



**WATFORD
BOROUGH
COUNCIL**

2020 Air Quality Annual Status Report (ASR)

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

Date June 2020

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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 96,767 (mid-2018). 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 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^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

The main pollutants of interest in the Borough continue to be NO₂ and PM₁₀ particulates. These are mainly associated with road traffic. NO₂ is formed during the combustion process when Nitrogen in the air bonds with Oxygen.

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

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

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.

Duration of project: 2015 – 2035

Watford Junction

COVID 19 Update - *The planned upgrade refurbishment of Watford Junction station forecourt has been paused at this time and will resume when the Council's activities return to normal.*

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.

Oxhey Activity Park

The development of Oxhey Activity Park is now underway to provide sport and leisure facilities. The development will provide a café with a riverside terrace, toilets with changing places services, a toddler and junior play area, improving walking and cycling routes through the park including disabled access, recreation facilities for skateboarding, scooters, blading, mountain bikes and BMX. It will also see a creation of wetland areas in the park and improvements to the River Colne corridor.

St Albans Road

COVID-19 Update - The planned maintenance and refurbishment of St Albans Road has been paused at this time and will resume when the Council's activities return to normal.

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.

Sustainable transport - on-demand bus service and bike hire

Two exciting proposals to encourage sustainable transport in Watford will allow residents to climb aboard a flexible on-demand bus service or hop on and off at Watford's cycling docks. Both of the proposals are part of Elected Mayor Peter Taylor's aim to improve public transport across Watford.

The bike share scheme will be open to the public, with cycles available for hire on-street, 24 hours a day, seven days a week. There are currently 25 schemes across the UK.

The flexible on-demand bus service runs via an app. Residents will simply be able book a ride share to pick them up at a 'virtual' stop and it will drop them at their destination. The app combines passenger requests and determines the most efficient route at a fixed fare. The scheme already runs successfully in Oxford, Sittingbourne and Liverpool.

Actions to Improve Air Quality

The Council has delivered the following new initiatives this year:

travelWatford

travelWatford app ready to download

For Watford by Watford

Free to download and use, the travelWatford 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.

By simply entering the address that you want to go to, the app, drawing from large banks of data, will provide information on all the potential modes of transport you could use to get to your destination including: trains, fixed route buses, on-demand bus, bike share, private hire, mini-cabs, parking, walking, cycling, EV charging and car clubs. Users have ready access to real time travel information, and key booking and payment options.

ArrivaClick on-demand bus service

Responding to routes customers want to take (launched 24th March 2020)

Seven small fifteen-seater buses (accessible and DDA complaint) from ArrivaClick will provide a flexible bus service that, unlike others does not follow a fixed route at fixed times – but responds to demand from the passengers and the routes they want to take. There are no bus stops – residents are picked up and dropped off at 'virtual bus 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 (just outside the Borough boundary). Each bus will have comfortable seating, tables, free Wi-Fi, USB chargers and air conditioning ensuring a clean, comfortable and safe method of public transport.

The scheme will operate via a free, easy to use smartphone app and the operator will also provide an online (web-based) and telephone service for those without access to a smartphone.

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.

- Monday to Thursday 6am to 10pm;
- Friday and Saturday 6am to 11pm;
- Sunday 8am to 9pm.

Beryl Bike share scheme

To help reduce road traffic, air pollution and lower CO₂ emissions, as well as improving the health and fitness of people in Watford, Beryl Bikes has delivered the first bike share scheme in Hertfordshire with the Council.

The scheme which went live on 2nd March 2020 is comprised of up to 200 pedal bikes and 100 e-bikes and 70 preferred parking locations at Beryl Bays across the borough.

Over 12,000 journeys have been made on Beryl bikes since the scheme was launched in early March. The bikes are giving people a socially distanced outlet for leisure and key worker commuting and they are free to use for all NHS workers and Council employees. Beryl have just added 30 more bikes to the scheme to help with demand, and more bays will be installed across the town when it is safe again to do so.

Investment in Watford Cycle Hub

A new building and more support services for cyclists

Watford Cycle Hub has been providing a range of essential cycle related services to support Watford cyclists for several years, including repair and maintenance courses and cycle training.

Located next to Holywell Community Centre, WBC is funding the replacement of its original pavilion building with a larger, bespoke, modular structure which will enable to the Hub to expand its core services to the community. The new building will also incorporate a community café and social space with a larger workshop, a dedicated office and display space for reconditioned bikes and an expanded range of accessories.

Work on the new structure started on Monday 11th November 2019 with completion expected by the end of March 2020. While the works are taking place, the team will be housed in temporary accommodation on-site and the Cycle Hub will continue to operate a limited cycle repair operation and cycle training facility.

Low Carbon Workspace Grants

The Low Carbon Workspaces project 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.

Other projects to be delivered in 2020:

EV Charging Points

COVID-19 Update - *The installation and activation of new electric vehicle charging bays in various locations has been paused. Currently the Council is installing new electric vehicle charging points in Victoria Road, Bradshaw Road, Durban Road East, Essex Road, Shaftesbury Road and at Cassiobury Park. We have made the decision to withdraw engineers from the installation, following Government guidelines. At this time WBC and its contractors prioritise the health and safety of engineers given the current situation.*

In Watford, there are two electric vehicle charging points present in each of the below car parks. By April 2020 there will be a further seven fast chargers available in Cassiobury Park carpark and at five other on street locations across the town (these will be announced shortly).

Current charging points:

- Avenue Car Park;
- Bushey Arches Car Park;
- Gade Car Park;
- Longspring Car Park;
- Queens Car Park;
- Sutton Car Park;
- Timberlake Car Park;
- Town Hall Car Park;
- Watford Business Park Car Park;
- A 'Rapid Charging Point' which is able to charge vehicles in approximately 20 minutes, is also available for use in 'Service Road Q', just off the northbound side of Beechen Grove.

Anti-idling

The Council is also considering introducing an anti-idling policy.

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

Clarendon Road by the Palace Theatre – we have introduced the rising bollards and these are now fully operational and work under ANPR. They prevent unauthorised vehicles from entering the High Street (Clarendon Road to Market Street). The bollards only lower for vehicles who are on the authorised white list (Buses/Deliveries/cash-in Transit etc.). Prior to the placement there were on average just under 1000 vehicles a day passing through this section of the High Street. After studies show that on average there are now 260 per day (of this 250 are buses and 10 are cash-in-transit/council vehicles etc.).

High Street – 8 new cycle parking stands have been introduced outside Wilkinson's, Intu main entrance and opposite the former One Bell public house.

Cycling - The Council has introduced the Beryl bike scheme (see above).

Quiet-Way – We have introduced the first part of a Quiet-Way to support the Clarendon Road Public Realm improvements. To help pedestrians and cyclists avoid the road works we have improved the condition of the footpaths and carriageway from Albert Road North, via Westland Road to the junction of Station Road. The route is supported with directional signage from the High Street to Watford junction Station. There are more Quiet-Ways planned for later this year.

Coming this year we have new tree planting planned for the Clarendon Road scheme and we are introducing rain gardens to support the new trees/planting areas. We are also planning a refurbishment of St Albans Road main shopping area which will see 25 new cycle parking stands and 7 new street trees introduced. Similarly the Watford Junction Station project will see 6 new trees in planters introduced. For the Clarendon Road phase 3 the new street lights planned will have led lighting. Again, delivery of these has been delayed due to the present situation.

Electric Vehicle Charging sites

We have installed 7 new dual purpose Electric Vehicle Charging Units. We are awaiting for UK Power Networks (UKPN) to connect the below sites to their mains so they can be operational. Unfortunately the sites are not considered essential so the UKPN work has been delayed.

Location	Groundworks	Electrical
Victoria Road	Completed	
Bradshaw Road	Completed	Completed
Durban Road East	Completed	Completed
Essex Road	Completed	
Shaftsbury Road	Completed	
Cassiobury Park x2	Completed	Completed

Intalink Enhanced Bus Partnership – The Herts Boroughs and Districts have agreed a Memorandum of Understanding with the County to support the Intalink Enhanced Bus Partnership. The air quality section of the document is reproduced below:

Memorandum of Understanding
Setting out the roles of district and borough councils
Following the establishment of the
Intalink Enhanced Bus Partnership
Plan and Scheme for Hertfordshire

7. Air quality

7.1 Air quality is a significant concern in Hertfordshire and there is a shared duty between local authorities to ensure that Hertfordshire's transport network supports nationwide efforts to reduce air pollution. Implementation of the Enhanced Partnership

will lead to increased confidence in and use of public transport which can only have a positive impact on the reduction of air pollution.

7.2 Ambitious targets will be set countywide, by the Intalink Board, with a particular focus on Air Quality Management Areas, prior to the commencement of the partnership. Progress will be monitored throughout the partnership. Performance against these targets will support district and borough councils' successful delivery of Air Quality Action Plans.

7.3 The County Council and local bus operators will strive to meet these targets through a joint approach, incorporating: county council investment in bus priority facilities; bus operator reinvestment of revenue in fleet upgrades; external funding bids; and increased county council local bus service contract specifications standards.

7.4 Operators will be required to provide an annual statement of fleet profile information to assist District and Borough Councils with monitoring emissions performance.

7.5 District and Borough Councils will support the County Council by sharing monitoring evidence of air pollution so that air quality commitments can be enforced.

Staff and Public E-cars

March saw a decrease in vehicle usage by staff. This can likely be attributed to the majority of staff working from home due to the Coronavirus outbreak.

- During March there was one new signup from staff. The total membership base is now 84. Encouragingly seven new public members signed up for the scheme in March bringing the total to 172. This increase follows on from the digital screen advertising campaign we begun running on Watford High Street at the end of January and some social media advertising by E-Car during February.
- There was a slight decrease in numbers of staff members to make a booking this month, with a total of 12, which is 2 less than last month. The number of active staff members this month represents 14% of the total staff membership base.
- Staff members made 27 bookings this month, around half the number of February's bookings, however this is to be expected due to the high number of staff members working from home.
- March saw 65.5 hours booked by staff, which is an 80 hour decrease from February and 64% less zero emission miles were travelled totalling 255.
- 80% of staff bookings were made in the first two weeks of March, whilst the last two weeks saw four bookings cancelled or unused out of six made. The last staff booking completed was on 17/03. This demonstrates the decline in usage as changes to staff working practices were rolled out during the course of the month.

- The council vehicles were booked on average 14% of their available time in March, which is the equivalent of each car being booked nearly 1.6 hours per day. This level is in line with the decrease in bookings made this month.
- There was a small decrease in booking efficiency this month. 50% of booked time was used, 9 percentage points less than last month, which may be due to staff shortening all but essential trips. The target of 70-80% usually shows very good booking efficiency.
- 4.75 hours were booked by staff outside of subscription hours.
- During March, 11 members of the public made 22 bookings across all three cars. 90% of these bookings were completed in the first three weeks of March whilst the last week saw only two bookings as government restrictions on people's movements were implemented more strongly. The Avenue Car Park vehicle had the highest utilisation at 10%, although moderate usage this is a 10 percentage point decrease on February. When we factor in all three cars public utilisation was 6%.

Civil Engineering Contractors vehicles - Below are some photos of our contractors latest vehicles operating in Watford. All of these vehicles meet Euro 6 emissions standards.



Photograph of civil engineering contractors vehicle



Photograph of civil engineering contractors vehicles

Hertfordshire County Council's Strategy & Programme Manager reports the following:

Listed below are some of the Highway improvement schemes that had been implemented or completed in 2019 and which contribute towards improving conditions for walking, cycling and public transport usage. This list does not include any maintenance schemes (such as footway resurfacing or subway maintenance).

- A41 North Western Avenue – new signalised pedestrian crossing near West Drive (scheme ref ITP17005);
- Phase one of Wiggshall Road footway upgrade: BP garage to junction with Thomas Sawyer Way (scheme ref ITP190027);
- Lower High Street junction with Dalton Way – Pedestrian crossing improvements and cycle signage rationalisation (remedial works following changes made as a result of the Health Campus/Riverwell planning permission) (scheme ref ITP18031);
- Beechfield School, Gammons Lane – School Crossing patrol improvements (scheme ref ITP190022-a);
- A405 Kingsway – longabout safety scheme (scheme ref SAR180012-1);
- St Catherine of Sienna school – Horseshoe Lane new School Crossing Patrol site (scheme ref SAR180019-b).

Not specific to Watford, Hertfordshire County Council's principle activities and achievements on air quality in 2019, delivered by the Public Health and Environment & Infrastructure departments, were:

- Adoption of the Air Quality Strategy and Implementation Plan. Available here: <https://www.hertfordshire.gov.uk/services/health-in-herts/healthy-places/healthy-places.aspx#air>;
- Collaboratively produced the third annual PM2.5 monitoring report for the county. This report is produced by the Herts and Beds Air Quality Forum for Hertfordshire Public Health and is on the Forum's website;
- Hertfordshire's Public Health Board ran a workshop for Health and Social Care in conjunction with District and Borough colleagues late in 2019 on Air Quality in a bid to raise awareness of the issue in the wider health sector;
- Hertfordshire Public Health has supported the communications for the countywide Air Alert Scheme, which is now up and running. The Air Alert scheme is funded by district and borough councils and coordinated through the Herts and Beds Air Quality Forum. This included funding an article on the scheme in the Environment Times and promotion to health partner organisations via the Public Health Board Workshop;

- Clean Air Day – a campaign day coordinated and supported by HCC countywide as part of the annual national campaign, which some authorities take part in;
- General campaigns and communications with an air quality focus from HCC's teams including the Active & Safer Travel Team.

Conclusions and Priorities

NO₂ concentrations have decreased at almost all monitoring locations, and at the automatic monitoring site there was a further reduction in the NO₂ annual mean concentration, and there were no exceedences of the 1-hour mean objective.

Exceedences of the annual mean all occurred within existing AQMAs. However, there was a decrease in concentrations on Farraline Road in AQMA 2 and on Chalk Hill in AQMA 3A, concentrations on Lower High Street remained the same.

After applying the distance correction, the predicted concentration at receptor was within 10% of the AQS objective at only Chalk Hill in AQMA 3A.

The improvement is considered to be the result of a gradual shift over time to vehicles that are less polluting, and this trend will hopefully continue with newer vehicles and a shift to less polluting vehicles such as EV.

There were no exceedences of the air quality objectives for PM₁₀.

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

In 2019/2020, the Council drafted a new AQAP for 2020-2025, due to the COVID-19 pandemic, further progress has not been made. Internal consultation is yet to take place, once this has occurred, external consultation will be carried out.

The Council has also undertaken a review of its diffusion tube locations, current locations have been reviewed, traffic count data and congestion hotspot information supplied by Hertfordshire County Council has been used to identify possible new locations.

The review has identified eight new locations based on congestion hotspot information and two new locations based on traffic counts.

The Council intends to deploy a total of fifteen additional diffusion tubes, two of these diffusion tubes will be deployed at the Council's automatic monitoring site, to permit co-location studies to be undertaken.

The Council intends to improve the positioning of one existing diffusion tube and to cease monitoring at two locations where concentrations have been consistently low.

Adopting the Council's new AQAP and making the proposed changes to the diffusion tube locations are priorities for 2020/2021.

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 2019. 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 can be found in Table E.1 in Appendix E.

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 must prepare an Air Quality Action Plan (AQAP) within 12-18 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. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <http://uk-air.defra.gov.uk/aqma/list>. Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

For reference, a map of Watford Borough Council's monitoring locations is available in Appendix D.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
AQMA 2 Vicarage Road	Declared 01/02/2006, amended 10/04/2019	NO ₂ Annual Mean	Watford	A predominately residential area with a cluster of commercial buildings within and as well as close to the vicinity. Queuing traffic.	NO	58.0	µg/m ³	35.6	µg/m ³	Watford Borough Council Air Quality Action Plan	2011	Not currently on Council's website
AQMA 3A Aldenham Road/Chalk Hill	Declared 01/02/2006, amended 10/04/2019	NO ₂ Annual Mean	Watford	A combination of residential and commercial buildings along a main road within close proximity to Bushey Station. Queuing traffic.	NO	56.8	µg/m ³	39.3	µg/m ³	Watford Borough Council Air Quality Action Plan	2011	Not currently on Council's website

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

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

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed, and provided the information specified in the Guidance. The following comments were designed to help inform future reports:

1. In Table 2.2, it is unclear when the measures were implemented and completed which makes it difficult to track the progress and identify new measures added this year. Please provide the year in which these measures were undertaken wherever possible.
2. AQMA 5 has been compliant for 2 years only and a decision has been made to revoke this AQMA. Please note, the general advice is 3 years compliance to have confidence in a revocation.
3. AQMA 1 has been revoked following 5 years of continuous compliance. The Local Authority should continue to keep these sites under review to ensure that they continue to meet their compliance.
4. AQMA 3A has 2 monitoring locations and AQMA 2 has one monitoring location within their boundary. It would be beneficial to have a few more monitoring locations within the AQMA as it is difficult to observe trends with a single location. Furthermore, additional monitoring locations might highlight potential hotspots in the area which might have gone unnoticed. For further guidance please refer to TG16.
5. Adoption of a revised AQAP is expected during the next reporting year. This is encouraged as the 2011 Action Plan is out of date.
6. The report could include links to PM_{2.5} and Public Health outcomes Frameworks in future ASRs.
7. Most of the comments from the previous appraisal have been addressed and actions have been taken to make changes in this year's report.
8. In general, the report is good, however there are areas that require improvement for future reports, as discussed above.

Conclusions have been brought forward from last year's appraisal and actioned in this ASR:

1. Please see Table 2.2 below. I believe that this has been addressed.
2. Noted. The Council will continue to monitor NO₂ in the former AQMA 5. WF38 is located at a junction that has been identified as a congestion hotspot by Hertfordshire County Council. This site will be kept under review.
3. Noted. The diffusion tubes located within the former AQMA 1 will be retained, the positioning of WF45 will be improved as part of the Council's review of monitoring locations. This site will be kept under review.
4. As part of the Council's review of monitoring locations, tubes will be deployed at two new locations within AQMA 3A and three new locations within AQMA 2. These locations have been chosen to provide wider coverage, some were selected based on traffic counts and congestion hotspot information.
5. The Council has drafted a new AQAP for 2020-2025. The Council intends to adopt this plan later this year.
6. Please see section 2.3 below. I believe that this has now been addressed.
7. Noted.
8. Noted.

Watford Borough Council's priorities for the coming year will be to adopt the Council's new AQAP and to make the proposed changes to the diffusion tube locations.

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	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	HCC/WBC	HCC/WBC	Schemes completed	Ease congestion and reduce emissions	On going	Unknown	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	HCC/WBC	HCC/WBC	Bus and rail patronage, number of cyclists and pedestrians	Reduce private car use and so reduce emissions.	On going	Unknown	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	HCC/WBC	HCC/WBC	Completed scheme	Medium impact.	On going	Unknown	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	WBC	WBC	Registered members on lift share. Number of private schemes	High in the vicinity of the junction	On going	Unknown	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	WBC	WBC	Number of travel plans in schools and businesses	Low	Complete / on going	Unknown	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	WBC	WBC	Age and Euro standard of Council vehicle fleet	Low	On going	Unknown	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	WBC	WBC	"Hits" on Herts & Beds Air website	Low	Complete	Unknown	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/airqualitystrategicplan.pdf
8	Continue to monitor air quality. Maintenance of	Public Information	Other	2011	WBC	WBC	Number of operational monitors	Low	On going	Unknown	Despite budgetary pressures Watford has continued to fund existing monitoring and has also funded the

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
	air quality monitors and data management.										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	WBC	WBC	Not applicable	Low	On going	Unknown	Site allocation traffic light system put in place with planning policy. Constraint information for developers included in planning information.
10	Enforcement of parking policy. Minimise emissions due to reduced traffic flow caused by obstructions.	Traffic Management	Other	2011	WBC	WBC	Number of warnings, fines and prosecutions for such offences	Not applicable	On going	Unknown	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	HCC/WBC	HCC/WBC	Number of charging points installed	Low	On going	Unknown	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	HCC/WBC	HCC/WBC	Bus patronage	Low	Complete / on going	Unknown	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	WBC	WBC	Uptake numbers.	Medium	Complete / on going	Unknown	Travelsmart continues to be promoted.
14	Promotion of cycling and walking. Increase sustainable transport.	Promoting Travel Alternatives	Promotion of walking	2011	WBC/HCC	WBC/HCC	Number of cyclists and pedestrians	Low	Complete / on going	Unknown	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	WBC	WBC	Publication of SPD; Number of planning applications made using the guidance.	Low	On going	Unknown	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).

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.

There is clear evidence that PM_{2.5} has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The following is taken from the Hertfordshire Local Authorities Report on Particulate Matter (PM_{2.5}) in Ambient Air in 2018 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 2.5µm 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 (2018) is 5.6%. 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 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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Watford Borough Council undertook automatic (continuous) monitoring at one site during 2019. Table A.1 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.

Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at <https://uk-air.defra.gov.uk/data/>.

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 (passive) monitoring of NO₂ at 19 sites during 2019. 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.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias⁴, “annualisation” (where the data capture falls below 75%), and distance correction⁵. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

Note that the concentration data presented in Table A.3 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).

⁴ <https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html>

⁵ Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. There appears to be an anomalous result for WF02 in December ($312.6\mu\text{g}/\text{m}^3$). This result is highlighted in red in Table A.3, however, the result has not been included in the calculations. The valid data capture for this location was 92%, removal of the anomalous result from the data set reduced valid data capture to 83%. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

NO_2 concentrations have decreased at almost all monitoring locations. Figure A.1 shows a general trend of decreasing annual mean concentrations over the last 5 years.

Exceedences of the annual mean all occurred within existing AQMAs. However, there was a decrease in concentrations on Farraline Road in AQMA 2 and on Chalk Hill in AQMA 3A, concentrations on Lower High Street remained the same.

Figures A.3, and A.4 show a trend of decreasing concentrations in AQMA 3A over the last 3 years. Figure A.2 shows a trend of decreasing concentrations in AQMA 2 over the last 2 years.

After applying the distance correction, the predicted concentration at receptor was within 10% of the AQS objective at only Chalk Hill in AQMA 3A.

There were no exceedances above $60\mu\text{g}/\text{m}^3$.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of $200\mu\text{g}/\text{m}^3$, not to be exceeded more than 18 times per year.

There was a further reduction in the NO_2 annual mean concentration ($30\mu\text{g}/\text{m}^3$) and there were no exceedences of the 1-hour mean objective (as measured at the Council's automatic monitoring site). Figure A.5 shows a trend of decreasing annual mean concentrations over the last 3 years.

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of $40\mu\text{g}/\text{m}^3$.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of $50\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times per year.

There were no exceedences of the air quality objectives for PM_{10} . Figures A.6 and A.7 show a general trend of decreasing annual mean and daily mean concentrations (although there was an increase in the daily mean in 2019).

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

Table A.7 in Appendix A presents the ratified and adjusted monitored $\text{PM}_{2.5}$ annual mean concentrations for the past 5 years.

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There were no exceedances of the EU Limit Value (25ug/m³) or the WHO guideline level (10ug/m³) for PM_{2.5}. Figure A.8 shows a trend of decreasing concentrations over the last 3 years.

Appendix A: Monitoring Results

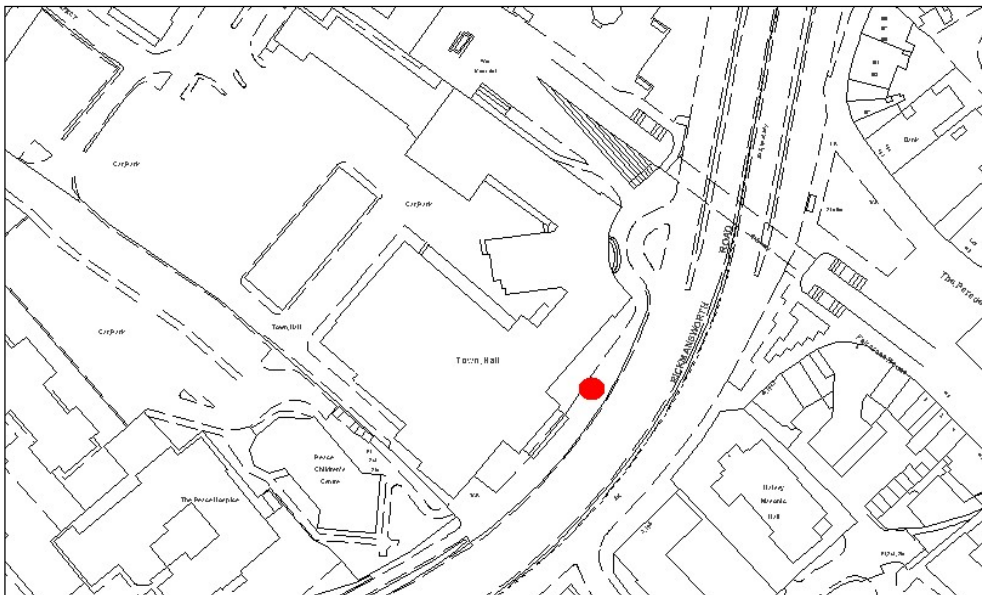
Table A.1 - Details of Automatic Monitoring Sites

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)
WF46	Watford Town Hall	Roadside	510540	196780	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

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)
WF02	Grove Pumping Station	Urban Background	508700	198950	NO ₂	NO	N	N/A	NO	2
WF03	Hospital	Kerbside	510570	195800	NO ₂	NO	N	4m	NO	2.4
WF06	Woodside Playing Fields	Urban Background	510985	200710	NO ₂	NO	N	N/A	NO	3
WF29	Pinner Road	Kerbside	511940	195320	NO ₂	AQMA 3A	Y – 6m	2m	NO	2.1
WF36	Ravenscroft	Industrial	512240	199910	NO ₂	NO	Y – 8m	N/A	NO	2.2
WF37	358, St. Albans Road	Kerbside	510970	198535	NO ₂	NO	Y – 5m	1m	NO	2.4
WF38	A405 / Horseshoe Lane	Kerbside	511680	200700	NO ₂	NO	Y – 2m	4m	NO	3
WF39	Balmoral Road	Kerbside	511000	198270	NO ₂	NO	N	1m	NO	2.4
WF40	Salisbury Road	Kerbside	510930	198000	NO ₂	NO	N	2m	NO	2.4
WF41	Leavesden Road	Kerbside	510850	197780	NO ₂	NO	N	1m	NO	2.5
WF42	Queens Road	Kerbside	511160	197000	NO ₂	NO	Y – 4m	1m	NO	2.4
WF43	Farraline Road	Kerbside	510800	196020	NO ₂	AQMA 2	Y – 4m	2m	NO	2.4
WF44	Chalk Hill	Kerbside	511920	195450	NO ₂	AQMA 3A	Y – 6m	2m	NO	2.1
WF45	Wellington Road	Kerbside	510750	197230	NO ₂	NO	Y-10m	4m	NO	2.3
WF46	Town Hall	Roadside	510565	196800	NO ₂	NO	N	6m	YES	2
WF47	Willow Lane	Kerbside	510335	195610	NO ₂	NO	Y - 3m	1m	NO	2.4

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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)
WF48	Lower High Street	Kerbside	511725	195619	NO ₂	AQMA3A	Y - 4m	1m	NO	2.4
WF49	Gammons Lane	Kerbside	510499	198454	NO ₂	NO	Y - 5m	1m	NO	2.4
WF50	Eastbury Road (Oxhey Early Years)	Kerbside	511057	194895	NO ₂	NO	N	2.7m	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

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 2019 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ^{(3) (4)}				
							2015	2016	2017	2018	2019
WF02	508700	198950	Urban Background	Diffusion Tube	83%	83%	15.4	18.7	15.9	16.0	13.5
WF03	510570	195800	Kerbside	Diffusion Tube	100%	100%	34.8	35.5	32.7	30.6	28.9
WF06	510985	200710	Urban Background	Diffusion Tube	83%	83%	18.9	19.6	20.0	18.2	18.8
WF29	511940	195320	Kerbside	Diffusion Tube	100%	100%	48.2	49.4	40.4	38.6	34.7
WF36	512240	199910	Urban Centre	Diffusion Tube	100%	100%	25.4	26	26.6	27.0	25.5
WF37	510970	198535	Kerbside	Diffusion Tube	83%	83%	31.8	38	34.2	32.5	30.0
WF38	511680	200700	Kerbside	Diffusion Tube	100%	100%	40.9	41.7	34.3	32.9	30.7
WF39	511000	198270	Kerbside	Diffusion Tube	100%	100%	36.3	38.1	33.9	29.9	30.4
WF40	510930	198000	Kerbside	Diffusion Tube	75%	75%	33.1	36.5	33.5	32.7	25.1
WF41	510850	197780	Kerbside	Diffusion Tube	92%	92%	32.2	37.6	37.4	34.5	34.2
WF42	511160	197000	Kerbside	Diffusion Tube	100%	100%	31.7	31	31.1	27.4	29.8
WF43	510800	196020	Kerbside	Diffusion Tube	100%	100%	44.8	49.5	52.7	51.1	42.2
WF44	511920	195450	Kerbside	Diffusion Tube	100%	100%	<u>70.7</u>	<u>73.6</u>	<u>61.6</u>	53.2	49.0
WF45	510750	197230	Kerbside	Diffusion Tube	100%	100%	31.6	34.9	37.1	32.6	32.5

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 2019 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ^{(3) (4)}				
							2015	2016	2017	2018	2019
WF46	510565	196800	Roadside	Diffusion Tube	100%	100%	32	31.7	30.2	26.8	26.3
WF47	510335	195610	Kerbside	Diffusion Tube	100%	100%	29.6	30.7	28.8	26.8	26.3
WF48	511725	195619	Kerbside	Diffusion Tube	100%	100%	44.5	50.6	46.5	42.3	41.7
WF49	510499	198454	Kerbside	Diffusion Tube	100%	100%		26.8	35.0	32.8	31.5
WF50	511057	194895	Kerbside	Diffusion Tube	100%	100%		57	34.4	32.2	31.1
Watford Town Hall	510540	196780	Roadside	Automatic	98.24%	98.24%	35	36	34	32.0	30.0

☒ Diffusion tube data has been bias corrected

☒ Annualisation has been conducted where data capture is <75%

☒ 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 adjustment

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**.

(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%).

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

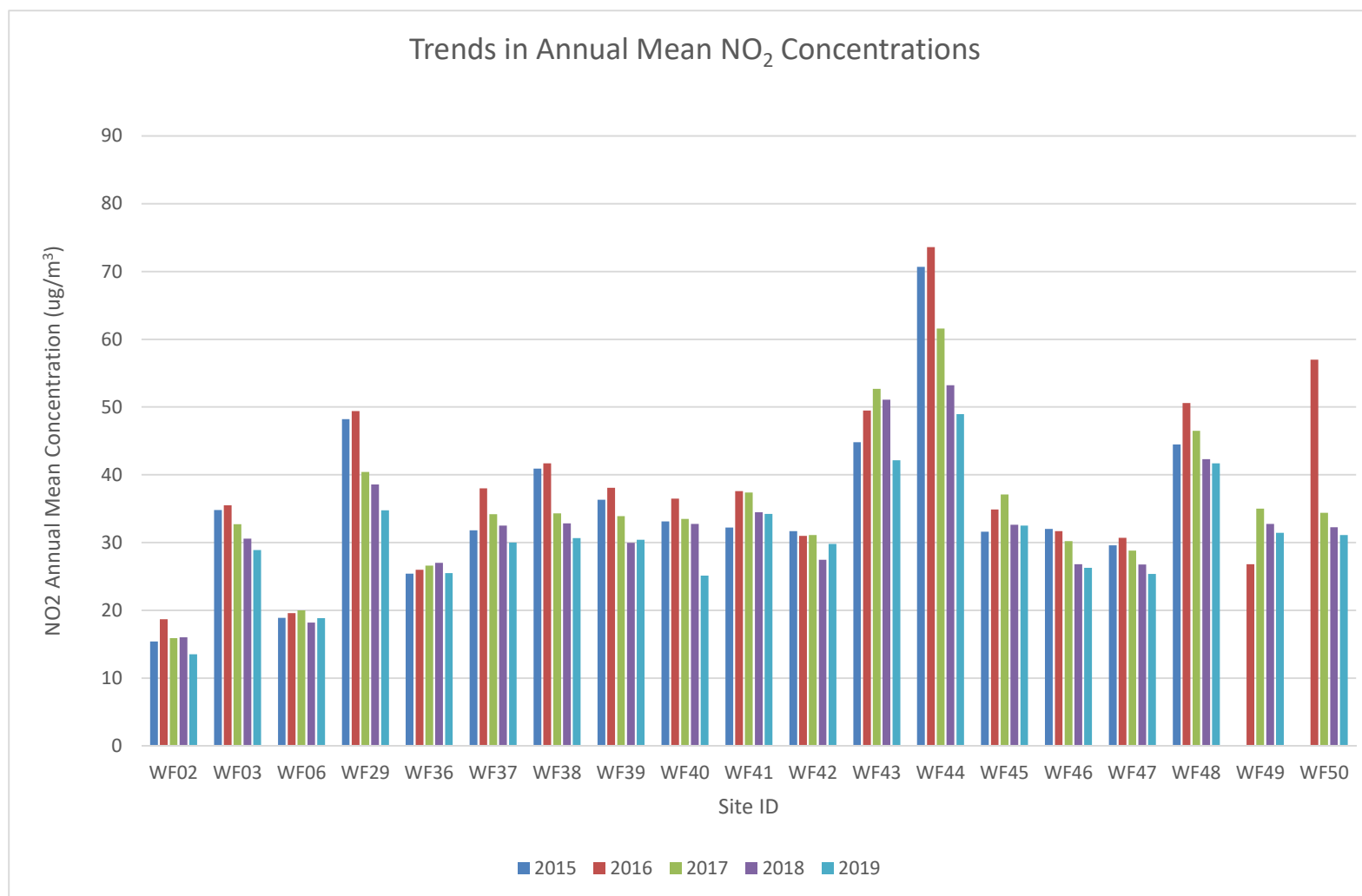
Figure A.2 – Trends in Annual Mean NO₂ Concentrations (ug/m³) (non-automatic monitoring sites)

Figure A.2 - Trends in Annual Mean NO₂ Concentrations (ug/m³) (Bias Adjusted and Annualised) at WF43/AQMA 2)

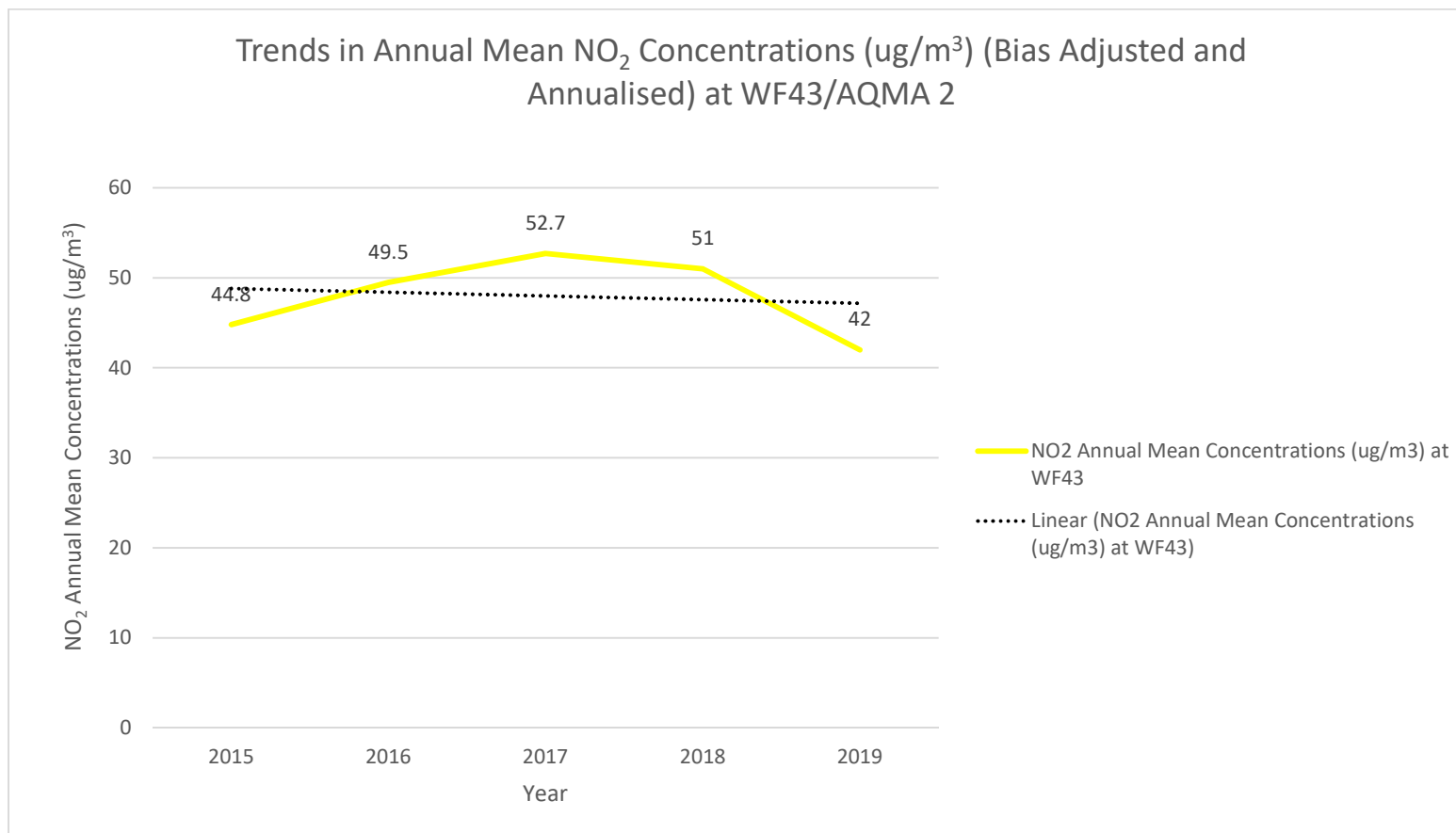


Figure A.3 - Trends in Annual Mean NO₂ Concentrations (ug/m³) (Bias Adjusted and Annualised) at WF44/AQMA 3A)

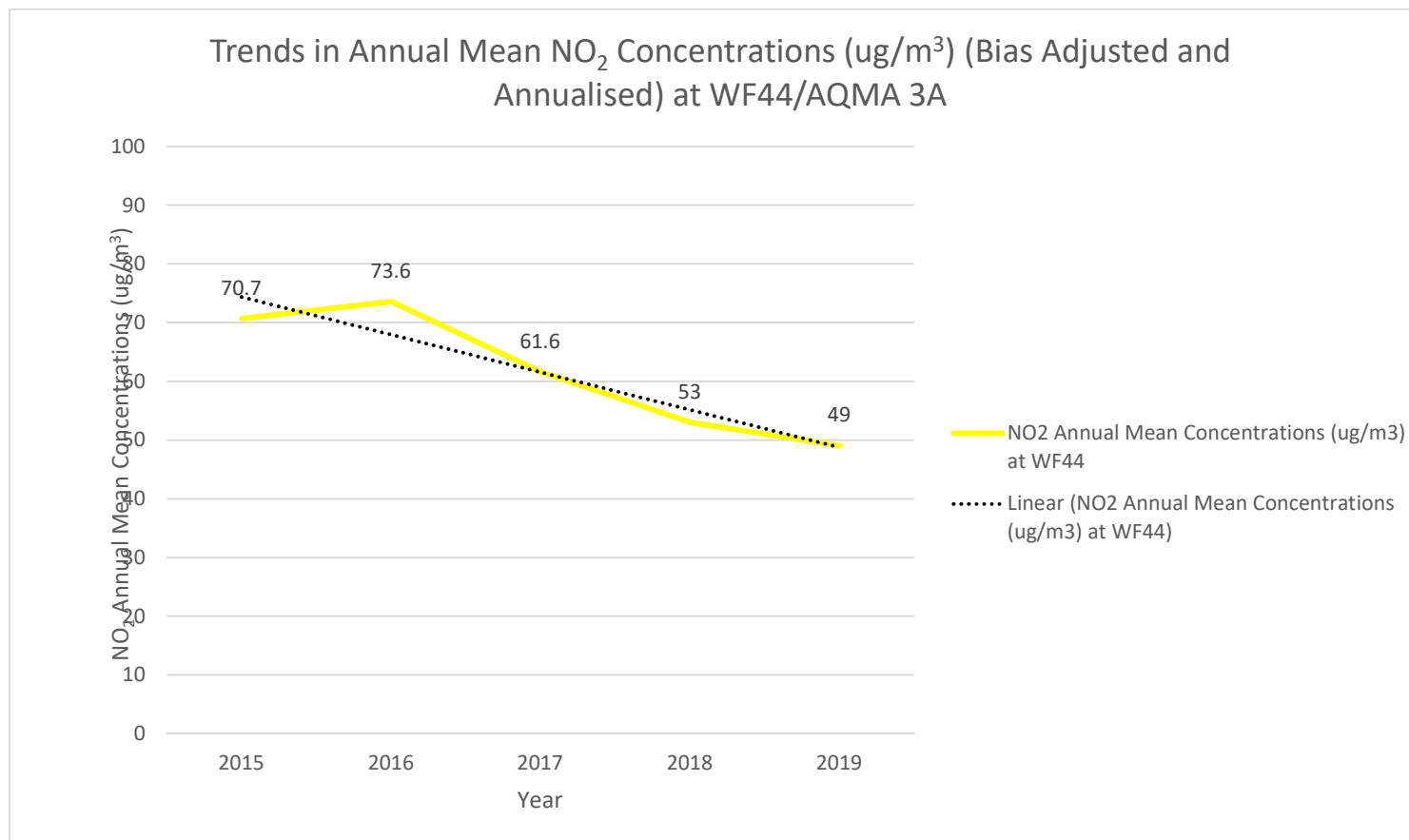


Figure A.4 - Trends in Annual Mean NO₂ Concentrations (ug/m³) (Bias Adjusted and Annualised) at WF48/AQMA 3A)

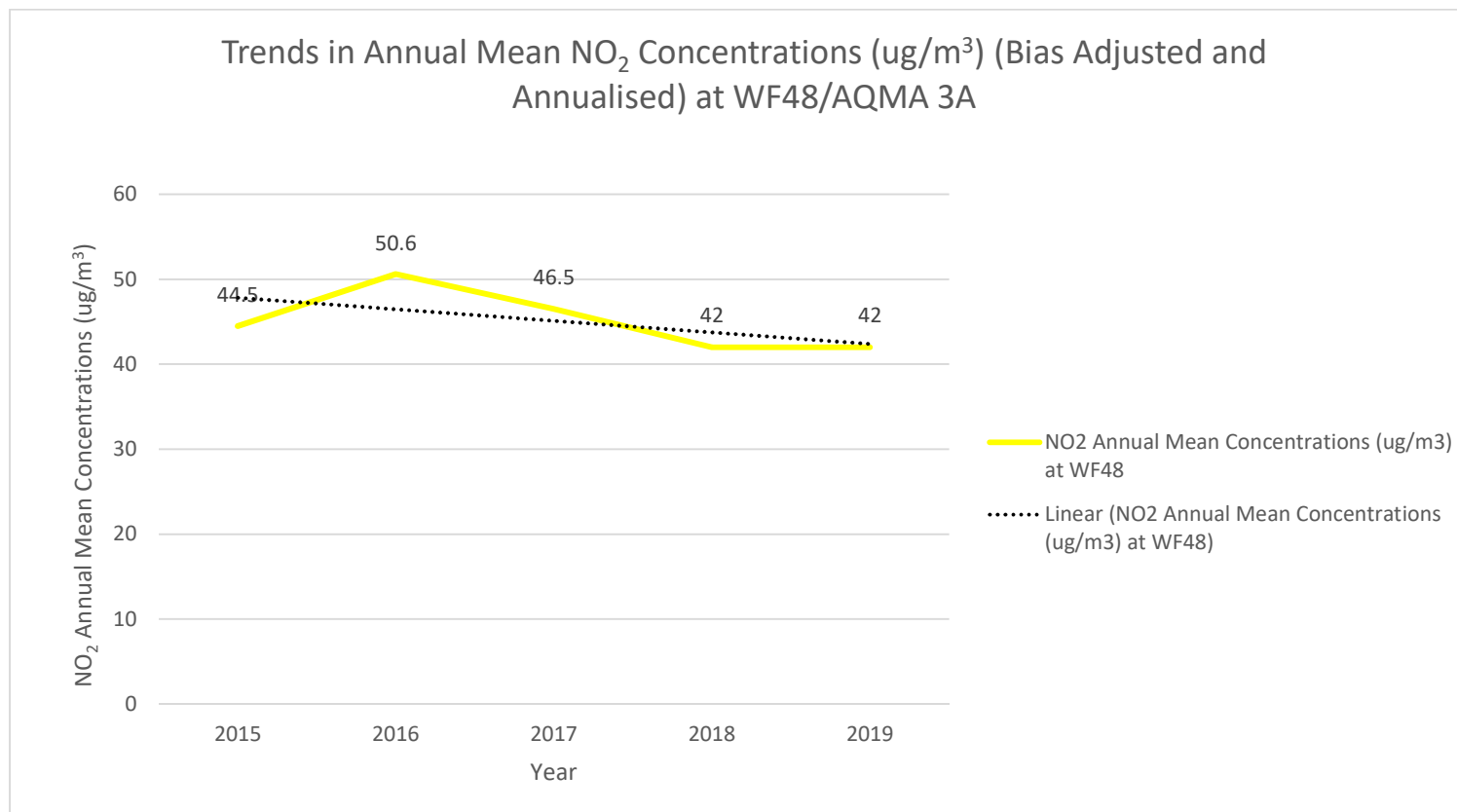


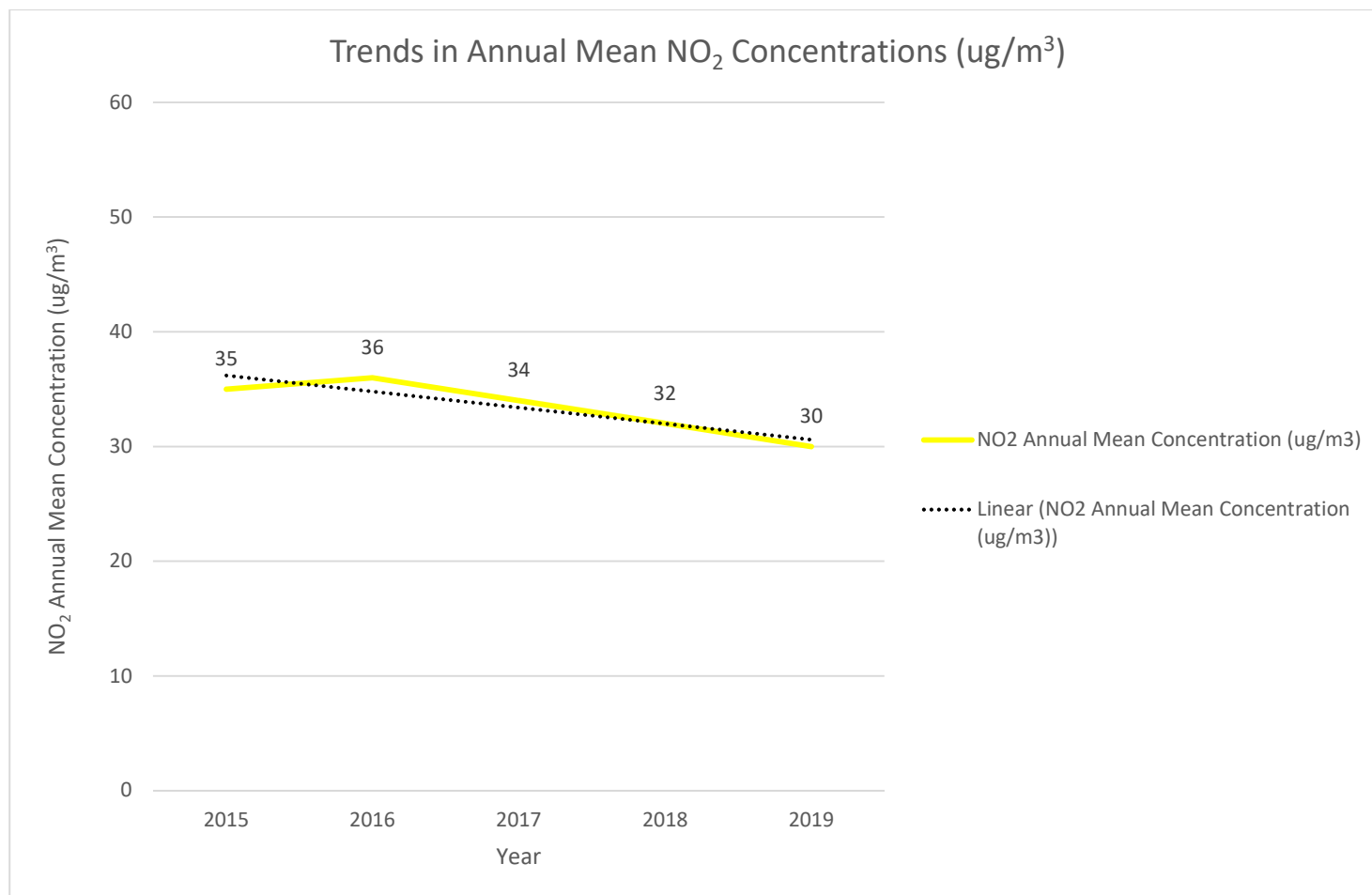
Figure A.5 – Trends in Annual Mean NO₂ Concentrations (ug/m³) (automatic monitoring site)

Table A.4 – 1-Hour Mean NO₂ Monitoring Results

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 2019 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
							2015	2016	2017	2018	2019
Watford Town Hall	510540	196780	Roadside	Automatic	98.24%	98.24%	0	0	0	0	0

Notes:

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

(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%).

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

Table A.5 – Annual Mean PM₁₀ Monitoring Results

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 (µg/m ³) ⁽³⁾				
						2015	2016	2017	2018	2019
Watford Town Hall	510540	196780	Roadside	97.69%	97.69%	22	14	15	15	15

☒ Annualisation has been conducted where data capture is <75%

Notes:

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

(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%).

(3) All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.6 – Trends in Annual Mean PM₁₀ Concentrations (ug/m³)

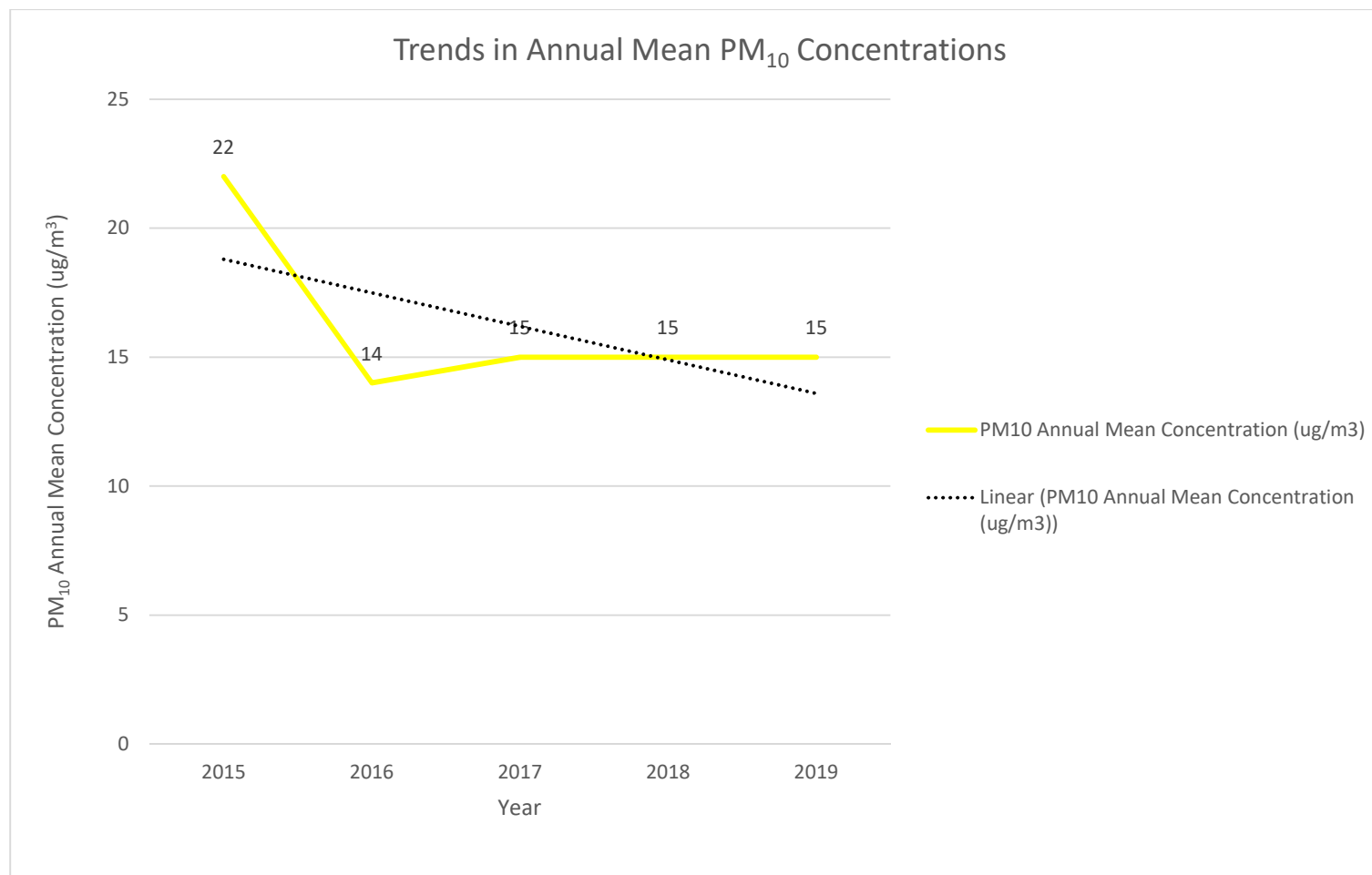


Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

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⁾				
						2015	2016	2017	2018	2019
Watford Town Hall	510540	196780	Roadside	97.69%	97.69%	5	1	3	1	4

Notes:

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

(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%).

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

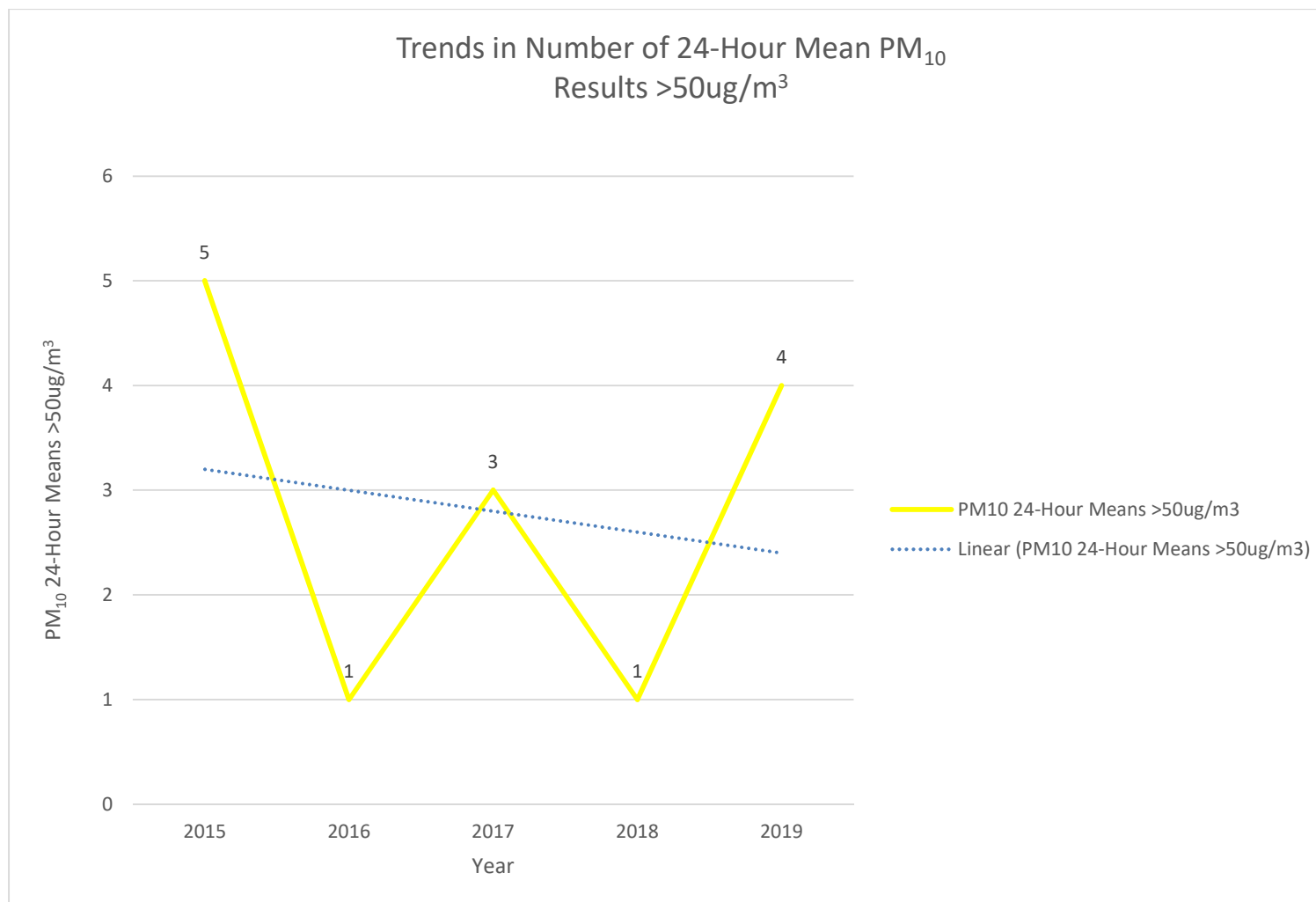
Figure A.7 – Trends in Number of 24-Hour Mean PM₁₀ Results >50µg/m³

Table A.7 – PM_{2.5} Monitoring Results

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 (µg/m ³) ⁽³⁾				
						2015	2016	2017	2018	2019
Watford Town Hall	510540	196780	Roadside	97.69%	97.69%	10	14	10	9	9

☒ Annualisation has been conducted where data capture is <75%

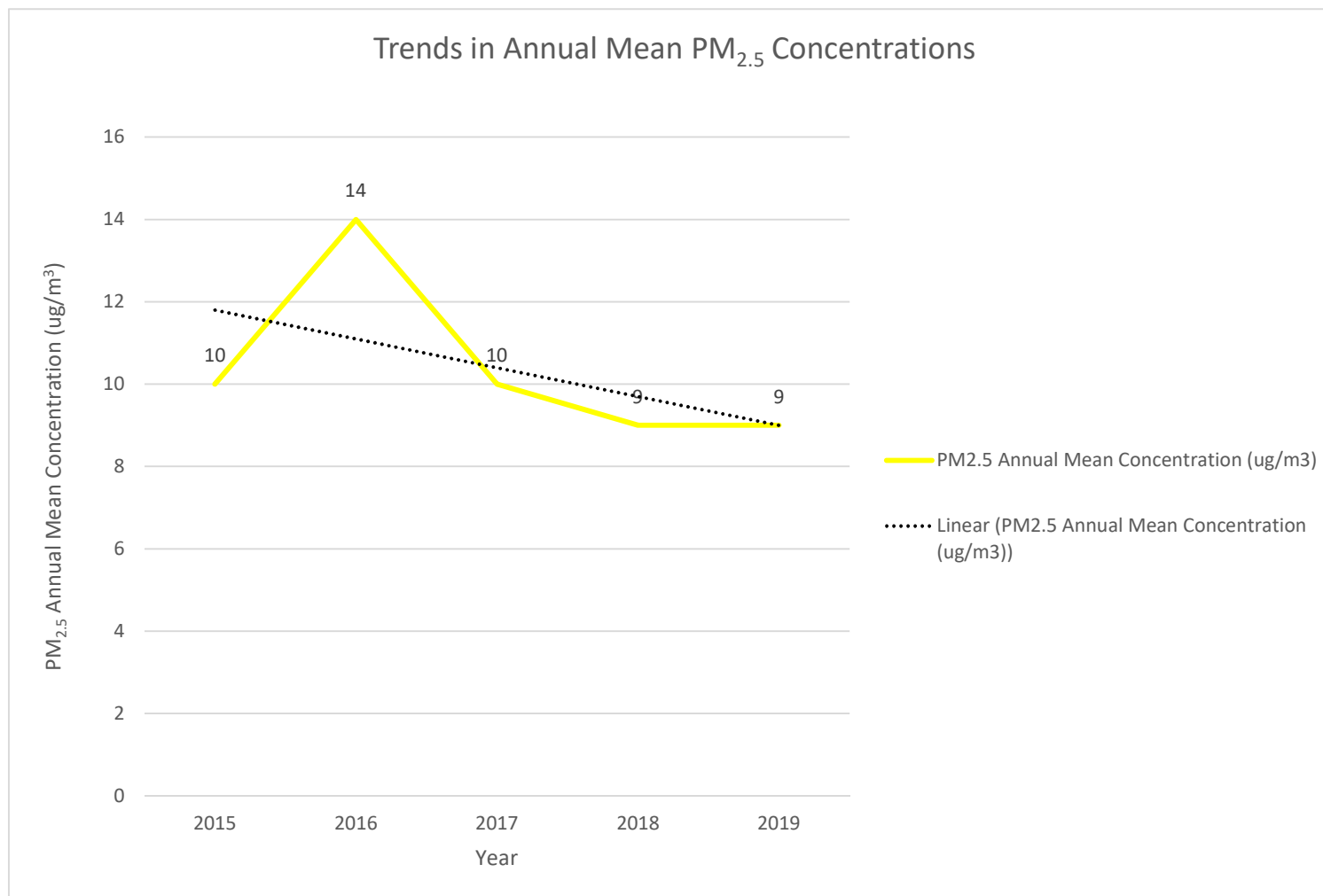
Notes:

(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%).

(3) All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.8 – Trends in Annual Mean PM_{2.5} Concentrations (ug/m³)



Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO₂ Monthly Diffusion Tube Results - 2019

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 (0.75) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
WF02	508700	198950	27.5	22.9	15.1	26.9	13.8	13.0	13.4	9.8	18.0	19.9	NO ACCESS	ANOMAL- OUS RESULT	18.0	13.5	
WF03	510570	195800	50.9	44.5	37.6	44.7	29.1	31.9	29.7	27.3	35.4	41.8	55.0	34.4	38.5	28.9	
WF06	510985	200710	36.2	34.2	22.2	22.5	17	14.9	14.9	MISSING	MISSING	26.1	40.1	23.1	25.1	18.8	
WF29	511940	195320	61.9	51.9	46.8	53.7	42.5	41.1	39.6	30.4	43.3	52.4	46.8	45.5	46.3	34.7	
WF36	512240	199910	40.2	38.2	26.5	42.4	29.4	26.1	25.6	20.3	30	34	68.3	27	34.0	25.5	
WF37	510970	198535	15	51	35.1	48.2	MISSING	MISSING	30.1	27.6	37.5	46.9	62.2	46.4	40.0	30.0	
WF38	511680	200700	47.8	43.4	39.2	49.9	35	32.4	36.1	26.8	37.4	44.8	55.7	41.9	40.9	30.7	
WF39	511000	198270	52.5	49.5	26.7	47.3	36	33.2	33	27.4	37.1	42.1	60	41.7	40.5	30.4	
WF40	510930	198000	MISSING	53.3	40	43.3	33.5	32.9	29.5	27.8	38.9	MISSING	MISSING	2.3	33.5	25.1	
WF41	510850	197780	59.1	MISSING	39.7	56.2	39.3	38	37.2	31.5	42.3	51.6	59.4	47.6	45.6	34.2	
WF42	511160	197000	52.7	44.4	34.4	38.3	26.9	26.4	26.8	23.3	33.2	37.2	87.8	45.6	39.8	29.8	
WF43	510800	196020	66.8	65	52.2	59.4	46.6	49.8	53.1	39.5	57.8	58.8	75.7	49.9	56.2	42.2	35.6
WF44	511920	195450	80.6	67.3	73.9	80.4	66.1	61.1	62.6	50.8	67.9	64.7	47.2	60.8	65.3	49.0	39.3
WF45	510750	197230	48.5	52.7	45.8	46.7	38.7	38.6	33.2	26.8	40.2	46.6	60.7	41.5	43.3	32.5	
WF46	510565	196800	42.8	41.1	35.8	37.2	29.1	27.9	27	24.2	31.2	38.9	48	37.1	35.0	26.3	
WF47	510335	195610	45.8	38.4	33.8	42.3	31.4	29.5	27.1	19	32	32.3	50.3	24	33.8	25.4	

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 (0.75) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
WF48	511725	195619	73.8	67.2	55.7	55.3	39.5	46.2	50.4	41.2	49.1	53.5	72.7	62.7	55.6	41.7	33.5
WF49	510499	198454	53.8	54.4	36.4	42.2	32.9	33.6	35.6	28.7	38.1	41.9	59.7	45.9	41.9	31.5	
WF50	511057	194895	52	53.1	40	43.7	29.2	33.3	30.5	28.1	36.6	45.9	59.2	46.2	41.5	31.1	

☐ Local bias adjustment factor used

☒ National bias adjustment factor used

☒ Annualisation has been conducted where data capture is <75%

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

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**.

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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

The following analysers have been in operation at Watford Town Hall:

1. API M200E chemiluminescent NOX analyser from Envirotechnology; and
2. In December 2015 a Fidas 200 system replaced the TEOM analyser and monitored PM₁₀ and PM_{2.5}.

<https://www.ecotech.com/wp-content/uploads/2015/03/Product-Brochure-Fidas-200.pdf>

The monitoring station is classified as a Roadside monitoring site, and is situated approximately 10 metres from the kerb of Rickmansworth Road.

Until October 2011, data was collected via modem by the King's College London Environmental Research Group (ERG). Data between October 2011 and October 2016, was collected by Air Quality Data Management (AQDM), Ricardo Energy & Environment took over this role in October 2016. Real time data, as well as weekly month and annual reports are available from Herts & Beds Air Quality Monitoring Network website:

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

Since December 2014 servicing and maintenance had been overseen by Envirotechnology. Local Site Operator (LSO) services are provided by Ricardo Energy & Environment, this includes fortnightly calibration and six monthly QC audits.

Diffusion tubes are supplied and analysed by Socotec, formerly Environmental Scientifics Group (ESG) Didcot, a UKAS accredited laboratory. The Council uses 50% TEA (triethanolamine) in acetone diffusion tubes.

QA/QC

Socotec participated in the following AIR NO₂ PT rounds during 2019:

AIR PT AR030 January - February 2019;
AIR PT AR031 April – May 2019;
AIR PT AR033 July-August 2019;
AIR PT AR034 September-October 2019.

For the January-February round, 87.5% of results submitted were determined to be satisfactory. For all the other rounds, 100% of results submitted were determined to be satisfactory.

Bias adjustment

A national bias adjustment factor was used. The national bias adjustment factor for 2019 is 0.75.

A database of bias adjustment factors determined from Local Authority co-location studies throughout the UK has been collated by the Local Air Quality Management Helpdesk. Using orthogonal regression, combined bias adjustment factors have been calculated for each laboratory, year and preparation method combination for which data are available.

The Diffusion Tube Bias Adjustment Factors Spreadsheet for April 2020 was used. The bias correction factors used are shown in Table 2.3, and the national spread sheet can be found at:

<http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Annualisation

During 2019, the valid data capture for all diffusion tubes was above 75%. Therefore it was not necessary for the calculated annual average to be annualised.

Nitrogen Dioxide fall off with distance calculations

These calculations were carried out on all measurements within AQMA's located near relevant exposure, where the annual mean was exceeded or was within 10% of the objective.

 Enter data into the pink cells						
Site Name/ID	Distance (m)		NO ₂ Annual Mean Concentration (µg/m ³)			Comment
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor	
WF43	2.0	8.0	21.8	42.2	35.6	
WF44	2.0	8.0	19.0	49.0	39.3	Predicted concentration at Receptor within 10% the AQS objective.
WF48	1.0	6.0	19.0	41.7	33.5	

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

Figure D.1: Location of nitrogen dioxide diffusion tube monitoring sites

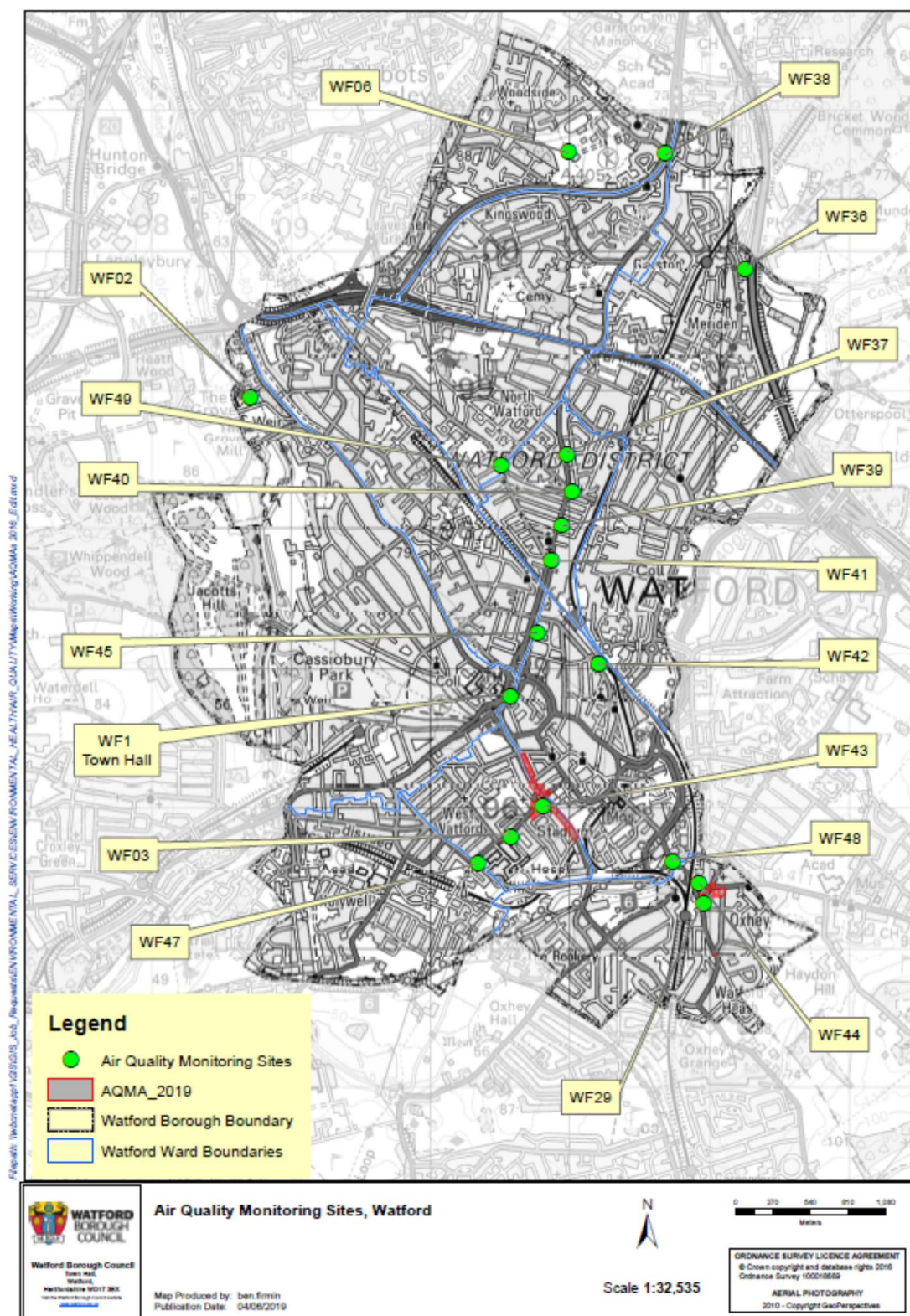


Figure D.2: Map showing Vicarage Road Air Quality Management Area No.2

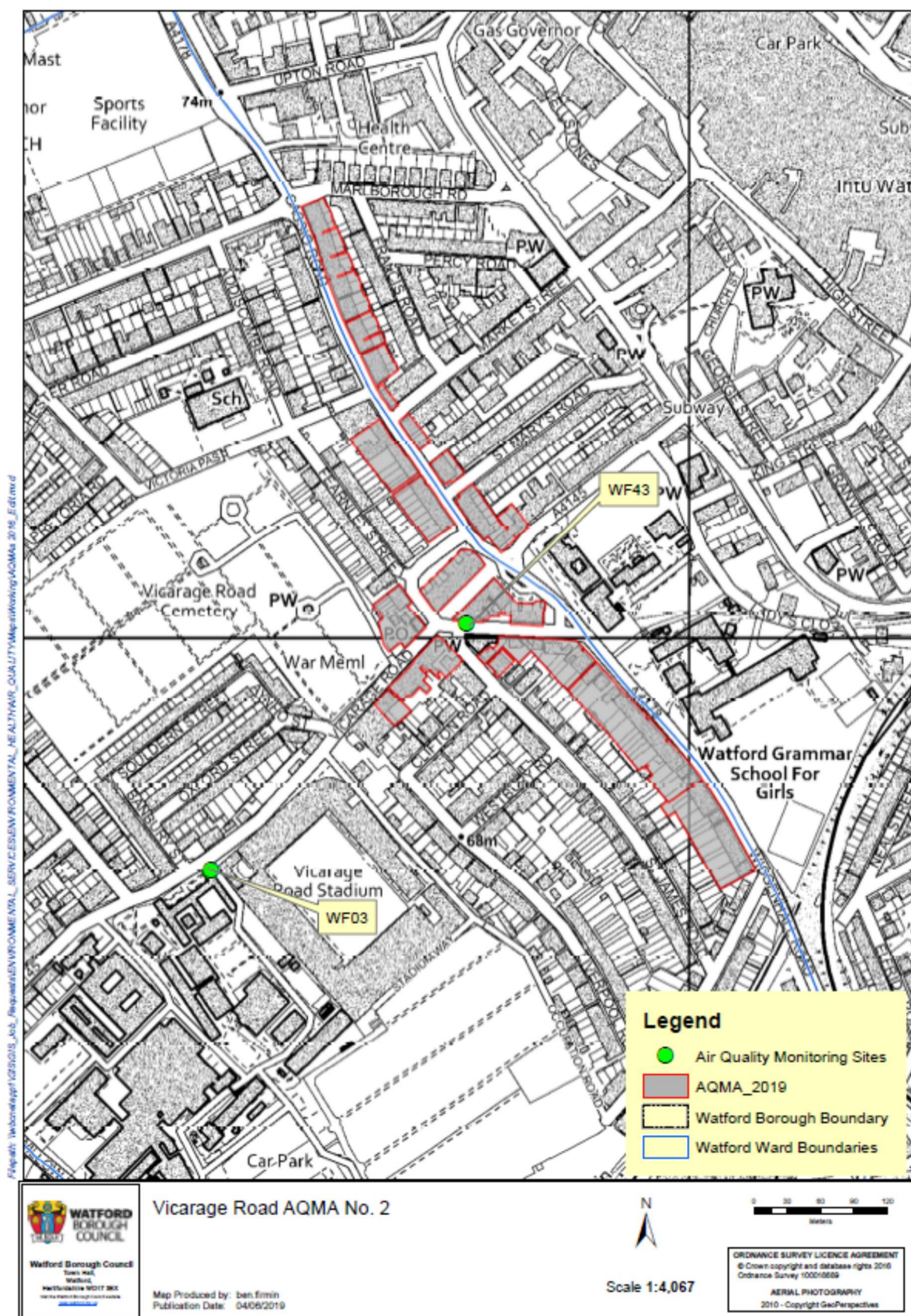
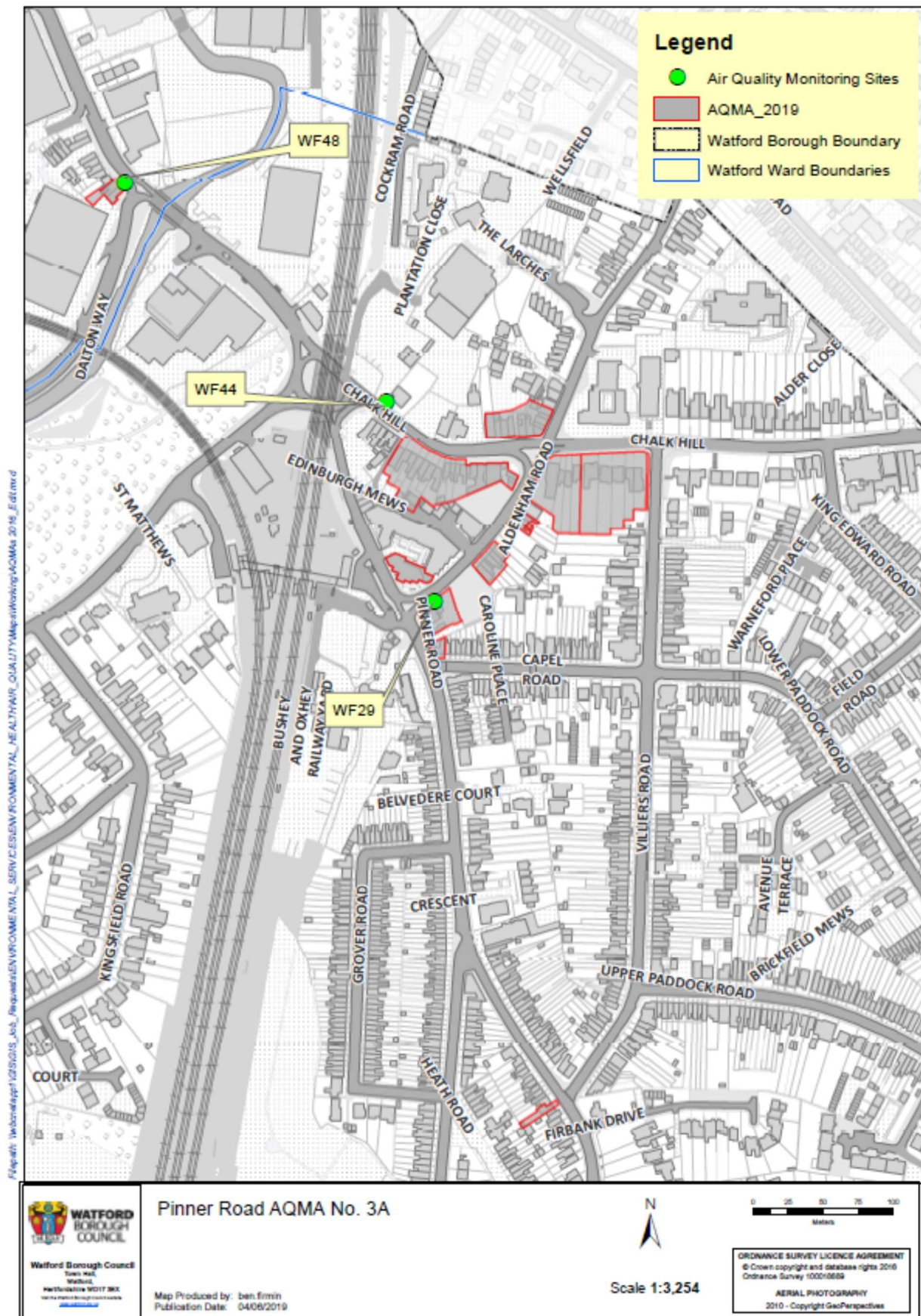


Figure D.3: Map showing Pinner Road Air Quality Management Area No.3A



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁶	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁶ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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	Air quality 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 (micrometres or microns) 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

Conlon, B. (2011) *Watford Borough Council Air Quality Action Plan April 2011*. AEA Group. Report Ref. ED4800001-Issue 1.

Department for Environment, Food & Rural Affairs (2018). *Local Air Quality Management Technical Guidance (TG16)*. London. Her Majesty's Stationary Office.

Firmin, B. (2019) *Watford Borough Council 2019 Air Quality Annual Status Report (ASR)*. Watford Borough Council. Report Ref. WBC/BF/ASR2019_FINAL. Available from: <https://www.airqualityengland.co.uk/local-authority/hnb-reports>.

Hertfordshire Local Authorities Report on Particulate Matter (PM_{2.5}) in Ambient Air in 2018 for Hertfordshire County Council Public Health (2018).

<http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

<https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>