



2019 Air Quality Annual Status Report (ASR)

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

June 2019

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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 billion³.

The major source of air quality pollutants in Bracknell Forest is emissions from road transport, and in particular the contribution from the A322 Bracknell and B3348/High Street and Sandhurst Road Crowthorne have been identified as significant. The main pollutant of concern is nitrogen dioxide (NO₂) and to a lesser extent to increased levels of particulate matter. Two Air Quality Management Areas (AQMAs) have been declared due to exceedances of the annual mean objective for NO₂; the Bracknell AQMA (Bagshot Road and Downshire Way) and the Crowthorne AQMA. There are no exceedances of PM₁₀. Details can be found at: <https://uk-air.defra.gov.uk/aqma/list?view=W> and maps are in Appendix D.

Nitrogen dioxide (NO₂) is the main pollutant of concern. The levels in 2018 have shown general decrease on 2017 levels. The ratified continuous monitored NO₂ annual mean in 2018, the level being 36.6 µg/m³ at Downshire Way did not exceed the Air Quality objective level of 40 µg/m³. There were 0 exceedances of the 1-hour objective at Downshire Way, which did not exceed the objective permitted level of 18.

There were no exceedances of the ratified, adjusted and distance corrected diffusion tubes within the Bracknell and Crowthorne AQMAs. There were no locations greater than 60µg/m³ which therefore does not indicate any exceedance of the 1-hour Objective. All sites showed a decrease in level compared to 2017, except of 7 of which

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

6 were within the AQMAs. Overall the levels have been reducing over the last 6 years to 2018.

No extensions or amendments to the AQMAs were required nor any new AQMAs to be declared.

Actions to Improve Air Quality

Bracknell Forest produced an air quality action plan in 2014, and updated in 2016, 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. The vision outlined in the LTP is:

"To develop a sustainable transport system that supports the local economy, provides choice, and improves quality of life in a safe and healthy environment".

The latest LTP (LTP3 2011-2026) focuses on a number of objectives, with specific policies to support them, including:

1. Reduce delays associated with traffic congestion and improve reliability of journey times
2. Maintain and improve, where feasible, the local transport network
3. Secure necessary transport infrastructure and services to support sustainable development.
4. Encourage and promote accessibility by sustainable modes of transport
5. Reduce greenhouse gas emissions from transport
6. Reduce casualties and improve safety on the local transport network

The LTP3 and supporting documents can be accessed via the Council's website, at: <http://www.bracknell-forest.gov.uk/planningtransportpolicy>

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 NO₂ 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. The remaining section, at Downshire Way has now secured funding for dual carriageway and work due to start in early 2019. 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. Since 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.

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 unloading goods. A reduction in NOX emissions of 19% is required to achieve the annual mean air quality objective for NO2 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 continuing to work 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.

A joint application with West Berkshire and Wokingham Councils to the Air Quality Grant Scheme 2017-18 was made but unfortunately not successful in securing grant funding for the project of involving the purchase of monitoring equipment which children/adults can wear to monitor their personal exposure to air pollution on the way to and from school against routes they have taken.

Conclusions and Priorities

The main focus for Bracknell Forest in terms of improving air quality is to reduce NOx emissions and therefore NO2 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 2018 the NO2 concentrations did not exceed the air quality objectives at any of the diffusion tube sites when the distance correction is applied.

Concentrations at the majority of the diffusion tube sites have decreased in 2018 compared to 2017 levels and were the lowest in the last 6 years.

The council has also continued to work 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.

The areas of concern continue to be:

- Bracknell AQMA - Downshire Way and Bagshot Road (A322)
- Crowthorne AQMA - High Street and Bracknell Road

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://liftshare.com/uk/community/bracknellforest>) 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>
- Go to The Lexicon website for the best ways to travel to the new town centre <https://www.thelexiconbracknell.com/get-here/travel-information>

- Go to <https://www.bracknell-forest.gov.uk/roads-parking-and-transport/travel-and-public-transport>

For further details on air quality in Bracknell Forest please refer to our website at:

<https://www.bracknell-forest.gov.uk/business-information/environmental-health/pollution/air-quality> .

Individuals or members of local groups are invited to share any ideas they have to cut nitrogen dioxide levels in Bracknell Forest by emailing:

Environmental.Health@Bracknell-Forest.gov.uk

Other useful websites are:

<https://uk-air.defra.gov.uk/>

<https://www.gov.uk/government/publications/2010-to-2015-government-policy-environmental-quality/2010-to-2015-government-policy-environmental-quality#appendix-5-international-european-and-national-standards-for-air-quality>

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1 Local Air Quality Management

This report provides an overview of air quality in Bracknell Forest during 2018. 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 **Error! Reference source not found.** in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMA declared by Bracknell Forest can be found in Table 2.1. Further information related to declared or revoked AQMA, including maps of AQMA boundaries are available online at:

https://uk-air.defra.gov.uk/aqma/details?aqma_ref=678 .

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

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
AQMA Bracknell	Declared 09/02/2011, Amended 2012	Nitrogen Dioxide annual mean	Bracknell	The A322 Bagshot Road and Downshire Way from Berkshire Way to junction with B3430	NO	50.3µg/m ³		38.4µg/m ³		BFC Air Quality Action Plan	2014	https://www.bracknell-forest.gov.uk/sites/default/files/documents/air-quality-action-plan-2014_0.pdf
AQMA Crowthorne	Declared 09/02/2011, Amended 2012	Nitrogen Dioxide annual mean	Crowthorne	Part B3348, High Street & part of Sandhurst Road	NO	41.7µg/m ³		42µg/m ³		BFC Air Quality Action Plan	2014	https://www.bracknell-forest.gov.uk/sites/default/files/documents/air-quality-action-plan-2014_0.pdf

☒ Bracknell Forest 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 the evidence provided was acceptable for all sources and pollutants. The following describes how the comments have been addressed:

- The site IDs in Table A.2 have been update to a consistent format to improve readability when cross-referencing results.
- In Table A.1 the reference to CM2 has been removed. CM3 is reference to the location of the continuous monitor when it moved from the location on the A322 off the Horse and Groom roundabout to the current location approximately 300m west on the A322 outside the fire station.
- A review of the exact locations of the diffusion tube sites was carried out prior to the new monitoring year commencing. Where possible the monitoring locations have been changed to represent exposure. In some circumstances it has not been possible to relocate the tubes and further changes /altered locations are planned for the 2019 monitoring programme.

Bracknell Forest Council has taken forward a number of direct measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in their respective Action Plans. Key completed measures are:

- Completion of replacement of flat top humps to speed cushions on High Street Crowthorne - this is within the Crowthorne AQMA to reduce the start/ stop traffic and maintain an even speed
- Freight Strategy developed as part of the Traffic Management Strategy, and
- Continuation of the provision of electric car charging points to commercial and residential developments through the development control process.

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

- Final section of A332 at Downshire Way to be dual carriageway- this is following National Productivity Infrastructure Framework funding being secured, which is within the Bracknell AQMA to improve movement during peak hours and reduce emissions.

Bracknell Forest Council's priorities for the coming year are:

- to investigate other measures to improve the flow of traffic along Crowthorne High Street due to delays in objections to planning applications to improve this location at the centre of the Crowthorne AQMA
- Electric charging points – consideration of on street provisions in residential locations to encourage greater uptake of electric vehicles, and
- Progress the Local cycling and walking improvement plan – technical input from DfT secured.

The principal challenges and barriers to implementation that Bracknell Forest Council anticipates facing are related to resources and lack of funding to implement more actions.

Progress on the following measures has been slower than expected due to: resources and lack of funding to implement more actions.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Bracknell Forest Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Bracknell and Crowthorne AQMAs.

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 on approach roads and journey time	Reduction in NO2 concentrations to below the objective in the AQMA 1	Work complete. 2018 update: monitoring showing improved movement through junction and improved queuing times	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. Phase IV amendments proposed 2019-2021	Reduce queues and journey time	Reduction in NO2 concentrations to below the objective in the AQMA 1	Work complete for Phase III. Now looking to implement Phase IV which will add an additional circulatory lane and an additional exit lane towards Nightingale Close	Completed Feb 2015	As above

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3	Capacity and safety improvements including full signalisation at Twin Bridges Roundabout	Traffic Management	Strategic highway improvements	BFC	2013	2013-2019	Reduce queues in peak time. Improvement in flow should reduce the stop/start of the traffic and reduce NOx	Reduction in NO2 concentrations to below the objective in the AQMA 1	Installation of MOVA and works complete. Funding secured through NPIF for Downshire Way dualling, with detailed design scheduled to be completed Sept 2018 and construction during 2019.	First phase 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	Under investigation	Reduce queues in peak time	Reduction in NO2 concentrations to below the objective in the AQMA 1	Work complete	Completed	Work led by WBC. No data provided to determine improvements made.
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	Concept designed and consultation ongoing	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 except for zebra crossing	2016	We are looking to move the bus shelter and improve the junction at the top (Eastern) end of Crowthorne High street, which should improve traffic flow and reduce queueing

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8	Improvements to bus stops to aid flow of traffic and reduce queuing	Transport Planning and Infrastructure	Bus route improvements	BFC	2014	2017-2018	Reduce queueing at bus stops and bus station to smooth flow. increase 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. No progress in 2018.	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	2016/17	Increase cycling rate by making people more aware and cycle paths made safe and inviting.	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Work in progress. Signs improved as required. Bespoke signage and corresponding maps produced for the 4 key cycle corridors, including the Red Route running parallel to Bagshot Road	2016/2017	Data from annual walking and cycling survey shows increase in cycling by 18% from 2014-2015. Information on cycle and pedestrian numbers are currently being reanalysed following survey undertaken in April 2017
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. Access for deliveries along the rear of the shops remains an ongoing objective in the updated Local Plan, but requires doing bits separately as development opportunities arise, given individual ownership issues at the back of the shops and properties. Responsibility for the current High Street delivery issues really relies with the Council's enforcement team, and as an interim/compromise solution a Freight Quality Partnership with the Parish, traders and freight providers.

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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 forecourt and a number of key hubs and shopping destinations. This is supplemented by a website which shows real time information (where available) for all stops in the borough.	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 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 NO2, PM10 and PM2.5 concentrations	Work is ongoing and website now has links to real-time information from external sites	completed 2018	Work to update the council's transport and travel web pages is ongoing, and we are looking at using the '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	2016/17	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.	Ongoing	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	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. Targeted marketing to residents along the Red Route may have contributed to the increase in cycling along the route after it was re-branded.	Complete 2014. Cycling increased by 57% along the Red route which runs alongside Bagshot Road within the Bracknell AQMA.	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.

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	and walking										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. All but one of the non-independent schools in the borough have produced a school travel plan. Bikeability classes are run each year. No current information on impact on car journeys available.
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 NO2, PM10 and PM2.5	LSTF project engaging with residents and businesses concluded in 2015 with positive results. "Travel in Bracknell" walking and cycling surveys showed broad increases in 2018 of around 25-30% on previous year.	Complete 2014. Work to be continued as part of DfT	Several large employers run minibuses 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. In addition to this major new residential development in Bracknell are required to develop travel plans. The guidance and advice was well received by businesses. The developer of the Jennets park development are required to run the buses to the town centre for a number of years.

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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. Electric pool car and van now on fleet.

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.

Bracknell Forest is taking the following measures to address PM_{2.5}: Although England has not set an air quality objective for PM_{2.5}, the Public Health Outcome Framework (PHOF) enables Council's Public Health and Environment departments to work together to priorities action on air quality. The PHOF indicator for the fraction of mortality attributable to particulate air pollution for 2017 is as follows:

Bracknell Forest	South East region	England
5.6%	5.6%	5.1%

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, and
- 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 undertook automatic (continuous) monitoring at 1 site during 2018, monitoring NO₂ and PM₁₀. Downshire Way is a roadside site. This site is identified as CM3 following its move in 2014 from the location known as CM2. The Foxhill School background site was ceased at the end of 2017. Table A.1 in Appendix A shows the details of the sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. National monitoring results are available at:

<https://uk-air.defra.gov.uk/data/> .

