



**WATFORD
BOROUGH
COUNCIL**

2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995
Local Air Quality Management

Date: June, 2021

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Executive Summary: Air Quality in Our Area

Air Quality in Watford

Watford is a concentrated urban area situated to the North West of London, with an estimated population of 96,800. It has a well-established regional shopping centre with major rail and road communication links. It has both mainline and underground train stations, the M1 lies along the northern boundary of the borough and the M25 is situated to the west. The borough is also served by several major trunk roads, including the A41, A411, A412 and A405.

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 ages³, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017⁴.

Watford suffers from traffic congestion. The main pollutants of concern in the Borough are NO₂, PM₁₀ and PM_{2.5}. These are mainly associated with road traffic. NO₂ is formed during the combustion process when Nitrogen in the air bonds with Oxygen. Road vehicles emit particulate matter from their exhaust and from non-exhaust sources such as brake, tyre and road surface wear and the resuspension of road dust.

The latest monitoring data shows a general trend of decreasing concentrations of NO₂. This is in line with the national trend. Defra recently reported that “between 2007 and 2019 inclusive, the annual mean NO₂ concentration at roadside sites reduced by an

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 2020

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

average of 1.8 µg/m³ each year. This reduction was observed at most long-running monitoring sites across the UK; which could be a consequence of the large reduction in road transport emissions of NO₂ over the same period in the UK, as newer vehicles subject to stricter emissions standards enter the transport fleet”.

Concentrations of NO₂ have decreased in the Council’s existing AQMAs. There are no new major sources of emissions in the Borough. The Council has not introduced any new AQMAs, Action Plans or strategies. The Council is in the process of drafting a new AQAP. The new Action Plan is currently in its second draft.

Major projects

Watford Borough Council (WBC) is committed to an ongoing redevelopment programme that is set to secure economic prosperity for decades. Over the next 10 to 15 years, more than £1.5 billion worth of investment will be leveraged by the Council as part of an ambitious plan which will create thousands of new homes and jobs, with significantly improved services, transport infrastructure and leisure facilities.

By providing the strategic lead for Watford’s sustainable economic growth, the Council is ensuring the borough remains a highly attractive proposition for residents and business alike.

Projects in progress

Watford Business Park

Watford Business Park is a 26.3 hectare site to the south-west of Watford town centre and is currently home to over 100 businesses, employing in the region of 1,200 people.

Whilst it is a major employment area, a significant proportion of the existing properties are old and of a poor specification. WBC is kick starting the regeneration of the park with plans to redevelop the ‘Gateway Zone’ at the northern entrance with modern, fit for purpose, flexible commercial premises. It has recently secured £5m of Local Enterprise Partnership funding which will enable the plans to move forward, creating new jobs and business growth in Watford.

The Council has purchased a number of buildings over the last three years. However, in order to move forward with the regeneration of this area, a Compulsory Purchase Order (CPO) has been made.

Watford Riverwell

Following the clean-up of the area around the Watford Health Campus, the opening of the road to Watford General Hospital and the completion of Trade City, the Council is now ready to deliver its first homes and create a new community in the area. WBC has been working on a new masterplan for Watford Riverwell to make sure it's a place that everyone can enjoy.

Watford Riverwell is the town's major regeneration project. Over the next 15 – 20 years, the £350million project will transform 65 acres of land surrounding Watford Hospital, much of which is currently unused, derelict and contaminated. The scheme will create a new, vibrant community that will provide around 1,000 new jobs and 750 homes; local retail, leisure and play facilities, and lots of public green space for everyone to enjoy.

Watford Junction

The station - which currently welcomes 8 million visitors every year - will be brought into the 21st century by WBC alongside its partners: Halkin, Network Rail, London North Western Railways and Hertfordshire County Council. To create an exciting and vibrant quarter around the town's main station, plans include a new façade, new shopping facilities, new bus stops, better walking routes and a brand new connecting bridge. Plans also include a second entrance to the station and a new ticket hall to banish long queues at the ticket barriers, a new bus station for the town and a multi-storey car park for station users.

The route to transformation

Phase 1 – New entrance and ticket hall, and retail and refreshment outlets;

Phase 2 – Development of the bus station;

Phase 3 – Development of 350 new homes, new offices and new retail space.

Western Gateway

The Western Gateway has been identified in the emerging Local Plan as a Special Policy Area where significant new development is being directed. During 2019, WBC will finalise a masterplan for the area which will support the delivery of circa 1000 new homes along with local retail and additional employment opportunities.

Two housing schemes, Ascot Road and adjacent to Tolpits Lane, have already been granted planning permission which will deliver over 500 new homes across the two sites. WBC is working closely with Hertfordshire County Council to develop options for a sustainable public transport scheme utilising the path of the former Metropolitan Line Extension corridor which will improve local connectivity and reduce congestion through to the town centre. Among the options being considered is a new transport hub at Ascot Road where people will be able to board the new service.

Clarendon Road

Significant improvements have taken place at the junction of Clarendon Road and Beechen Grove in Watford. Improvements included resurfacing of the carriageway and footways, upgrading the traffic lights, lamp columns and street furniture and enhancing the overall look and feel of the junction to create an improved 'gateway' to the town centre. A whole host of major improvements will take place until March 2025, to help create a sense of arrival for the millions coming through Watford Junction every year.

St Albans Road

WBC, working closely with local councillors, local businesses, residents and Hertfordshire County Council, want to make improvements to St Albans Road. These include £400,000 of investment of new street furniture, improved paving, tree planting, more cycle friendly routes and other changes to the look and feel of the area. The area has also been highlighted as a fly tipping hotspot, so the Council's Environmental Health team will be focusing on the St Albans Road area (from Leavesden Road to Balmoral Road and immediately surrounding roads) to help improve street scene issues.

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 Strategy⁵ sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero⁶ 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.

The Council has prepared its first draft of the New Local Plan, which will set a vision for Watford up to 2036 and guide planning decisions and new development.

The Council in partnership with Hertfordshire County Council has commissioned a Highways Redesign and Traffic Management Study in support of the Council's Sustainable Transport Strategy.

The Council's Sustainability Strategy 2020 to 2023 contains 6 key strands. One of these strands is Improving Transport & Air Quality. The section of the strategy entitled Improving Transport & Air Quality, highlights the health impacts of air pollution and the cost to society, and describes the Council's LAQM activities and highlights of progress so far.

The following items have been included under this theme in the Council's Sustainability Action Plan:

- *Participate and develop the HCC Sustainable travel town application as part of a wider ranging strategy to cover low carbon transportation in the borough;*
- *Widen the remit of the existing projects in the Sustainable Transport Board to develop strategies;*
- *Expand electric pool car scheme;*
- *All Council fleet where possible will be replaced with ultra-low emission vehicles or electrical vehicles at the end of life. This will include service vehicles such as those required for parking enforcement and the recycling collection vehicles;*

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

- *Explore options to reward lower emissions vehicles through the Essential Car Allowance. Explore ways to incentivise staff to choose low carbon travel methods. As part of this would be to incentivise cycling by providing a mileage reimbursement for business trips travelled by bike;*
- *Ensure computer systems are set up to best make use of laptop video conferencing facilities, thereby reducing the need for travel;*
- *Introduce the Cycle to Work scheme for staff and develop incentives such as purchase of tax-free bicycles and equipment;*
- *Undertake a comprehensive study to evaluate the most cost-effective and practical options to increase EV charging infrastructure across the borough. This will increase our understanding of future needs, management options, costings, and inform our policies on residential charging and appropriate requirements for new developments;*
- *Develop a strategy, and associated incentives, to reduce emissions from authority- authorised taxis. This will include programmes to encourage electric vehicles;*
- *Begin implementation of the EV charging infrastructure program; applying for and utilising OLEV Funding as appropriate (e.g. WBC Car parks, leisure centres and key office sites). Include rapid charging;*
- *Explore options to convert parking spaces to secure cycle storage where there is a demand from 40% of households on the street;*
- *Continue to develop and implement the measures of our Air Quality Management Plan to reduce emissions from road transport and improve air quality;*
- *Widely promote Idling Campaigns to raise awareness of the impact of idling vehicles on health and air quality. Children and parents will be the core focus of the campaign as well as using enforcement officers to raise awareness and possibly enforce anti-idling;*
- *Utilise existing relationships with businesses (e.g. Environmental Health) to promote anti idling (e.g. Screwfix, restaurants on indoor air pollution);*
- *Communications campaign targeting schools on walking buses and ways to avoid air pollution;*
- *Create communications for website/CSC that provides information on indoor and outdoor air quality and how best to protect vulnerable adults and children;*
- *Widely promote Idling Campaigns with council delivery partners;*

- *Investigate and implement options to restrict permits/licences for services and traders that need to idle their engines;*
- *Install utility access points in the city centre for traders and events staff to avoid the need for idling engines and generators;*
- *Introduce a bike share scheme to Watford - expected to launch March 2020;*
- *Introduce demand responsive transport (DRT) - expected March 2020;*
- *Introduce Transport App to bring together all modes of transport in the borough. Inclusion of DRT and bike share March 2020;*
- *Determine a strategy for Local Cycling, Walking and Infrastructure Plan. Expected by August 2020;*
- *Develop business case for parking sensors (using smart technology to identify spaces). Project development proposal by end 2020.*

Sustainable Watford

Cycling - Beryl & Cycle Hub

Beryl - The bikes are available to hire 24/7 (via Beryl Bays across Watford) all year round through a user friendly smartphone app. You can also use the Beryl's e-Bikes, which have a centre mount pedal assist, ensuring a lower centre of gravity in the bike which provides a safer and more enjoyable riding experience.

Rides are charged per-minute, daily, or through a variety of economical prepaid riding passes. For those without a smartphone, Beryl is looking at alternative ways to provide access to the scheme.

Watford Cycle Hub - The Council has funded the replacement of its original pavilion building with a larger, bespoke, modular structure which will enable to the Hub to expand its services to the community. The new building incorporates a café and social space with a larger workshop, a dedicated office and display space for reconditioned bikes and an expanded range of accessories.

Transport - ArrivaClick & travelWatford app

ArrivaClick (accessible and DDA compliant)

The on-demand bus provides a flexible bus service that, unlike others does not follow a fixed route at fixed times. People are picked up and dropped off at 'virtual stops' at a point either close to their home or their destination.

The buses will operate across the borough and to Warner Brother Studios and Croxley Park. Each bus will have comfortable seating, tables, free Wi-Fi, USB chargers and air conditioning. The operating times are 6am - 10pm (Mon to Thurs), 6am - 11pm (Fri and Sat) and 8am - 9pm (Sun).

Journey prices range from £1 to £2.50 per mile depending on the time of day and further discounts are available to regular users via weekly passes and credit bundles.

travelWatford app

Free to download and use, the app is available on IOS and Android. It brings together all of Watford's transport options and lets people choose the best options for a given journey based on cost, waiting time and environmental impact.

Users have ready access to real time travel information, and key booking and payment options.

E-Vehicles - E-Car Club & Charging Points

Low-emission vehicles eligible for a plug-in grant

Residents and businesses can get a discount on the price of brand new low-emission *vehicles* through a grant that the government gives to vehicle dealerships and manufacturers. Grants are available of up to £2,500 for electric vehicles priced under £35,000.

Watford E-Car Club

The fleet includes three electric Renault ZOE 40KwH hatchbacks parked in the Watford Town Hall car park, which can be booked for an hour or several days at a time. The award-winning cars have an average range of 150 - 180 miles per charge.

You can be booked online (or via the free mobile app) and as they're completely electric, there are no additional fuel costs to worry about. Insurance is even included in this price and the minimum membership age is 19-years-old.

The cost is just £6.50 per hour, or £60 for 24 hours.

EV Charging Points

The new installations by our partner and electric vehicle infrastructure experts Electric Blue are being focused in areas where there is little or no off-street parking.

