2018 Air Quality Annual Status Report (ASR)

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

Date June 2018

Local Authority Officer	Hardesh Bhatti
Department	Community and Customer Services
Address	Town Hall Watford WD17 3EX
Telephone	01923 278441
E-mail	Hardesh.Bhatti@watford.gov.uk
Report Reference number	WBC/HB/ASR2018_v2
Date	June 2018

Executive Summary: Air Quality in Our Area

This Annual Status Report forms part of the ninth round of air quality Review and Assessment carried out by Watford Borough Council. It sets out updated air quality monitoring data and assesses whether any new or proposed developments are likely to have a significant effect on air quality concentrations.

Furthermore, this report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedances are considered likely, the local authority must then 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.

Air Quality Monitoring Data

Across Hertfordshire, where monitoring is undertaken, the concentrations of nitrogen dioxide (NO_2) have been declining, which means air quality has been improving. In Watford this trend is generally also apparent.

The real-time analysers located at the Town Hall continue to monitor oxides of nitrogen and PM_{10} and $PM_{2.5}$ particulates. In addition, we have a network of diffusion tubes monitoring long term nitrogen dioxide concentrations. This network now stands at 19 tubes and includes sites that will be able to assess long term trends in concentrations close to the Health Campus and associated link road –which opened in November 2016, as well as concentrations in Gammons Lane, where local concerns about queuing traffic have been raised. There are four locations where the National Air Quality Objective has been exceeded.

The air quality problem in Watford is predominantly a result of emissions from road

vehicles, for example, idling engines at busy junctions.

Not all car journeys made will start or end within the borough boundaries and so it is vital to work with other agencies. Watford is part of the Hertfordshire and Bedfordshire Air Quality Network which meets approximately four times a year at which transport officers from the county council are also in attendance.

Therefore, a key initiative to improve air quality has been to encourage the use of greener travel including the uptake of electric vehicles. This is being achieved through the installation of charging points at various locations within the borough.

Furthermore, we seek to increase uptake of this technology by ensuring large-scale new build flats have supporting infra-structure in place. Additionally, we have supported the use of car-share schemes within some new development around the Watford Junction area.

A significant disappointment has been the recent decision by Transport for London to abandon plans to extend the Metropolitan Line. This scheme was envisaged as part of a wider transport scheme which would have helped discourage car use for people travelling into/ out of Watford from West London. Fortunately, the mayor of Watford Peter Taylor, who supported the scheme has suggested alternatives, but the exact details are yet to be finalised.

Furthermore, a detailed assessment of NO2 concentrations in each of the AQMA's was carried out and based upon the findings, and a review of monitoring data since this detailed assessment the conclusion have been verified and therefore the AQMA boundaries need to be reviewed and this work is expected to take place in 2018.

The new road connecting to health campus opened in 2016 and recent monitoring suggests that it could have had a positive impact on air quality in the Bushey Arches locality.

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 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 billion[3].

Using the PHE Air Pollution Toolkit, within Watford the estimated 2017 annual health cost for nitrogen dioxide was £10 million and £19 million for $PM_{2.5}$ [4].

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.

From the data gathered during 2016, there was a reduction in NO2 concentrations across the borough. We will be reviewing our existing AQMA's in 2017.

[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
4 https://www.gov.uk/government/publications/air-pollution-a-tool-to-estimate-healthcare-costs

There are four AQMA's within Watford:

- AQMA 1: St Albans Road.
- AQMA 2: Vicarage Road.
- AQMA 3A: Aldenham Road/Chalk Hill.
- AQMA 5: A405 / Horseshoe Lane.

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

Conclusions and Priorities

There are a number of ambitious development plans that are coming into fruition. Despite the decision by Transport for London to revoke plans to extend the Metropolitan Line, other projects continue to move forward. Most noticeably is the INTU extension, and whilst it will bring significant economic and cultural benefit into the town, it also has the potential to increase traffic flows. Therefore, we will be reviewing traffic survey data where available to determine if there has been a significant increase, where identified, additional monitoring will be necessary.

There is a good working relationship between Environmental Health and planning which ensures that air quality is taken into account during the decision making process, for example, encouraging greener modes of transport such as a car club scheme.

Overall, concentrations have reduced at most monitoring locations. However, there continues to be an annual mean exceedance at AQMA 3A. There were no exceedances outside any of the existing air quality management areas.

There will be a review of the air quality management areas as trends over recent years have shown that levels are below the national objective.

Updating our Air Quality Action Plan and reviewing our air quality management areas is a priority in 2018. Furthermore, we will be acting upon the recommendations made by Local Air Quality Management in 2017 following the submission of our Annual Status Report for 2016.

Local Engagement and How to get Involved

All our residents, visitors and businesses play a role in improving air quality, for example, walking, cycling or using public transport instead of driving. For those of us who need 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.

Table of Contents

1 Local Air Quality Management

This report provides an overview of air quality in Watford Borough Council during 2017. 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

A key initiative has been the installation of electric vehicle charging points in each of the following car parks:

- 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

In addition, 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..

There has also been an installation of charging points in various privately owned car parks such as those owned by supermarkets.

Further information can be found at:
https://www.watford.gov.uk/info/20014/parking/58/where_can_i_park_in_watford/5

As set out in our AQAP other measures were to be implemented including infrastructure improvements. The major projects are the two new link roads:

1. Health Campus link road (http://www.watfordhealthcampus.org/) opened in November 2016. This link road seems to have improved air quality at the Chalk Hill and Hornet's Gyratory/Wiggenhall Rd AQMAs, although this could become more apparent with further monitoring.

The road links Wiggenhall Road and the Campus with Dalton Way. The link road is expected to help alleviate the localised congestion and improve access to the hospital for emergency vehicles, for example in the Chalk Hill and Hornet's Gyratory/Wiggenhall Road AQMAs. In addition, transport improvements associated with the Watford Health Campus include:

- The introduction of pedestrian and cycle routes in new green spaces around the site;
- Increased proportion of journeys made via public transport, with the hope of new bus services being attracted to the site;
- Increased links to London through more direct road provision;
- More accessible car parking for visitors to the site;
- Provision of new access and link roads to the site; and
- Support for the introduction of the Croxley Rail Link for direct access to the site and beyond by train.

2. Watford Junction link road which is expected to significantly improve air quality on St Albans Rd in AQMA 1. This proposal is still in the planning stage.

Further funding was made available to improve pedestrian and cycle access along the main high street:

https://www.watford.gov.uk/info/20016/the_council/787/high_street_improvements/1

Other schemes delivered in Watford by the county council were done through the Integrated Transport Programme. These schemes contribute to reducing vehicle pollution through lower speeds, or by encouraging more travel by non-car modes.

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. Also refer to Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMAs.

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

We propose to revoke AQMA 1 and AQMA 5 (see monitoring section).

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 1 St Albans Road	Feb-06	NO2 Annual Mean	Watford	A combination or residential and commercial buildings along a main road. Queuing traffic and street canyon.	NO	*49.4	µg/m3	*33.9	µg/m3	Watford Borough Council Air Quality Action Plan	2011	https://watford.jdi-consult.net/documents/pdfs5/Air%20Quality%20Action%20Plan%202011.pdf
AQMA 2 Vicarage Road	Feb-06	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	52.7	µg/m3			

AQMA 3A Aldenham Road/Chalk Hill	Feb-06	NO2 Annual Mean	Watford	A combination or residential and commercial buildings along a main road within close proximity to Bushey Station. Queuing traffic.	NO	56.8	µg/m3	40.4	µg/m3			
AQMA 5 A405/ Horseshoe Lane	Feb-06	NO2 Annual Mean	Watford	A predominately residential area within close proximity to main roads and motorway.	NO	41.1	µg/m3	34.3	µg/m3			

- - Highest value from within air quality management area

☒ **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 Borough Council

Defra's appraisal of last year's ASR concluded the following main points,

1. ‘“We recommend that a review of the current monitoring strategy takes place, in order to provide an adequate number of monitoring points suitable for reviewing the status of each AQMA. The single exceedance in AQMA 3A of above 60µg/m^3, suggest exceedance of the hourly mean, which should be subject to further investigation for the area of exceedance as a basis for reviewing the status of AQMA3A.”
2. “There is no evidence that the current AQAP has been reviewed or updated in recent years. We consider it would be beneficial if the AQAP is reviewed following a review of the locations of local pollution hotspots.”
3. “The one single high result at Chalk Hill requires further consideration.”
4. “Detailed monitoring and assessment should be continued to support decisions on identifying further effective measures, based on achieving the required levels of emissions reductions to achieve the air quality objectives.”

