	2.0	No	2.5

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)
DT13	Chester Road 1	Roadside	360648	387388	NO2	Warrington AQMA	3.0	3.0	No	2.5
DT14	Walton Terrace	Roadside	360450	386052	NO2	Warrington AQMA	3.0	2.0	No	2.5
DT15	Wilderspool Causeway 1	Roadside	360832	387326	NO2	Warrington AQMA	2.5	2.5	No	2.5
DT16	Wilderspool Causeway 3	Roadside	361220	386874	NO2	Warrington AQMA	10.0	3.0	No	2.5
DT17	Wilderspool Causeway 2	Roadside	361321	386570	NO2	Warrington AQMA	0.0	2.0	No	2.5
DT18	Stockton Heath	Roadside	361470	385981	NO2	No	3.0	2.0	No	2.5
DT19	WA144 Gainsborough Road 1	Roadside	360854	386674	NO2	No	8.0	4.8	No	2.5
DT20	WA145 Gainsborough Road 2	Roadside	360411	386506	NO2	No	9.0	3.5	No	2.5
DT21	Knutsford Road	Roadside	361898	387430	NO2	Warrington AQMA	0.0	3.0	No	2.5
DT22	Kingsway South 1	Roadside	362813	387180	NO2	Warrington AQMA	0.0	3.0	No	2.5
DT23	Latchford Village 2	Roadside	362779	387288	NO2	Warrington AQMA	1.0	1.5	No	2.5
DT24	Latchford Village 3	Roadside	362604	387222	NO2	Warrington AQMA	1.0	1.5	No	2.5
DT25	Mersey Street 1	Roadside	361005	388145	NO2	Warrington AQMA	2.5	6.0	No	2.5

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)
DT26	Lovely Lane	Roadside	359405	388419	NO2	No	2.5	2.5	No	2.5
DT27	Crosfield Street	Roadside	360040	388406	NO2	Warrington AQMA	4.5	2.5	No	2.5
DT28	King Edward Street	Roadside	362392	389101	NO2	No	2.5	2.5	No	2.5
DT29	Steel Street	Roadside	362131	389473	NO2	No	7.0	1.5	No	2.5
DT30	Winwick Road 1	Roadside	360598	389820	NO2	Warrington AQMA	5.5	5.0	No	2.5
DT31	Winwick Road 2	Roadside	360484	390416	NO2	Warrington AQMA	5.5	3.0	No	2.5
DT32	Winwick Road 3	Roadside	360434	390968	NO2	Warrington AQMA	0.0	2.0	No	2.5
DT33	WA138 Long Lane	Roadside	360708	390355	NO2	No	7.0	3.0	No	2.5
DT34	WA139 Hallfields Road	Roadside	361510	389726	NO2	No	5.0	3.0	No	2.5
DT35	WA140 Longford Street	Roadside	361074	389237	NO2	No	2.5	2.0	No	2.5
DT36	WA141 Grange Avenue 1	Roadside	362469	387781	NO2	No	5.0	2.7	No	2.5
DT37	WA142 Grange Avenue 2	Roadside	362446	387337	NO2	No	7.5	1.5	No	2.5
DT38	WA143 Kingsway South 2	Roadside	362779	387627	NO2	Warrington AQMA	9.0	1.0	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.3 – Annual Mean NO₂ Monitoring Results: Automatic Monitoring (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	359152	388218	Urban Background	87.0	87.0	21	15	15	15	13
CM2	360015	387907	Roadside	99.9	99.9	41	28	32	32	31
CM3	360331	386454	Roadside	86.9	86.9	30	22	23	24	23
CM4	358390	388105	Roadside	99.7	99.7			21	21	19
CM5	358391	388106	Roadside	96.9	96.9					18

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

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

☒ Where exceedances of the NO₂ annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023.

Notes:

The annual mean concentrations are presented as µg/m³.

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

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%).

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
DT1	366708	392164	Rural	99.7	99.7	16.3	10.4	11.7	10.0	8.6
DT2	359152	359218	Urban Background	92.6	92.6	19.7	12.9	14.6	13.8	13.2
DT3	359152	359218	Urban Background	92.6	92.6	20.4	13.5	15.0	14.2	13.0
DT4	359152	359218	Urban Background	73.2	73.2	20.2	13.5	15.6	14.8	14.3
DT5	366081	389204	Roadside	99.7	99.7	41.0	22.9	26.9	23.2	22.3
DT6	360466	391853	Roadside	99.7	99.7		23.9	28.4	24.5	23.4
DT7	360233	381994	Roadside	91.8	91.8			35.2	30.4	27.8
DT8	360044	388048	Roadside	89.9	89.9	43.8	31.1	40.0	35.6	32.4
DT9	360309	387848	Roadside	99.7	99.7	36.1	30.6	28.8	27.1	26.0
DT10	359509	388235	Roadside	99.7	99.7	30.7	25.3	26.2	25.7	23.2
DT11	359447	388112	Roadside	99.7	99.7	39.1	31.8	37.5	34.7	31.7
DT12	359430	387947	Roadside	99.7	99.7	31.7	26.2	28.2	24.9	24.1
DT13	360648	387388	Roadside	99.7	99.7	34.1	25.5	28.6	26.3	22.3
DT14	360450	386052	Roadside	91.8	91.8	31.4	26.1	25.2	23.6	22.3
DT15	360832	387326	Roadside	99.7	99.7	28.8	22.0	24.5	22.0	20.2
DT16	361220	386874	Roadside	99.7	99.7	29.7	20.6	24.3	22.7	21.3
DT17	361321	386570	Roadside	74.8	74.8	30.6	21.2	24.8	20.2	20.9
DT18	361470	385981	Roadside	99.7	99.7	25.1	17.7	21.0	18.5	17.3
DT19	360854	386674	Roadside	99.7	99.7				16.5	16.6
DT20	360411	386506	Roadside	99.7	99.7				17.4	17.0

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 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
DT21	361898	387430	Roadside	99.7	99.7	29.9	21.5	25.1	23.0	20.6
DT22	362813	387180	Roadside	99.7	99.7	32.5	22.9	29.0	26.5	24.7
DT23	362779	387288	Roadside	99.7	99.7	34.8	26.5	31.0	28.9	26.9
DT24	362604	387222	Roadside	99.7	99.7	31.0	22.2	26.8	22.7	22.8
DT25	361005	388145	Roadside	99.7	99.7	35.3	26.7	30.5	28.2	26.1
DT26	359405	388419	Roadside	99.7	99.7	30.6	23.2	27.2	22.3	26.8
DT27	360040	388406	Roadside	99.7	99.7	33.4	25.4	27.1	24.9	23.8
DT28	362392	389101	Roadside	99.7	99.7	35.1	26.8	31.6	28.0	26.7
DT29	362131	389473	Roadside	99.7	99.7	35.9	25.9	30.3	27.5	24.6
DT30	360598	389820	Roadside	99.7	99.7	30.2	22.0	25.7	23.2	21.7
DT31	360484	390416	Roadside	90.4	90.4	36.6	30.1	33.2	30.2	27.3
DT32	360434	390968	Roadside	90.1	90.1	39.8	27.0	30.3	26.1	24.8
DT33	360708	390355	Roadside	99.7	99.7				27.1	27.2
DT34	361510	389726	Roadside	99.7	99.7				23.4	22.8
DT35	361074	389237	Roadside	99.7	99.7				27.1	26.2
DT36	362469	387781	Roadside	99.7	99.7				15.0	14.7
DT37	362446	387337	Roadside	91.8	91.8				17.6	17.9
DT38	362779	387627	Roadside	99.7	99.7				22.5	20.3

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

☒ Diffusion tube data has been bias adjusted.

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

Notes:

The annual mean concentrations are presented as $\mu\text{g}/\text{m}^3$.

