CITY OF WOLVERHAMPTON COUNCIL

2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: December 2022

Executive Summary: Air Quality in Our Area

Air Quality in Wolverhampton

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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often the less affluent areas.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion. The main air quality issues in Wolverhampton relate to emissions of nitrogen dioxide (NO2) from road traffic. The areas most affected are close to busy roads, junctions and parts of the city centre, particularly where the traffic is congested, the roads are narrow, or there is a high proportion of heavy goods vehicles (HGV's).

In 2018 Defra required the council to carry out a feasibility study to deliver nitrogen dioxide concentration compliance in the shortest possible time on 4 road links. In response, the council implemented 3 specific actions to accelerate the reduction of NO2 levels withing the city centre.

The covid lockdowns significantly affected the 2020 data and have made it difficult to assess the effectiveness these actions. The 2021 data indicates that NO2 levels have reduced by an extra 8% on the Ring Road, and an extra 10% in Broad Street, compared with the average reduction across the city for this period.

In 2021 there were no locations above the objective where members of the public are likely to be exposed on a regular basis. One location on St David's Ring Road did exceed the objective, however this is in an area where there are no relevant locations and pedestrian traffic is minimal.

The council is continuing to work towards further improvements in air quality with its partners at a local, sub regional and regional level.

Air Quality in the City of Wolverhampton

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

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

Actions to Improve Air Quality

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

The 2019 Clean Air Strategy[5] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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

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

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

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

[5] Defra. Clean Air Strategy, 2019

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

Over the last 5 years the council has introduced a range of measures which have been effective in reducing pollution levels and enabled the council to comply with the air quality objectives; these measures fall into the following core areas:

- road improvements,
- public transport improvements,
- bus route improvements,
- traffic management,
- promoting travel alternatives,
- promoting low emission vehicles,
- air quality planning and guidance.

In 2018 the council commissioned AECOM to carry out a feasibility study to look at intervention measures to accelerate the reduction of NO2 emissions on 4 road links identified by Defra's which are exceeding the EU limit value for NO2. These measures have been considered in terms of their ability to deliver reductions in the shortest possible time against the level of effort and investment required to achieve them.

The following priority interventions have been implemented:

- Road link 28464 – A4150 Ring Road St David's (North East Quadrant)

Action 1: Signal optimisation

Air quality and journey time monitoring equipment

Carriage way improvement

Action 2: Phased retrofit of buses with SCR technology

Action 3: Development of walking and cycling infrastructure

The journey time monitoring system has been expanded to assist signal optimisation, smoothing traffic flow and minimising congestion. Nitrogen dioxide sensors located at junctions feed into this system enabling traffic to be routed away from hotspots on the network. (Action 1.)

The following road links are now compliant with the EU limit values.

- Road link 57739 – A4150 Ring Road St Georges (South East Quadrant)
- Ring Road St Davids (North East Quadrant).
- Broad Street.

- Lichfield Street, Bilston.

Conclusions and Priorities

Data from 2021 shows that 1 location Ring Road St David's (Road link 28464) is exceeding the annual NO2 air quality objective. The actions implemented following the 2018 feasibility study has reduced the NO2 levels by 21% between 2019 and 2021 at this location. This is 8% above the average annual reduction in NO2 levels for Wolverhampton.

The council's priorities for 2022 are:

- A 454 Willenhall Road improvement scheme
- Continue to accelerate the uptake of low emissions vehicles and public transport
- Completion of the Metro extension and railway station
- Completion of the low emission taxi scheme

Local Engagement and How to get Involved

The council has a number of initiatives to encourage people to use alternative forms of transport and to think about where and when they need to use their car:

- Wolverhampton Car Share
- Walking strategy
- Cycle strategy

Residents can play their part in improving air quality and making Wolverhampton a better place to live, by thinking about their car use.

- Do you need to use your car for short trips to the local shops?
- Can you use the bus or train or metro?
- Can you share a lift?
- Can you walk to school?

Further information can be obtained from the council's web site:

http://www.wolverhampton.gov.uk/home

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1 Local Air Quality Management

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

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine if the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by the City of Wolverhampton 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 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by the City of Wolverhampton Council can be found in Table 2.1. The table presents a description of the AQMA that is currently designated within the City of Wolverhampton Council. Appendix D: Map(s) of Monitoring Locations and AQMAs, provides maps of AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO_2 annual mean;

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 National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Wolverhampton Air Quality Management Area 2005	22/03/2005	NO2 Annual Mean Particulate matter PM_{10}	Whole city declaration	Yes	55µg/m^3 34 Exceedances	43µg/m^3 1 Exceedance	Wolverhampton City Council Air Quality Management Action Plan 2005	City Council Air Quality Management Action Plan 2005

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

☒ **City of Wolverhampton council confirm that all current AQAPs have been submitted to Defra.**

Progress and Impact of Measures to address Air Quality in the City of Wolverhampton

Defra's appraisal of the previous ASR concluded:

The report is well structured, detailed, and provides the information specified in the Guidance. The report could be improved via the below comments;

1. *The current AQAP was published in 2005 and is now over 16 years old. AQAPs should be updated every 5 years. The council have noted that they were updating the AQAP in 2020, but they should prioritise to finish and publish the AQAP as for the 2021 ASR.*
2. *Annualisation and distance correction calculations were shown which is encouraged, however some small inconsistencies in the distance correction table.*
3. *The council are reminded to be mindful of ensuring that the data in the excel tables and ASR text presents the same information which is clear and concise. There were 67 locations in Table A.2, 69 locations in Table A.3, 63 locations with two triplicate locations in the text and nowhere mentions which sites are triplicate locations.*
4. *The map although present, could be improved. There needs to be clear labels of the location IDs, instead of NEW sites in 2017 this could be updated to show new sites of the reporting year (2019), AQMA boundary could be made clearer which a clear title in the legend (eg the blue line). Finally, the background map is too busy and it is hard to see the yellow points in the map.*
5. *The Action plan measure table has been updated and discussed in really good detail which is to be commended.*
6. *Trends and comparison of the Air Quality Objectives, and the justification of the bias factor were all clear and detailed which is commended. Trend graphs were also all clear which is encouraged for future reports.*
7. *Current AQMA declaration is supported by the monitoring results.*

The positive comments provided by Defra, particularly relating to the action plan measures, are very encouraging and supportive. The council is aware of the need to update the AQAP and intends to use the Action plan measures as the basis for the new AQAP; this has been prioritised for completion during 2022.

The City of Wolverhampton Council has taken forward a number of direct measures in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in **Error! Reference source not found.**.

Key completed measures are:

- **Action 1: A4150 Ring Road St David's – key outcomes:**

Feasibility study completed and accepted by Defra – completed 2017

Traffic signal optimisation - completed 2018

Bluetooth Journey time and pollution monitoring installed on Ring Road St David's and Ring Road St Georges; now fully operational recording baseline journey time and air quality data - completed 28/11/18.

Carriage way improvements to increase lane capacity and smooth traffic flow. – completed 2019

- **Action 2: Retrofitting of buses with SCR technology – key outcomes:**

  Bus retrofit procurement (National Express) - completed 30/11/18

  Bus retrofit mobilisation (National Express) - completed 31/12/18

  Bus retrofit delivery (National Express) – completed 2019

  Bus retrofit procurement (other operators) – completed 2019

  Bus retrofit mobilisation (other operators) – completed 2019

  Bus operators' vehicle decommissioning/new vehicle procurement – completed 2019

  Tendered bus services release, review & award, operational – completed 2019

  NO2 levels have fallen by 21% between 2019 and 2021 due to actions 1 and 2, this is 10% above the average reduction across the city

- **Action 4: Wolverhampton Interchange Project Phase 1 – key outcomes:**

  A new access road into the bus station off the ring road has reduced the number of buses within the city centre resulting in a 23% reduction in NO2 levels in the city centre.

- **Action 5: Wolverhampton City Centre Scheme – key outcomes:**

  Pedestrianisation and the re-routing of traffic in the Market Street area of the city centre has led to a reduction in NO2 levels of 14% in Market Street, Queen Street and Princess Street.

- **Action 6: Connected Places Programme – key outcomes:**

  Public consultation, ground investigations and site surveys - completed 2019.

  Consultation on Phase 1 Victoria St, Skinner St, Salop St and School St:

  Pedestrianisation of Victoria Street to provide a connection with the new Westside development and the retail core in the city centre. This is intended to remove traffic from the city centre and improve traffic flow around the ring road.

- **Action 7: Midland Metro City Centre extension – key outcomes:**

  Work commenced 2018 due to be completed 2022/23

- **Action 8: Railway station access improvements – key outcomes**

  The provision of a new station building and access road, has reduced road traffic within the ring road along Broad Street, Fryer Street and Lichfield Street.

- **Action 9: City North Gateway A449 Stafford Road improvement Phase 1 – key outcomes:**

  M54 junction 2 to Springfield Lane. Junction improvements at Broadlands and Springfield Lane to improve traffic flow and reduce congestion – completed 2018.

- **Action 10: City East Gateway A454 Willenhall Road improvement phase 1 – key outcomes:**

  Public consultation on junction and carriageway improvements to improve traffic flow and congestion has been completed. A new one-way system is proposed along Horseley Fields which is currently exceeding the annual mean objective for NO_2. The proposals will reduce traffic by approximately 50% along Horseley Fields and is predicted to reduce NO_2 emissions by 7.2µg/m3.

- **Action 11: Wolverhampton City Centre Advanced Quality Partnership Scheme (AQPS) – key outcomes:**

  Sets an agreed standard for all buses to achieve EURO 6 within the city centre by 24th April 2022. The following vehicle emission standards will apply to all services operating within the Ring Road:

  Sunday 25th November 2018 Minimum Euro III on all journeys

  Sunday 28th April 2019 Minimum Euro VI on 10 per cent of journeys

- **Action 13: Urban Traffic Control Major Scheme – Key outcomes:**

  20 traffic signals upgraded to SCOOT with bus priority.

  80 PELICAN crossings upgraded to PUFFIN crossings.

  A journey time monitoring system comprising of 28 ANPR cameras has been installed on major access routes into the city.

- **Action 14: Ultra-low emission Taxi infrastructure scheme – key outcomes:**

Wolverhampton City Council received notification of funding awarded, totalling £478000 to install 20 rapid charge points and 4 fast charge points

Delivery programme to install electric charging points in a phased approach during 2018/19 and 2019/20. 6 electric charging points installed during 2019.