Watford Borough Council has taken forward a number of direct measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

We will also be reviewing our AQAP and the areas with high results to identify the potential causes and include additional actions in our AQAP if required.

Work is being done to revise the existing Local Plan Strategy to include air quality policy requirements that will continue to seek mitigate through design.

We will be improving the information we provide to our residents and businesses, for example, updating our webpage. Earlier this year, we explored the possibility of signing up to a messaging system for residents. However, after carefully careful

consideration, we decided not to pursue this as there were numerous free apps and Defra's Air Quality Strategy also commits to providing an alert scheme for vulnerable residents.

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	On going promotion.
3	Watford Junction interchange improvement	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

	Increase the accessibility of the rail station										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 liftshare. Number of private schemes	High in the vicinity of the junction	Complete / on going	Complete / on going	Ongoing 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	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
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	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.

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 $PM_{2.5}$:

- Establish an effective partnership working arrangements with Hertfordshire County Council Public Health. This has occurred as a result of three key drivers:
    - Increased evidence and awareness of the harm from exposure to $PM_{2.5}$
    - The transfer of central government funding from a central public health body to County Councils
    - The existence of the Public Health Outcome Indicator (PHOI) for the fraction of mortality attributable to particulate air pollution measured as fine particulate matter $PM_{2.5}$.
    - Access to Public Health Funding for each of the ten Hertfordshire Local Authorities to purchase and establish $PM_{2.5}$ monitoring equipment in their areas. Watford has installed a FIDAS monitor on Tuesday, 8th December 2015.
- Watford Council has not yet identified any measures targeted specifically at reducing $PM_{2.5}$ and it is considered unlikely that any such measures will be identified over the coming years. Instead it is anticipated that:
- Measures to reduce emissions of NOx 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 location during 2017. 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 NO_2 at 19 sites during 2017. 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 (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 7 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

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 200µg/m^3, not to be exceeded more than 18 times per year.

Overall, Nitrogen Dioxide concentrations have reduced at the majority of our monitoring locations.

Exceedences all occurred within existing AQMA's. After applying the distance correction, public exposure exceeded the national objective at all locations excluding Pinner Road.

There was a noticeable decrease along the Pinner Road and chalk Hill locations/ AQMA3A, although concentrations still exceeded national objectives.

With regards to the A405/ AQMA5, concentrations reduced to 34.3 µg/m^3.

There was a noticeable increase along Gammons Lane. However, it is not possible to review long term trends as monitoring only began in 2016. There was no exceedednce of the national objective at this location.

There was a further reduction in the annual mean and there were no exceedences of the 1-hour mean objective. However, there was a single exceedance in AQMA 3A above 60µg/m^3, suggesting an exceedance of the hourly mean, which should be subject to further investigation.

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 40µg/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 50µg/m^3, not to be exceeded more than 35 times per year.

There were no exceedences of the air quality objectives.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.7 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 2 years.

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.

Monitoring to date has shown that concentration is below the national objective annual mean target of 25 µg/m^3.

National objective data can be found at:

https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update.pdf

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	NO2,PM2, PM10	NO	1)API M200E chemiluminescent NOX analyser from Envirotechnology; and 2) Fidas 200 Analyser monitoring PM10 and PM2.5:	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.

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 a Continuous Analyser?	Height (m)
WF02	Grove Pumping Station	B	508700	198950	NO2	N	N	N/A	N	2
WF03	Hospital	K	510570	195800	NO2	N	N	4m	N	2.4
WF06	Woodside Playing Fields	B	510985	200710	NO2	N	N	N/A	N	3
WF29	Pinner Road	K	511940	195320	NO2	AQMA3A	Y – 6m	2m	N	2.1
WF36	Ravenscroft	I	512240	199910	NO2	N	Y – 8m	N/A	N	2.2
WF37	358, St. Albans Road	K	510970	198535	NO2	AQMA1	Y – 5m	1m	N	2.4
WF38	A405 / Horseshoe Lane	K	511680	200700	NO2	AQMA5	Y – 2m	4m	N	3
WF39	Balmoral Road	K	511000	198270	NO2	AQMA1	N	1m	N	2.4
WF40	Salisbury Road	K	510930	198000	NO2	AQMA1	N	2m	N	2.4
WF41	Leavesden Road	K	510850	197780	NO2	AQMA1	N	1m	N	2.5
WF42	Queens Road	K	511160	197000	NO2	N	Y – 4m	1m	N	2.4
WF43	Farraline Road	K	510800	196020	NO2	AQMA2	Y – 4m	2m	N	2.4
WF44	Chalk Hill	K	511920	195450	NO2	AQMA3A	Y – 6m	2m	N	2.1
WF45	Wellington Road	K	510750	197230	NO2	AQMA1	Y-10m	4m	N	2.3

WF46	Town Hall	R	510565	196800	NO2	N	N	6m	Y	2
WF47	Willow Lane	K	510335	195610	NO2	N	Y - 3m	1m	N	2.4
WF48	Lower High Street	K	511725	195619	NO2	N	Y - 4m	1m	N	2.4
WF49	Gammons Lane	K	510499	198454	NO2	N	Y - 5m	1m	N	2.4

Note: B = background; K = kerbside; I = intermediate; R = roadside.

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 NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2013	2014	2015	2016	2017
Watford Town Hall	Roadside	Automatic	-	83.79%	39	40	35	36	34

☒ **Diffusion tube data has been bias corrected**

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

Notes:

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

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

(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.

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2013	2014	2015	2016	2017
Watford Town Hall	Roadside	Automatic	-	83.79%	0	0	0	0	0

Notes:

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

(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 PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2013	2014	2015	2016	2017
Watford Town Hall	Roadside	-	82.91%	24	21	22	14	15

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

Notes:

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

Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2013	2014	2015	2016	2017
Watford Town Hall	Roadside	-	82.91%	7	6	5	1	3

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

(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.

Table A.7 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2013	2014	2015	2016	2017
Watford Town Hall	Roadside	-	82.92%	-	-	10	14	10

☒ **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.

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2017

Site ID	Site type	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 (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
WF02	Grove Pumping Station Hempstead Road	38.6	21.6	20.3	16.9	17.5	13.1	11.1	15.2	15.9	17.1	22.8	21.3	20.7	15.9	-
WF03	Hospital Vicarage Road	68.3	Missing	39.9	39.3	39.1	37.1	31.5	36.5	40.7	40.9	51.7	43.7	42.5	32.7	-
WF06	Woodside Playing Fields	47.8	31.7	22.8	21.1	19.5	Missing	15	25.4	20.8	24.8	32.6	24.9	26.0	20.0	-
WF29	Pinner Road	76.5	53.9	49.6	53.9	54.8	42.9	41.3	43.2	47.5	47.7	63.3	55.1	52.5	**40.4**	38.8
WF36	Ravenscroft	53.5	38.9	33	27.4	34.4	Missing	Missing	28.2	32	30.6	37.1	30.1	34.5	26.6	-
WF37	o/S 358 St Albans Rd	70.9	48.1	45.2	37.7	43.8	36.9	Missing	33.1	40.5	38.5	49.7	Missing	44.4	34.2	-
WF38	A405 Horseshoe	68.8	49.9	43.9	43.9	46.5	36.9	33.9	38.6	43.2	40.5	48.8	40.4	44.6	34.3	-

	Lane															
WF39	Balmoral Road	67.5	52	41.4	38.8	40.4	38.8	32.2	35.3	34.4	43	51.7	41.6	43.1	33.9	-
WF40	Salisbury Road	66.8	Missing	46.1	42.6	45.9	29.8	35.6	38.7	41	41.9	Missing	46.6	43.5	33.5	-
WF41	Leavesden Road	71.7	53.9	52.8	46.3	45	34.8	35.2	Missing	Missing	48.7	56.7	41	48.6	37.4	36.6
WF42	Queens Road	69.3	45.3	38.9	42.1	35.7	27.2	21.5	30.8	Missing	Missing	55.6	Missing	40.7	31.1	-
WF43	Farraline Road	92.2	65.1	66.1	63	73	58.7	60.7	59.6	66.2	67.8	82.6	67.5	68.5	**52.7**	47.5
WF44	Chalk Hill	105	78.6	82.3	86.7	78.7	69.5	69.2	65.8	77.1	74.7	90.7	81.3	80.0	**61.6**	57.1
WF45	Wellington Road	65.6	53	45.8	45.9	Missing	29	67.8	34.2	43.2	42.8	54.3	Missing	48.2	37.1	-
WF46	Town Hall no 2 Colocation	61.5	47.5	40.6	37.4	37.4	30	27.5	33	37.8	35.1	45.2	37	39.2	30.2	-
WF47	Willow Lane	56.2	41.9	Missing	34.5	36.8	29.2	25.3	Missing	Missing	34	44.7	34.4	37.4	28.8	-
WF48	High Street	82.7	70.4	59.3	58.7	58.4	53.9	47.7	55.4	49.7	59.5	Missing	68.9	60.4	**46.5**	40.7
WF49	Gammons Lane (o/s 67)	71.8	52	45.4	38.9	41.4	38.4	35.2	36.8	41	42.9	55.4	45.9	45.4	35.0	-
WF50	Eastbury Road (Oxhey Early Years)	71.2	55.9	42.1	38.4	45.9	34.5	33.7	35.8	41.2	40.5	50.4	47	44.7	34.4	-

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

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

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

(2) Distance corrected to nearest relevant public exposure.

Table B.2 Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2017)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3							
			2010* (Bias Adjustment Factor = 0.86)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)	2014 (Bias Adjustment Factor = 0.81	2015 (Bias Adjustment Factor = 0.8)	2016 (Bias Adjustment Factor=0.78)	2017 (Bias Adjustment Factor=0.77)
WF02	Grove Pumping Station	N	22	18	21	18	16	15.4	18.7	15.9
WF03	Hospital, Vicarage Road	N	44	38	38	36	33	34.8	35.5	32.7
WF06	Woodside Leisure Centre	N	27	22	25	21	20	18.9	19.6	20.0
WF29	Pinner Road	AQMA 3A	62	52	56	51	49	48.2	49.4	40.4
WF36	Ravenscroft	N	34	30	25	29	30	25.4	26	26.6
WF37	St Albans Road 2	AQMA 1	46	36	40	35	36	31.8	38	34.2

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3							
			2010* (Bias Adjustment Factor = 0.86)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)	2014 (Bias Adjustment Factor = 0.81	2015 (Bias Adjustment Factor = 0.8)	2016 (Bias Adjustment Factor=0.78)	2017 (Bias Adjustment Factor=0.77)
WF38	A405 Horseshoe Lane	AQMA 5	45	38	40	37	39	40.9	41.7	34.3
WF39	Balmoral Road	AQMA 1	51	45	(45)	43	37	36.3	38.1	33.9
WF40	Salisbury Road	AQMA 1	48	41	42	39	35	33.1	36.5	33.5
WF41	Leavesden Road	AQMA 1	40	33	36	36	36	32.2	37.6	36.6
WF42	Queens Road	N	39	33	(37)	34	32	31.7	31	31.1
WF43	Farraline Road	AQMA 2	58	48	55	49	46	44.8	49.5	52.7
WF44	Chalk Hill	AQMA 3A	91	83	(84)	84	80	70.7	73.6	61.6
WF45	Wellington Road	AQMA 1	42	36	40	35	33	31.6	34.9	37.1
WF46	Town Hall collocation	N	39	37	37	34	33	32.0	31.7	30.2
WF47	Willow Lane	N	n/a	n/a	35	35	32	29.6	30.7	28.8
WF48	Lower High Street	N	n/a	n/a	n/a	n/a	42	44.5	50.6	**46.5**
WF49	Gammons Lane (o/s 67)	N	-	-	-	-	-	-	26.8	35.0
WF50	Eastbury Road (Oxhey Early Years)	N	-	-	-	-	-	-	(57)	34.4

Note: Bias adjusted annual means in excess of the 40 µg/m^3 annual mean NO_2 objective are shaded grey.

Annual means > 60 µg/m^3 are underlined, indicating a potential exceedance of the NO_2 hourly mean objective
Figures in brackets are those for which data capture was below 75%

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.

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

The Socotec laboratory participates in the field intercomparison scheme and the Workplace Analysis Scheme for Proficiency (WASP) programme, operated by the Health and Safety Laboratory (HSL). This compares results from diffusion tube monitoring and analysis with those from automatic monitoring. Results and bias corrections factors can be seen at:

http://laqm.defra.gov.uk/diffusion-tubes/diffusion-tubes.html

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

Diffusion tube: bias adjustment:

Analysed by: Socotec

Tube preparation method: acetone:triethanolamine (50:50)

Year: 2017

Bias adjustment figure is: 0.77

Distance adjustment calculations:

Pinner Road:

Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	2	metres
Step 2	How far from the KERB is your receptor (in metres)?	6	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	34	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	40.4	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	*38.8*	µg/m^3

Leavesden Road:

Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	1	metres
Step 2	How far from the KERB is your receptor (in metres)?	3	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	34	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	37.4	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	*36.6*	µg/m^3

Farraline Road:

Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	1	metres
Step 2	How far from the KERB is your receptor (in metres)?	4	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	34	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	52.7	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	**47.5**	$\mu g/m^3$

chalk Hill:

Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	2	metres
Step 2	How far from the KERB is your receptor (in metres)?	4	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	34	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	61.6	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	**57.1**	$\mu g/m^3$

Lower High Street:

Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	1	metres
Step 2	How far from the KERB is your receptor (in metres)?	10	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	34	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	46.5	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	**40.7**	$\mu g/m^3$

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

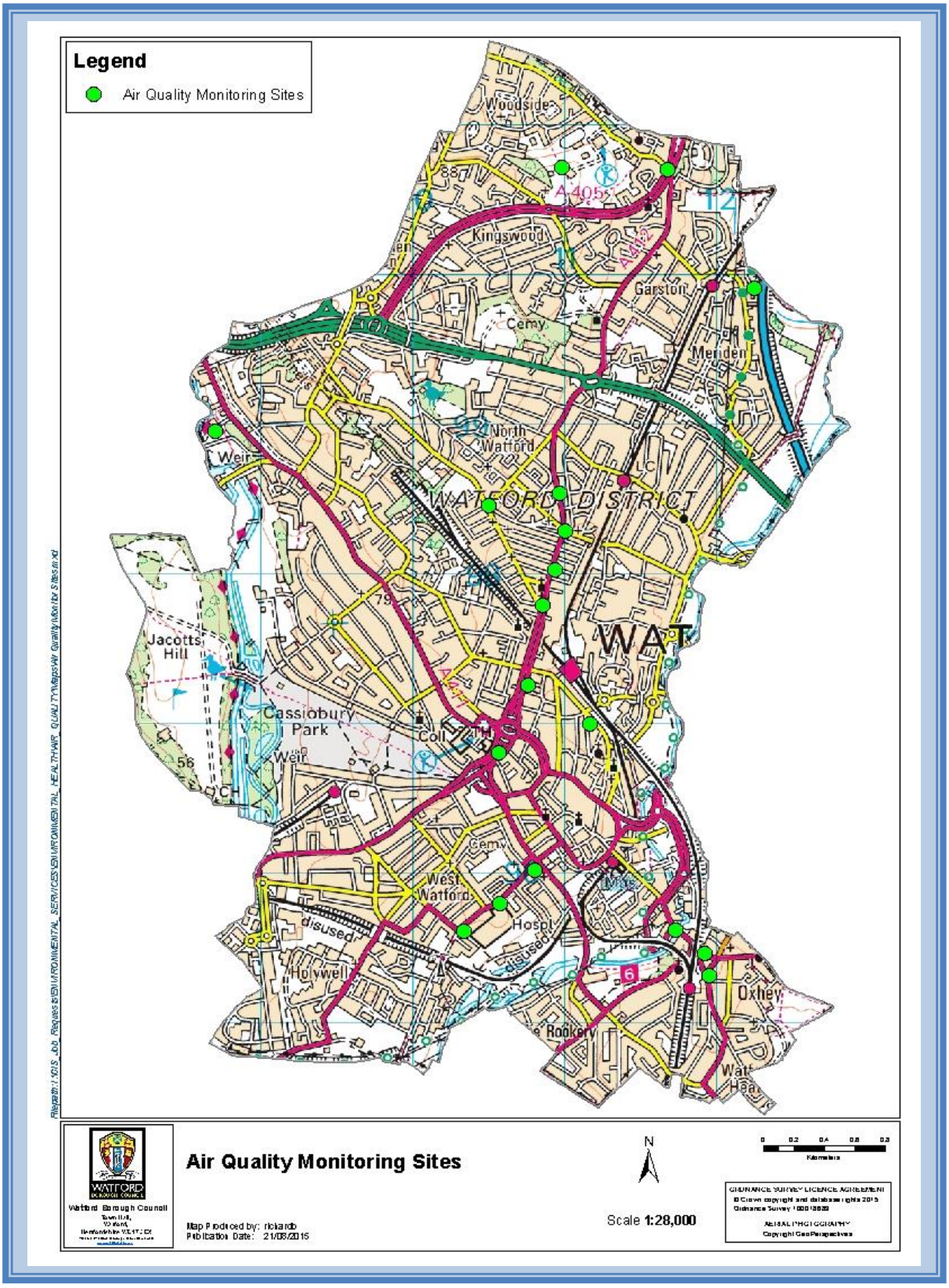


Figure 2 Approximate location of nitrogen dioxide diffusion tube monitoring sites