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

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

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

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

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

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

Figure A.1 – Trends in Annual Mean NO₂ Concentrations for Warrington AQMA

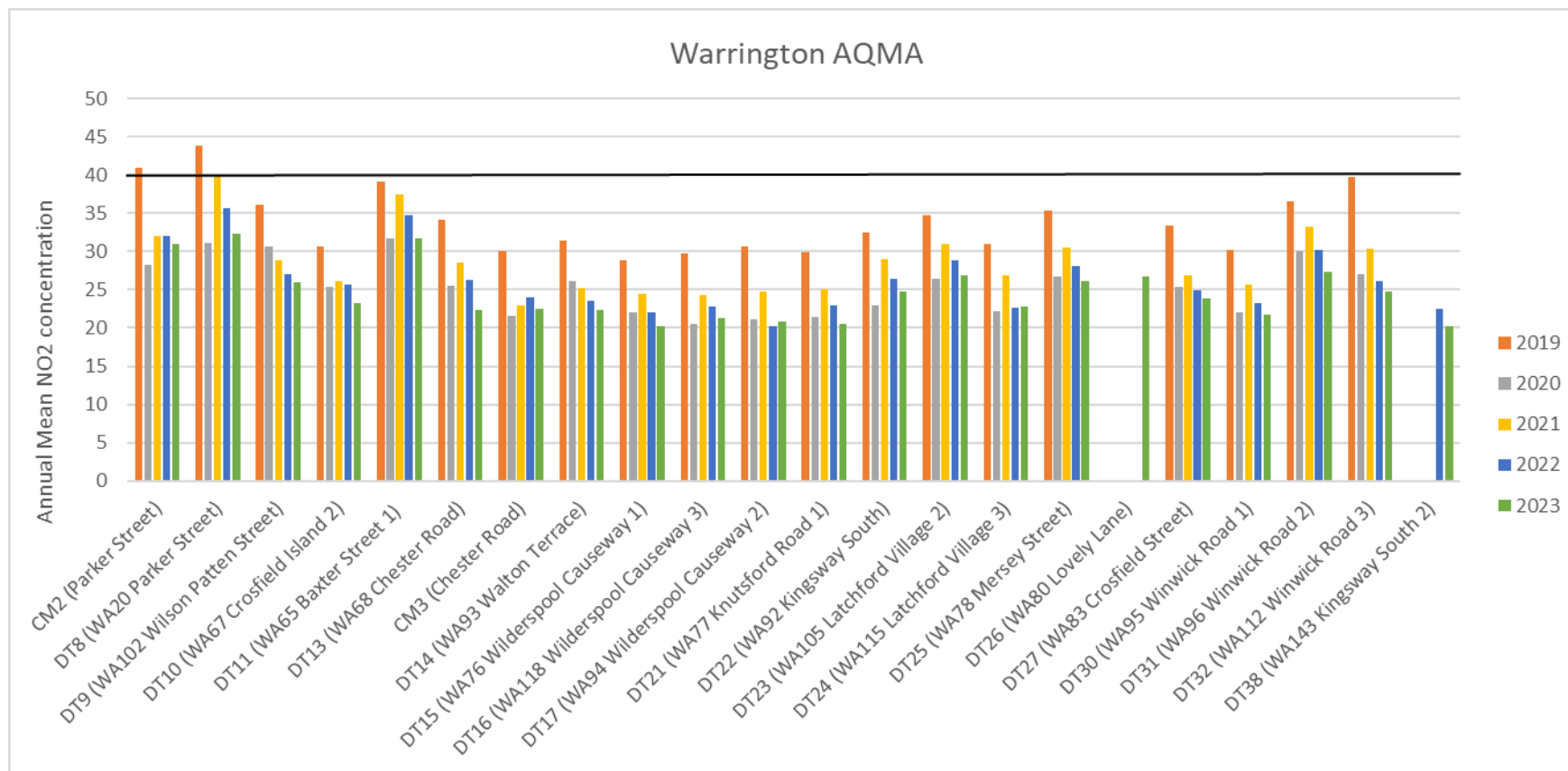


Figure A.2 – Trends in Annual Mean NO₂ Concentrations for Motorway AQMA

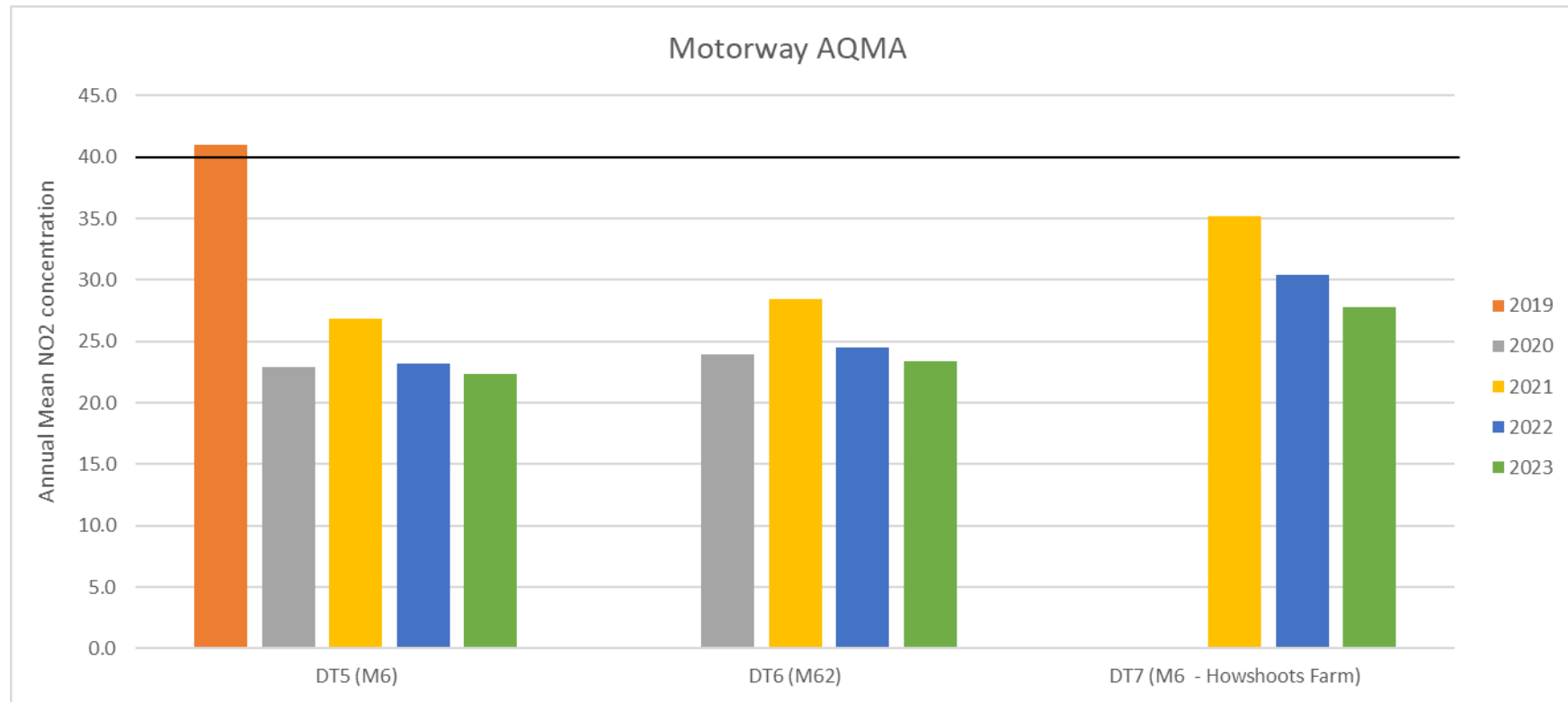


Figure A.3 – Trends in Annual Mean NO₂ Concentrations for Warrington AQMA

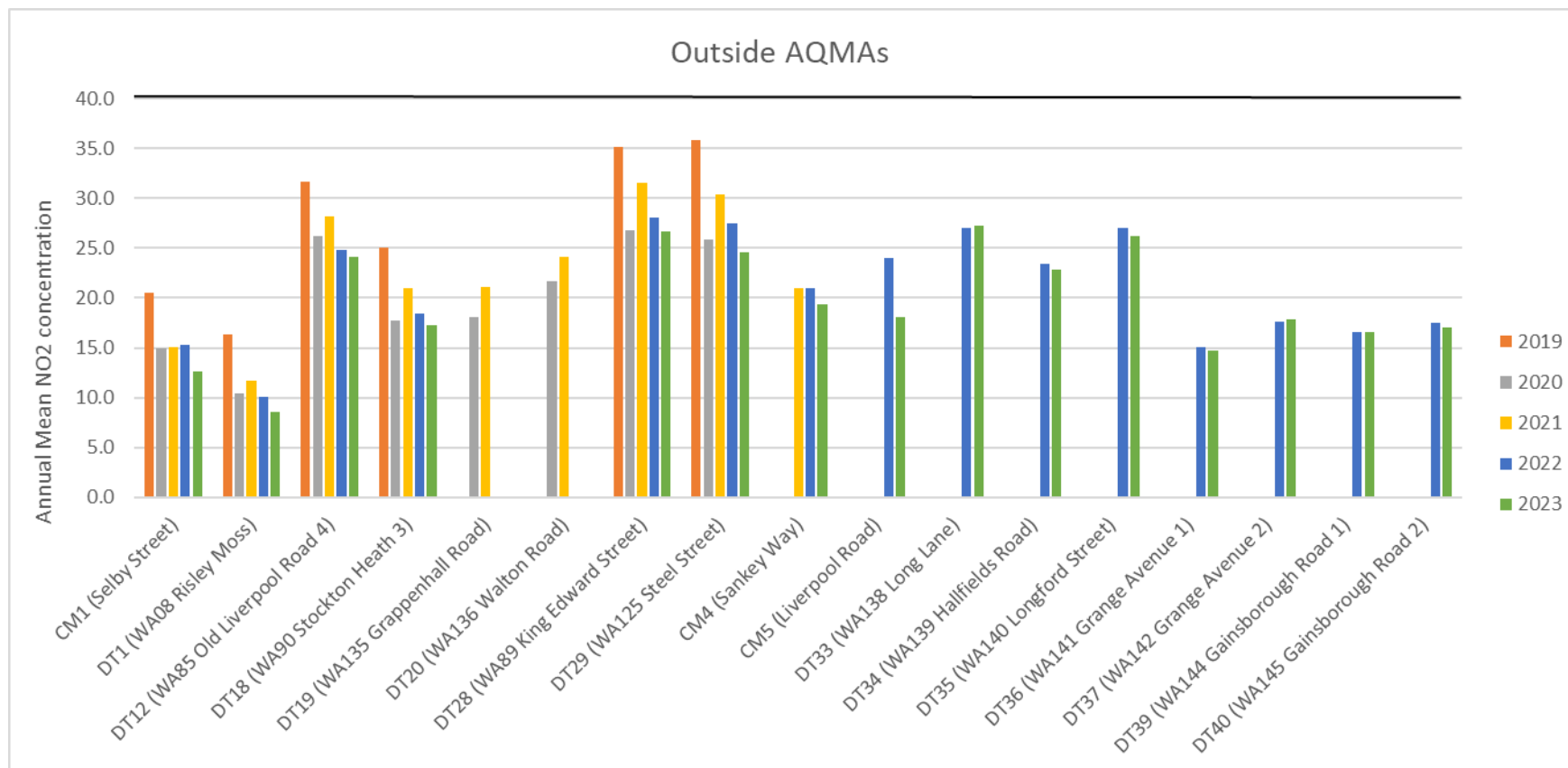


Figure A.4 – Comparison of NO₂ Monthly Mean Concentrations measured at automatic monitoring sites across the North West

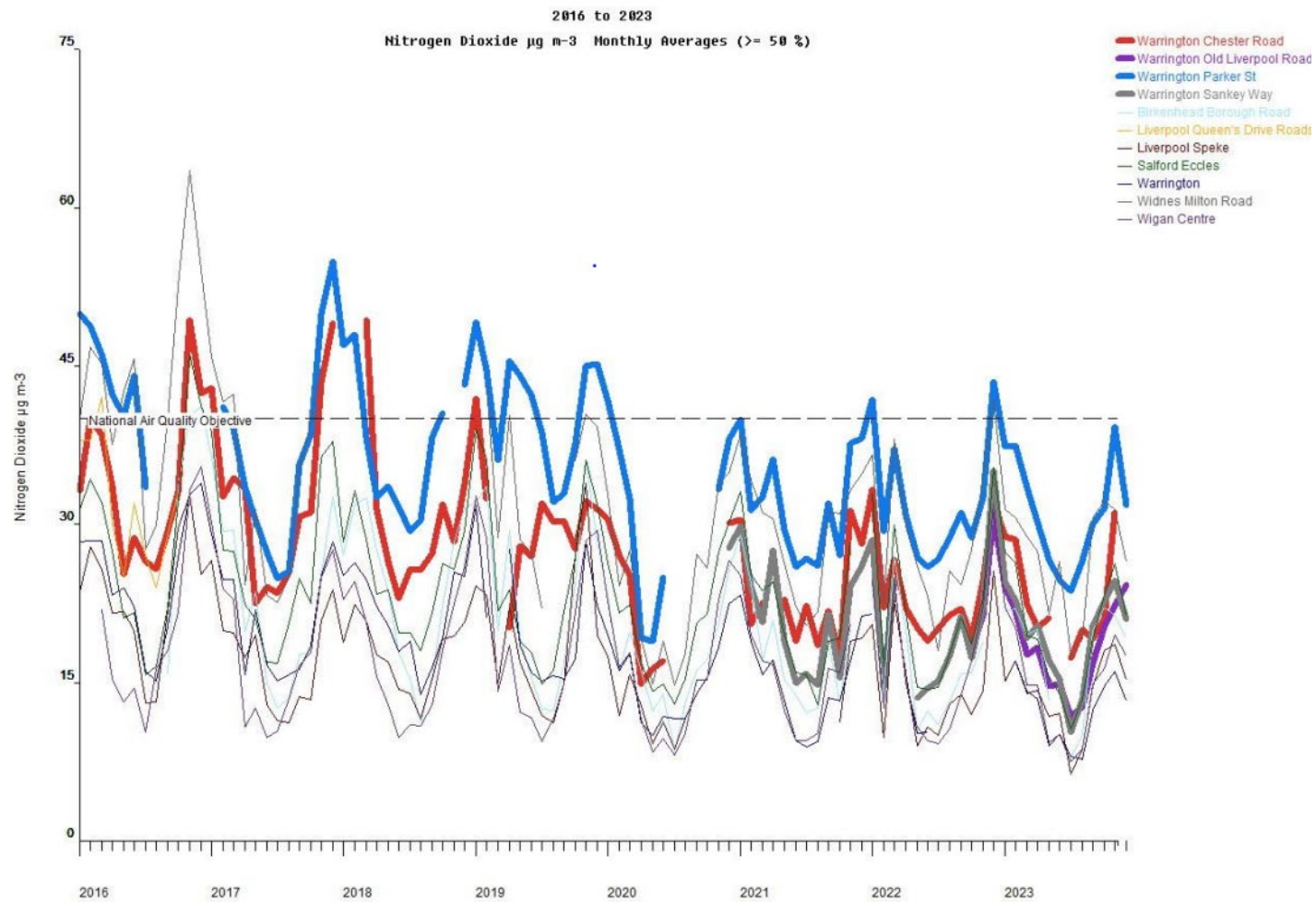


Table A.5 – 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	359152	388218	Urban Background	87.0	87.0	0	0	0	0	0
CM2	360015	387907	Roadside	99.9	99.9	2	0	0	0	0
CM3	360331	386454	Roadside	86.9	86.9	1	0	0	0	0
CM4	358390	388105	Roadside	99.7	99.7			0	0	0
CM5	358391	388106	Roadside	96.9	96.9					0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m³ have been recorded.

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(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%).

Table A.6 – Annual Mean PM₁₀ Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	359152	388218	Urban Background	93.1	93.1	17	15	13	15	14
CM4	358390	388105	Roadside	60.4	60.4			13	11	10
CM5	358391	388106	Roadside	100.0	100.0					13

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

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ are shown in **bold**.

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.

(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.5 – Trends in Annual Mean PM₁₀ Concentrations

