2016 Air Quality Annual Status Report (ASR)

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

Date (June 2016)

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Report Reference number	
Date	June 2016

Executive Summary: Air Quality in Our Area

Air Quality in Bracknell Forest

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 billion[3].

The main air quality issues in Bracknell Forest are associated with emissions from road traffic. These emissions contribute to exceedences of air quality objectives for the pollutant nitrogen dioxide (NO_2) and to a lesser extent to increased levels of particulate matter in the form of PM_{10} and $PM_{2.5.}$ Two Air Quality Management Areas (AQMAs) have been declared due to exceedences of the annual mean objective for $NO_{2;}$ the Bracknell AQMA (Bagshot Road and Downshire Way) and an AQMA in Crowthorne[4]. Monitoring results show that this objective continues to be exceeded in the AQMAs despite local actions and improvements in vehicle emissions.

Photo of Downshire Way air quality monitoring station

[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://uk-air.defra.gov.uk/aqma/details?aqma_id=356 https://uk-air.defra.gov.uk/aqma/details?aqma_id=355

Actions to Improve Air Quality

Bracknell Forest produced an air quality action plan in 2014 which outlines local measures to improve pollution within the AQMAs and more widely across the borough. The action plan is integrated with the delivery of the adopted Local Transport Plan (LTP) to improve local air quality and climate change through joint working with the Council's Environmental Health, Transport Planning and Planning Divisions.

Within the Bracknell AQMA, the Council has determined that Oxides of Nitrogen (NO_x) would need to be reduced by 50% to comply with the annual mean air quality objective for NO_2 and that the main contribution of emissions from vehicles is from queuing traffic on the A322. To help smooth the traffic flow and reduce journey times in this AQMA, a number of major highway improvements have been completed along the A329/A322 corridor that links the M3 and M4 motorway. Work on a number of the junctions has been funded through the LTP and the Council had a successful bid to the Department for Transport to improve the Twin Bridges roundabout.

Photo of Twin Bridges roundabout

Within the Crowthorne AQMA, the main emissions sources are from moving traffic, primarily from vans used to deliver goods to the shops along the High Street as they can cause delays in other traffic when unloading and loading goods. A reduction in NO_x emissions of 19% is required to achieve the annual mean air quality objective for NO_2 in this AQMA. As part of the action plan, the speed humps on the High Street have been upgraded and replaced by speed cushions to reduce the stop-start driving style. Another measure that is being pursued in the long term is to introduce a rear

service road for a number of shops along the High Street. If this was to be achieved this could potentially reduce the number of delivery vehicles unloading and loading by up to 50%. The Council is working with existing and new shop owners to gain the required planning permissions to move this action forward.

Photograph of new speed cushions, Crowthorne High Street

Local Priorities and Challenges

The main focus for Bracknell Forest in terms of improving air quality is to reduce NO_x emissions and therefore NO_2 concentrations by focusing actions within the two declared AQMAs. The Council also recognise that wider improvements in air quality across the Borough can also improve concentrations within these AQMAs.

Within the borough, the major priority is to regenerate the town centre in the next few years. In addition to improvements to the strategic highway to cope with the predicted increased demand in traffic, the regenerated town centre aims to promote sustainable access such as improving pedestrian and cycle routes, providing a high quality and efficient bus service and quality freight partnership.

Photograph of proposed regeneration of town centre

How to Get Involved

There are a number of ways members of the public can help to improve local air quality

- Walk or cycle short distances of less than one or two miles rather than driving
- Search for car sharing opportunities using Bracknell Forest Travelshare at (https://bracknellforest.liftshare.com/) or Faxi (https://faxi.co.uk/) to share journeys with work colleagues
- Use the bus or train regularly and keep up-to-date with the latest bus routes timetables at http://www.bracknell-forest.gov.uk/busroutesinbracknellforest and live bus departures at http://www.bracknellrti.com/Naptan.aspx

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1 Local Air Quality Management

This report provides an overview of air quality in Bracknell Forest during 2015. 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 Bracknell Forest Borough Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

Two AQMAs have been declared by Bracknell Forest Borough and a summary of these can be found in **Error! Reference source not found.**. Further information related to these AQMAs, including maps of the boundaries are available online[5].

Table 2-1– Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Bracknell (Area 1)	NO_2 annual mean	Bracknell Forest	An corridor encompassing Bagshot Road (A322), Horse and Groom Roundabout and Downshire Way (233 properties)	Air Quality Action Plan 2014 http://www.bracknell-forest.gov.uk/air-quality-action-plan-2014.pdf
Crowthorne (Area 2)	NO_2 annual mean	Crowthorne	An area from Bracknell Road and Crowthorne High Street in Crowthorne (271 properties)	Air Quality Action Plan 2014 http://www.bracknell-forest.gov.uk/air-quality-action-plan-2014.pdf

2.2 Progress and Impact of Measures to address Air Quality in Bracknell Forest

Bracknell Forest Borough Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2-3. More detail on these measures can be found in the 2014 Action Plan.

Key completed measures include a number of highway improvements as part of the A329-A322 corridor plan including changes to junctions, signalisation and better

[5] https://uk-air.defra.gov.uk/aqma/details?aqma_id=356, https://uk-air.defra.gov.uk/aqma/details?aqma_id=355.

coordination of traffic flow using UTMC and CCTV systems. These works are ongoing, but some examples of work already completed include:

- Horse and Groom roundabout improvements and signalisation (2012)
- Sports Centre roundabout signalisation (Feb 2015)
- Twin Bridges roundabout signalisation and capacity improvements (2015)
- Downshire Way widening (March 2015)
- Coral Reed junction (April 2016)

The aims of these highway improvements are to improve journey times and reduce queuing along this strategic corridor. Table 2-2 outlines the predicted changes in journey time using Bracknell's traffic model. Bracknell Forest Council plan to start monitoring one year after the Coral Reef junction was completed (i.e. to start April 2017) to allow traffic and road users to adapt to the new junctions and provide more reliable results on the effectiveness of the scheme. It is anticipated that improvements in journey time and through flow will reduce queuing traffic at these junctions and reduce emissions. The monitoring results will be presented in subsequent annual reports.

Table 2-2: Predicted changes in journey times from highway improvements

Direction	Existing journey time		Proposed journey time	
	AM	PM	AM	PM
Eastbound	16:32	13:53	12:31	11:41
Westbound	18:50	16:10	11:51	13:41

Bracknell Forest's key priorities for the coming year are to move ahead with the regeneration of the town centre and to continue with completing the improvements on the strategic highway to cope with the increased demand in traffic that this may bring. Smaller scale measures such as improvements to bus stops and signage will be put in place as and when required or when funding becomes available. The Council also plan to submit a bid to the DfT's Access Fund in autumn 2016 to provide an integrated mobile app and website to provide users with real time information on different modes of travel as well as personalised travel information.