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Bracknell Forest undertook non- automatic (passive) monitoring of NO₂ at 42 sites during 2018. Table A.2 in Appendix A shows the details of the sites. A full review of the details of the non-automatic monitoring sites has been carried out and amendments have been made. The revised details have been provided in Table A.2, in particular some site names now reflect the monitoring site more specifically; site type have been reviewed and now remove all references to façade; grid references updated; and distances to relevant exposure and distance to kerb now more accurate. This needs to be taken into consideration in the results for 2018 and 2017 compared to 2016.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

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

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

Continuous monitoring Downshire Way Bracknell

The annual mean objective at Downshire Way is below the annual mean objective at 36.6 µg/m³. This is a decrease compared to 2017. The co-location study result was slightly lower at 36 µg/m³. There were no exceedances of the one hour objective (200 µg/m³ not to be exceeded more than 18 times), with the highest being 159.0 µg/m³ recorded on 3/09/18 19.00-20.00. There was excellent data capture of 99.5%. Figure 1 below shows the hourly data.

Overall there were no exceedances of the annual mean and one hour objectives.

Figure 1 Downshire Way one hour nitrogen dioxide results

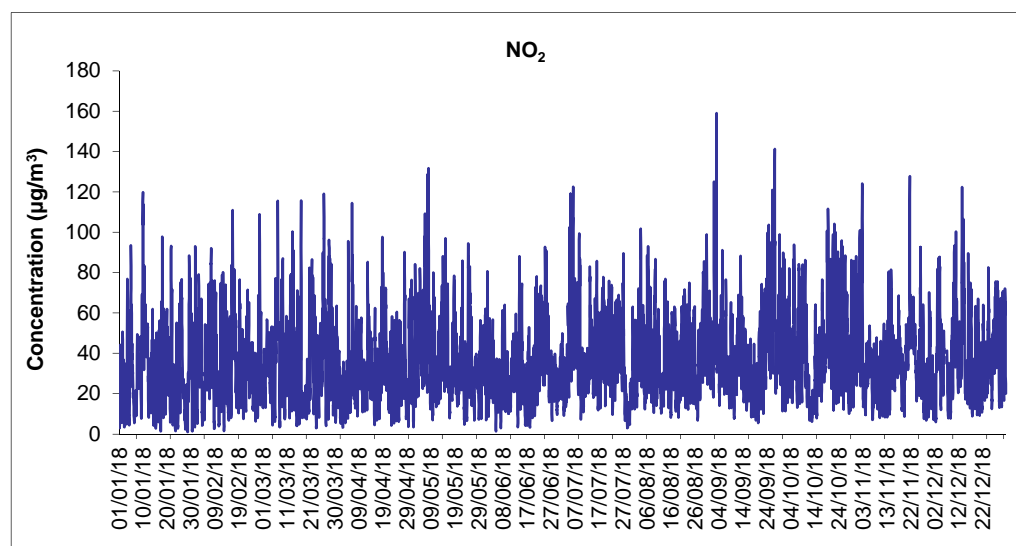
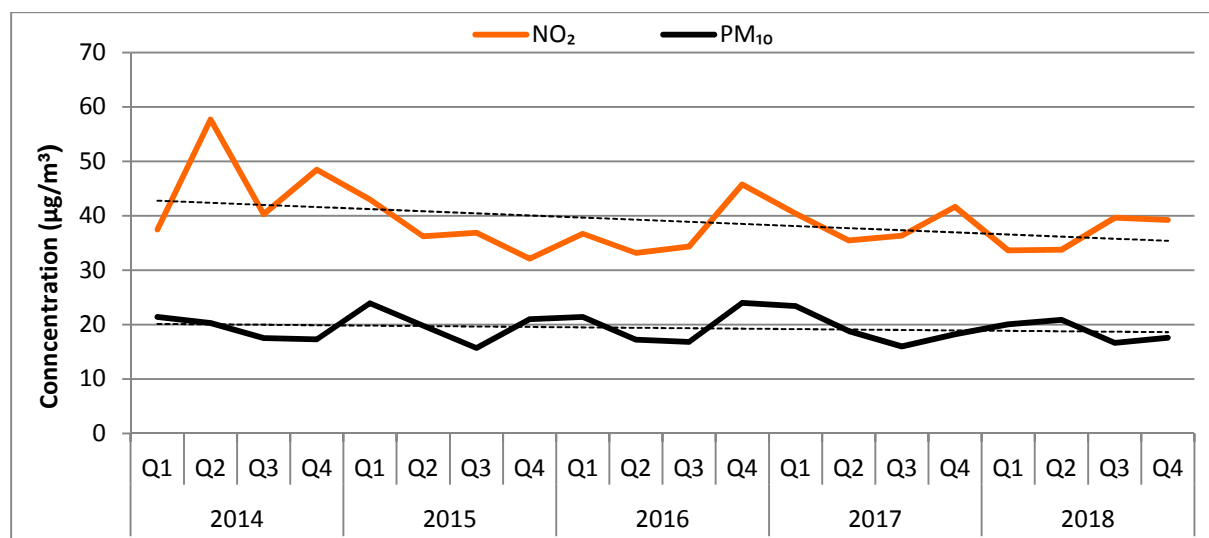


Figure 2 below shows the 5 year trends in annual mean concentrations at the automatic monitoring unit. The concentrations at the roadside site have remained consistent for the last 3 years and have all been below the objective level. Should this continue then revocation of the AQMA for Bracknell will need to be considered. The NO_x data compared well with Newbury, Wokingham and AURN background sites.

Figure 2 Trends in nitrogen dioxide and PM₁₀ at the continuous monitoring units



Diffusion Tube data

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B, which include the distance correction to nearest exposure.

The diffusion tube results generally consistently over-read within 20% of the NO_x analyser throughout the year, which is considered acceptable. Exceptions to this are June where the diffusion tube average is slightly below the NO_x analyser average, and January and April where diffusion tube averages are more than 20% higher than the automatic data.

In 2018 42 locations of passive monitoring took place, of which 6 were triplicate and 1 was triplicate co-located at the continuous monitor. 3 new site was set up (sites ID 122, 123 and 124). At the end of 2018 22 sites ceased, some to due levels well below the objective and some to due re-location to relevant exposure. In 2019 6 new sites are proposed, some as a results of relocation of previous sites (ceased at end of 2018) to represent relevant exposure.

Bracknell AQMA

There were no sites within the Bracknell AQMA which have exceeded the annual mean objective. The co-location study at site ID 86 Downshire Way automatic monitor was below the objective level for the third year and the result of $36 \mu\text{g}/\text{m}^3$ is marginally lower than the automatic level result of $36.6 \mu\text{g}/\text{m}^3$. 7 of the 12 sites within AQMA reduced compared to the 2017 level.

There were no levels where the annual mean was greater than $60 \mu\text{g}/\text{m}^3$, which indicates that an exceedance of the 1-hour mean objective is also likely at these sites.

Crowthorne AQMA

Of the nine sites within the AQMA there were no exceedances. All sites except site 85 at 72 High Street within the AQMA reduced compared to the 2017 levels. Overall the levels are reducing year on year.

There were no levels where the annual mean was greater than $60 \mu\text{g}/\text{m}^3$, which indicates that an exceedance of the 1-hour mean objective is also likely at these sites.

Outside of the AQMAs

The results continue to show that the diffusion tube concentrations have decreased from 2017 levels and the lowest in the last 5 years at all sites outside the two AQMAs at all site types. The levels are lower those recorded in 2014.

The 11 sites which commenced in 2017 (sites 111-121) all within Bracknell town centre and surroundings to assess the effect of changes in traffic due to the town centre regeneration and opening on the new shopping centre. There were no exceedances and the levels all decreased (except at 119 which slightly increase from 28.4 to $29.4 \mu\text{g}/\text{m}^3$).

There were no levels where the annual mean was greater than $60 \mu\text{g}/\text{m}^3$, which indicates that an exceedance of the 1-hour mean objective is also likely at these sites.

This overall reduction from 2017 levels has been seen in nearby areas outside the Borough.

3.2.2 Particulate Matter (PM₁₀)

Error! Reference source not found. in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

Table A.5 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year.

PM₁₀ annual mean

The annual mean concentration was well below the objective at the monitoring site. The level at the roadside Downshire Way was 18.8µg/m³. The concentration was consistent with levels reported in previous years and have declined slightly in the last six years. There was excellent data capture of 98.5%. The A322 corridor is a stretch of road which forms the AQMA Bracknell which over the past 5 years has seen widening in order to manage congestion. This work will continue in 2019 following national projection funding being secured to proceed with the final section of dualisation which is the section immediately adjacent to the continuous monitor.

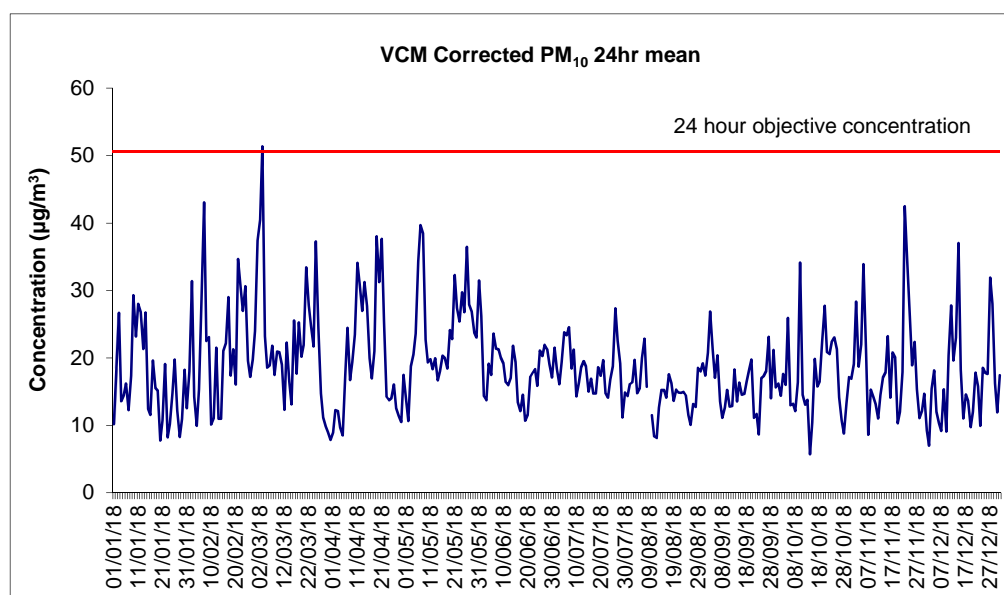
The levels in the last 5 years as shown in Figure 2 above. Therefore was no exceedance of the annual mean objective.

PM₁₀ daily mean

The daily mean concentration was exceeded on 1 day at Downshire Way (on Saturday 03/03/18). This date was at the end of 10 day period of very cold weather. This was well below the permitted number of 35 exceedances per year. Figure 3 below shows the trend in 24 hour mean results. These results are similar to previous years data.

Therefore was no exceedance of the daily mean concentration.

Figure 3 Downshire Way PM₁₀ daily mean



The results were generally consistent with the Reading AURN site, Oxford St.Ebbs and Chilbolton Observatory AURN site (a rural background site in located between Andover and Winchester), but peaks at higher concentrations.

3.2.3 Particulate Matter (PM_{2.5})

No particulate matter (PM_{2.5}) monitoring is undertaken.

3.2.4 Sulphur Dioxide (SO₂)

No sulphur dioxide monitoring is undertaken.