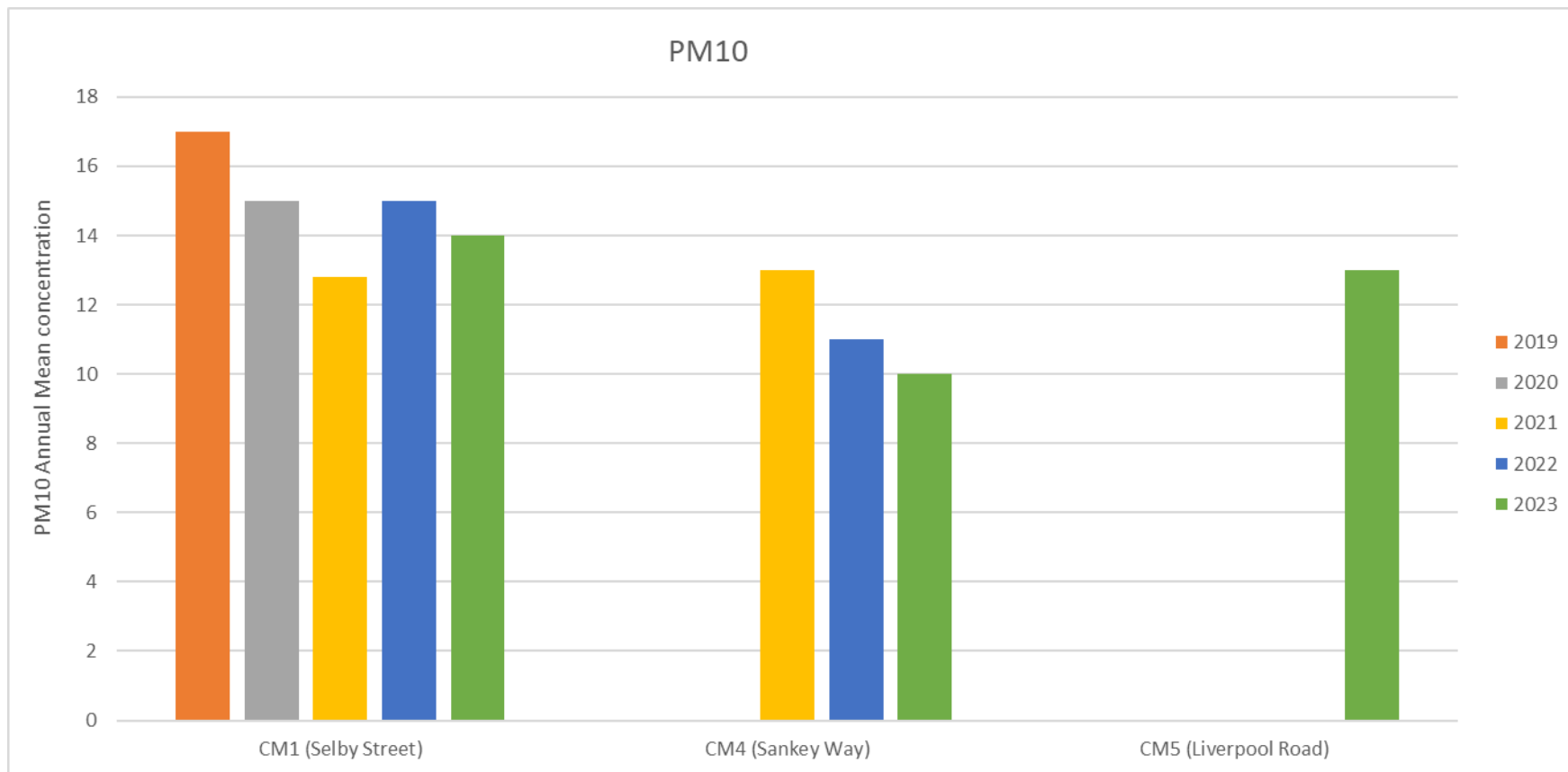


Table A.7 – 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means > 50µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	359152	388218	Urban Background	93.1	93.1	5	1	1	1	0
CM4	358390	388105	Roadside	60.4	60.4			2	1	0
CM5	358391	388106	Roadside	100.0	100.0					0

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m³ have been recorded.

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(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%).

Table A.8 – Annual Mean PM_{2.5} Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	359152	388218	Urban Background	93.3	93.3	11	9	8	7	8
CM4	358390	388105	Roadside	60.4	60.4			10	9	8
CM5	358391	388106	Roadside	97.7	97.7					9

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

Notes:

The annual mean concentrations are presented as µg/m³.

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.

(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.6 – Trends in Annual Mean PM_{2.5} Concentrations

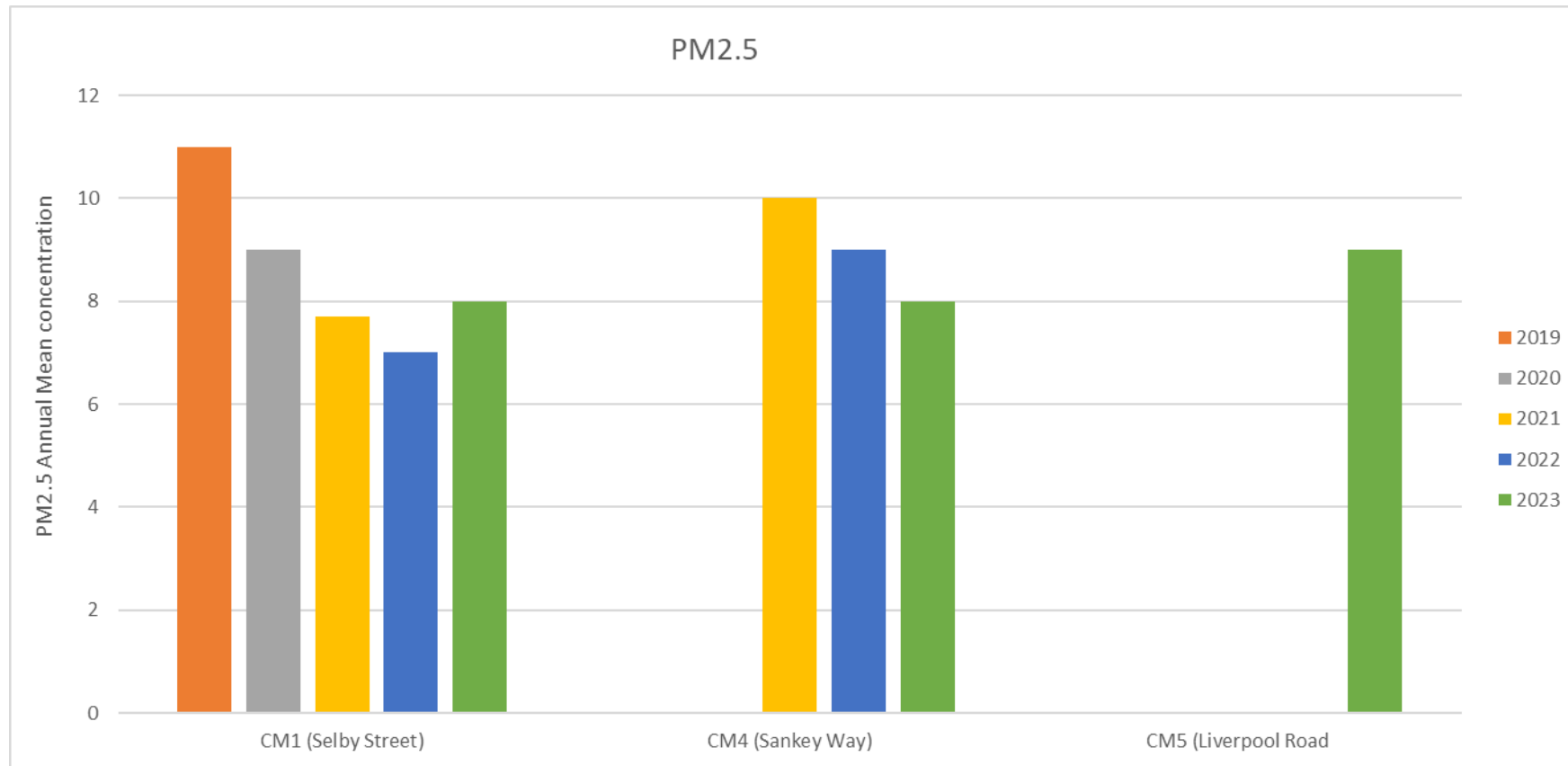


Figure A.7 – Comparison of 2023 PM_{2.5} PHOF indicator

Area ▲▼	Recent Trend	Count ▲▼	Value ▲▼		95% Lower CI	95% Upper CI
England	-	-	5.8		-	-
North West region (statistical)	-	-	5.6		-	-
Sefton	-	-	6.6		-	-
Blackpool	-	-	6.5		-	-
Knowsley	-	-	6.5		-	-
Manchester	-	-	6.1		-	-
Wigan	-	-	6.1		-	-
Liverpool	-	-	6.0		-	-
Cheshire East	-	-	6.0		-	-
St. Helens	-	-	6.0		-	-
Tameside	-	-	5.9		-	-
Salford	-	-	5.9		-	-
Oldham	-	-	5.9		-	-
Stockport	-	-	5.8		-	-
Bolton	-	-	5.8		-	-
Cheshire West and Chester	-	-	5.7		-	-
Rochdale	-	-	5.7		-	-
Halton	-	-	5.7		-	-
Bury	-	-	5.6		-	-
Trafford	-	-	5.6		-	-
Warrington	-	-	5.5		-	-
Blackburn with Darwen	-	-	5.2		-	-
Lancashire	-	-	5.1		-	-
Wirral	-	-	5.0		-	-
Cumberland	-	-	-		-	-
Westmorland and Furness	-	-	-		-	-