Table 2-3– Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Improvements and signalisation of the Horse and Groom Roundabout	Traffic Management	Strategic highway improvements	BFC	2012	2012	Reduce queues and journey time	Reduction in NO_2 concentrations to below the objective in the AQMA 1	Work complete	Completed 2012	These 4 measures are part of the wider improvements of the A322/A329 corridor. Monitoring will start one year after final junction complete (April 2017) to allow traffic and road users to adapt to the new junctions, This should provide the most reliable results to fully assess the effectiveness of the schemes. Data will be provided in subsequent reports.
2	Improvements and signalisation of the Sports Centre Roundabout	Traffic Management	Strategic highway improvements	BFC	2013	2014	Reduce queues and journey time	Reduction in NO_2 concentrations to below the objective in the AQMA 1	Work complete	Completed Feb 2015	
3	Capacity and safety improvements including full signalisation at Twin Bridges Roundabout	Traffic Management	Strategic highway improvements	BFC	2013	2013-2015	Reduce queues in peak time	Reduction in NO_2 concentrations to below the objective in the AQMA 1	Installation of MOVA and works complete	Completed 2015	
4	Widening of Downshire Way from Horse and Groom roundabout to Twin Bridges	Traffic Management	Strategic highway improvements	BFC	2013	2013-2016	Reduce queues and journey time	Reduction in NO_2 concentrations to below the objective in the AQMA 1	Work complete	Completed March 2015	
5	Capacity and safety improvements at junction with B3348 Dukes Ride and A321 Wokingham Rd	Traffic Management	Strategic highway improvements	BFC and WBC	2012	2014-2015	Reduce queues in peak time	Reduction in NO_2 concentrations to below the objective in the AQMA 1	Work complete	Completed	Work led by WBC. No data provided to determine improvements made.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
6	Improvements to Dukes Ride/Bracknell Road junction	Traffic Management	Strategic highway improvements	BFC	2015	2017	Reduce queues and journey time	Reduction in NO_2 concentrations to below the objective in AQMA 2	Work not started	2018	This action is subject to funding through the LTP.
7	Crowthorne High Street improvements – speed cushions replacing flat top humps	Traffic Management	Other –Traffic calming	BFC	2012	2013-2015	Reduce stop start traffic to reduce emissions	Reduction in emissions from these types of measures can be in the order of 5% leading to a reduction in NO_2 concentration in AQMA 2	Work complete 2014	2016	Annual speed surveys and NO_2 monitoring conducted. Data shows that speeds remain below 20 mph and measured concentrations on the High Street remain below the objective.
8	Improvements to bus stops to aid flow of traffic and reduce queuing	Transport Planning and Infrastructure	Bus route improvements	BFC	2014	2014-2018	Reduce queueing at bus stops and bus station to smooth flow. Increase in number of people using buses	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Bus station complete. Bus stop work ongoing when required.	2017/2018	Bus station improved with better layout and lighting and drivers encouraged to turn engine off Also improvements made to bus fleet (min Euro IV buses). Information on bus patronage to be provided in subsequent reports.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
9	Improve signage along key routes including Bagshot Road in the AQMA	Transport Planning and Infrastructure	Cycle Network	BFC	2014	2017	Increase cycling rate	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Work in progress. Signs improved as required.	2016/2017	Data from annual walking and cycling survey shows increase in cycling by 18% from 2014-2015.
10	Delivery plan and provision of rear service year to reduce number of delivery vehicles unloading in Crowthorne High Street	Freight and Delivery Management	Delivery plans	BFC	2014	2014-2018	Reduce unloading and loading by 50% along section of High Street and smooth traffic flow	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	In progress. Council is working with shop owners to gain planning permission to use rear access.	2018	Long term action that is depending on gaining permission from shops.
11	Provision of real time information at all roadside displays	Promoting Travel Alternatives	Other – Real Time Travel Information	BFC	2012	2014-2018	Increase in number of people using bus and rail	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Real time information is provided at the bus station, rail station and a number of key hubs and shopping destinations.	2018	Annual figures produced on bus patronage (not yet available) to be provided in subsequent report. Council is to submit a bid in 2016 to the DfT Access Fund to build an app to provide real-time information
12	Updating the Council's website to include rail and bus times in real time	Promoting Travel Alternatives	Other – Real Time Travel Information	BFC	2014	2014-2018	Increase in number of people using bus and rail	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Work is ongoing and website now has links to real-time information from external sites	2018	Comment as above.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
13	Commissioning further work with Government funding into smart ticketing	Promoting Travel Alternatives	Other – Smart Ticketing	BFC	2014	2014-2015	Increase in number of people using bus and rail	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	No specific progress on this as no funding available.	2016/2017	It is anticipated that smart ticketing (e.g. contactless payment) will happen over time by rail and bus companies.
14	Undertaking targeted marketing to households and businesses within 150m of the key routes to encourage cycling and walking	Promoting Travel Alternatives	Promotion of Cycling and Walking	BFC	2014	2014	Increase in cycling and walking	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	LSTF study complete	Complete 2014. Work to be continued.	Original survey conducted through LSTF project completed and showed cycling increased by 57% on Bagshot Road. Further promotion work planned as part of proposed DfT access fund bid.
15	Development of travel plans by schools within the Borough	Promoting Travel Alternatives	School Travel Plans	BFC	2013	Ongoing	Reduction in local car journeys	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	35 out of 37 schools (95%) have a travel plan	Ongoing	Council actively works with schools to use and update their plans and encourage cycling and walking. Bikeability classes are run each year. No current information on impact on car journeys available.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
16	Development of two programmes of personal travel planning to encourage more sustainable travel; one programme will be set in a residential area, and the other at large employer sites	Promoting Travel Alternatives	Personalised Travel Planning	BFC	2014	2015	Reduce local car journeys	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	LSTF study completed	Complete 2014. Work to be continued as part of DfT access bid.	Several large employers run mini-buses for staff travelling from the station to the office (e.g. Dell). Business travel plan produced and distributed to all businesses in 2016 and this is available on the Council website.
17	Through the programme of replacement ensure that fleet vehicles continue to comply with current emission levels	Promoting Low Emission Transport	Public Vehicle Procurement	BFC	2013	2014	Reduce vehicle NOx and PM emissions	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Contractor fleet min Euro 4 standard on recent contracts (e.g. refuse and highway)	Ongoing	This measure is ongoing as part of procurement of new vehicles.
18	Consider introducing electric cars as pool cars	Promoting Low Emission Transport	Public Vehicle Procurement	BFC	2013	2014	Reduce vehicle NOx and PM emissions	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Procured one electric car and considering procuring a further pool car.	Ongoing	Provision for electric car charging increasing to encourage use of vehicles. Currently available in Council staff and public car parks, fleet depot, Waitrose and new multi-storey car park.

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. Because of this there is a Public Health Outcomes Framework (PHOF) indicator for $PM_{2.5}$ based on the evidence that an increase in annual average (population weighted) $PM_{2.5}$ by 10 µg/m^3 results in an increase in all-cause mortality rate by 1.06. This indicator is expressed as a percentage each year for each authority against the national average.

Although England has no set air quality objective for $PM_{2.5}$, the PHOF enables Council's Public Health and Environment departments to work together to priorities action on air quality. Many of the actions that Bracknell Forest are working on to reduce vehicle related emissions will address $PM_{2.5}$ concentrations. Of those measures in the action plan, the following are examples of those that will contribute towards $PM_{2.5}$ reductions:

- Cycle network and promoting cycling and walking
- Promoting low emission Council vehicles
- Traffic calming measures in Crowthorne High Street
- Strategic highway improvements to smooth traffic flow and reduce journey times

Although this pollutant is not currently monitored in Bracknell, the Council will consider whether $PM_{2.5}$ can be measured at one or both of their existing automatic sites instead of PM_{10} as part of the monitoring strategy review. As an alternative, the Council will assess changes in $PM_{2.5}$ concentrations over time by using the best available data sources. Local data include measured $PM_{2.5}$ concentrations from the nearest site in Reading, modelled concentrations from the Defra background maps and the ratio of measured PM_{10} to $PM_{2.5}$ from Bracknell's own monitoring sites. The current available $PM_{2.5}$ data are given in Table 2-4. The PHOF indicator shows that the percentage of mortality associated with $PM_{2.5}$ was 5.6% in Bracknell in the 2010

baseline. This dropped to 5.1% in 2013 which is slightly lower than the national average

Table 2-4: Monitored and modelled $PM_{2.5}$ concentrations, 2014-2015

Year	Annual mean $PM_{2.5}$ concentration ($\mu g/m^3$)			
	Monitored background concentration (Reading)	Average modelled background (Bracknell)	Estimated roadside concentration (Downshire Way)	Estimated background concentration (Fox Hill)
2015	7.5	11.7	14.0	11.8
2014	9.8	11.9	13.4	11.9

The Council will provide an update on the current situation with regards to $PM_{2.5}$ in each ASR to report on their progress to reduce concentrations.

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.

Bracknell Forest Borough Council undertook automatic (continuous) monitoring at Fox Hill School and Downshire Way during 2015. Table A.1 in Appendix A shows the details of the sites. On 29th May 2013, the previous monitoring site in Downshire Way was closed down and relocated due to major roadwork's to widen the road and network on Downshire Way around the Twin Bridges roundabout. The new monitoring site is at a similar distance from the road but on the opposite site of the carriageway. Monitoring has continued at this new site and there are no plans to move the site back to the original location. The Council plans to maintain their automatic monitoring sites but will review the location of their diffusion tubes during 2016 to consider whether to relocate tubes in locations that historically have meet the objective to locations in nearly completed housing estates such as Jennett's Park.

Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead as there are no identified issues with these pollutants in Bracknell.

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

Bracknell Forest Borough Council undertook non- automatic (passive) monitoring of NO_2 at 52 sites during 2015. 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) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for "annualisation" and bias. Further details on adAjustments 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 measured at the two automatic sites for the past 5 years with the air quality objective of 40µg/m^3. Concentrations at Fox Hill School were consistent with levels reported in previous years and are well below the objective. The annual mean concentration at Downshire Way (2) is below the annual mean objective in 2015 and is lower than the concentrations reported in the previous two years. Figure 1 shows the 5 year trends in annual mean concentrations at Fox Hill School and the two Downshire Way sites. It can be seen that concentrations at Foxhill are well below the objective and have remained fairly consistent over the past 5 years which is to be expected for a background site. The concentrations at the Downshire Way 2 site decreased slightly in 2015 to levels similar to those found in 2011 at the Downshire Way 1 site.

