2017 Air Quality Annual Status Report (ASR)

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

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Executive Summary: Air Quality in Our Area

Air Quality in Bracknell Forest Council

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. 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.

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

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 (NOx) 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. In 2016 a number of adjustments have been made to the timings of lights on the roads around Bracknell to ensure that traffic moves at a more constant speed through Bracknell which should improve journey time reliability and improve air quality by preventing queue build ups in certain areas.

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

NOx 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.

The council have also investigated changes to the junction at the eastern end of Crowthorne High Street which would have aimed to improve capacity at this point. This is unlikely to go ahead due to objections to the plans.

Photograph of new speed cushions, Crowthorne High Street

Conclusions and Priorities

The main focus for Bracknell Forest in terms of improving air quality is to reduce NOx 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.

During 2016 the NO_2 concentrations exceeded the air quality objectives at seven diffusion tube sites. Three exceedances were within AQMA 1 and three were within

AQMA 2.There was one exceedance outside of the AQMA's at the '3M' roundabout. Concentrations at this site have increased significantly from previous years. This is due to temporary road works which have been in place whilst the town centre regeneration is completed. It is believed that levels will return to normal once the Town centre is open and traffic is free flowing. Concentrations at the majority of the diffusion tube sites have increased slightly in 2016 compared to 2015 levels but were similar to 2014 levels. It is believed that there was a country wide reduction in concentrations in 2015 and the increased concentrations seen in 2016 are in line with what is expected.

The major change in the coming year is the opening of the Lexicon centre in Bracknell's town centre this is expected to increase the number of visitors to the area significantly and may put increased pressure on the roads leading to the car parks in the centre. The council are working with the developers to encourage non car use for the employees who will be working in the development. This will include the travel planners for the Lexicon development being available at the open interview days to advise potential employees as to the best ways to travel to work. The centre website will also include instructions on ways to get to the centre using public transport.

The council has also been working with network rail to increase the length of the platform at Bracknell's train station to increase the number of people able to use the trains at peak times.

Local Engagement and 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

- Check out the Lexicon website for the best ways to travel to the new Town centre from September

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1 Local Air Quality Management

This report provides an overview of air quality in Bracknell Forest during 2016. 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 to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Bracknell Forest can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=29. Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

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 (inc. date of publication)
						At Declaration	Now	
Bracknell (Area 1)	Declared 09/02/2011 Amended 2012	NO_2 annual mean	Bracknell Forest	E.g. An area encompassing a number of properties at the junction of road 1 and road 2.	NO	50.3µg/m^3	43.6days	Air Quality Action Plan 2014 http://www.bracknell-forest.gov.uk/air-quality-action-plan-2014.pdf
Crowthorne (Area 2)	Declared 09/02/2011 Amended 2012	NO_2 annual mean	Crowthorne	E.g. An area encompassing a number of properties at the junction of road 1 and road 2.	NO	41.7 µg/m^3	50.5 µg/m^3	Air Quality Action Plan 2014 http://www.bracknell-forest.gov.uk/air-quality-action-plan-2014.pdf

☒ **Bracknell Forrest 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 Bracknell Forest

Defra's appraisal of last year's ASR concluded that there is continuing exceedance of the annual mean objective for nitrogen oxide in the current AQMA's. The appraisal said that the measurements with continued exceedances should be distance corrected to relevant exposures. This has been addressed in this report and results can be seen in Appendix C. Defra was pleased with the amount of progress that had been made in the development of the measures within the current action plan. In future reports they would like the council to review the extent of the exceedances within each AQMA with the aim of eventually revoking the AQMA. The council have tried to review the exceedances within each AQMA and levels have generally gone down in AQMA 1 in 2016 but are currently still exceeding the objective levels. Unfortunately some of the locations within AQMA 2 have increased since 2015 levels. The council will be working on the measures that affect the AQMA 2 more in the coming year. However they are largely dependent on the co-operation of current business owners along Crowthorne High Street allowing deliveries to be made behind the properties. This agreement may take considerable time to put into place.

Bracknell Forest council has taken forward a number of direct measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Although in a number of cases the actions have been completed the council is looking to further develop a number of the actions to continue the work. Actions 1 to 4 have now been completed but the council are still working on improving the timings between the junctions in these areas to optimise traffic flow with the aim of improving air quality. This is an ongoing process and timings may have to change with the town centre regeneration. The council would also like to undertake some post implementation air quality monitoring to understand if the work has improved the air quality in these areas. This will largely be dependent on if the council can find funding to undertake this work. Action 14 which was targeting marketing to houses within 150 m of key routes to encourage cycling and walking has been completed but the council is looking to reach more people by using social media and created their first targeted Facebook promotion in 2016 and is looking to increase this in 2017.

The council is committed to looking for alternative source of funding in areas where they have been unsuccessful so that those actions may still go ahead.

More detail on these measures can be found in the 2014 Action Plans. Key completed measures include a number of highway improvements as part of the A329-A322 corridor plan including changes to junctions, signalisation and better 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 Reef junction (April 2016)
- Crowthorne High Street replacement of flat top humps. (2016)
- Targeted marketing to households and businesses within 150m of the major cycle routes within the borough. (2014)
- Additional measure investigated for Crowthorne High Street was the change to the junction at eastern end of high street to improve capacity at the junction. This is unlikely to go ahead.
- Provision of real time information at all roadside displays unfortunately the funding request for this was unsuccessful.

Bracknell Forest expects the following measures to be completed over the course of the next reporting year:

- Bracknell Forest will continue to look for funding for the provision of real time information of roadside displays which will encourage more usage of alternative travel modes
- Council are looking to update their website to provide real time information on the next bus or train service. This would encourage more use of public transport.

- Increase the use of social media to promote cycling within the borough with two likely campaigns planed for the bike week and cycle to work day.
- Additional measures to be investigated for Crowthorne High Street such as the movement of the bus shelter and improve the junction at the Eastern end of the high street to improve vehicle flow and reduce emissions.

Bracknell Forest's priorities for the coming year are to investigate other measures to improve the flow of traffic along Crowthorne High Street. Bracknell Forest are also investigating the possibility of upgrading Downshire way to duel carriageway status.

The principal challenges and barriers to implementation that Bracknell Forrest anticipates facing are objections to planning applications to improve Crowthorne High Street.

Progress on the following measure 7 has been slower than expected due to difficulty in acquiring the required land at the back of the shop properties to enable deliveries to be removed from Crowthorne High Street.

Bracknell Forrest Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in AQMA 1. If funding becomes available the Council would like to monitor the air quality around the road improvement scheme to be able to identify the improvements that have been made to the air quality. It is believed that the improvements set out in the AQAP would achieve the required improvements in air quality in AQMA 2, however with the delays to the planning permissions required to remove the delivery vehicles from Crowthorne High Street the Council have been looking at other ways (outlined above) to improve the flow of traffic and improve the air quality in this AQMA.

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	Improvements and signalisation of the Horse and Groom Roundabout	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	BFC	2012	2012	Reduce queues and journey time	Reduction in NO2 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, Some journey time monitoring has been undertaken, during July and November 2016, following the completion of the Coral Reef scheme. This showed an overall improvement in peak hour journey times along the whole corridor (inc. above schemes) between Coppid Beech roundabout and Swinley Gyratory.
2	Improvements and signalisation of the Sports Centre Roundabout	Traffic Management	Strategic highway improvements	BFC	2013	2014	Reduce queues and journey time	Reduction in NO2 concentrations to below the objective in the AQMA 1	Work complete	Completed Feb 2015	As above

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 NO2 concentrations to below the objective in the AQMA 1	Installation of MOVA and works complete	Completed 2015	As Above
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 NO2 concentrations to below the objective in the AQMA 1	Work complete	Completed March 2015	As above. In addition, the council is currently looking at options to upgrade Downshire Way to dual carriageway standard
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 NO2 concentrations to below the objective in the AQMA 1	Work complete	Completed	Work led by WBC, outside of Bracknell Forest boundary. This was not a major scheme so unlikely any significant monitoring will be undertaken
6	Improvements to Dukes Ride/Bracknell Road junction	Traffic Management	Strategic highway improvements	BFC	2015	2017	Reduce queues and journey time	Reduction in NO2 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 NO2 concentration in AQMA 2	Work complete 2014	2016	We are looking to move the bus shelter and improve the junction at the top (Eastern) end of Crowthorne Highstreet, which should improve traffic flow and reduce queueing

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. ncrease in number of people using buses	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Bus station complete. Bus stop work ongoing when required.	2017/2018	Improvements have been made to bus fleet, 85 meet Euro VI, 65% meet Euro V and only 1 bus used for emergencies only falls below Euro IV.
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 NO2, PM10 and PM2.5 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 9% from 2016, and an increase in walking of 0.2%
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 NO2, PM10 and PM2.5 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 NO2, PM10 and PM2.5 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	A new RTI screen was installed in May 2017 on the approach to the bus station from Station Park. The Council's bid to the Access Fund in 2016 was unsuccessful. The council will continue to look for funding opportunities
12	Updating the Council's website to include	Promoting Travel Alternatives	Other – Real Time Travel Information	BFC	2014	2014-2018	Increase in number of people using bus and rail	Reduction in background NO2, PM10 and PM2.5 concentrations	Work is ongoing and website now has links to real-time information from external sites	2018	Work to update the council's transport and travel web pages is ongoing, and we are looking at using the

	rail and bus times in real time							across the borough			'Elgin' map platform to show public transport stops & times, roadworks and delays. Information pages will be simplified
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 NO2, PM10 and PM2.5 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. It is believed this will be a national rather than local change.
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 NO2, PM10 and PM2.5 concentrations across the borough	LSTF study complete - The councils work going forward is to target a wider area through social media	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 took place in 2016 as part of a targeted facebook campaign. The council are working with public health to use videos promoting cycling round the borough. Two further campaigns are planned for bike to work week and cycle to work day.
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 NO2, PM10 and PM2.5 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.
16	Development of two programmes of	Promoting Travel Alternatives	Personalised Travel Planning	BFC	2014	2015	Reduce local car journeys	Reduction in background NO2, PM10 and PM2.5	LSTF study completed	Complete 2014. Work to be continued as part of DfT	Several large employers run mini-buses for staff travelling from the

	personal travel planning to encourage more sustainable travel; one programme will be set in a residential area, and the other at large employer sites							concentrations across the borough		access bid.	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. The guidance and advice was well received by businesses. In addition to this major new developments are required to deliver mitigation measures, including contributions towards improving public transport services
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 NO2, PM10 and PM2.5 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 NO2, PM10 and PM2.5 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. The council are looking to move to electric vehicles once their lease on the petrol cars expires.