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO₂ 2023 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(0.81)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DT1	366708	392164	17.2	14.1	10.3	9.5	8.0	7.6	6.2	7.9	9.3	12.7	16.0	8.2	10.6	8.6	-	
DT2	359152	359218	22.1	17.6	17.4	16.4	11.7	13.0		10.6	16.2	16.4	21.4	16.9	16.3	13.2	-	
DT3	359152	359218	21.4	18.4	17.0	16.1	11.9	11.3		7.2	15.7	20.4	20.9	16.7	16.1	13.0	-	
DT4	359152	359218	21.6	18.9	17.0	15.7	11.8				15.8	20.9	21.3	15.7	17.6	14.3	-	
DT5	366081	389204	33.7	33.5	28.6	29.8	25.4	25.5	18.1	22.6	25.9	30.0	32.6	24.8	27.5	22.3	-	
DT6	360466	391853	38.6	37.2	26.8	26.9	26.5	23.5	22.8	24.8	28.7	28.5	34.9	27.7	28.9	23.4	-	
DT7	360233	381994	47.9	38.1	15.3	38.8	33.7	28.2	28.6	31.8	37.0	38.7	40.1		34.4	27.8	-	
DT8	360044	388048	43.2	46.3	40.6	45.9	37.9		31.3	33.4	42.3	43.2	44.5	31.4	40.0	32.4	-	
DT9	360309	387848	37.7	39.3	29.7	32.8	28.7	28.0	23.5	27.1	31.9	36.2	39.2	31.3	32.1	26.0	-	
DT10	359509	388235	36.6	33.8	29.4	27.7	20.9	22.1	24.1	22.6	31.4	31.4	34.7	28.9	28.6	23.2	-	
DT11	359447	388112	46.0	44.5	39.8	41.8	36.1	36.3	31.9	31.9	42.2	42.6	41.5	34.5	39.1	31.7	-	
DT12	359430	387947	44.0	36.2	30.0	29.3	23.8	23.5	23.7	22.0	29.1	33.5	34.3	27.0	29.7	24.1	-	
DT13	360648	387388	35.4	32.0	26.4	28.9	24.4	25.5	20.7	23.1	26.3	30.4	32.7	24.9	27.6	22.3	-	
DT14	360450	386052	34.6	32.3	26.4	25.8	27.0	23.6	22.9	23.2	25.3	27.8	33.6		27.5	22.3	-	
DT15	360832	387326	35.8	31.9	24.3	21.8	21.6	20.7	17.8	21.0	22.9	27.5	28.6	25.5	25.0	20.2	-	
DT16	361220	386874	31.6	29.1	25.8	26.6	25.1	24.2	19.6	22.5	25.4	29.5	32.8	22.8	26.2	21.3	-	
DT17	361321	386570	34.7	36.5	25.3	23.9	22.9	20.1		20.5	23.8	25.0			25.9	20.9	-	
DT18	361470	385981	27.2	26.5	22.3	22.0	18.9	16.3	13.5	16.6	20.8	24.7	28.2	18.9	21.3	17.3	-	
DT19	360854	386674	30.6	26.7	18.5	18.6	16.1	15.0	13.0	14.7	19.2	23.7	28.2	22.4	20.5	16.6	-	

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 <(0.81)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DT20	360411	386506	28.2	26.5	19.6	19.3	17.6	16.5	14.1	17.7	18.8	24.3	28.7	20.2	21.0	17.0	-	
DT21	361898	387430	34.7	31.0	26.1	24.9	21.9	20.9	17.1	21.0	24.4	28.4	32.3	22.8	25.4	20.6	-	
DT22	362813	387180	33.9	36.5	31.9	36.9	29.4	30.5	21.1	24.6	31.0	32.1	33.2	25.4	30.5	24.7	-	
DT23	362779	387288	42.6	39.7	31.9	35.1	29.0	30.5	26.6	25.6	35.2	33.7	38.3	30.8	33.2	26.9	-	
DT24	362604	387222	35.9	34.7	26.1	31.0	26.6	25.8	17.6	22.2	26.4	33.7	37.0	20.5	28.1	22.8	-	
DT25	361005	388145	40.8	39.9	32.3	33.9	27.2	27.3	24.1	24.5	35.7	35.5	35.4	29.7	32.2	26.1	-	
DT26	359405	388419	39.2	37.4	34.3	38.8	30.6	31.4	24.2	24.0	32.8	36.1	37.7	30.6	33.1	26.8	-	
DT27	360040	388406	38.6	35.4	28.5	27.1	26.8	24.3	23.0	24.6	30.8	32.5	34.9	25.8	29.4	23.8	-	
DT28	362392	389101	40.6	39.9	34.4	34.1	28.9	28.3	20.7	27.4	35.2	31.4	42.5	31.8	32.9	26.7	-	
DT29	362131	389473	39.2	39.3	32.9	34.0	28.6	25.0	19.0	23.5	28.3	32.1	31.4	31.9	30.4	24.6	-	
DT30	360598	389820	34.8	32.1	24.4	25.5	24.9	21.3	21.6	21.3	29.0	28.5	33.8	24.6	26.8	21.7	-	
DT31	360484	390416	44.8	41.6		32.7	22.4	25.4	30.0	28.0	37.6	35.1	39.5	33.6	33.7	27.3	-	
DT32	360434	390968	39.7	38.2	26.5	26.0	27.8	23.5	25.5		28.7	31.2	40.3	29.8	30.7	24.8	-	
DT33	360708	390355	40.6	36.5	31.8	31.2	25.4	26.7	24.6	26.5	30.7	28.9	41.7	57.7	33.5	27.2	-	
DT34	361510	389726	34.0	30.1	28.4	29.2	26.7	26.3	22.1	25.0	30.0	29.1	31.7	25.8	28.2	22.8	-	
DT35	361074	389237	39.2	38.8	32.9	31.5	24.9	28.1	23.8	25.9	33.7	38.1	39.0	32.5	32.4	26.2	-	
DT36	362469	387781	25.4	22.2	15.7	15.0	13.7	13.5	11.6	13.6	18.3	22.5	27.5	19.4	18.2	14.7	-	
DT37	362446	387337	30.9	27.0	20.3	20.3	17.0	16.0	14.9	16.3	22.5	25.8	31.7		22.1	17.9	-	
DT38	362779	387627	36.4	34.9	27.3	25.2	24.9	20.1	19.0	3.8	26.5	26.4	31.6	24.7	25.1	20.3	-	

All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1.

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

Warrington Borough Council confirm that all 2023 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 Warrington During 2023

Warrington Borough Council has not identified any new sources relating to air quality within the reporting year of 2023.

Additional Air Quality Works Undertaken by Warrington Borough Council During 2023

Warrington Borough Council has not completed any additional works within the reporting year of 2023. The revised Air Quality Action Plan was approved in January 2022. A number of additional diffusion tube monitoring locations were included in 2022 to monitor the impact of the Low Traffic Neighbourhood (LTN) schemes proposed as part of the Central 6 Regeneration Masterplan; this was continued throughout 2023.

QA/QC of Diffusion Tube Monitoring

The Council uses Gradko International Ltd Laboratories to supply and analyse the diffusion tubes. The tubes are prepared using 20% triethanolamine (TEA) in water. Manufacture and analysis of the tubes by Gradko are covered by the AIR PT scheme which assessed performance in February, June, August, and October, as shown in the table/information below from Gradko. All monitoring has been carried out in accordance with the 2023 Diffusion Tube Monitoring Calendar.

AIR PT Nitrogen Dioxide Proficiency Scheme Results 2023

Methods: GLM 7 – CARY 60 Spectrophotometer

AIR PT Proficiency Scheme - Nitrogen Dioxide 2023					
Date	Round	Assigned value	Procedure GLM 7		
			Measured concentration	z-Score	% Bias
Feb-23	AIR PT 55-1	1.4	1.43	0.29	2.1%
Feb-23	AIR PT 55-2	1.42	1.39	-0.28	-2.1%
Feb-23	AIR PT 55-3	2.24	2.26	0.11	0.9%
Feb-23	AIR PT 55-4	2.26	2.32	0.34	2.7%
Jun-23	AIR PT 56-1	2.49	2.5	0.05	0.4%
Jun-23	AIR PT 56-2	2.46	2.4	-0.33	-2.4%
Jun-23	AIR PT 56-3	0.92	0.92	0	0.0%
Jun-23	AIR PT 56-4	0.9	0.9	0	0.0%
Aug-23	AIR PT 57-1	1.09	1.00	-1.1	-8.3%
Aug-23	AIR PT 57-2	1.10	1.07	-0.36	-2.7%
Aug-23	AIR PT 57-3	2.16	2.06	-0.62	-4.6%
Aug-23	AIR PT 57-4	2.19	1.88	-1.89	-14.2%
Oct-23	AIR PT 58-1	1.57	1.57	0	0.0%
Oct-23	AIR PT 58-2	1.59	1.46	-1.09	-8.2%
Oct-23	AIR PT 58-3	1.97	1.89	-0.54	-4.1%
Oct-23	AIR PT 58-4	1.97	1.87	-0.68	-5.1%

Diffusion Tube Annualisation

All diffusion tube locations within Warrington Borough Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2024 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Warrington Borough Council have applied a national bias adjustment factor of 0.81 to the 2023 monitoring data. A summary of bias adjustment factors used by Warrington Borough Council over the past five years is presented in Table C.1. The local bias adjustment factor, calculated as 0.83, was not selected due to poor precision during Period 6 and 7, as well as poor continuous monitor data capture for Period 1 (see copy of Local Bias Adjustment Outputs below).