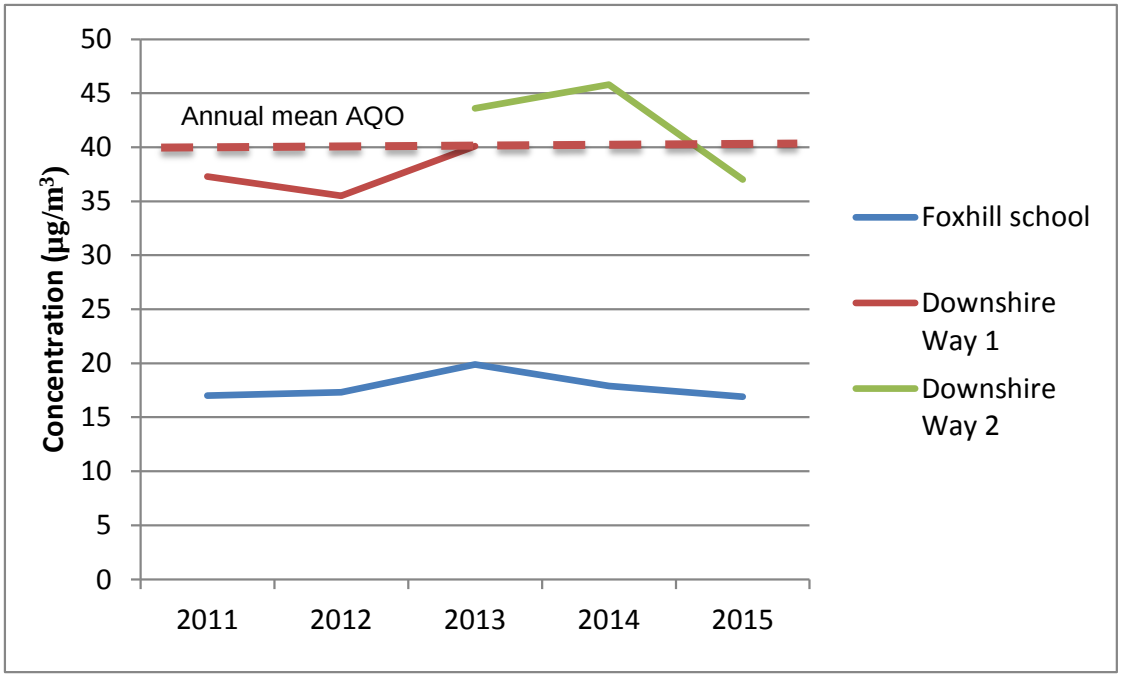


Figure 1 Trends in annual mean NO_2 concentrations over the past 5 years at the continuous monitoring sites

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. There were no exceedances of the hourly air quality objective at either of the two monitoring sites.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B. Figure 2 shows the diffusion tube results for those sites located within the two AQMAs in Bracknell. It can be seen that concentrations in 2015 have decreased at all sites within the AQMA from 2014 levels. Six diffusion tube sites within the AQMA continue to exceed the annual air quality objective. They are site 1 (Bagshot Road), site 12 (Downshire Way), site 42 (Bagshot Road Façade) and site 86 (Downshire Way monitor) in AQMA 1 and site 38 (Bracknell Road) and site 58 (Bracknell Road receptor) in AQMA 2. There were no exceedances at any of the diffusion tube sites outside of the AQMAs.

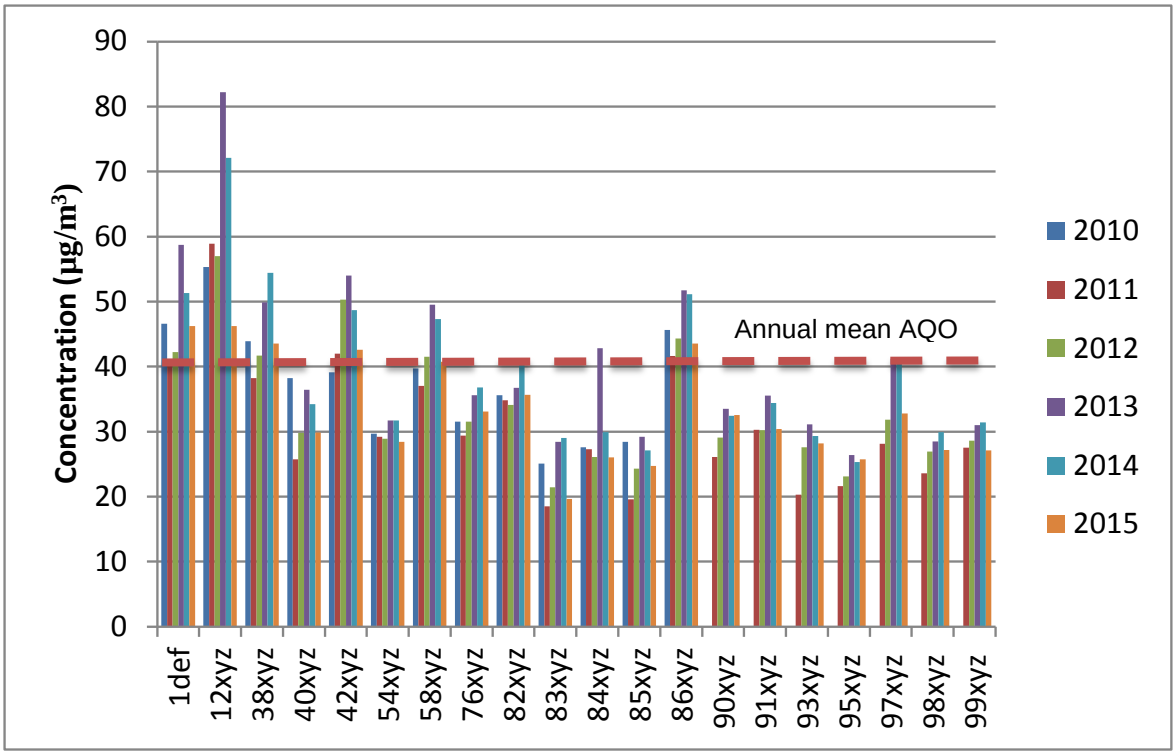


Figure 2 Trends in annual mean NO_2 concentration from diffusion tubes in the AQMAs over the past 6 years

3.2.2 Particulate Matter (PM_{10})

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

The annual mean concentration was well below the objective at both monitoring sites in 2015. Concentrations were consistent with levels reported in previous years and have declined slightly in the last five years.

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. The 24 hourly objective was exceeded on three days at Fox Hill School and five days at Downshire Way in 2015. These are both below the permitted number of exceedances of 35 days per year. These results are similar to previous years data.

Figure 1Figure 3 shows the downward trend in particulate concentrations over the past 5 years at the Fox Hill School site and at the Downshire Way sites apart from in 2013. There may have been elevated contractions of PM_{10} at the two Downshire Way sites in 2013 due to the road widening work that was being carried out along that stretch of road at the time.

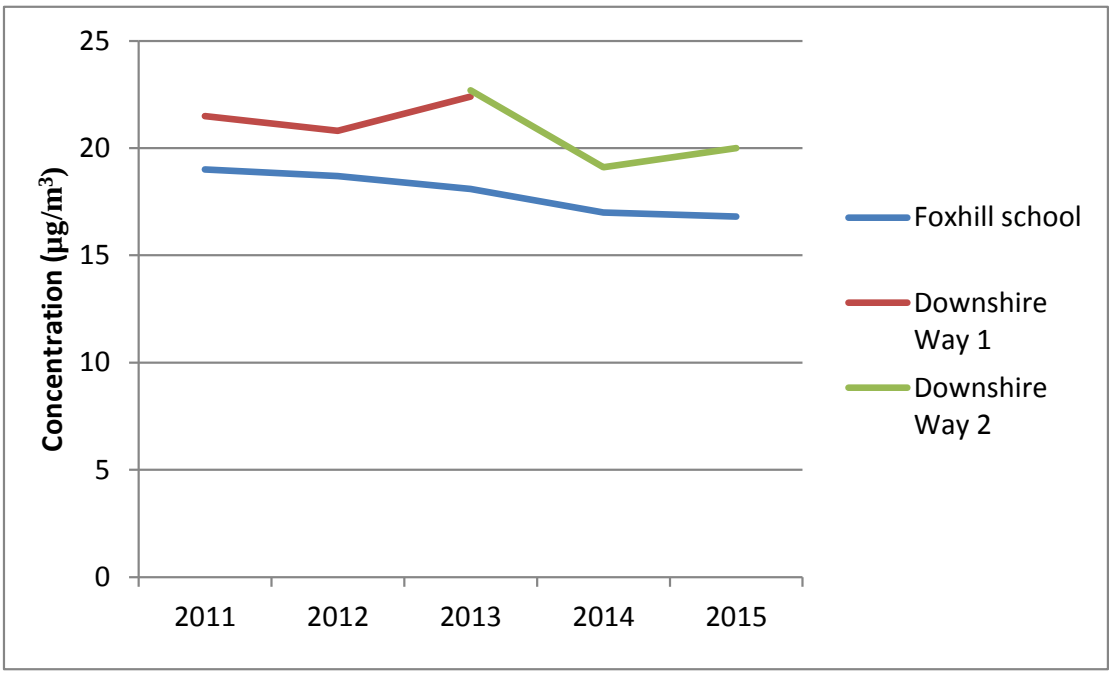


Figure 3 Trends in annual mean PM_{10} concentration over the past 5 years at the continuous monitoring sites