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 PM2.5 based on the evidence that an increase in annual average (population weighted) PM2.5 by 10 µg/m3 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 not set an 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 Forrest are working on to reduce vehicle related emissions will address PM2.5 concentrations. Of those measures in the action plan, the following are examples of those that will contribute towards PM2.5 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

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.

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 undertook non- automatic (passive) monitoring of NO_2 at 41 sites during 2016. 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 5 years with the air quality objective of 40µg/m^3. Concentrations at Fox Hill School continuous monitor were slightly higher than the previous two years but 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 2016 with similar levels to 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 Fox Hill 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 have remained consistent with 2015 levels.

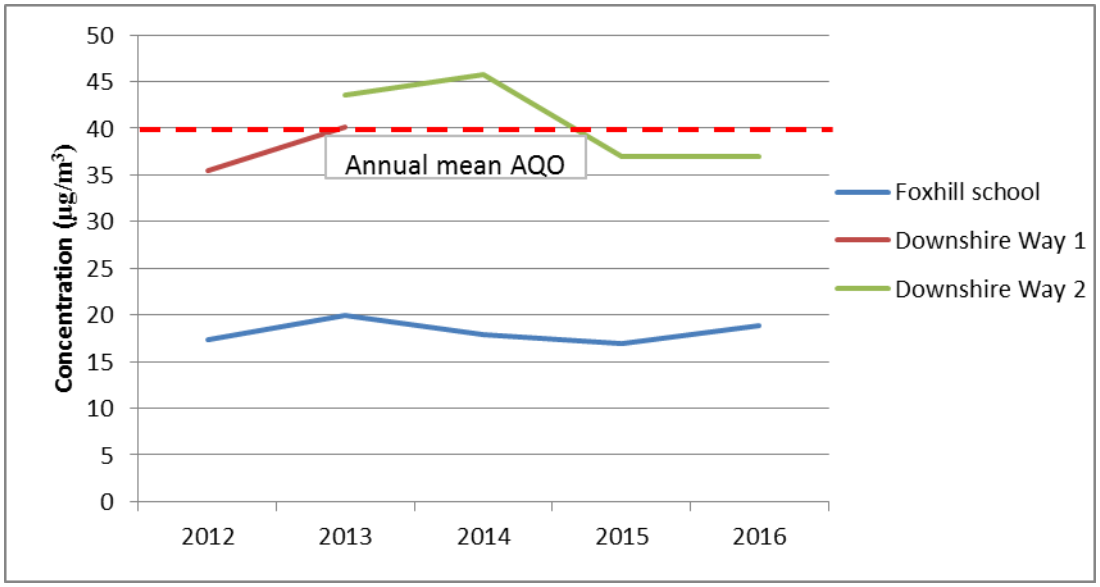


Figure 1: Trends in NO_2 concentration at the continuous monitoring sites.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B. The results show that the diffusion tube concentrations have increased from 2015 levels at nearly all of the sites to concentrations similar to those in 2014 and in some cases exceeding these levels. Figure A1 in Appendix A shows the diffusion tube results for those sites located within the two AQMAs in Bracknell. Five diffusion tube sites within the AQMA's continue to exceed the annual air quality objective. They are site 12 (Downshire Way) and site 42 (Bagshot Road Façade) in AQMA 1 and site 38 (Bracknell Road), site 58 (Bracknell Road receptor) and site 85

(Crowthorne High Street (receptor)) in AQMA 2. At site 27 (3M Roundabout) there was an exceedance, this site is outside of the AQMA's and the result is very high compared to previous years. This high result is likely to be due to the traffic being diverted past this site due to the town centre upgrades. In addition to this there have been roadworks resulting in one lane closure traffic to build up at this point. This is a short term problem and once the town centre regeneration project is complete it is believed levels will reduce below the objective limit again. Monitoring will continue at this site and concentrations will be reviewed again in 2018. If concentrations continue to be high the council will undertake a detailed assessment at this site. This was the only exceedance of diffusion tube sites outside of the AQMA's. Site 86 at the Downshire Way monitor was very close to the objective concentration at 39.9µg/m^3 but did not exceed the concentration.

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 the Foxhill monitoring site and 2 exceedances at the Downshire way monitoring site. These exceedances occurred on the 29th November at 18:00 and 19:00.

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 2016. 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 two days at Fox Hill School and eight days at Downshire Way in 2016. These are both below the permitted number of exceedances of 35 days per year. These results are similar to previous years data.

Figure A3 in Appendix A 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 PM10 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.

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	NO2; PM10	N	Chemiluminescent; TEOM	N	N/A	2.7
CM2	Downshire Way (1)	Roadside	X486917	Y168495	NO2:PM10	Y	Chemiluminescent;TEOM	Y (1m)	8m	2.7
CM3	Downshire Way (2)	Roadside	X486510	Y168847	NO2:PM10	Y	Chemiluminescen; TEOM;	Y (1m)	8m	2.7

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)
1def	Bagshot Road	Kerbside	X487230	Y168840	NO2	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 Close	Facade	X486569	Y168824	NO2	N	Y (<5m)	30m	N	1.7
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

76xyz	Dukes Ride	Kerbside	X484188	Y164178	NO2	Y	Y (10m)	<1m	N	2
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
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
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
99xyz	16 Firlands (receptor)	Façade	X487258	Y167948	NO2	Y	Y (<1m)	10m	N	1.6
100xyz	Continuous monitor Crowthorne	Roadside	X484112	Y163992	NO2	N	Y (3m)	2m	Y	1.8
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 Gate Flats	Façade	X487626	Y169316	NO2	N	Y(<1m)	2.5m	N	1.8
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

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 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
CM1	Urban Background	Chemiluminescent	99	99	17.3	19.9	17.9	16.9	18.9
CM2	Roadside	Chemiluminescent			35.5	**40.1**			
CM3	Roadside	Chemiluminescent	97	97		**43.6**	**45.8**	37	37
1def	Kerbside	Diffusion Tube	55	55	**42.2**	**58.7**	**50.5**	**46.3**	38.3
1xyz	Façade	Diffusion Tube	92	92	24.1	32.8	30.5	25.4	25.5
3	Urban background	Diffusion Tube			16.5	23.1	21.9		
12xyz	Kerbside	Diffusion Tube	100	100	**57**	**82.2**	**72.1**	**58.6**	**40.8**
17/18/19	Urban background	Diffusion Tube	83	83	17.8	26.8	19.1	16.5	22.6
27x	Kerbside	Diffusion Tube	92	92	38.4	**46.5**	**52.8**	16.8	**43.7**
29x	Kerbside	Diffusion Tube	83	83	28.6	31	30.5	27.9	32.8
32xyz	Facade	Diffusion Tube	100	100	25.7	28.6	29.8	25.4	30.1
38xyz	Roadside	Diffusion Tube	100	100	**41.7**	**49.9**	**54.4**	**43.6**	**43.5**
40xyz	Roadside	Diffusion Tube	100	100	29.8	36.4	34.2	29.9	36.7
41xyz	Kerbside	Diffusion Tube	92	92	22.8	**41.3**	38.7	27.8	33.2
42xyz	Roadside	Diffusion Tube	92	92	**50.3**	**54**	**48.7**	**42.6**	**43.6**
54xyz	Façade	Diffusion Tube	100	100	28.9	31.7	31.7	28.4	30.8
58xyz	Façade	Diffusion Tube	100	100	**41.5**	**49.5**	**47.3**	**40.7**	**49**
65x	Kerbside	Diffusion Tube	92	92	27.2	36.6	28.4	33.2	30.8