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	486992	167898	NO ₂ ; PM ₁₀	N	Chemiluminescent; TEOM	N/A	N/A	2.7
CM3	Downshire Way	Roadside	486501	168850	NO ₂ , PM ₁₀	Y	Chemiluminescent; TEOM;	1	7	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	Sports Centre Bagshot Road	Kerbside	487230	168840	NO2	YES	35	1	NO	1.6
1xyz	Rectory Close lamppost	Roadside	487140	168407	NO2	YES	6.5	14	NO	1.7
12xyz	Old Bracknell Close Verge	Kerbside	486560	168794	NO2	YES	18	1	NO	1.7
27x	3M roundabout (24 Binfield Road)	Kerbside	486671	169599	NO2	NO	9	1	NO	1.3
29x	8 Clintons Green	Kerbside	486347	169534	NO2	NO	9	1	NO	2.8
32xyz	8 Old Bracknell Close	Urban Background	486569	168824	NO2	NO	0	30	NO	1.7
38xyz	The Bungalow Bracknell Road	Kerbside	484353	164261	NO2	YES	5	5	NO	1.7
40xyz	229 Crowthorne High Street	Roadside	484054	163858	NO2	YES	0	3	NO	1.6
41xyz	3M Roundabout (Fowlers Lane)	Kerbside	486622	169573	NO2	NO	16	1	NO	1.8
42xyz	Bagshot Road Railings	Roadside	487244	168041	NO2	YES	2	3.5	NO	0.9

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54xyz	opp 7-12 Elizabeth Close	Suburban	487243	168169	NO2	YES	28	18	NO	1.8
58xyz	Pine View Bracknell Road	Kerbside	484360	164263	NO2	YES	2	1	NO	1.6
76xyz	2 Dukes Ride	Roadside	484188	164178	NO2	YES	2	1.5	NO	2
78x	John Nike Way (Braeside)	Roadside	484348	169212	NO2	NO	5	2	NO	2.1
82xyz	19 Boxford Ridge	Roadside	486751	168661	NO2	YES	0	14	NO	1.9
83xyz	75 Glebewood	Suburban	487216	167940	NO2	YES	7	30	NO	1.8
84xyz	24/26 Dukes Ride (Playhouse)	Roadside	484123	164189	NO2	NO	8	1.5	NO	1.8
85xyz	72 Fletcher Cottage, Crowthorne High Street	Roadside	484138	164075	NO2	YES	0	4.5	NO	1.6
86xyz	Downshire Way continuous monitor	Roadside	486501	168850	NO2	YES	1	7	YES	2.6
90xyz	Dive shop, Bracknell Road	Roadside	484408	164341	NO2	YES	17	3.5	NO	1.6
91xyz	The Mount, Bracknell Road	Roadside	484352	164249	NO2	YES	0	6	NO	1.7
93xyz	The Prince Alfred PH, 2 High Street	Roadside	484176	164159	NO2	YES	0	4	NO	1.8
95xyz	3 Leverkusen Road	Suburban	486941	168537	NO2	YES	0	24	NO	1.7

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97xyz	Linden House	Roadside	487166	168470	NO2	YES	0	2	NO	1.6
98xyz	67 Elizabeth Close	Roadside	487246	168065	NO2	YES	0	8	NO	2
99xyz	16 Firlands	Roadside	487258	167948	NO2	YES	0	10	NO	1.6
100xyz	Co-Op 149 Crowthorne High St	Roadside	484112	163985	NO2	NO	3	3.5	NO	1.8
108	251-269 Kelvin Gate	Roadside	487626	169316	NO2	NO	0	8.5	NO	1.8
111	3 Laureates Place	Roadside	484572	169649	NO2	NO	4	7	NO	1.75
112	9 Grouse Meadows	Roadside	484779	168545	NO2	NO	11	8	NO	1.75
113	10 Blackbird Place	Roadside	484526	168360	NO2	NO	6	12	NO	1.75
114	1-10 Crossways, St Marks Road	Suburban	484498	169700	NO2	NO	13	2	NO	1.7
115	Blenheim Avenue (Rear 31 Hampden Cres)	Suburban	487265	168537	NO2	NO	2.5	3	NO	1.75
116	Broad Lane (near 3 Gibson Drive)	Roadside	487690	168673	NO2	NO	7	3.5	NO	1.85
117	Blue Smoke House, The Ring	Kerbside	4869894	169392	NO2	NO	2	0.2	NO	2.5
118	Market Street (Time Square)	Roadside	486842	169068	NO2	NO	4	2.5	NO	2
119	opp 3 Market Street (Ann Marie)	Roadside	486817	169233	NO2	NO	23	3.5	NO	2
120	1-96 Platform (Station)	Roadside	486883	168992	NO2	NO	10	1.5	NO	2.2

121	Skimped Hill Lane (Point layby)	Roadside	486702	169310	NO2	NO	12	2	NO	2
122	1 Meadowsweet Lane	Roadside	486163	170565	NO2	NO	0	6.58	NO	1.86
123	New Forest Ride 40 sign (27 Wards Stone Park)	Roadside	488388	166666	NO2	NO	0	2.2	NO	1.8
124	229 Yorktown Road	Roadside	484686	161359	NO2	NO	0	1.7	NO	2.3

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
CM1 Foxhill School	Urban Background	Automatic	N/A	N/A	<u>17.9</u>	16.9	18.9	15.8	N/A
CM3 Downshire Way	Roadside	Automatic	100	99.5	<u>45.8</u>	37	37	38.4	36.6
1def Sports Centre Bagshot Road	Kerbside	Diffusion Tube	100	91.7	<u>50.5</u>	46.3	38.3	37.1	22
1xyz Rectory Close lamppost	Kerbside	Diffusion Tube	100	83.3	<u>30.5</u>	25.4	25.5	22.3	23.4
12xyz Downshire Way	Kerbside	Diffusion Tube	100	100	<u>72.1</u>	58.6	40.8	48.2	29.3
27x 3M Roundabout (24 Binfield Road)	Kerbside	Diffusion Tube	100	75	<u>52.8</u>	16.8	43.7	43.5	37
29x 8 Clintons Green	Kerbside	Diffusion Tube	100	83.3	<u>30.5</u>	27.9	32.8	25.4	21.5
32xyz 8 Old Bracknell Close	Urban Background	Diffusion Tube	100	100	<u>29.8</u>	25.4	30.1	22.4	21
38xyz The Bungalow Bracknell Road	Kerbside	Diffusion Tube	100	91.7	<u>54.4</u>	43.6	43.5	42.9	34.1
40xyz 229 Crowthorne High Street	Roadside	Diffusion Tube	100	91.7	<u>34.2</u>	29.9	36.7	28.2	26

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41xyz 3M Roundabout (Fowlers Lane)	Kerbside	Diffusion Tube	100	75	<u>52.8</u>	16.8	43.7	43.5	29.6
42xyz Bagshot Road Railings	Roadside	Diffusion Tube	100	91.7	<u>30.5</u>	27.9	32.8	25.4	28
54xyz opp 7-12 Elizabeth Close	Suburban	Diffusion Tube	100	91.7	<u>31.7</u>	28.4	30.8	26.7	20.5
58xyz Pine View Bracknell Road	Kerbside	Diffusion Tube	100	100	<u>47.3</u>	40.7	49	49.4	38.4
76xyz 2 Dukes Ride	Kerbside	Diffusion Tube	100	100	<u>36.8</u>	33.1	37.2	30.2	24.8
78x John Nike Way (Braeside)	Roadside	Diffusion Tube	100	91.7	<u>32.5</u>	27.9	35.2	27.9	22.8
82xyz 19 Boxford Ridge	Roadside	Diffusion Tube	100	100	<u>40.2</u>	35.7	35.6	29.2	30
83xyz 75 Glebewood	Suburban	Diffusion Tube	100	100	<u>29</u>	19.6	23.7	17.6	18.5
84xyz 24/26 Dukes Ride (Playhouse)	Kerbside	Diffusion Tube	100	100	<u>29.9</u>	26	29.4	25.1	20.4
85xyz 72 Fletcher Cottage High Street Crowthorne	Roadside	Diffusion Tube	100	66.7	<u>27.1</u>	24.7	50.5	23.9	24
86xyz Downshire Way continuous monitor	Roadside	Diffusion Tube	100	100	<u>51.1</u>	43.5	39.9	38.5	36
90xyz Dive shop,	Roadside	Diffusion Tube	100	100	<u>32.4</u>	32.5	37	27.6	21.3

Bracknell Road									
91xyz The Mount, Bracknell Road	Roadside	Diffusion Tube	100	100	<u>34.4</u>	30.4	35.3	28	26
93xyz The Prince Alfred PH, 2 High Street	Roadside	Diffusion Tube	100	91.7	<u>29.3</u>	28.2	32	25.8	23
95xyz 3 Leverkusen Road	Suburban	Diffusion Tube	100	83.3	<u>25.3</u>	25.7	28	20.9	21
97xyz Linden House	Roadside	Diffusion Tube	100	100	<u>40</u>	32.8	37.4	28.7	26
98xyz 67 Elizabeth Close	Roadside	Diffusion Tube	100	75	<u>29.9</u>	27.2	28.9	24.4	24
99xyz 16 Firlands	Roadside	Diffusion Tube	100	100	<u>31.4</u>	27.1	30.4	25.3	24
100xyz Co-Op 149 Crowthorne High Street	Roadside	Diffusion Tube	100	91.7	<u>30.6</u>	27.5	23.1	23.1	20.9
108 251-269 Kelvin Gate	Roadside	Diffusion Tube	100	100	<u>23.8</u>	24.9	27.6	23.5	21
111 3 Laureates Place	Roadside	Diffusion Tube	100	91.7	<u>N/A</u>	N/A	N/A	23.3	21
112 9 Grouse Meadows	Roadside	Diffusion Tube	100	91.7	<u>N/A</u>	N/A	N/A	25.3	22
113 10 Blackbird Place	Roadside	Diffusion Tube	100	75	<u>N/A</u>	N/A	N/A	22.6	20
114 1-10 Crossways, St Marks Road	Suburban	Diffusion Tube	100	100	<u>N/A</u>	N/A	N/A	27.1	20.3

115 Blenheim Avenue (Rear 31 Hampden Cres)	Suburban	Diffusion Tube	100	100	<u>N/A</u>	N/A	N/A	22.5	21.8
116 Broad Lane (near 3 Gibson Drive)	Roadside	Diffusion Tube	100	83.3	<u>N/A</u>	N/A	N/A	24.8	19.3
117 Blue Smoke House, The Ring	Kerbside	Diffusion Tube	100	75	<u>N/A</u>	N/A	N/A	23.2	20.1
118 Market Street (Time Square)	Roadside	Diffusion Tube	100	91.7	<u>N/A</u>	N/A	N/A	25.7	24.2
119 opp 3 Market Street (Ann Marie)	Roadside	Diffusion Tube	100	41.7	<u>N/A</u>	N/A	N/A	28.4	29.4
120 1-96 Platform (Station)	Roadside	Diffusion Tube	100	100	<u>N/A</u>	N/A	N/A	25.0	21.1
121 Skimped Hill Lane (Point layby)	Roadside	Diffusion Tube	100	58.3	<u>N/A</u>	N/A	N/A	26.4	22.1
122 1 Meadowsweet Lane	Roadside	Diffusion Tube	100	91.7	<u>N/A</u>	N/A	N/A	N/A	19
123 New Forest Ride 40 sign (27 Wards Stone Park)	Roadside	Diffusion Tube	100	91.7	<u>N/A</u>	N/A	N/A	N/A	33
124 229 Yorktown Road	Roadside	Diffusion Tube	100	75	<u>N/A</u>	N/A	N/A	N/A	31

☒ Diffusion tube data has been bias corrected

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

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

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

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

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2014	2015	2016	2017	2018
CM1 Foxhill School	Urban Background	Automatic	N/A	N/A	0	0	0	0	N/A
CM3 Downshire Way	Roadside	Automatic	100	99.5	6	0	2	4	0

Notes:

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

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

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

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

Table A.5 – Annual Mean PM10 Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2014	2015	2016	2017	2018
CM1 Foxhill School	Urban Background	N/A	N/A	17	16.8	15.1	14.1	N/A
CM3 Downshire Way	Roadside	100	98.5	19.1	20	19.8	19	18.8

☐ Annualisation has been conducted where data capture is <75% N/A

Notes:

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

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
				2014	2015	2016	2017	2018
CM1 Foxhill School	Urban Background	N/A	N/A	4	3	2	2	N/A
CM3 Downshire Way	Roadside	100	98.5	5	5	8	3	1

Notes:

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

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2018

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

Site ID	NO ₂ Mean Concentrations (µg/m³)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.84) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
1def	41.5	45.9	47.9	45.7	46.8		54.6	45.3	46.7	46.5	49.4	52.5	47.5	40	22
1xyz	27.6	33.2	36.2	31.3	29.0	26.8	27.9			31.2	32.5	22.6	29.8	25.0	23.4
12xyz	83.2	49.7	51.9	58.2	55.1	39.0	66.2	64.2	63.3	68.8	54.9	62.6	59.8	50.0	29.3
27x	53.8	54.2	73.9		98.9	65.5	67.0	63.6	59.5	65.1			66.8	56.0	37.0
29x	34.4	31.4	41.7	30.4	26.6	27.1	31.5	25.5			39.9	34.0	32.3	27.0	21.5
32xyz	25.8	28.8	28.6	24.4	23.8	18.9	24.8	25.0	26.4	29.9	27.8	22.7	25.6	21.0	
38xyz		42.9	50.4	40.0	39.2	47.7	45.9	40.9	46.7	50.4	54.2	49.4	46.2	39.0	34.1
40x	31.1	30.7	31.9	30.2	28.5		28.6	24.4	27.6	32.3	38.9	30.9	31.0	26.0	
40y	34.8	36.0	33.8	30.6	31.9			26.2	27.6	29.5	39.2	35.9			
40z	30.8	30.9	34.2	28.3	29.7			26.0	28.4	32.4					
41xyz		32.8	41.0	34.3	30.2	23.7	34.5	27.6		53.3	41.2		35.4	30.0	29.6
42xyz	42.7	39.6	37.9	38.1	37.3	26.9	44.8		37.2	37.9	29.5	43.6	37.8	32.0	29.9
54xyz	33.3	33.5	29.7	25.8	24.6	19.4	29.6		30.2	31.9	30.7	36.0	29.5	25.0	20.5
58x	50.7	54.9	65.9	57.1	48.6	40.7	57.3	51.5	51.4	53.7	56.4	57.2	53.8	45.0	38.4
58y	59.1	57.6	65.1	51.0		37.9	52.2	45.1	52.8	53.9	55.0	57.6			