The City of Wolverhampton Council expects the following measures to be completed over the course of the next reporting year:

- **Action 7: Midland Metro City Centre extension:**
  Completion of The Midland Metro link with the main bus station and railway station to provide a fully integrated transport system.
- **Action 14: Ultra-low emission Taxi scheme:**

  Roll out of a total of 24 electric charging points.

The assessment of the effectiveness of these actions has been hampered by the introduction of lockdowns to control the covid virus. This is discussed further in Section 3 of the report.

Whilst the measures in **Error! Reference source not found.** will help to contribute towards compliance, the City of Wolverhampton Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Wolverhampton Air Quality Management Area 2005.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Traffic signal optimisation and junction improvements to improve traffic flow Road link 28464 A4150 Ring Road St David's (North East Quadrant) Road link 57739 A4150 Ring Road St Georges (South East Quadrant)	Traffic Management	UTC, Congestion management, traffic reduction	2018	City of Wolverhampton Council (CWC)	Defra grant	None set	Predicted reduction in NO2 emissions of 2.9%	Feasibility study completed and accepted by Defra. Bluetooth Journey time monitoring and pollution monitoring installed on Ring Road St Davids and Ring Road St Georges; now fully operational recording baseline journey times and air quality data Highway improvements to road links 28464 and 57739 have been completed	2018 28/11/18 2019	Part of a range of measures identified in the Black Country Local Authorities feasibility study to deliver nitrogen dioxide concentration compliance in the shortest possible time.
2	Retrofitting of buses with SCR technology Road link 28464 A4150 Ring Road St David's (North East Quadrant) Road link 57739 A4150 Ring Road St Georges (South East Quadrant)	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	2018	CWC Transport for West Midlands Defra grant	Defra grant	Retrofit 127 buses with SCR Decommission and retrofit 19 buses CBTF programme 7 buses	Predicted reduction in NO2 emissions of 2.1% (100% take up)	Feasibility study completed and accepted by Defra. Bus retrofit procurement (National Express) Bus retrofit mobilisation (National Express) Bus retrofit delivery (National Express) Bus retrofit procurement (other operators) Bus retrofit mobilisation (other operators) Bus operators' vehicle decommissioning/new vehicle procurement Tendered bus services release, review & award, operational	2018 30/11/18 31/12/18 2019 2019 2019 2019 2019 2019 2019	Part of a range of measures identified in the Black Country Local Authorities feasibility study to deliver nitrogen dioxide concentration compliance in the shortest possible time. The cost of retrofitting this technology to existing buses is expensive. In order to achieve a reduction in emissions of 2.1% it would require 100% compliance meaning over 160 buses would need to be retrofitted at a cost of £3million. This is intended to be a phased retrofit upgrading the oldest buses first. Supply chain delays due to volume of orders.
3	Development of walking and cycling infrastructure. Road link 28464 A4150 Ring Road St Davids (North East Quadrant) Road link 57739 A4150 Ring Road St Georges (South East Quadrant)	Promoting Travel Alternatives	Promotion of cycling	2018	CWC	Defra grant	None set	Predicted reduction in NO2 emissions of 1.4% based on a 2.5% take up and a reduction of 5.5% with a 10% take up.	Feasibility study completed and accepted by Defra.	2019/20	Walking and cycling infrastructure intervention scored lowest in the evaluation assessment of the various interventions. This intervention will be reviewed pending the outcome of other interventions
4	Wolverhampton Interchange project phase 1	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2010	CWC	CWC Defra grant	None set	23% in NO2	Completed	Completed	The provision of a new access road into the bus station from the ring road, has led to a net reduction in the numbers of buses within the city centre. NO2 levels dropped by 23% following completion of the scheme. The number of monitoring sites exceeding the air quality objective reduced from 19 in 2009 to 4 in 2013.
5	Wolverhampton City Centre Scheme	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2012	CWC	CWC, Defra grant	None set	14% reduction in NO2	Completed	Completed	The pedestrianisation of Market Street and the re-routing of traffic along Queen St and Princess St have reduced NO2 levels in this area of the city centre by 14%.
6	Connected Places Programme	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2017	CWC in conjunction with private business.	Local Growth Fund grant, CWC regeneration reserve, other external funding bodies to be secured.	None set		Connected Places Strategy and delivery plan has been produced along with technical supporting documents including Car Parking Strategy, Baseline Report, Materials Guide and summary document. The Planning and consultation phase has been completed. Westside link Phase 1 - Victoria St, Skinner St, Salop St and School St: Removing existing obstructions such as unnecessary street furniture and	2019 - 2025	The Connected Places Programme outlines the council's vision and priorities for a people centred approach to improving Wolverhampton's city centre streets and public spaces. The baseline assessment has identified a number of key drivers for change including the need to accommodate additional demands for movement due to a shift towards non car based modes of transport. To do this the environment

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
									signage Removing existing roadway in Victoria Street and creation of a new public square. Public consultation, ground investigations and site surveys completed autumn 2019.		for walking and cycling needs to be improved. This will be achieved through improved links between key assets and increased pedestrianisation within the city centre.
7	Midland Metro City Centre extension.	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2017	CWC	CWC Defra grant	None set	Reduced vehicle emissions	Submission of Noise and Air Quality assessments. Necessary approvals have been obtained. Work commenced 2018 due to be completed early 2021	2021	The development of a fully integrated transport structure will provide new linkages and encourage a modal shift in transport, enhancing and improving City Centre access. By improving public transport links, it is anticipated car ingress into the city centre will be reduced lowering vehicle emissions and improving air quality.
8	New access road to railway station	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2017	CWC	CWC Defra grant	None set	Reduced vehicle emissions	Construction of new access road Reoptimized signal timings on corn hill junction and hurry call facility installed to allow rapid egress of traffic	2016 2019	The provision of a new station access road will reduce traffic within the ring road particularly along Broad Street, Fryer Street and Lichfield Street, thereby reducing NO2 emissions within the city centre. The effectiveness of this will be determined following a review of the monitoring data.
9	City North Gateway A449 Stafford Road improvement	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2017	CWC	CWC,	None set	Reduced vehicle emissions	Phase 1 Vine Island to M54 island Phase 2 Elephant and Castle junction; improvement to provide sustainable connectivity between the university main campus and Springfield campus Phase 3 in design stage.	Completed 2019 Phase 2 & Phase 3 to be completed 2025.	The City North Gateway project is a major transport corridor review which forms part of the key route network to support growth and minimising the impact of increasing vehicle numbers through: • Improving traffic flow • Individual junction improvements • Improving sustainable transport – walking/cycling/public transport • Encouraging modal shift • Reducing single occupancy
10	City East Gateway A454 Willenhall Road improvements.	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2017	CWC	CWC	None set	Reduced vehicle emissions	Phase 1 design and consultation completed. Future phases in design stage.	Phase 1 to be completed 2022. Future Phases to be completed by 2025.	The A454 Willenhall Rd project is a major transport corridor review which forms part of the key route network to support growth and minimising the impact of increasing vehicle numbers through: • Improving traffic flow • Individual junction improvements • Improving sustainable transport – walking/cycling/public transport • Encouraging modal shift • Reducing single occupancy
11	Advanced Quality Bus Partnership	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2018	CWC & Centro		None set	Reduced vehicle emissions	Draft AQPS consultation completed. Scheme come into force 14th August 2018. the following vehicle emission standards will apply to all services operating within the Ring Road Sunday 25th November 2018 Minimum Euro III on all journeys Sunday 28th April 2019 Minimum Euro VI on 10 per cent of journeys Sunday 26th' April 2020 Minimum Euro VI on 50 per cent of journeys Sunday 25th April 2021 Minimum Euro VI on 75 per cent of journeys Sunday 24th April 2022 Minimum Euro VI on all journeys.	2017/18	The AQP will enable better control of the quality of vehicles, emissions standards and the management of bus stops to ensure reliability and journey times within the city centre. Sets an agreed standard for all buses to achieve EURO 6 within the city centre by 2021/22
12	Showcase route extension and improvements	Transport Planning and Infrastructure	Bus route improvements	2011	CWC & Centro		None set	Reduced vehicle emissions	WCW has implemented a programme of enhanced bus routes featuring real time information at bus stops, improved bus shelters and lighting at stops improved bus shelters and lighting at stops and bus priority at junctions. Electric hybrid buses were	Completed	This is part of a range of measures aimed at reducing emissions from buses and encouraging the use of public transport.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
									introduced on show case route 1 in 2011.		
13	Urban traffic Control Major Scheme	Traffic Management	UTC, Congestion management, traffic reduction	2013	CWC		None set	Reduced vehicle emissions	Approximately 20 traffic signals were upgraded to SCOOT with bus priority during 2013/14. Approximately 80 traffic PELICAN crossings have been upgraded to PUFFIN crossings over the last 5 years. A journey time monitoring system comprising of 28 ANPR cameras has been installed within the city. The traffic light signalling system has been upgraded to wireless digital communications. This has improved the control of traffic light signals and traffic flow within the city.	Completed	The UTC Major Scheme seeks to make more efficient use of the existing infrastructure and reduce congestion on the network of strategic routes throughout the West Midlands. It will make traffic signals more efficient, provide a common platform for bus priority measures, deliver more variable message signs, and, create a technical platform which enables intelligent transport services to be deployed. The project has been developed in partnership with the police, Highways Agency and public transport operators.
14	Ultra low emission Taxi scheme	Promoting Low Emission Transport	Taxi emission incentives	2017	CWC OLEV	OLEV	None set	Reduced vehicle emissions	The Council has been awarded £478,00 from OLEV to install 24 electric vehicle charging points for taxis by 2020. Delivery programme to install electric charging points in a phased approach during 2018/19 and 2019/20 6 electric charging points installed 2019	2017 2018 2019	The OLEV award has enable the council to install the necessary infrastructure to facilitate the uptake of electric taxis as they become available. The council is aiming to convert 16% of both the Hackney and private hire fleets in the city to electric vehicles by 2020. Whilst the taxi fleet will have priority use by way of a booking system, the general public will also be able to use them as well. The scheme compliments the wider work of the West Midlands Combined Authority to promote low emission vehicles.
15	West Midlands Low Emissions Towns & Cities Program (LETCP)	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2012	LETCP Board comprising Walsall (Chair), Birmingham, Coventry, Dudley, Sandwell, Solihull, and Wolverhampton councils Defra funded	Defra grant	None set	Reduced vehicle emissions	Good Practice Air Quality Planning Guidance - May 2014; Good Practice Procurement Guidance - September 2014; West Midlands LETCP Low Emission Zones - Technical Feasibility Study Work Package 1 Scenario modelling base case; West Midlands LETCP Low Emissions Zones - Technical Feasibility Study WP1a Scenario modelling; West Midlands LETCP 'Economic and health impacts of air pollution' study has been completed. Draft West Midlands LETCP Low Emissions Strategy, completion is scheduled for late 2016. Publication of the Good Practice Air Quality Planning Guidance and the Good Practice Procurement Guidance. These documents have been adopted by CWC and are being implemented. Low Emission Strategy published	On going	The LETCP program comprises of a range of measures and guidance to drive policy and reduce emissions from road traffic across the West Midlands.
16	Black Country Air Quality SPD	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2016	Black Country Authorities led by Dudley MBC		None set	Reduced vehicle emissions	The 4 Black Country authorities, Dudley, Sandwell, Walsall and Wolverhampton have produced a Black Country supplementary planning document (SPD) to incorporate the LETCP Air Quality good Practice Guide into planning policy.	Completed	The SPD requires new development to incorporate a range of measures to reduce emissions from road traffic. These include the provision of electric charging points, traffic management plans, and a damage cost calculator. The level of mitigation required is proportional to the size of the development.
17	The Black Country Ultra Low Emission Vehicle Strategy and Implementation Plan	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to	2017	CWC in conjunction with Dudley MBC, Sandwell MBC and Walsall MBC.		None set	Reduced vehicle emissions	Low Emission Strategy published January 2017	On going	The Black Country Ultra Low Emission Vehicle Strategy and implementation plan will form part of a Black Country Transport Strategy and will help deliver a step change in