76xyz	Kerbside	Diffusion Tube	92	92	31.5	35.6	36.8	33.1	37.2
77x	Roadside	Diffusion Tube	100	100	27.1	31.7	31.1	30	34.7
78x	Roadside	Diffusion Tube	75	75	27.6	34.4	32.5	27.9	35.2
79x	Façade	Diffusion Tube	100	100	31.8	**40.7**	30.3	27.3	30.4
82xyz	Façade	Diffusion Tube	100	100	34.1	36.7	**40.2**	35.7	35.6
83xyz	Façade	Diffusion Tube	100	100	21.4	28.4	29	19.6	23.7
84xyz	Kerbside	Diffusion Tube	92	92	26.1	**42.8**	29.9	26	29.4
85xyz	Roadside	Diffusion Tube	55	55	24.3	29.2	27.1	24.7	**50.5**
86xyz	Roadside	Diffusion Tube	100	100	**44.3**	**51.7**	**51.1**	**43.5**	39.9
90xyz	Roadside	Diffusion Tube	83.3	83.3	29.1	33.5	32.4	32.5	37
91xyz	Façade	Diffusion Tube	100	100	30.2	35.5	34.4	30.4	35.3
93xyz	Façade	Diffusion Tube	100	100	27.6	31.1	29.3	28.2	32
95xyz	Façade	Diffusion Tube	100	100	23.1	26.4	25.3	25.7	28
96xyz	Façade	Diffusion Tube	100	100	23.7	28.2	27.3	22.7	26.4
97xyz	Roadside	Diffusion Tube	100	100	31.8	**41.2**	**40**	32.8	37.4
98xyz	Façade	Diffusion Tube	100	100	26.9	28.5	29.9	27.2	28.9
99xyz	Façade	Diffusion Tube	100	100	28.6	31	31.4	27.1	30.4
100xyz	Roadside	Diffusion Tube	80	80	26	28.1	30.6	27.5	23.1
101xyz	Façade	Diffusion Tube	92	92	21.4	20.9	20.5	17.9	21
102xyz	Façade	Diffusion Tube	92	92	22.8	25	23.2	19.5	23.7
103xyz	Kerbside	Diffusion Tube	92	92	23.2	30.9	38	24.3	28.5
104xyz	Façade	Diffusion Tube	92	92	22.7	25.6	24	23.9	26.6
105xyz	Kerbside	Diffusion Tube	92	92	28.8	26.7	24.7	23.9	25.5
106 Road	Façade	Diffusion Tube			32.6	24			
107 Road	Kerbside	Diffusion Tube			26.3				
108	Façade	Diffusion Tube	100	100	-		23.8	24.9	27.6

109	Façade	Diffusion Tube	100	100	-		23.6	23.3	28.4
110	Facade	Diffusion Tube	100	100	-		24.2	25.2	30.2

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

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

☒ **If applicable, all 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) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

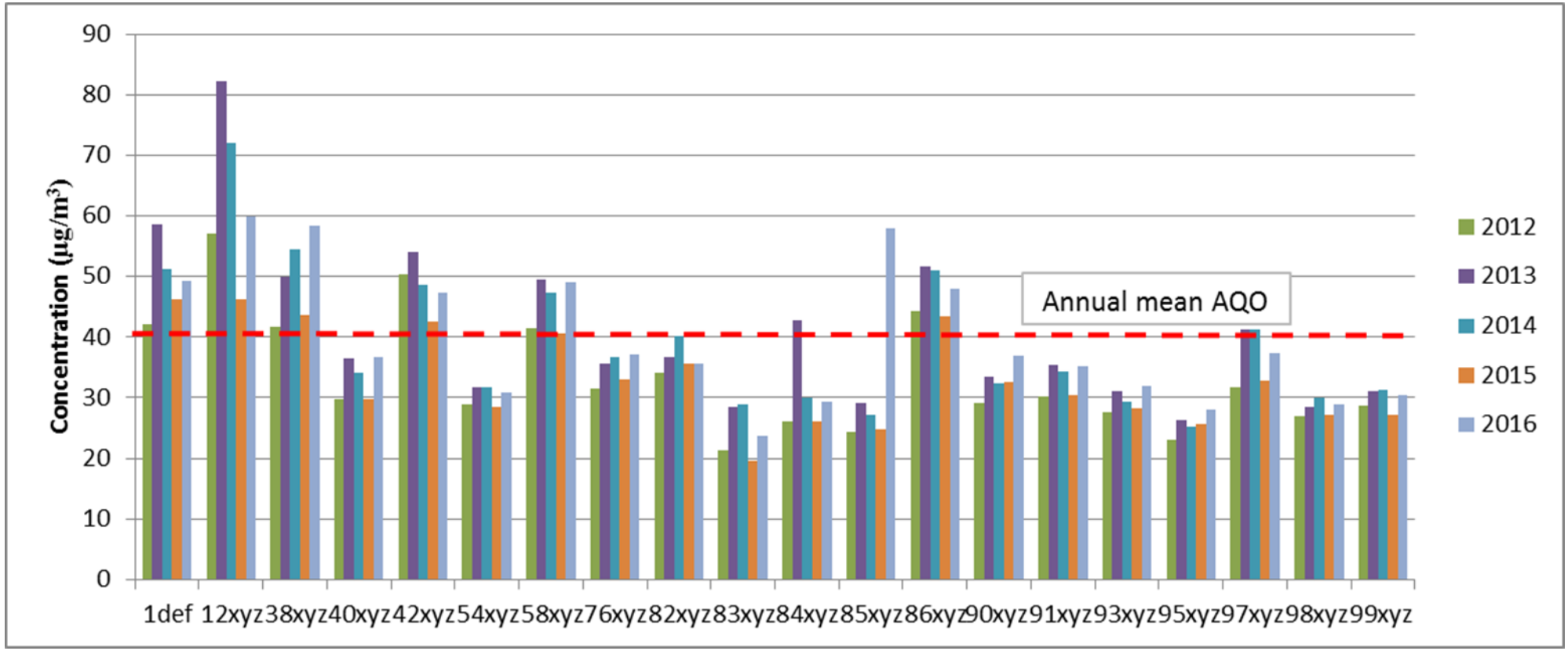


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2012	2013	2014	2015	2016
CM1	Urban Background	Chemiluminescent	99	99	**0**	**0**	**0**	**0**	**0**
CM2	Roadside	Chemiluminescent			**0**	**1**			
CM3	Roadside	Chemiluminescent	97	97		**0**	**6**	**0**	**2**

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 2016 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2012	2013	2014	2015	2016
CM1	Urban Background	97	97	18.7	18.1	17	16.8	15.1
CM2	Roadside			20.8	22.4	-	-	
CM3	Roadside	97	97	-	22.7	19.1	20	19.8

☒ **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.

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations

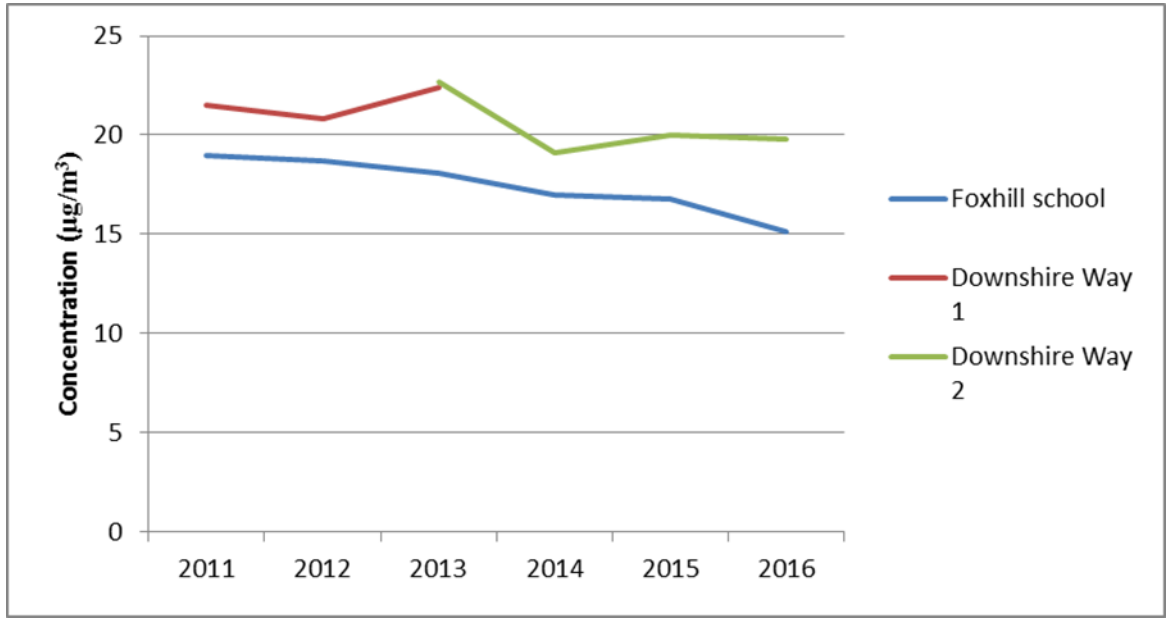


Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2012	2013	2014	2015	2016
CM1	Urban Background	98	98	**6**	**3**	**4**	**3**	2
CM2	Roadside			**9**	**3**	**-**	**-**	
CM3	Roadside	99	99	**-**	**5**	**5**	**5**	8

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.

Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2016

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 (0.85) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
1 d Bagshot Road	0.3	73.7	54.2	49.3							64.3	54.3	49.4	49.3	38.3
1e Bagshot Road	0.2	43.9	51.8	33.0				73.2			63.6	65.3	47.3		
1 f Bagshot Road	47.4	84.17	53.1	<0.35				67.16			59.11	65.9	53.9		
1x Rectory Lane	30.06	28.92	37.49		32.03	30.87	17.11	18.24	26.93	40.95	41.35	38.02	31.1	25.5	
1y Rectory Lane	26.92	29.8	37.03		16.63	31.35	15.71	19.21	28.15	40.02	38.62	41.68	29.6		
1z Rectory Lane	22.29	29.68	39.06		17.08	31.68	18.04	19.69	27.81	39.5	40.21	36.71	29.3		
12x Downshire Way	80.73	55.34	65.2	12.21	23.87	75.28	54.81	67.97	63.26	69.41	81.93	77.58	60.6	59.8	40.8
12y Downshire Way	77.57	68.28	67.5	23.67	23.13	67.5	73.39	55.96	56.41	63.75	74.99	80.12	61.0		
12z Downshire Way	78.49	58.73	0.37	55.66	26.13	79.77	61.67	55.62	55.49	66.17	79.15	76.89	57.9		

17 Foxhill School	25.95	24.08		19.22	10.33	15.58	10.72		33.81	26.63	30.08	33.06	23.0	22.6	
18 Foxhill School	25.88	22.04		20.75	9.94	17.33	10.43		28.81	25.64	28.31	33.2	22.2		
19 Foxhill School	24.15	24.92		20.08	9.78	16.29	10.52		30.07	27.33	30.23	32.34	22.6		
27x 3M R/about	59.35	52.51	57.1	59.39	37.81	57.61	50.9		94.37	58.25	45.33	73.51	58.7	58.7	43.7
29 x Clintons Close	37.2	34.62			19.8	27.59	22.17	23.99	33.16	37.33	46.29	45.85	32.8	32.8	
32x 8 Old Bracknell Close (receptor)	35.48	30.67	28.98	29.81	37.71	22.53	23.84	22.17	28.87	31.21	35.66	73.08	33.3	30.1	
32y 8 Old Bracknell Close (receptor)	33.47	28.73	26.9	<0.35	37.03	23.97	23.46	22.56	<25.27	31.28	38.38	36.62	27.3		
32z 8 Old Bracknell Close (receptor)	28.39	30.49	27.32	29.59	39.42	22.89	22.34	22.5	28.18	33.41	34.45	37.39	29.7		
38x Bracknell Road (the Bungalow)	74.68	47.58	60.03	72.59	25.5	47.03	44.48	45.46	55.18	69.98	86.66	78.42	59.0	58.4	43.5
38y Bracknell Road (the Bungalow)	53.22	80.9	56.07	64	23.12	64.19	48.91	47.22	52.41	68.9	86.66	76.49	60.2		
38z Bracknell Road (the Bungalow)	57	65.58	58.68	64.93	29.47	56.98	50.71	47.98	55.07	62.79		68.75	56.2		
40x Crowthorne	32.93	41.85	80.37	29.45	17.42	32.32	21.57	23.86	32.64	43.15	49.36	47.62	37.7	36.7	

High Street - card shop (receptor)														
40y Crowthorne High Street - card shop (receptor)	35.64	39.17	75.87	28.26	18.06	36.05	24.33	20.56	33.16	41.85	52.93	51.45	38.1	
40z Crowthorne High Street - card shop (receptor)	30.46	37.58	66.94	26.93	18.57	32.58	22.95	23.54	35.04			47.18	34.2	
41x 3M R/about (Lamp post)	41.92	36.81	31.13	32.43	18.55	28.51	23.26	25.34	33.2	40.1	<0.33	53.51	33.2	33.2
42x Bagshot Road	50.6	44.58	66.36	51.03	26.81	38.24	35.81	31.88		50.79	67.75	60.66	47.7	47.4	43.6
42y Bagshot Road	44.06	50.01	53.95	42.49	23.59	41.26	41.55	42.1		55.01	54.56	64.61	46.7		
42z Bagshot Road	40.79	46.54	57.23	43.56	23.96	45.12	38.38	38.05			60.89	84.12	47.9		
54 x Elizabeth Close	37.05	32.81	37.07	33.27	14.38	25.19	25.6	25.78	34.07	32.79	38.23	41.62	31.5	30.8	
54y Elizabeth Close	37.47	37.18	33.18	36.76	12.75	26.11	28.23	24.87	24.34	33.1	39.98	34.67	30.7		
54z Elizabeth Close	39.1	32.97	35.27	33.32	12.69	23.21	25	22.99	31.52	32.9	36.17	38.37	30.3		
58x Bracknell Rd (Pine View)	32.89	60.81	64.59	58.25	22.82	58.41	46.78	37.2	41.4	59.02	64.15	63.12	50.8	49.0	
58y Bracknell	31.63	58.34	59.13	48.84	24.45	52.44	42.37	40.91	36.39	52.11	68.71	56.97	47.7		

Rd (Pine View)															
58z Bracknell Rd (Pine View)	27.7	55.92	58.14	53.58	23.7	44.4	47.15	44.9	45.21	56.19	65.76	58.69	48.4		
65x Binfield Road		34.7	32.33	31.99	16.24	24.17	24.17	25.68	30.31	35.04	41.11	43.48	30.8	30.8	
76 X Dukes Ride (o/s bank)	40.74	46.69	43.49	33.54	18.18	34.12	28.61	25.31	39.15	37.35	47.37	45.76	36.7	37.2	
76 Y Dukes Ride (o/s bank)	36.13	49.96	41.72	34.97	18.4	32.37	27.55		36.86	43.35	52.61	43.86	38.0		
76 Z Dukes Ride (o/s bank)	35.11	48.02	40.56	34.31	14.83	33.05	33.25		35.13	42.75	52.07		36.9		
77 X London Road, Binfield (merydene)	40.45	36.48	33.72	32.45	15.26	31.13	33.55	26.58	29.95	36.01	48.5	52.47	34.7	34.7	
78 X John Nike Way	41.39	36.82		35.34	17.08	29.47		28.56	33.75		45.91	48.69	35.2	35.2	
79 X Park Rd - Celsius (receptor)	43.25	29.03	79.91	25.19	12.46	21.95	21.95	15.59	42.51	1.74	39.42	32.21	30.4	30.4	
82 X Downshire Way - Boxford (receptor)	45.16	32.25	34.44	34.4	30.69	19.4	46.86	41.63	35.4	32.58	43.26	38.67	36.2	35.6	
82 Y Downshire Way - Boxford (receptor)	43.99	31.15	33.9	36.88	18.57	33.03	45.96	41.77	37.04	35.28	44.13	40.99	36.9		

82 Z Downshire Way - Boxford (receptor)	42.9	34.5	30.96	<0.35	19.07	32.27	48.55	40.58	37.85	34.86	42.65	39.79	33.7		
83 X Bagshot Rd - Glebewood (receptor)	27.02	25.4	30.91	24.34	10.74	17.57	12.1	13.15	24.19	30.41	30.52	52.95	24.9	23.7	
83 Y Bagshot Rd - Glebewood (receptor)	25.58	26.36	26.7	23.22	11.31	22.53	11.28	13.99	24.62	28.84	30.58	31.86	23.1		
83 Z Bagshot Rd - Glebewood (receptor)	28.96	24.95	26.4	23.42	11.4	19.23	11.51	13.95	<22.12	30.23	31.3	32.93	23.0		
84 X Dukes ride - Playhouse (receptor)	28.36	38.87	36.87	31.18	14.77	26.32	25.75	24.57	31.04	34.85		40.74	30.3	29.4	
84 Y Dukes ride - Playhouse (receptor)	31.54	34.29	35.09	29.34	15.34	27.54	22.92	24.92	27.62	36.25			28.5		
84 Z Dukes ride - Playhouse (receptor)	32.04	38.86	34.18	35.4	17.14	28.66	23.29	23.88	25.15	34.19			29.3		
85 X 72 High Street Crowthorne (receptor)				29.99	16.5	27.78	27.78	67.85		79.82	72.41	83.81	50.7	50.5	
85 Y 72				30.47	16.72			70.3		86.2	71	85.3	60.0		

High Street Crowthorne (receptor)														
85 Z 72 High Street Crowthorne (receptor)				31.98				70.18	39	76.82	77.63	83.38	63.2	
86 X Downshire Con Monitor	56.48	36.87	45.56	50.77	14.23	53.3	53.94	49.92	52.46	51.05	73.8	59.74	49.8	48.1	39.9
86 y Downshire Con Monitor	50.83	43.29	44.08	55.09	14.04	45.47	51.19	46.26	45.83	54.65	65.38	68.29	48.7		
86 z Downshire Con Monitor	49.64	42.63	44.96	47.8	26.75	38.78	45.05	53.36	44.84	53.36	<0.33	55.39	45.7		
90x Past and present	44.02		38.49	37.7		31.64	27.17	27.36	33.66	38.78	44.71	37.76	36.1	37.0	
90y Past and present	45.2		44.6	38.21		32.97	27.06	30.59	34.14	38.98	45.16	42.07	37.9		
90z Past and present	46.53		42.36	36.55		34.24	27.87	28.02	31.52	38.6	45.71	39.37	37.1		
91x The Mount (receptor)	35.72	40.59	41.58	38.07	16.62	33.22	23.82	27.96	33.62	37.81	48.52	44.29	35.2	35.3	
91y The Mount (receptor)	33.15	40.03	42.3	37.25	17.53	32.68	27.98	28.08	36.73	37.42	53.34	40.2	35.6		
91z The Mount (receptor)	34.97	40.51	36.39	38.8	17.58	34.46	27.94	22.46	32.95	43.27	47.05	44.43	35.1		
93x The Prince Alfred	29.68	40.43	37.85	33.04	14.49	29.75	24.87	23.51	25.77	37.07	44	41.51	31.8	32.0	
93y The Prince Alfred	31.63	39.01	41.35	32.41	15.93	32.16	23.81	22.2	28.36	36.76	44.26	43.29	32.6		