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58z		56.0	66.5	54.3		41.2	57.2	52.8	50.9	56.9	52.2	52.8			
76x	35.3	33.1	30.9	30.6	27.8	31.0	27.9	27.0	32.6	34.1	38.6	36.9	32.1	27.0	24.8
76y	34.9	33.4	31.9	29.5	30.5	29.9	31.1	28.1	31.6	36.3	38.0	35.5			
76z	30.5	27.4	30.1		29.3	28.2	30.6	27.2	33.0	35.4	37.7	36.2			
78x	38.0	34.3	40.5	32.5	24.0	28.4	32.9	28.0	20.3	33.6		30.5	31.2	26.0	22.8
82xyz	36.6	36.1	32.7	30.5	29.4	21.6	43.6	48.8	44.0	35.3	35.0	38.0	36.0	30.0	
83xyz	24.0	27.4	29.3	23.4	18.3	17.1	17.8	17.4	16.6	26.3	32.1	24.4	22.8	19.0	18.5
84xyz	33.8	30.7	31.6	27.4	25.4	24.6	25.3	22.4	26.3	29.3	37.4	29.2	28.6	24.0	20.4
85xyz	29.2			27.6	28.1	26.6	28.1	27.4		32.0	33.2		29.0	24.0	
86x	48.5	40.4	41.2	48.1	43.7	32.6	47.3	48	50.4	50.4	41.3	51.2	44.0	37.0	36.0
86y	46.8	40.9	42.2	43.5	41.4	26.9	46	46.6	47.3	49	41.6	50.2			
86z	45.5	37.6	41.3	41.9	40.4	28.3	46.3	48.7	49.4	47.7	42	50.4			
90x	36.1	33.7	33.3	33.9	29.7	27.5	30.2	24.4	27.7	32.4	37.6	35.6	32.3	27.0	21.3
90y	33.8	37.1	32.0	34.0	31.2	28.7	29.6	25.8	28.8	34.5	38.1	35.7			
90z	37.5	30.1	38.6	33.4	33.0	26.9	31.2	25.3	26.5	31.8	39.7	36.3			
91x	35.1	33.2	33.4	27.7	29.2	27.6	28.6	28.2	29.8	33.9	37.1	29.8	31.4	26.0	
91y	35.3	32.5	32.4	26.7		27.3	28.9	28.5	27.2	37.7	35.6	32.7			
91z	30.8	28.8	35.6	30.8	28.3		32.2	27.4	29.5	35.3	38.0	32.9			
93xyz		31.4	28.0	25.0	26.4	24.9	26.5	23.6	25.8	32.5	32.4	27.0	27.6	23.0	
95xyz	30.6	29.4	33.6	26.2	20.7	17.1	22.8	21.7	19.6	28.6			25.0	21.0	
97xyz	31.6	33.2	32.4	31.7	32.5	29.5	36.9	32.1	34.4	13.3	33.4	35.8	31.4	26.0	
98xyz	32.9	28.4	27.8	26.3	21.4	16.4		48.5	28.9	30.7			29.0	24.0	
99xyz	25.5	32.0	30.1	27.7	24.0	21.1	34.6	30.6	30.9	32.4	30.5	28.7	29.0	24.0	
100x	25.9	24.0	26.4	25.8	25.3	22.4	23.0		21.2	26.7	35.7		26.0	22.0	20.9
100y	29.1	27.7	30.9	26.2	23.1	23.0	24.0	18.5	22.8	28.8	34.1				
100z	31.3	27.5	30.6	26.8	23.0	23.7	23.5	20.9	21.6	27.4	29.1				

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108	25.7	23.8	26.1	23.9	23.5	20.4	23.0	22.3	24.6	28.5	31.5	29.9	25.3	21.0	
111	31.8	29.7	29.8		23.2	21.2	22.1	22.2	24.7	29.6	30.3	25.2	26.4	22.0	21.0
112	36.6	32.4	34.1	28.8	26.7	24.3	27.1	27.2	24.0	29.8	30.0		29.2	25.0	22.0
113	24.8	30.0	31.7	23.1	26.9	24.3	24.7	22.5	22.2				25.6	21.0	20.0
114	32.4	30.6	33.8	28.9	24.4	22.2	27.5	25.8	28.7	30.5	40.3	33.6	29.9	25.0	20.3
115	29.4	28.7	32.0	25.3	23.0	22.2	26.2	24.9	27.8	30.2	30.2	29.8	27.5	23.0	21.8
116	29.1	29.0	31.5	22.6	21.3	19.6	22.1	17.9		25.9	27.6		24.6	21.0	19.3
117	29.1	30.6			27.1	21.8		25.5	26.5	27.6	31.4	32.0	28.0	23.0	20.1
118	40.7	34.8	34.5	31.0	27.8	22.5	33.0	29.3	32.8	36.2	31.6		32.2	27.0	24.2
119	39.0	39.1	41.8	39.7						34.5			38.8	31.4	29.4
120	34.5	32.2	36.2	33.2	25.9	21.7	27.1	24.0	27.0	33.9	38.7	35.7	30.8	26.0	21.1
121	38.0	34.7	37.1	32.0	33.8	26.4		31.5					33.4	28.0	22.1
122	26.5	23.1	27.0	21.9	18.0	17.7	18.6	17.4	18.4		29.4	26.3	22.2	19.0	
123		39.7	38.5	38.7	34.4	34.0	38.1	36.0	38.6	40.4	44.7	47.7	39.1	33.0	
124		40.9	37.5	25.4	44.2	32.8		39.3		40.9	41.0	34.5	37.4	31.0	

☒ Local bias adjustment factor used

☐ National bias adjustment factor used

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

☒ Where applicable, data has been distance corrected for relevant exposure

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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

(2) Distance corrected to nearest relevant public exposure.

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

QA/QC for continuous monitoring

TRL carry out the QA/QC on behalf of Bracknell Forest Council.

Site Operation

Routine instrument calibrations are conducted approximately once per fortnight, which involve zero and span checks, a written record of the gas analyser diagnostics and a general visual inspection of all equipment is undertaken. There is a written operating procedure and a calibration record sheet is completed at every site visit.

Data retrieval and daily data checking

Data from the monitoring station is retrieved and processed on a Campbell CR10x data logger as 15-minute mean data. The logger was interrogated via a Siemens TC35i GSM modem at 8-hourly intervals by the ENVIEW 2000 software hosted at TRL. This was used to retrieve, check and archive data. TRL's internal QA/QC procedures require all data to be backed up on a secure server and all documentation associated with each site to be uniquely identified and securely stored to provide an audit trail. Daily data inspections are undertaken during office hours using the facilities of the Data Management System. Initial observations of the Management System indicate whether the site has been contacted during its nominated 'poll time' overnight. If this has not been successful a manual poll of the site may be required. If this is not successful further investigation of the communications integrity will be required to establish contact with the site modem and data logger. Three day plots of recorded data are viewed for the requested site, and these are inspected and assessed for continuity, validity, minimum and maximum values, date and time, power failures and general integrity. All anomalies are recorded on the Daily Check sheet, as required. Any anomalies or queries arising from daily inspection of data, or system operation, are brought to the attention of the Project Manager who will evaluate the situation, and initialise any necessary action. In the event that the PM is not available, contact will be made with the next available senior person within the monitoring team. Any issues identified with equipment operation will be referred to the client for attention within 24 hours (excluding weekends). On a weekly basis, data are examined using summary statistics and outlier analysis to establish data validity. In the event that unusual data episodes are recorded, these would be routinely examined over longer data periods to establish their impact on trends, but would also be cross referenced with data peaks and troughs recorded at other national monitoring stations. In addition, integrity and validity of data logger clock times are checked, and any significant errors recorded in the Data Management System logbook. All site data recorded through the Data Management System is archived on TRL's Network. The data is backed up daily, and the TRL IT Department maintains these data within their long-term and secure archives. This secures all data in the event of any system failure.

Data calibration and ratification

Data is ratified as per AURN recommended procedures. The calibration and ratification process for automatic gas analysers corrects the raw dataset for any drift in the zero baseline and the upper range of the instrument. This is done using a Microsoft Excel-

based calibration and ratification file which incorporates the zero and span check information from the calibration visits. The zero reading recorded during the calibration visits is used to adjust any offset of the baseline of the data. The difference between the span value obtained between one calibration visit and the next visit is used to calculate a factor. This change is assumed to occur at the same rate over the period between calibrations and as such the factor is used as a linear data scaler. This effectively results in the start of the period having no factor applied and the end of the period being scaled with the full factor with a sliding scale of the factor in-between. After applying the calibration factors, it is essential to screen the data, by visual examination, to see if they contain any unusual measurements or outliers. Errors in the data may occur as a result of equipment failure, human error, power failures, interference or other disturbances. Data validation and ratification is an important step in the monitoring process. Ratification involves considerable knowledge of pollutant behaviour and dispersion, instrumentation characteristics, field experience and judgement. On completion of this data correction procedure, these data were converted to hourly means and a summary of these data were provided to West Berkshire Council at quarterly intervals and a calendar year annual report is prepared.

Independent Site Audits

In addition to these checks an independent site audit is carried out to ensure the nitrogen dioxide analyser is operating correctly. The audit that is carried out utilises procedures that are applied within DEFRA's National Automatic Air Monitoring Networks Quality Control Programme. The efficiency of the analyser's converter is checked and the analyser is also leak tested. The gas bottle used for calibrations on site is also checked against the auditor's gas bottle to ensure the stability of the gas concentration.

The site audit was only carried out at the Downshire Way Bracknell site on 19th October 2018.

NOX analyser:

The converter in the NO_x analyser was tested and found to be 98.92% efficient with NO₂ concentrations of 245 ppb. The recommended range for instrumentation in the national automatic air monitoring network is in the range of 98% to 102% efficient. This was a good result. To ensure that the analyser is sampling only ambient air the instrument was leak checked. The result was satisfactory, indicating that the analyser sampling systems were free of significant leaks.

The analysers exhibited good steady state responses to both zero and span (calibration) gases with acceptable levels of variation (noise).

The NO_x analyser flow rate was measured using a calibrated flow meter and compared against the analyser's flow rate sensor to evaluate its accuracy. The Downshire Way analyser flow rate sensor was slightly outside the +/- 10% of the calibrated flow meter.

Based on the NO_x analyser's response to the audit standard and audit zero, the concentrations of the station NO cylinders have been reassessed. This provides an indication of the on-site standards stability (the gas concentration stabilities). For the

purpose of these stability checks, the criteria adopted within the national network, and used here, is that the recalculated concentration should lie within 10% of the suppliers stated concentrations.

PM10 TEOM:

The calibration factors of the TEOM instrument were assessed using filters of known weight. The calculated calibration factor was compared with the instrument's stated factors. The criteria for instrumentation in the national automatic air monitoring network is that the calculated factors must lie within +/-2.5% of the stated factors. The difference between the calculated and stated factors was -1.01% for the Downshire Way instrument, this is a good result.

To ensure that a true PM10 measurement is made, the total flow through the sample inlet must be 16.7 litres per minute. Volumetric flow tests were carried out on the instrument, the measured flows showed good agreement with the system flow set points. To ensure that the analyser was sampling only ambient air the instrument flow rates were tested with a flow restricting adaptor. The aim of this test is to identify if there are any leaks in the system. A comparison is made between the restricted flow readings and the unrestricted flow readings. The results showed no large discrepancy was found in the systems, indicating the instruments were free of major leaks.