Herts 2025 - Electric taxi vehicles



Herts 2025 is an initiative led by Electric Blue aimed at delivering significant air quality improvements in Hertfordshire towns by increasing the uptake of zero emission electric vehicles (EVs) within the taxi industry. The initiative is addressing the market failure surrounding the lack of information and awareness of the benefits, availability and capabilities of EVs. The scheme has been supported by

the European Regional Development Fund (ERDF) Programme.

Funded trial scheme

Electric Blue will soon be offering taxi drivers in Watford the complete package and the opportunity to trial a taxi before they make the switch. As well as securing preferential rates on purchasing a car and reduced licensing fees, the business provides advice on grants available from the Government.



Low Carbon Workspace Grants

Low Carbon Workspaces provides financial support to help SMEs make energy efficiency changes to their premises or processes. Grants of up to £5,000 are available to small and medium sized businesses to: improve the energy efficiency of their premises (e.g. LED lighting, heating upgrades), install a renewable energy system or purchase an electric vehicle. Further information is available at [lowcarbonworkspaces.co.uk](https://www.lowcarbonworkspaces.co.uk)

The Council's Head of Transport and Infrastructure reports the following:

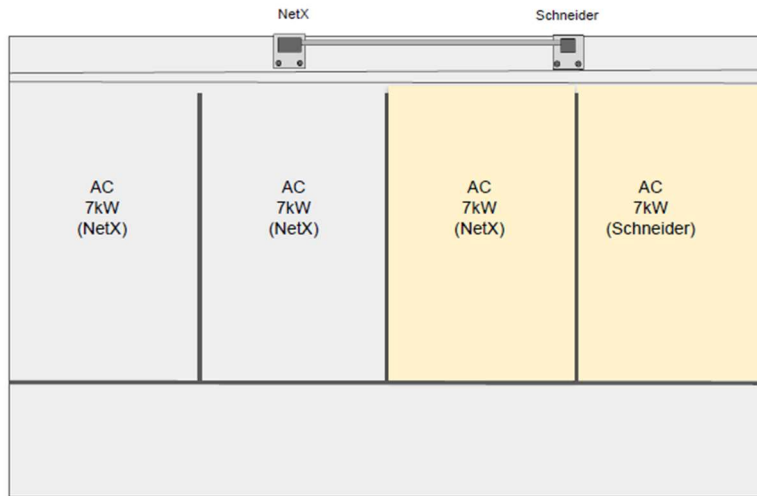
Electric Charging Units: The Council was awarded funding by the Office For Low Emissions in June 2020 and we have so far managed to install dual charge points at Bradshaw Road, Victoria Road, Durban Road East, Essex Road and Shaftesbury Road as well as EV charging on Watford Business Park and 2 charge points at Cassiobury Park car park (8 chargers in total for up to 16 Ev's to charge at any one time).

The Council has seven more sites currently under construction at: Granville Road, Stamford Road, Sotherton Road, Grosvenor Road, Sutton Road, Westland Road and Mildred Avenue and each site will allow charging for up to two vehicles. The Council is aiming to have these completed by the end of May 2021 and 3 more sites (subject to UKPN having a suitable power connection) completed by the end of June 2021.

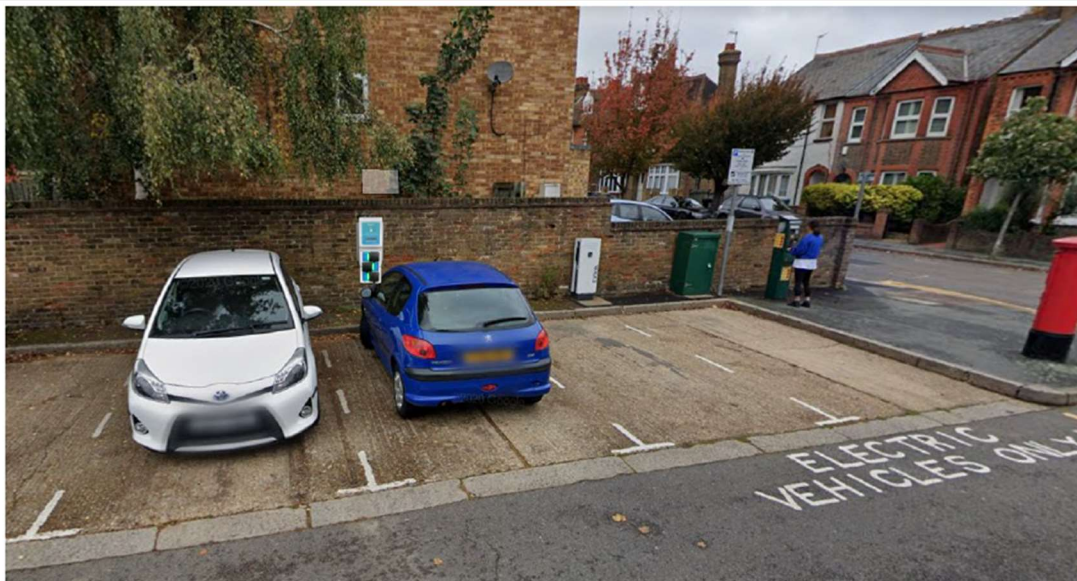
NetX Project: The Council is also taking part in a pilot project to add more charge points from the infrastructure that we are installing. The Council has joined Brighton, Southend and the University of Hertfordshire to install these add-on charge points. The first site for Watford for NetX is in Essex Road.



Essex Road



Essex Road



Public Realm Improvements: The Council has been unaffected by the Covid-19 pandemic and the construction sites have continued during lock down.



St Albans Road streetscape project completed in November 2020 has seen the Council refurbish 7 of the original planters and introduce 19 new bespoke planters and the Council has planted 8 new street trees.



The Watford Junction station frontage improvements has seen the Council introduce 6 new planters. This project was completed in November 2020.

No comments had been received from Hertfordshire County Council at the time of writing. If received, comments will be added at a later date.

Conclusions and Priorities

NO₂ concentrations decreased at almost all monitoring locations, including at Chalk Hill in AQMA 3A. There were no exceedances of the air quality objectives for NO₂, with respect to both annual mean and 1-hour objectives.

The annual mean concentration at Chalk Hill (WF44) was 38.9 ug/m³, this concentration was within 10% of the annual mean objective for NO₂. Following fall-off with distance correction, this concentration was 32.5 ug/m³.

There were no exceedances of the air quality objectives for PM₁₀, relating to both annual mean and daily mean objectives.

There were no exceedances of the EU Limit Value (25ug/m³) or the WHO guideline level (10ug/m³) for PM_{2.5}.

In January 2022, the Council intends to make the changes to the monitoring network that were discussed in last year's ASR.

Adopting the Council's new AQAP is a priority for 2021/2022.

Local Engagement and How to get involved

The Council welcomes comments from residents and business operators regarding air quality in the Borough. The Environmental Health Team can be contacted via email envhealth@watford.gov.uk or by telephone call 01923 278503.

Data measured at the automatic monitoring site at Watford Town Hall can be viewed at https://www.airqualityengland.co.uk/site/latest?site_id=HB004.

Residents, businesses and visitors to the Borough can play a role in improving air quality, for example, walking, cycling or using public transport instead of driving. For those who need to use a car, replacing it with a greener vehicle such as an electric one is a great way of improving air quality. If individuals or businesses are not ready to replace their existing vehicles, they should ensure that at least they are serviced and in particular, tyre pressures are at the appropriate level as doing so will help lower emissions as well as saving money.

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1 Local Air Quality Management

This report provides an overview of air quality in Watford during 2020. 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 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 pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Watford 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 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

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

- NO₂ 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 Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA 2 Vicarage Road	Declared 01/02/2006, Amended 10/04/2019	NO ₂ Annual Mean	A predominately residential area with a cluster of commercial buildings within and as well as close to the vicinity. Queuing traffic.	NO	58	34.2	Watford Borough Council Air Quality Action Plan, 2011	https://www.airqualityengland.co.uk/local-authority/hnb-reports
AQMA 3A Aldenham Road, Chalk Hill	Declared 01/02/2006, Amended 10/04/2019	NO ₂ Annual Mean	A combination of residential and commercial buildings along a main road within close proximity to Bushey Station. Queuing traffic.	NO	56.8	30.6	Watford Borough Council Air Quality Action Plan, 2011	https://www.airqualityengland.co.uk/local-authority/hnb-reports

Watford Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date.

Watford Borough Council confirm that all current AQAPs have been submitted to Defra.

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

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

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports.

1. The Council undertook a review of its diffusion tube locations and identified new locations based on congestion and traffic count information. They plan to deploy 15 additional diffusion tubes. This demonstrates the Council's active engagement in both monitoring and trying to understand air quality within the borough. It is encouraged for the Council to continue reviewing diffusion tube locations and to relocate tubes if deemed appropriate (i.e. relocate from areas where low concentrations are continually recorded).
2. The Council plan to deploy a triplicate site that will be co-located with the automatic monitor. This is welcomed as it allows the Council to calculate a local bias adjustment factor which may prove to be more representative of the borough.
3. It appears as though the concentration in Table 2.1 for AQMA 3 is incorrect. The results in the ASR indicate that once distance correction is applied there are no exceedances of the annual mean objective. However, the concentration in Table 2.1 for the AQMA is $41\mu\text{g}/\text{m}^3$ which would indicate an exceedance. This concentration appears to be incorrect. Can the Council please ensure the correct concentration is included in the Table.
4. Overall the Council have provided a good and detailed ASR. They play an active role in monitoring air quality within the borough and in the management of their AQMAs. The Council are encouraged to continue their good work.

The Council has addressed the matters raised following Defra's appraisal:

1. Unfortunately we had to delay making our intended changes in January. Putting up the brackets that hold the diffusion tubes would require the use of a ladder. Two Officers are needed to undertake this work safely. Due to the COVID-19 pandemic, we have not been working/travelling in pairs. We are hoping that we will be able to make these changes in January 2022.
2. Please see above.
3. The concentrations in Table 2.1 were corrected prior to publishing the report.
4. Noted.

Watford Borough Council has taken forward a number of direct measures during the current reporting year of 2020 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 20 measures are included within Table 2.2, with the type of measure and the progress Watford Borough Council have made during the reporting year of 2020 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 - Watford Borough Council Air Quality Action Plan. Key completed measures are:

- Implement the Intalink project Increase the integration of public and sustainable transport movements;
- Promotion of car sharing scheme – increase car sharing to ease congestion;
- Promotion of Travel Plans – increase in sustainable transport;
- Annual Council vehicle fleet review – maintain clean Council vehicle fleet;
- Promote air quality within the Borough - increase awareness of AQ as a health issue;
- Installation of EV charging points - encourage the uptake of electric vehicles;
- Implement bus strategy - encourage the increase of bus patronage;

- Promotion of TravelSmart - personalised travel planning to reduce car use;
- Promotion of cycling and walking - increase sustainable transport.

Watford Borough Council expects the following measures to be completed over the course of the next reporting year:

- Road Infrastructure Improvements Ease congestion in St Albans Road AQMA. Further improvements are recommended in the Congestion study;
- Watford Junction interchange improvement Increase the accessibility of the rail station;
- Develop Supplementary Planning Document for Air Quality. Develop SPD on AQ for inclusion in the 2011 Development Plan Document.

The principal challenges and barriers to implementation that Watford Borough Council anticipates facing are restrictions relating to the COVID-19 pandemic and demands on officer time.

Progress on the following measures has been slower than expected due to the COVID-19 pandemic:

- Road Infrastructure Improvements Ease congestion in St Albans Road AQMA. Further improvements are recommended in the Congestion study;
- Watford Junction interchange improvement Increase the accessibility of the rail station.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant Emission Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Road Infrastructure Improvements Ease congestion in St Albans Road AQMA. Further improvements are recommended in the Congestion study	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2011	2016	HCC/WBC	HCC/WBC	NO	Funded	£100k - £500k	Implementation	Ease congestion and reduce emissions	Schemes completed	On-going	WBC is investing £400,000 on new street furniture, improved paving, tree planting, more cycle friendly routes etc. The planned maintenance and refurbishment works have been paused as a result of the COVID-19 pandemic.
2	Implement the Intalink project Increase the integration of public and sustainable transport movements	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2011	2016	HCC/WBC	HCC/WBC	NO	Funded	£100k - £500k	Implementation	Reduce private car use and so reduce emissions.	Bus and rail patronage, number of cyclists and pedestrians	On-going	The Herts Boroughs and Districts have agreed a Memorandum of Understanding setting out the roles of district and borough councils following establishment of the Intalink Enhanced Partnership Plan and Scheme for Hertfordshire
3	Watford Junction interchange improvement Increase the accessibility of the rail station	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2011	2016	HCC/WBC	HCC/WBC	NO	Funded	£100k - £500k	Implementation	Medium impact.	Completed scheme	On-going	The planned upgrade to Watford Junction station forecourt has been paused at this time due to the COVID-19 pandemic.
4	Promotion of car sharing scheme. Increase car sharing to ease congestion	Alternatives to private vehicle use	Car & lift sharing schemes	2011	2016	WBC	WBC	NO	Funded	£10k - 50k	Completed	Registered members on lift share. Number of private schemes	High in the vicinity of the junction	Complete / on going	On-going promotion through council's commuting officer
5	Promotion of Travel Plans. Increase in sustainable transport	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2011	2016	WBC	WBC	NO	Funded	£10k - 50k	Completed	Number of travel plans in schools and businesses	Low	Complete / on going	On-going promotion through council's commuting officer
6	Annual Council vehicle fleet review. Maintain clean Council vehicle fleet	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2011	2016	WBC	WBC	NO	Funded	£10k - 50k	Completed	Age and Euro standard of Council vehicle fleet	Low	Complete / on going	Civil engineering contractors using vehicles of Euro 6 standard.
7	Promote air quality within the Borough. Increase awareness of AQ as a health issue.	Public Information	Other	2011	2016	WBC	WBC	NO	Funded	< £10k	Completed	"Hits" on Herts & Beds Air Quality website	Low	Complete / on going	This is being considered across Hertfordshire and HCC Public Health Director has committed funding. We have worked with HCC and other LA's to draft a Hertfordshire Air Quality Strategy. http://www.hertfordshire.gov.uk/docs/pdf/a/airqualitystrategicplan.pdf
8	Continue to monitor air quality. Maintenance of air quality monitors and data management.	Public Information	Other	2011	2016	WBC	WBC	NO	Funded	£50k - £100k	Completed	Number of operational monitors	Low	Complete / on going	Despite budgetary pressures Watford has continued to fund existing monitoring and has also funded the maintenance of new PM 2.5 monitors.
9	Undertake feasibility studies. To investigate the air quality impact of any potential future schemes	Policy Guidance and Development Control	Other policy	2011	2016	WBC	WBC	NO	Funded	£10k - 50k	Implementation	Not applicable	Low	On going	Site allocation traffic light system put in place with planning policy. Constraint information for developers included in planning information.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost Measure	Measure Status	Reduction in Pollutant Emission Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
10	Enforcement of parking policy. Minimise emissions due to reduced traffic flow caused by obstructions.	Traffic Management	Other	2011	2016	WBC	WBC	NO	Funded	£50k - £100k	Completed	Number of warnings, fines and prosecutions for such offences	Not applicable	Complete / on going	The Police have retained powers to issue Fixed Penalty Notices to vehicles causing an obstruction
11	Installation of EV charging points. Encourage the uptake of electric vehicles.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2011	2016	HCC/WBC	HCC/WBC	NO	Funded	£100k - £500k	Completed	Number of charging points installed	Low	Complete / on going	The Council has installed 7 new dual purpose Electric Vehicle Charging Units. As a result of the COVID-19 pandemic, UKPN have been unable to connect the units to the mains supply. The Council has previously installed 19 charging points across the district.
12	Implement bus strategy. Encourage the increase of bus patronage.	Alternatives to private vehicle use	Other	2011	2016	HCC/WBC	HCC/WBC	NO	Funded	£50k - £100k	Completed	Bus patronage	Low	Complete / on going	Local Sustainable Transport Fund. On-going partnerships and promotion with local bus companies through council.
13	Promotion of TravelSmart. Personalised travel planning to reduce car use.	Alternatives to private vehicle use	Other	2011	2016	WBC	WBC	NO	Funded	£10k - 50k	Completed	Uptake numbers.	Medium	Complete / on going	Travelsmart continues to be promoted.
14	Promotion of cycling and walking. Increase sustainable transport.	Promoting Travel Alternatives	Promotion of walking	2011	2016	WBC/HCC	WBC/HCC	NO	Funded	£10k - 50k	Completed	Number of cyclists and pedestrians	Low	Complete / on going	New cycle route along St. Albans Road. Ebury Road route planned Grand union canal route planned New road signs with pedestrian info being implemented SW Herts cycling strategy Permanent loop monitoring planned
15	Develop Supplementary Planning Document for Air Quality. Develop SPD on AQ for inclusion in the 2011 Development Plan Document.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2011	2016	WBC	WBC	NO	Funded	< £10k	Implementation	Publication of SPD; Number of planning applications made using the guidance.	Low	Council to prepare SPD	HCC Public Health Director has expressed wish for there to be a county wide strategy. As part of the Local Plan Strategy we will be considering the need for supplementary planning guidance.

2.3 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.

Exposure to high concentrations of particulate matter can exacerbate lung and heart conditions, significantly affecting quality of life, increasing hospital admissions and deaths. Children, the elderly and those with pre-existing respiratory and cardiovascular disease, are known to be more susceptible to the health impacts from air pollution.

Inhalation of particulate matter can have adverse impacts on human health, the greatest impact is believed to be from long term exposure to PM_{2.5}, which increase age-specific mortality risk, particularly from cardiovascular causes.

The following is taken from the Hertfordshire Local Authorities Report on Particulate Matter (PM_{2.5}) in Ambient Air in 2019 for Hertfordshire County Council Public Health:

Poor air quality is considered to be the largest environmental risk to the public's health and contributes to:

- Cardiovascular disease;
- Lung cancer;
- Respiratory diseases;
- Increased chance of hospital admissions and visits to Emergency Departments.

There is growing evidence that air pollution is a significant contributor to preventable ill health and early death.

Whilst legal limits are in place, evidence suggests that health effects can still occur below these limits. This is recognised by the World Health Organisation, which sets lower pollutant exceedance thresholds than some EU limits adopted into UK legislation.

The only specific indicator for air pollution is included within the Public Health Outcomes Framework and relates to particulate matter (PM) with a diameter of 2.5um or smaller (Public Health Outcome Indicator (PHOI) 3.01).

PHOI 3.01 is 'the fraction of annual all-cause mortality attributable to long-term exposure to current levels of anthropogenic particulate pollution.' The indicator is based on an estimated amount of PM_{2.5} derived by Defra modelling from local measurement, one site in Borehamwood, Hertfordshire and another in Sandy, Bedfordshire. That data is then adjusted by way of population to give a population weighted figure before its use in deriving the PHOI.

The PM_{2.5} focussed PHOI reflects the adverse impact that this type of air pollution can have on public health as a result of the fine particles being carried deep into the lungs where they can cause inflammation and a worsening of heart and lung diseases.

However, it is important to recognise that the figures published for PHOI 3.01 are estimates and therefore cannot be used for performance monitoring; they can only provide an indication of the scale of the issue. Further information on the use of health related air quality data is available at

<https://www.hertshealthevidence.org/documents/thematic/airqualitydatafaq-briefing-2019-07.pdf>.

It is for this reason that this report no longer makes direct reference to the PHOI figures, but uses the population weighted Defra modelled PM_{2.5} concentrations in their place.

The fraction of mortality attributable to particulate air pollution for Hertfordshire (2019) is 5.7%. The PHOF data is available at:

https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/3/gid/1000043/pat/6/par/E12000006/ati/202/are/E10000015/iid/30101/age/230/sex/4/cid/4/page-options/ovw-do-0_car-ao-1_car-do-0.

Watford Borough Council is taking the following measures to address PM_{2.5}:

The Council monitors PM_{2.5} concentrations at its automatic monitoring station. Monitoring data is reported in the Council's Annual Status Report and in the Hertfordshire Local Authorities Report on Particulate Matter (PM_{2.5}) in Ambient Air.

Monitoring data from the automatic monitoring station can be viewed at

https://www.airqualityengland.co.uk/local-authority/index?la_id=408.

An Officer of the Council attends the Hertfordshire and Bedfordshire Air Quality Forum and the Hertfordshire County Council Public Health Board.

The Council will ensure compliance with the Environmental Permitting Regulations and will promote the use of cleaner fuels in wood burning stoves to help reduce PM_{2.5} concentrations.

The Air Quality (Domestic Solid Fuels Standards (England) Regulations 2020 are to be enforced by the relevant local authority. Hertfordshire County Council are the relevant local authority.

The Council will require that developers follow good construction practice to minimise fugitive dusts.

Under the Clean Air Act 1993, Watford has been declared a Smoke Control Area.

It is anticipated that:

- Measures to reduce emissions of NO_x by encouraging a move away from internal combustion engine vehicles to ultra-low emission vehicles (ULEV) will reduce PM_{2.5} emissions from exhausts;
- Measures to reduce road travel altogether will reduce PM_{2.5} emissions from brake and tyre wear and dust re-suspension.

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

This section sets out the monitoring undertaken within 2020 by Watford Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Watford Borough Council undertook automatic (continuous) monitoring at one site during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring 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. The https://www.airqualityengland.co.uk/local-authority/?la_id=408 page presents automatic monitoring results for Watford Borough Council with automatic monitoring results also available through the UK-Air website.

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

Watford Borough Council undertook non- automatic (i.e. passive) monitoring of NO₂ at 19 sites during 2020. 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.

3.1.3 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 2020 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.

Figure A.1 presents trends in NO₂ annual mean concentrations at diffusion tube sites WF02 to WF50 between the years 2016 to 2020. There were no exceedances of the annual mean objective in 2020 and there is a general trend of reduction experienced across the sites.

Figure A.2 presents trends in NO₂ annual mean concentrations at diffusion tube location WF43 in AQMA 2 between the years 2016 to 2020. There were no exceedances of the annual mean objective in 2020 and there is a general trend of reduction experienced across the sites.

Figures A.3 to A.5 present trends in NO₂ annual mean concentrations at diffusion tube locations WF29, WF44 and WF48 in AQMA 3A between the years 2016 to 2020. There were no exceedances of the annual mean objective in 2020 and there is a general trend of reduction experienced across the sites.

The annual mean concentration at Chalk Hill (WF44) was 38.9 µg/m³, this concentration was within 10% of the annual mean objective for NO₂. Following fall-off with distance correction, this concentration was 32.5 µg/m³.

NO₂ concentrations decreased at almost all monitoring locations, including at Chalk Hill in AQMA 3A.

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 exceedances of the air quality objectives for NO₂, with respect to both annual mean and 1-hour objectives.

There will be no changes to existing AQMAs or the declaration of a new AQMA.

There are no proposed changes to the monitoring network (other than those already proposed that were discussed in last year's ASR).

3.1.4 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.

Figure A.6 presents trends in PM₁₀ annual mean concentrations at the Watford Town Hall roadside site between the years 2016 to 2020. There were no exceedances of the annual mean objective in 2020 and there is a general trend of reduction experienced at this site.

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.

Figure A.7 presents trends in the number of 24-hour mean PM₁₀ concentrations that exceed 50ug/m³ at the Watford Town Hall roadside site between the years 2016 to 2020. The number of exceedances had increased in 2019, however, there were no exceedances of the annual mean objective in 2020.

There were no exceedances of the air quality objectives for PM₁₀, relating to both annual mean and daily mean objectives.

There will be no changes to existing AQMAs or the declaration of a new AQMA.

There are no proposed changes to the monitoring network (other than those already proposed that were discussed in last year's ASR).

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 past five years.

Figure A.8 presents trends in PM_{2.5} annual mean concentrations at the Watford Town Hall roadside site between the years 2016 to 2020. There were no exceedances of the EU Limit Value (25ug/m³) or the WHO guideline level (10ug/m³) for PM_{2.5}. There is a general trend of reduction experienced at this site.

There were no exceedances of the EU Limit Value (25ug/m³) or the WHO guideline level (10ug/m³) for PM_{2.5}.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

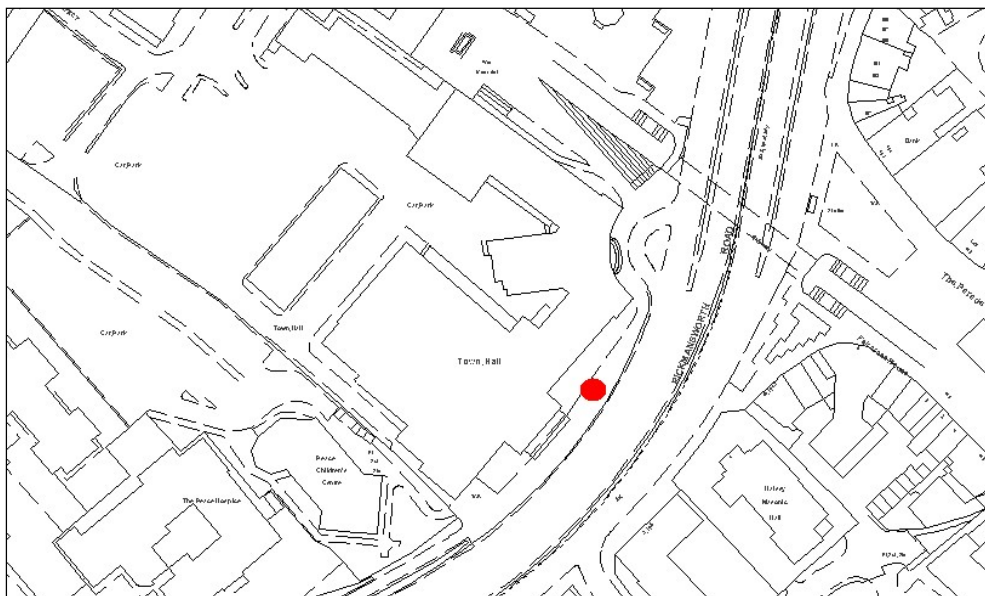
Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
WF46	Watford Town Hall	Roadside	510540	1967870	NO ₂ , PM _{2.5} , PM ₁₀	No	API M200E chemiluminescence NO/NO ₂ /NO _x analyser and a Palas Fidas 200 for monitoring PM ₁₀ and PM _{2.5}	N/A	10m	1.5m

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

Location of Watford Town Hall automatic monitoring station.



Photograph showing the automatic monitoring at Watford Town Hall.

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 located with a Continuous Analyser?	Co-located with a Continuous Analyser?	Tube Height (m)
WF02	Grove Pumping Station	Urban Background	508700	198950	NO2	No	0.0	0.0	No	No	2.0
WF03	Hospital Vicarage Road	Kerbside	510570	195800	NO2	No	0.0	4.0	No	No	2.4
WF06	Woodside Playing Fields	Urban Background	510985	200710	NO2	No	0.0	0.0	No	No	3.0
WF29	Pinner Road	Kerbside	511940	195320	NO2	Yes - AQMA 3A	6.0	2.0	No	No	2.1
WF36	Ravenscoft	Industrial	512240	199910	NO2	No	8.0	0.0	No	No	2.2
WF37	St Albans Road	Kerbside	510970	198535	NO2	No	5.0	1.0	No	No	2.4
WF38	A405 Horseshoe Lane	Kerbside	511680	200700	NO2	No	2.0	4.0	No	No	3.0
WF39	Balmoral Road	Kerbside	511000	198270	NO2	No	0.0	1.0	No	No	2.4
WF40	Salisbury Road	Kerbside	510930	198000	NO2	No	0.0	2.0	No	No	2.4
WF41	Leavesden Road	Kerbside	510850	197780	NO2	No	0.0	1.0	No	No	2.5
WF42	Queens Road	Kerbside	511160	197000	NO2	No	4.0	1.0	No	No	2.4
WF43	Farraline Road	Kerbside	510800	196020	NO2	Yes - AQMA 2	4.0	2.0	No	No	2.4
WF44	Chalk Hill	Kerbside	511920	195450	NO2	Yes - AQMA 3A	6.0	2.0	No	No	2.1

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 located with a Continuous Analyser?	Co-located with a Continuous Analyser?	Tube Height (m)
WF45	Wellington Road	Kerbside	510750	197230	NO2	No	10.0	4.0	No		2.3
WF46	Town Hall	Roadside	510565	196800	NO2	No	0.0	6.0	Yes		2.0
WF47	Willow Lane	Kerbside	510335	195610	NO2	No	3.0	1.0	No		2.4
WF48	Lower High Street	Kerbside	511725	195619	NO2	Yes - AQMA 3A	4.0	1.0	No		2.4
WF49	Gammons Lane	Kerbside	510499	198454	NO2	No	5.0	1.0	No		2.4
WF50	Eastbury Road	Kerbside	511057	194895	NO2	No	0.0	2.7	No		2.9

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 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
WF46	510540	1967870	Roadside	88.5	88.5	36.0	34.0	32.0	30.0	21.0

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/m³.

Exceedances of the NO₂ annual mean objective of 40µg/m³ 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 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 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
WF02	508700	198950	Urban Background	92.3	92.3	18.7	15.9	16.0	13.5	10.9
WF03	510570	195800	Kerbside	100.0	100.0	35.5	32.7	30.6	28.9	21.9
WF06	510985	200710	Urban Background	100.0	100.0	19.6	20.0	18.2	18.8	14.9
WF29	511940	195320	Kerbside	100.0	100.0	49.4	40.4	38.6	34.7	26.1
WF36	512240	199910	Industrial	100.0	100.0	26.0	26.6	27.0	25.5	17.7
WF37	510970	198535	Kerbside	100.0	100.0	38.0	34.2	32.5	30.0	25.4
WF38	511680	200700	Kerbside	100.0	100.0	41.7	34.3	32.9	30.7	23.2
WF39	511000	198270	Kerbside	82.7	82.7	38.1	33.9	29.9	30.4	24.1
WF40	510930	198000	Kerbside	100.0	100.0	36.5	33.5	32.7	25.1	25.5
WF41	510850	197780	Kerbside	100.0	100.0	37.6	37.4	34.5	34.2	26.9
WF42	511160	197000	Kerbside	92.3	92.3	31.0	31.1	27.4	29.8	20.7
WF43	510800	196020	Kerbside	90.4	90.4	49.5	52.7	51.1	42.2	34.9
WF44	511920	195450	Kerbside	92.3	92.3	<u>73.6</u>	<u>61.6</u>	53.2	49.0	39.5

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
WF45	510750	197230	Kerbside	100.0	100.0	34.9	37.1	32.6	32.5	27.0
WF46	510565	196800	Roadside	100.0	100.0	31.7	30.2	26.8	26.3	20.2
WF47	510335	195610	Kerbside	100.0	100.0	30.7	28.8	26.8	26.3	19.6
WF48	511725	195619	Kerbside	100.0	100.0	50.6	46.5	42.3	41.7	34.6
WF49	510499	198454	Kerbside	100.0	100.0	26.8	35.0	32.8	31.5	23.7
WF50	511057	194895	Kerbside	100.0	100.0	57.0	34.4	32.2	31.1	23.3

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

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

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

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.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 NO₂ Concentrations

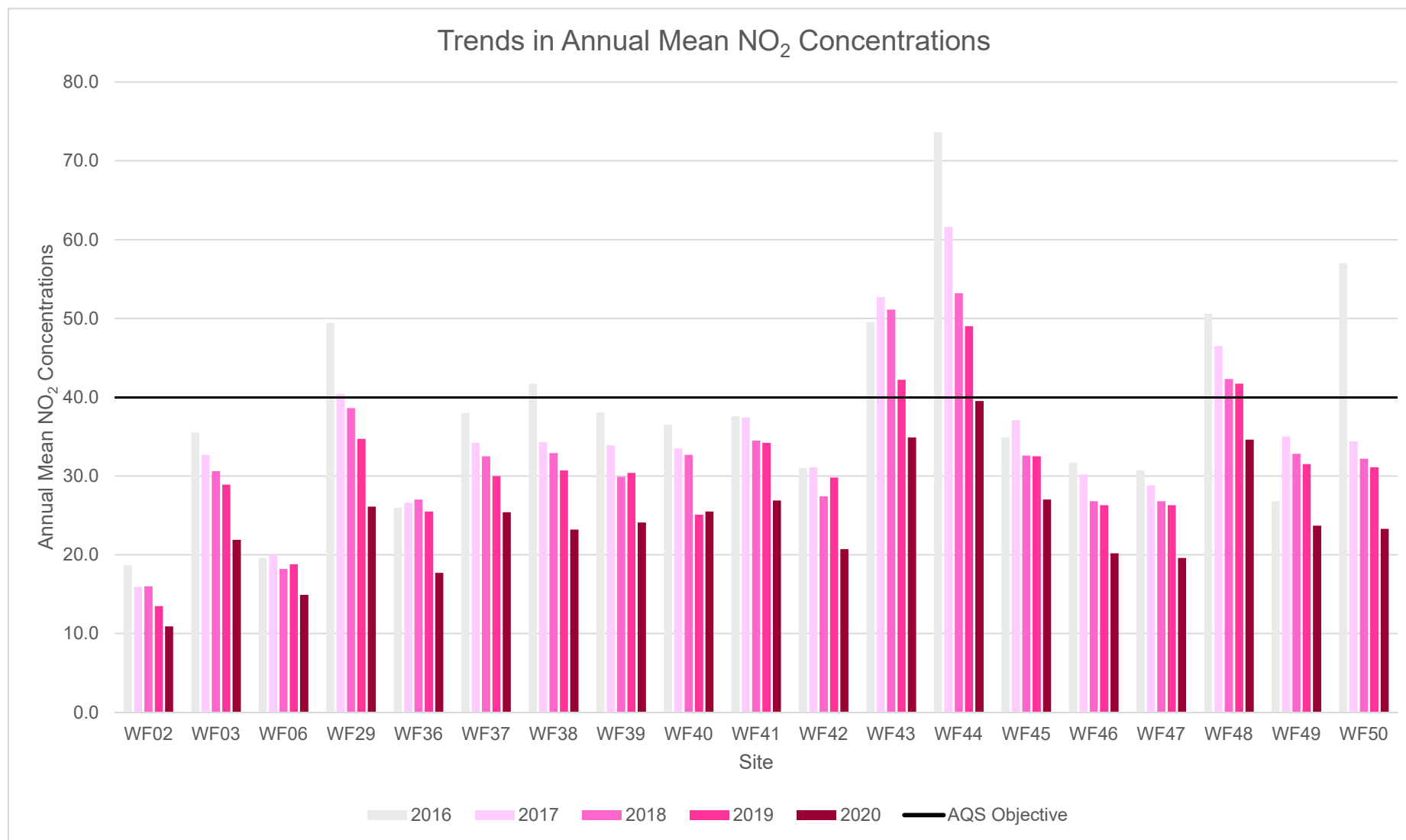


Figure A.2 – Trends in Annual Mean NO₂ Concentrations at WF43/AQMA 2

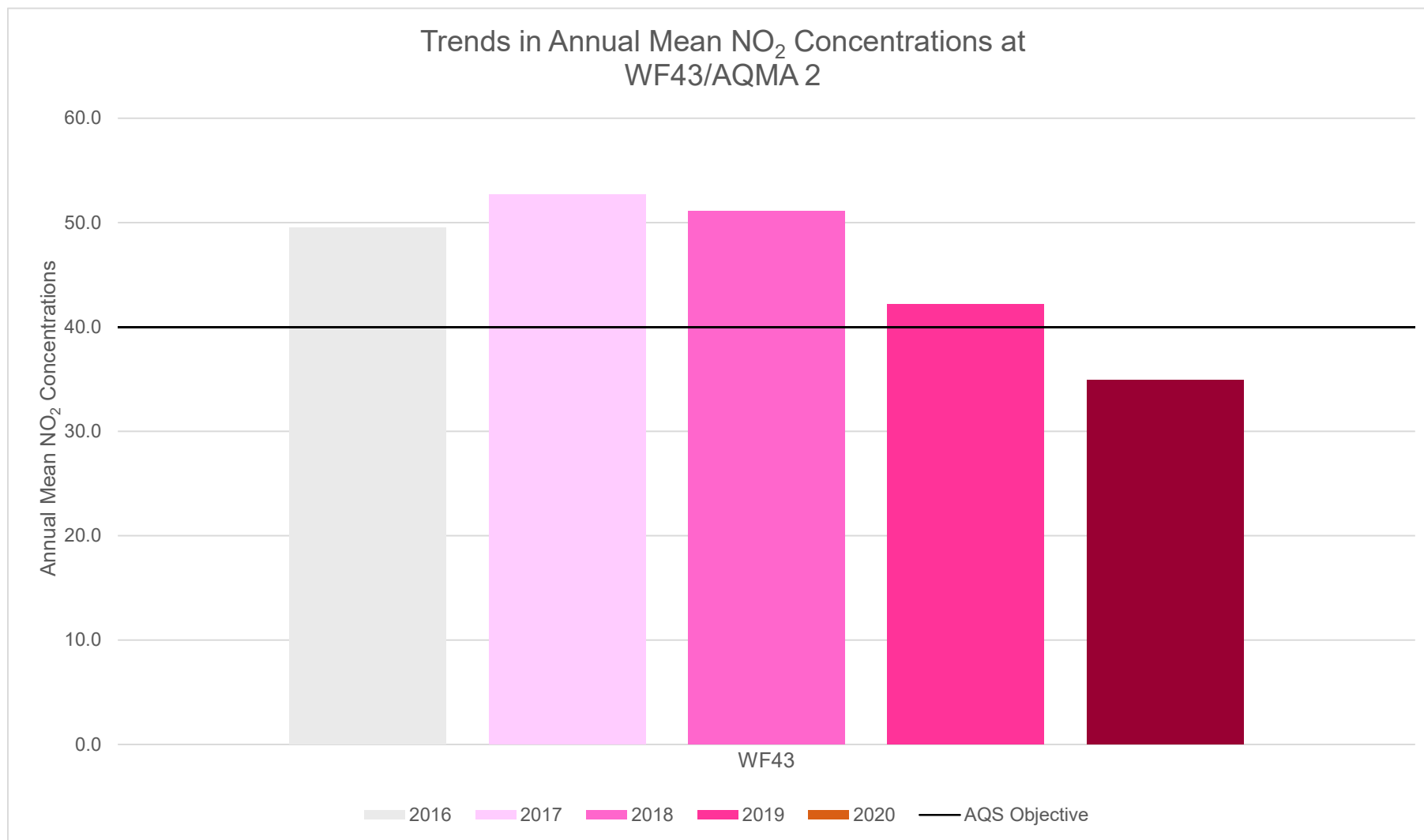


Figure A.3 – Trends in Annual Mean NO₂ Concentrations at WF29/AQMA 3A

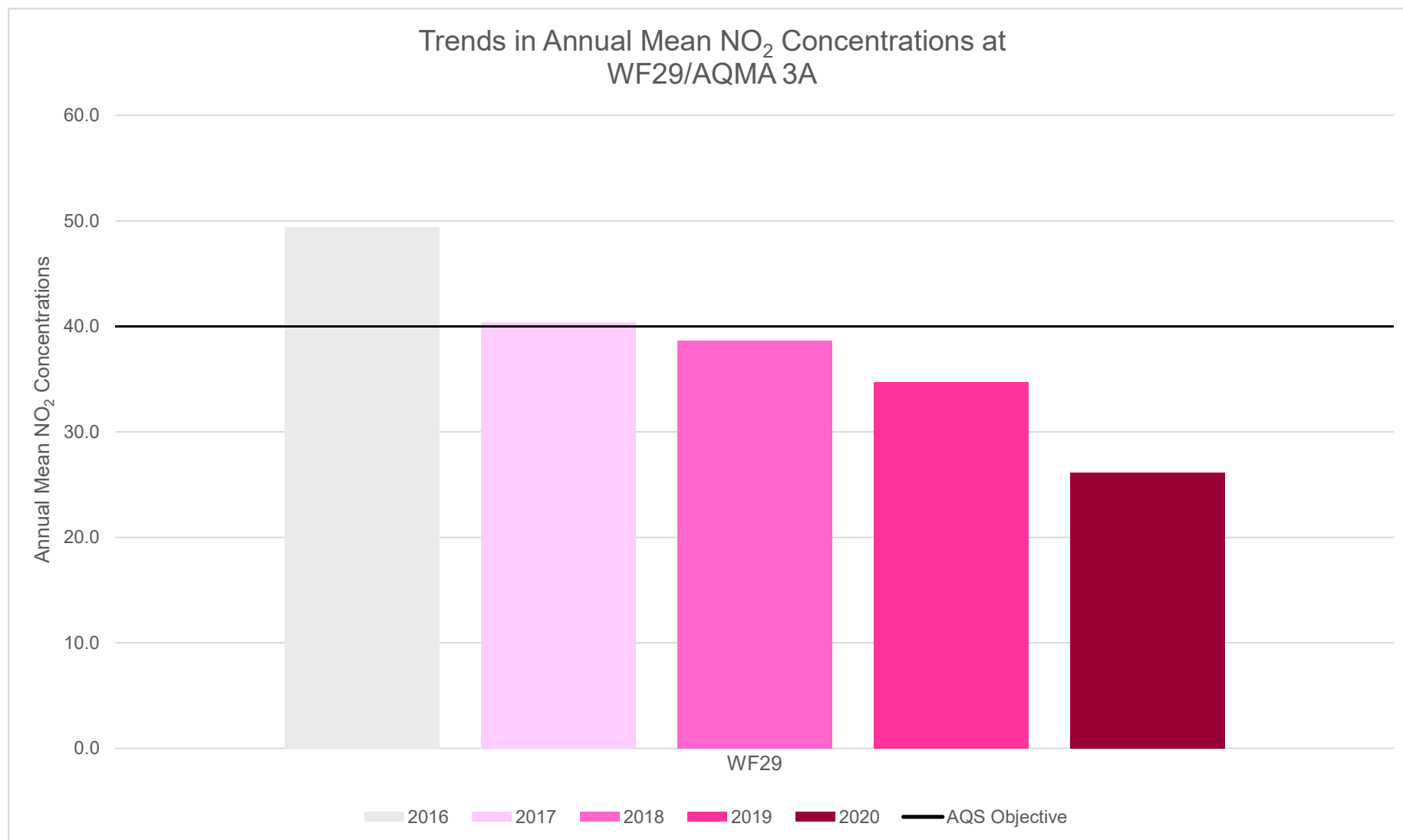


Figure A.4 – Trends in Annual Mean NO₂ Concentrations at WF44/AQMA 3A

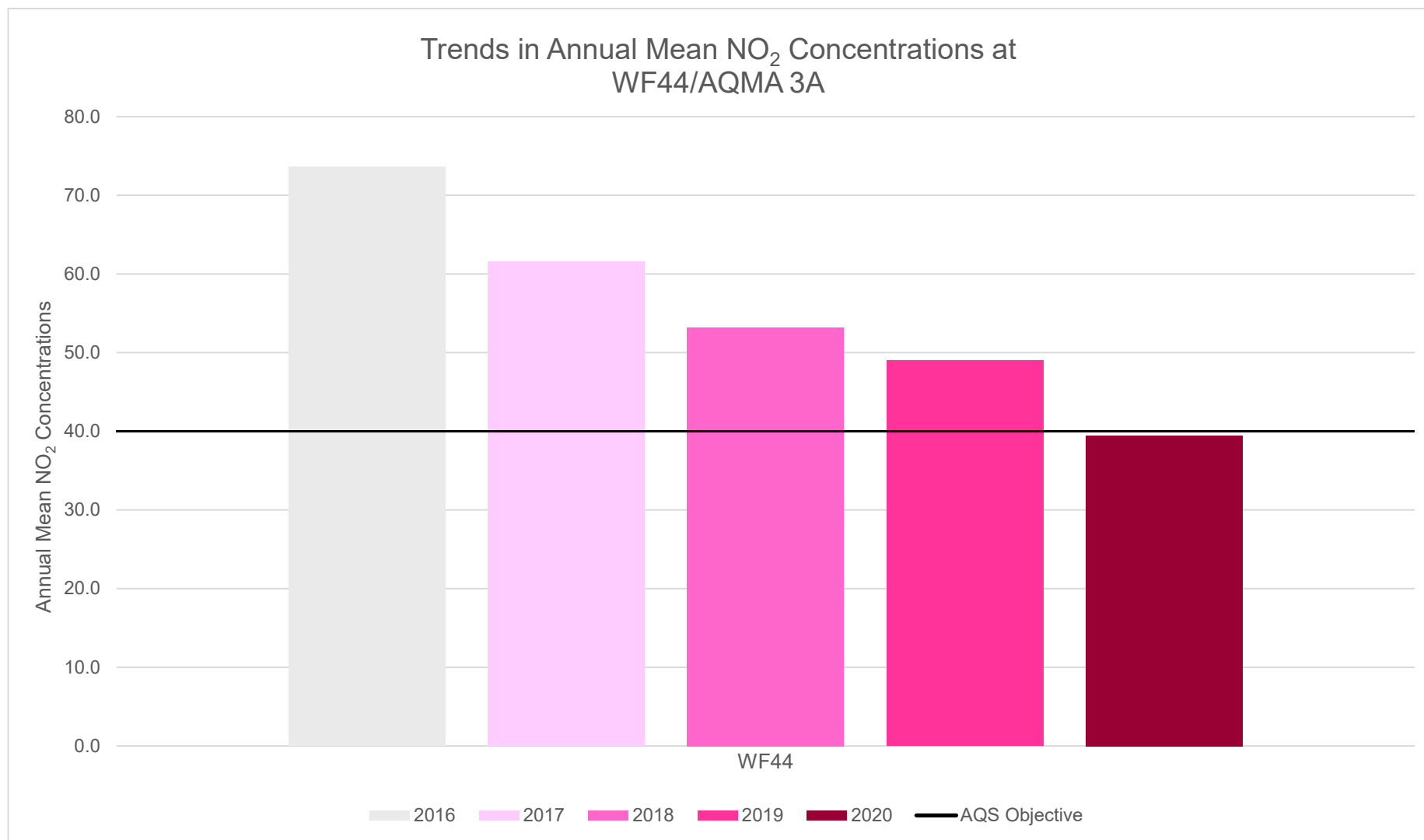


Figure A.5 – Trends in Annual Mean NO₂ Concentrations at WF48/AQMA 3A

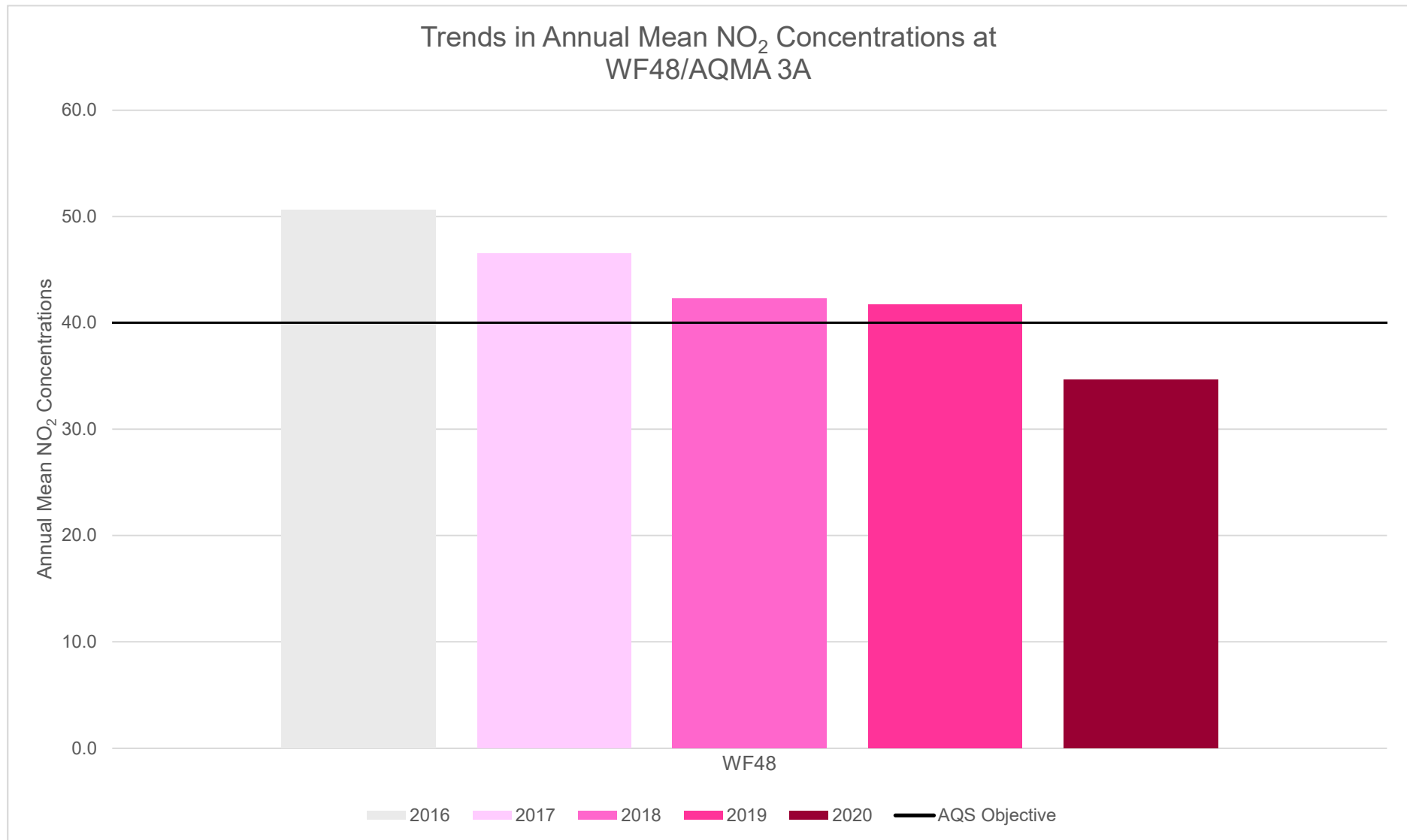


Table A.5 – 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
Watford Town Hall	510540	196780	Roadside	88.5	88.5	0	0	0	0	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 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
Watford Town Hall	510540	196780	Roadside	95.4	95.4	14	15	15	15	13

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

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.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.6 – Trends in Annual Mean PM₁₀ Concentrations

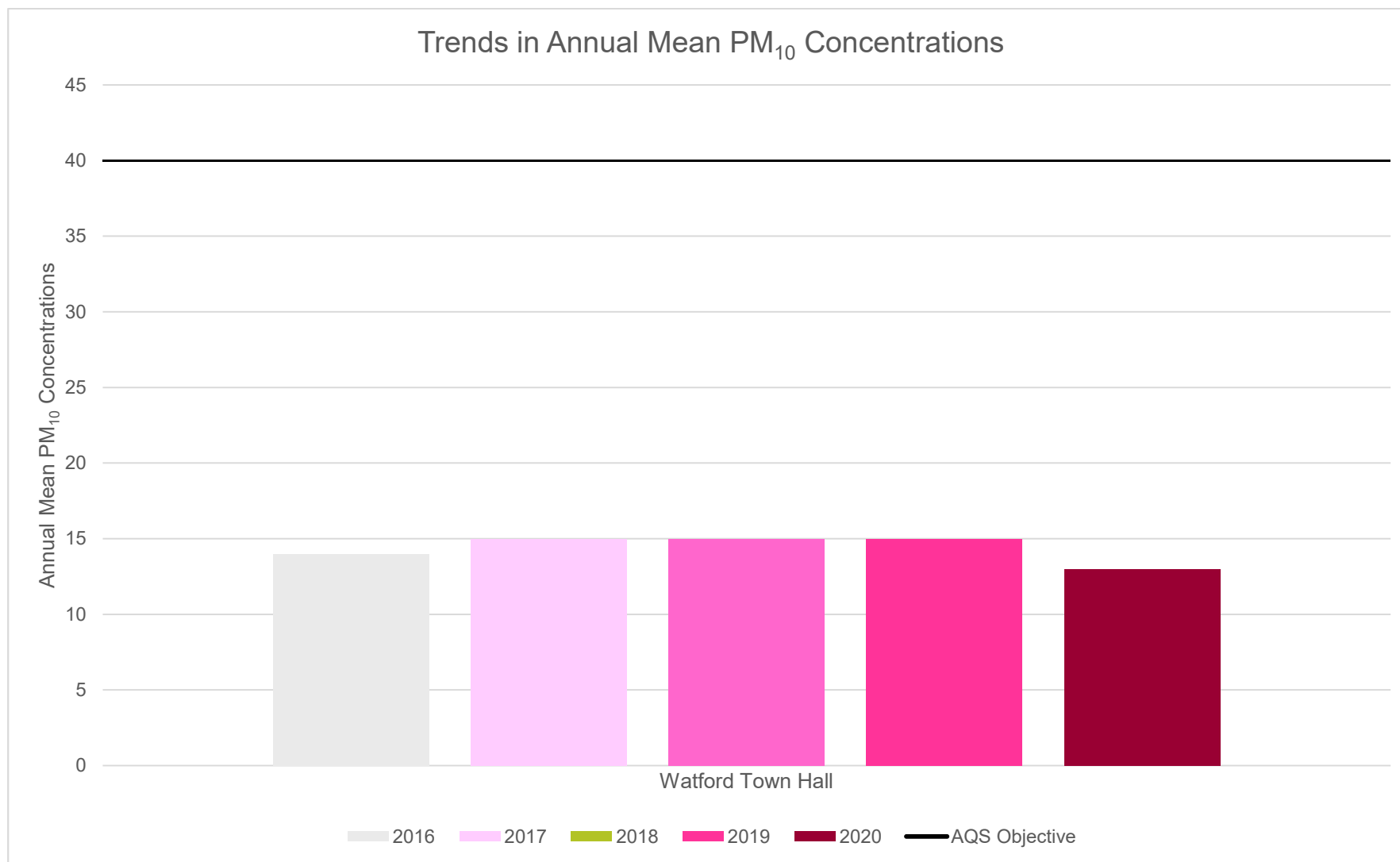


Table A.7 – 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means > 50µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture (%) ⁽²⁾	2016	2017	2018	2019	2020
Watford Town Hall	510540	196780	Roadside	95.4	95.4	1	3	1	4	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%).

Figure A.7 – Trends in Number of 24-Hour Mean PM₁₀ Results > 50µg/m³

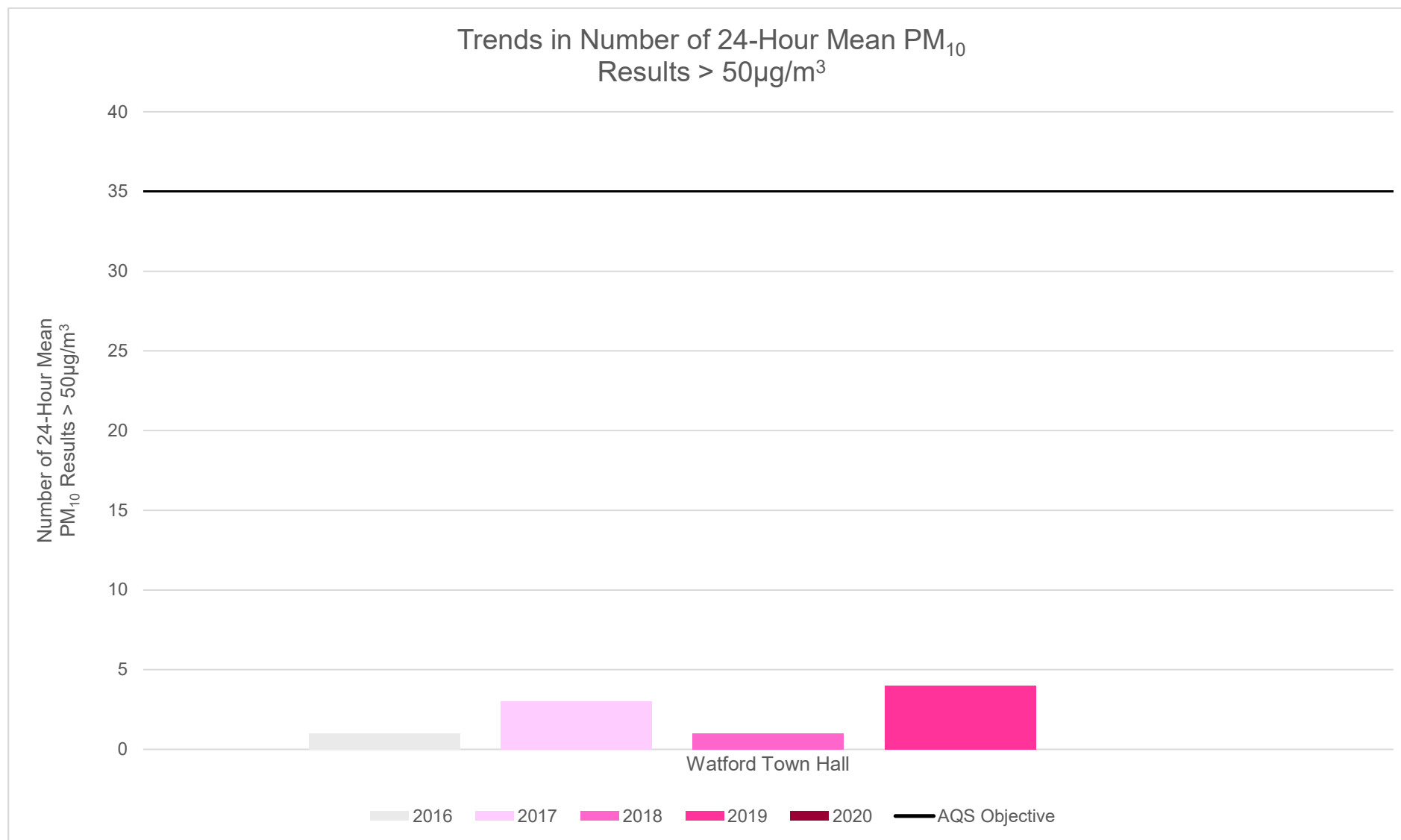


Table A.8 – Annual Mean PM_{2.5} Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	2016	2017	2018	2019	2020
Watford Town Hall	510540	196780	Roadside	95.4	95.4	14	10	9	9	8

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

Notes:

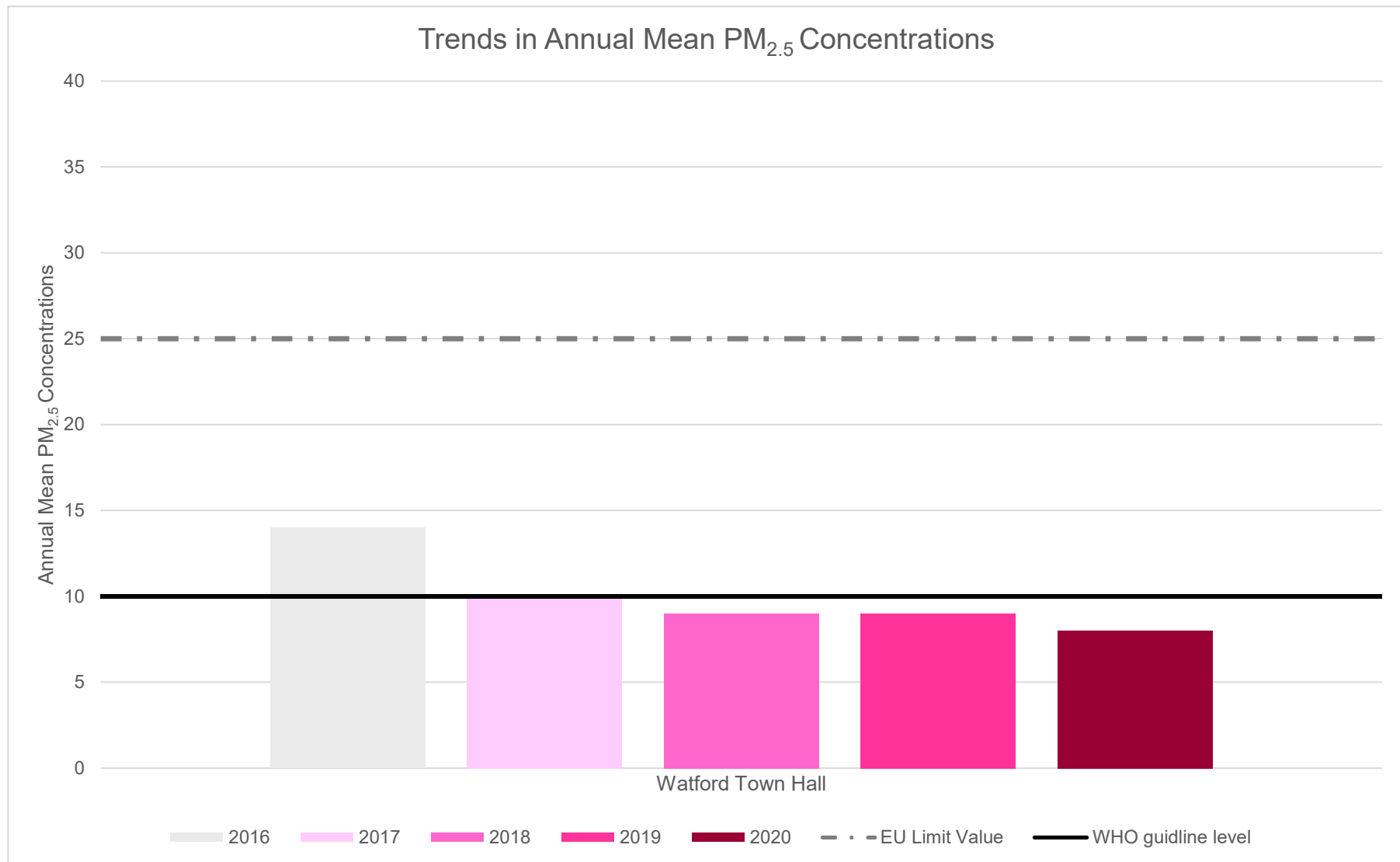
The annual mean concentrations are presented as µg/m³.

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.8 – Trends in Annual Mean PM_{2.5} Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO₂ 2020 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
WF02	508700	198950	18.6	15.6		15.1	10.6	10.6	7.8	13.1	10.8	14.3	20.7	18.7	14.2	10.9	-	
WF03	510570	195800	41.0	32.1	28.3	26.6	21.2	15.0	19.2	25.4	27.5	30.2	42.3	32.3	28.4	21.9	-	
WF06	510985	200710	26.8	20.5	14.3	12.9	11.1	9.2	8.8	41.1	15.2	18.9	28.6	24.3	19.3	14.9	-	
WF29	511940	195320	49.2	32.4	32.3	26.9	28.3	30.9	26.2	14.2	33.1	41.6	49.3	42.4	33.9	26.1	-	
WF36	512240	199910	29.8	22.6	22.3	21.8	19.4	19.7	13.6	22.3	22.3	23.6	29.7	28.2	22.9	17.7	-	
WF37	510970	198535	41.1	31.6	24.5	28.8	24.1	27.3	18.4	33.0	42.2	34.7	47.2	42.5	33.0	25.4	-	
WF38	511680	200700	41.1	29.6	29.9	26.9	23.2	22.1	19.4	30.8	31.6	32.7	40.8	34.1	30.2	23.2	-	
WF39	511000	198270	44.0		29.0	26.5	22.7	24.8	20.5		28.5	35.7	42.9	38.2	31.3	24.1	-	
WF40	510930	198000	56.8	31.0	37.9	26.7	22.0	25.2	19.4	29.6	28.7	37.3	42.3	41.1	33.2	25.5	-	
WF41	510850	197780	49.6	37.1	29.7	27.3	24.7	30.6	22.4	36.7	35.1	35.6	51.5	39.5	35.0	26.9	-	
WF42	511160	197000	44.8		26.0	21.9	16.3	18.8	15.0	24.7	24.9	30.9	38.3	34.1	26.9	20.7	-	
WF43	510800	196020	59.8	46.8	43.8	34.3	32.1	33.9	37.1		52.4	54.3	52.4	51.3	45.3	34.9	-	
WF44	511920	195450	69.7	3.0		50.4	49.9	48.3	43.9	58.7	65.7	59.0	63.0	52.2	51.3	39.5	32.9	
WF45	510750	197230	47.8	33.0	27.9	31.6	26.8	29.4	24.3	37.3	39.5	38.9	45.5	38.6	35.1	27.0	-	
WF46	510565	196800	38.6	30.6	24.6	21.8	18.9	20.5	19.5	25.9	28.3	30.2	39.5	16.8	26.3	20.2	-	
WF47	510335	195610	35.5	25.4	22.0	22.8	20.2	22.6	10.3	22.8	25.5	27.0	39.1	32.0	25.4	19.6	-	
WF48	511725	195619	65.7	54.2	41.4	33.5	32.4	41.7	37.2	48.5	47.5	57.0	58.5	22.1	45.0	34.6	-	
WF49	510499	198454	41.0	32.3	28.0	23.0	21.4	25.4	21.0	30.7	29.1	36.3	45.8	35.5	30.8	23.7	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.77)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
WF50	511057	194895	47.0	34.7	30.9	25.0	17.9	8.7	20.9	28.2	32.1	33.4	44.9	39.4	30.3	23.3	-	

- 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.TG16.
- National bias adjustment factor used.
- Where applicable, data has been distance corrected for relevant exposure in the final column.
- Watford Borough Council confirm that all 2020 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 Watford During 2020

Watford Borough Council has not identified any new sources relating to air quality within the reporting year of 2020.

Additional Air Quality Works Undertaken by Watford Borough Council During 2020

Watford Borough Council has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

Diffusion tubes were supplied by SOCOTEC in 2020. The method of preparation used was 50% TEA (triethanolamine) in acetone.

SOCOTEC are UKAS accredited. Diffusion Tubes were analysed in accordance with SOCOTEC's standard operating procedure ANU/SOP/1015. This method meets the guidelines set out in DEFRA's 'Diffusion Tubes For Ambient NO₂ Monitoring: Practical Guidance.'

SOCOTEC participate in the AIR PT intercomparison scheme for comparing spiked Nitrogen Dioxide diffusion tubes. SOCOTEC currently holds the highest rank of a satisfactory laboratory.

In the most recent round (AIR PT AR040 September – October 2020), 100% of results submitted were determined to be satisfactory.

SOCOTEC were considered to have good diffusion tube precision in 2020.

Monitoring was completed in adherence with the 2020 Diffusion Tube Monitoring Calendar.

Diffusion Tube Annualisation

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

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 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.TG16 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.

Watford Borough Council have applied a national bias adjustment factor of 0.77 to the 2020 monitoring data. A summary of bias adjustment factors used by Watford Borough Council over the past five years is presented in Table C.1.

The national bias adjustment factor was taken from spreadsheet version no. 03/21.

Twenty-two studies are applicable to the factor.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.77
2019	National	Not recorded	0.75
2018	National	Not recorded	0.76
2017	National	Not recorded	0.77
2016	National	Not recorded	0.78

NO₂ Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure should be 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.

Fall-off-with-distance calculations were required for WF44, the bias adjusted annual mean concentration was within 10% of the objective. The output from the Diffusion Tube Data Processing Tool are presented in Table C.4.

QA/QC of Automatic Monitoring

Ricardo Energy & Environment complete data management and Local Site Operator (LSO) duties for the Council's automatic monitoring site.

Calibrations are carried out monthly, UKAS ISO 17025 QC audits are undertaken twice yearly. Servicing and maintenance is carried out by Enviro Technology Services Ltd.

Monitoring data is ratified in accordance with The Air Quality Data Validation and Ratification Process used for the UK Automatic Urban and Rural Monitoring Network (AURN). The monitoring data presented within the ASR is ratified.

Live and historic data is available at https://www.airqualityengland.co.uk/local-authority/?la_id=408.

PM₁₀ and PM_{2.5} Monitoring Adjustment

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

Automatic Monitoring Annualisation

All automatic monitoring locations within Watford Borough Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

NO₂ Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure should be estimated using the NO₂ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-

automatic annual mean NO₂ concentrations corrected for distance are presented in Table B.1.

No automatic NO₂ monitoring locations within Watford Borough Council required distance correction during 2020.

Table C.2 – NO₂ Fall off With Distance Calculations (concentrations presented in µg/m³)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted)	Background Concentration	Concentration Predicted at Receptor	Comments
WF44	2.0	8.0	39.5	19.4	32.9	

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

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

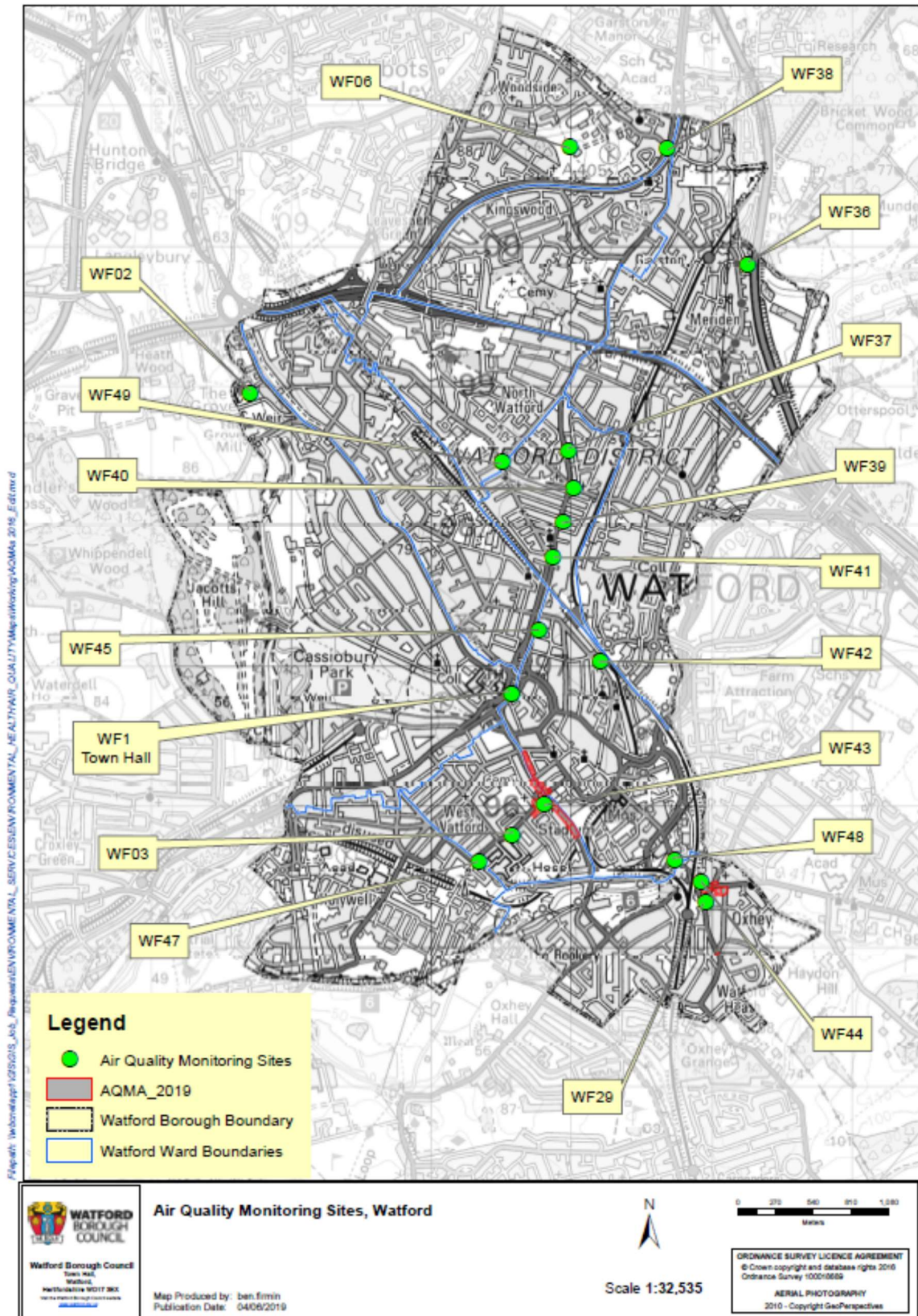


Figure D.2: Map showing Vicarage Road Air Quality Management Area No.2

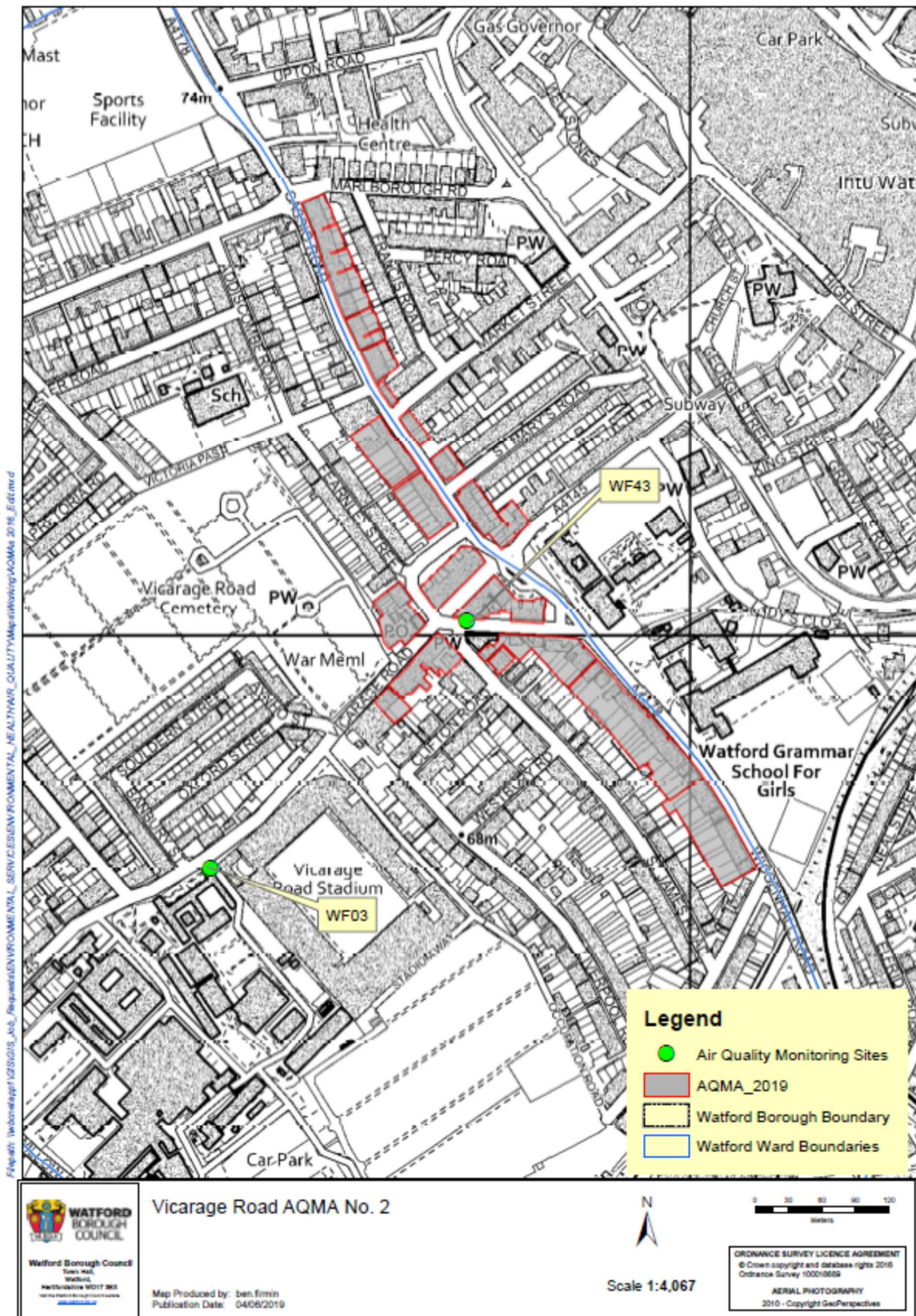
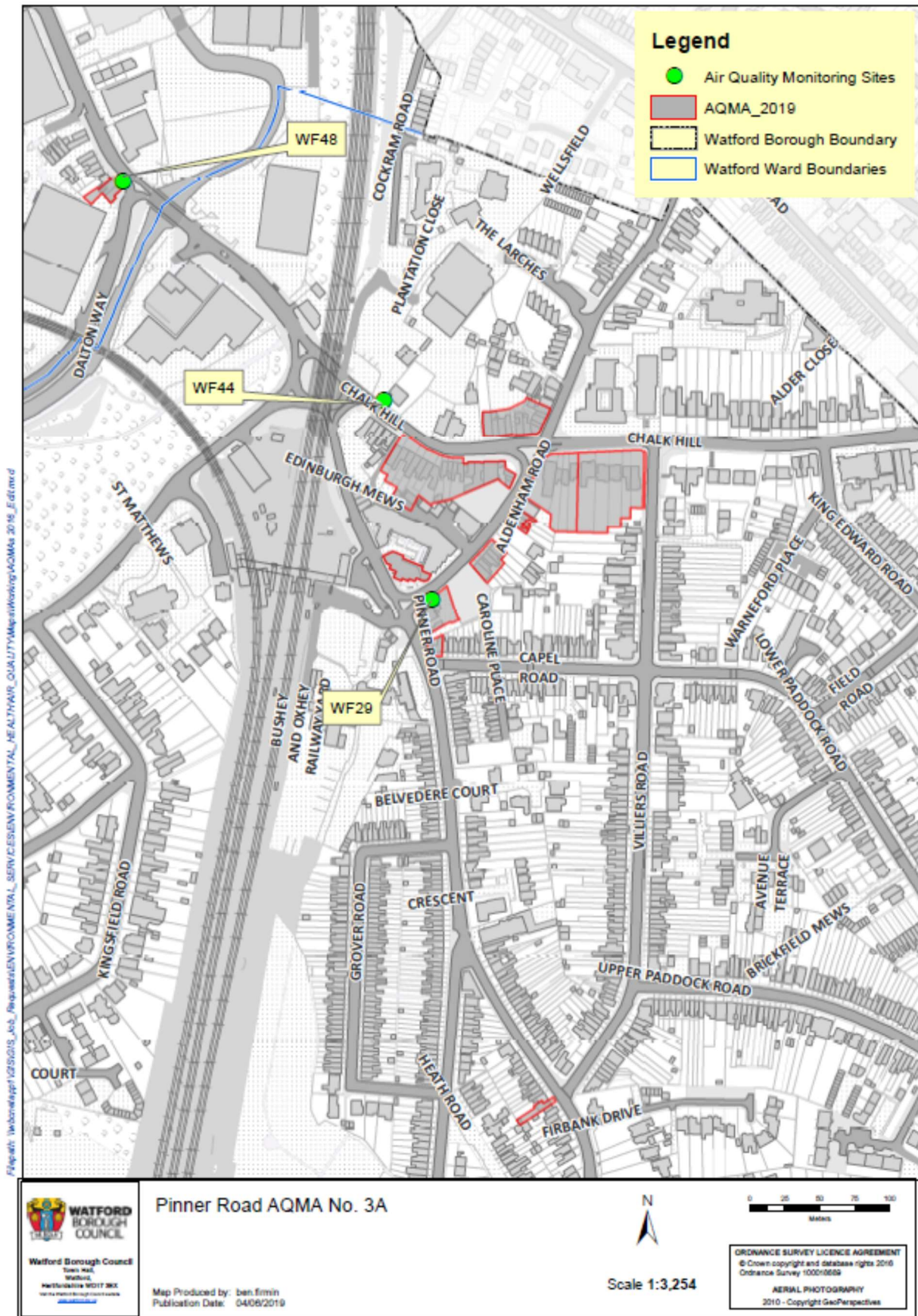


Figure D.3: Map showing Pinner Road Air Quality Management Area No.3A



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

*The current air quality objectives are set out in the Air Quality (England) Regulations 2000, as amended by the Air Quality (England) Regulations 2002. These regulations provide the statutory basis for the air quality objectives under LAQM in England. There is not currently an air quality objective for PM_{2.5}.

Local Authorities in England have a role in working towards reducing emissions and concentrations of PM_{2.5}. There is an exposure reduction objective for PM_{2.5} of 25ug/m³ as an annual mean (to be achieved by 2020 and maintained thereafter). There is also a target of a 15% reduction in concentrations at urban background sites between 2010 and 2020. These objectives were included in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland published in 2007.

These objectives and targets are in line with the European obligations introduced by the EU Ambient Air Quality Directive (Directive 2008/50/EC). These are a target value of 25ug/m³ to be achieved by 2010 (and maintained thereafter), a limit value of 25ug/m³ to be achieved by 1st January 2015 and a target of a 20% reduction in concentrations at urban background sites between 2010 and 2020.

The WHO air quality guidelines: global update 2005: particulate matter, ozone, nitrogen dioxide and sulfur dioxide offer guidance on reducing the effects on health of air pollution.

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

These guidelines included revised guideline values for the most common air pollutants. Although these guidelines are neither standards nor legally binding criteria, they are designed to offer guidance in reducing the health impacts of air pollution based on expert evaluation of current scientific evidence. The WHO air quality guideline level for PM_{2.5} is 10ug/m³.

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO₂) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data⁸ suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)⁹ has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO₂ annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

⁸ Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

⁹ Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m³ if expressed relative to annual mean averages. During this period, changes in PM_{2.5} concentrations were less marked than those of NO₂. PM_{2.5} concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that PM_{2.5} concentrations during the initial lockdown period are of the order 2 to 5µg/m³ lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Watford

- Reductions of NO₂ concentrations of between 31.1% and 42.3% were experienced at roadside diffusion tube monitoring sites within AQMA 1 between April and June 2020. This equated to a 17.4% reduction in annual mean concentration relative to 2019.
- Reductions of NO₂ concentrations of between 9.7% and 49.9% were experienced at roadside diffusion tube monitoring sites within AQMA 3A between April and June 2020. This equated to a 17.0% to 24.8% reduction in annual mean concentration relative to 2019.

To help with social distancing, the lower section of the High Street (from Kings Street to Market Street) was closed to through traffic except for buses, taxis and disabled drivers'.

Opportunities Presented by COVID-19 upon LAQM within Watford

No LAQM related opportunities have arisen as a consequence of COVID-19 within Watford.

Challenges and Constraints Imposed by COVID-19 upon LAQM within Watford

As previously discussed, we had to delay making our intended changes to our monitoring network in January. Putting up the brackets that hold the diffusion tubes would require the

use of a ladder. Two Officers are needed to undertake this work safely. Due to the COVID-19 pandemic, we have not been working/travelling in pairs.

No other challenges or constraints relating to LAQM have arisen during 2020 as a consequence of COVID-19 within Watford.

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is ongoing	Long delay (>6 months) in development of a new AQAP, but is ongoing	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is ongoing	Long delay (>6 months) in development of a new AQAP, but is ongoing	No progression in development of a new AQAP

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 Highways England
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

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