93z The Prince Alfred	33.36	41.14	39.16	34.94	15.98	26.65	22.91	23.43	26.67	34.97	43.83	37.27	31.7		
95x 3 Leverkusen Way (receptor)	35.58	27.78	28.42	27.98	13.5	20.11	16.3	20.85	29.42	32.32	36.73	43.47	27.7	28.0	
95y 3 Leverkusen Way (receptor)	30.54	26.72	29.79	29.23	13.63	21.58	17.7	20.71	27.1	30.62	37.12	42.59	27.3		
95z 3 Leverkusen Way (receptor)	35.75	27.02	30.37	26.81		20.95	18.45	19.51	28.08	33.42	34.61	45.19	29.1		
96x Trotters Folly	30.51	26.44	28.07	29.22	15.16	24.49	17.17	18	25.25	31.71	33.87	39.01	26.6	26.4	
96y Trotters Folly	26.83	29.89	30.49	32.29	15.4	23.94	16.61	16.5	26.65	31.48	29.62	36.65	26.4		
96z Trotters Folly	33.83	26.08	28.02	31.02	14.68	24.35	17.44	17.84	25.48	30.04	31.71	35.74	26.4		
97x Linden house	40.19	37.72	36.92	39.83	19.1	34.5	26.9	30.55	37.35	<0.205	49.9	44.19	36.1	37.4	
97y Linden house	40.89	31.62	40.34	38.34	20.05	34.57	25.85	32.74	33.51	41.83	86.66	45.29	39.3		
97z Linden house	41.49	37.98	36.72	36.55	19.21	32.55	30.26	31.9	34.45	42.83	46.42	52.55	36.9		
98x 67 Elizabeth close	28.06	31.17	32.35	31.66	13.61	25.74	23.99	23.5	30.84	33.32	35.58	35.32	28.8	28.9	
98y 67 Elizabeth close	32.3	28.52	31.87	30.98	14.91	24.36	24.88	21.38	32.49	31.97	38.76	34.95	29.0		
98z 67 Elizabeth close	30.7	32.39	33.3	29.46	15.09	26.36	23.67	21.19	31.12	31.28	38.46	34.55	29.0		
99x 16	31.29	28.02	31.89	31.24	15.07	29.08	28.08	23.42	33.58	31.48	37.74	39.87	30.1	30.4	

Firlands															
99y 16 Firlands	32.43	28.79	30.81	30.37	14.33	25.82	28.64	24.84	31.75	29.63	39.09	39.39	29.7		
99z 16 Firlands	45.16	32.03	32.83	31.33	15.25	27.97	28.53	23.71	31.71	32.64	38.58	36.05	31.3		
100x continuous monitor - CO- OP Crowthorne	27.27	<0.35	33.41	38.07	14.82	26.79	17.98	20.49	26.48	34.21			24.0	23.1	
100y continuous monitor - CO- OP Crowthorne	26.71	<0.35	34.89	37.68	14.31	24.5	18.8	19.11	25.12				22.4		
100z continuous monitor - CO- OP Crowthorne	33.18	<0.35	32.97	39.62	14.71	23.89	17.73	18.54	26.52				23.1		
101x - 14 Ambassador	20.75	25.91	27.26	23.52	12.97	18.2	13.51	14.85	19.67	26.48	26.81		20.9	21.0	
101y - 14 Ambassador	21.17	23.56	25.81	24.66	12.08	17.4	13.1	15.93	15.69	30.3	29.91		20.9		
101z - 14 Ambassador	19.53	25.9	26.71	23.01	11.87	18.95	12.86	16.5	21.03	27.91	29.55		21.3		
102x - 28 Southwold	23.32	27.52	27.09	24.26	11.61	20.78	12.92	16.66	24.4	30.7	29.83		22.6	23.7	
102y - 28 Southwold	24.33	26.99	26.41	23.5	11.91	18.32	14.03	16.09	26.99	31.67	30.92		22.8		
102z - 28 Southwold	25.23	26.59	25.24	23.53	4.73	20.69	12.45	15.83	66.62	30.51	30.45		25.6		
103x - 43 Avebury	31.1	31.31	34.29	30.61	17.05	28.54	17.3	19.73	28.93	40.14	37.8		28.8	28.5	
103y - 43 Avebury	32.03	36.35	32.57	28.79	16.4	26.26	15.52	18.84	28.94	40.29	40.12		28.7		

103z - 43 Avebury	29.7	32.58	30.32	30.99	16.01	23.83	16.61	20.08	28.4	37.72	40.1		27.9		
104x - 53 Neuman Cresent	26.35	31.4	22.94	26.24	13.37	22.73	20.73	22.59	28.39	31.98	40.22		26.1	26.6	
104y - 53 Neuman Cresent	28.35	34.63	28.38	29.25	13.04	20.7	22.1	22.11	24.26	34.33	36.13		26.7		
104z - 53 Neuman Cresent	28.53	31.92	32.27	27.89	12.31	23.67	23.86	23.52	24.24	33.71	35.13		27.0		
105x - 69 Quintiles	32.23	27.76	26.85	25.56	12.74	22.79	23.69	20.84	20.32	29.9	37.23		25.5	25.5	
108 Kelvin Gate flats (2)	27.84	30.57	32.37	29.62	13.91	24.06	19.9	20.6	6.02	34.19	36.47	38.39	26.2	27.6	
109 Kelvin Gate flats (3)	29.57	28.95	27.21	25.71	12.23	23.37	19.43	21.1	27.21	32.52	37.43	33.71	26.5	28.4	
110 Kelvin Gate flats (4)	30.78	32.88	29.74	27.39	13.35	25.07	19.64	21.71	25.84	28.89	68.7	38.39	30.2	30.2	

☒ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

☒ **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) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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

As for previous reporting rounds the triplicate diffusion tubes located at Fox Hill School have been School have been used to compare with against the NO_2 concentrations recorded by the collocated the collocated continuous monitoring station to determine a local bias adjustment factor. To do this, factor. To do this, then monthly results were entered into the 'Checking Precision and Accuracy of and Accuracy of Triplicate Tubes' spreadsheet[4] (

) which calculated a local bias adjustment factor of 0.85 (95% confidence interval) . This value was compared with the national bias factor from the spreadsheet version 3/17 V2[5] for the laboratory and method (Gradko 20% TEA in water). This gave a figure of 0.94 which is slightly more than the local factor. In previous years the local bias adjustment factor has been used so it was decided that to use the local bias factor is justified.

[5] https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Figure 2: 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 (CV)	95% CI of mean
1			26.0	25.9	24.2	25	1.0	4	2.5
2			24.1	22.0	24.9	24	1.5	6	3.7
3									
4			19.2	20.8	20.1	20	0.8	4	1.9
5			10.3	9.9	9.8	10	0.3	3	0.7
6			15.6	17.3	16.3	16	0.9	5	2.2
7			10.7	10.4	10.5	11	0.1	1	0.4
8									
9			33.8	28.8	30.1	31	2.6	8	6.5
10			26.6	25.6	27.3	27	0.8	3	2.1
11			30.1	28.3	30.2	30	1.1	4	2.7
12			33.1	33.2	32.3	33	0.5	1	1.1
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
19.68681	99.85	Good	Good
22.65937	100.00	Good	Good
23.24234	100.00		Good
18.9629	99.85	Good	Good
19	99.55	Good	Good
14	100.00	Good	Good
8	96.19	Good	Good
10	100.00		Good
14	99.88	Good	Good
21	99.85	Good	Good
24.43016	99.64	Good	Good
29.98066	99.88	Good	Good
Overall survey -->		Good precision	Good Overall DC

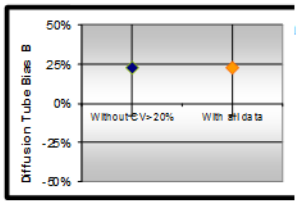
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 10 out of 10 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	0.85 (0.67 - 1.14)
Bias B	18% (-12% - 48%)
Diffusion Tubes Mean:	23 µgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	19 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	19 (15 - 26) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 10 periods of data	
Bias factor A	0.85 (0.67 - 1.14)
Bias B	18% (-12% - 48%)
Diffusion Tubes Mean:	23 µgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	19 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	19 (15 - 26) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Short-term to Long-term Data Adjustment

There were two diffusion tubes that had a data capture rate of less than 75% in 2016. The measured data from these sites were annualised according to the methodology (Box 7.9) in the Guidance using data from four AURN sites in the local area, all of which had a suitable data capture rate.

Figure 3: 1 Bagshot Road - May to July and September and October

Site	Annual Mean	Period Mean	Ratio
Chilbolton Observatory	14.2	13.2	1.08
London Hillingdon	51.3	47.4	1.08
Reading New Town	34.5	26.2	1.32
Southampton Centre	34.1	29.8	1.14
		Average	1.15

Figure 4: 85 72 High Street Crowthorne (receptor) –January to March, June, July and September

Site	Annual Mean	Period Mean	Ratio
Chilbolton Observatory	14.2	13.5	1.05
London Hillingdon	51.3	49.8	1.03
Reading New Town	34.5	33.7	1.03
Southampton Centre	34.1	34.4	0.99
		Average	1.03

Distance correction

A number of sites exceeded the annual mean objective but five were not at locations representative of relevant exposures. The concentrations at these sites have been distance corrected using the LAQM NO_2 fall off with distance calculator.

Figure 5: Bagshot Way

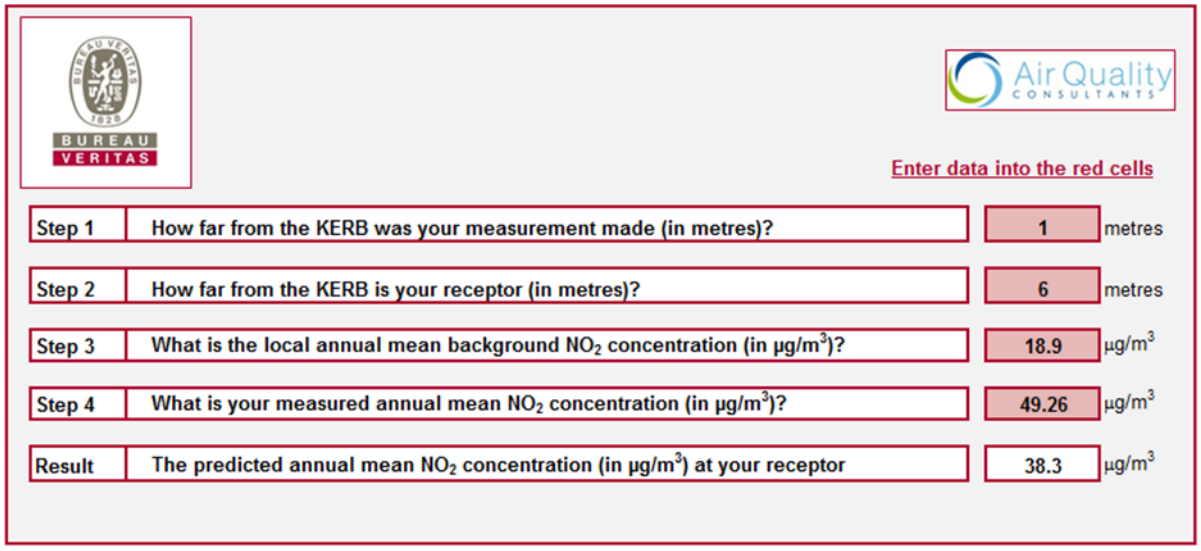
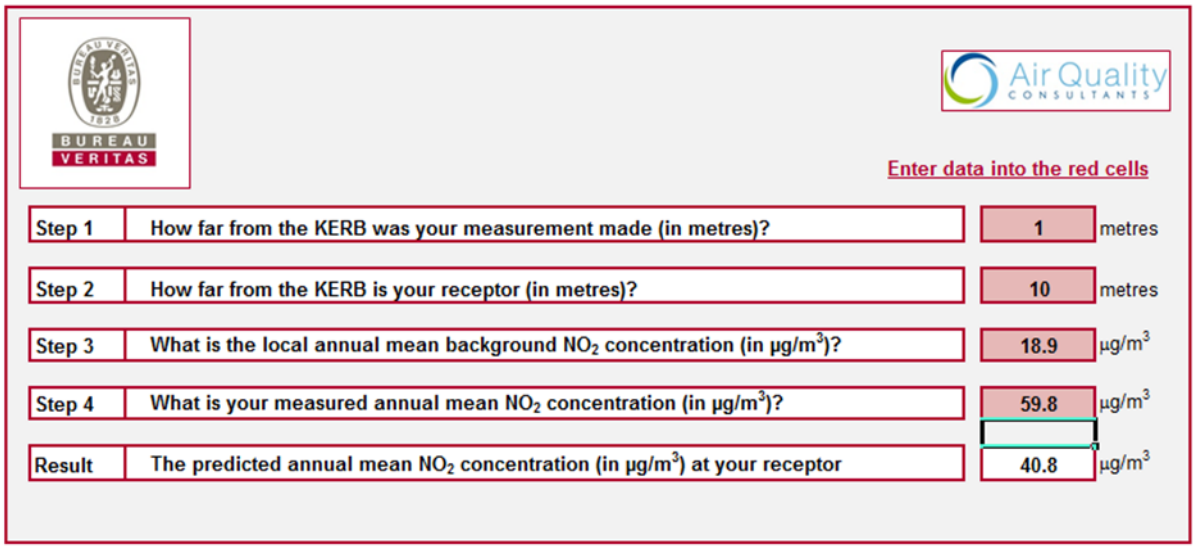


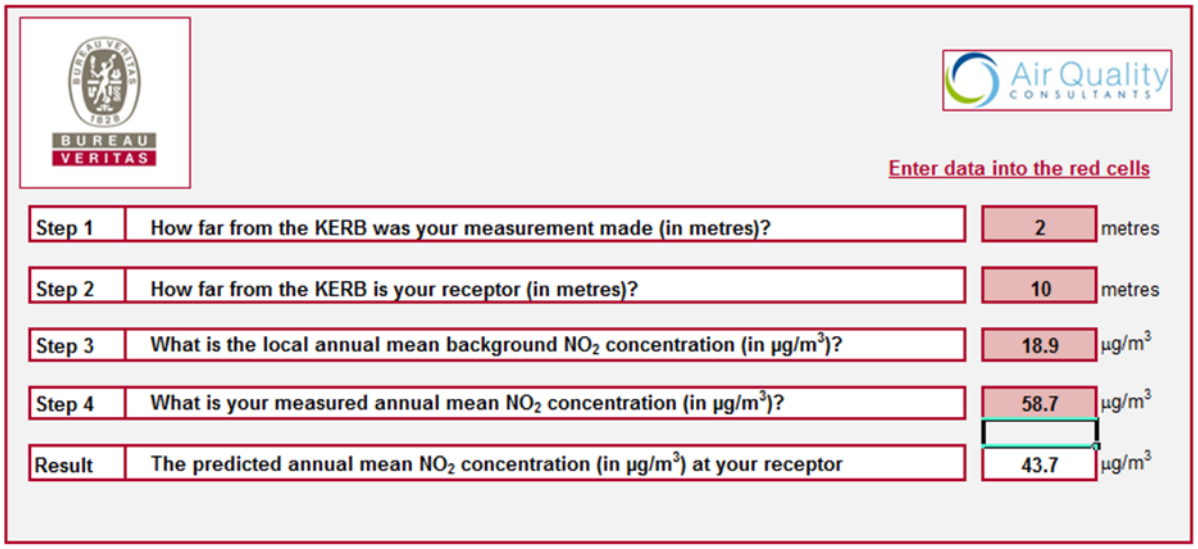
Figure 6: Downshire Way



Enter data into the red 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 µg/m^3)?	18.9	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	59.8	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	40.8	µg/m^3

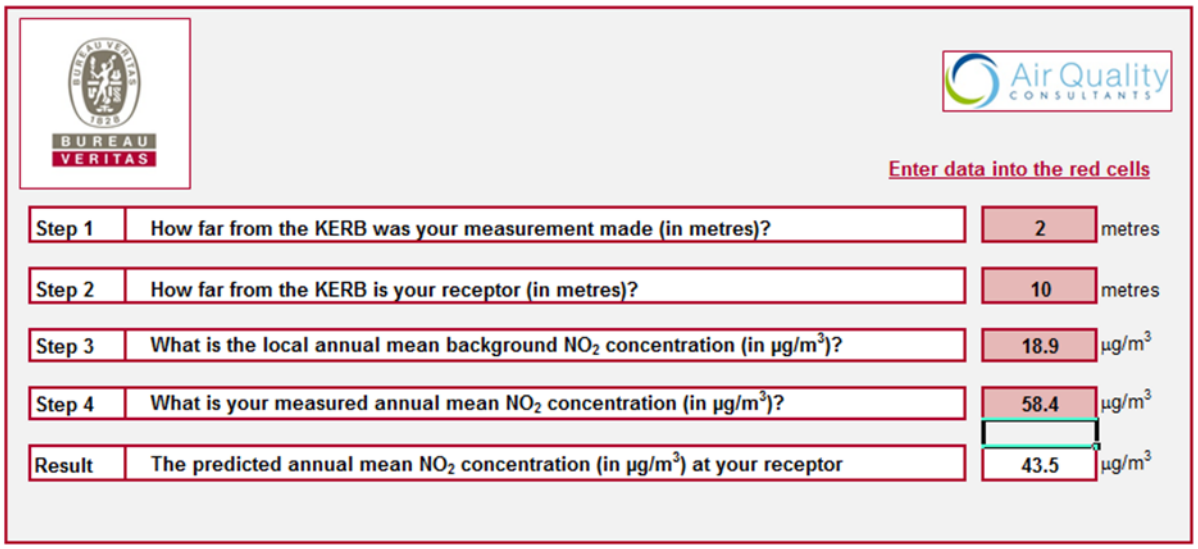
Figure 7: 27 3M Roundabout



Enter data into the red 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)?	10	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	18.9	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	58.7	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	43.7	µg/m^3

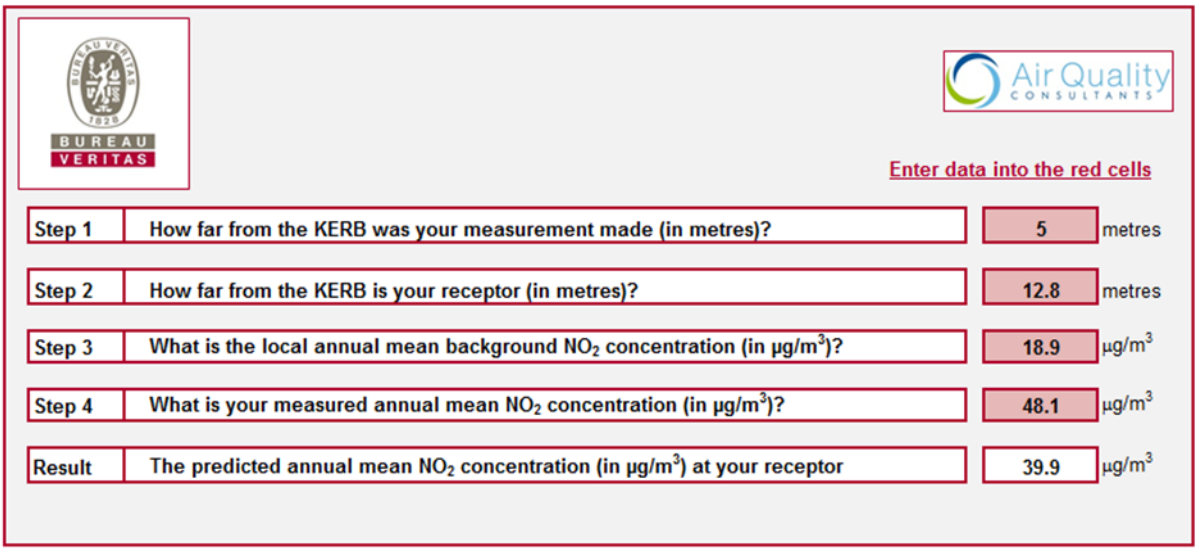
Figure 8: 38 Bracknell Road



Enter data into the red 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)?	10	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	18.9	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	58.4	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	43.5	µg/m^3

Figure 9: Downshire Way continuous monitor



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	5	metres
Step 2	How far from the KERB is your receptor (in metres)?	12.8	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	18.9	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	48.1	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	39.9	µg/m^3

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

Figure 10: Map of automatic monitoring sites in relation to AQMA 1 (Bagshot Road, Bracknell)

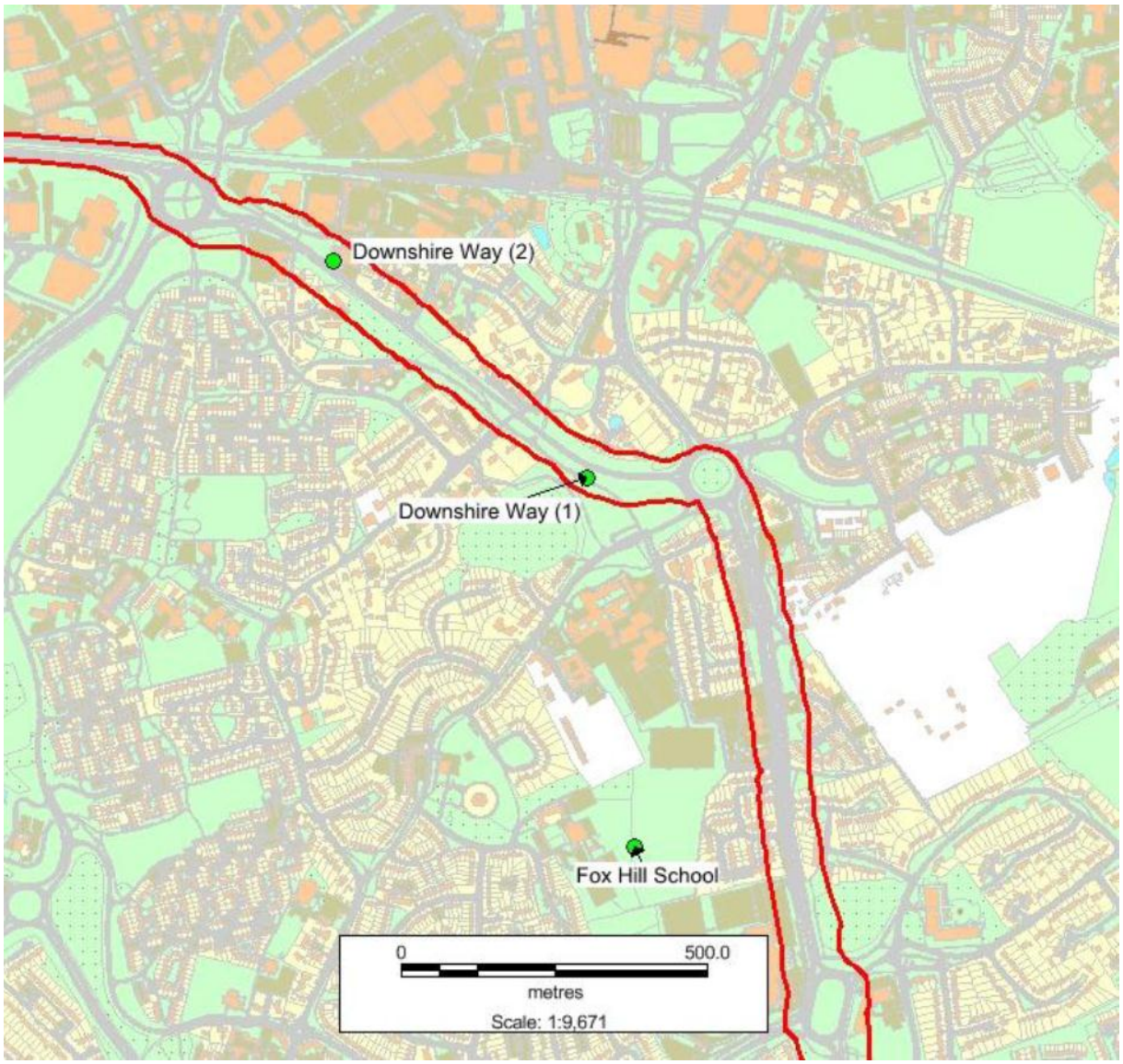


Figure 11: Map of non-automatic monitoring sites close to AQMA 1, Bagshot Road.

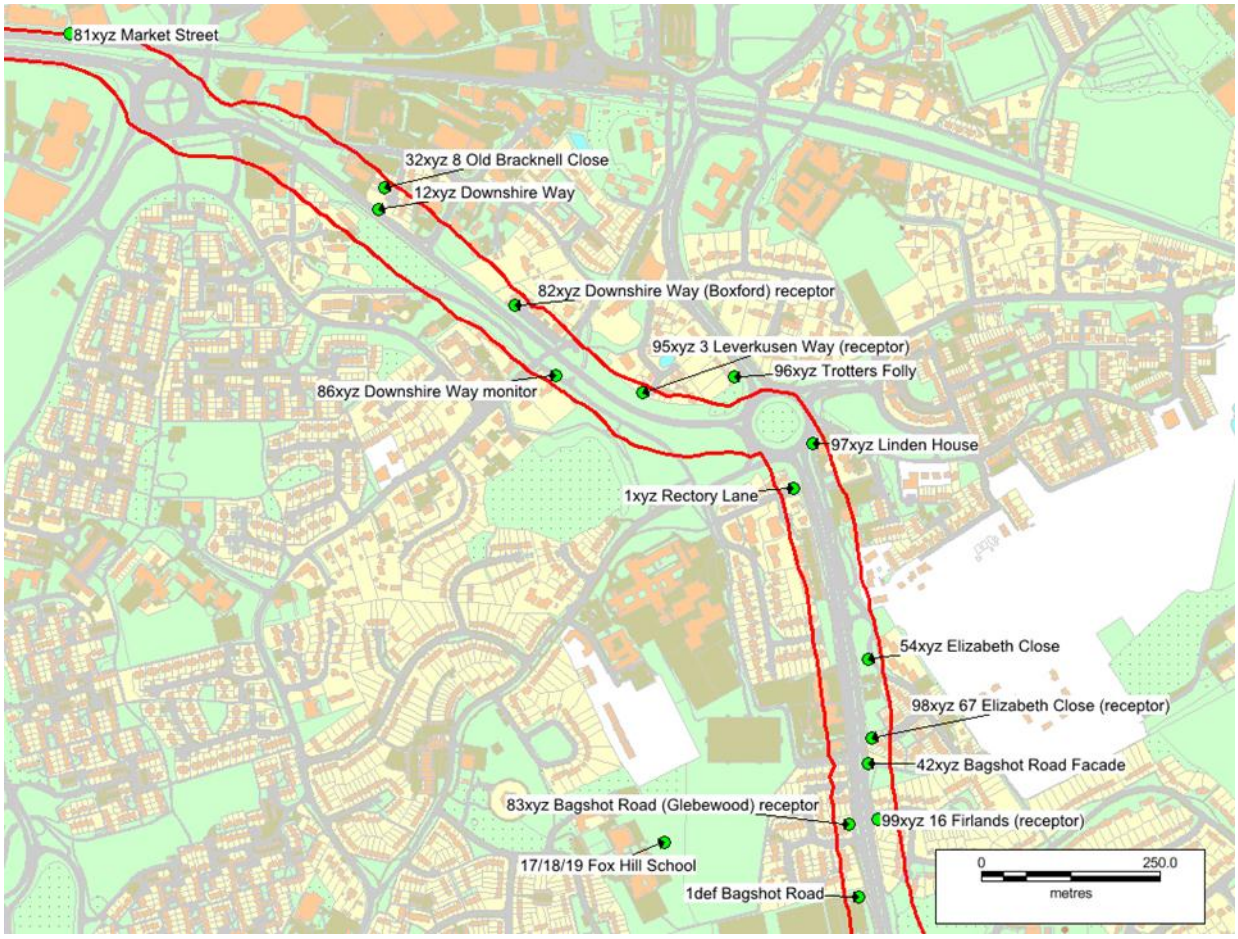


Figure 12: Map of non-automatic monitoring sites, Bracknell Town Centre.

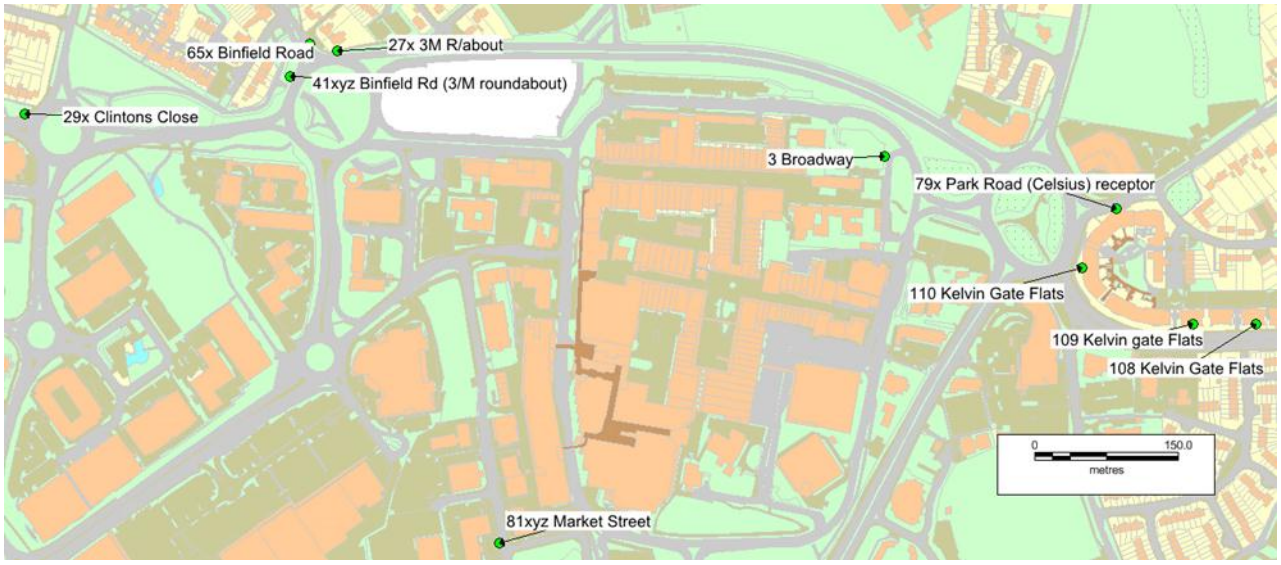


Figure 13: Map of non-automatic monitoring sites, Easthampstead.

Figure 14: Map of non-automatic monitoring sites close to AQMA 2, Crowthorne.

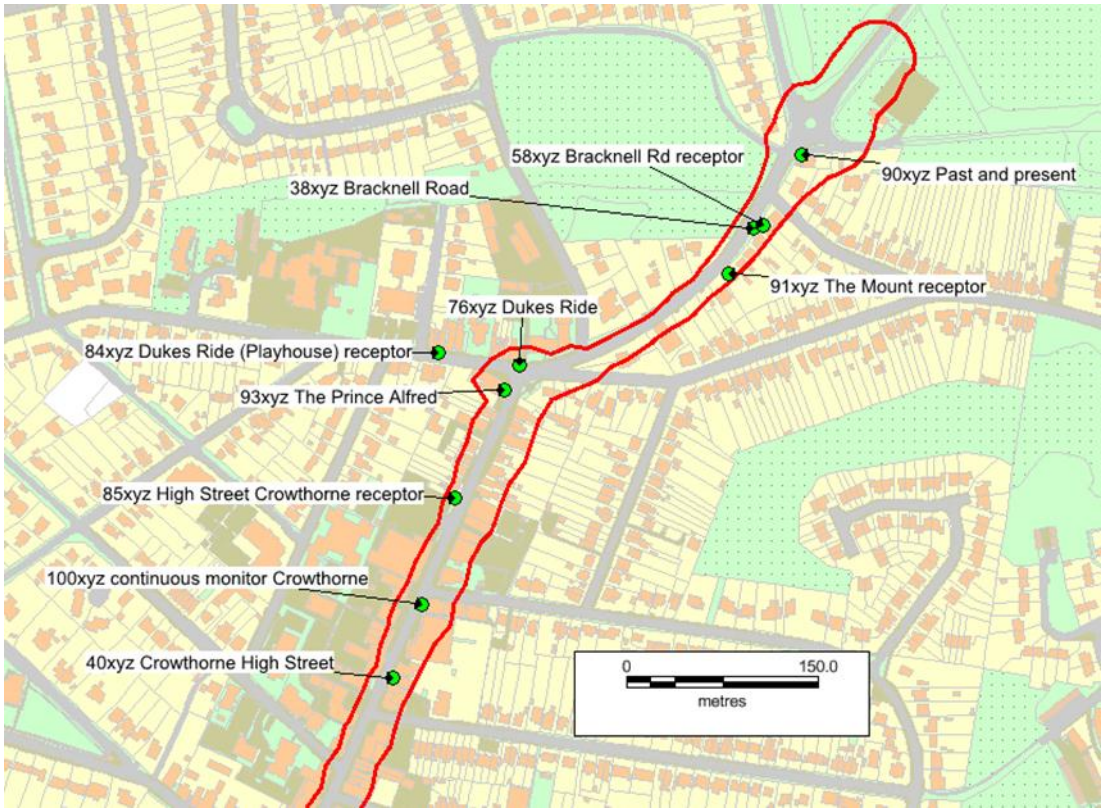
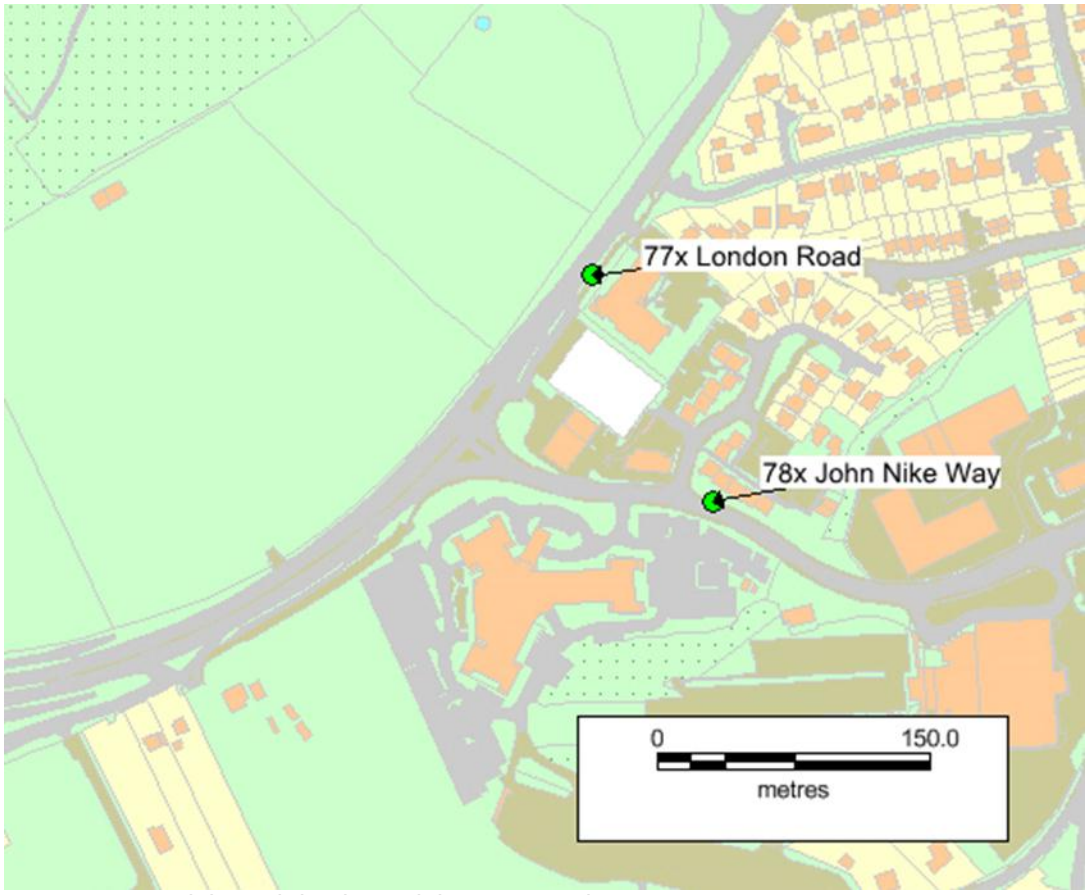


Figure 15: Map of non-automatic monitoring sites, Sandhurst.

Figure 16: Map 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[6]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[6] The units are in microgrammes of pollutant per cubic metre of air (µg/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
SO_2	Sulphur Dioxide

References

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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.

Bracknell Forrest Council (2016) Air Quality Annual Status Report (ASR). 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.