To ensure that the TEOM analyser configurations are consistent with the Environment Agency Automatic Urban and Rural Network (AURN) quality control programme the TEOM analysers' settings were reviewed. This includes accuracy checks of the TEOM temperature and pressure sensors, a check of the condition of the inlet head cleanliness and checks on the operation settings. It was found that the wait time was set to 10 and it is recommended that this is changed to 1800 to be consistent. The TEOM PM10 inlet head was deemed as requiring cleaning, this should be carried out at regular intervals by the local site operator and at the services.

The temperature and pressure sensors were checked against UKAS accredited audit field sensors. The pass criteria for instrumentation in national automatic air monitoring network is that the onsite TEOM temperature and pressure sensors must agree within 3°C and 3mbar respectively with audit sensors. The Downshire Way instrument passed these tests.

QA/QC of Diffusion Tube Monitoring

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO₂ Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management. The laboratory participants analyse four spiked tubes, and report the results to HSL. HSL assign a performance score to each laboratory's result, based on their deviation from the known mass of nitrite in the analyte.

The Performance criteria are due to be changed, at present the criteria are based on the z-score method, and equates to the following:

GOOD: Results obtained by the participating laboratory are on average within 13% of the assigned value. This equates to a Rolling Performance Index (RPI) of 169 or less.

ACCEPTABLE: Results obtained by the participating laboratory are on average within 13- 26% of the assigned value. This equates to an RPI of 169 - 676.

WARNING: Results obtained by the participating laboratory are on average within 26 – 39% of the assigned value. This equates to an RPI of 676 - 1521.

FAILURE: Results obtained by the participating laboratory differ by more than 39% of the assigned value. This equates to an RPI of greater than 1521.

However from April 2009, the criteria has been based upon the Rolling Performance Index (RPI) statistic and will be tightened to the following:

GOOD: Results obtained by the participating laboratory are on average within 7.5% of the assigned value. This equates to an RPI of 56.25 or less.

ACCEPTABLE: Results obtained by the participating laboratory are on average within 15% of the assigned value. This equates to an RPI of 225 or less.

UNACCEPTABLE: Results obtained by the participating laboratory differ by more than 15% of the assigned value. This equates to an RPI of greater than 225.

Bracknell Forest Council use Gradko International for the supply and analysis of the nitrogen dioxide diffusion tubes for their non-automatic monitoring programme. Gradko's performance for AIR PT AR024 (Jan 2018 – Feb 2018) = 100%, AR025 (Apr 2018- May 2018) = 100%, AR027 (July 2018 – Aug 2018) = 100% , and AR028 (Sept 2018 – Oct 2018) = 100%, which relates to the % of results which are satisfactory.

Diffusion Tube Bias Adjustment Factors

Diffusion Tube Bias Adjustment Factors

Gradko International Ltd of St Martin's House 77 Wales Street Winchester Hampshire is the supplier and analyst of the nitrogen dioxide diffusion tubes. The tubes are analysed by U.V. spectrophotometry. The limit of detection is 20% TEA/Water.

Factor from Local Co-location Studies and Discussion of Choice of Factor to Use

The national study of bias adjustment factors spreadsheet (ref. 03/19 update) suggested a bias adjustment factor of **0.84** be applied. A copy of the co-location spreadsheet used is provided below. Using the Downshire Way Bracknell co-location study a local bias adjustment factor has been calculated as **0.84**

For the purposes of the ASR 2019 for the 2018 data the bias adjustment factor is derived from the Downshire Way co-location study and the national as they are identical.

Precision and Accuracy

Checking Precision and Accuracy of Triplicate Tubes



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	02/01/2018	30/01/2018	48.5	46.8	45.5	47	1.5	3	3.7
2	30/01/2018	27/02/2018	40.4	40.9	37.6	40	1.8	4	4.4
3	27/02/2018	27/03/2018	41.2	42.2	41.3	42	0.6	1	1.4
4	27/03/2018	30/04/2018	48.1	43.5	41.9	45	3.2	7	8.1
5	30/04/2018	05/06/2018	43.7	41.4	40.4	42	1.7	4	4.1
6	05/06/2018	03/07/2018	32.6	26.9	28.3	29	3.0	10	7.3
7	03/07/2018	31/07/2018	47.3	46.0	46.3	47	0.7	1	1.7
8	31/07/2018	04/09/2018	48.0	46.6	48.7	48	1.0	2	2.6
9	04/09/2018	01/10/2018	50.4	47.3	49.4	49	1.6	3	3.9
10	01/10/2018	29/10/2018	50.4	49.0	47.7	49	1.4	3	3.4
11	29/10/2018	06/12/2018	41.3	41.6	42.0	42	0.4	1	0.9
12	06/12/2018	07/01/2019	51.2	50.2	50.4	51	0.5	1	1.3
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
31.5	99.7	Good	Good
33.5	99.6	Good	Good
35.7	99.9	Good	Good
32.0	99.9	Good	Good
37.4	99.8	Good	Good
31.6	100.0	Good	Good
40.0	99.7	Good	Good
39.7	99.9	Good	Good
40.4	99.7	Good	Good
42.6	99.6	Good	Good
35.9	99.9	Good	Good
42.3	114.7	Good	Good

Overall survey →

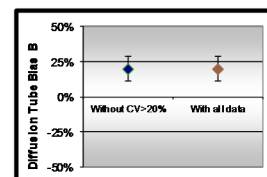
Good
precision
Overall DC
(Check average CV & DC from
Accuracy calculations)

Site Name/ID:	Downshire Way Bracknell
---------------	-------------------------

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.84 (0.78 - 0.9)
Bias B	19% (11% - 28%)
Diffusion Tubes Mean:	44 μgm^{-3}
Mean CV (Precision):	3
Automatic Mean:	37 μgm^{-3}
Data Capture for periods used:	101%
Adjusted Tubes Mean:	37 (34 - 40) μgm^{-3}

Precision	12 out of 12 periods have a CV smaller than 20%
-----------	---

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.84 (0.78 - 0.9)
Bias B	19% (11% - 28%)
Diffusion Tubes Mean:	44 μgm^{-3}
Mean CV (Precision):	3
Automatic Mean:	37 μgm^{-3}
Data Capture for periods used:	101%
Adjusted Tubes Mean:	37 (34 - 40) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Annualisation

As required annualisation of data was carried out for 1 sites for ID 119 3 Market Street Bracknell, referring to procedure in TG(16) (updated Feb 2017) Box 7.9:

Site	Site type	Annual mean 2018 μgm^{-3}	Period mean 2018 μgm^{-3}	Ration (A/P)
Chilbolton Observatory	Background	10.68	11.1	0.96
Lullington Heath	Background	11.54	11.9	0.97
Average				0.965
Measured mean concentration x average				37.4

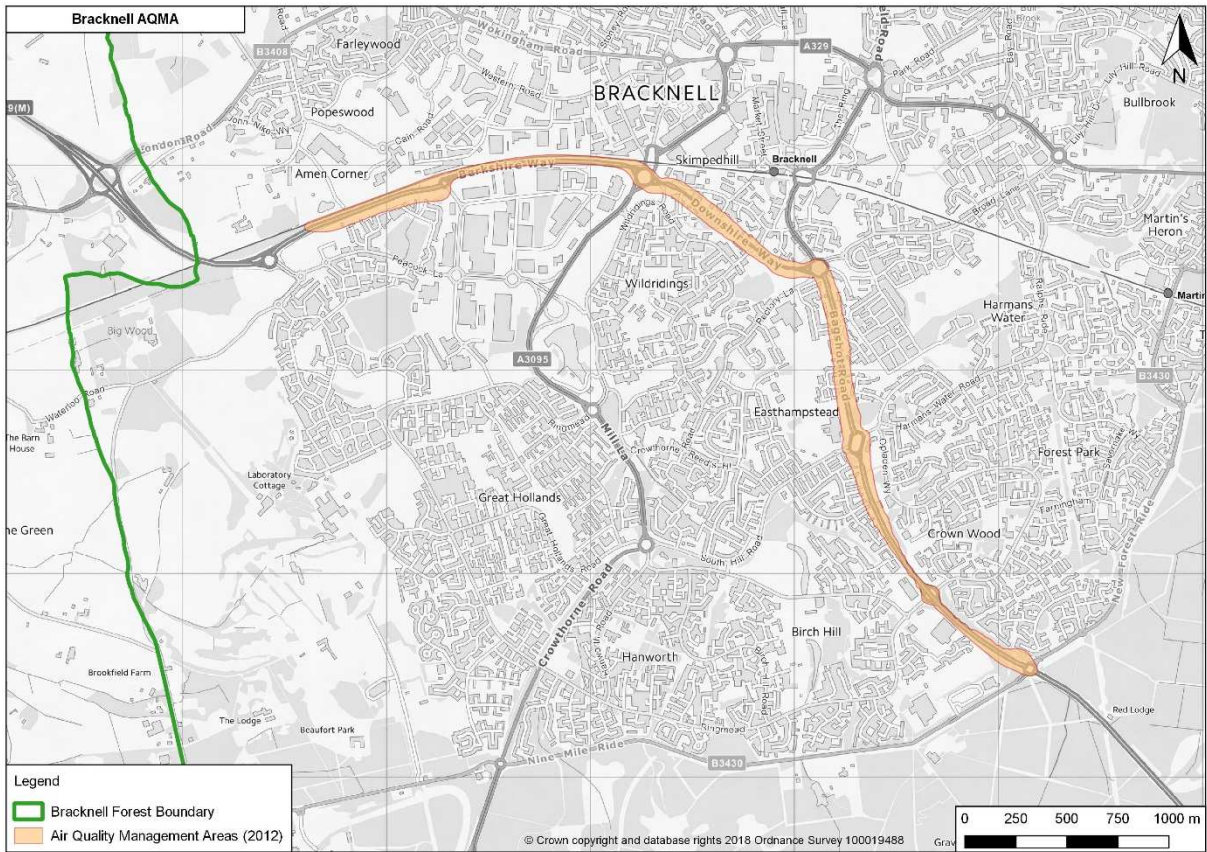
Distance Correction

28 sites required distance correction calculation using the NO₂ fall off with distance calculator v4.2, released April 2018.