Local Bias Adjustment Outputs - Information Only							
Go back to STEP 3 - Bias Adjustment to define factor							
	STEP 3a Local Bias Adjustment Input 1	STEP 3b Local Bias Adjustment Input 2	STEP 3c Local Bias Adjustment Input 3	STEP 3d Local Bias Adjustment Input 4	STEP 3e Local Bias Adjustment Input 5	STEP 3f Local Bias Adjustment Input 6	STEP 3g Local Bias Adjustment Input 7
Periods used to calculate bias	9						
Bias Adjustment Factor A	0.83 (0.78 - 0.88)						
Diffusion Tube Bias B	21% (13% - 29%)						
Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	16.5						
Mean CV (Precision)	4.1%						
Automatic Mean ($\mu\text{g}/\text{m}^3$)	13.6						
Data Capture	95%						
Adjusted Tube Mean ($\mu\text{g}/\text{m}^3$)	14 (13 - 14)						
Overall Diffusion Tube Precision	Good Overall Precision						
Overall Continuous Monitor Data Capture	Poor Overall Data Capture						
Local Bias Adjustment Factor	0.83	Warning - One or more Co-location studies has Poor Overall Continuous Monitor Data Capture (i.e. <90%). Local Bias Adjustment Factor should be treated with caution.					

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.81
2022	National	03/23	0.84
2021	Local		0.89
2020	National	03/21	0.81
2019	Local		0.94

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. Distance adjustment was not required.

QA/QC of Automatic Monitoring

QA/QC was contracted to ESU1 Ltd for the NO_x analyser at the Selby Street and ET Services for the NO_x analysers at Parker Street, Chester Road and Sankey Way during 2022. Routine calibrations are carried out by a trained officer from the Council, the LSO (Angela Sykes). Six monthly routine services are carried out by the contractor at each site.

Selby Street NO_x and PM data is ratified as part of the AURN. Parker Street, Chester Road and Sankey Way data is ratified and provided by AQDM consultants. Ricardo-AEA provides six monthly independent QC audit checks for the Selby Street site as part of the AURN requirements. All QC checks have passed for each site.

The PM₁₀ and PM_{2.5} FDMS analysers are affiliated into the AURN. Servicing is carried out by Air Monitors Ltd with six monthly QC audits by Ricardo-AEA on behalf of Defra. Monthly calibration checks are completed by a trained Council Officer with data supplied for verification to Bureau Veritas and Ricardo-AEA acting on behalf of Defra.

PM₁₀ and PM_{2.5} Monitoring Adjustment

The type of PM₁₀/PM_{2.5} monitor(s) utilised within Warrington Borough Council do not require the application of a correction factor.

Automatic Monitoring Annualisation

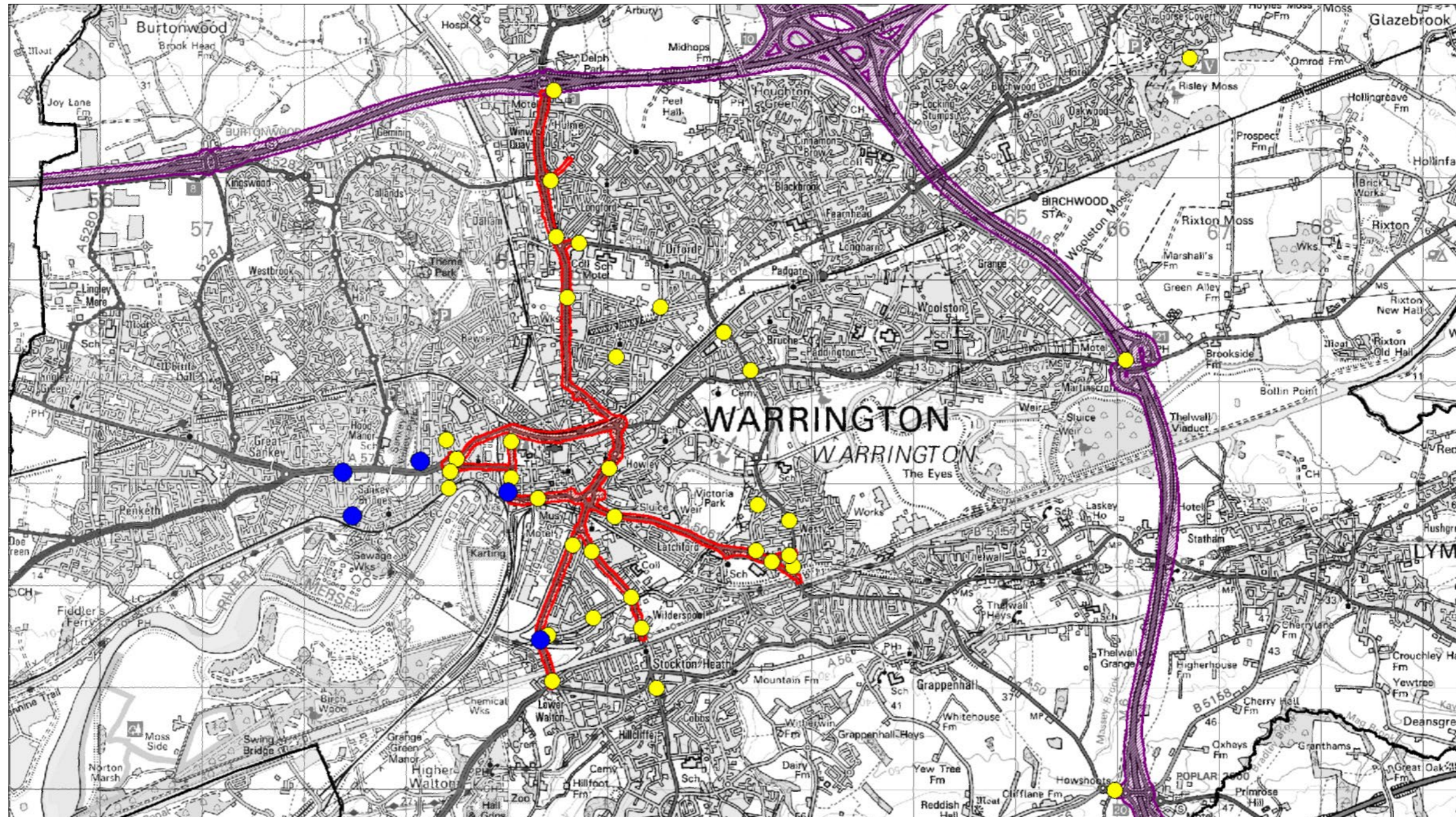
All automatic monitoring locations within Warrington Borough Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data.

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 NO₂ fall-off with distance calculator available on the LAQM Support website. No automatic NO₂ monitoring locations within Warrington Borough Council required distance correction during 2023.

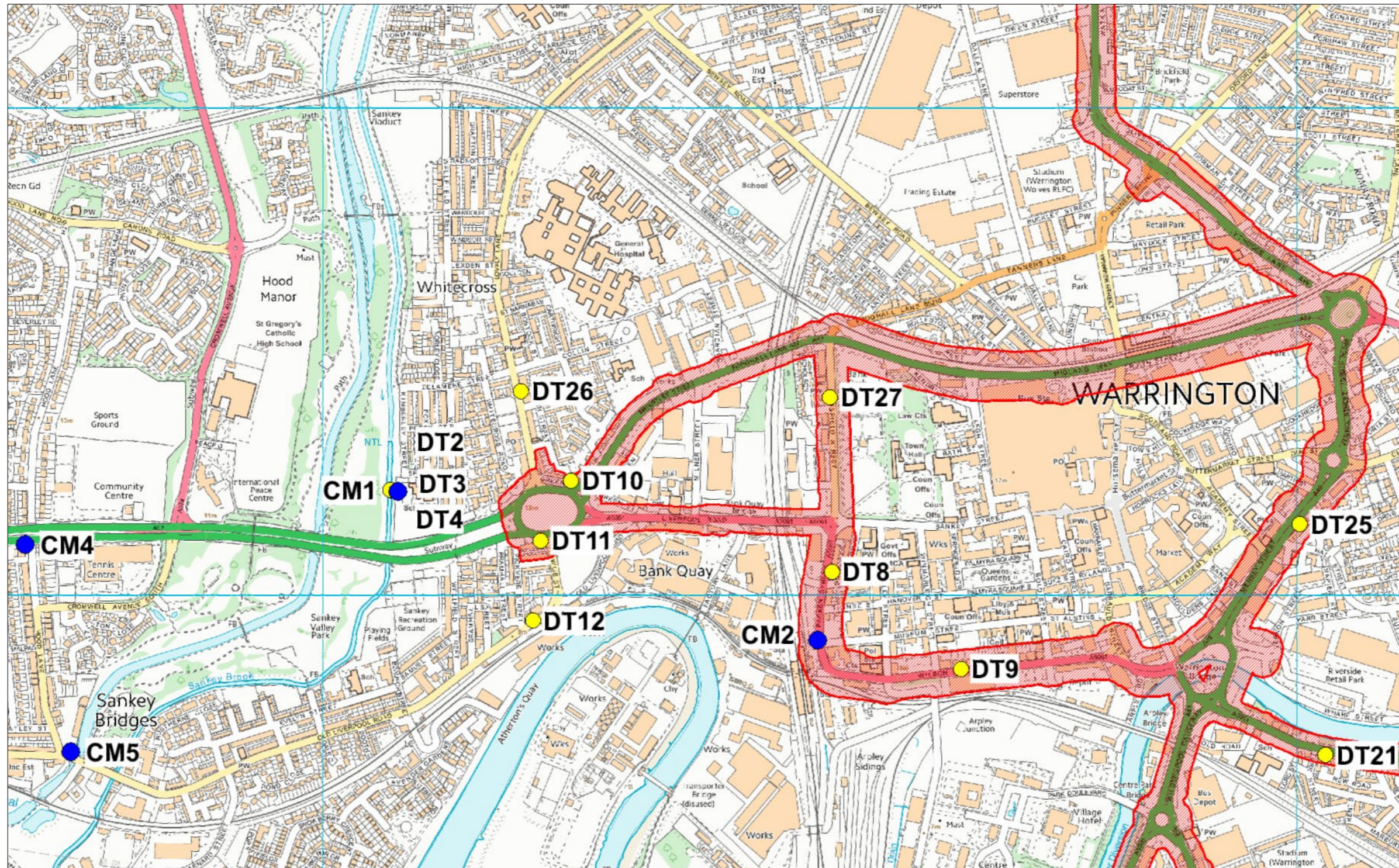
Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Map of All Continuous/Automatic Monitoring and Non-Automatic Monitoring Sites