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)
CM1	Fox Hill School	Urban Background	X486992	Y167898	NO_2; PM_{10}	N	Chemiluminescent; TEOM	N	N/A	2.7
CM2	Downshire Way (1)	Roadside	X486917	Y168495	NO_2;PM_{10}	Y	Chemiluminescent; TEOM	Y (1m)	8m	2.7
CM3	Downshire Way (2)	Roadside	X486510	Y168847	NO_2;PM_{10}	Y	Chemiluminescent; TEOM	Y (1m)	8m	2.7

(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)
1def	Bagshot Road	Kerbside	X487230	Y168840	NO_2	Y	Y (6m)	<1m	N	1.6
1xyz	Rectory Lane	Façade	X487140	Y168407	NO2	N	Y (10m)	5m	N	1.7
3	Broadway	Urban background	X487240	Y169490	NO2	N	N	>30m	N	2.5
12xyz	Downshire Way	Kerbside	X486560	Y168794	NO2	Y	Y (10m)	<1m	N	1.7
17/18/19	17/18/19 Fox Hill School	Urban background	X486959	Y167915	NO2	N	N	>30m	Y	2.6
27x	3M R/about	Kerbside	X486671	Y169599	NO2	N	Y (9m)	1m	N	1.3
29x	Clintons Close	Kerbside	X486347	Y169534	NO2	N	Y (20m)	1m	N	2.8
32xyz	8 Old Bracknell	Facade	X486569	Y168824	NO2	N	Y (<5m)	30m	N	1.7

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)
	Close									
38xyz	Bracknell Road	Roadside	X484371	Y164284	NO2	Y	Y (10m)	2m	N	1.7
40xyz	Crowthorne High Street	Roadside	X484090	Y163935	NO2	Y	Y (<10m)	1m	N	1.6
41xyz	3M R/about	Kerbside	X486622	Y 169573	NO2	N	Y (21m)	1m	N	1.8
42xyz	Bagshot Road Facade	Roadside	X487244	Y168025	NO2	Y	Y (<5m)	3m	N	0.9
54xyz	Elizabeth Close	Façade	X487243	Y168169	NO2	Y	Y (<5m)	15m	N	1.8
58xyz	Bracknell Rd receptor	Façade	X484378	Y164286	NO2	Y	Y (<5m)	5m	N	1.6
65x	Binfield Road	Kerbside	X486643	Y169606	NO2	N	Y (12m)	<1m	N	2.1

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)
76xyz	Dukes Ride	Kerbside	X484188	Y164178	NO2	Y	Y (10m)	<1m	N	2.0
77x	London Road	Roadside	X484283	Y169335	NO2	N	Y(11m)	2m	N	1.9
78x	John Nike Way	Roadside	X484348	Y169212	NO2	N	Y(7.5m)	2m	N	2.1
79x	Park Road (Celsius) receptor	Façade	X487481	Y169436	NO2	N	Y(<1m)	2m	N	1.8
80xyz	Ring Road	Façade	X486894	Y169392	NO2	N	Y(2m)	2m	N	1.8
81xyz	Market Street	Roadside	X486840	Y169090	NO2	N	Y(<1m)	2m	N	1.8
82xyz	Downshire Way (Boxford) receptor	Façade	X486751	Y168661	NO2	Y	Y(<1m)	14m	N	1.9

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)
83xyz	Bagshot Road (Glebewood) receptor	Façade	X487216	Y167940	NO2	Y	Y(<1m)	3m	N	1.8
84xyz	Dukes Ride (Playhouse receptor)	Kerbside	X484125	Y164187	NO2	Y	Y(3m)	1m	N	1.8
85xyz	High Street Crowthorne receptor	Roadside	X484138	Y164075	NO2	Y	Y(<1m)	4m	N	1.6
86xyz	Downshire Way monitor	Roadside	X486807	Y168564	NO2	Y	Y(1m)	9m	Y	2.6
90xyz	Past and present	Roadside	X484408	Y164341	NO2	Y	Y (17m)	4m	N	1.6
91xyz	The Mount receptor	Façade	X484352	Y164249	NO2	Y	Y (<1m)	6m	N	1.7

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)
93xyz	The Prince Alfred	Façade	X484176	Y164159	NO2	Y	N	4m	N	1.8
95xyz	3 Leverkusen Way (receptor)	Façade	X486929	Y168540	NO2	Y	Y(<1m)	9m	N	1.7
96xyz	Trotters Folly	Façade	X487057	Y168562	NO2	N	Y (<1m)	13m	N	1.5
97xyz	Linden House	Roadside	X487166	Y168470	NO2	Y	N	2m	N	1.6
98xyz	67 Elizabeth Close (receptor)	Façade	X487249	Y168061	NO2	Y	Y (1m)	10m	N	2.0
99xyz	16 Firlands (receptor)	Façade	X487258	Y167948	NO2	Y	Y (<1m)	10m	N	1.6
100xyz	Continuous monitor	Roadside	X484112	Y163992	NO2	N	Y (3m)	2m	Y	1.8

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)
	Crowthorne									
101xyz	14 Ambassador	Façade	X486035	Y167738	NO2	N	Y (<1m)	16m	N	1.8
102xyz	28 Southwold	Façade	X485606	Y166333	NO2	N	Y (<1m)	10m	N	1.8
103xyz	43 Avebury	Kerbside	X486239	Y167281	NO2	N	Y (7m)	<1m	N	1.3
104xyz	53 Neuman Crescent	Façade	X486282	Y167374	NO2	N	Y (<1m	24m	N	1.7
105xyz	69 Quintiles	Kerbside	X485673	Y166268	NO2	N	Y (4m)	<1m	N	1.5
106	19 Yorktown Road	Façade	X483435	Y161534	NO2	N	Y (<1m)	20m	N	1.3
107	107 42 Yorktown Road	Kerbside	X483696	Y161427	NO2	N	N	<1m	N	1.8
108	108 Kelvin	Façade	X487626	Y169316	NO2	N	Y(<1m)	2.5m	N	1.8

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)
	Gate Flats									
109	109 Kelvin gate Flats	Façade	X487561	Y169316	NO2	N	Y(<1m)	4.4m	N	1.8
110	110 Kelvin Gate Flats	Facade	X487445	Y169375	NO2	N	Y(<1m)	6.6m	N	1.8

(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 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
CM1	Fox Hill School	Urban Background	94	94	17.0	17.3	19.9	17.9	16.9
CM2	Downshire Way (1)	Roadside	-	-	37.3	35.5	**40.1***		
CM3	Downshire Way (2)	Roadside	98	98			**43.6***	**45.8**	37.0

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 Technical Guidance 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 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
CM1	Fox Hill School	Urban Background	94	94	0	0	0	0	0
CM2	Downshire Way (1)	Roadside	-	-	0	0	1		
CM3	Downshire Way (2)	Roadside	98	98			0	**6**	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 90%, 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 2015 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
CM1	Fox Hill School	Urban Background	94	19.0	18.7	18.1	17.0	16.8
CM2	Downshire Way (1)	Roadside	-	21.5	20.8	22.4	-	-
CM3	Downshire Way (2)	Roadside	99	-	-	22.7	19.1	20.0

Notes: Exceedances of the PM_{10} annual mean objective of 40µg/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 Technical Guidance 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 2015 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2011	2012	2013	2014	2015
CM1	Fox Hill School	Urban Background	94	8	6	3	4	**3**
CM2	Downshire Way (1)	Roadside	99	17	9	3	-	-
CM3	Downshire Way (2)	Roadside		-	-	5	5	5

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 90%, the 90.4th percentile of 24-hour means is provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2015

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (1)	Site mean
1d	54.7	57.5	54.8	37.2	49.8	45.9	51.9	60.6	54.3	63.6	48.5		52.6	**47.4**	**46.3**
1e	72.1	38.9	73.0	35.9	48.3	50.0			47.5	58.9	42.0		51.8	**46.7**	
1f	47.9	55.3	52.4	36.7	46.1	44.2		52.7	49.1	67.2	45.4		49.7	**44.7**	
1x	32.1	40.3	33.0	29.9	21.1	25.9	19.8	28.9	37.6	42.9	19.3	16.7	29.0	26.1	25.4
1y	34.4	32.0	31.8	31.2	19.9	24.5	20.6	25.9	30.5	41.8	20.7	16.4	27.5	24.7	
1z	33.2	36.9	37.4	28.3	22.0	26.1	19.6	29.2	34.0	39.3	19.5	14.7	28.4	25.5	
12x	88.0	76.1	71.4	51.6	56.5	49.3	70.3	79.5	59.4	76.0	51.6	58.3	65.7	**59.1**	**58.6**
12y		79.2	73.7	50.2	70.4	54.3	65.0	70.2	63.9	66.0	45.5	68.9	64.3	**57.9**	
12z	76.1	78.2	71.7	47.8	74.2	48.1	64.0	77.0	68.3	76.3	38.4	64.5	65.4	**58.8**	
17		22.0	24.8	20.2	12.6	14.9	12.4	17.9	19.8	26.1	17.9	15.9	18.6	16.7	16.5
18		25.2	23.0	18.7	13.0	14.1	11.3	13.0	21.1	26.0	18.4	15.4	18.1	16.3	
19		21.2	22.5	19.2	13.7	14.8	12.7	17.3	21.6	24.3	17.3	15.1	18.2	16.4	
27x	74.8	57.9	57.0	29.3	52.4	51.9			62.1			62.5	56.0	50.4	16.8
29x	35.4	35.4	33.4	30.5	21.9	23.7	28.3	32.4		35.5	33.0		31.0	27.9	27.9
32x	37.8	35.0	29.4	23.2	24.7	23.9	25.6	29.3	29.3		24.9	23.3	27.9	25.1	25.4
32y	33.9	36.6	33.1	28.4	22.9	23.7	24.6	30.1		32.8	25.0	21.7	28.4	25.6	