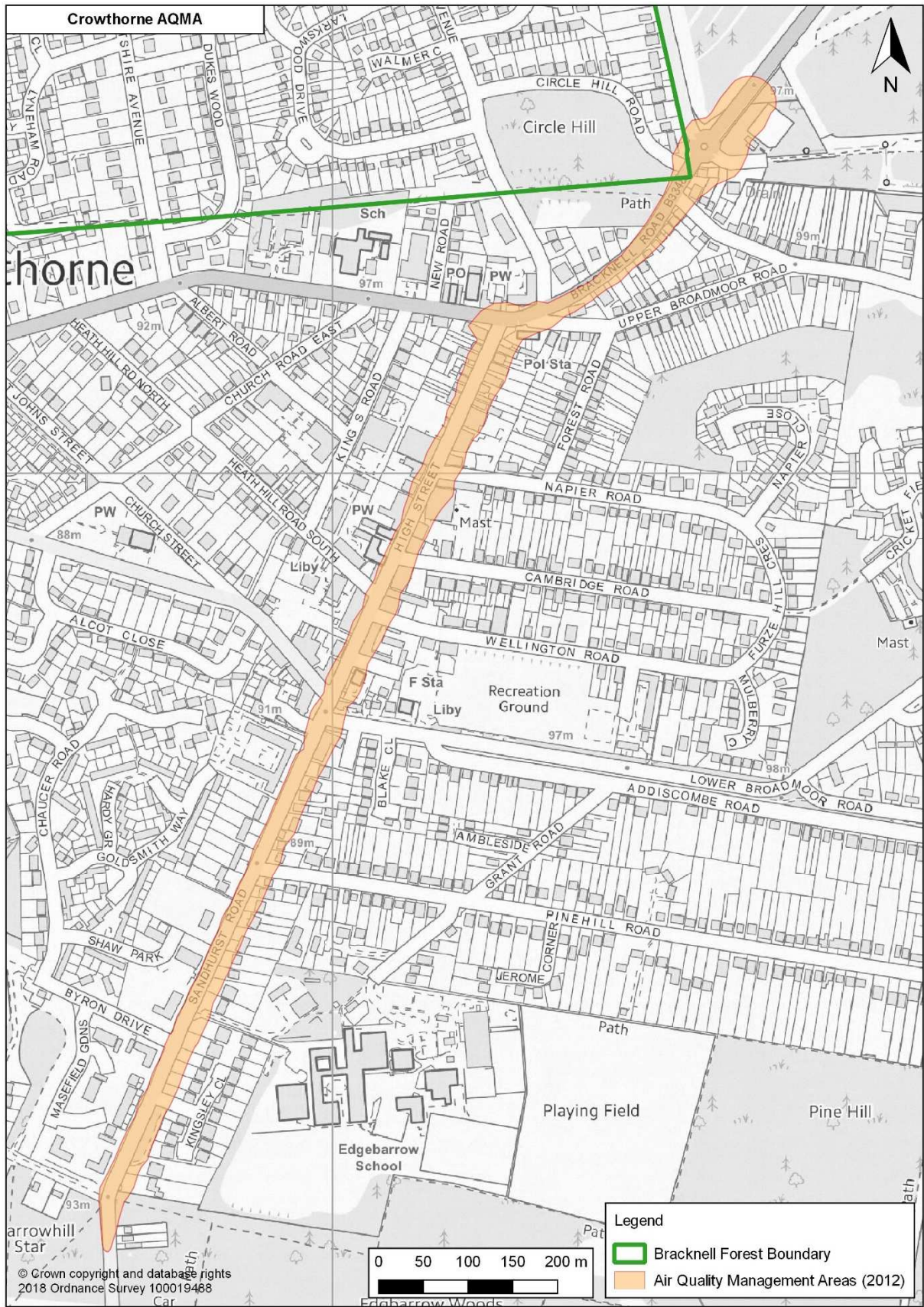
Site ID	Measured annual mean concentration (in µg/m ³)	Predicted annual mean at receptor (µg/m ³)
1def	40	22
1xyz	25	23.4
12xyz	50	29.3
27x	56	37
29x	27	21.5
38xyz	39	34.1
41xyz	30	29.6
42xyz	32	29.9
54xyz	25	20.5
58x	45	38.4
76x	27	24.8
78x	26	22.8
83xyz	19	18.5
84xyz	24	20.4
86xyz	37	36
90x	27	21.3
100xyz	22	20.9
111	22	21
112	25	22
113	21	20
114	25	20.3
115	23	21.8
116	21	19.3
117	23	20.1
118	27	20.1
119	31.4	29.4
120	26	21.1
121	28	22.1

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

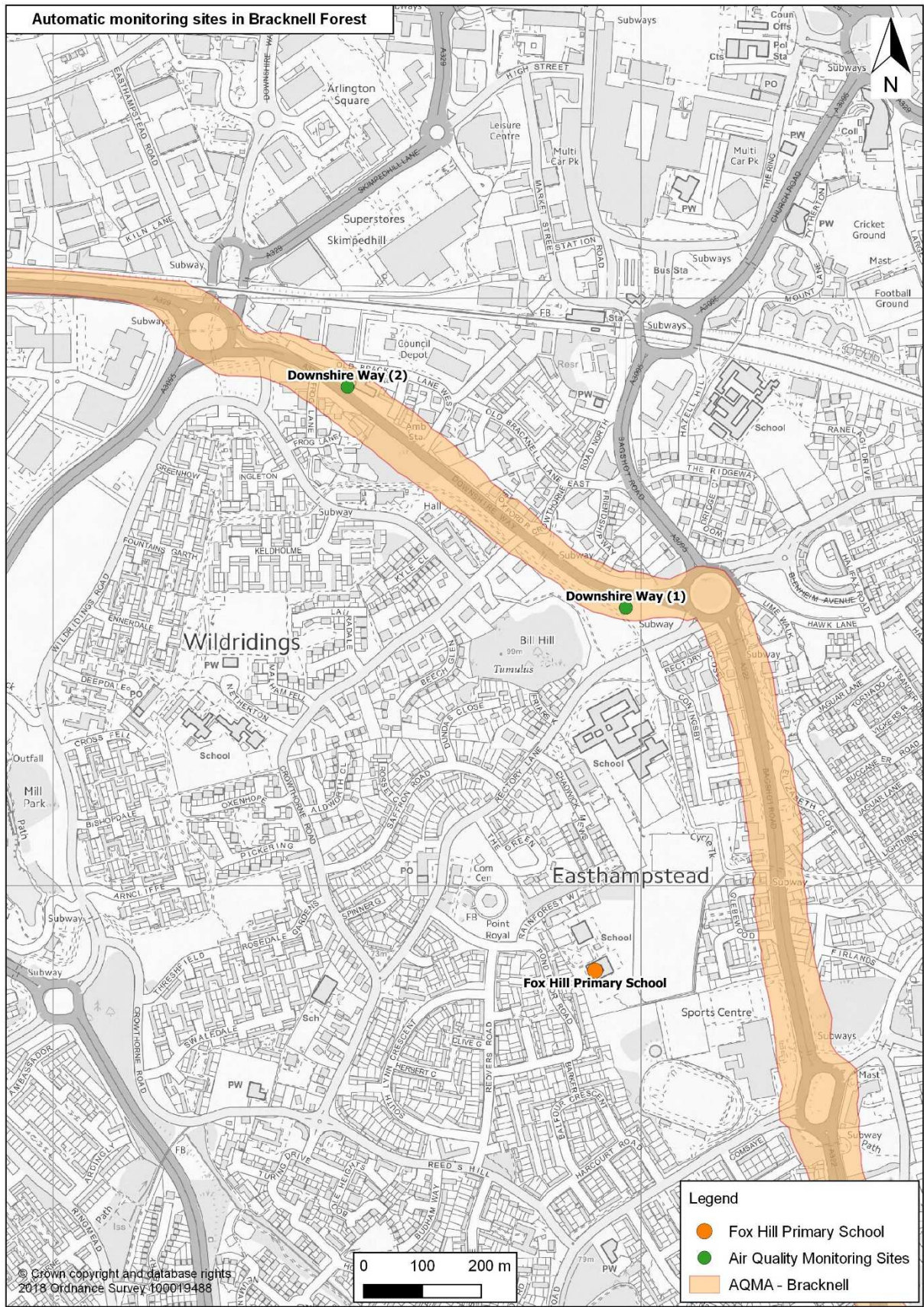
Bracknell AQMA



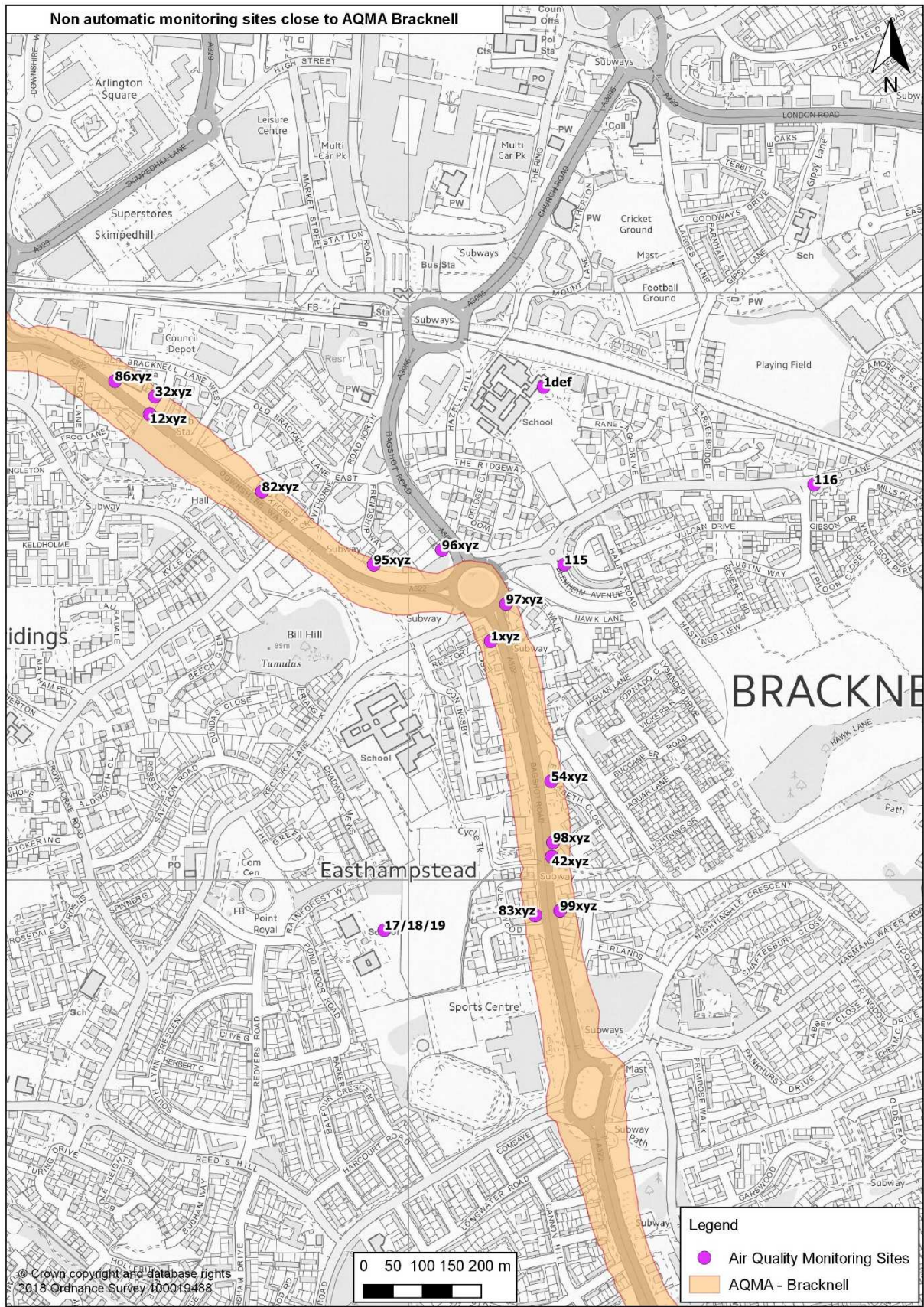
Crowthorne AQMA



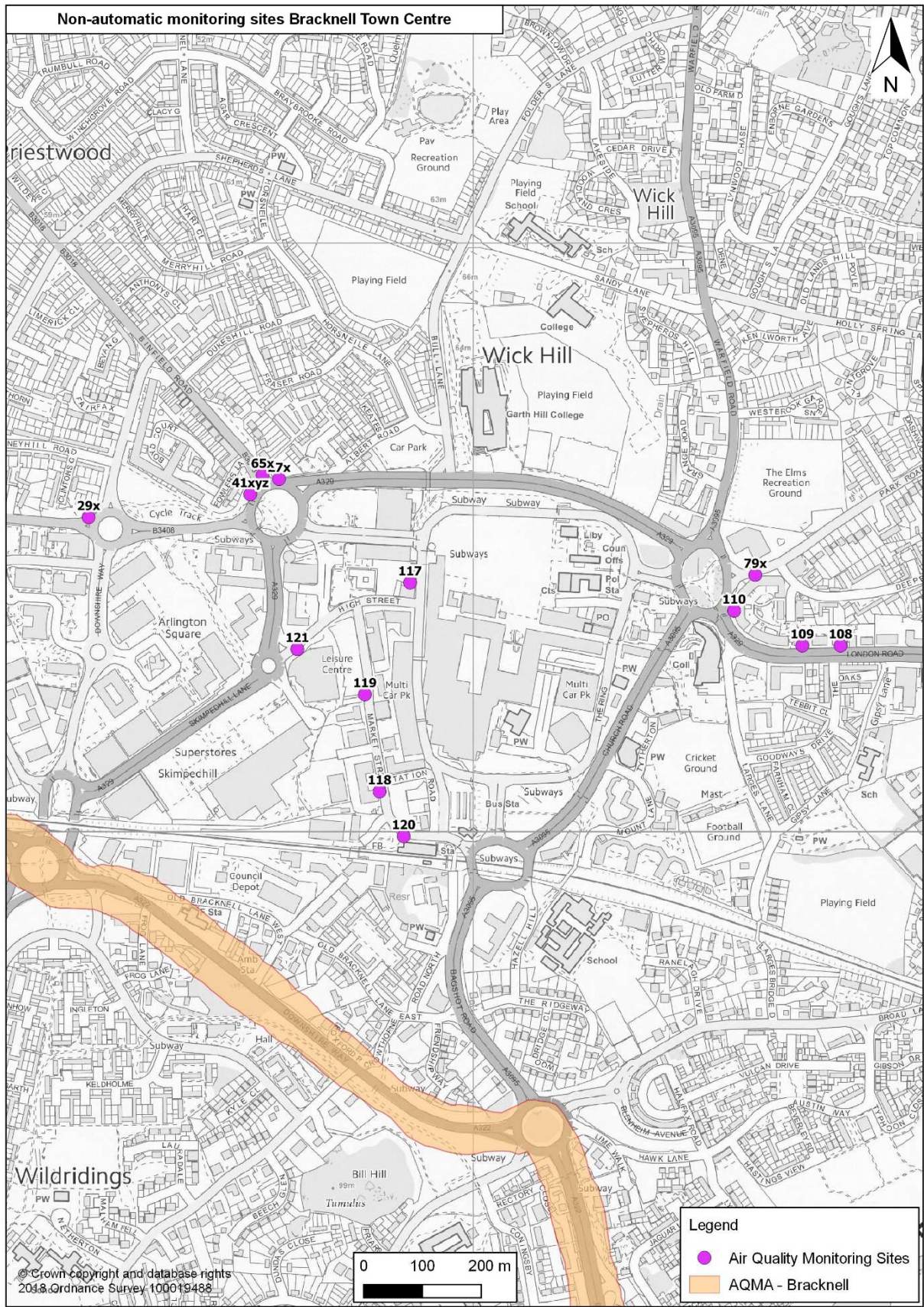
Automatic monitoring in Bracknell Forest