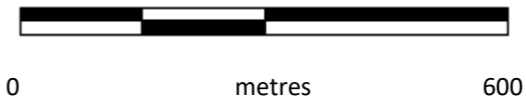


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<p>WARRINGTON Borough Council</p>	<p>Legend:</p> <ul style="list-style-type: none"> ● Continuous Monitoring ● Non-Continuous Monitoring (Diffusion Tubes)

Figure D.2 – Map of all Town Centre Monitoring Sites

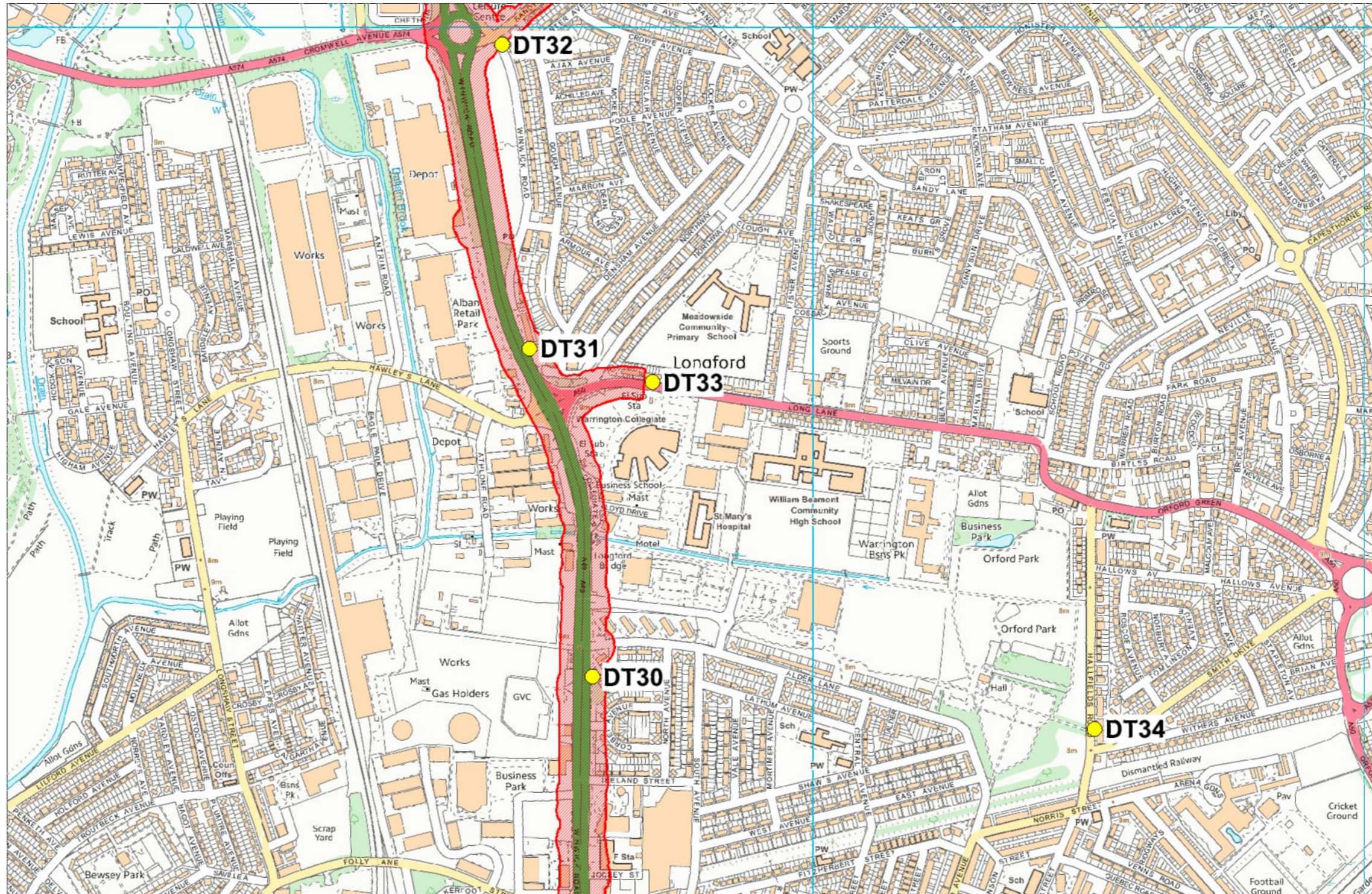


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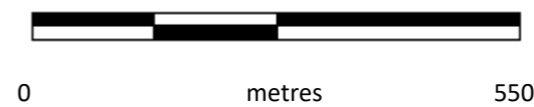


Legend: ● Continuous Monitoring
● Non-Continuous Monitoring (Diffusion Tubes)