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
			reduce emissions and improve air quality								the number of ULEV's in the sub-region by meeting existing demand and stimulating further demand by providing vehicle owners and operators with the confidence to invest in ULEVs. The Implementation Plan will drive each council's own capital and revenue programmes and inform funding bids to the Local Growth Fund, Combined Authority, Office for Low Emission Vehicles (OLEV), European Structural Investment Fund (ESIF), Horizon 2020 and other appropriate funds. It will also support the wider promotion of ULEVs to the public, other public sector organisations and to businesses.
18	Movement for Growth: West Midlands strategic Transport Plan	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2016	Combined Authority		Key Performance Indicators related to air quality: % of residents in the metropolitan area able to access 3 or more strategic centres in 45 minutes by public transport in the am peak. Modal share of all journeys by car, public transport, cycling and walking. % of car journeys non-single occupancy. CO2 emitted within the SEP area by Transport, Businesses and Holmes. Number of poor days of air quality per year (rated 4 or higher on the daily air quality index). Nitrogen dioxide levels in the metropolitan area.	Reduced vehicle emissions	Plan approved June 2016. Consultation draft 2026 Delivery Plan for Transport April 2017 WMCA approved the delivery plan September 2017 Transport plan 2017-18	On going	The document sets out the West Midlands Combined authority's vision and strategy to deliver a transport system that will boost the region's economy and improve the quality of life for the the people of the West Midlands. Over the next 10 years the Combined Authority will invest £5bn in the regions transport network. This investment will focus on improving the transport infrastructure including public transport, cycling and walking and behaviour change by giving the information to make the best travel choice possible.
19	West Midlands Transport Emissions Framework	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2016	Combined Authority		None set	Reduced vehicle emissions			The West Midlands Transport emissions Framework is in direct response to the Defra Air Quality Action Plan which requires the implementation of Clean Air Zones. It is aligned to the Strategic Transport Plan and will provide a coordinated approach at Combined Authority level, to tackle air quality issues and improve our overall transport emissions.
20	West Midlands Combined Authority Regional Air Quality Review and Action Plan	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2018	Combined Authority			Reduced vehicle emissions	Action Plan published July 2019		Identifies effective and feasible regional level actions to improve air quality in the west Midlands region.
21	West Midlands Low Emissions Bus Delivery Plan	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2016	Centro	centro	A reduction in NOx emissions of 90% by 2035	Reduced vehicle emissions	Scoping study July 2016	2035	The objective of this study, commissioned by Centro, is to develop a Delivery Plan to 2035 for low emission bus adoption and the installation of the required refuelling infrastructure. The Delivery Plan aims to guide and support the transition of the West Midlands bus fleet towards a zero/low emission fleet and, by providing a quantification of impacts and prioritisation of efforts, will be a valuable source of evidence for funding applications.

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
22	Local sustainable transport initiatives	Promoting Low Emission Transport	Other	2015	CWC, Local Sustainable Transport Fund	Growth fund	None set	Reduced vehicle emissions	£3m obtained from Local sustainable transport bid for the period 2015 to 2019, £4.6m received from the growth fund covering the period 2015 to 20. The following initiatives are on-going: promotion of sustainable transport, managing short trips, Smarter Networks, Smarter Choices, cycle to work scheme, salary sacrifice scheme to purchase bikes, cycle parking, promotion of walking, monthly payments for transport season tickets, public transport scratch cards for work related trips.	2020	Part of a range of initiatives aimed at improving fleet emissions by encouraging the take up of low emission vehicles, driver training and vehicle management.
23	WCC Fleet modernisation	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	ongoing	CWC		None set	Reduced vehicle emissions	Ongoing process of fleet modernisation. HGV's using Ad blue systems. Low emission vehicles have been adopted in limited numbers where appropriate. Electric vehicle trials are on-going. The Council's fleet of mowers has been upgraded with rotary mowers which are more economical and use less fuel. Heavy commercial vehicles meet EURO VI.	Ongoing, the council intends to adopt low emission vehicle technologies where appropriate as they become available.	The adoption of low emission vehicle technology will reduce the overall emissions from the council fleet.
24	Increased bus lane enforcement	Transport Planning and Infrastructure	Bus route improvements	2015	CWC		None set	Reduced vehicle emissions	Completed	Completed	6 bus lane enforcement cameras have been installed on bus lanes. These became live on the 1st June 2015
25	Active travel strategy	Promoting Travel Alternatives	Promotion of walking	2014	CWC		None set	Reduced vehicle emissions	Active Travel Strategy to promote walking and cycling launched December 2014 in conjunction with the council's Transportation and Public Health divisions.	On going	The promotion of alternative forms of transport is intended to reduce the number of vehicles on the road improving congestion and reducing vehicle emissions
26	Green fleet review	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2014	CWC		None set	Reduced vehicle emissions	Completed		Green fleet review of council's liveried and grey fleets. Plugged in fleet initiative review of potential for ULEV vehicles including the introduction of staff pool vehicles.
27	Passenger transport fleet services review	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2017	CWC		None set	Reduced vehicle emissions			Review of euro classifications of passenger transport vehicles
28	Encouragement of city centre living	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2014	CWC		None set	Reduced vehicle emissions	As part of its Local Development Scheme the city council has 3 Area Action Plans including the City Centre AAP adopted in 2016 which promotes city centre living.	On going	City centre living reduces the need for car ownership and promotes the use of public transport.
29	Wolverhampton Car Share (WCS).	Alternatives to private vehicle use	Car & lift sharing schemes	2015	CWC		None set	Reduced vehicle emissions	The car share scheme was re launched in 2015 as part of the councils revised travel plan which was produced in January 2015. Wolverhampton City Council is working jointly with South Staffs Council on a car share scheme for the i54 development which includes the new Jaguar Land Rover engine plant.	On going	This forms part of the Green Travel Plan encouraging alternative means of travel. These measures are aimed at reducing the number of vehicles entering the city centre, reducing vehicle emissions.

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

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

The City of Wolverhampton Council's Environmental Protection section is working closely with Public Health colleges to assess the current levels of $PM_{2.5}$ within the city and their impact on public health.

The council carried out PM2.5 monitoring at 4 locations over a 3 year period between 2016 and 2018. The results have indicated compliance with the proposed PM2.5 objective and also showed that there is little in the way of spatial variation across the city between background and roadside locations. This monitoring was discontinued as the Black Country group lead by Walsall MBC is developing a computer model for PM2.5.

Air quality data is being fed into the council's Public Health Outcomes Framework and has been used to correlate areas of poor air quality and areas of depravation. The council has also set up an Air Quality Working Group which is made up of Heads of Service and officers covering the following services areas:

Head of City Transport	Chair & Strategic Lead on Air Quality & Transport
Service Lead/ Professional Lead – Transport Strategy	Strategic Lead on Transport Strategy
Head of Environmental Services	Strategic Lead on Environmental Services & Fleet
Service Lead – Parking Services	Link on parking management
Fleet Manager	Link on fleet
Consultant in Public Health	Strategic Lead on Public Health & Air Quality
Principal Public Health Specialist	Link on Public Health & Air Quality

Consultant in Public Health	Strategic Lead on Public Health & Active Travel
Senior Officer – Environmental Protection	Link on air quality
Strategic Health Lead (City Planning)	Link on strategic planning, transport and health projects
Licensing Manager	Link on taxi regulation
Service Manager – Housing Development	Link on new housing built by CWC; WV Living/WH
Head of City Development	Link on regeneration schemes

The purpose of the Group is to:

- Co-ordinate and provide maximum value from initiatives to improve air quality and public health within City of Wolverhampton Council and in partnership with other agencies.
- Co-ordinate measures to meet UK Government statutory requirements and national, sub-regional and local strategy and policy on air quality
- Improve awareness of available funding opportunities and co-ordinate submission of bids to maximise exploitation of such opportunities.

Wolverhampton entered into a partnership with EarthSense in 2019 and launched the LiveTAP (Live Visualisation of Emissions – Towards Informed Avoidance of Pollution Hotspots) project. A network of 15 additional NO2, PM_{10} and $PM_{2.5}$ monitors has been deployed across the city to provide real time data to feed into this.

The project has been completed unfortunately funding has not been available to continue operating the monitors. The Black country PM2.5 model has instead used a network of PM2.5 reference analysers for verification purposes.

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

This section sets out the monitoring undertaken within 2021 by the City of Wolverhampton Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

The City of Wolverhampton Council undertook automatic (continuous) monitoring at 4 sites during 2021. **Error! Reference source not found.** in Appendix A shows the details of the sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. National monitoring results are available at https://uk-air.defra.gov.uk/

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.

The TEOM1400a monitors are old and no longer supported by the VCM mode and, following the review of the 2021 data, the council has decided to turn off 3 of the 4 monitors which it currently operates. The remaining monitor at the St Peter's Square site, has been retained as an urban background site to continue monitoring PM10 trends within the city centre.