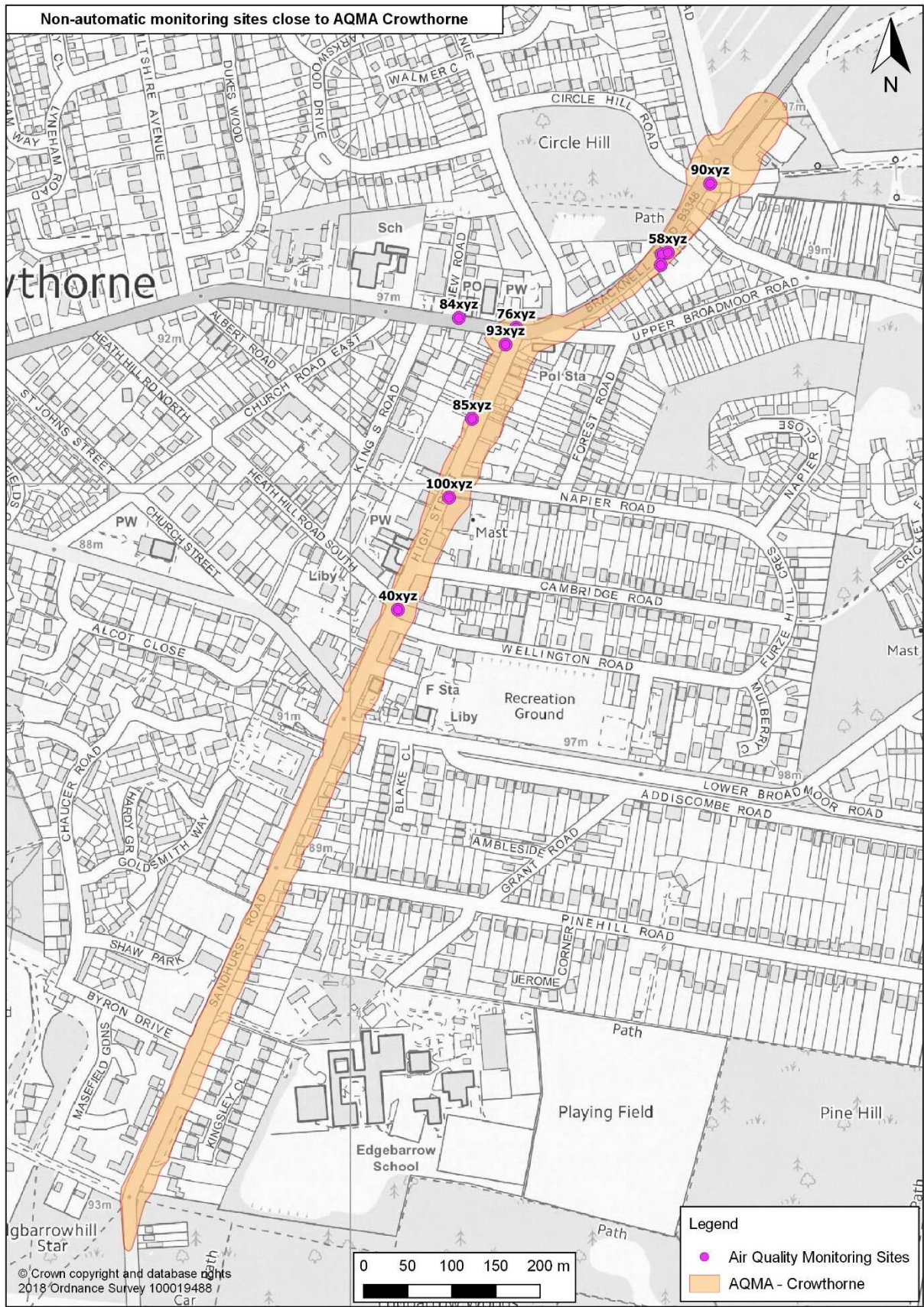
Non-automatic monitoring close to AQMA Bracknell



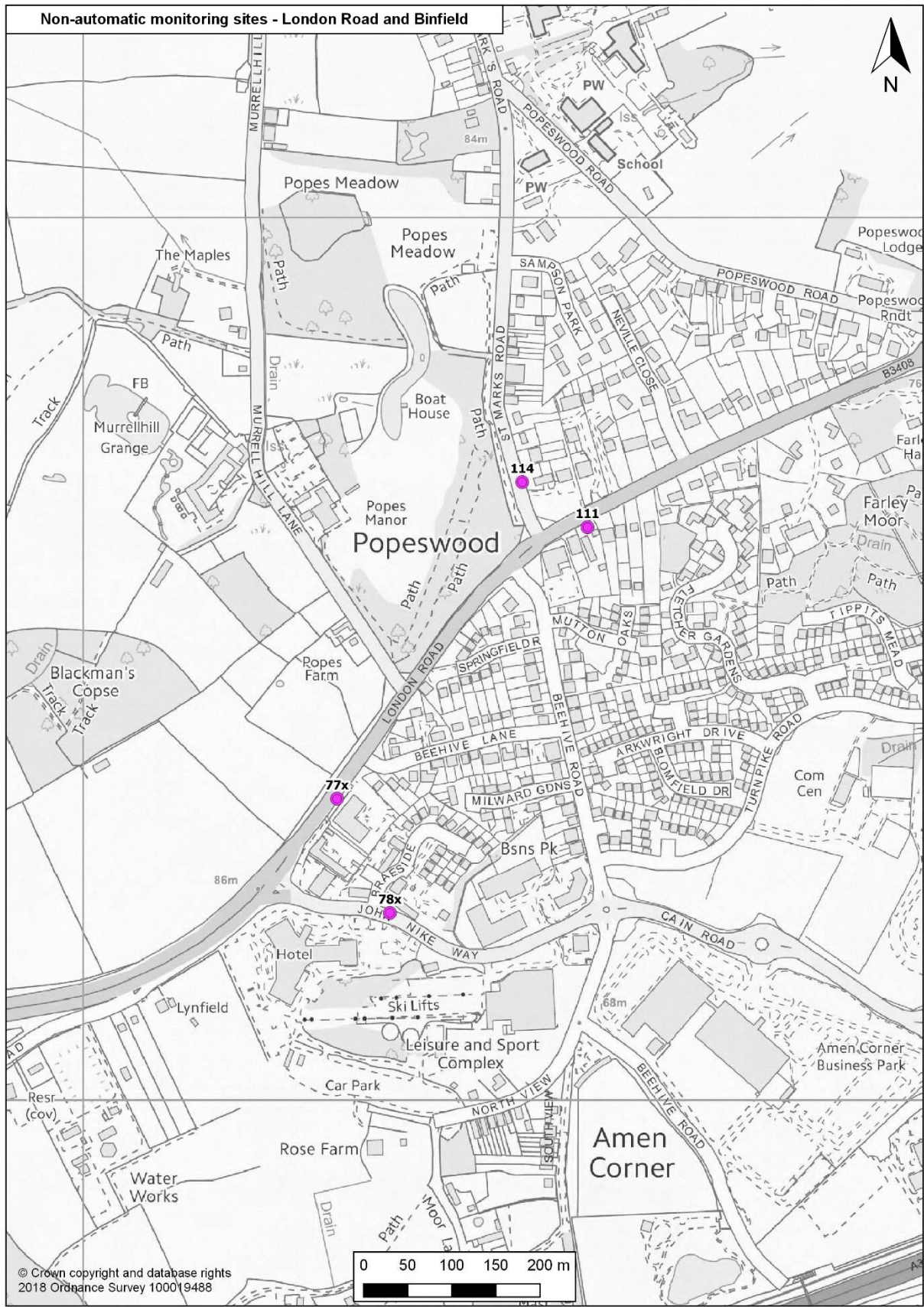
Non-automatic monitoring Bracknell Town Centre