Figure D.3 – Map of all Winwick Road/Orford Monitoring Sites

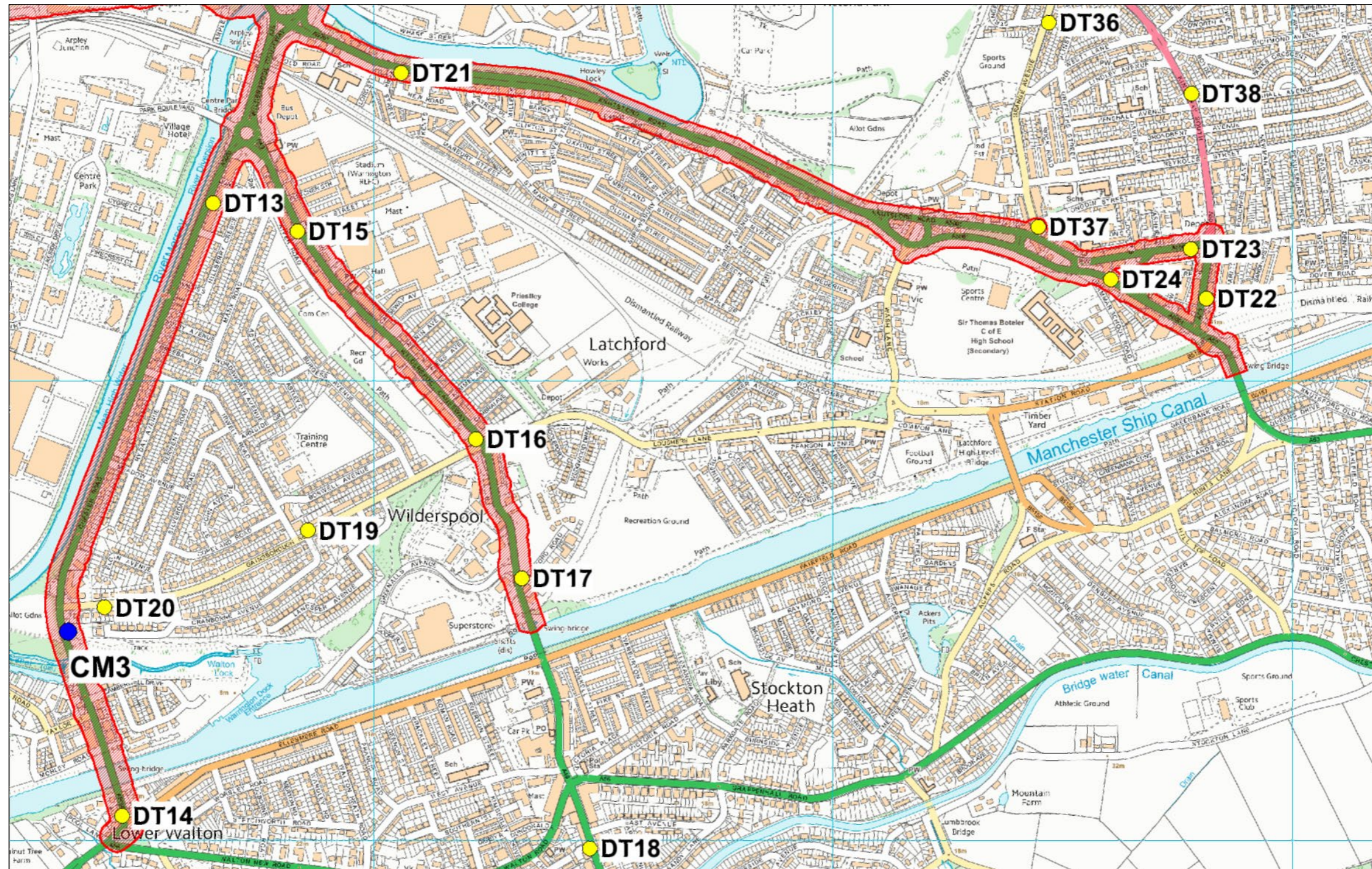


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- Legend:**
- Continuous Monitoring
 - Non-Continuous Monitoring (Diffusion Tubes)

Figure D.4 – Map of all South Warrington Monitoring Sites

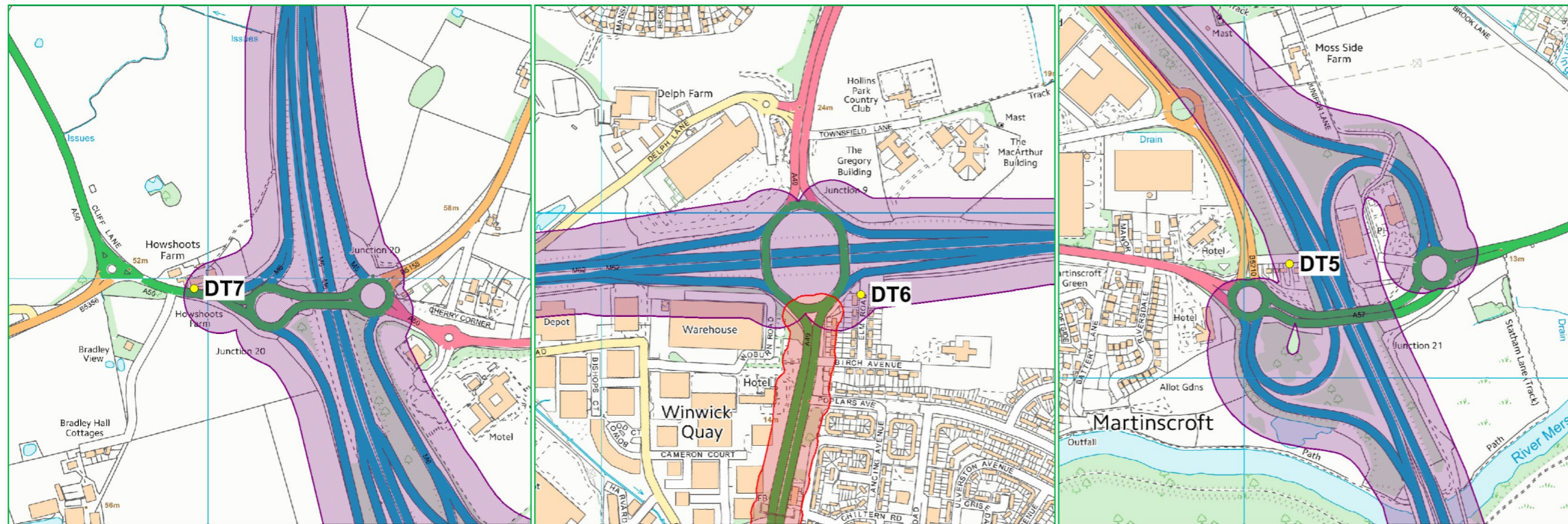


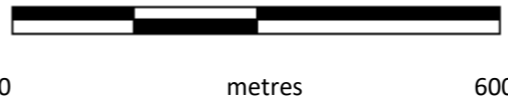

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Legend: ● Continuous Monitoring
● Non-Continuous Monitoring (Diffusion Tubes)

Figure D.5 – Map of all Motorway Non-Automatic Monitoring Sites



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 <p>WARRINGTON Borough Council</p>	<p>Legend:</p> <ul style="list-style-type: none"> ● Continuous Monitoring ● Non-Continuous Monitoring (Diffusion Tubes)

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁷

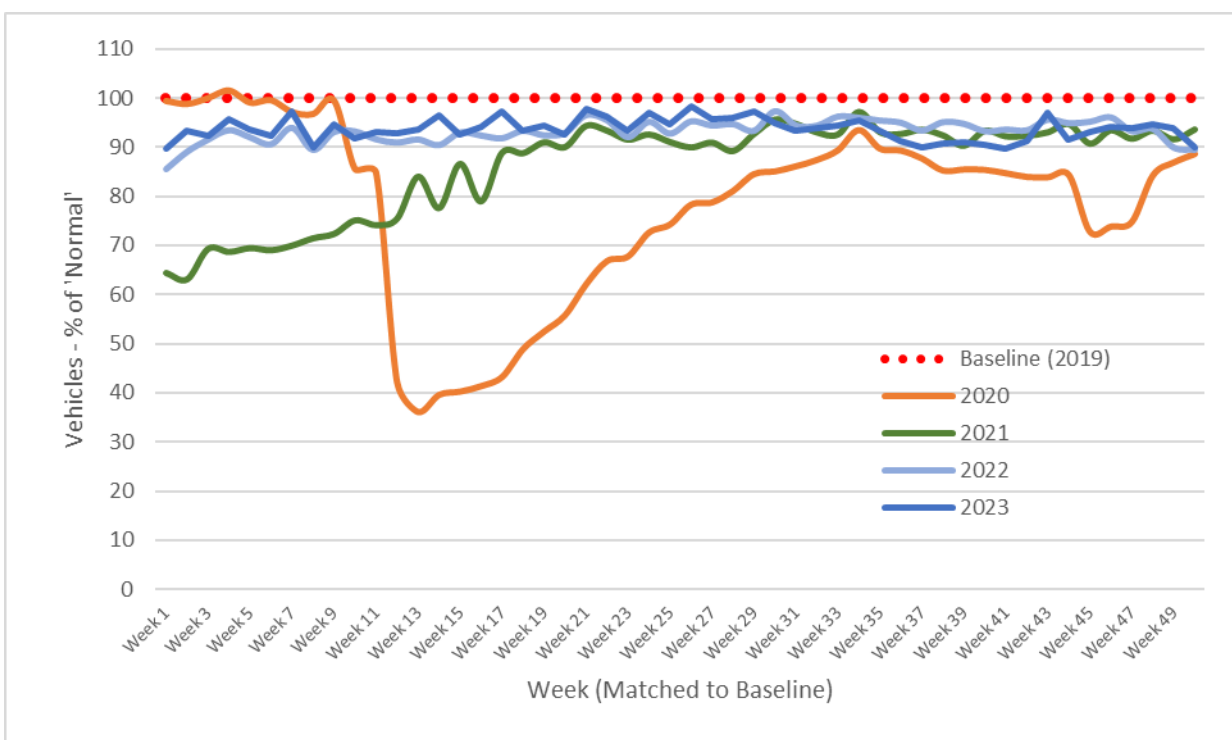
Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO ₂)	200µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO ₂)	40µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50µg/m ³ , not to be exceeded more than 35 times a year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

This data has been taken from automatic traffic counts based on 6 major radial routes across Warrington (Sankey Way, Chester Road, Winwick Road, Knutsford Road, Manchester Road and Wilderspool Causeway), from Tuesday to Thursday only (Midweek).

The graph below summarises the past four years in comparison with the relative pre-pandemic 'normality' in 2019.



The baseline year used is 2019 (pre-pandemic). In 2023 traffic volume averaged 94% of this pre-Covid level.

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.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.
- Living Well in Warrington, Warrington Health and Wellbeing Strategy 2024-2028