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

The City of Wolverhampton Council undertook non-automatic (passive) monitoring of NO2 at 63 sites during 2021. Table A.2 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 (NO_2)

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

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. There were no annual means greater that 60µmg/m3 over the period.

Figure A.1 shows the NO2 trends over the last 10 years, the average reduction in NO2 over this period is 35%.

One site exceeded the annual mean objective in 2021:-

Site RR2 Ring Road St David’s 43ug/m3

This site is on a foot path that runs alongside the ring road, the location is shown on Figure D.2. It is within the designated AQMA, however, there are no relevant locations close to the site and it is not well used by pedestrian.

Th previous report identified 4 sites that exceeded the objective. As 3 of these sites were within the city centre, **Actions 1** and **2** were put in place specifically to accelerate the

reduction of NO_2 within this area of the city. Outdside the ring road there remained 1 hot spot on Lichfield Street Bilston. This exceedance was relatively minor at 1.8µg/m3 above the objective, and compliance was predicted to be achieved by 2021 if levels continue to fall at the normal rate.

The 2020 data has been significantly affected by the lockdowns implemented to control the spread of covid, this has made it very dificult to measure how successful these actions have been. The averge yearly drop in NO2 concentrations over the 10 years prior to 2020 was 4%, in 2020 the levels dropped by 20%. The 2021 levels have returned to more typical values, however, they are still between 2 and 3% below the trend line.

Between 2019 and 2021 NO2 levels on the Ring Road and on Broad Street in the city centre dropped by 21 and 23% respectively. This is between 8 and 10% above the mean levels across the city for the period, which suggests this is not soley due to covid but a result of the actions taken to accelerate the reduction of NO2 at these locations.

3.1.4 Particulate Matter (PM_{10})

As the levels of PM10 in the city have fallen dramatically in the last 10 years and, as the analysers are no longer supported by the VCM model, the council has decided to turn off Penn Road, Stafford Road and Willenhall Road monitors. The monitor at St Peter's Square will continue to provide trend data.

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

In 2021 there were no exceedances of the objectives. The council has concluded that the interventions the council has taken have enabled compliance with the objectives therefore it is nolonger necessary to include PM_{10} in the AQMA. The council will amend the AQM to remove PM_{10} as soon as possible.

3.1.5 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the years 2017 to 2019

The results show little variation in $PM_{2.5}$ levels between background and roadside locations across the city. This suggests that a significant proportion of $PM_{2.5}$ is not coming from local sources but is being transported into the city from elsewhere.

The reliability of the monitors proved to be variable, and the decision was taken to discontinue their use.

3.1.6 Sulphur Dioxide (SO_2)

The City of Wolverhampton Council no longer monitors SO_2

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?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
A1	Lichfield Street	Roadside	391654	298782	NO_2, PM_{10} $PM_{2.5}$	Yes	AQ Mesh	2	2	2.5
A2	Penn Road	Roadside	390374	296775	NO_2, PM_{10}		Chemiluminescent, TEOM,	N/A	6.5	2.5
A4	Stafford Road	Roadside	391261	302199	NO_2, PM_{10}	Yes	Chemiluminescent, TEOM,	5	8.5	2.5
A5	Willenhall Road	Urban Background	394754	298429	NO_2, PM_{10}, $PM_{2.5}$	Yes	Chemiluminescent, TEOM, AQ Mesh	0	12.5	2.5
A9	St Peter's Square	Urban Background	391362	298934	NO_2, PM_{10} $PM_{2.5}$	Yes	Chemiluminescent, TEOM, AQ Mesh	N/A	30	2.5
A10	Foxlands Ave	Suburban	388841	295174	$PM_{2.5}$	Yes	AQ Mesh	9.2	2.3	3

Notes:

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

(2) N/A if not applicable

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
BIL1		Roadside	395057	296541	NO_2	Y	0	4		3m
BIL2		Roadside	395085	296475	NO_2	Y	0.5	4.5		3m
BIL3		Roadside	395095	296492	NO_2	Y	N/A	3		3m
BIL4		Roadside	395118	296454	NO_2	Y	0	2.5		3m
LIC1		Roadside	391689	298778	NO_2	Y	N/A	3.5		3m
LIC2		Roadside	391508	298744	NO_2	Y	0	3		3m
LIC3		Roadside	391621	298773	NO_2	Y	N/A	6		3m
LIC4		Roadside	391654	298782	NO_2	Y	1.5	1.5		3m
LIC5		Roadside	391654	298782	NO_2	Y	1.5	1.5		3m
LIC6		Roadside	391654	298782	NO_2	Y	1.5	1.5		3m
LIC7		Roadside	391660	298766	NO_2	Y	N/A	4		3m
LIC8		Roadside	391454	298734	NO_2	Y	N/A	5		3m
LIC9		Roadside	391707	298757	NO_2	Y	N/A	3		3m
PIP1		Roadside	391765	298663	NO_2	Y	N/A	2		3m
PRI1		Roadside	391553	298931	NO_2	Y	N/A	3		3m
PRI2		Roadside	391566	298795	NO_2	Y	0	3		3m
PRI4		Roadside	391581	298686	NO_2	Y	N/A	5		3m
QUE1		Roadside	391603	298651	NO_2	Y	0	2.5		3m
QUE2		Roadside	391605	298635	NO_2	Y	N/A	4.5		3m
QUE3		Roadside	391664	298666	NO_2	Y	0	2.5		3m
QUE4		Roadside	391694	298657	NO_2	Y	N/A	4.5	YES	3m

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
STA1		Roadside	391389	299803	NO_2	Y	2	2		3m
STA5		Roadside	391261	302199	NO_2	Y	6.5	8.5	Yes	3m
STA6		Urban Background	391261	302199	NO_2	Y	6.5	8.5	Yes	3m
STA7		Roadside	391261	302199	NO_2	Y	6.5	8.5	Yes	3m
STA9a		Roadside	391535	303346	NO_2	Y	0	12		3m
WIL1		Roadside	394187	298452	NO_2	Y	0	8		3m
WIL2		Roadside	394712	298428	NO_2	Y	0	14.5		3m
PAR		Roadside	392362	296550	NO_2	Y	0	6.5		3m
BRI		Roadside	388195	298787	NO_2	Y	0	11		3m
BRO		Roadside	391679	298867	NO_2	Y	0	3		3m
CAN		Roadside	393004	300864	NO_2	Y	7.5	6.5		3m
CLE		Roadside	391487	298351	NO_2	Y	N/A	5		3m
CUL		Roadside	393364	297370	NO_2	Y	0	2.5		3m
DUD		Roadside	391530	297313	NO_2	Y	-1.5	4.5		3m
HOR		Roadside	392116	298607	NO_2	Y	0.5	2.7		3m
COR		Roadside	391956	298683	NO_2	Y	4.5	2		3m
NEA		Roadside	394715	299882	NO_2	Y	0	3.2		3m
OXF		Roadside	395398	296283	NO_2	Y	4.5	2.7		2.5m
TET		Roadside	389286	299894	NO_2	Y	3.2	3.2		3m
WAT		Urban Background	391127	298869	NO_2	Y	N/A	3		3m
WOL		Urban Background	394032	297176	NO_2	Y	4	2		3m

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
PEN		Urban Background	390386	296759	NO_2	Y	6.4	1.8		3m
PRO		Urban Background	394614	296090	NO_2	Y	N/A	28		3m
TRI		Urban Background	395541	296482	NO_2	Y	-24	73		3m
COL		Urban Background	395864	300595	NO_2	Y	N/A	48		
MAR		Urban Background	390705	302736	NO_2	Y	N/A	165		3m
WAR		Urban Background	389051	296781	NO_2	Y	N/A	50		3m
WRE		Roadside	392090	296095	NO_2	Y	N/A	50		3m
CC1		Roadside	391368	298681	NO_2	Y	N/A	5.9		3m
CC2		Roadside	391309	298553	NO_2	Y	0	2.8		3m
CC5		Roadside	391531	298376	NO_2	Y	N/A	5.8		3m
CC7		Roadside	391597	298579	NO_2	Y	N/A	9.5		3m
RR1		Roadside	391798	298836	NO_2	Y	0	2.9		3m
RR2		Roadside	391828	298894	NO_2	Y	N/A	7		3m
RR3		Roadside	391720	299027	NO_2	Y	N/A	3.6		3m
RR4		Roadside	391894	298721	NO_2	Y	N/A	1.2		3m
RR5		Roadside	391901	298587	NO_2	Y	N/A	11.4		3m
RR6		Roadside	391859	298522	NO_2	Y	N/A	3		3m
STA10		Roadside	391600	303791	NO_2	Y	N/A	15.5		3m
STA11		Roadside	391638	304270	NO_2	Y	N/A	2.5		3m
STA12		Roadside	391616	303643	NO_2	Y	N/A	5		3m

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
LWS1		Roadside	392156	298451	NO_2	Y	11.3	0.5		3m
LWS2		Roadside	392032	298468	NO_2	Y	6.8	2		3m
WIL3		Roadside	392991	298410	NO_2	Y	3.2	4		3m
WIL4		Roadside	393440	298379	NO_2	Y	0	7		3m
WIL5		Roadside	393639	298406	NO_2	Y	2.7	2.8		3m

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3) (4)				
							2017	2018	2019	2020	2021
A1	391654	298782	Roadside	Automatic		NA	38	38	Closed	Closed	Closed
A2	390374	296775	Roadside	Automatic		99	38	36	35	29	34
A4	391261	302199	Roadside	Automatic		84	36	29	28	23	23
A5	394754	298429	Roadside	Automatic		60	24	28	27	25	28
A9	391362	298934	Urban Background	Automatic		96	25	24	23	17	19

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

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

Notes:

The annual mean concentrations are presented as µg/m^3.