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (1)	Site mean
32z	35.1	36.2	32.6	24.2	24.5	24.0	24.3	29.1	29.3	31.9	23.4	24.4	28.2	25.4	
38x	57.0	49.9	59.1	28.4	44.5	47.2	49.8	61.4	57.6	68.9	51.8	25.5	50.1	**45.1**	**43.6**
38y	34.8	67.5	55.5	36.3	52.9	48.5	46.8	39.6		55.0	43.7	28.3	46.3	**41.6**	
38z	58.8	55.3	60.3	29.4	46.3	53.4	54.8	52.3	48.9		48.5	28.8	48.8	**43.9**	
40x			34.2	32.8	25.8	33.7	29.6	34.4	36.6	43.1	32.6	28.5	33.1	29.8	29.9
40y			29.5	38.0	25.0	33.3	30.4	35.0	39.4	40.5	31.3	28.8	33.1	29.8	
40z		37.0	31.4	32.0		34.1	29.9	33.8	34.8	42.8	29.8	27.0	33.2	29.9	
41x		38.6	35.3	29.3	25.1	26.7	28.3	31.6	32.8		30.5	30.7	30.9	27.8	27.8
42x		56.7		42.1	46.3	42.5	41.5	55.2	52.4	57.0	41.0	35.4	47.0	**42.3**	**42.6**
42y		48.1		40.5	51.6	39.9	50.7	54.9	44.1	55.0		42.8	47.5	**42.8**	
42z		55.6			38.3	37.7	40.3	53.4	49.0	65.9		38.6	47.3	**42.6**	
54x	46.2	38.6	32.8	23.6	36.9	28.5	28.4	33.9	30.9	23.8	35.0	25.2	32.0	28.8	28.4
54y	41.0	40.6	33.2	22.2	34.6	26.1	26.8	35.1	30.7	33.1	33.9	25.9	31.9	28.8	
54z	45.6	40.4	26.8	26.6	30.5	24.4	30.5	23.6	32.3	31.4	30.8	27.3	30.9	27.8	
58x	45.4	49.3	66.7	37.4	43.7	50.0	43.8	36.1	48.7	45.5	37.3	37.8	45.1	**40.6**	**40.7**
58y	48.0	53.6	52.5	32.5	42.1	43.8	44.0	45.7	52.3	50.0	39.0	36.6	45.0	**40.5**	
58z	47.8	56.0	52.5	38.4	43.7	44.2	44.8	43.2	48.1	52.5	41.2	34.2	45.5	**41.0**	
65	39.6	35.8	38.1	25.3	33.4	28.3	35.9	34.4	32.6		32.1	36.0	33.8	30.4	33.2
76x		37.7	40.3	26.7	34.8	36.4	36.4	38.4	35.3	40.2	36.0	34.7	36.1	32.5	33.1
76y		45.1	40.2	27.4	34.5	35.2	34.3	38.3	40.0	40.1	37.0	33.2	36.8	33.2	

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (1)	Site mean
76z		41.9	39.3	29.9	37.6	35.3	36.0	35.9	42.4	42.7	34.9	35.4	37.4	33.7	
77x		39.8	34.5	26.4	32.9	27.5	28.7	32.7	32.5	39.5	39.8	32.7	33.4	30.0	30.0
78x		43.1	40.5	27.3	27.4	26.6	28.6	30.1	31.3		29.8	25.8	31.0	27.9	27.9
79x	43.6			23.2	28.6	26.8	27.3	32.2			32.8	27.6	30.3	27.2	27.3
82x	46.7	41.0	38.5	32.9	44.6	41.3	51.4	44.9	27.5	34.9	39.4		40.3	36.3	35.7
82y	44.3	42.4	38.1	30.7	43.3	37.9	46.3	46.9	38.4	31.3	34.9		39.5	35.6	
82z	45.7	44.2	41.9	32.4	46.5	41.3	49.0	46.4	39.8	31.0	34.4	16.4	39.1	35.2	
83x	24.9	28.5	26.6	16.7		16.6	13.8	21.5	24.2	29.0	17.5	21.3	21.9	19.7	19.6
83y	25.7	27.9	27.1	16.0		17.7	14.4	21.1	22.8	32.8	18.9	19.9	22.2	20.0	
83z	24.1	29.4	24.6	21.9		17.8	15.0	21.5			17.5	20.3	21.4	19.2	
84x		38.3	29.4	24.8	25.8	29.4	24.7	26.7	29.5	33.8	26.8	23.1	28.4	25.5	26.0
84y	35.9	32.7	27.6	23.8	27.1	28.3	27.7	24.4	25.7	31.2	25.4	25.1	27.9	25.1	
84z	39.7	39.5	28.9	25.7	25.6	28.7	25.1		32.4	35.5		23.5	30.5	27.4	
85x	36.2		33.6	23.0	22.0	23.2	19.7	26.6		36.8		22.8	27.1	24.4	24.7
85y	34.0	33.4	39.5	22.6	20.3	24.5	19.7	22.9		38.1		22.5	27.7	25.0	
85z	35.6	28.3	32.7	24.1	21.6		18.0	26.3		38.2		22.8	27.5	24.8	
86x	33.6	48.8	57.4	36.1		44.1	52.2	58.3	48.2	52.6	64.3	38.8	48.6	**43.7**	**43.5**
86y	33.4	46.3	52.1	36.5		44.1	57.7	55.7	56.1	51.0	59.7	39.1	48.3	**43.5**	
86z	33.2	57.6	52.4	44.2	45.1	48.7	52.7	58.7	52.9			35.8	48.1	**43.3**	
90x	49.0	40.9	34.2	44.5	29.6	32.0	31.4	30.7	36.3	38.0	32.9	30.4	35.8	32.2	32.5

Site ID	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 (1)	Site mean
90y	44.7	44.9	33.1	47.1	30.5	34.2	31.1	33.0	35.3	40.3	35.3	29.9	36.6	32.9	
90z	36.5	36.4	36.1	56.7	32.6	34.1	29.4	31.6	36.1	39.2	33.7	29.1	36.0	32.4	
91x		37.1	35.2	27.5	23.5	34.8	28.9	30.3	35.6	39.5	26.5	34.3	32.1	28.9	30.4
91y	40.9	37.5	35.1	27.6	28.1	31.5	30.1	32.1	36.6		27.5	36.3	33.0	29.7	
91z		36.6		29.4	56.0	35.2	28.8	29.7	37.8	41.7	27.4	39.2	36.2	32.6	
93x	45.6	36.4	32.8	26.9	26.0	32.9	25.1	28.3	33.6			23.5	31.1	28.0	28.2
93y	39.7	35.5	33.9	24.6	30.7	30.7	26.4	29.2	31.6			25.8	30.8	27.7	
93z	44.2	43.0	31.7	27.4	27.3	28.6	26.6	30.1	37.1			23.8	32.0	28.8	
95x	58.6		56.4	24.5		21.5	20.3	25.9	26.7		26.1	24.5	31.6	28.4	25.7
95y	56.8		59.4	23.4	20.1	21.4	20.5	26.5	26.7		25.2	24.4	30.4	27.4	
95z				25.9	20.2	19.8	20.6	27.0	26.9		25.2	24.1	23.7	21.3	
96x	29.1	32.7	25.4	25.0	19.0	23.9	18.8	27.1	27.2	32.7	22.5	24.0	25.6	23.0	22.7
96y	33.0	31.3	27.0	23.4	17.7	20.7	20.9	26.4	30.2	29.6	22.9	24.0	25.6	23.0	
96z	29.0	25.4	32.2	18.7	18.3	20.4	20.5		26.9	31.1	22.3	24.2	24.5	22.0	
97x	41.6	39.5	38.6	27.1	35.8	31.3	35.6	40.0	38.2	47.4	29.0	30.5	36.2	32.6	32.8
97y	45.7	38.7	36.6	32.2	35.6	34.2	33.9	34.0	38.8	48.8	31.1	31.7	36.8	33.1	
97z	49.6	41.7	38.0	24.1	31.5	35.0	33.4	36.4	36.7	47.0	30.9	30.1	36.2	32.6	
98x	40.1	36.8	29.8	27.2	29.6	23.8	24.3	32.0	29.1	33.1	27.4	33.4	30.6	27.5	27.2
98y	37.2	34.9	32.0	23.2	25.8	23.5	27.0	31.9	28.6	27.7	29.2	33.6	29.5	26.6	
98z	38.4	37.0	31.4	22.7	28.4	25.1	27.1	31.2	31.4	32.7	27.3	33.4	30.5	27.5	