Details of Automatic Monitoring Sites

Site Name	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure?	Distance to kerb of nearest road	Worst-case Location?
Watford Town Hall	X 510540 Y 196780	NO_2, PM_{10}	N	N	10m	Y

Figure 3 Location of Watford Town Hall automatic monitoring station

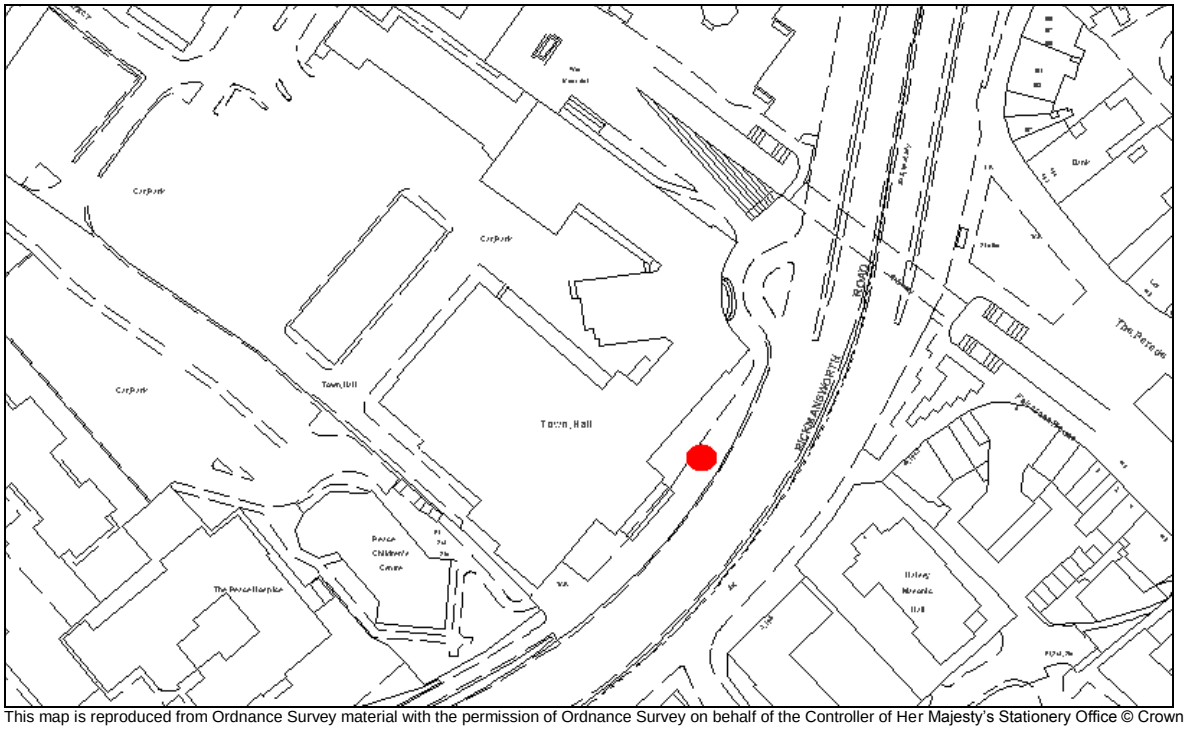


Figure 4: Photograph showing the automatic monitoring at Watford Town Hall.

Current Air Quality Management Areas: Monitoring location denoted with,

Figures 5,6,7,8,9 Maps showing St. Albans Road Air Quality Management Area No.1

Figure 5:

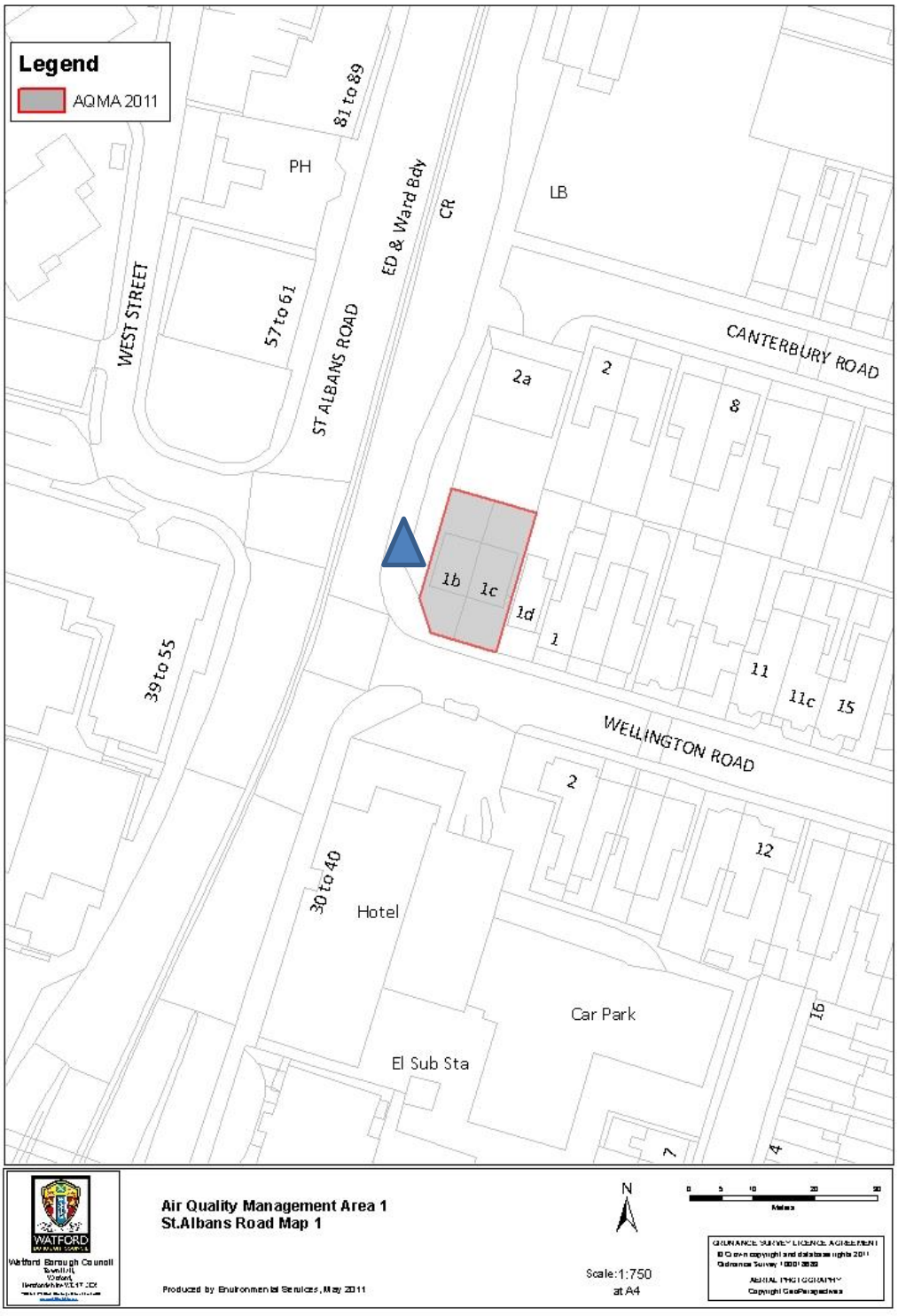


Figure 6:

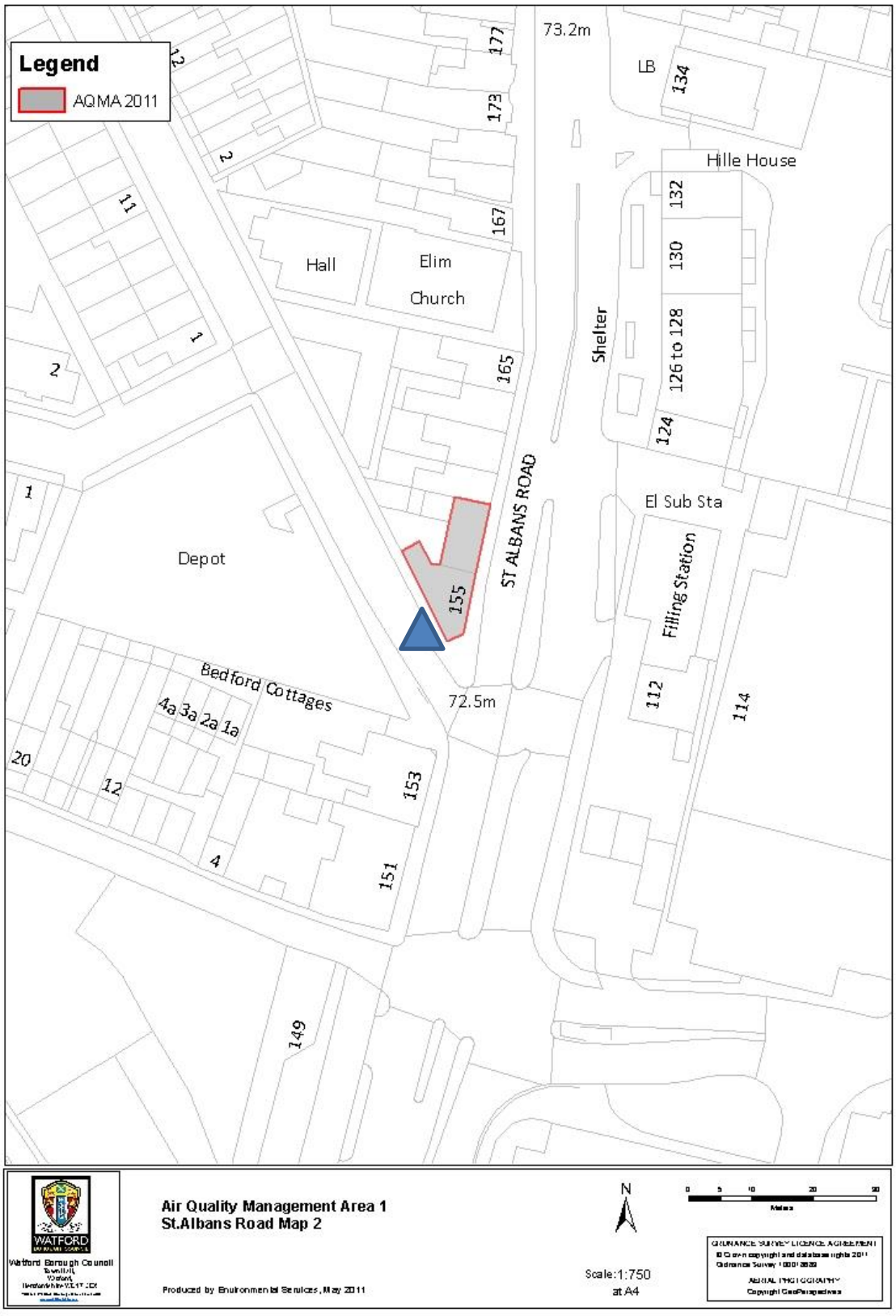

Legend
AQMA 2011
73.2m
LB
134
177
173
167
165
Hille House
132
130
126 to 128
124
Shelter
Hall
Elim
Church
ST ALBANS ROAD
El Sub Sta
Filling Station
Depot
155
Bedford Cottages
4a 3a 2a 1a
72.5m
112
114
153
151
149
20
12
4
2
1
11
Air Quality Management Area 1
St.Albans Road Map 2
Produced by Environmental Services, May 2011
Scale:1:750
at A4
N

Figure 7:

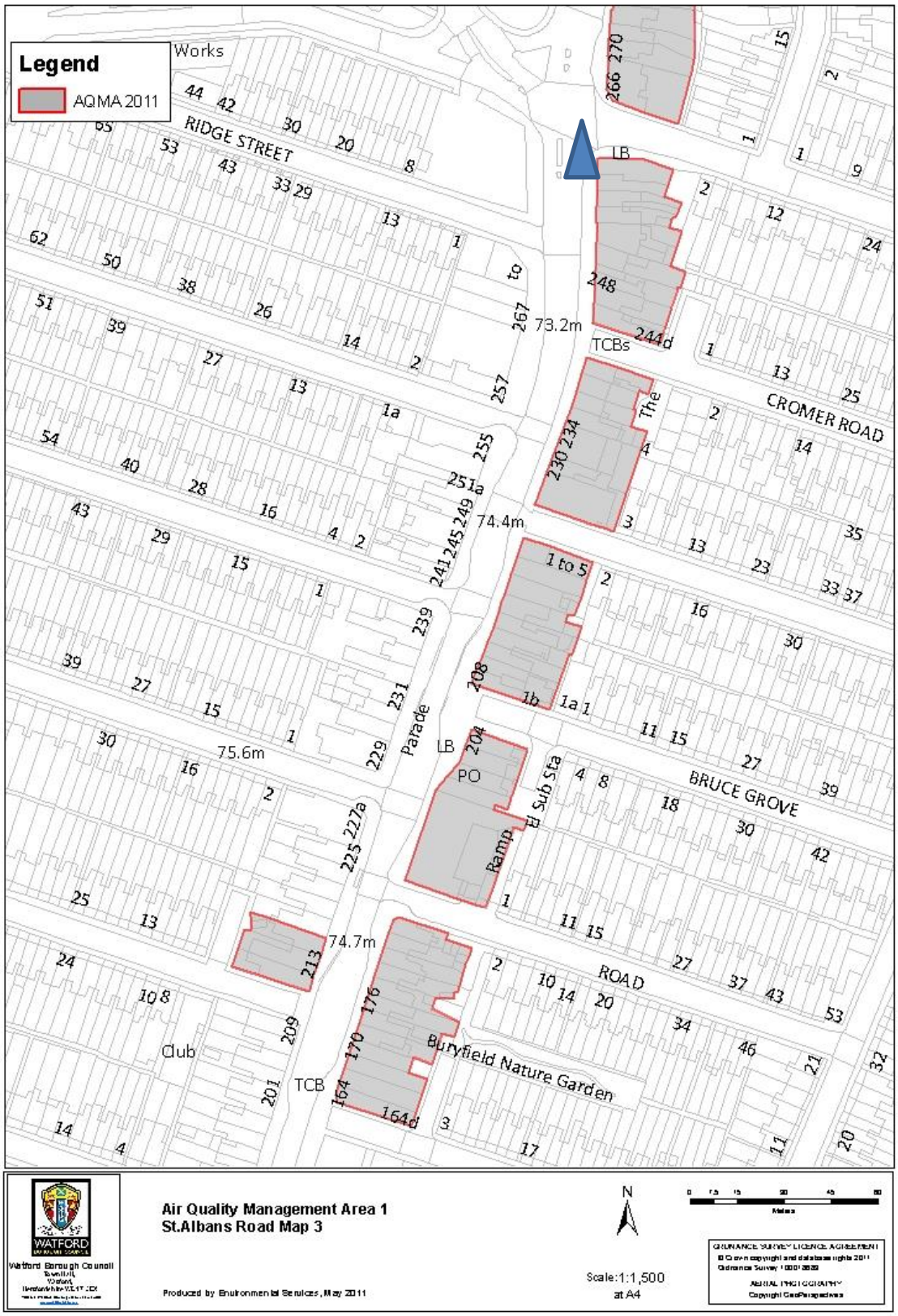

Legend
AQMA 2011
Works
RIDGE STREET
CROMER ROAD
BRUCE GROVE
ROAD
Parade
Ramp
PO
LB
TCBs
TCB
Club
73.2m
74.4m
75.6m
74.7m
Buryfield Nature Garden
Air Quality Management Area 1
St.Albans Road Map 3
Produced by Environmental Services, May 2011
Scale:1:1,500
at A4
N

Figure 8:

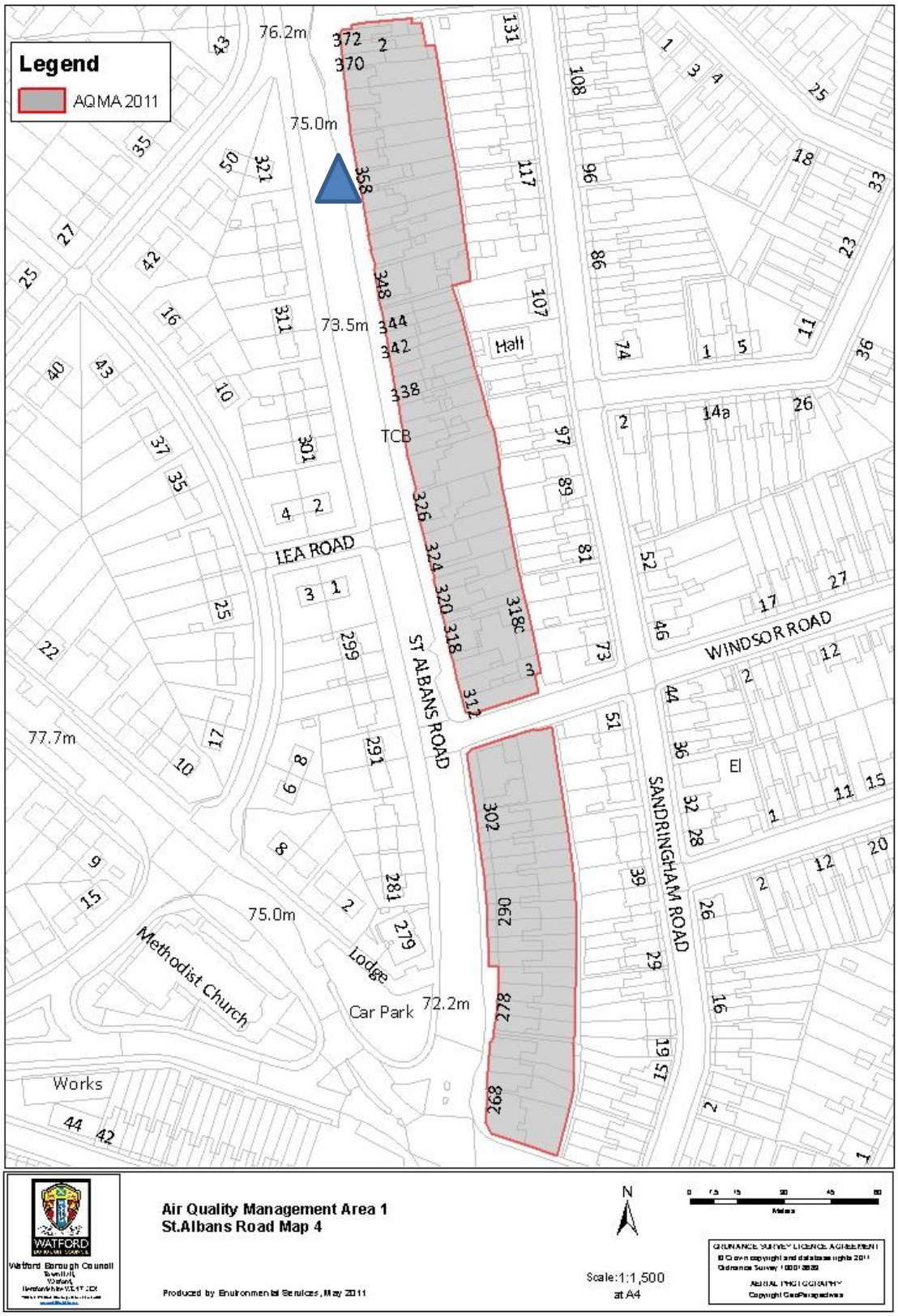
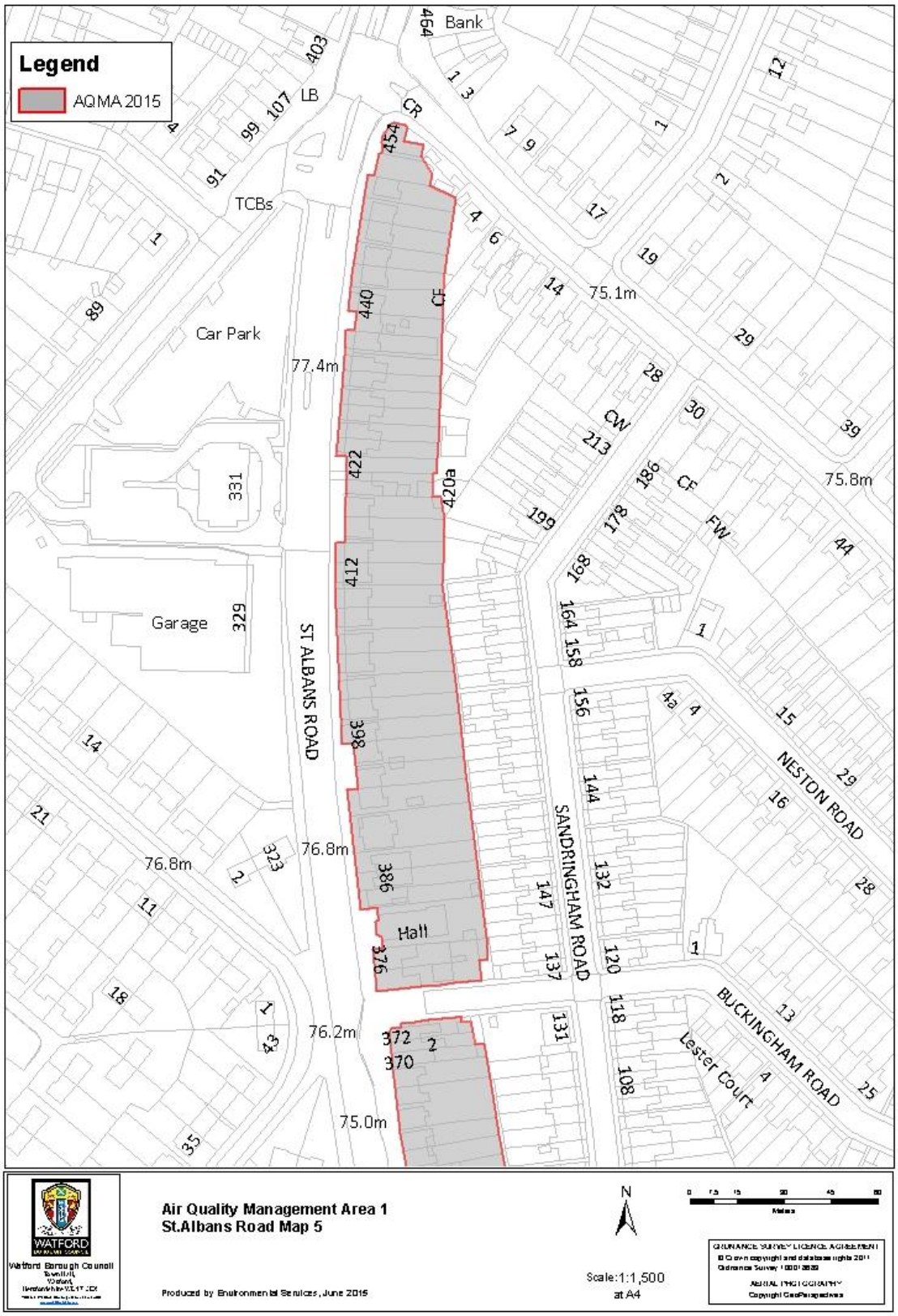

Legend
AQMA 2011
76.2m
75.0m
73.5m
77.7m
75.0m
72.2m
ST ALBANS ROAD
LEA ROAD
WINDSOR ROAD
SANDRINGHAM ROAD
Hall
TCB
Methodist Church
Lodge
Car Park
Works
Air Quality Management Area 1
St.Albans Road Map 4
Produced by Environmental Services, May 2011
Scale:1:1,500
at A4
N

Figure 9:


Legend
AQMA 2015
Bank
TCBs
Car Park
Garage
Hall
ST ALBANS ROAD
SANDRINGHAM ROAD
NESTON ROAD
BUCKINGHAM ROAD
Lester Court
77.4m
75.1m
75.8m
76.8m
76.8m
76.2m
75.0m
Air Quality Management Area 1
St.Albans Road Map 5
Produced by Environmental Services, June 2015
Scale:1:1,500
at A4
N

Figures 10 and 11: Maps showing Vicarage Road / Hornet Air Quality Management Area No.2

Figure 10:

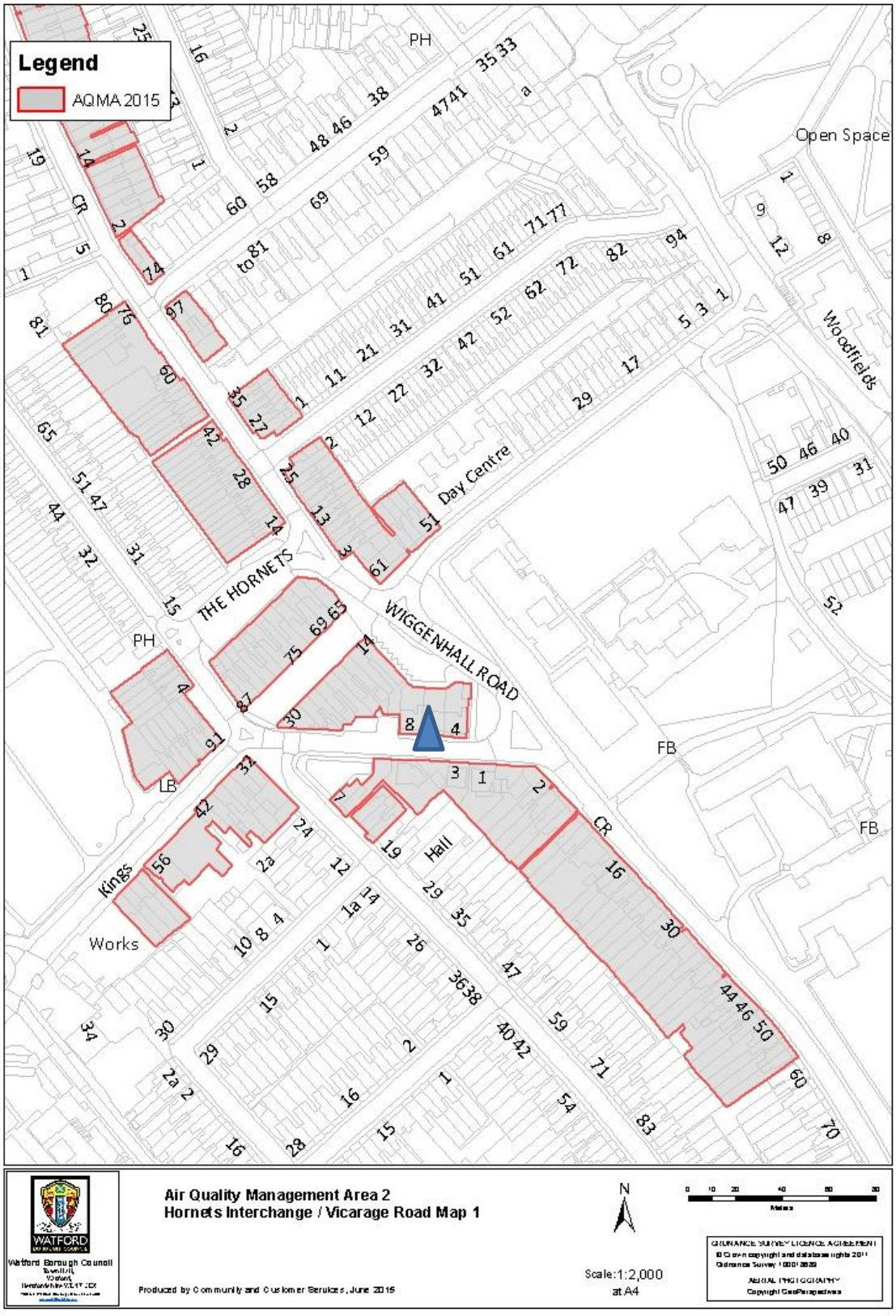


Figure 11:

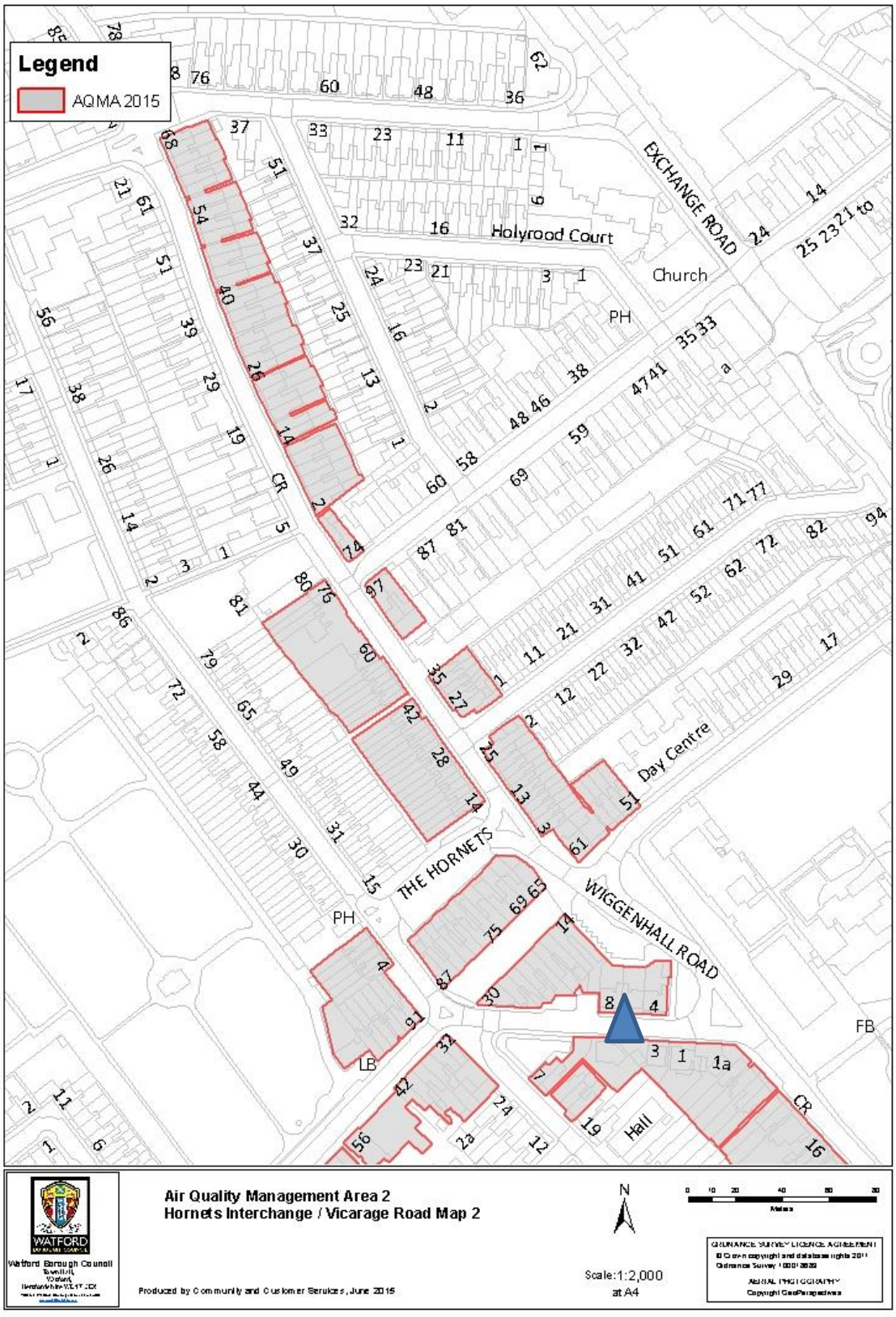

Legend
AQMA 2015
Holyrood Court
EXCHANGE ROAD
Church
PH
CR
Day Centre
THE HORNETS
WIGGENHALL ROAD
PH
LB
FB
Hall
Air Quality Management Area 2
Hornets Interchange / Vicarage Road Map 2
N
Scale:1:2,000
at A4
Produced by Community and Customer Services, June 2015

Figure 12: Map showing Chalk Hill / Pinner Road Air Quality Management Area No.3A

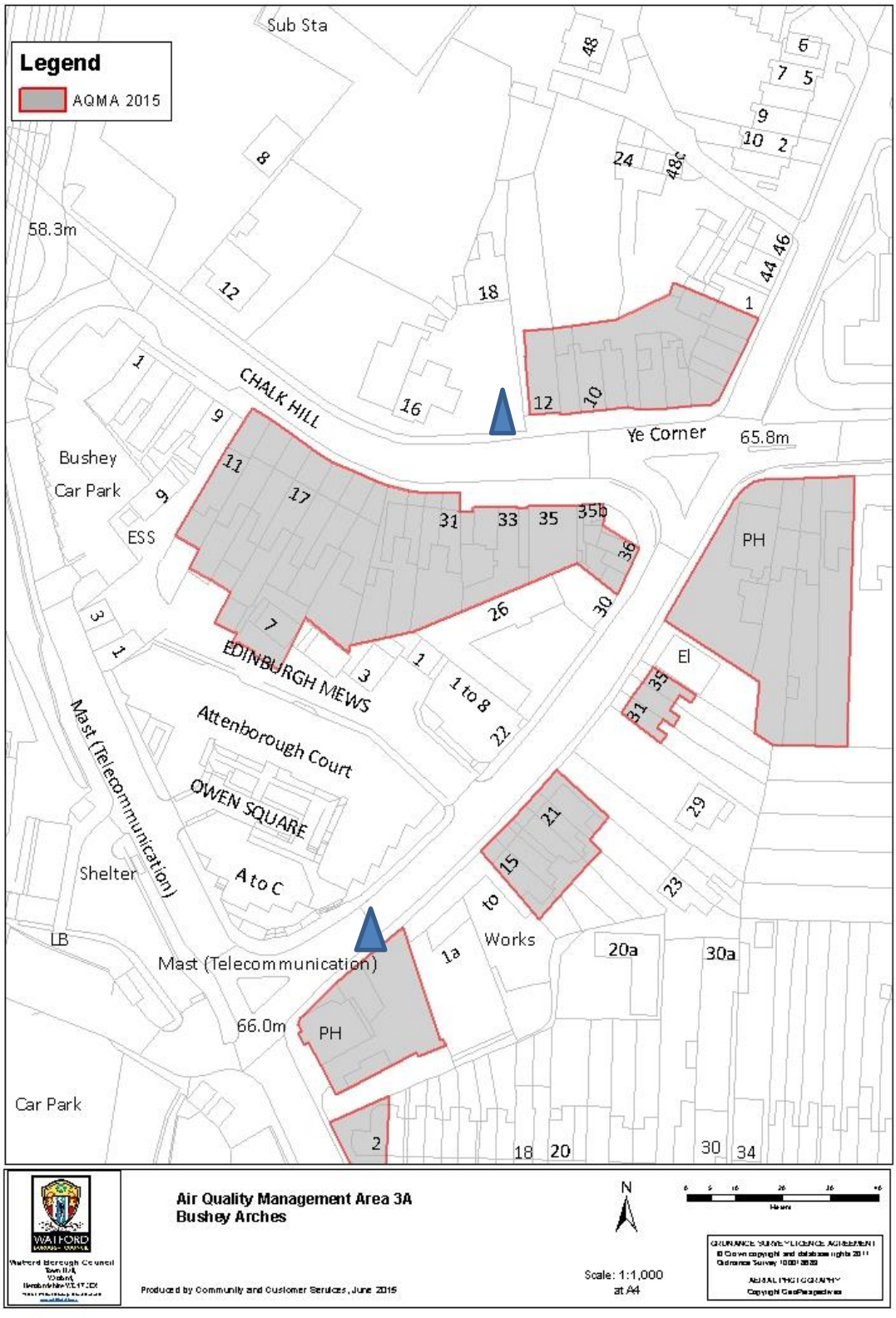
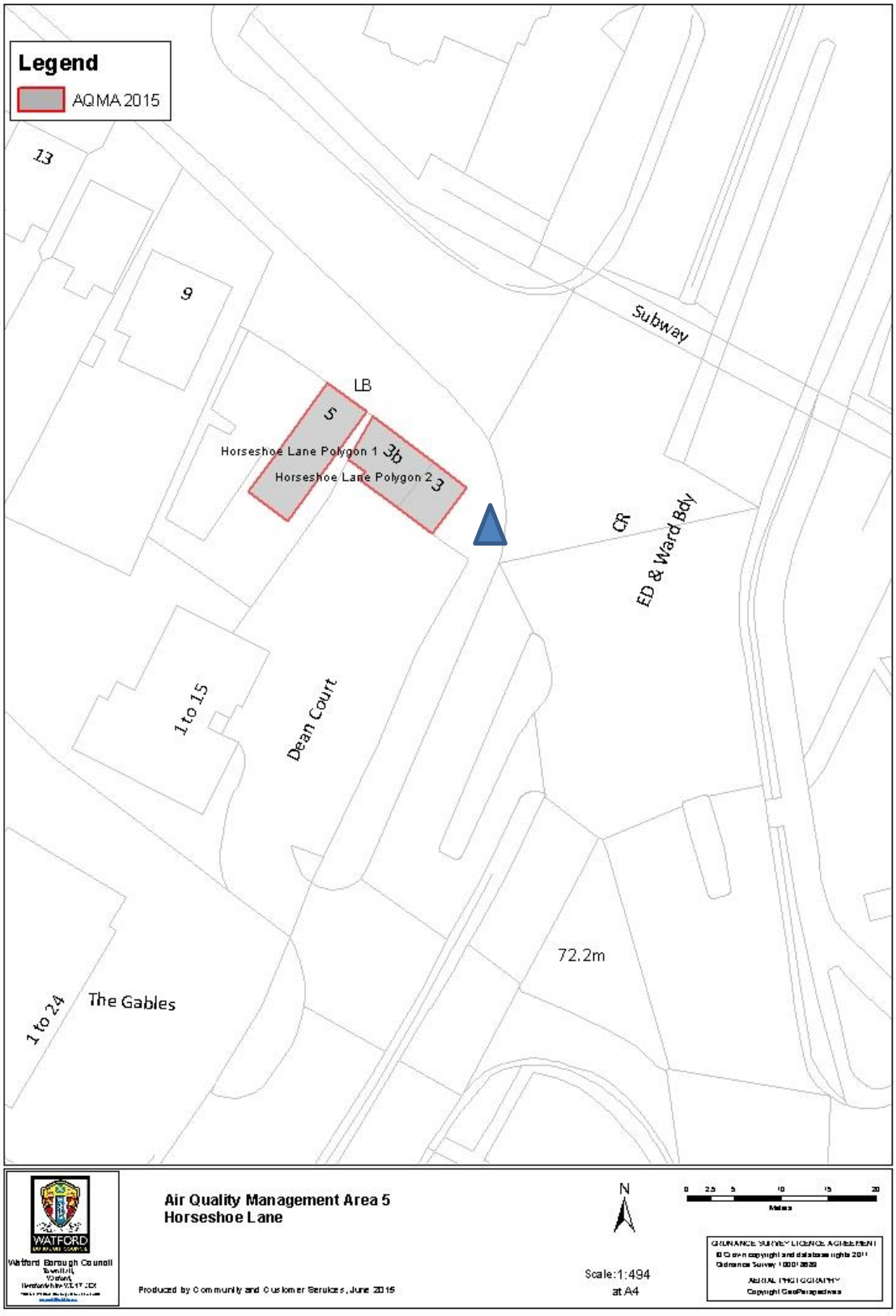


Figure 13: Map showing Horseshoe Lane / A405 Air Quality Management Area No.5



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

[4] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	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

References

- Ricardo Energy & Environment *Detailed Assessment of Nitrogen Dioxide in the Watford Air Quality Management Areas* (2015)
- https://www.watford.gov.uk/info/20014/parking/58/where_can_i_park_in_watford/5
- Goodlad, Gill Air Quality Strategic Plan. (2015) http://www.hertfordshire.gov.uk/docs/pdf/a/airqualitystrategicplan.pdf
- Watford Borough Council *Watford Borough Council Air Quality Action Plan*
- Watford Borough Council *Watford Housing Strategy 2015-2020* (2015) https://www.watford.gov.uk/site/scripts/google_results.php?q=housing+strategy
- Local Air Quality Management DEFRA Technical Guidance LAQM.TG (09)
- Brown, Richard *2015 Updating and Screening Assessment for Watford Borough Council* (2015)
- https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html