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021(%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3) (4)				
							2017	2018	2019	2020	2021
BIL1	395057	296541	Roadside	Diffusion Tube		99	36	**41**	39	31	34
BIL2	395085	296475	Roadside	Diffusion Tube		99	26	31	29	25	27
BIL3	395095	296492	Roadside	Diffusion Tube		99	37	39	39	31	34
BIL4	395118	296454	Roadside	Diffusion Tube		91	29	**43**	**42**	34	39
LIC1	391689	298778	Roadside	Diffusion Tube		99	36	35	37	23	25
LIC2	391508	298744	Roadside	Diffusion Tube		99	37	**42**	40	25	25
LIC3	391621	298773	Roadside	Diffusion Tube		99	35	33	31	22	26
LIC4	391654	298782	Roadside	Diffusion Tube		91	35	33	33	23	25
LIC5	391654	298782	Roadside	Diffusion Tube		Closed	33	33	37	Closed	Closed
LIC6	391654	298782	Roadside	Diffusion Tube		Closed	33	33	30	Closed	Closed
LIC7	391660	298766	Roadside	Diffusion Tube		99	31	30	33	26	27
LIC8	391454	298734	Roadside	Diffusion Tube		99	29	31	29	20	21
LIC9	391707	298757	Roadside	Diffusion Tube		99	37	33	34	23	25
PIP1	391765	298663	Roadside	Diffusion Tube		91	39	34	33	23	25
PRI1	391553	298931	Roadside	Diffusion Tube		99	34	37	34	26	30
PRI2	391566	298795	Roadside	Diffusion Tube		99	35	37	35	23	26
PRI4	391581	298686	Roadside	Diffusion Tube		99	24	25	22	17	17
QUE1	391603	298651	Roadside	Diffusion Tube		99	24	23	24	16	20
QUE2	391605	298635	Roadside	Diffusion Tube		66	31	29	26	19	25
QUE3	391664	298666	Roadside	Diffusion Tube		99	25	24	22	17	19
QUE4	391694	298657	Roadside	Diffusion Tube		99	30	26	28	17	20
STA1	391389	299803	Roadside	Diffusion Tube		99	29	30	29	22	23
STA5	391261	302199	Roadside	Diffusion Tube		99	33	32	29	25	26

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021(%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2017	2018	2019	2020	2021
STA6	391261	302199	Roadside	Diffusion Tube		99	34	30	30	24	27
STA7	391261	302199	Roadside	Diffusion Tube		99	33	29	29	24	26
STA9A	391535	303346	Roadside	Diffusion Tube		99	31	30	29	23	27
WIL1	394187	298452	Roadside	Diffusion Tube		89	24	22	22	17	19
WIL2	394712	298428	Roadside	Diffusion Tube		91	37	39	37	30	32
PAR	392362	296550	Roadside	Diffusion Tube		99	36	35	35	28	32
BRI	388195	298787	Roadside	Diffusion Tube		91	19	20	19	14	16
BRO	391679	298867	Roadside	Diffusion Tube		82	**46**	**45**	**43**	32	35
CAN	393004	300864	Roadside	Diffusion Tube		83	28	29	29	22	24
CLE	391487	298351	Roadside	Diffusion Tube		99	23	28	27	20	25
CUL	393364	297370	Roadside	Diffusion Tube		99	23	22	22	18	21
DUD	391530	297313	Roadside	Diffusion Tube		99	25	27	25	19	21
HOR	392116	298607	Roadside	Diffusion Tube		99	**41**	40	34	28	32
COR	391956	298683	Roadside	Diffusion Tube		91	32	30	30	22	24
NEA	394715	299882	Roadside	Diffusion Tube		99	21	22	23	18	19
OXF	395398	296283	Roadside	Diffusion Tube		91	29	32	30	26	29
TET	389286	299894	Roadside	Diffusion Tube		83	35	35	34	27	29
WAT	391127	298869	Roadside	Diffusion Tube		99	35	35	35	27	28
WOL	394032	297176	Roadside	Diffusion Tube		99	20	20	20	16	15
PEN	390386	296759	Roadside	Diffusion Tube		99	35	38	35	29	31
PRO	394614	296090	Intermediate	Diffusion Tube		91	24	25	25	20	19
TRI	395541	296482	Intermediate	Diffusion Tube		99	25	24	28	18	20
COL	395864	300595	Background	Diffusion Tube		99	15	16	15	11	11
MAR	390705	302736	Background	Diffusion Tube		47	15	14	14	10	9

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021(%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3) (4)				
							2017	2018	2019	2020	2021
WAR	389051	296781	Background	Diffusion Tube		99	13	12	13	10	11
WRE	392090	296095	Background	Diffusion Tube		99	14	16	15	13	14
CC1	391368	298681	Roadside	Diffusion Tube		83	29	30	27	19	22
CC2	391309	298553	Roadside	Diffusion Tube		99	26	24	22	15	15
CC3	391466	298374	Roadside	Diffusion Tube		Closed	26	Closed	Closed	Closed	Closed
CC5	391531	298376	Roadside	Diffusion Tube		99	26	29	26	19	23
CC7	391597	298579	Roadside	Diffusion Tube		99	27	28	25	19	21
RR1	391798	298836	Roadside	Diffusion Tube		55	26	34	27	26	23
RR2	391828	298894	Roadside	Diffusion Tube		99	**61**	**55**	**52**	38	43
RR3	391720	299027	Roadside	Diffusion Tube		99	37	**43**	**43**	31	34
RR4	391894	298721	Roadside	Diffusion Tube		99	33	34	34	27	28
RR5	391901	298587	Roadside	Diffusion Tube		99	36	39	36	26	32
RR6	391859	298522	Roadside	Diffusion Tube		99		35	33	28	28
STA10	391600	303791	Roadside	Diffusion Tube		91	23	26	25	19	20
STA11	391638	304270	Roadside	Diffusion Tube		99	39	35	34	26	29
STA12	391616	303643	Roadside	Diffusion Tube		99	37	33	31	25	29
LWS1	392156	298451	Roadside	Diffusion Tube		99	25	24	23	18	20
LWS2	392032	298468	Roadside	Diffusion Tube		89	28	26	24	20	21
WIL3	392991	298410	Roadside	Diffusion Tube		99		34	35	28	31
WIL4	393440	298379	Roadside	Diffusion Tube		99		23	20	16	18
WIL5	393639	298406	Roadside	Diffusion Tube		99		32	32	25	27

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

☒ **Diffusion tube data has been bias adjusted.**

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

Notes:

The annual mean concentrations are presented as µg/m^3.

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

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

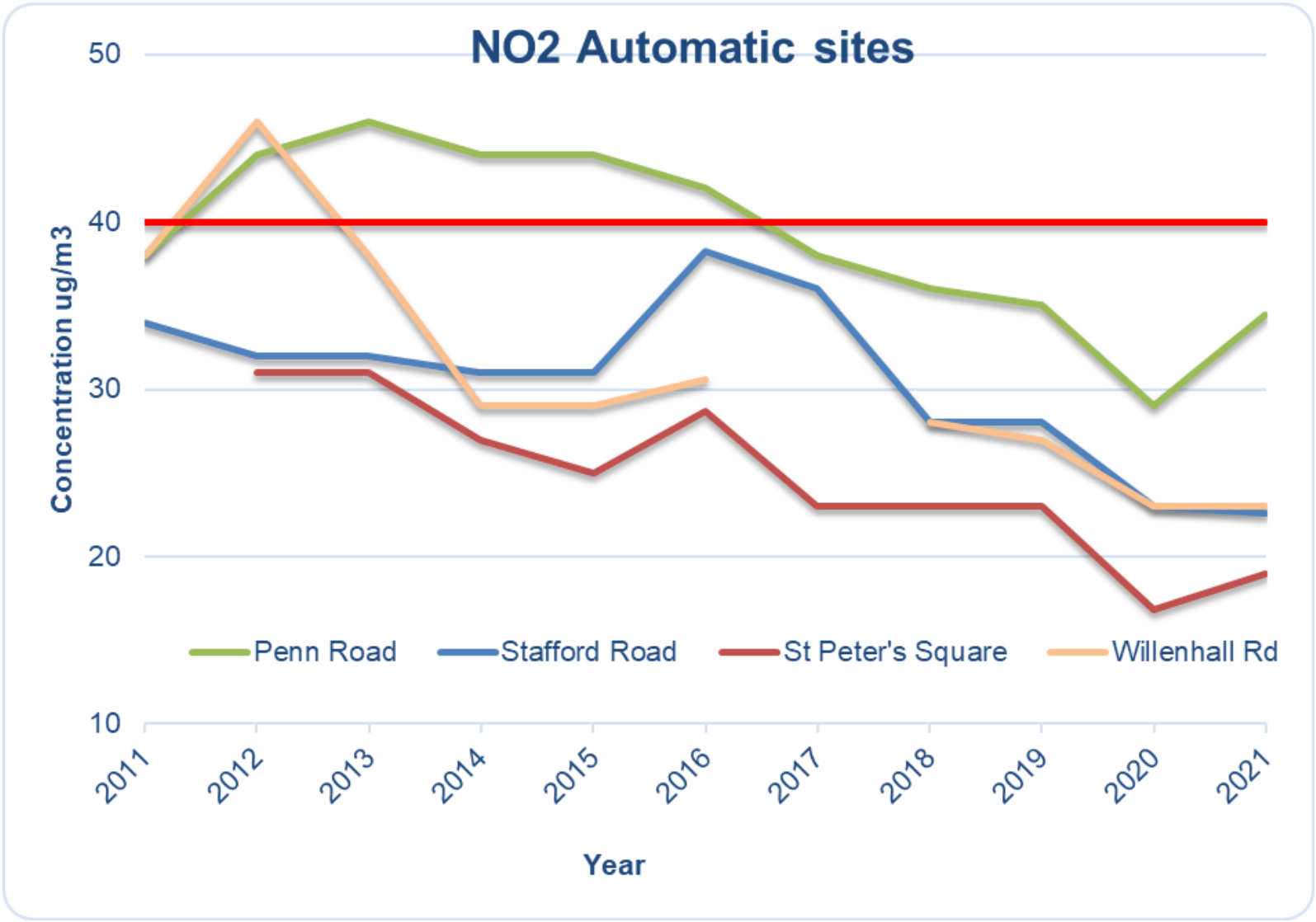
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations



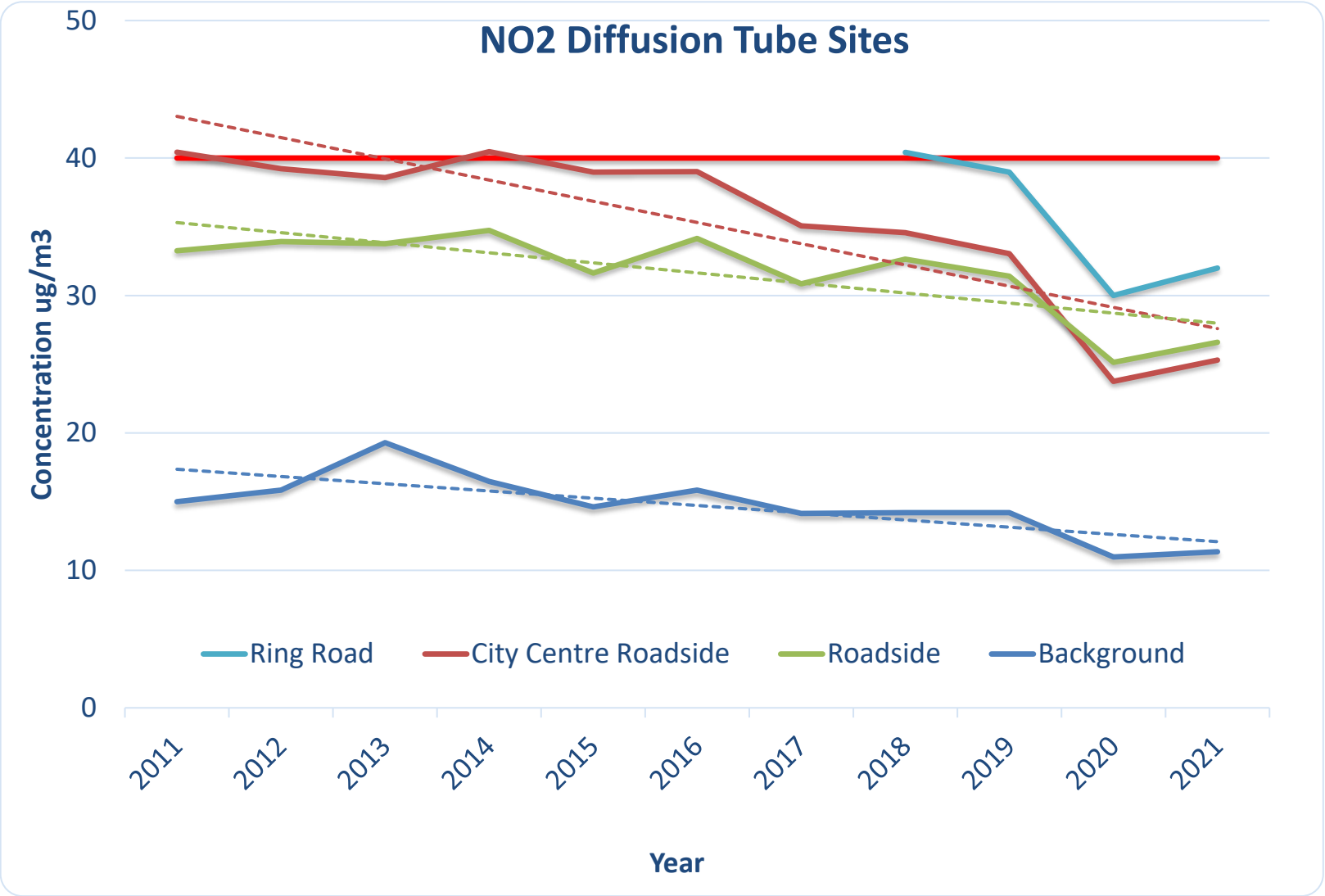

NO2 Diffusion Tube Sites
Concentration ug/m3
50
40
30
20
10
0
Ring Road
City Centre Roadside
Roadside
Background
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year

Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
							2017	2018	2019	2020	2021
A1	391654	298782	Roadside	Automatic		NA	0	0 (105)	closed	closed	closed
A2	390374	296775	Roadside	Automatic		99	0	0	0 (98)	0	0
A4	391261	302199	Roadside	Automatic		84	0	0	0	0	0 (78)
A5	394754	298429	Roadside	Automatic		60	0 (84)	0	0 (134)	0	0 (90)
A9	391362	298934	Urban Background	Automatic		96	0	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 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 PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2019 (%) [2]	PM_{10} Annual Mean Concentration ($\mu g/m^3$) [3]				
						2017	2018	2019	2020	2021
A1	391654	298782	Roadside			16	15	Closed	Closed	Closed
A2	390374	296775	Roadside			20	17	16	Closed	Closed
A4	391261	302199	Roadside			17	16	15	Closed	Closed
A5	394754	298429	Roadside			18	14	11	Closed	Closed
A9	391362	298934	Urban Background		95	17	13	12	13	12

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

Notes:

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

Exceedances of the PM_{10} annual mean objective of $40\mu g/m^3$ are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(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.2 – Trends in Annual Mean PM_{10} Concentrations

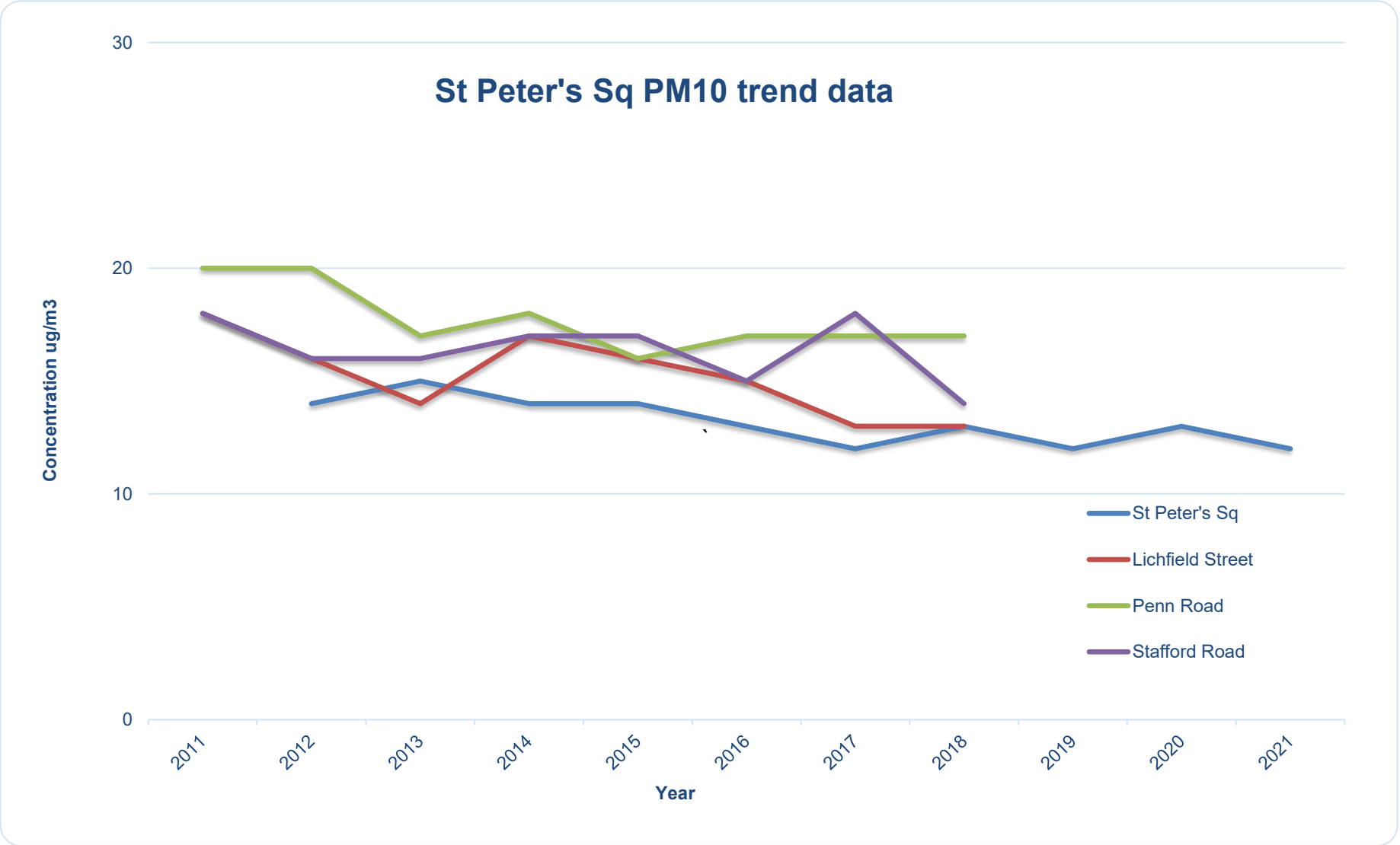


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
						2017	2018	2019	2020	2021
A1	391654	298782	Roadside			2	0	Closed	Closed	Closed
A2	390374	296775	Roadside			3	0	0 (25)	Closed	Closed
A4	391261	302199	Roadside			2	0	0 (27)	Closed	Closed
A5	394754	298429	Roadside			1 (24)	0	0 (20)	Closed	Closed
A9	391362	298934	Urban Background		95	1 (29)	0	1	1	0

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 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 ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
						2017	2018	2019	2020	2021
A1	391654	298782	Roadside			6	9	5	Closed	Closed
A5	394754	298429	Roadside			9	7	7	Closed	Closed
A9	391362	298934	Urban Background			6	8	3	Closed	Closed
A10	388841	295174	Suburban			7	No Result	7	Closed	Closed

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

Notes:

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(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%).

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Annual Mean		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.77) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
BIL1	395057	296541	43.1	49.3	37.5	52.0	43.4	44.1	46.1	43.9	47.4	40.8	37.8	44.0	44.1	34.0	
BIL2	395085	296475	38.6	33.4	30.8	38.6	31.2	29.5	42.4	31.7	31.6	29.0	42.8	34.8	34.5	26.6	
BIL3	395095	296492	51.1	41.5	40.4	51.1	43.6	39.7	30.0	32.6	49.1	40.9	55.0	44.1	43.3	33.3	
BIL4	395118	296454	49.1	50.4	44.2	54.2	48.3		44.0	41.3	57.0	50.5	56.3	48.2	49.4	38.0	
LIC1	391689	298778	36.5	42.1	24.7	33.0	27.7	28.4	21.7	32.3	34.0	34.0	38.8	35.1	32.4	24.9	
LIC2	391508	298744	39.5	32.0	28.1	33.0	29.2	27.5	27.2	30.4	33.0	33.5	42.6	36.1	32.7	25.2	
LIC3	391621	298773	40.3	35.4	28.3	26.4	32.8	26.5	31.8	30.5	35.6	32.6	41.6	38.4	33.4	25.7	
LIC4	391654	298782	35.5	35.3	23.7	35.2	32.1	35.2	31.6	33.1	33.8	29.1		30.7	32.3	24.9	
LIC7	391660	298766	42.6	32.5	28.1	21.2	34.0	28.1	35.3	27.5	41.9	39.4	49.5	39.8	35.0	26.9	
LIC8	391454	298734	33.5	22.8	23.4	27.8	22.6	25.0	24.8	26.2	26.8	23.5	36.1	29.0	26.8	20.6	
LIC9	391707	298757	41.0	34.2	26.7	26.0	33.0	25.6	22.5	26.2	36.3	36.0	40.9	39.7	32.3	24.9	
PIP1	391765	298663		31.1	27.4	30.2	33.3	19.5	21.4	31.8	41.4	39.1	39.6	41.5	32.4	24.9	
PRI1	391553	298931	42.2	43.4	31.1	44.1	37.9	34.7	35.4	35.3	38.3	34.4	42.6	41.2	38.4	29.6	
PRI2	391566	298795	39.6	28.5	30.8	36.5	28.3	29.8	28.0	31.7	36.0	31.7	39.4	35.6	33.0	25.4	
PRI4	391581	298686	27.6	27.5	17.2	19.7	18.0	17.4	11.0	19.9	22.9	22.5	30.6	27.2	21.8	16.8	
QUE1	391603	298651	27.7	29.4	18.2	29.0	19.9	21.4	22.1	28.5	24.5	22.9	31.0	27.7	25.2	19.4	
QUE2	391605	298635			19.2		25.7	18.4	21.7		72.1	26.6	31.0	31.8	30.8	25.0	
QUE3	391664	298666	26.8	29.1	19.6	26.3	23.0	18.1	21.6	24.7	26.7	23.2	31.4	28.0	24.9	19.2	
QUE4	391694	298657	29.5	30.4	18.8	25.4	24.5	16.4	22.2	25.2	29.6	27.0	30.7	30.9	25.9	19.9	
STA1	391389	299803	28.8	37.4	24.3	25.7	20.7	22.6	20.0	27.7	36.2	37.4	36.1	31.0	29.0	22.3	
STA5,6,7	391261	302199	42.9	32.7	33.2	31.2	31.0	22.3	27.7	30.4	38.4	36.7	47.2	38.4	34.3	26.4	
STA9a	391535	303346	38.7	38.3	30.8	42.2	32.4	27.5	29.6	30.6	37.5	32.0	37.4	33.8	34.2	26.4	
WIL1	394187	298452	31.4	29.9	20.5	26.0	17.1	16.4		15.2	27.0	19.9	29.5	28.3	23.7	18.3	
WIL2	394712	298428	44.4	36.0	42.5	41.9	44.2	41.8	34.7		46.3	42.9	46.7	32.9	41.3	31.8	
PAR	392362	296550	44.3	44.5	39.6	45.7	33.8	39.2	40.6	38.9	38.6	33.8	52.6	40.4	41.0	31.6	
BRI	388195	298787	25.1	25.7	16.4	22.7	13.2		16.7	18.5	21.6	17.4	21.1	24.3	20.2	15.6	
BRO	391679	298867	53.5	35.0			40.5	30.5	38.2	43.0	48.8	47.7	50.5	54.9	44.3	34.1	
CAN	393004	300864		37.5	28.5	28.9	29.4	24.2	31.3	30.0		33.3	36.6	32.8	31.3	24.1	
CLE	391487	298351	38.8	33.4	20.8	29.2	29.9	27.5	27.2	27.5	34.6	32.3	41.5	37.2	31.7	24.4	
CUL	393364	297370	35.4	31.0	24.4	26.6	22.5	16.0	20.8	23.3	30.7	26.8	33.9	31.6	26.9	20.7	
DUD	391530	297313	32.5	31.6	21.2	27.7	25.1	21.3	20.1	24.8	29.3	28.2	32.9	32.1	27.2	21.0	
HOR	392116	298607	43.7	42.8	35.0	42.8	40.2	36.0	33.4	43.7	41.1	38.7	54.1	35.5	40.6	31.2	

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)													
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
															Raw Data	Bias Adjusted (0.77) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
COR	391956	298683	39.0	35.3	28.3	26.4	27.0	22.1	26.0	28.5	38.2	31.2		35.9	30.7	23.7	
NEA	394715	299882	36.1	29.3	21.3	24.5	19.8	18.2	19.6	20.2	27.9	22.3	29.9	29.8	24.9	19.2	
OXF	395398	296283	39.3	35.4	29.6	50.1	38.2		37.5	36.5	37.9	32.2	38.7	33.4	37.2	28.6	
TET	389286	299894	33.4	34.7	33.4	36.3			31.1	30.2	44.7	40.3	44.8	42.9	37.2	28.6	
WAT	391127	298869	35.4	42.6	27.1	39.8	28.4	33.7	35.2	31.7	42.1	37.1	35.6	40.1	35.7	27.5	
WOL	394032	297176	28.6	24.8	17.5	22.4	14.7	12.7	14.8	16.0	20.4	17.8	23.3	23.7	19.7	15.2	
PEN	390386	296759	42.5	44.7	33.8	46.4	43.8	46.4	38.3	48.3	49.0	43.1	18.2	25.3	40.0	30.8	
PRO	394614	296090		31.2	23.3	32.4	20.4	19.8	19.1	21.9	20.7	24.5	30.5	31.0	25.0	19.2	
TRI	395541	296482	34.2	30.8	20.9	27.1	21.7	16.9	19.5	15.3	25.6	25.0	30.8	33.2	25.1	19.3	
COL	395864	300595	23.4	18.3	11.0	12.2	10.6	6.6	11.0	11.5	15.8	15.5	20.0	20.5	14.7	11.3	
MAR	390705	302736			12.1		9.3	8.1			3.0		16.2	17.5	11.0	8.7	
WAR	389051	296781	19.6	11.5	12.0	14.4	9.1	10.2	10.0	11.0	11.8	11.7	25.3	16.4	13.6	10.5	
WRE	392090	296095	19.7	19.4	12.9	15.0	12.4	10.4	11.9	11.7	15.6	15.5	54.4	16.1	17.9	13.8	
CC1	391368	298681			25.2	22.6	25.0	28.8	20.1	29.3	32.1	30.1	37.8	33.5	28.5	21.9	
CC2	391309	298553	26.2	17.5	15.1	19.4	14.5	14.1	15.7	17.7	21.1	17.1	26.9	24.7	19.2	14.8	
CC5	391531	298376	33.0	28.9	23.9	35.7	27.8	29.5	29.1	29.0	29.8	25.9	37.9	29.5	30.0	23.1	
CC7	391597	298579	31.1	28.8	19.9	30.9	24.8	20.9	20.6	24.7	28.1	28.0	28.1	30.5	26.4	20.3	
RR1	391798	298836	46.7	33.8	31.4		32.7	22.2					26.7	30.6	32.0	22.7	
RR2	391828	298894	66.4	46.5	53.3	51.0	54.3	33.1	53.4	51.2	62.1	59.1	71.3	52.8	54.5	42.0	
RR3	391720	299027	57.5	47.5	39.1	41.4	43.8	29.1	34.5	31.9	50.6	40.6	55.6	55.1	43.9	33.8	
RR4	391894	298721	50.6	40.0	35.1	30.7	31.0	21.6	26.5	29.4	38.0	38.1	49.6	46.2	36.4	28.0	
RR5	391901	298587	47.8	46.4	30.2	47.3	38.5	32.0	38.2	38.5	43.7	37.4	44.4	43.5	40.7	31.3	
RR6	391859	298522	34.1	38.0	34.9	35.1	36.3	31.1	30.2	37.2	35.4	31.7	48.3	37.0	35.8	27.5	
STA10	391600	303791		38.0	19.9	32.2	21.2	16.4	20.0	25.0	24.0	24.0	25.0	32.7	25.3	19.5	
STA11	391638	304270	47.1	37.5	35.8	33.7	28.8	30.3	33.1	34.1	39.5	41.8	47.6	40.2	37.5	28.8	
STA12	391616	303643	51.4	32.8	31.0	39.0	33.3	32.6	33.9	36.3	39.0	36.1	45.9	34.2	37.1	28.6	
LWS1	392156	298451	34.9	31.2	21.8	26.3	19.3	19.5	19.9	20.4	25.3	23.9	37.0	25.6	25.4	19.6	
LWS2	392032	298468	36.8	30.4	25.3	29.8	21.1	22.3		22.5	25.8	26.3	30.3	31.6	27.5	21.2	
WIL3	392991	298410	54.8	43.9	33.6	39.8	34.8	25.8	28.8	33.8	47.1	41.4	47.4	46.4	39.8	30.6	
WIL4	393440	298379	32.1	27.9	17.8	25.3	15.2	17.5	17.1	18.0	20.4	20.6	30.0	40.1	23.5	18.1	
WIL5	393639	298406	42.6	41.0	34.4	33.9	34.1	29.1	22.9	30.0	40.9	36.4	45.9	22.9	34.5	26.6	

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

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

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column.**

☒ **The City of Wolverhampton Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within the City of Wolverhampton Council During 2021

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

Additional Air Quality Works Undertaken by the City of Wolverhampton Council During 2021.

Wolverhampton City Council has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

The council uses diffusion tubes prepared using 50% TEA in acetone which are supplied by ESG Didcot.

The tubes arrive from ESG and are stored in a refrigerator prior to exposure. The tubes are then exposed in accordance with the start and end dates for the national NO_2 survey. Following exposure, the tubes are capped and immediately dispatched to ESG for analysis.

Triplicate tubes are collocated at automatic monitoring stations A1 and A4 in order to obtain a bias correction factor. The correction factor is applied to the yearly average to enable comparison with the annual NO_2 objective. The results from the co-location study are submitted to the Local Air Quality Management help desk for inclusion in the national co-location studies data base. The output from the 2022 local bias adjustment spread sheet is shown below.

	STEP 3a Local Bias Adjustment Input 1
Periods used to calculate bias	10
Bias Adjustment Factor A	0.65 (0.6 - 0.7)
Diffusion Tube Bias B	55% (43% - 67%)
Diffusion Tube Mean (µg/m^3)	36.0
Mean CV (Precision)	4.9%
Automatic Mean (µg/m^3)	23.2
Data Capture	94%
Adjusted Tube Mean (µg/m^3)	23 (22 - 25)
Overall Diffusion Tube Precision	**Good Overall Precision**
Overall Continuous Monitor Data Capture	**Poor Overall Data Capture**
Local Bias Adjustment Factor	**0.65**

The bias adjustment factor which the council has used are detailed in Table C.1 below.

The national bias adjustment factor has been used for 2021 as the data capture for the automatic analyser for May and June dropped below 85%

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	09/22	0.77
2020	National	09/21	1.01
2019	National	06/20	1.05
2018	National	09/19	1.07
2017	National	06/17	1.08

NO_2 Fall-off with Distance from the Road

No diffusion tube NO_2 monitoring locations within the City of Wolverhampton Council required distance correction during 2021.

QA/QC of Automatic Monitoring

The council follows the QA/QC procedures outlined in Chapter 7 of LAQM.TG16 in order to minimise data loss and achieve the required 90% data capture.

The chemiluminescent monitors are calibrated daily using on site calibration gases. This involves feeding zero air gas, followed by a span gas containing a known concentration of

NO_2 through the analyser. A correction factor is then applied based on the analyser's response. Data is stored in both raw and corrected form.

A site visit is made every month to change filters and carry out a manual calibration which is checked against the automatic daily calibrations. Copies of the calibration reports, calibration gas logs and engineer's reports are retained on file.

All the sites are covered by a service contract provided by Enviro Technology Services plc (ET). The sites are serviced every 6 months by an ET service engineer in accordance with the manufacturer's instructions and warranty conditions. ET also provide a 48-hour call out response to cover breakdowns.

Data is examined on a regular basis to screen out erroneous and unusual measurements, having regard to the recommendations in Chapter 7 of LAQM.TG16.

The data presented in the report has been ratified, live data is available through the council's hosted Envitech Europe by web site at:

https://airquality.wolverhampton.gov.uk/home/googleMapWithForcast

PM_{10} Monitoring Adjustment

The type of PM10 monitor utilised within the City of Wolverhampton Council are no longer supported by the VCM model. The data is presented is uncorrected and is used for trend data only.

Automatic Monitoring Annualisation

Data capture for site A 5 was less than 75%, a summary of the annualisation correction is provided in Table C.1.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within the City of Wolverhampton Council required distance correction during 2021.

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Site1 Birmingham Acocks Green	Annualisation Factor Site 2 Walsall Woodlands	Annualisation Factor Site 3 Cannock A5190		Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
A5	1.35	1.2	1.11		1.22	23	28	

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

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

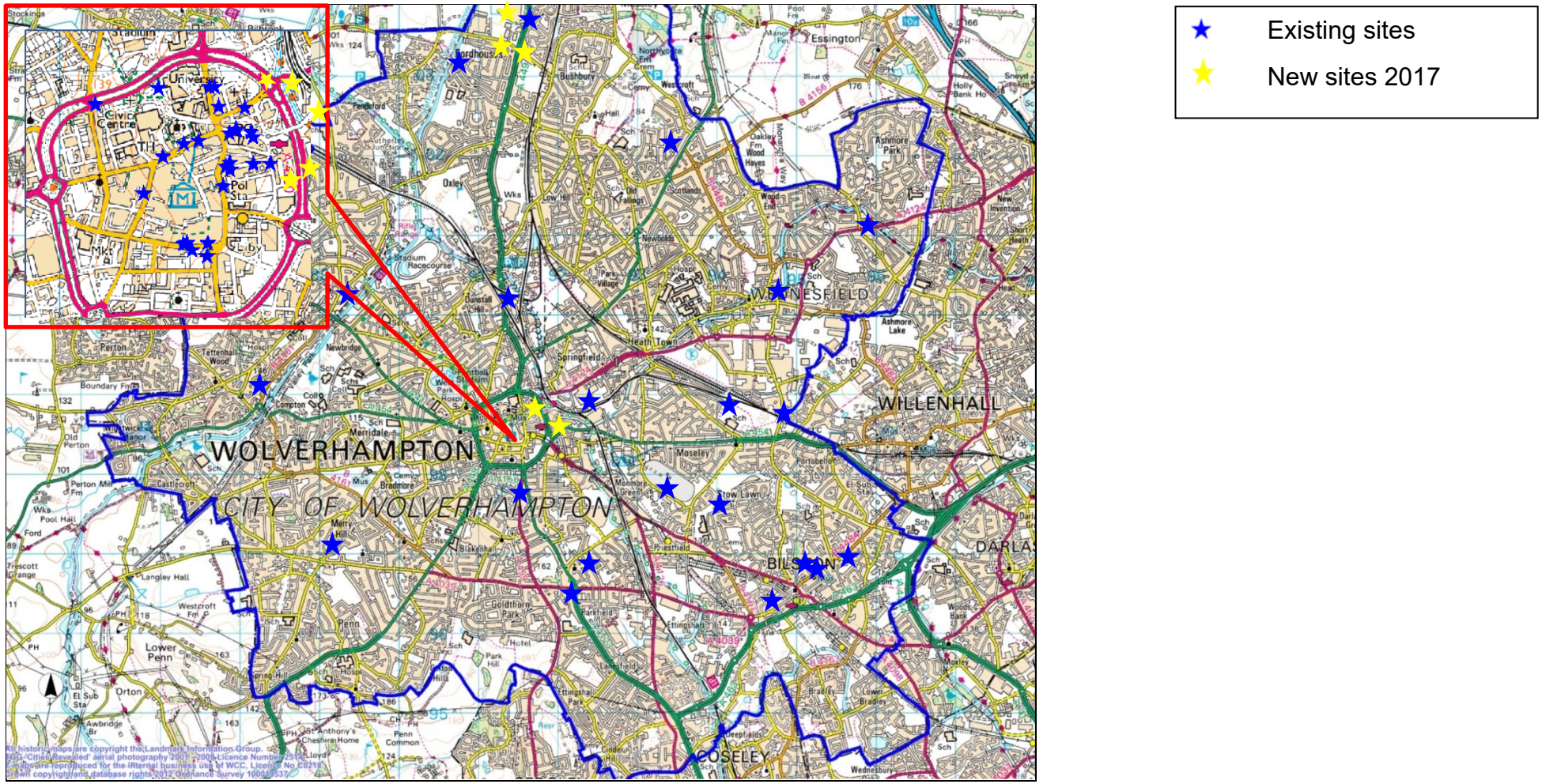
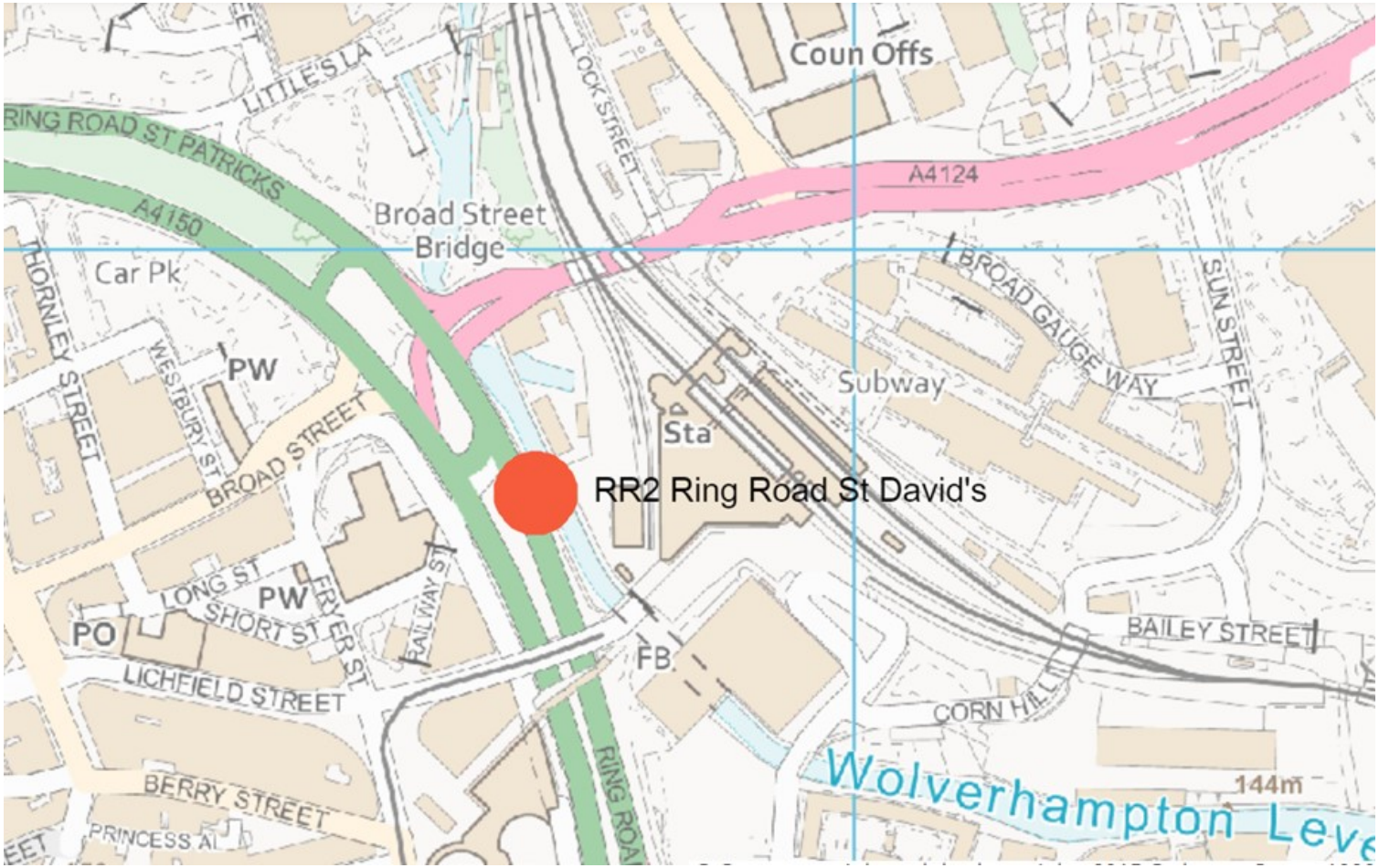


Figure D.2 – Location of exceedance site



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

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/m^3).

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

(1) Local Air Quality Management – Technical Guidance (TG16), Department for Environment, Food and Rural Affairs 2016.

(2) LAQM Tools; Local Air Quality Management website www.airquality.co.uk

(3) 2015 Air Quality Updating and Screening Assessment, City of Wolverhampton Council.

(4) 2018 Air Quality Annual Status Report (ASR), City of Wolverhampton Council.

(5) Connected Places Strategy, City of Wolverhampton Council.

(6) Movement for Growth: The West Midlands Strategic Transport Plan, West Midlands Combined Authority.

(7) Transport Plan 2017/18, West Midlands Combined Authority.

(8) Black Country Ultra Low Emission Vehicle Strategy, Black Country Consortium.

(9) Black Country Local Authorities Targeted Feasibility Study to Deliver Nitrogen Dioxide Concentration Compliance in the Shortest Possible Time

(10) Transport For West Midlands Quarterly update report

(11) Defra Third Wave LA quarterly report update