Site ID	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 (1)	Site mean
99x	35.5	35.1	28.1	24.8	29.2	27.0	29.3	33.6	27.6	31.5	29.6	30.3	30.1	27.1	27.1
99y	35.6	33.7	30.9	22.8	27.0	27.1	29.5	33.3	32.7	30.4	25.7	29.7	29.9	26.9	
99z	43.4	32.4	30.0	24.4	30.6	26.0	29.4	33.7	29.3	28.7	28.7	26.5	30.2	27.2	
100x	37.3	39.5	37.4	26.6			21.6				27.1	22.6	30.3	27.3	27.5
100y	40.2	34.0		26.7			21.9		45.3		22.0	23.8	30.6	27.5	
100z	39.9			26.6			22.0		48.0		25.6	22.7	30.8	27.7	
101x	27.9	25.8			14.9	20.2	14.4	22.0	22.8	24.9	14.7	11.5	19.9	17.9	17.9
101y	28.5	26.3		21.4	15.3	19.1	14.4		23.6	25.5	13.6	12.7	20.0	18.0	
101z	28.0	25.6		21.8	15.8	20.5	13.6	20.5	22.8	23.9	14.2	10.9	19.8	17.8	
102x	22.5	25.2		21.4	14.5	21.4	16.4	23.2	28.6	32.3	17.4	18.6	22.0	19.8	19.5
102y	22.0	23.3		21.4	14.2	22.3	15.4	24.2	24.6	30.9	17.0	18.6	21.3	19.1	
102z	24.0	25.0		21.2	14.2	22.3	16.3	24.4	26.0	30.9	16.9	18.6	21.8	19.6	
103x		34.7			17.9	26.7	20.1	29.2	31.8	36.3	21.6	23.6	26.9	24.2	24.3
103y	34.2		28.4	25.6	18.7	26.6	20.1	28.4	32.6	38.7	26.0	22.0	27.4	24.6	
103z	30.7				20.1	26.8	20.2	29.5	30.6	34.7	24.0	23.2	26.6	24.0	
104x	35.7	32.0	30.0	19.6	24.7	26.6	23.2	28.7	29.8	27.5	23.8	20.7	26.9	24.2	23.9
104y	34.0	30.5	26.8	28.1	20.7	26.9	24.2	26.8	27.7	25.7	22.9	20.7	26.2	23.6	
104z	31.0	28.7	31.2	23.4	25.1	26.5	25.1	28.6	29.7	28.7	21.8	20.6	26.7	24.0	
105	38.5	32.5	31.7	21.5	23.4	23.1	19.7	24.6		27.1	27.8	22.1	26.6	23.9	23.9
108	32.1	30.7	28.7	22.8		22.5	23.9	27.9	32.6	34.5	26.5	22.2	27.7	24.9	24.9

Site ID	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 (1)	Site mean
109	36.4	31.3	29.9	24.1	23.1	21.2	19.1	20.4	25.7	30.5	27.5	21.5	25.9	23.3	23.3
110	35.0	33.2	30.5	24.5	25.8	23.7	24.1	28.8	28.1	32.3	26.9	20.5	27.8	25.0	25.2

(1) See Appendix C for details on bias adjustment

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

In 2015, there were no monitoring sites which had a data capture rate of less than 75% so there was no requirement to annualise data.

As for previous reporting rounds the triplicate diffusion tubes located at Fox Hill School have been used to compare with against the NO_2 concentrations recorded by the collocated continuous monitoring station to determine a local bias adjustment factor. To do this, then monthly results were entered into the 'Checking Precision and Accuracy of Triplicate Tubes' spreadsheet[6] (Figure 4) which calculated a local bias adjustment factor of 0.90 (95% confidence interval) . This value was compared with the national bias factor from the spreadsheet version 3/16[7] for the laboratory and method (Gradko 20% TEA in water). This gave a figure of 0.91 which is similar to the local factor and therefore a decision to use the local bias factor is justified.

Figure 4: Local Bias Factor spreadsheet

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation	95% CI of mean
1									
2			22.02	25.18	21.23	23	2.1	9	5.2
3			24.84	23.01	22.55	23	1.2	5	3.0
4			20.18	18.65	19.19	19	0.8	4	1.9
5			12.58	13.00	13.66	13	0.5	4	1.4
6			14.91	14.13	14.76	15	0.4	3	1.0
7			12.40	11.26	12.71	12	0.8	6	1.9
8			17.93	12.97	17.33	16	2.7	17	6.7
9			19.75	21.13	21.65	21	1.0	5	2.4
10			26.09	26.04	24.35	25	1.0	4	2.5
11			17.95	18.42	17.34	18	0.5	3	1.3
12			15.87	15.40	15.05	15	0.4	3	1.0
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
22.80	96		Good
23.79	93	Good	Good
21.55	96	Good	Good
20.21	96	Good	Good
10.65	93	Good	Good
12.82	96	Good	Good
10.27	96	Good	Good
14.09	96	Good	Good
18.77	96	Good	Good
20.41	96	Good	Good
14.90	74	Good	or Data Capture
11.59	99	Good	Good
Overall survey -->		Good precision	Good Overall DC

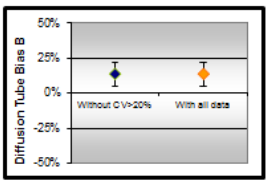
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Fox Hill

Precision: 11 out of 11 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 10 periods of data
Bias factor A 0.9 (0.83 - 0.97)
Bias B 12% (3% - 20%)
Diffusion Tubes Mean: 18 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 16 µgm^{-3}
Data Capture for periods used: 96%
Adjusted Tubes Mean: 16 (15 - 18) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 10 periods of data
Bias factor A 0.9 (0.83 - 0.97)
Bias B 12% (3% - 20%)
Diffusion Tubes Mean: 18 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 16 µgm^{-3}
Data Capture for periods used: 96%
Adjusted Tubes Mean: 16 (15 - 18) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

[6] http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html
[7] http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Appendix D: Map of Monitoring Locations

Figure 5 Map of automatic monitoring sites in relation to AQMA 1 (Bagshot Road, Bracknell).

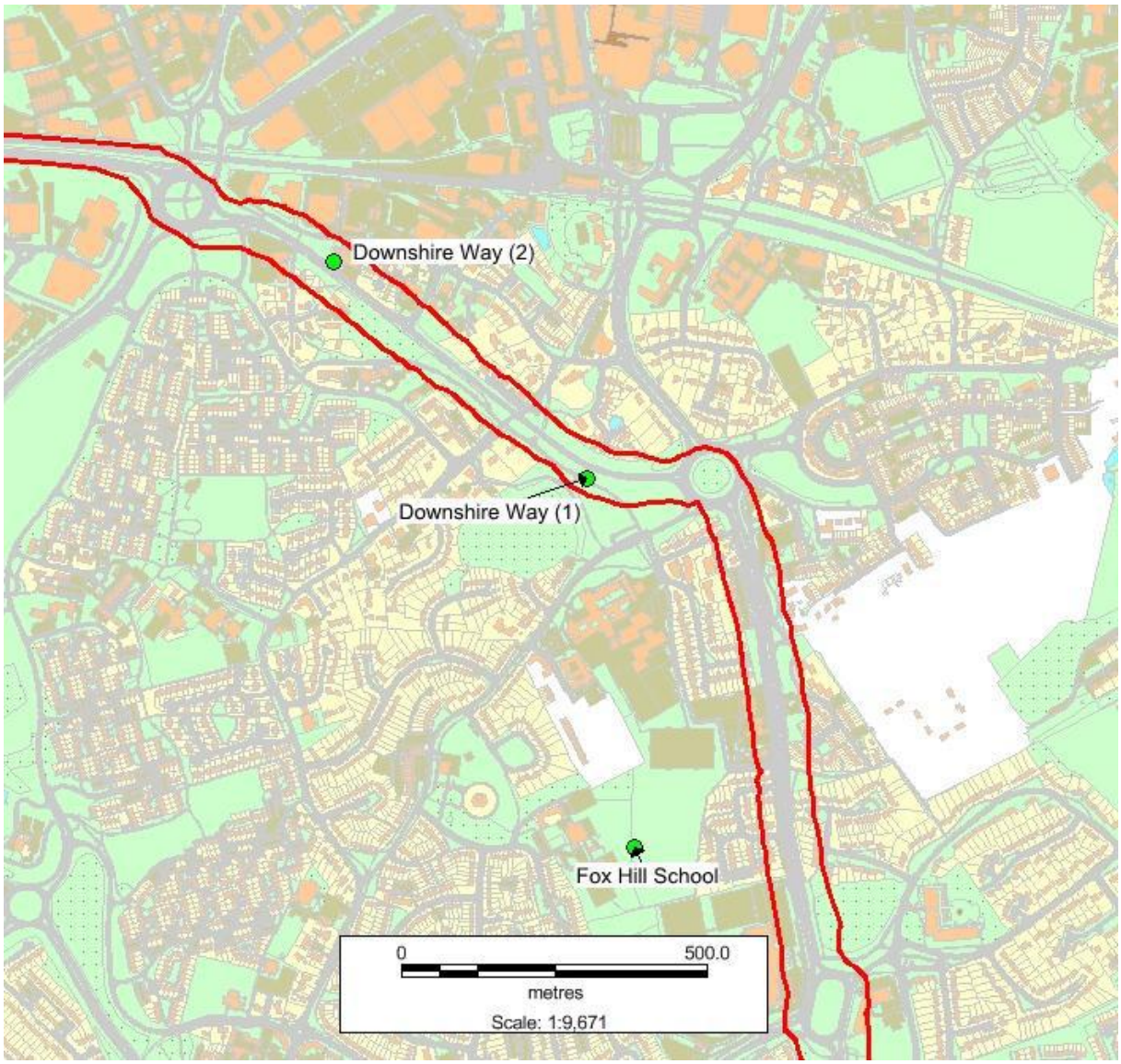


Figure 6 Map of non-automatic monitoring sites close to AQMA 1, Bagshot Road.

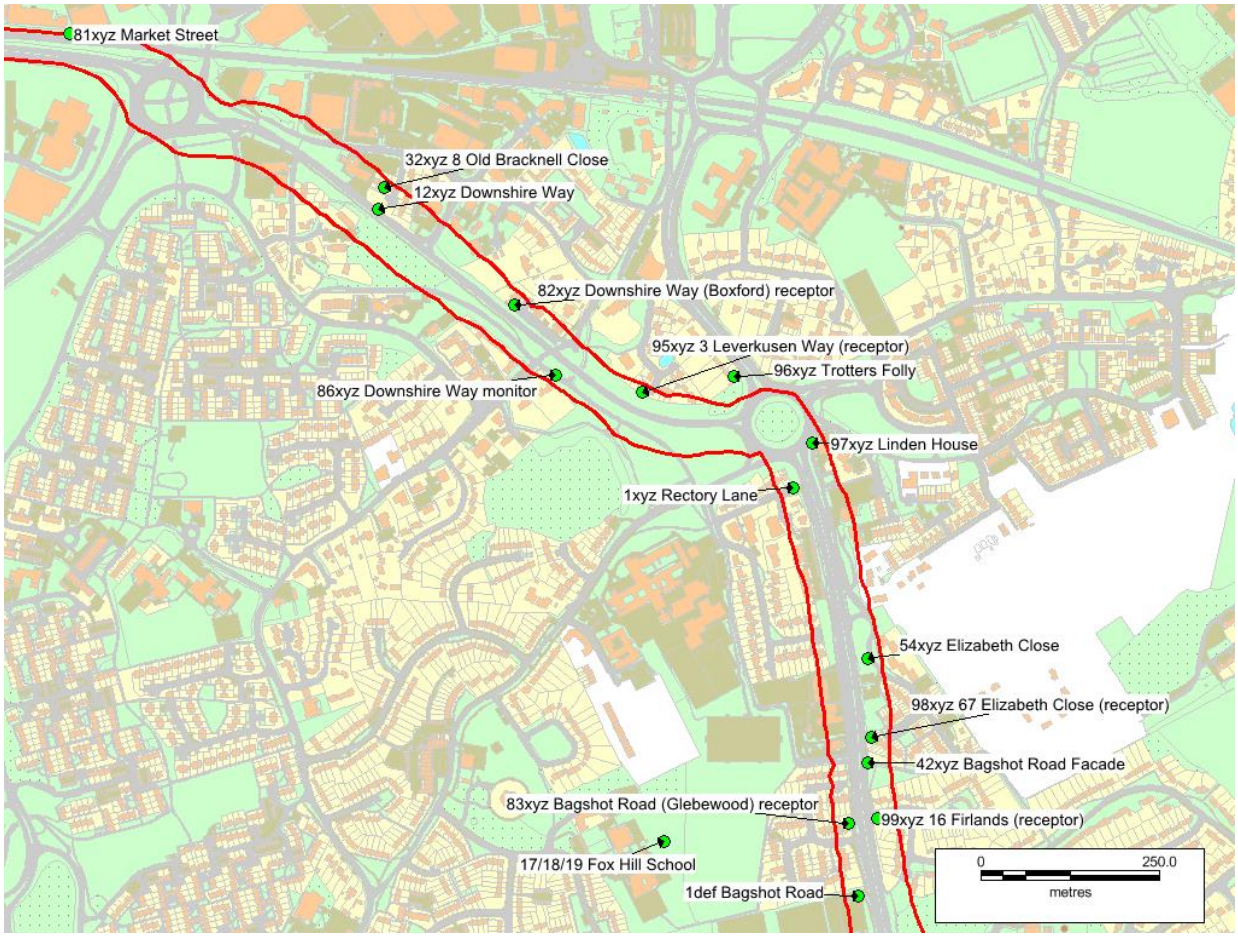


Figure 7 Map of non-automatic monitoring sites, Bracknell Town Centre.

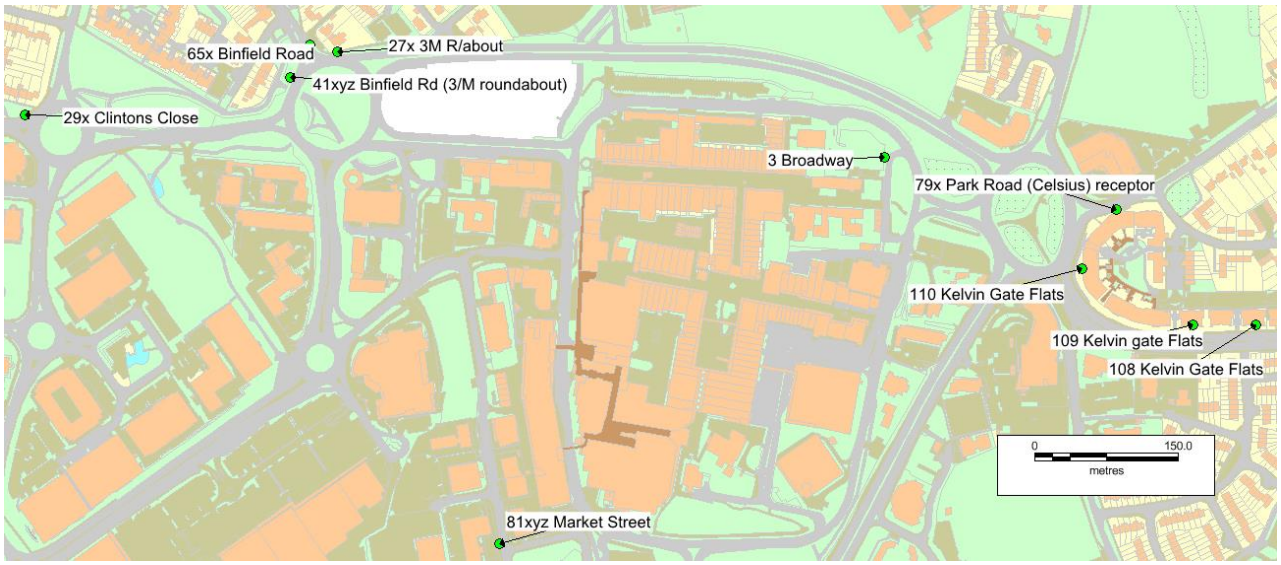


Figure 8 Map of non-automatic monitoring sites, Easthampstead.

Figure 9 Map of non-automatic monitoring sites close to AQMA 2, Crowthorne.

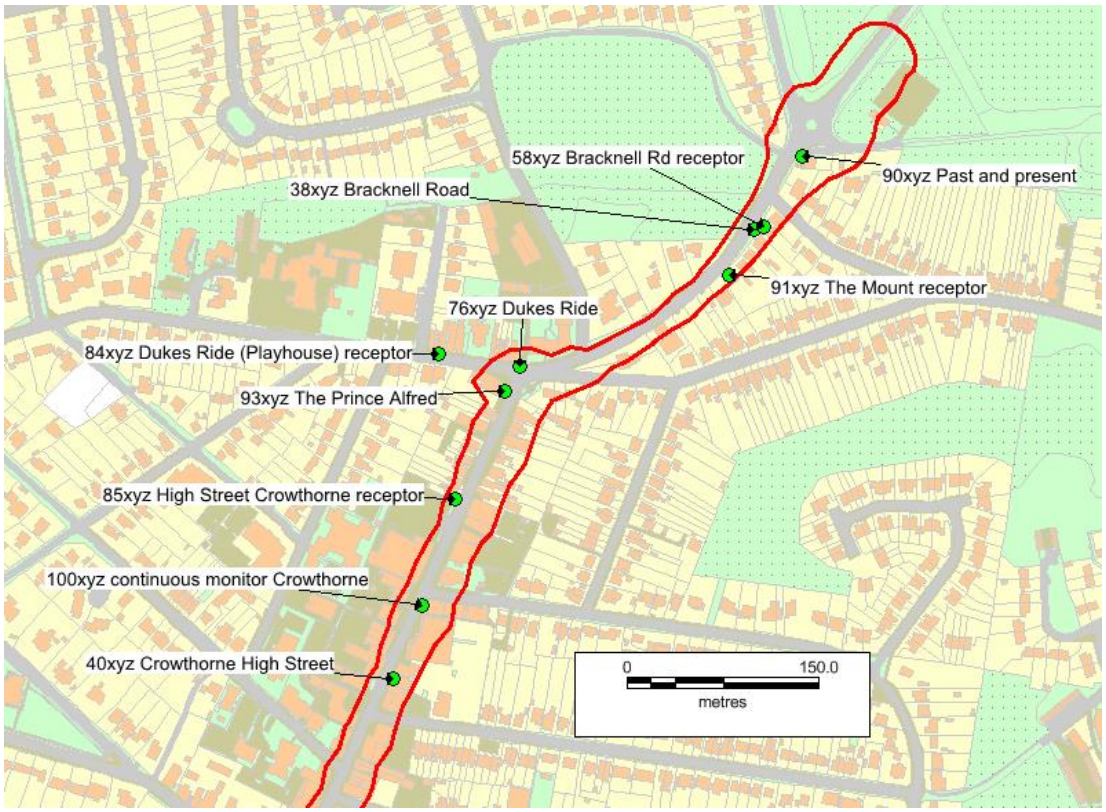


Figure 10 Map of non-automatic monitoring sites, Sandhurst.

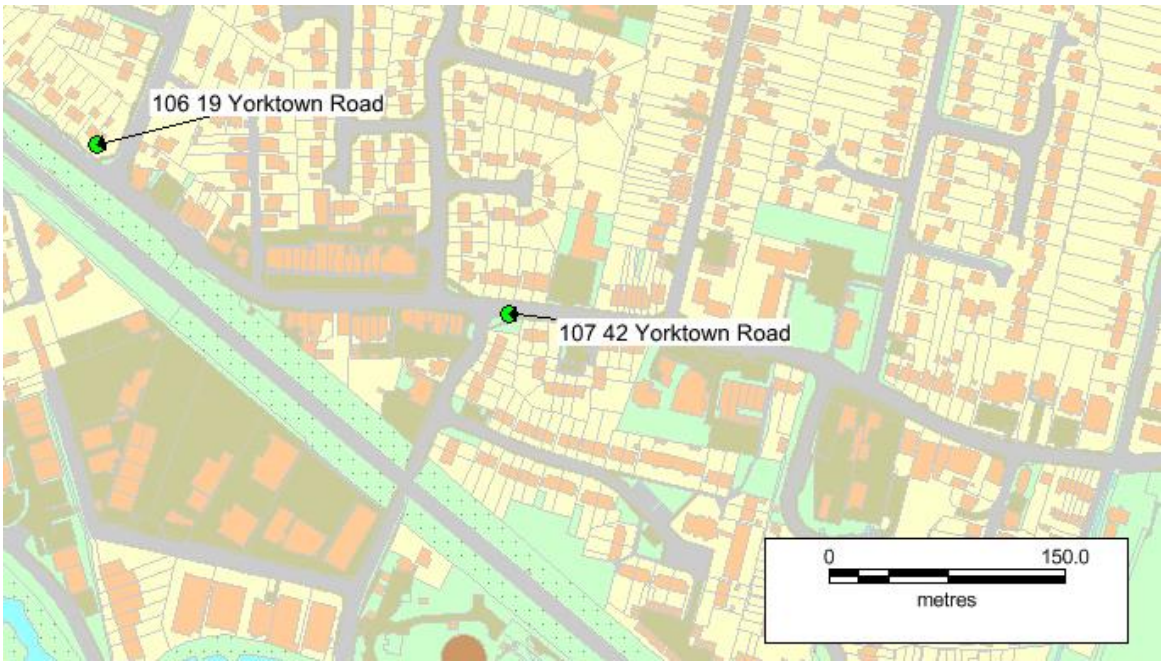
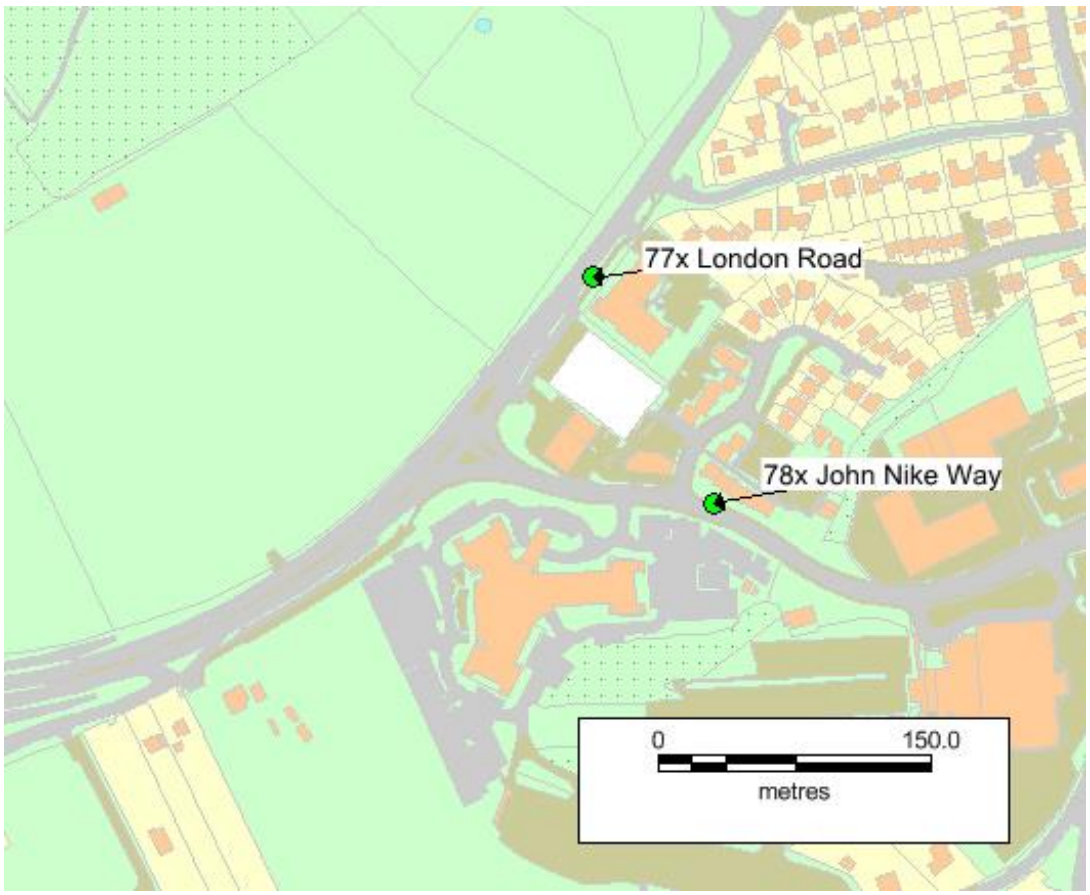


Figure 11Map of non-automatic monitoring sites, London Road.



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[8]	
	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

[8] 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
CCTV	Closed Circuit TV - cameras
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PHOC	Public Health Outcomes Framework – includes an indicator for $PM_{2.5}$
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
UTMC	Urban Traffic Management Control – traffic management system

References

*Bracknell Forest Council (2010).*Detailed Assessment of Air Quality Downshire Way and Bagshot Road, Bracknell and Bracknell Road, Crowthorne. Entec report May 2010.

Bracknell Forest Borough Council (2012) Further Assessment of Air Quality - Downshire Way and Bagshot Road, Bracknell and Bracknell Road, Crowthorne. TRL Report.

Bracknell Forest Council (2015) Updating and Screening Assessment Report. In Fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management.

*Defra (2016).*Part IV of the Environment Act 1995 Environment (Northern Ireland) Order 2002 Part III. Local Air Quality Management Technical Guidance LAQM.TG(16). Department for Environment, Food and Rural Affairs. April 2016.