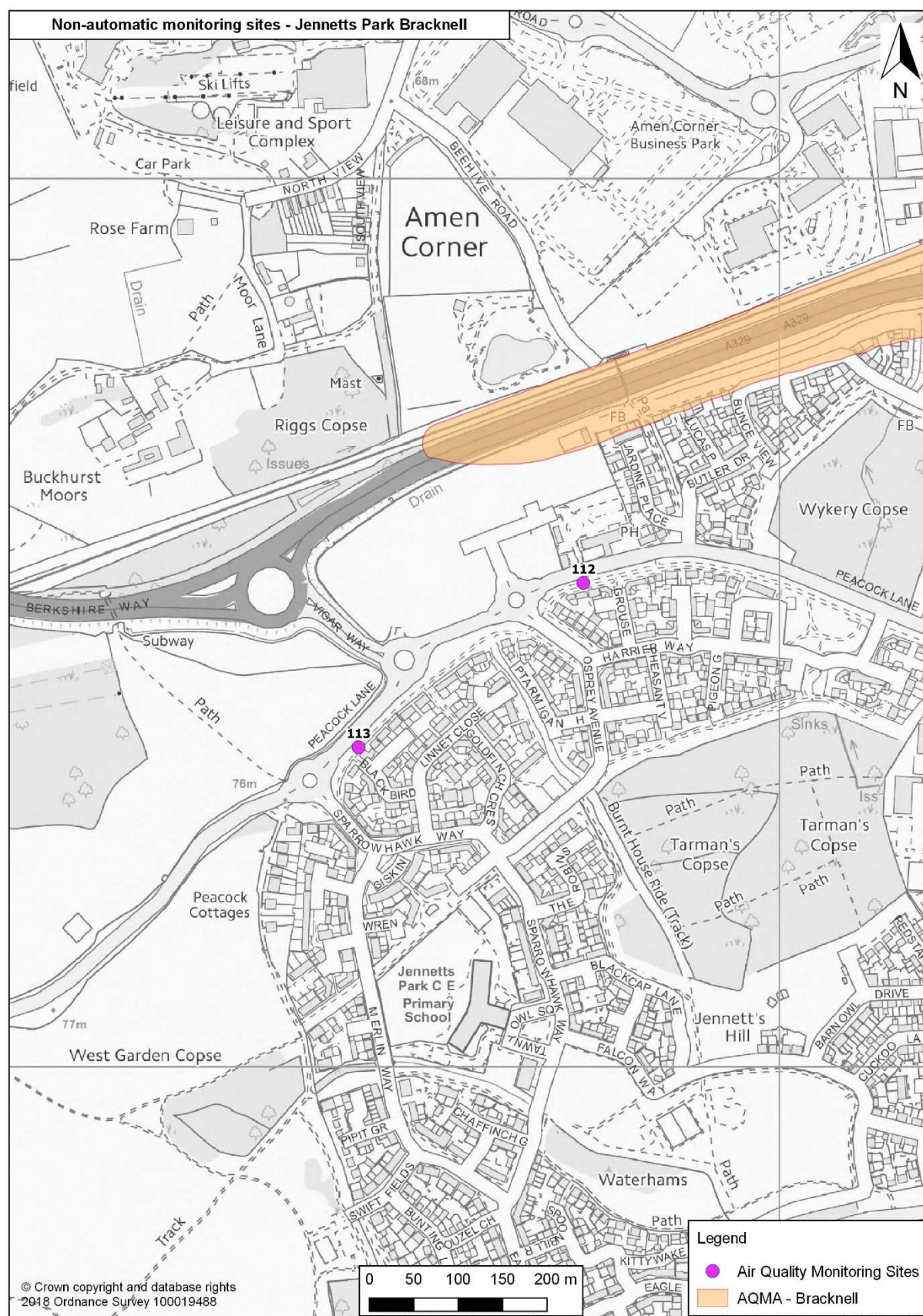
Non-automatic monitoring Crowthorne



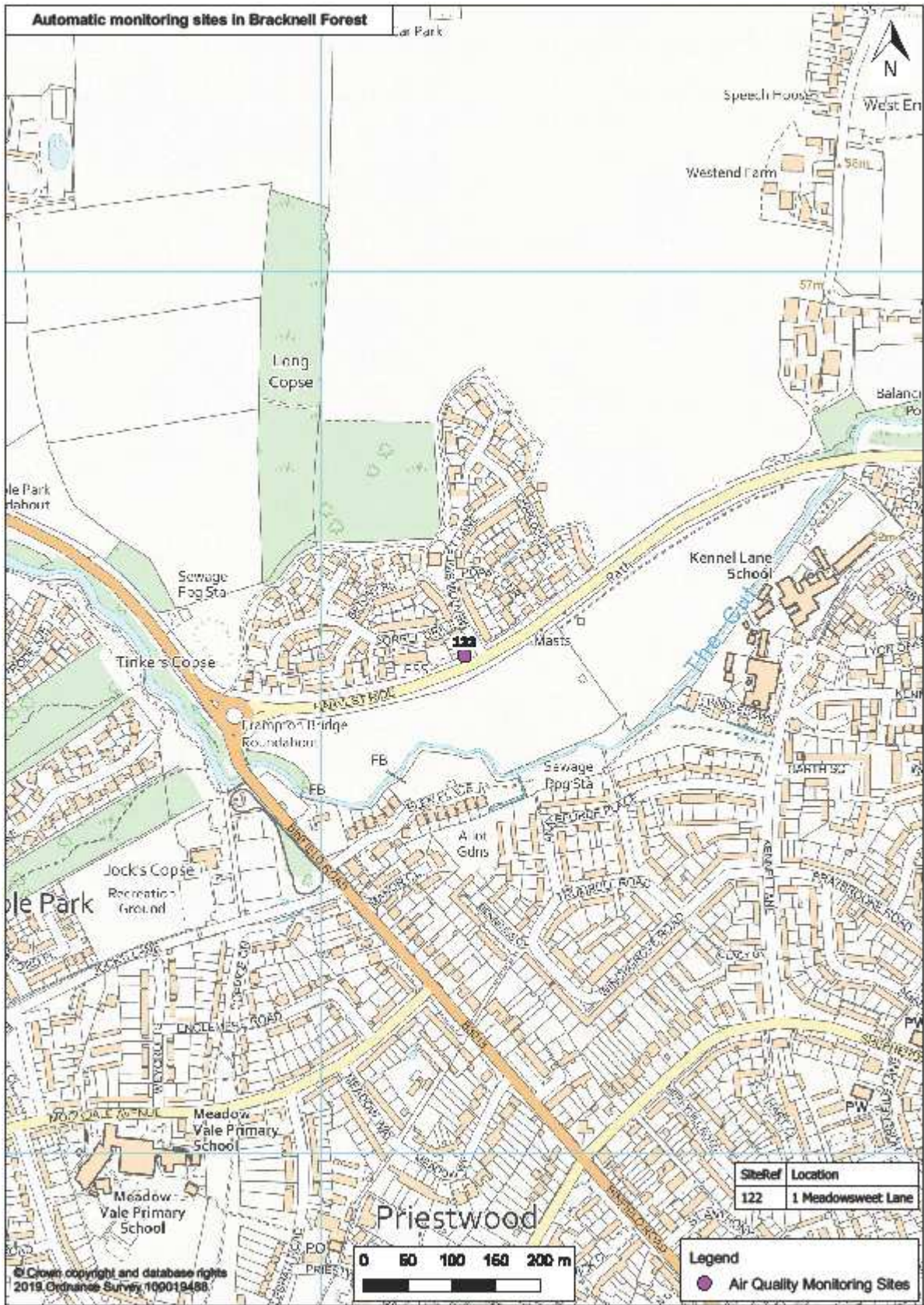
Non-automatic monitoring London Road Bracknell and Binfield



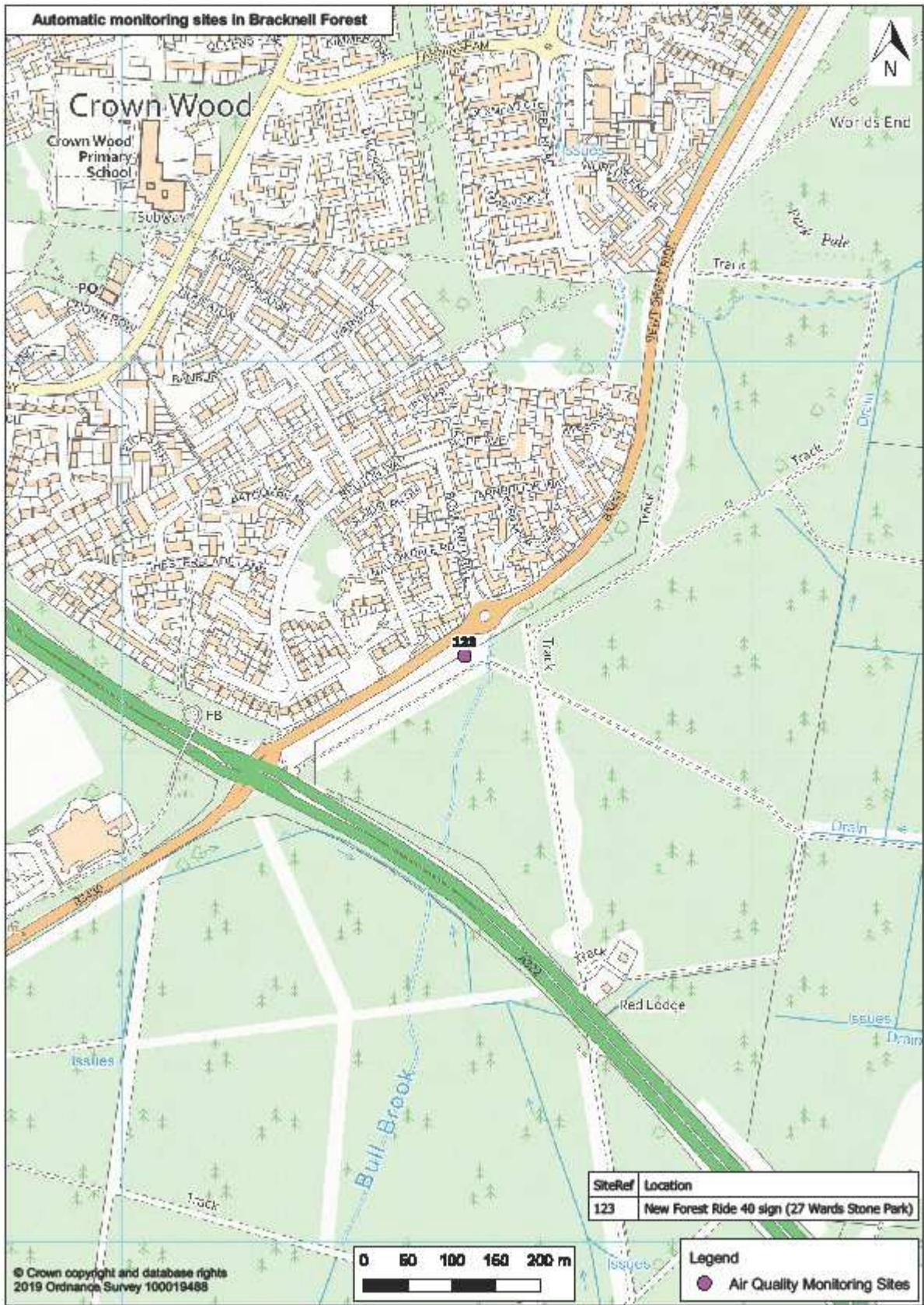
Non-automatic monitoring Jennetts Park Bracknell



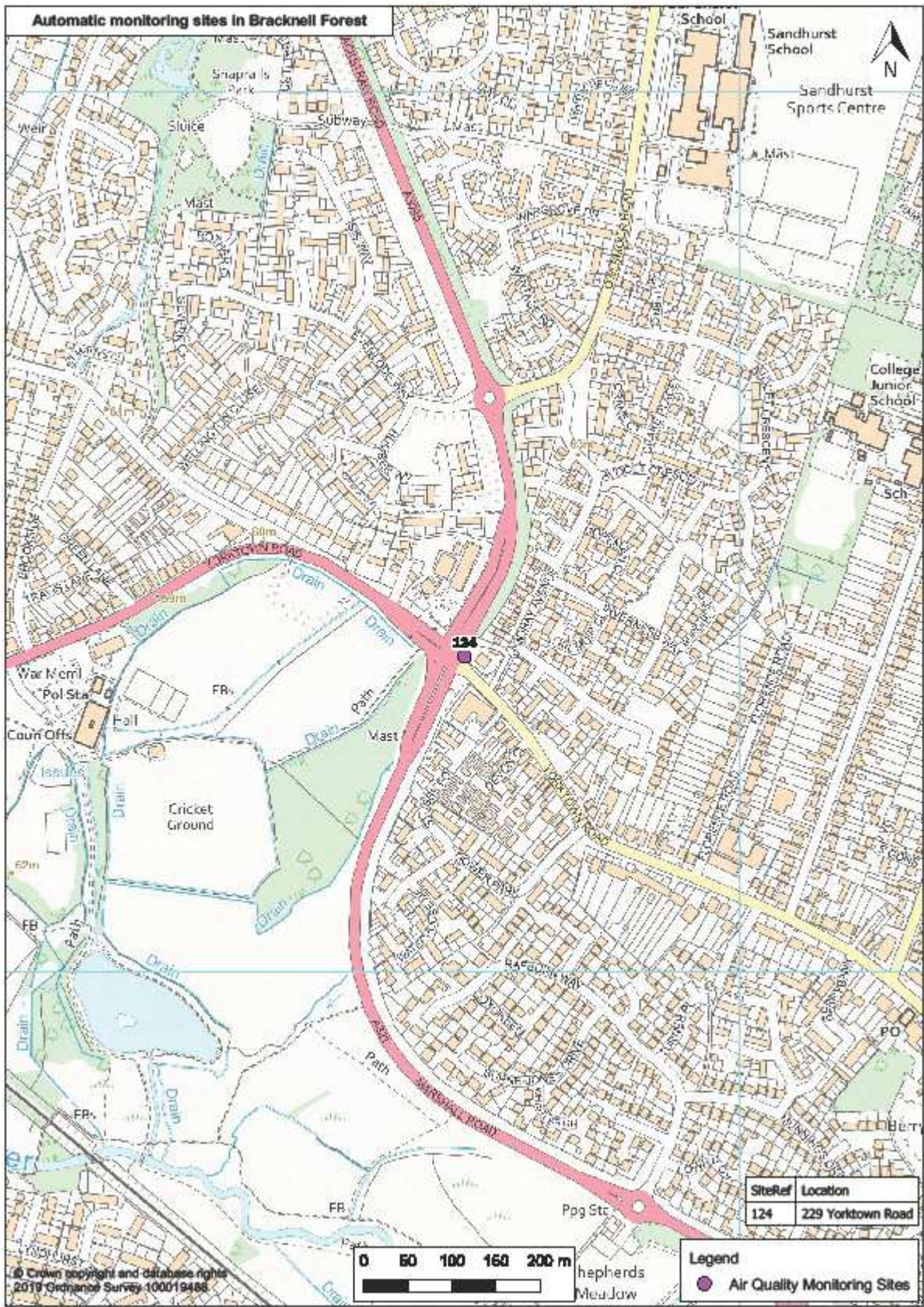
Non-automatic new sites for 2018 – 122



Non-automatic new sites for 2018 – 123



Non-automatic new sites for 2018 – 124



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁴	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁴ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide