



**WATFORD
BOROUGH
COUNCIL**

2019 Air Quality Annual Status Report (ASR)

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

Date June 2019

Watford Borough Council

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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 a population of around 93,700. 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 (the 'Council') 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.

Watford Riverwell

Following the clean-up of the area around the Watford Health Campus, the opening of the road to Watford Hospital and the completion of Trade City, the Council is now ready to deliver the first homes and create a new community and area. The Council has been working on a new masterplan for Watford Riverwell to ensure that it is 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.

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

Watford Junction

The station - which currently welcomes 8 million visitors every year - will be brought into the 21st century by the Council 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 facade, 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 queues at the ticket barriers, a new bus station for the town and a multi-storey car park for station users.

Western Gateway

As part of the Western Gateway project, which will deliver c.1000 new homes, local retail and additional employment opportunities, The Council is working closely with Hertfordshire County Council (HCC) 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 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

The Council, working closely with local councillors, local businesses, residents and HCC, 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, the Council 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 or and cycling docks

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.

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.

The flexible on-demand bus service runs via an app. Residents will simply book their 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.

It is anticipated that improvements to transport infrastructure, encouragement of sustainable transport and provision of public green space brought about by these projects will help improve air quality within the Borough.

Watford Borough Council has recently completed the following projects:

intu Watford

The £180 million pound extension turned Watford in to a 1.4 million sq. ft. retail, catering and leisure destination and saw the council-owned Charter Place Shopping Centre redeveloped and integrated with the existing refurbished intu Watford shopping centre, placing Watford as one of the top 20 shopping destinations in the UK, alongside Bristol and Edinburgh.

New public spaces for entertainment and events have been created, along with large modern retail units, a restaurant hub, bowling alley and cinema.

Watford High Street Improvements

The High Street improvements – led by the Council in partnership with HCC and Watford BID - were undertaken to provide better access for everyone to fully enjoy the town centre, as well as making it brighter and more spacious by laying attractive new paving, upgrading the bus shelters, banishing unwanted clutter, providing a new dedicated taxi rank just behind the High Street itself and offering new permanent disabled parking bays.

Bollards are now in place to prevent vehicles from illegally driving through the town centre, which has also allowed the bus services to provide smoother and quicker travel for residents and visitors to the town.

Actions to Improve Air Quality

The Council has extended the E-Car Club Scheme, residents now have the opportunity to hire electric cars. Staff and public usage is continuing to increase.

Improvement works have been carried out on the High Street, the project has brought about the prohibition of motor vehicles (except buses and deliveries) and increased cycle movements.

The Council are continuing to install cycling stands across the town. The Council has undertaken tree planting as part of the Public Realm Project.

HCC has undertaken works to improve the contraflow cycle route in the High Street. HCC have also introduced 20mph zones in several areas of the town.

HCC has provided funding to Watford Borough Council's High Street and Clarendon Road Public Realm improvement projects.

HCC is continuing to support sustainable travel, by offering Bikeability cycle training, road safety and active travel promotional activities and campaigns.

HCC is continuing to support and administer the Intalink Partnership.

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 AQMA's. However, there was a decrease in concentrations on Pinner Road, Chalk Hill and Lower High Street in AQMA 3A and on Farraline Road in AQMA 2.

After applying the distance correction, the predicted concentration at receptor was above the AQS objective at only Farraline Road and Chalk Hill.

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. Monitoring of PM_{2.5} to date has shown concentrations to be below the national objective annual mean target of 25 µg/m³.

In 2018, the Council carried out a review of the AQMA's in the Borough, in two AQMA's trends over recent years had shown that NO₂ concentrations were below the national objective for NO₂. The Council has now revoked these AQMA's.

There are two remaining AQMAs within Watford:

- AQMA 2: Vicarage Road.
- AQMA 3A: Pinner Road.

The Council has amended these AQMAs, to include additional properties where exceedances of the NO₂ annual mean objective have been identified.

Further information can be found at:
https://www.watford.gov.uk/info/20010/your_environment/196/local_air_quality

Reviewing the measures described in the Council's Air Quality Action Plan and reviewing the Council's monitoring strategy is a priority for 2019.

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 Borough Council during 2018 and 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 (AQMA) 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 AQMA declared by Watford Borough Council can be found in Table 2.1. Further information related to declared or revoked AQMA, 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 AQMA, 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.

The Council has revoked AQMA 1 and AQMA 5.

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	NO2 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	µg/m3	42	µg/m3	Watford Borough Council Air Quality Action Plan	2011	https://watford.jdi-consult.net/documents/pdfs/5/Air%20Quality%20Action%20Plan%202011.pdf
AQMA 3A Aldenham Road/ Chalk Hill	Declared 01/02/2006, amended 10/04/2019	NO2 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/m3	41.6	µg/m3	Watford Borough Council Air Quality Action Plan	2011	https://watford.jdi-consult.net/documents/pdfs/5/Air%20Quality%20Action%20Plan%202011.pdf

☒ 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 provided to help inform future reports.

1. Table 2.1 does not report concentrations at relevant exposure. Please ensure future reports take note of this and report corrected figures where required. For further guidance please refer to LAQM Technical Guidance 16 (TG16)
2. With the exception of some minor edits in the *Comments/Barriers to Implementation* column of the AQAP it is unclear what progress has been made towards implementing measures (in comparison to 2017's ASR). This space, alongside the *Progress to Date* column, should be used as an opportunity to reflect on and discuss so that the Council have a continually updated record of their efforts. An elaborated discussion should be included in the text body of Section 2.2, with broad progress descriptions included in Table 2.2 (it must be more than open ended phrases and copied text). For further guidance please refer to TG16.
3. Further to the above the report does not provide adequate discussion of the actions that are being taken forward in Section 2.2.
4. The AQAP only has one measure specific to AQMA 1. The AQAP is designed specifically to mitigate emissions within all AQMAs. With the exception of the above, the majority of measures seem to be Borough wide. In line with the above, and the Councils own comments, efforts should be dedicated towards updating the AQAP and accompanying discussion. For further guidance please refer to TG16
5. AQMA-1 has been compliant since 2014, however some sites have fluctuated within the 10% of the AQO margin. Generally there is a downward trend; if results from 2018 data show levels below this threshold for all sites the Council should begin to consider revoking this AQMA. Monitoring should continue in AQMA2/3A until enough years of data has been collected to demonstrate a downward trend and continual compliance. AQMA is currently compliant with AQOs, however has fluctuated over the last 5 years. Similarly, the Council should continue to carry out monitoring in this location until enough years data is collected that can support a revocation.
6. As per last year's comments the maps of monitoring locations are not labelled as referenced in results tables. Please ensure all maps are clearly labelled, with AQMA specific maps including monitoring locations.
7. The report should demonstrate clear links between PM_{2.5} and the Public Health Outcomes Framework. For further guidance please refer to TG16.

8. Further to the above, the Council are encouraged to develop measures targeting the Boroughs PM_{2.5} emissions. For further guidance please refer to TG16.
9. Further to last year's comments the Council are advised to review their monitoring strategy. There are limited monitoring points in AQMAs and across the Borough. The Council should continually explore the area to identify new hotspots. Sites that have recorded continually low concentrations might be redeployed elsewhere in the borough. For further guidance please refer to TG16.
10. In general the report is good, however there are a number of 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. The concentrations in Table 2.1 have been reported at relevant exposure.
2. Table 2.2 has been updated. The Council will be reviewing the measures described in the Air Quality Action Plan (AQAP) in 2019.
3. The Council will be reviewing the measures described in the AQAP in 2019.
4. AQMA 1 has been revoked. As above.
5. In 2018 the Council revoked AQMAs 1 and 5 and amended AQMAs 2 and 3A.
6. This has been addressed, please see Appendix D.
7. This has been addressed.
8. The Council has not developed specific measures targeting the Boroughs PM_{2.5} emissions.
9. We will be reviewing our monitoring strategy in 2019.
10. Noted and actioned.

Watford Borough Council's priorities for the coming year will be to review the measures described in the AQAP and to review the Council's monitoring strategy.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	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	HCC/WBC	Complete	Partially complete	Schemes completed	Ease congestion and reduce emissions	Partially complete	On going	Local Sustainable Transport Fund. 20 Zone west of St. Albans Road planned. New cycle route along St. Albans Road. The congestion study was completed 'some time ago' and signals at two junctions have been adjusted. Some permanent loops are in place so there will be some journey time information. St. Albans Road link road on hold.
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	HCC/WBC	Complete	Complete / on going	Bus and rail patronage, number of cyclists and pedestrians	Reduce private car use and so reduce emissions.	On going	On going	Ongoing promotion. Discussions taking place currently.
3	Watford Junction interchange improvement Increase the accessibility of the rail station	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	HCC/WBC	Complete	Partially complete	Completed scheme	Medium impact.	Partially complete	On going	Forecourt and other work done as part of national station improvement scheme. No start date as yet for major work such as link road.
4	Promotion of car sharing scheme. Increase car sharing to ease congestion	Alternatives to private vehicle use	Car & lift sharing schemes	WBC	Complete	Complete / on going	Registered members on lift share. Number of private schemes	High in the vicinity of the junction	On going	On going	Ongoing promotion through council's commuting officer

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5	Promotion of Travel Plans. Increase in sustainable transport	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	WBC	Complete	Complete / on going	Number of travel plans in schools and businesses	Low	Complete / on going	Complete / on going	Ongoing 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	WBC	On going	On going	Age and Euro standard of Council vehicle fleet	Low	Underway	On going	Corporate procurement policy being developed
7	Promote air quality within the Borough. Increase awareness of AQ as a health issue.	Public Information	Other	WBC	Complete	On going	"Hits" on Herts & Beds Air Quality website	Low	Complete	Complete	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	WBC	Complete	Complete	Number of operational monitors	Low	On going	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	WBC	On going	On going	Not applicable	Low	On going	On going	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	WBC	Complete	Complete	Number of warnings, fines and prosecutions for such offences	Not applicable	On going	Outstanding	Outstanding

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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	HCC/WBC	Complete	Complete	Number of charging points installed	Low	Complete/on going	Complete	None
12	Implement bus strategy. Encourage the increase of bus patronage.	Alternatives to private vehicle use	Other	HCC/WBC	Complete / on going	Complete / on going	Bus patronage	Low	Complete / on going	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	WBC	Complete	Complete	Uptake numbers.	Medium	Complete / on going	Complete / on-going	Travelsmart continues to be promoted.
14	Promotion of cycling and walking. Increase sustainable transport.	Promoting Travel Alternatives	Promotion of walking	WBC/HCC	Complete	Complete	Number of cyclists and pedestrians	Low	Complete / on going	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	WBC	On going	On going	Publication of SPD; Number of planning applications made using the guidance.	Low	On going	On going	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.

The Council's AQAP identified the role of traffic in the Borough's air quality problems and set out a range of transport-focussed measures that could help improve air quality. In total, 21 options were considered. Some of these were based on measures already under consideration, and were drawn from existing plans and policies. Additional options were suggested to complement planned and ongoing activity. Of these options 16 were moved forward as measures for implementation or further feasibility study.

The objective of the AQAP is to improve air quality at the Watford AQMAs to work towards meeting the national air quality objective for the protection of human health.

Measure 4. Promotion of car sharing scheme - E-Car Club Scheme

In February 2019, as part of its commitment to support green transport, the Council in partnership with E-Car Club, offered residents the opportunity to hire electric cars. The Council has an operated a pool car scheme for members of staff for some years.

WDC Usage Report April 2019 - Summary

April was a record breaking month for the staff side of the scheme. Public usage continued to perform strongly but was affected by the non-subscription vehicle being unavailable in April.

There is currently 75 staff members registered on the pool car scheme. A record 21 staff made a record 50 bookings in April. An increase of six and five respectively. Staff travelled a record 1030 zero carbon miles this month, an increase of 485 miles from the previous record. This month saw staff members book the vehicles for 108 hours during subscription hours and 22.75 hours outside subscription hours.

Utilisation was 27% over the two vehicles, an increase of 8.6% from March.

The number of public bookings was 20 this month which covered 1034 miles. This is a fall on last month but can be explained by the non-sub vehicle being unavailable. A new vehicle will be returning shortly.

Watford High Street Improvements

The High Street improvements were led by the Council's Transport and Infrastructure Section in partnership with HCC and Watford BID – were undertaken to provide better access for everyone to fully enjoy the town centre, as well as making it brighter and more spacious by laying attractive new paving, upgrading the bus shelters, banishing unwanted clutter, providing a new dedicated taxi rank just behind the High Street itself and offering new permanent disabled parking bays.

Technical Note - Watford Town Centre – Summary of Traffic Surveys prepared by Project Centre on behalf of WDC (Document Ref. 100005201/TS/JB/01, dated 17 December 2018).

Watford Town Centre underwent a period of investment and development with over £180m spent on extending the existing INTU shopping centre to create 1.4 million square feet of retail and leisure space to attract people from a wider areas to shop there, and to encourage them to stay longer. The development included additional shops, more restaurants, and leisure facilities including a nine screen IMAX Cineworld.

Project Centre was commissioned to undertake a Traffic Study in February 2017 along Clarendon Road between the A411 and the High Street, and High Street between Clarendon Road and King Street to identify potential short and longer-term measures for improvement in the area. The work included a review of traffic movements through the High Street.

Project Centre were subsequently commissioned to undertake a review of traffic movements along High Street following completion of the works (completed at the end of August 2018), which included a bus gate to enforce the prohibition of motor vehicles (except buses and deliveries). In addition, an assessment of cycle movement was also requested in order to determine if there has been any increase in cycling since completion of the scheme.

The survey data indicates that there has been a clear reduction in motor vehicles along the High Street following implementation of the scheme. This confirms that the provision of the bus gate has been effective in reducing abuse of the prohibition.

Whilst there is no direct comparison for cyclists flows between the lower and upper sections of the High Street before and after implementation; surveys undertaken after the scheme was completed indicate that there are significant movements.

Reduced traffic flows may encourage cycling in the High Street. Therefore it is recommended that further video surveys are undertaken at the junction, once the scheme has been in place for a minimum of 6 months to determine if there has been any increase in cycling.

It is considered likely that these improvements will have also helped improve air quality in the High Street.

The Council are continuing to install cycling stands across the town. In addition to those the Council has put in as part of the Public Real scheme (the Council and intu have provided around 60 parking opportunities for cyclists) the Council has 5 more stands to go in the high street by Halifax Building Society (making 10 spaces for cycle parking) and the Council plans to install 17 at the Met Station providing parking for up to 34 more cycles.

Clarendon Road Phase 2 Project is almost complete. The Council has removed 4 trees and in their place we put back in 4 new trees and provided a further 6 trees in planters.

For the High Street Public Realm Project, the Council took 3 trees out and planted 6 and also put in 2 more in Church Street by the new blue badge bays. So a net gain of 5 trees.

Improvements to the area are likely to increase pedestrian and cycle usage. It is considered likely that these incremental improvements will help improve air quality in these areas.

HCC's Highways Service delivers a programme of transport improvement projects focusing on improving sustainable transport in the county – this is called the Integrated Transport Programme. The following schemes were in the delivery programme for 2018/19 in Watford:

- . Watford High Street ongoing works to improve the contraflow cycle route – including the installation of segregating wands to prevent vehicle parking and protect people cycling in that lane;
- . 20 mph zones completed covering the Nascot Wood Road area, north of Langley Road area, Greenbank Road area, Sandringham Road area and Bradshaw Road area. These schemes were started earlier in 2017/18.

HCC also provided funding contributions to Watford Borough Council's High Street and Clarendon Road urban realm improvement projects, the main of which was delivered in 2018.

Measure 14 (Promotion of cycling and walking. Increase sustainable transport)

Programmes delivered by HCC's Active & Safer Travel Team, which support sustainable travel, mode shift and the air quality agenda include:

- Bikeability cycle training;
- Road safety and active travel promotional activities and campaigns.

Measure 3 (Implement the intalink project Increase the integration of public and sustainable transport movements)

HCC also supports and administers the Intalink Partnership of Hertfordshire bus and passenger transport operators and local authorities. HCC are currently considering the introduction of an enhanced partnership plan and scheme. The aim of this will be to have more control over the service providers and will also incentivise fleet modernisation. The plan will also be to introduce ANPR data, real time timetabling data, mobile apps etc to enable a better customer experience, which should help increase the number of passengers using the service.

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.

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

- Partnership working with Hertfordshire County Council's Public Health Service;
- Interdepartmental working with both Council's Transport and Planning Departments;
- Continued maintenance of FIDAS monitor and measurement of PM_{2.5}.

The Council has not identified any measures targeted specifically at reducing PM_{2.5}. 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;
- Improvements in the High Street are likely to reduce exposure in areas of high pedestrian footfall.

Smoke Control Areas

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

The Environmental Health Department operates a Duty EHO rota, this enables the Council to respond quickly to complaints regarding smoke..

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 2018. 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 2018. 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 bias, “annualisation” and distance correction. 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.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B. There appears to be an anomalous result for WF36 in May ($1.9\mu\text{g}/\text{m}^3$). 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 67%, removal of the anomalous result from the data set reduced valid data capture to 58%, the calculated annual average was then annualised.

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 AQMA's. However, there was a decrease in concentrations on Pinner Road ($39\mu\text{g}/\text{m}^3$), Chalk Hill ($51\mu\text{g}/\text{m}^3$) and Lower High Street ($42\mu\text{g}/\text{m}^3$) in AQMA 3A and on Farraline Road ($53\mu\text{g}/\text{m}^3$) in AQMA 2.

Figures A.4, A.5 and A.6 show a trend of decreasing concentrations in AQMA 3A. Figure A.3 shows that concentrations have fluctuated in AQMA 2 over the last 5 years, with a decrease in concentrations in 2018.

After applying the distance correction, the predicted concentration at receptor was above the AQS objective at only Farraline Road ($42\mu\text{g}/\text{m}^3$) and Chalk Hill ($42\mu\text{g}/\text{m}^3$).

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 ($32\mu\text{g}/\text{m}^3$) and there were no exceedences of the 1-hour mean objective (as measured at the Council's automatic monitoring site). Figure A.2 shows a trend of decreasing annual mean concentrations over the last 5 years.

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

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.7 and A.8 show a trend of decreasing annual mean and daily mean concentrations.

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.

Monitoring of PM_{2.5} to date has shown that the concentration is below the national objective annual mean target of 25 µg/m³. Figure A.9 shows that concentrations have fluctuated over the last 4 years, with decreasing concentrations observed in the last 2 years.

3.2.4 Sulphur Dioxide (SO₂)

Table A.8 in Appendix A compares the ratified continuous monitored SO₂ concentrations for 2018 with the air quality objectives for SO₂.

The Council does not currently monitor SO₂.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	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	Chemiluminescent,TEOM (oscillatingmicrobalance) and FIDAS (Optical)	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.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with Continuous Analyser? ^a	Height (m)
WF02	Grove Pumping Station	Urban Background	508700	198950	NO2	NO	N	N/A	NO	2
WF03	Hospital	Kerbside	510570	195800	NO2	NO	N	4m	NO	2.4
WF06	Woodside Playing Fields	Urban Background	510985	200710	NO2	NO	N	N/A	NO	3
WF29	Pinner Road	Kerbside	511940	195320	NO2	AQMA3A	Y – 6m	2m	NO	2.1
WF36	Ravenscroft	Industrial	512240	199910	NO2	NO	Y – 8m	N/A	NO	2.2
WF37	358, St. Albans Road	Kerbside	510970	198535	NO2	NO	Y – 5m	1m	NO	2.4
WF38	A405 / Horseshoe Lane	Kerbside	511680	200700	NO2	NO	Y – 2m	4m	NO	3
WF39	Balmoral Road	Kerbside	511000	198270	NO2	NO	N	1m	NO	2.4
WF40	Salisbury Road	Kerbside	510930	198000	NO2	NO	N	2m	NO	2.4
WF41	Leavesden Road	Kerbside	510850	197780	NO2	NO	N	1m	NO	2.5
WF42	Queens Road	Kerbside	511160	197000	NO2	NO	Y – 4m	1m	NO	2.4
WF43	Farraline Road	Kerbside	510800	196020	NO2	AQMA2	Y – 4m	2m	NO	2.4
WF44	Chalk Hill	Kerbside	511920	195450	NO2	AQMA3A	Y – 6m	2m	NO	2.1

WF45	Wellington Road	Kerbside	510750	197230	NO2	NO	Y-10m	4m	NO	2.3
WF46	Town Hall	Roadside	510565	196800	NO2	NO	N	6m	YES	2
WF47	Willow Lane	Kerbside	510335	195610	NO2	NO	Y - 3m	1m	NO	2.4
WF48	Lower High Street	Kerbside	511725	195619	NO2	NO	Y - 4m	1m	NO	2.4
WF49	Gammons Lane	Kerbside	510499	198454	NO2	NO	Y - 5m	1m	NO	2.4
WF50	Eastbury Road (Oxhey Early Years)	Kerbside	511057	194895	NO2	NO	N	2.7m	NO	2.9

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
WF02	Urban Background	Diffusion Tube	75%	75%	16	15.4	18.7	15.9	16
WF03	Kerbside	Diffusion Tube	92%	92%	33	34.8	35.5	32.7	31
WF06	Urban Background	Diffusion Tube	92%	92%	20	18.9	19.6	20.0	18
WF29	Kerbside	Diffusion Tube	100%	100%	49	48.2	49.4	40.4	39
WF36	Urban Centre	Diffusion Tube	58%	58%	30	25.4	26	26.6	27
WF37	Kerbside	Diffusion Tube	100%	100%	36	31.8	38	34.2	32
WF38	Kerbside	Diffusion Tube	100%	100%	39	40.9	41.7	34.3	33
WF39	Kerbside	Diffusion Tube	92%	92%	37	36.3	38.1	33.9	30
WF40	Kerbside	Diffusion Tube	75%	75%	35	33.1	36.5	33.5	33
WF41	Kerbside	Diffusion Tube	100%	100%	36	32.2	37.6	37.4	34
WF42	Kerbside	Diffusion Tube	92%	92%	32	31.7	31	31.1	27
WF43	Kerbside	Diffusion Tube	83%	83%	46	44.8	49.5	52.7	51
WF44	Kerbside	Diffusion Tube	100	100	<u>80</u>	<u>70.7</u>	<u>73.6</u>	<u>61.6</u>	53
WF45	Kerbside	Diffusion Tube	100	100	33	31.6	34.9	37.1	33

WF46	Roadside	Diffusion Tube	100	100	33	32	31.7	30.2	27
WF47	Kerbside	Diffusion Tube	92	92	32	29.6	30.7	28.8	27
WF48	Kerbside	Diffusion Tube	100	100	42	44.5	50.6	46.5	42
WF49	Kerbside	Diffusion Tube	92	92	-	-	26.8	35.0	33
WF50	Kerbside	Diffusion Tube	83	83	-	-	57	34.4	32
Watford Town Hall	Roadside	Automatic	88.39%	88.39%	40	35	36	34	32

☒ Diffusion tube data has been bias corrected

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

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.

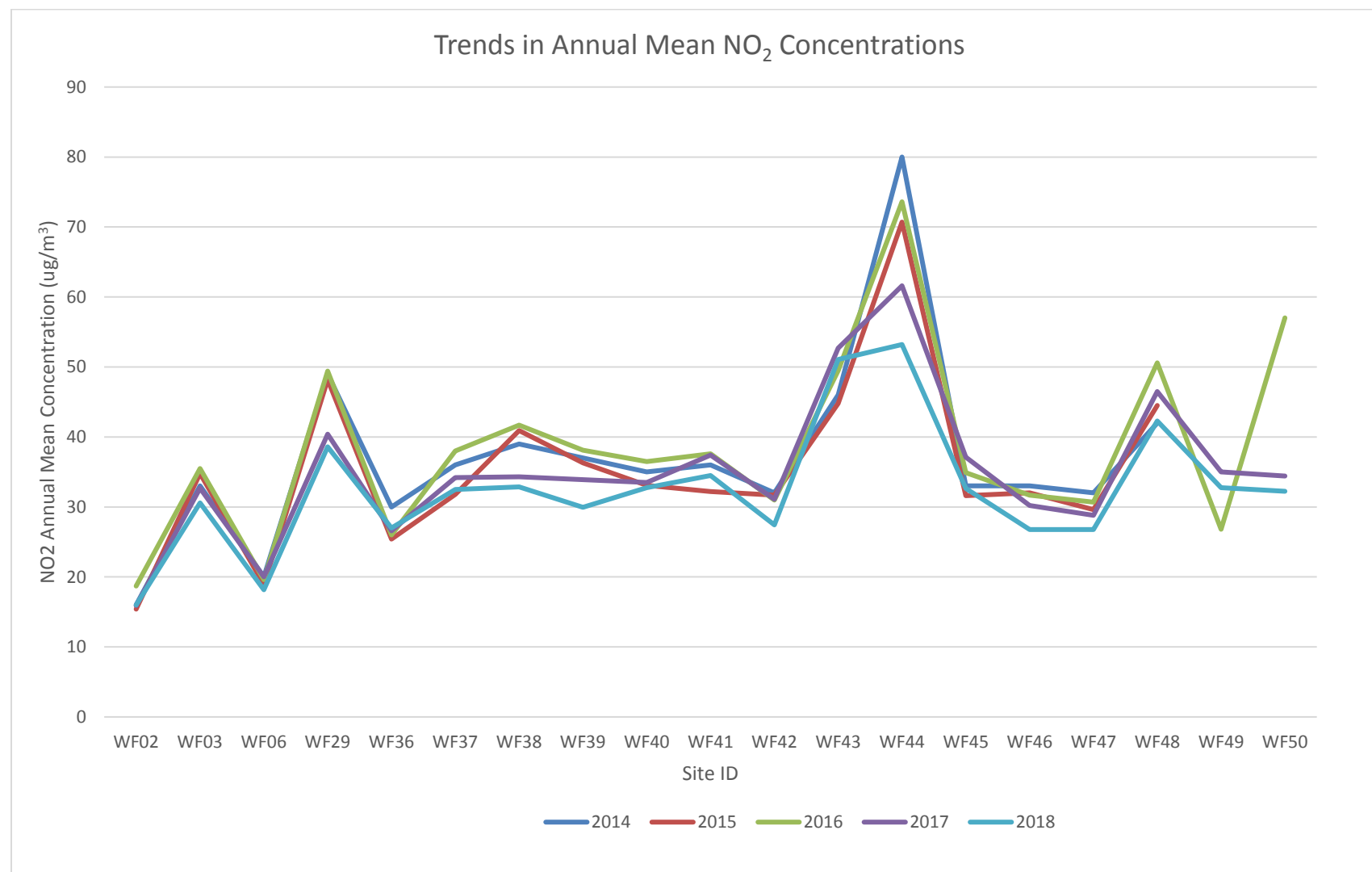
Figure A.1 – Trends in Annual Mean NO₂ Concentrations

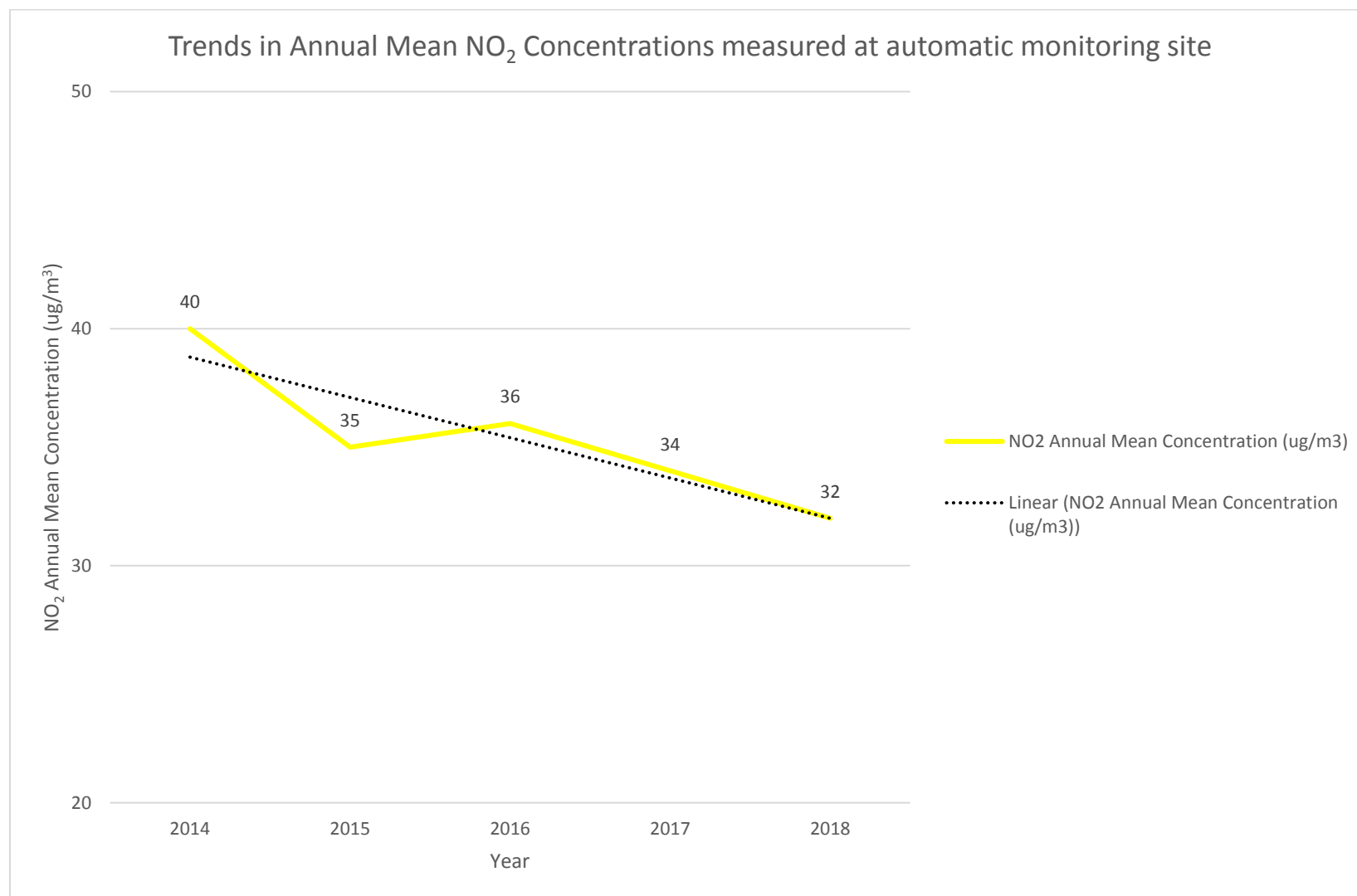
Figure A.2 – Trends in Annual Mean NO₂ Concentrations measured at automatic monitoring site

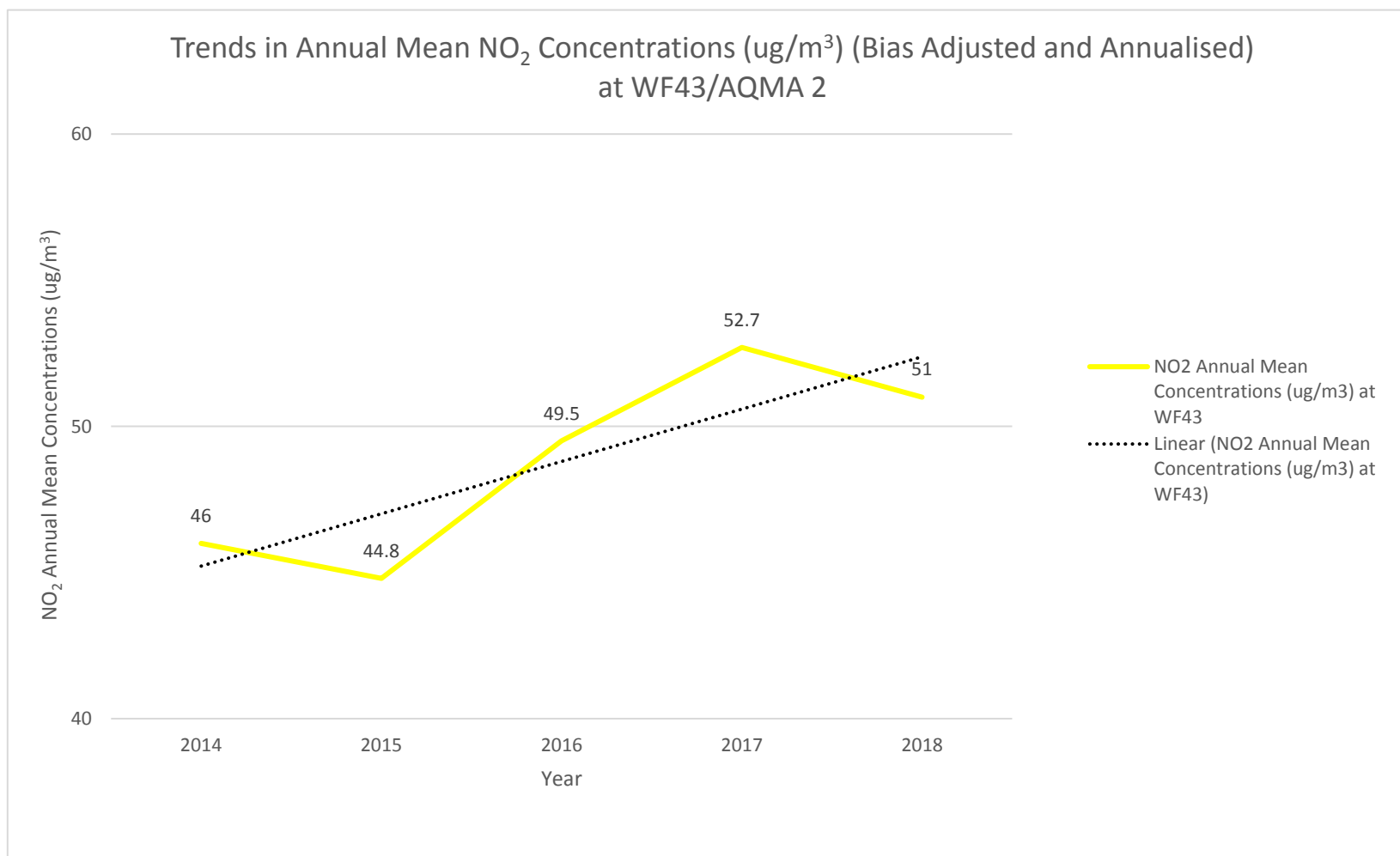
Figure A.3 – Trends in Annual Mean NO₂ Concentrations (ug/m³) (Bias Adjusted and Annualised) at WF43/AQMA 2

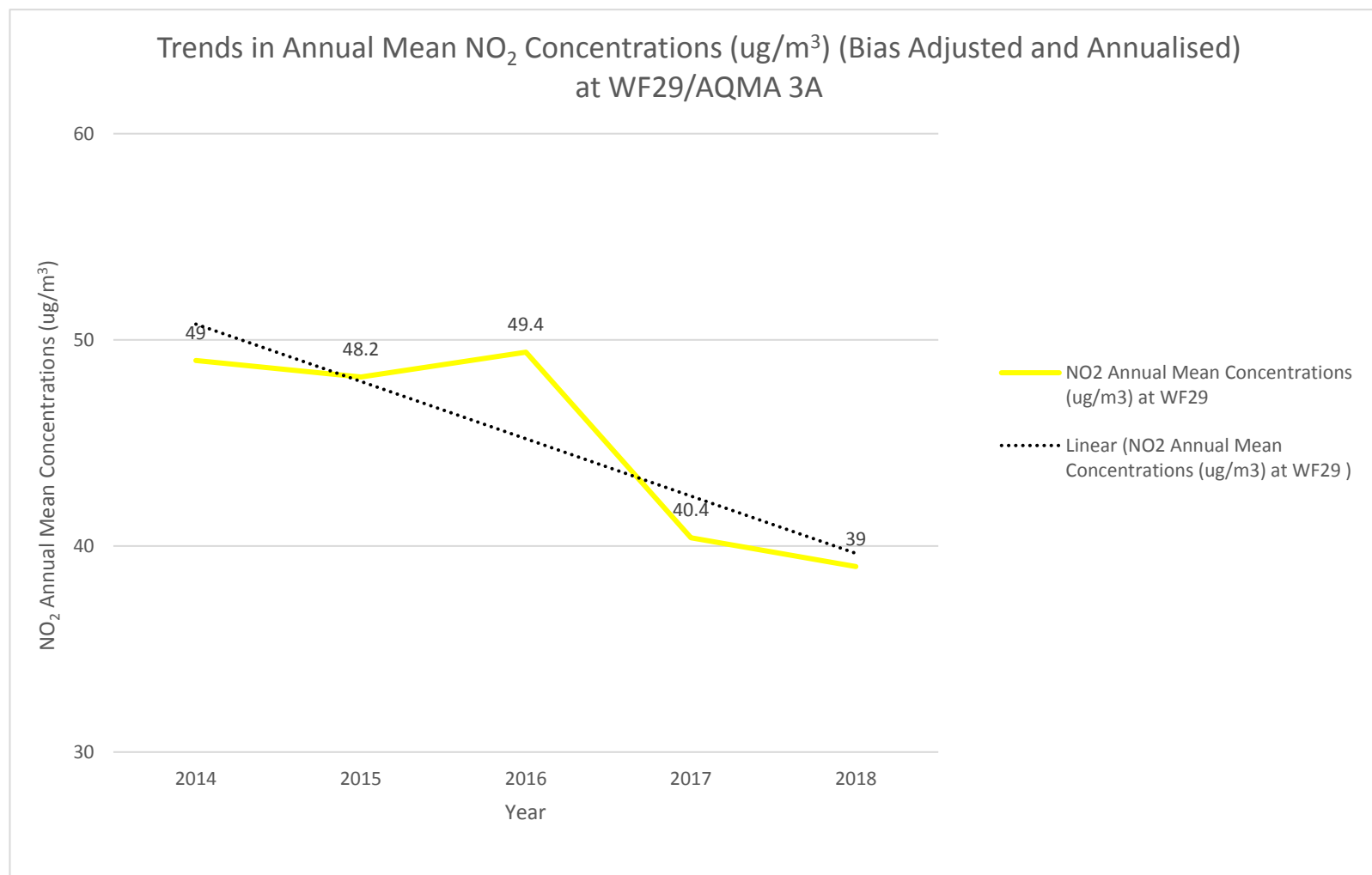
Figure A.4 – Trends in Annual Mean NO₂ Concentrations (ug/m³) (Bias Adjusted and Annualised) at WF29/AQMA 3A

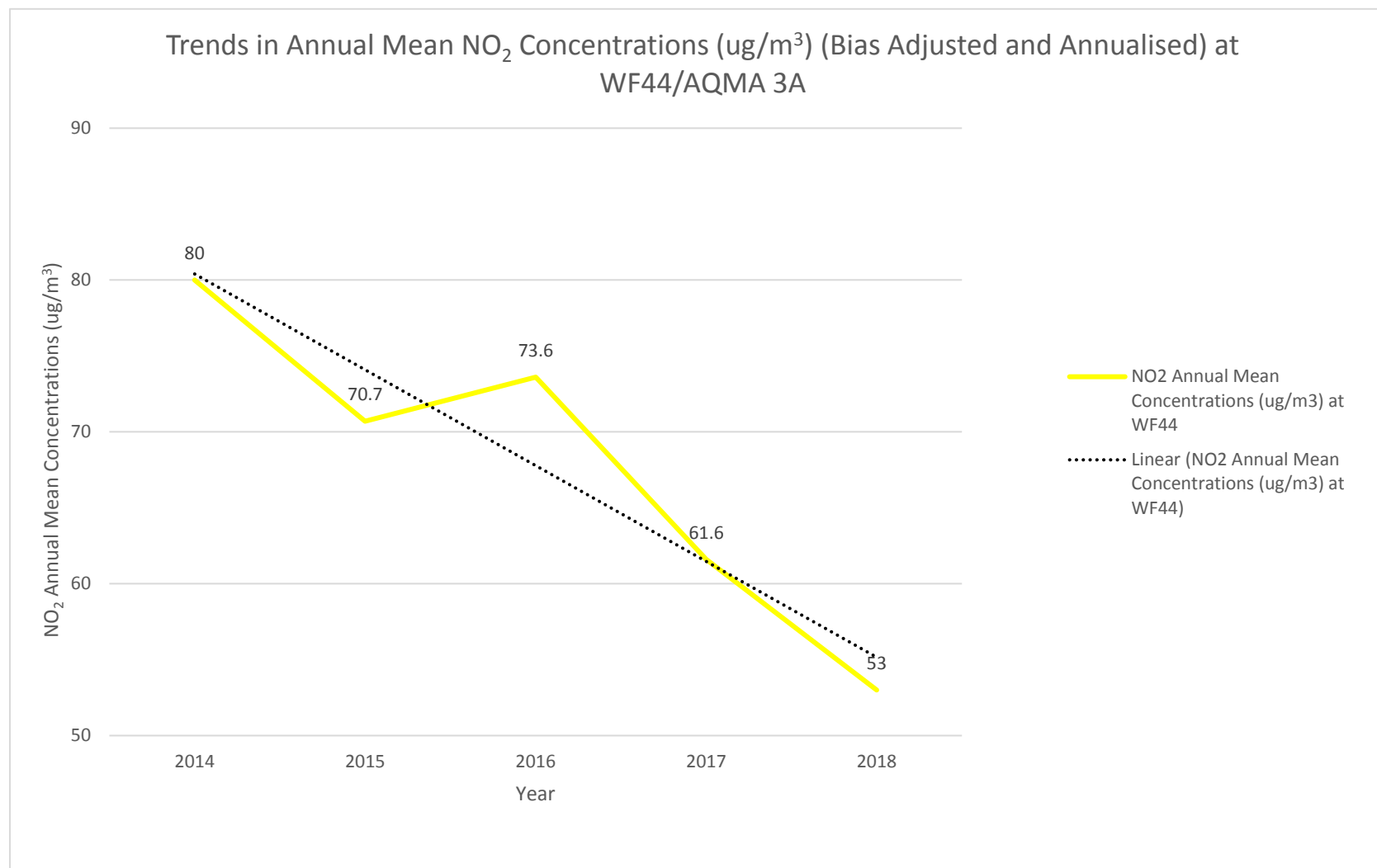
Figure A.5 – Trends in Annual Mean NO₂ Concentrations (ug/m³) (Bias Adjusted and Annualised) at WF44/AQMA 3A

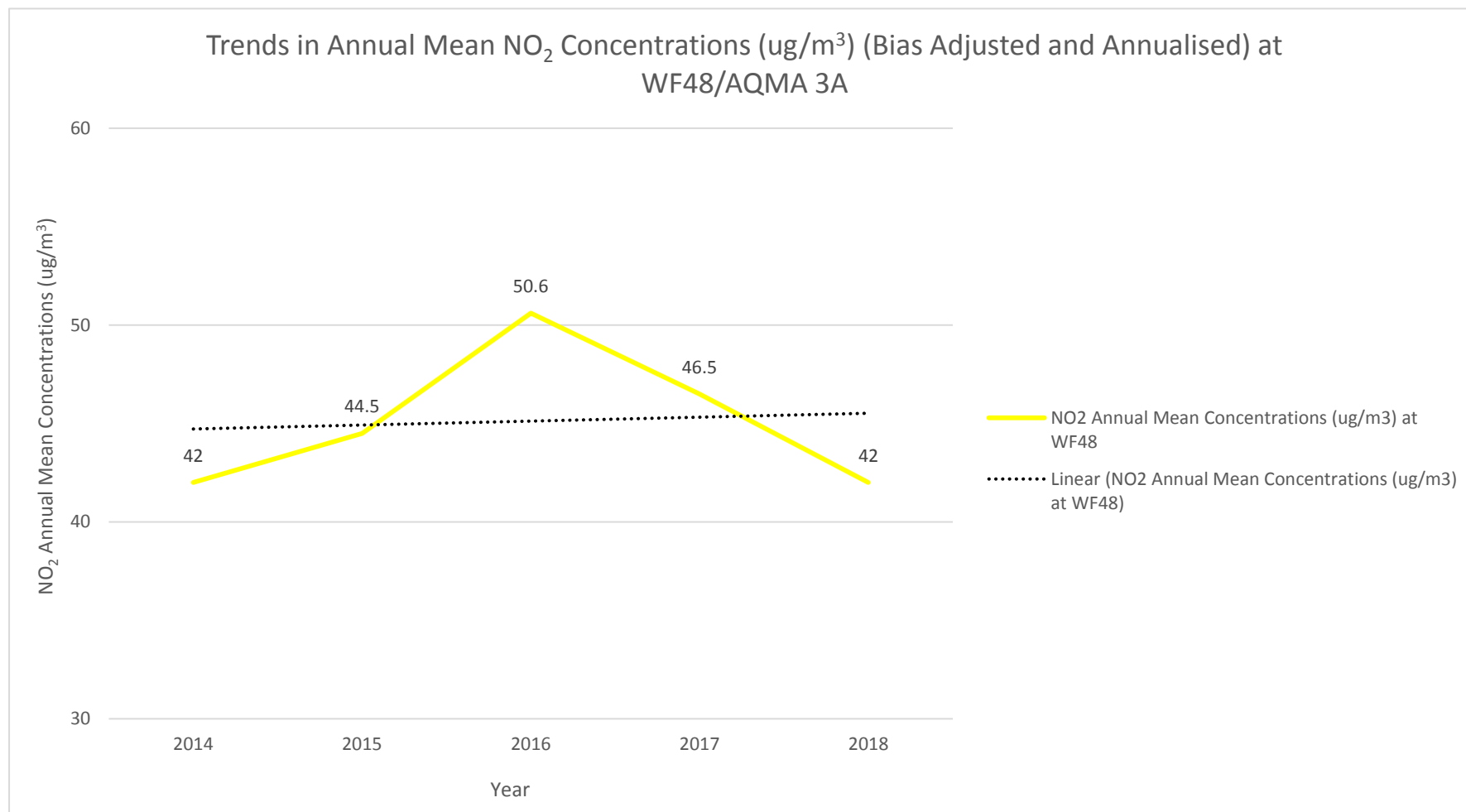
Figure A.6 – Trends in Annual Mean NO₂ Concentrations (ug/m³) (Bias Adjusted and Annualised) at WF48/AQMA 3A

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2014	2015	2016	2017	2018
Watford Town Hall	Roadside	Automatic	98.39%	98.39%	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 PM10 Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2014	2015	2016	2017	2018
Watford Town Hall	Roadside	99.94%	99.94%	21	22	14	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.7 – Trends in Annual Mean PM₁₀ Concentrations

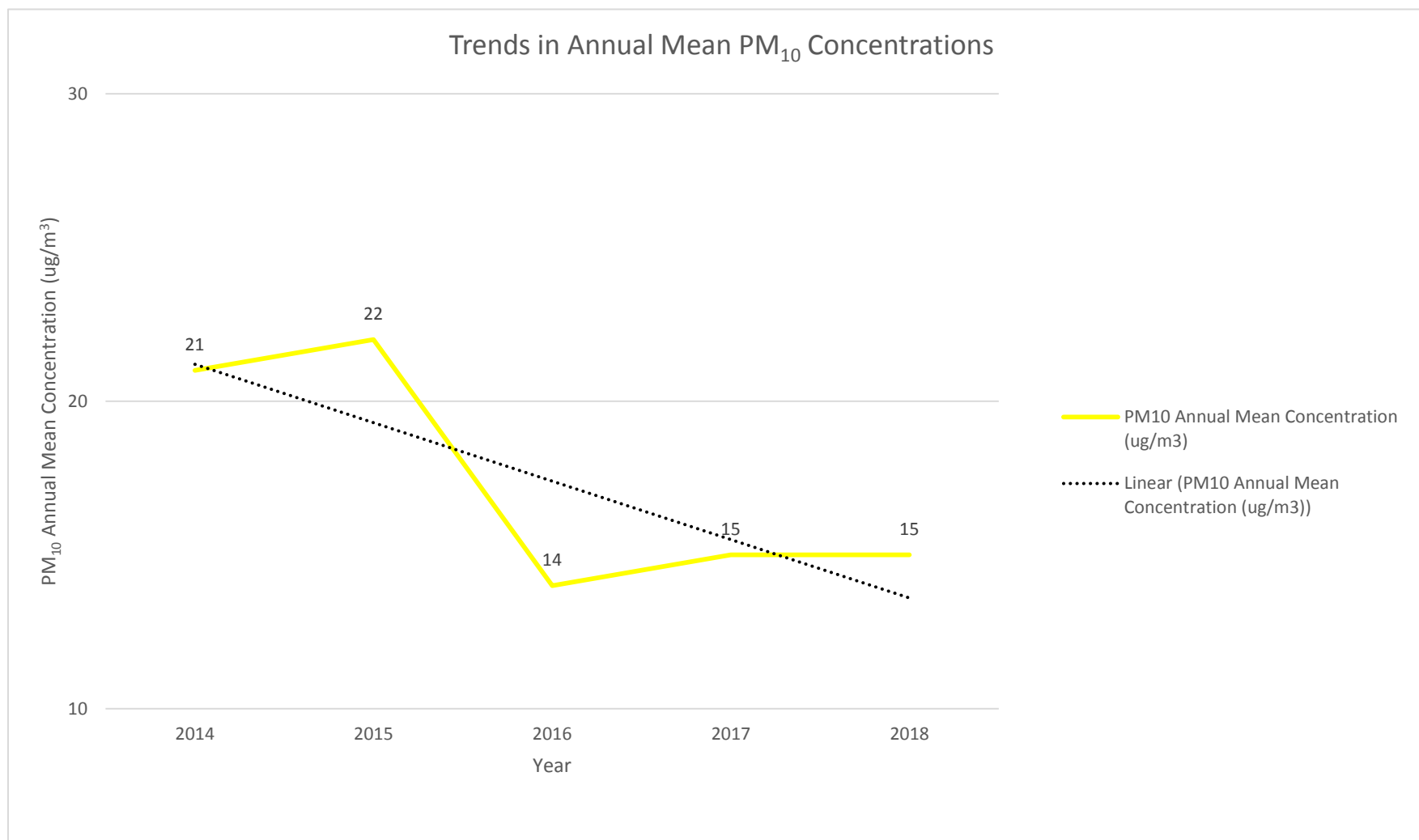


Table A.5 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
				2014	2015	2016	2017	2018
Watford Town Hall	Roadside	99.94%	99.94%	6	5	1	3	1

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.

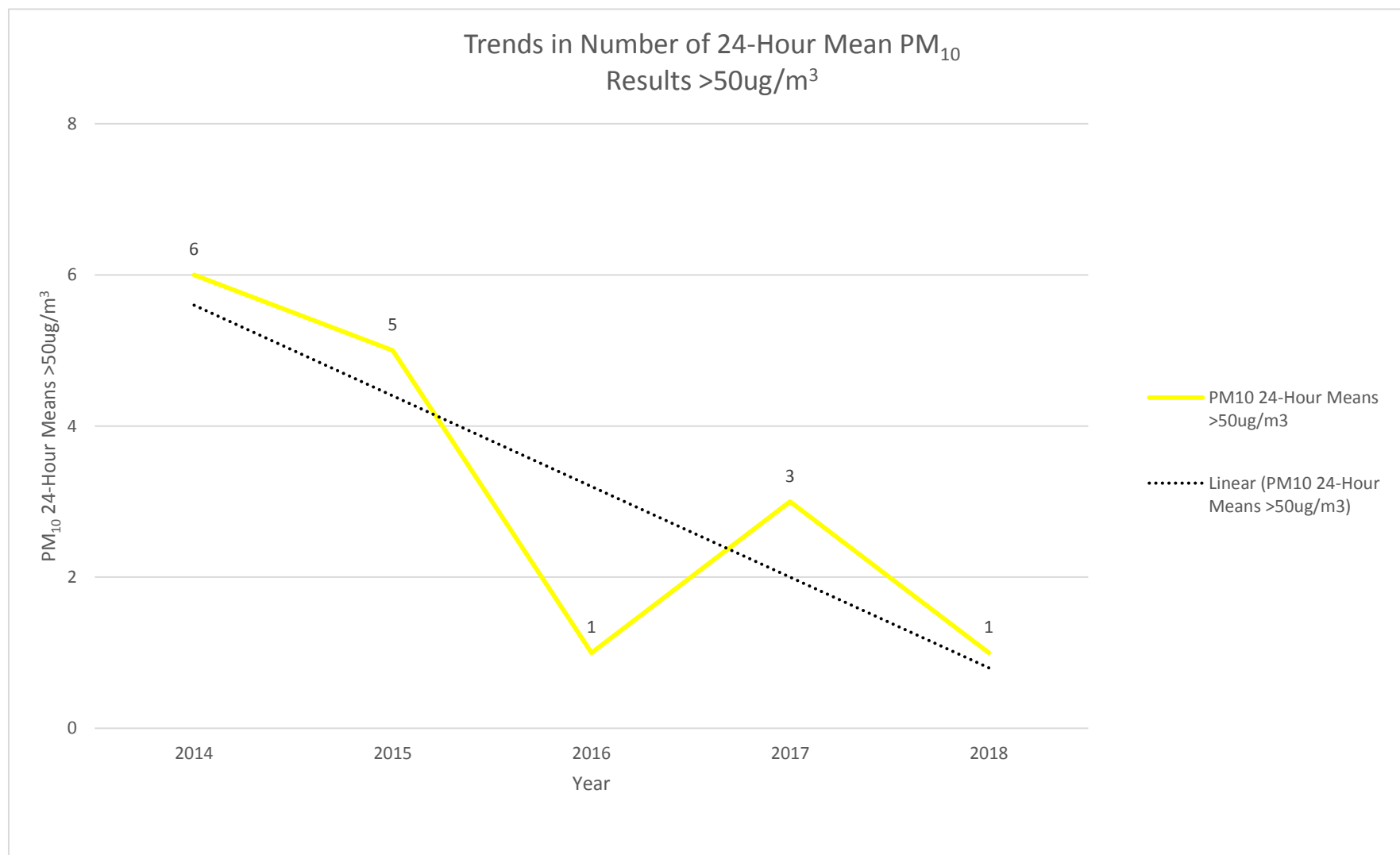
Figure A.8 – Trends in Number of 24-Hour Mean PM₁₀ Results >50µg/m³

Table A.6 – PM_{2.5} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM _{2.5} Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2014	2015	2016	2017	2018
Watford Town Hall	Roadside	99.94%	99.94%		10	14	10	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.

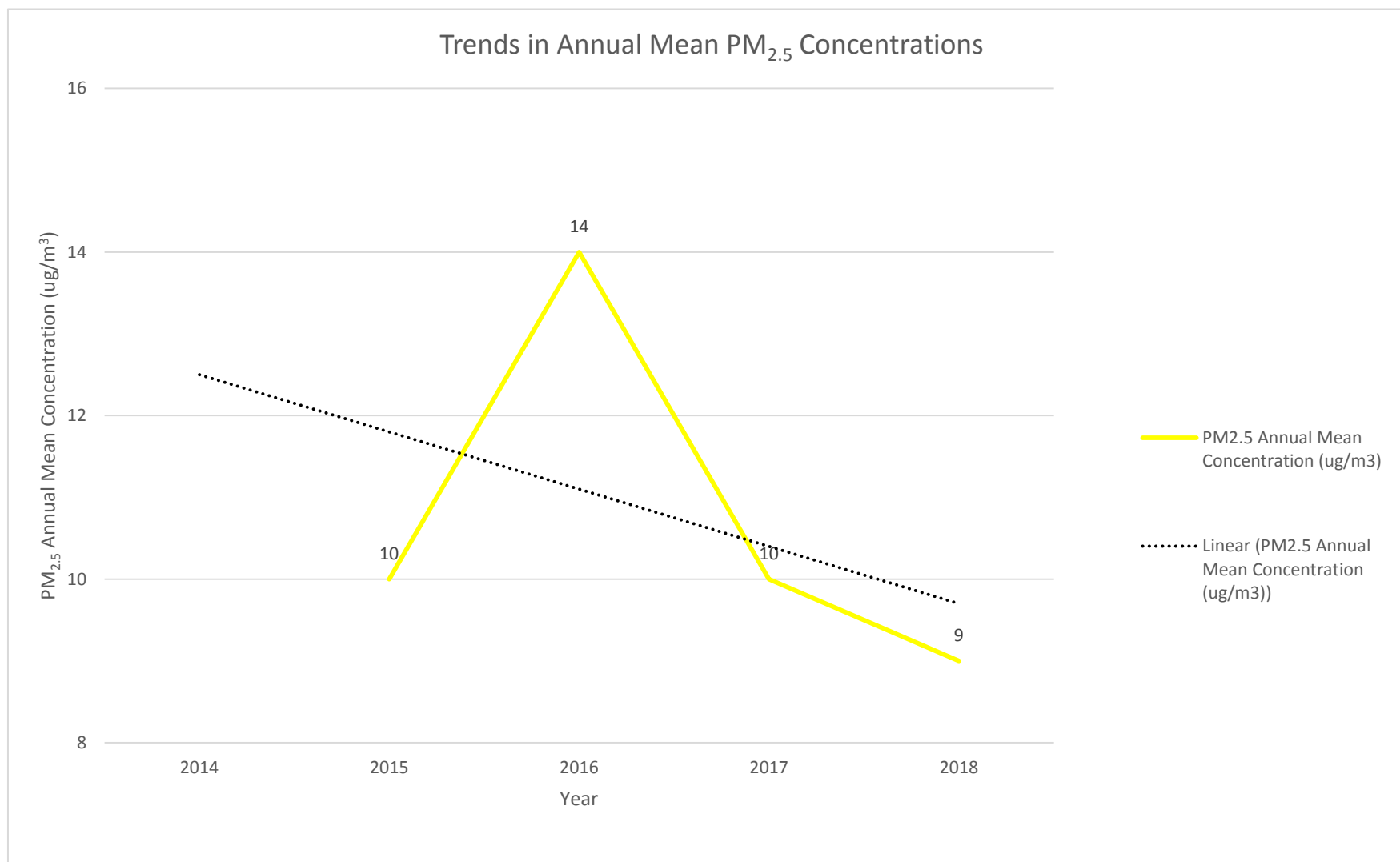
Figure A.9 – Trends in Annual Mean PM_{2.5} Concentrations

Table A.9 – SO₂ Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	Number of Exceedances 2018 (percentile in bracket) ⁽³⁾		
				15-minute Objective (266 µg/m ³)	1-hour Objective (350 µg/m ³)	24-hour Objective (125 µg/m ³)
-	-	-	-	-	-	-

Notes:

Exceedances of the SO₂ objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

(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 relevant percentiles are provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2018

Site ID	NO ₂ Mean Concentrations (µg/m³)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.76) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
WF02	22.1	25.2	25.5	MISSING	MISSING	13.1	18.7	14.3	MISSING	21.5	24.4	24.6	21	16	
WF03	MISSING	38.1	44.1	43.5	40	33.3	41.5	36.5	36.6	42.1	41.7	45.1	40	31	
WF06	30.7	30.8	26.6	23.2	MISSING	13.5	16.5	18.4	20.8	22.6	32.7	27.3	24	18	
WF29	43.4	66.3	54.4	52.2	51.6	47.6	50.4	40.7	46	51.4	54	51.2	51	39	32
WF36	33.3	MISSING	MISSING	28	ANNOMALOUS RESULT	63	30.5	MISSING	MISSING	33	37.4	29.9	36	27	
WF37	46.8	49.7	51.7	45.7	47.3	35.8	39.4	31.6	34	39.9	42	49.2	43	32	
WF38	44.7	41.7	48.4	47.8	44.2	37.5	39.5	35.1	38.5	43.3	51.4	46.6	43	33	
WF39	46.6	46.3	46.7	MISSING	15.1	32.8	45.6	32.9	33.4	41.6	46.6	45.8	39	30	
WF40	49.2	57.9	51	45.4	MISSING	34.2	35.9	32.8	35	46.3	MISSING	MISSING	43	33	
WF41	48.4	56.4	48.9	47.9	47.4	38.7	48	20.8	31.3	45.1	59.8	51.9	45	34	
WF42	MISSING	42.3	39.4	34.1	33.3	26.4	24.2	29.8	38.3	39.1	47.3	43	36	27	
WF43	62	70.3	62.2	56	79.5	69.1	76.5	64.1	MISSING	69.4	MISSING	63	67	51	42
WF44	77.3	72	79	71.6	85.5	67.3	79.7	60.2	63.2	79.1	68.4	36.8	70	53	42
WF45	40.5	45.5	45.6	46.9	41.6	30.3	41.9	38.9	41.1	50.2	50	42.8	43	33	
WF46	38.8	46	40.7	32	21.3	26.7	32.9	32	33.8	39.8	40.5	38.5	35	27	

Watford Borough Council

WF47	MISSING	45.1	32.4	38.6	35.8	34.3	32	29.2	31	35.4	39.7	33.8	35	27	
WF48	58.7	59.4	62.9	60.7	50.1	37.3	54.2	49.6	51.1	55.8	61.7	66.2	56	42	34
WF49	50.4	47.3	49.6	44.3	MISSING	32.7	40.2	36.7	34.1	43.5	50.6	44.9	43	33	
WF50	45.9	49.8	43	47	36.6	28.1	Missing	MISSING	33.8	36.6	52.6	50.8	42	32	

☐ 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

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 PM2.5:

<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 Pollution Monitoring Network website;

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

Since December 2014 servicing and maintenance had been overseen by Envirotechnology. Periodic calibration (LSO) of the equipment is overseen by Kings College London.

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 2018:

AIR PT AR024 January - February 2018;
AIR PT AR025 April – May 2018;
AIR PT AR027 July-August 2018;
AIR PT AR028 September-October 2018.

100% of results submitted were determined to be satisfactory.

Bias adjustment

A national bias adjustment factor was used. The national bias adjustment factor for 2018 is 0.76.

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 March 2019 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 2018 the valid data capture for one diffusion tube (WF36) was below 75%. Therefore the calculated annual average was annualised according to the method outlined in boxes 7.9 and 7.10 in LAQM TG16. Data from a background monitoring site with more than 85% data capture is required for this calculation. A site known as Hillingdon UKA00266 was chosen from Defra's Automatic Urban Rural Network (AURN) of monitoring stations. This site was chosen as it was the nearest background site that had sufficient data capture. The calculated ratio is then used to adjust the calculated annual mean before it is bias adjusted. Further details on the Hillingdon monitoring site can be seen below.

Hillingdon UKA00266 monitoring station

The monitoring station is within a self-contained, air-conditioned housing located on an open grass area approximately 2.5 metres from the kerb of a residential road. The site is bordered on three sides by residential roads and on the fourth by the busy M4 motorway, which is approximately 30 metres from the station and above the height of the inlet. The general area is open and protected from the M4 by trees.

WF36:

Month	Start Date	End Date	B1	D1	B1 when D1 is available
Jan	03 January 2018	31 January 2018	54	33.3	54
Feb	31 January 2018	28 February 2018	49		
Mar	28 February 2018	28 March 2018	55		
Apr	28 March 2018	02 May 2018	56	28	56
May	02 May 2018	06 June 2018	41	1.9	41
Jun	06 June 2018	04 July 2018	31	63	31
Jul	04 July 2018	01 August 2018	47	30.5	47
Aug	01 August 2018	05 September 2018	42		
Sept	05 September 2018	03 October 2018	42		
Oct	03 October 2018	31 October 2018	54	33	54
Nov	31 October 2018	05 December 2018	55	37.4	55
Dec	05 December 2018	09 January 2019	49	29.9	49
Average			48		48
Ratio					0.99

WF36 - following removal of anomalous result for May:

Month	Start Date	End Date	B1	D1	B1 when D1 is available
Jan	03 January 2018	31 January 2018	54	33.3	54
Feb	31 January 2018	28 February 2018	49		
Mar	28 February 2018	28 March 2018	55		
Apr	28 March 2018	02 May 2018	56	28	56
May	02 May 2018	06 June 2018	41		
Jun	06 June 2018	04 July 2018	31	63	31
Jul	04 July 2018	01 August 2018	47	30.5	47
Aug	01 August 2018	05 September 2018	42		
Sept	05 September 2018	03 October 2018	42		
Oct	03 October 2018	31 October 2018	54	33	54
Nov	31 October 2018	05 December 2018	55	37.4	55
Dec	05 December 2018	09 January 2019	49	29.9	49
Average			48		49
Ratio					0.97

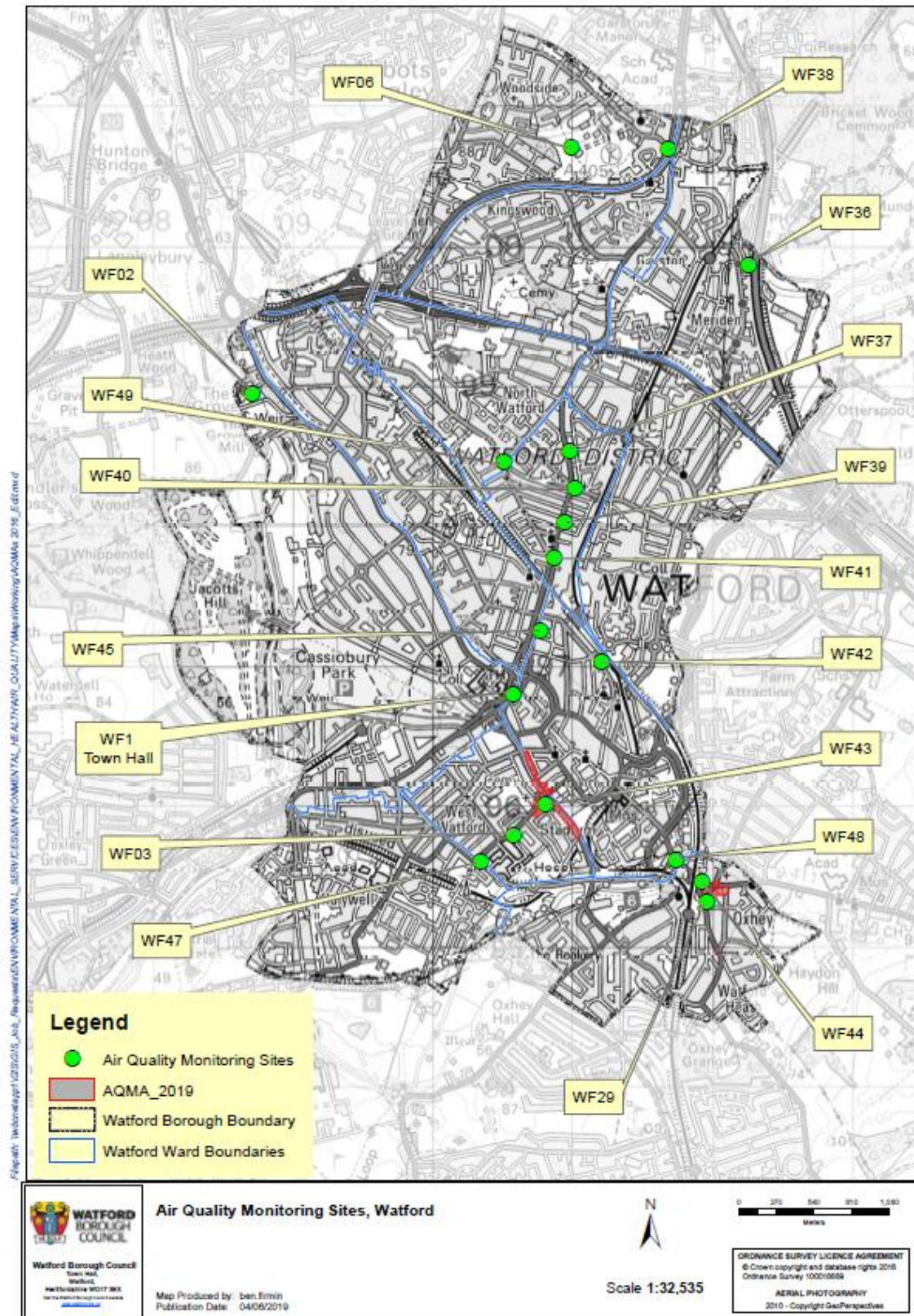
Nitrogen Dioxide fall off with distance calculations

These were carried out on all measurements within AQMA's where located near relevant exposure.

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	
WF29	2.0	8.0	18.0	39.0	32.2	
WF43	2.0	6.0	16.0	51.0	42.0	Predicted concentration at Receptor above AQS objective.
WF44	2.0	8.0	18.0	53.0	41.6	Predicted concentration at Receptor above AQS objective.
WF48	1.0	5.0	18.0	42.0	34.2	

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

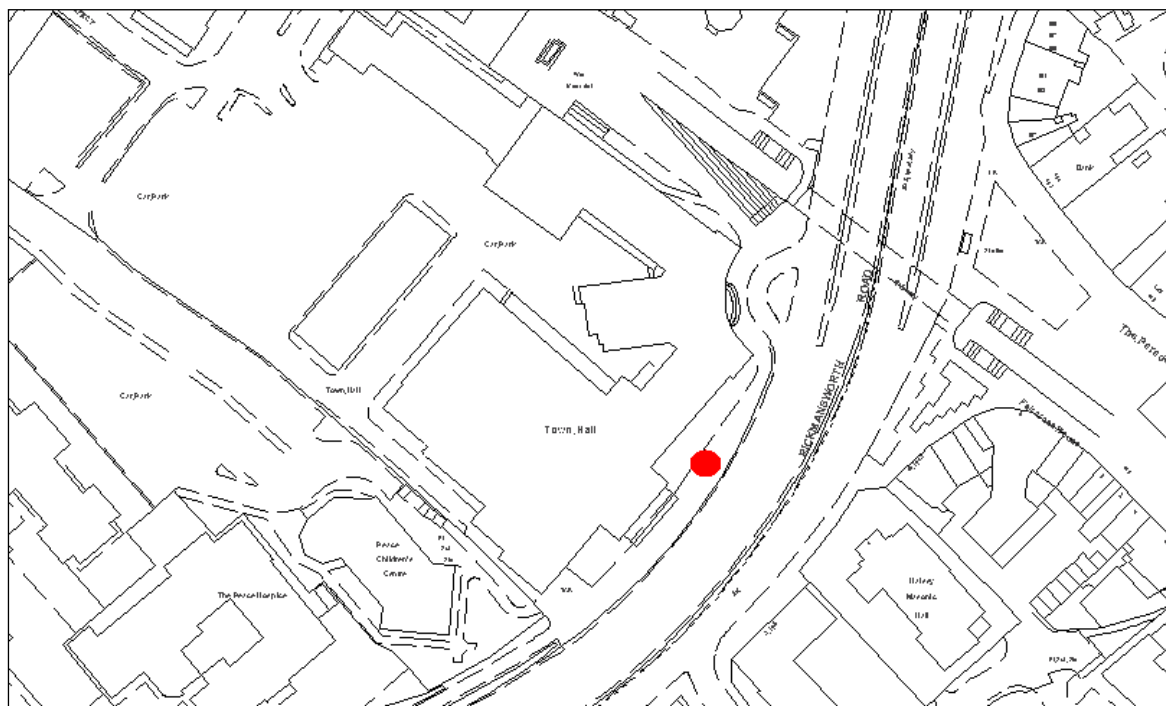
Figure A.10: Location of nitrogen dioxide diffusion tube monitoring sites



Details of Automatic Monitoring Sites

Site Name	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure?	Distance to nearest road	Worst-case Location?
Watford Town Hall	X 510540 Y 196780	NO ₂ , PM ₁₀	N	N	10m	Y

Figure A.11: Location of Watford Town Hall automatic monitoring station



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Figure A.12 Photograph showing the automatic monitoring at Watford Town Hall.



Figure A.13: Map showing Vicarage Road Air Quality Management Area No.2

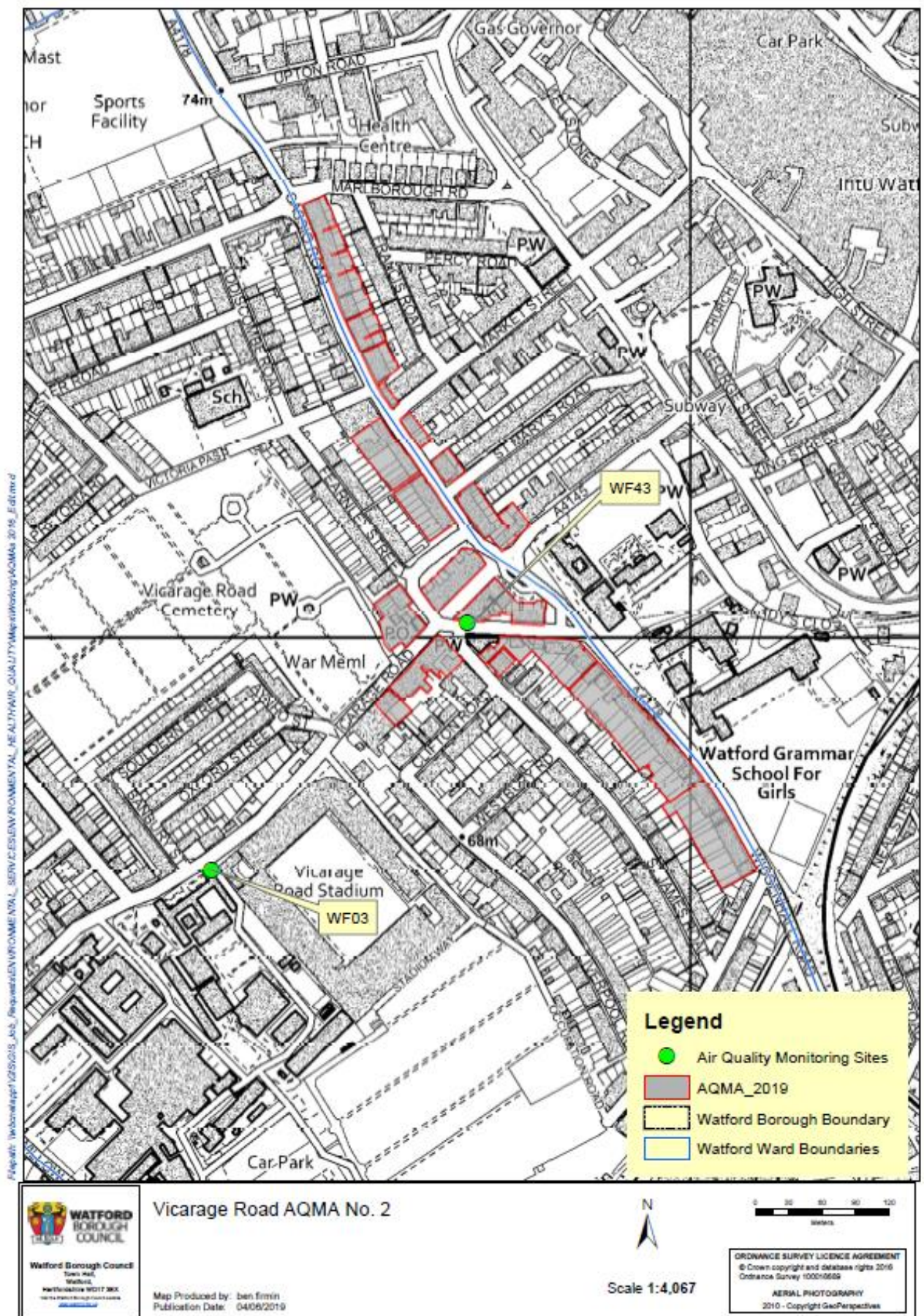
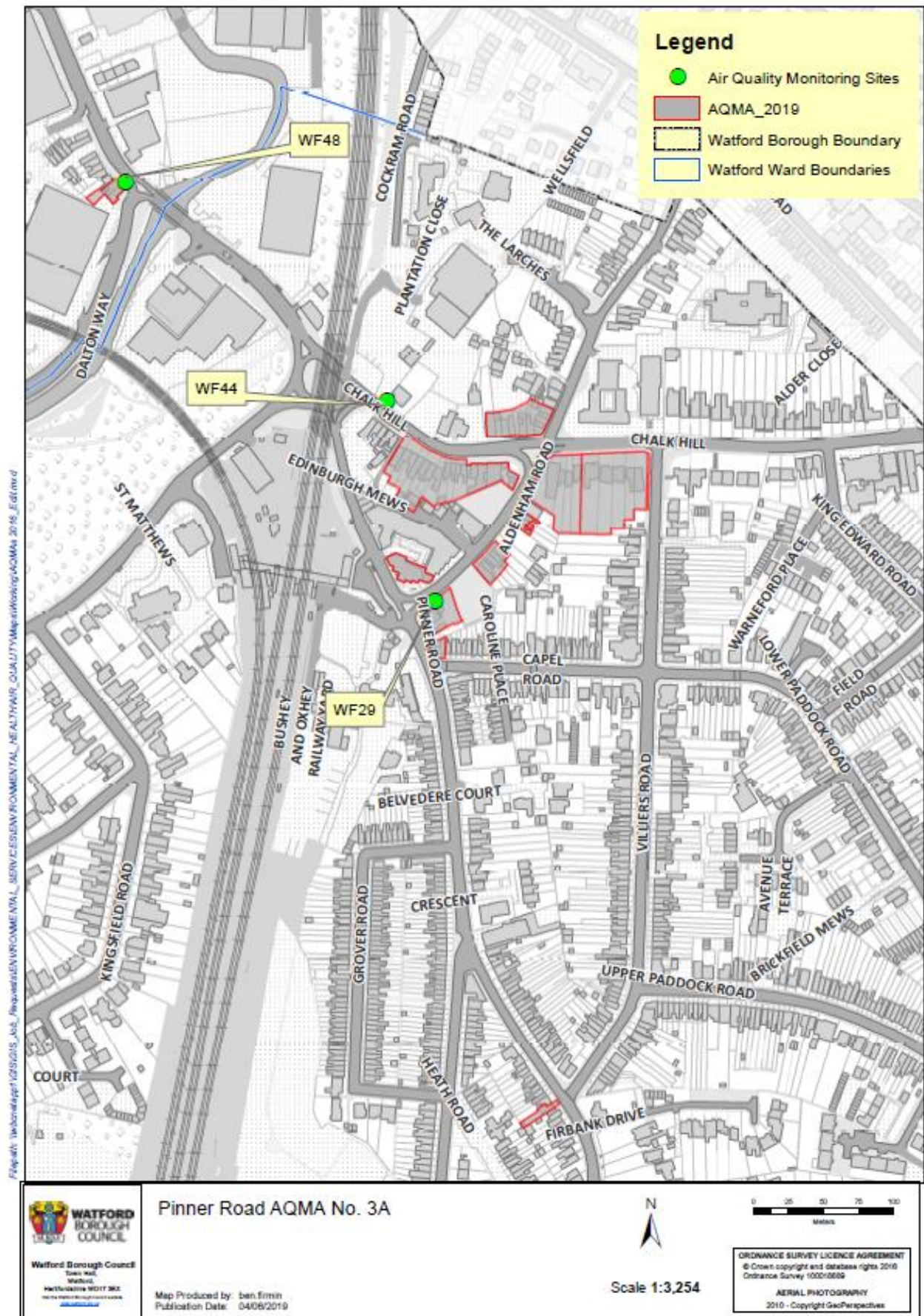


Figure A.14: Map showing Pinner Road Air Quality Management Area No.3A



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant		Air Quality Objective ⁴	
		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

⁴ 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

- Ricardo Energy & Environment *Detailed Assessment of Nitrogen Dioxide in the Watford Air Quality Management Areas* (2015)
- Watford Borough Council *Watford Borough Council Air Quality Action Plan* (2011)
- DEFRA Local Air Quality Management Technical Guidance (TG16)
- <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>
- <https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>