



2020 Air Quality Annual Status Report (ASR)

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

June 2020

Bracknell Forest Borough Council

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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 equality 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 in Bracknell, the 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 the increased levels of particulate matter. Two Air Quality Management Areas (AQMAs) were declared in 2011 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 2019 have shown a decreasing trend since 2015. The annualised continuous monitored NO₂ Annual Mean in 2019, of 33.6µg/m³ at Downshire Way did not exceed the Air Quality objective level of 40µg/m³ and there were no exceedances of the 1-hour objective at Downshire Way. There have been no exceedances of the Objectives since before 2015.

There were no exceedances of the ratified, bias corrected, annualised and distance corrected diffusion tubes within the Bracknell and Crowthorne AQMA's. There were no locations greater than 60µg/m³ which further indicates that there are unlikely to be any exceedance of the 1-hour Objective. The majority of the 2019 sites showed decreased levels compared with 2018, except 8 locations outside of the AQMAs, 5 within the Crowthorne AQMA, and 3 sites within the Downshire Way AQMA. Overall the levels

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

have been reducing over the last 5 years since 2015. 5 of the sites have only been monitoring for 1 year therefore we have no comparative information.

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

20 sets of diffusion tubes were decommissioned, as the levels of NO₂ showed to be continual below 40µg/m³ for a number of years. 5 new sites have been commissioned 2019, all of which were under 40µg/m³.

The PM₁₀, which is monitored in the Bracknell AQMA (when annualised) measured 17.18µg/m³ and did not exceed the Annual Mean Objective 40µg/m³. The results also showed no exceedances of the 24 hours Annual Mean 50µg/m³, which is not to be exceeded more than 35 times a year. The PM₁₀ level also demonstrates a decreasing trend since 2015.

Actions to Improve Air Quality

Bracknell Forest produced an Air Quality Action Plan in 2014 updated in 2016, which outlines local measures to improve pollution levels 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 Nitrogen Dioxide would need to be reduced by 22% to comply with the Annual Mean Air Quality Objective, and that the main contribution of emissions from vehicles is from queuing traffic on the A322. This is being accomplished with the 2019 results showing a decrease of 61.83% from 50.3 $\mu\text{g}/\text{m}^3$ NO_2 in 2011 to 31.6 $\mu\text{g}/\text{m}^3$ NO_2 in 2019.

This has been helped by smoothing the traffic flow and reducing journey times in this part of the AQMA and a number of major highway improvements have been completed along the A329/A322 corridor that links the M3 and M4 motorway. The remaining section, which had proved to be a bottle neck at Downshire Way, secured funding to convert to a dual carriageway in 2018 and will be completed in June 2020. Work on a number of the junctions has been funded through the LTP and the Council also made a successful bid to the Department for Transport to improve the Twin Bridges roundabout. Since 2016 a number of adjustments have been made to traffic light timings on the roads around Bracknell to ensure that vehicles move at a more constant speed through Bracknell. This should improve journey time reliability, reduce idling traffic and prevent queues building in certain areas.

Within the Crowthorne AQMA the main emissions sources are from moving traffic, primarily from vans delivering goods to shops along the High Street where they can also delay traffic, causing engine idling, whilst loading and unloading goods. 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. Since the declaration of the AQMA in 2011 the NO_2 has continued to reduce from 41.7 $\mu\text{g}/\text{m}^3$ to 36.2 $\mu\text{g}/\text{m}^3$ in 2019 at the location of relevant exposure.



Figure S.1: Speed Cushion in Crowthorne AQMA

The Council also investigated changing the junction at the Eastern end of Crowthorne High Street to improve capacity. However the scheme was rejected and Highway designers are now refining the idea to produce a new concept.

A joint application with West Berkshire and Wokingham Councils was made to the Air Quality Grant Scheme 2019 but was not successful in securing funding for a project related to an anti-idling campaign.

Conclusions and Priorities

The main focus for Bracknell Forest in terms of improving air quality is to reduce NO_x emissions, particularly NO₂ concentrations, by focusing actions within the two declared AQMAs. The Council also recognises that wider improvements in air quality across the Borough can also improve concentrations within these AQMAs.

During 2019 the NO₂ concentrations did not exceed the Air Quality Objectives at any of the diffusion tube sites once the distance correction was applied.

Concentrations at the majority of the diffusion tube sites have increased slightly in 2019 compared to 2018 levels however they are still showing a downward trend since 2016.

Local Engagement and How to get Involved

There are a number of ways 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 <https://www.bracknell-forest.gov.uk/roads-parking-and-transport/travel-and-public-transport/buses> 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 all cycling, walking, taxis and bus routes.

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:

For daily pollution levels see DEFRA <https://uk-air.defra.gov.uk/forecasting/locations?q=Bracknell>

Other useful AQ sites 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 2019. 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 introduce 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/details?aqma_ref=678.

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		
						At Declaration		Now		Name	Date of Publication	Link
AQMA Bracknell	Declared 09/02/2011 <i>Amended 2012</i> (Continuous monitor)	Nitrogen Dioxide Annual Mean	Bracknell	The A322 Bagshot Road and Downshire Way from Berkshire Way to junction with B3430	NO	50.3	µg/m ³	0	Exceedances <i>(met objective as Annual mean of 31.1 µg/m³)</i>	BFBC 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 <i>Amended 2012</i> (58 xyz)	Nitrogen Dioxide Annual Mean	Crowthorne	Part B3348, High Street & part of Sandhurst Road	NO	41.7	µg/m ³	0	Exceedances <i>(met objective as Annual mean of 36.2 µg/m³)</i>	BFBC 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 NO₂ data within Table A.3 only includes the bias adjusted and annualised (where appropriate) results.
- Distance corrected results are only presented in Table B, and the method is shown in Table C.6, Appendix C.
- Bracknell Forest Council is aware that the AQAP will need updating and will be looking to develop this further over the next few years, once all the major highway improvement works have finished and the impacts on the AQ has been measured on Downshire Way. Once we have the figures will then be able to plan for future interventions.

Bracknell Forest Council has taken a number of direct measures during the current reporting year of 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

The current 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, aiming to reduce stop/start traffic and maintain an even speed.
- Adoption and implementation of the [Traffic Management Strategy](#) which focuses on tackling congestion and improving journey times across the Borough, with resulting improvements to air quality. This is complemented by the [Sustainable Modes Strategy](#), which was approved in 2019.
- Installation of 14 new electric charge points at Council owned town centre car parks in June 2019 and encouraging the provision of electric car charging points on commercial and residential developments by updating development control policy and processes (work ongoing).

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

- Final section of A332 at Downshire Way to become dual carriageway- following the securing of National Productivity Infrastructure Framework funding, this is within the Bracknell AQMA and aims to improve movement during peak hours and therefore reduce emissions.
- A3095 improvements 2020: This project aims to deliver significant improvements to one of the key highway corridors along the Thames Valley in Berkshire. The project will assist in terms of accommodating movements and reducing congestion between the M4 (J8/9/10) and M3 (J4) (Downshire Way AQMA).
- The proposed scheme focusses upon the section of the A3095 from the Hanworth Roundabout through to the Golden Retriever Junction and includes the:
 1. Introduction of additional signalisation on Hanworth Roundabout
 2. Replacement of Golden Retriever Roundabout with a fully signalised junction.
- The local junction modelling work and wider VISUM network modelling work has indicated that the preferred scheme options will deliver significant enhancement to the operation of the individual junctions as well as improved journey times along the A3095 corridor. In turn, this will support the continued growth of Bracknell as an employment centre and further residential growth across the region. The modelling results show that the introduction of the scheme will have a beneficial impact on air quality.

The works are due to commence in the Summer of 2020, subject to Covid-19.

Bracknell Forest's priorities for the coming year are:

- To investigate other ways of improving traffic flow along Crowthorne High Street, following delays caused by objections to planning applications aimed at improving this location in the centre of the Crowthorne AQMA.
- Completion of the A3095 improvement project.
- Electric charging points – a study has been undertaken to look at the feasibility of installing charge points at key local community locations (i.e. shops and leisure

facilities). During 2020 we will pursue any that are identified as feasible subject to legal agreements.

- Aim to adopt stricter planning requirements for EV charge points in new developments.
- Begin to implement the schemes identified in the Local Cycling and Walking Improvement Plan.
- Discuss and promote anti-idling campaigns within Schools.
- Continue to promote and implement initiatives and measures specified in the Sustainable Modes strategy.
- This coming year we planned to carry out surveys and data gathering to help shape a more efficient network of bus services in future. This work was to be supplemented with an increase in marketing efforts to promote greater bus use. However, the Coronavirus pandemic and associated guidelines for social distancing on public transport have resulted in a significant downturn in bus use rendering the survey unworkable for now and the foreseeable future.

The principal challenges and barriers to implementation that Bracknell Forest anticipate relate to a lack of resources and funding.

Meanwhile, the measures stated above and in Table 2.2 will contribute towards continual compliance and enable the future revocation of Bracknell and Crowthorne AQMAs.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	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	2012	BFC	BFC	Reduce queues on approach roads and journey time	Reduction in NO ₂ 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 Downshire Way works	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	2014. Phase IV amendments proposed 2019-2021	BFC	BFC	Reduce queues and journey time	Reduction in NO ₂ 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	Improvement in movement of traffic providing reliable journey times with reduction in queues
3	Capacity and safety improvements including full signalisation at Twin Bridges Roundabout	Traffic Management	Strategic highway improvements	2013-2019 (under investigation)	BFC	BFC	Reduce queues in peak time. Improvement in flow should reduce the stop/start of the traffic and reduce NO _x	Reduction in NO ₂ 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 - ongoing	First phase completed 2015.	Improved movement along Bagshot road and Downshire way for peak hour Traffic. The improvement in flow should reduce the stop/start of the traffic and therefore reduce the amount of NO _x emitted.
4	Widening of Downshire Way from Horse and Groom roundabout to Twin Bridges	Traffic Management	Strategic highway improvements	2013-2016	BFC	BFC	Reduce queues and journey time	Reduction in NO ₂ concentrations to below the objective in the AQMA 1	Work complete	Completed March 2015	As above. Funding secured through NPIF for Downshire Way dualling, with detailed design scheduled to be complete in September 2018 and construction during 2020 (delayed due to C-19)
5	Capacity and safety improvements at junction with B3348 Dukes Ride and A321 Wokingham Rd	Traffic Management	Strategic highway improvements	Under investigation	BFC and WBC	BFC and WBC	Reduce queues in peak time	Reduction in NO ₂ concentrations to below the objective in the AQMA 1	Work complete	Completed	Improved traffic movement through junction in peak hour. Junction falls within Wokingham BC Work led by WBC.
6	Improvements to Dukes Ride/Bracknell Road junction	Traffic Management	Strategic highway improvements	2017	BFC	BFC	Reduce queues and journey time	Reduction in NO ₂ concentrations to below the objective in AQMA 2	Concept designed and consultation ongoing	2020	New concept design, consulting Parish Council. Improve the flow of traffic 2020 should be starting.
7	Crowthorne High Street improvements – speed cushions replacing flat top humps	Traffic Management	Other –Traffic calming	2013-2015	BFC	BFC	Reduce stop start traffic to reduce emissions	Reduction in emissions from these types of measures can be in the order of 5% leading to a reduction in NO ₂ concentration in AQMA 2	Work complete 2014 except for zebra crossing	2016	This should reduce the stop/start of the traffic and help maintain an even speed through the high street thus reducing the NO _x
8	Improvements to bus stops to aid flow of traffic and reduce queuing	Transport Planning and Infrastructure	Bus route improvements	2017-2018	BFC	BFC	Reduce queueing at bus stops and bus station to smooth flow. increase in number of people using buses	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} concentrations across the borough	Bus station complete. Bus stop work ongoing when required. No progress in 2019	2020/2021	Not progressed this year but still an intention going forward. 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.

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9	Improve signage along key routes including Bagshot Road in the AQMA	Transport Planning and Infrastructure	Cycle Network	2016/17	BFC	BFC	Increase cycling rate by making people more aware and cycle paths made safe and inviting.	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} 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 Cycling levels across the wider Borough have increased by 13.7% from 2018 to 2019
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	2014-2018	BFC	BFC	Reduce unloading and loading by 50% along section of High Street and smooth traffic flow	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} concentrations across the borough	In progress. Council is working with shop owners to gain planning permission to use rear access.	2018	Long term action that is depending on gaining permission from shops. 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 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.
11	Provision of real time information at all roadside displays	Promoting Travel Alternatives	Other – Real Time Travel Information	2014-2018	BFC	BFC	Increase in number of people using bus and rail	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} concentrations across the borough	Real time information is provided at the bus station, rail station 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. Encourage people to use the bus thus reducing the amount of vehicles on the road.
12	Updating the Council's website to include rail and bus times in real time	Promoting Travel Alternatives	Other – Real Time Travel Information	2014-2018	BFC	BFC	Increase in number of people using bus and rail	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} 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 '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	2016/17	BFC	BFC	Increase in number of people using bus and rail	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} concentrations across the borough	No specific progress on this as no funding available.	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 and walking	Promoting Travel Alternatives	Promotion of Cycling and Walking	2014	BFC	BFC	Increase in cycling and walking	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} 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.	Ongoing – constant improvements and initiatives being run. .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. 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	2013 - Ongoing	BFC	BFC	Reduction in local car journeys	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} concentrations across the borough	34 out of 35 schools have implemented a school 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	2014	BFC	BFC	Reduce local car journeys	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} concentrations across the borough	<p>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.</p> <p>Secured funding from two major housing developments to provide bus services as part of travel plan for development.</p> <p>TRL developer (Legal & General) are funding alterations to a bus service which will allow access to Crowthorne station</p> <p>Residents will have an alternative form of transportation to the retail sector and other amenities other than their own vehicle.</p>	Complete 2014. Work to be continued as part of DfT	Several large employers run mini-buses for staff travelling from the station to the office (e.g. Dell). Business travel plan produced and distributed to all businesses in 2016 are 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 is 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. TRL developer (Legal & General) are funding alterations to a bus service which will allow access to Crowthorne station.
17	Through the programme of replacement ensure that fleet vehicles continue to comply with current emission levels	Promoting Low Emission Transport	Public Vehicle Procurement	2013	BFC	BFC	Reduce vehicle NOx and PM emissions	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} concentrations across the borough	Contractor fleet min Euro 4 standard on recent contracts (e.g. refuse and highway)	Ongoing	Electric pool car and van now on fleet with monitoring ongoing. Reducing the amount of high emitting NO _x vehicles
18	Consider introducing electric cars as pool cars	Promoting Low Emission Transport	Public Vehicle Procurement	2013	BFC	BFC	Reduce vehicle NOx and PM emissions	Reduction in background NO ₂ , PM ₁₀ and PM _{2.5} concentrations across the borough	Pool cars and van now on fleet	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 estimate the local concentration of PM_{2.5} is 12 µg/m³, Table 2.4 shows that only 0.81% of PM_{2.5} comes from a primary source Road & Transport sources ⁽⁴⁾, the other 99.19% come from other sources. Therefore only 0.097 µg/m³ of Bracknell Forest PM_{2.5} is from Road & Transport.

The fraction of mortality attributable to particulate air pollution indicator' value for Bracknell Forest and other Local Authorities within Berkshire, can be seen in Table 2.3. Further information about other areas in the UK can be can be found using the link below. <https://fingertips.phe.org.uk/profile/public-health-outcomesframework/data#page/0/gid/1000043/pat/6/par/E12000005/ati/101/-are/E07000194>

Table 2.3: Showing the Fraction of Mortality attributable to particulate air pollution indicator value within Berkshire.

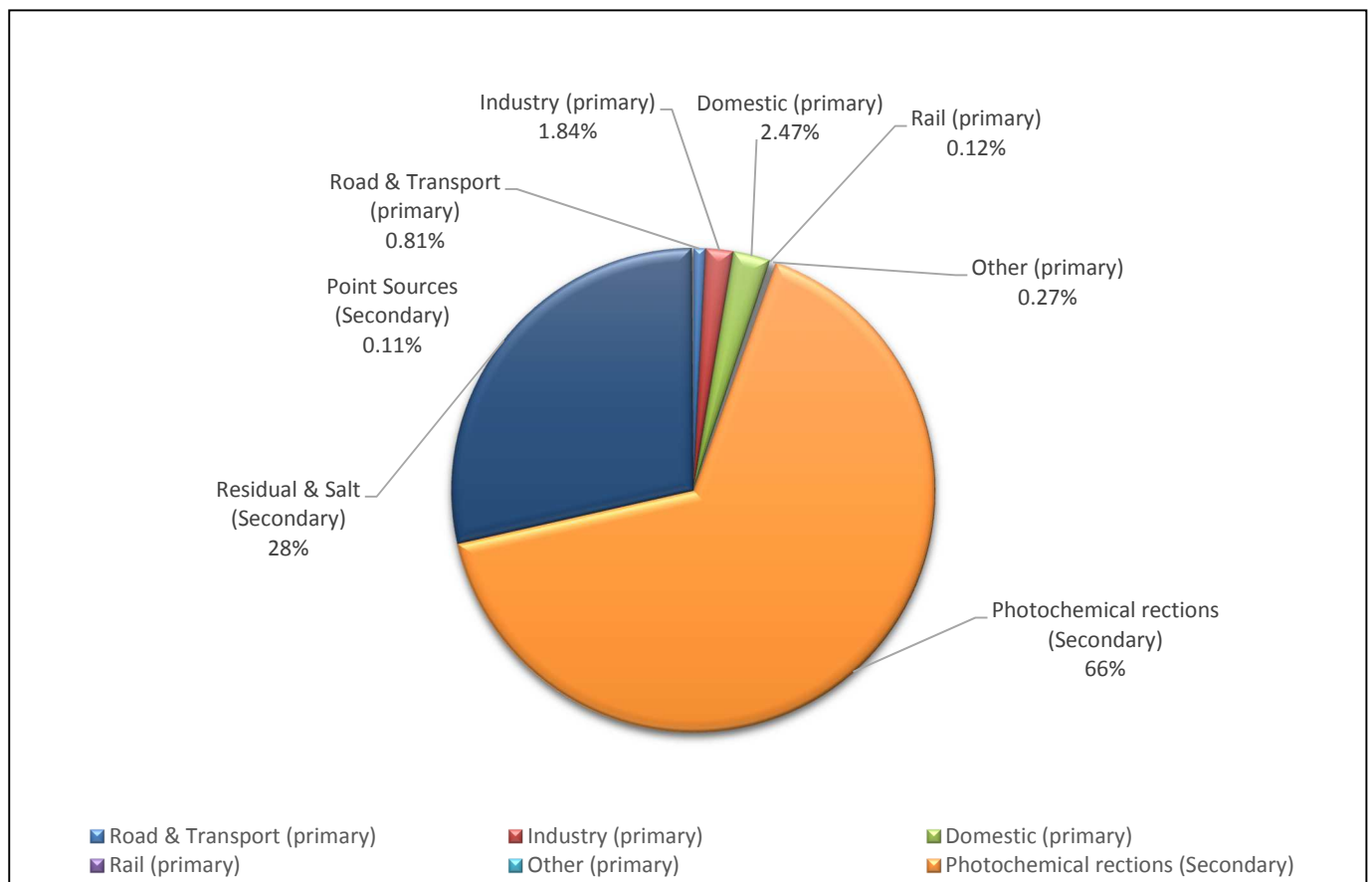
Bracknell Forest	Reading	Slough	West Berkshire	Windsor & Maidenhead	Wokingham
5.7	6.3	6.5	5.3	5.8	5.9

Bracknell Forest Borough Council

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 of the 0.81% are:

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

Table 2.4. A pie chart showing both the Primary and Secondary sources of PM_{2.5}⁽⁴⁾



⁽⁴⁾ (<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017>)

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 (CM3) at 1 site during 2019, monitoring NO₂ and PM₁₀ in Downshire Way which is a roadside site. **Error! Reference source not found.** in Appendix A shows the details of the sites. NB.DEFRA have stated that 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 25 sites during 2019, 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 are now more accurate. This needs to be taken into consideration of the results for 2019, 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 bias⁴, “annualisation” (where the data capture falls below 75%), and distance correction⁵. 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. Note that the concentration data presented in Table A.3 represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Figure A.1.3 – The Trend Chart illustrated below shows the annual mean concentration of NO₂ from the diffusion tubes within the Crowthorne AQMA.

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.

⁴ <https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html>

⁵ Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

Continuous Monitoring Downshire Way Bracknell

The Annual Mean Objective at Downshire Way is below the Annual Mean Objective ($40\mu\text{g}/\text{m}^3$) at $33.6\mu\text{g}/\text{m}^3$. This is a decrease compared to 2018. The co-location study result was slightly higher at $34.4\mu\text{g}/\text{m}^3$. There were no exceedances of the one hour objective ($200\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year), with the highest NO_2 level being $156.63\mu\text{g}/\text{m}^3$ recorded on 24th February 2019 19.00-20.00. There was good data capture of 97.0% from the 1st January 2019 to 6th September 2019, then the power supply was disconnected due to the Downshire Way road works.

Overall there were no exceedances of the annual mean and one hour objectives see Figure 3.1 below.

Figure 3.1 Downshire Way one hour Nitrogen Dioxide results

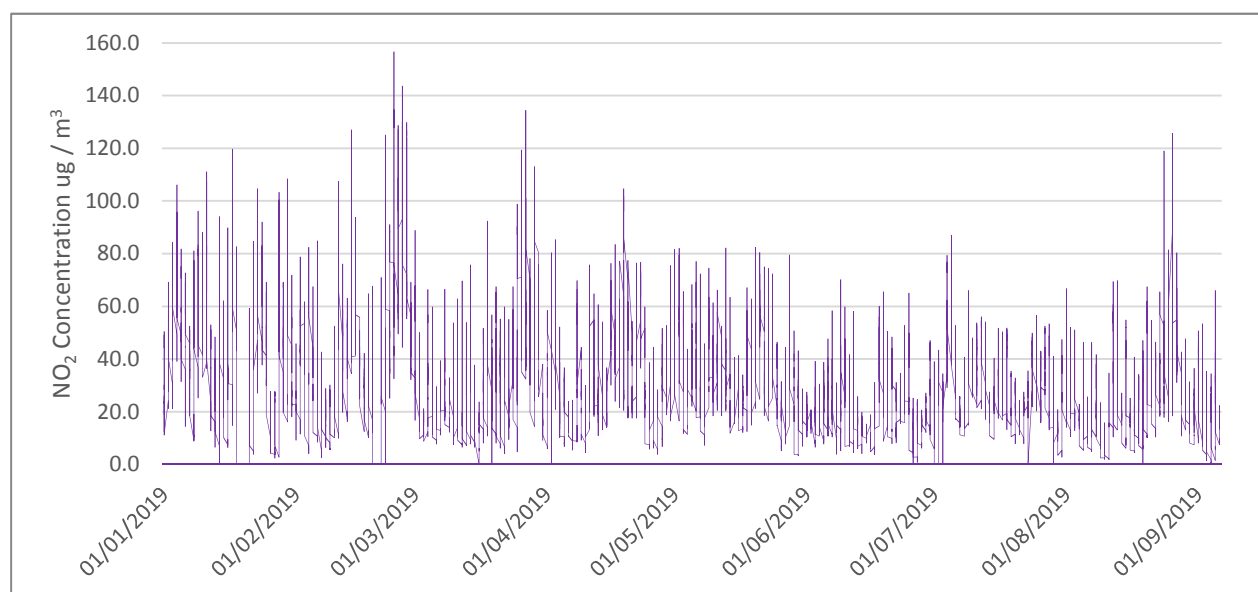


Figure A.1.1 shows the 5 year trends in annual mean concentrations at the automatic monitoring unit. The concentrations at the roadside site have remained consistent for

the last 3 years and have all been below the objective level. Should this continue then revocation of the AQMA for Bracknell may need to be considered, however further data will need to be collected as the layout of the Downshire Way had been altered in 2019/2020. Therefore the true impact of the NO₂ from the road change will not be seen until the 2021/2022 results. Data trends seen at the Bracknell Station are similar to those at comparable AURN monitoring sites Reading New Town and Oxford St. Ebbes. The average NO₂ readings from the Continuous Monitor align well with Diffusion Tube results, within 5µg/m³ of each other from January – May, and August. In June and July, the Continuous Monitor average is ~8 µg/m³ below the diffusion tube.

Diffusion Tube data

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B, which include the distance correction where the NO₂ level is above 36.0µg/m³ to nearest exposure/receptor.

There were no levels where the annual mean was greater than 60µg/m³, which indicates that an exceedance of the 1-hour mean objective is also likely to be met at these sites.

There were 25 diffusion tube (passive monitoring) locations, of which 4 were triplicate and 1 was triplicate co-located at the continuous monitor. 5 new sites were set up (sites ID 125,126,127,128 & 129). 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.

Bracknell AQMA

There were no sites within the Bracknell AQMA (Map D.5) which have exceeded the Annual Mean Objective (40µg/m³). The co-location study at site ID 86 Downshire Way automatic monitor was below the objective level for the forth year and the result of 34.4µg/m³ is slightly higher than the automatic level result of 33.6µg/m³. 3 of the 6 sites within AQMA reduced compared to the 2018 levels.

Crowthorne AQMA

For all 5 sites within the AQMA (Map D.8) there was only 1 kerbside exceedances of the annual objective ($4 \mu\text{g}/\text{m}^3$) at 58xyz Pine View, $41.5 \mu\text{g}/\text{m}^3$, which when distance corrected to the nearest residential location (location of relevant exposure) reduced to $36.2 \mu\text{g}/\text{m}^3$, this level has decreased since 2018 ($45.0 \mu\text{g}/\text{m}^3$ at Kerbside and $38.4 \mu\text{g}/\text{m}^3$ at relevant exposure). 4 out of the 5 sites within the AQMA increased slightly compared to the 2018 levels, however all of the sites have reduced since 2016.

Outside of the AQMA

For all 14 sites outside of the AQMA there were no exceedances of the annual objective ($40 \mu\text{g}/\text{m}^3$).

The results from the 14 site have shown that 6 out of 8 sites have had a slight increase in NO_2 since 2018, whilst 6 are new this year and have no comparative level. These small increases may be due to the popularity of the New Regenerated Town Centre.

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 unlikely at these sites.

3.2.2 Particulate Matter (PM_{10})

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

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of $50 \mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times per year.

PM_{10} annual mean

The annual mean concentration was well below the objective at the monitoring site. The level at the roadside Downshire Way was $17.18 \mu\text{g}/\text{m}^3$, with an average of 35,000 vehicles using that route daily. The concentration was consistent with levels reported in previous years and have declined slightly in the last 5 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 have seen widening in order to manage congestion. This work will continue into 2020 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 3.2 below. Therefore was no exceedance of the annual mean objective.

PM₁₀ Daily Mean

The daily mean concentration (50 µg/m³), of which it can be exceeded up to 35 times a year, was exceeded on 6 days at the Downshire Way. In February, there are sharp spikes in NO_x across the 24th, 26th & 27th, aligning with the PM₁₀ exceedances. The other 3 PM₁₀ exceedances on the 16th, 17th & 18th April also coincide with some elevated levels of NO_x.

The data trends seen at Bracknell Station are similar to those at comparable AURN monitoring sites Reading New Town and Oxford St. Ebbes.

3.2.3 Particulate Matter (PM_{2.5})

Bracknell Forest does not carry out PM_{2.5} monitoring as it not a statutory requirement, nor has there been any legal limited value set. However, in the absence of PM_{2.5} monitoring, and where a local authority carries out PM₁₀ monitoring, it is recommended to consult Chapter 7 Section 1 of Technical Guidance LAQM.TG16 (7.107 – 7.111) in order to include an estimate of PM_{2.5} concentrations. In Appendix C, Table C.7 you will find the method to estimate the local concentration of 12 µg/m³, which is slightly higher than the recommend WHO (World Health Organisation) based guideline recommendation of an Annual Mean of 10 µg/m³ 9 https://apps.who.int/iris/bitstream/handle/10665/69477/WHO_SDE_PHE_OEH_06.02_eng.pdf?sequence=1).

3.2.4 Sulphur Dioxide (SO₂)

Bracknell Forest Borough Council

No sulphur dioxide monitoring is undertaken, as DEFRA have not required BFBC to do so.

Appendix A: Monitoring Results

Table A.1 - Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
CM3	Downshire Way	Roadside	486501	168850	NO ₂ ; PM ₁₀	YES Downshire Way	Chemiluminescent; TEOM	n/a	5	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)
1xyz	Rectory Close lamppost	Roadside	487140	168407	NO2	YES	6.5	14	NO	1.7
32xyz	8 Old Bracknell Close	Urban Background	486569	168824	NO2	NO	0	30	NO	1.7
40xyz	229 Crowthorne High Street	Roadside	484054	163858	NO2	YES	0	3	NO	1.6
58xyz	Pine View Road Bracknell	Kerbside	484360	164263	NO2	YES	2	1	NO	1.6
76xyz	2 Dukes Ride	Roadside	484188	164178	NO2	YES	2	1.5	NO	2
82xyz	19 Boxford Ridge	Roadside	486751	168661	NO2	YES	0	14	NO	1.9
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
91xyz	The Mount, Bracknell Road	Roadside	484352	164249	NO2	YES	0	6	NO	1.7

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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
99xyz	16 Firlands	Roadside	487258	167948	NO2	YES	0	10	NO	1.6
108	251-269 Kelvin Gate	Roadside	487626	169316	NO2	NO	0	8.5	NO	1.8
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
117	Blue Smoke House, The Ring	Kerbside	4869894	169392	NO2	NO	2	0.2	NO	2.5
120	1-96 Platform (Station)	Roadside	486883	168992	NO2	NO	10	1.5	NO	2.2
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 the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for 2019 Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2019 (%) ⁽²⁾	NO ₂ Annual Mean Concentration				
							2015	2016	2017	2018	2019
CM3 Downshire Way	486501	168850	Roadside	Automatic	98	66.3	37	37	38.4	36.6	33.6
1xyz Rectory Close lamppost	487140	168407	Kerbside	Diffusion Tube	100	91.97	25.4	25.5	22.3	25	22.5
32xyz 8 Old Bracknell Close	486569	168824	Receptor	Diffusion Tube	100	100	25.4	30.1	22.4	21	22.9
40xyz 229 Crowthorne High Street	484054	163858	Roadside	Diffusion Tube	100	100	29.9	36.7	28.2	26	27.1
58xyz Pine View Bracknell Road	484188	164178	Kerbside	Diffusion Tube	100	100	40.7	49	49.4	45.0	41.5
76xyz 2 Dukes Ride	486751	168661	Kerbside	Diffusion Tube	100	100	33.1	37.2	30.2	27.0	27.8
82xyz 19 Boxford Ridge	484123	164189	Roadside	Diffusion Tube	100	100	35.7	35.6	29.2	30	31.8
84xyz 24/26 Dukes Ride (Playhouse)	484138	164075	Kerbside	Diffusion Tube	100	100	26	29.4	25.1	24.0	23.9
86xyz Downshire Way continuous monitor	486501	168850	Roadside	Diffusion Tube	100	100	43.5	39.9	38.5	37	34.4

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91xyz The Mount, Bracknell Road	484352	164249	Roadside	Diffusion Tube	100	100	30.4	35.3	28	26	27.9
93xyz The Prince Alfred PH, 2 High Street	484176	164159	Roadside	Diffusion Tube	100	91.7	28.2	32	25.8	23	24.5
95xyz 3 Leverkusen Road	486941	168537	Suburban	Diffusion Tube	100	83.3	25.7	28	20.9	21	25.38
99xyz 16 Firlands	487258	167948	Roadside	Diffusion Tube	100	100	27.1	30.4	25.3	24	25.2
108 251-269 Kelvin Gate	487626	169316	Roadside	Diffusion Tube	100	100	24.9	27.6	23.5	21	23.4
114 1-10 Crossways, St Marks Road	484498	169700	Suburban	Diffusion Tube	100	83.34	n/a	n/a	27.1	25.0	25.8
115 Blenheim Avenue (Rear 31 Hampden Cres)	487265	168537	Suburban	Diffusion Tube	100	83.34	n/a	n/a	22.5	23.0	22.7
117 Blue Smoke House, The Ring	4869894	169392	Kerbside	Diffusion Tube	100	91.67	n/a	n/a	23.2	23.0	24.1
120 1-96 Platform (Station)	486883	168992	Roadside	Diffusion Tube	100	100	n/a	n/a	25.0	26.0	27.3
122 1 Meadowsweet Lane	486163	170565	Roadside	Diffusion Tube	100	91.7	n/a	n/a	n/a	19	22.0
123 New Forest Ride 40 sign (27 Wards Stone Park)	488388	166666	Roadside	Diffusion Tube	100	91.7	n/a	n/a	n/a	33	35.2

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124 - 229 Yorktown Road	484686	161359	Roadside	Diffusion Tube	100	66.68	n/a	n/a	n/a	31	28.3*
125 - 69 Oak Tree Cottage, Sandhurst Road, Crowthorne (lamppost)	487140	168407	Roadside	Diffusion Tube	100	83.34	n/a	n/a	n/a	n/a	24.2
126 - Byron Drive, Crowthorne	486569	168824	Roadside	Diffusion Tube	100	83.34	n/a	n/a	n/a	n/a	23.4
127 - opp. #7 old Wokingham Road (cycle sign)	484054	163858	Roadside	Diffusion Tube	100	83.34	n/a	n/a	n/a	n/a	22.4
128 - #10 Lucas Place (along footpath adjacent house 2nd lamppost)	484188	164178	Kerbside	Diffusion Tube	100	100	n/a	n/a	n/a	n/a	18.4
129 - Spring Cottage, rectory close (lamppost#3)	486751	168661	Kerbside	Diffusion Tube	100	100	n/a	n/a	n/a	n/a	20.4

☒ Diffusion tube data has been bias corrected

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

☒ Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance adjustment

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.

(4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

Figure A.1.1 –Trend Chart illustrated below shows the annual mean Concentration of NO₂ from the Continuous Monitor within the Bracknell AQMA.

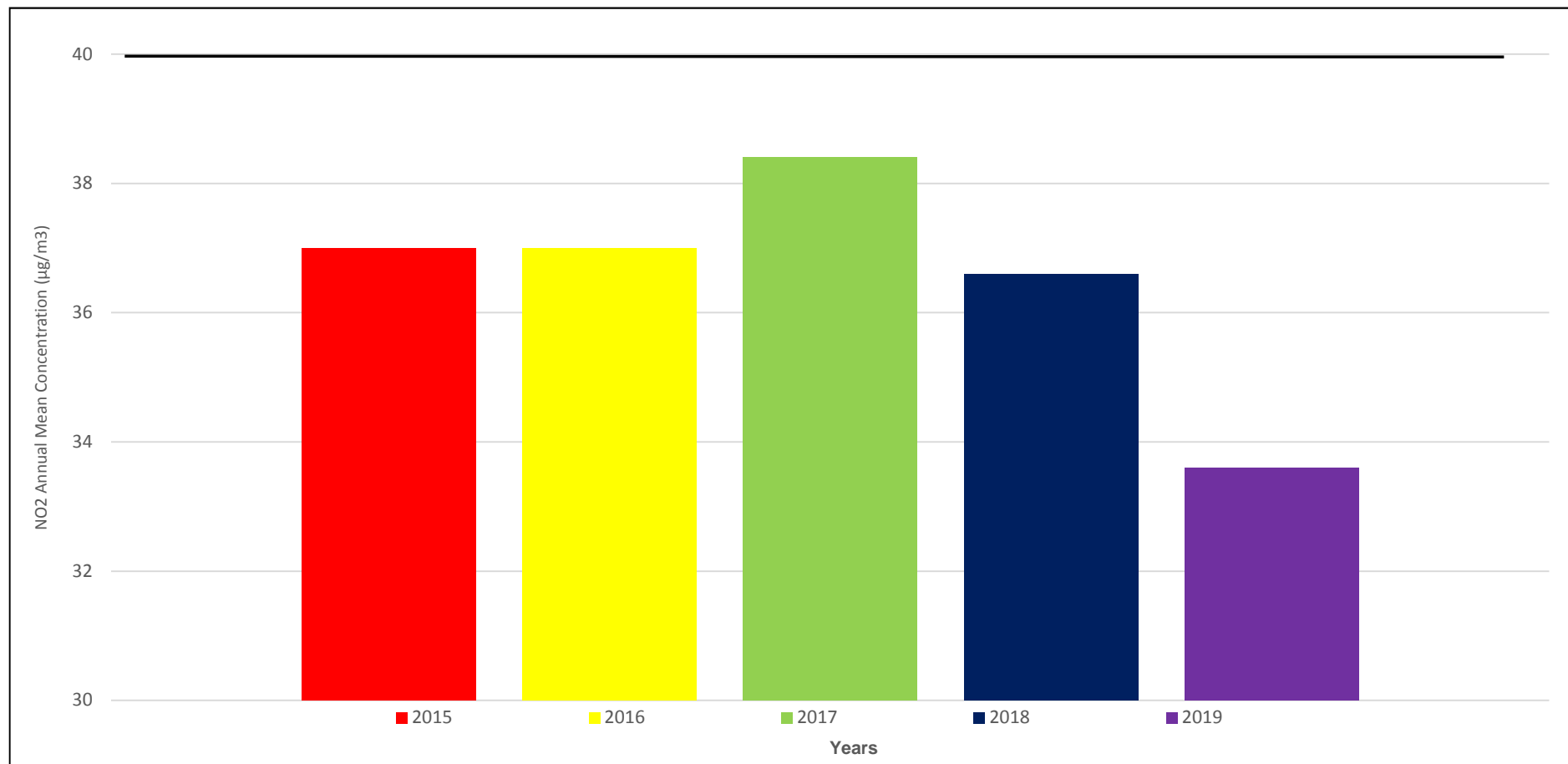


Figure A.2.2 –Trend Chart illustrated below shows the annual mean concentration NO₂ from the Diffusion tubes within the Bracknell AQMA

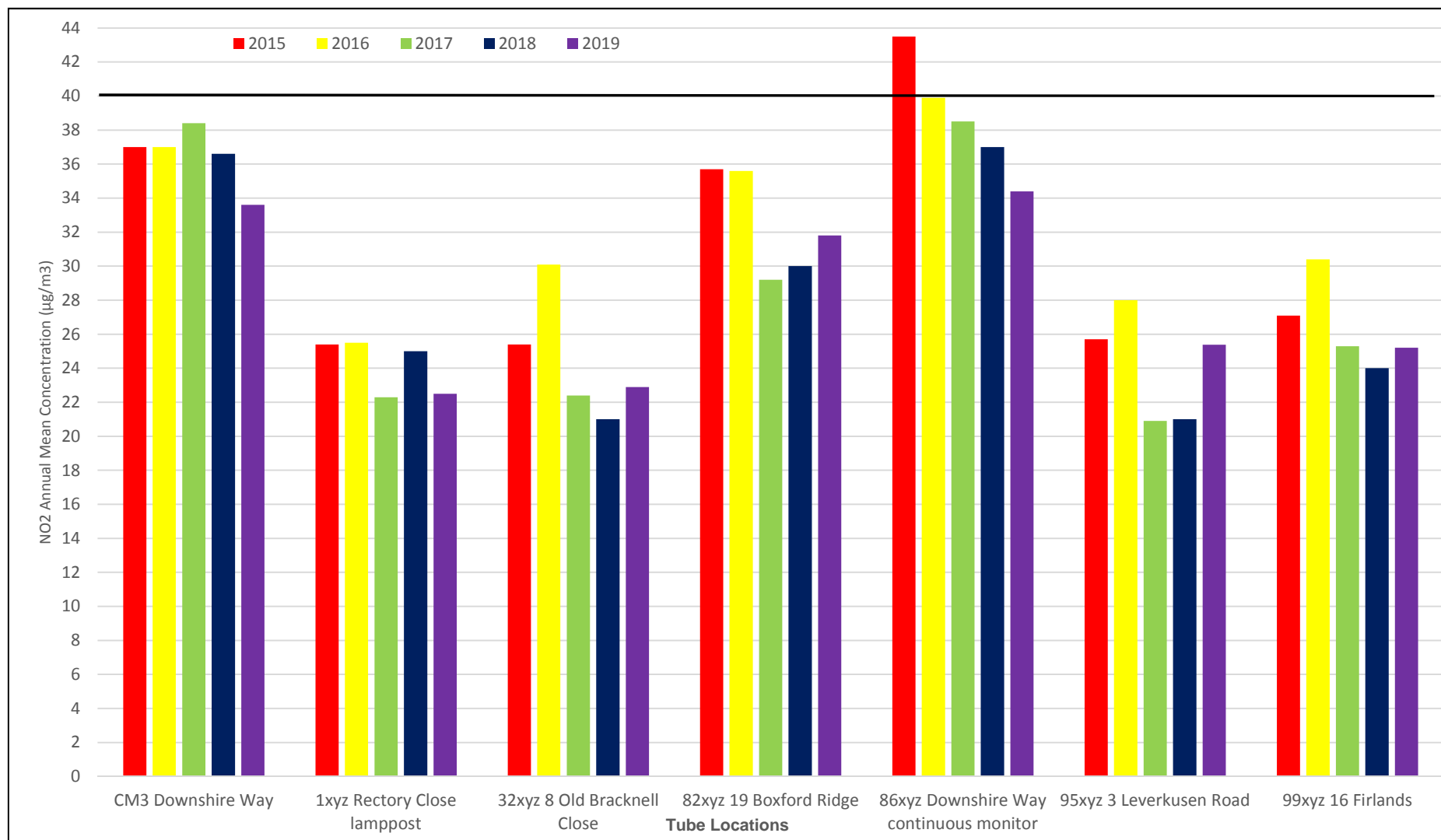


Figure A.1.3 – The Trend Chart illustrated below shows the annual mean concentration of NO₂ from the diffusion tubes within the Crowthorne AQMA.

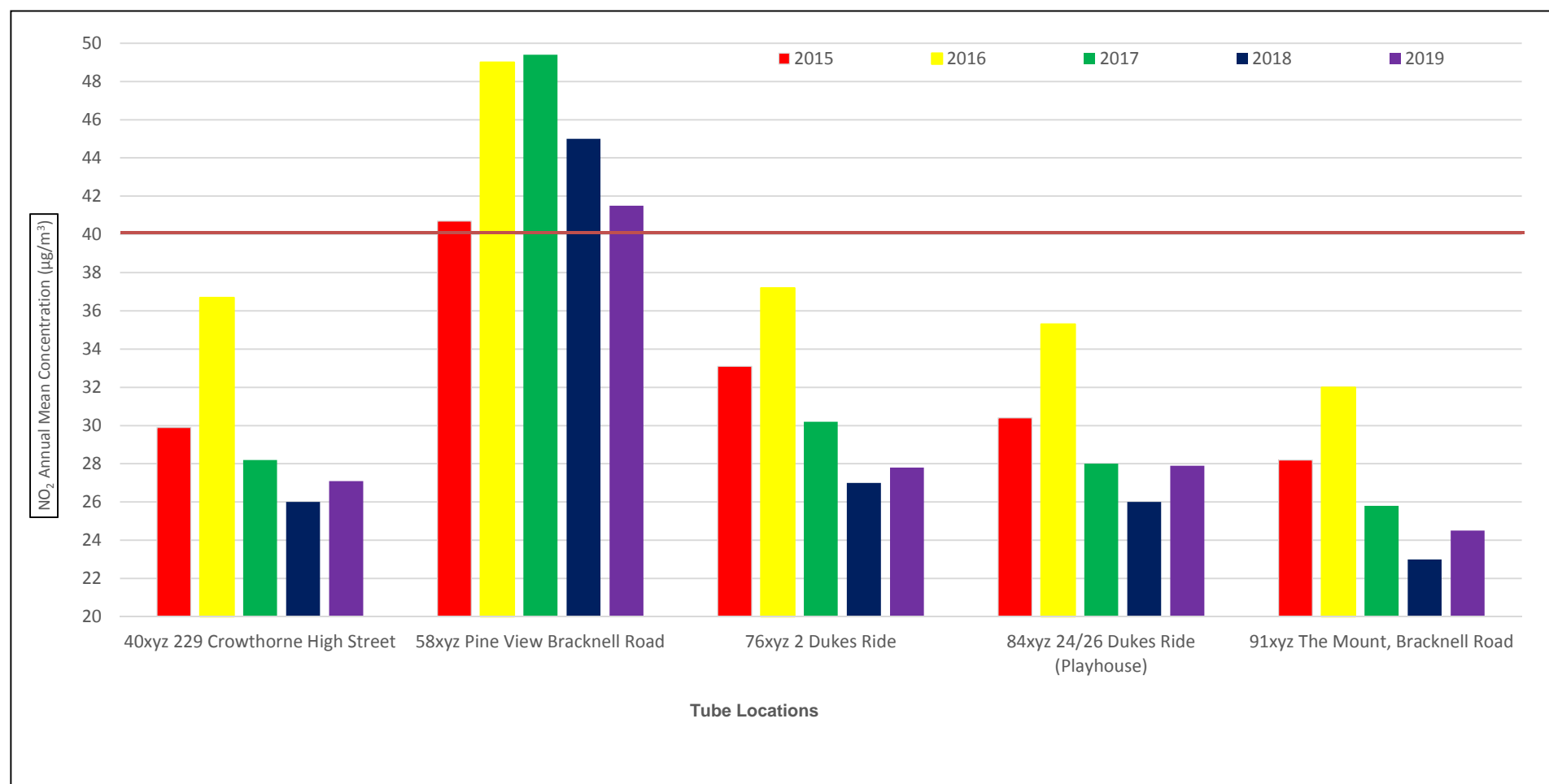


Table A.4 – 1-Hour Mean NO₂ Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2019 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
							2015	2016	2017	2018	2019
CM3 Downshire Way	486501	168850	Roadside	Automatic	98.9	67.5	6	0	2	4	0 (127.07)

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. (If 99.8th percentile >200 µg/m³ = more than 18 exceedances of 200 µg/m³ a year).

Table A.5 – Annual Mean PM₁₀ Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2019 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2015	2016	2017	2018	2019
CM3 Downshire Way	486501	168850	Roadside	98.9	67.5	19.1	20	19.8	19	17.18

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

Notes:

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

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

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

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

Figure A.3 – Trends in Annual Mean PM₁₀ Concentrations from the Continuous Monitor in the Bracknell AQMA.

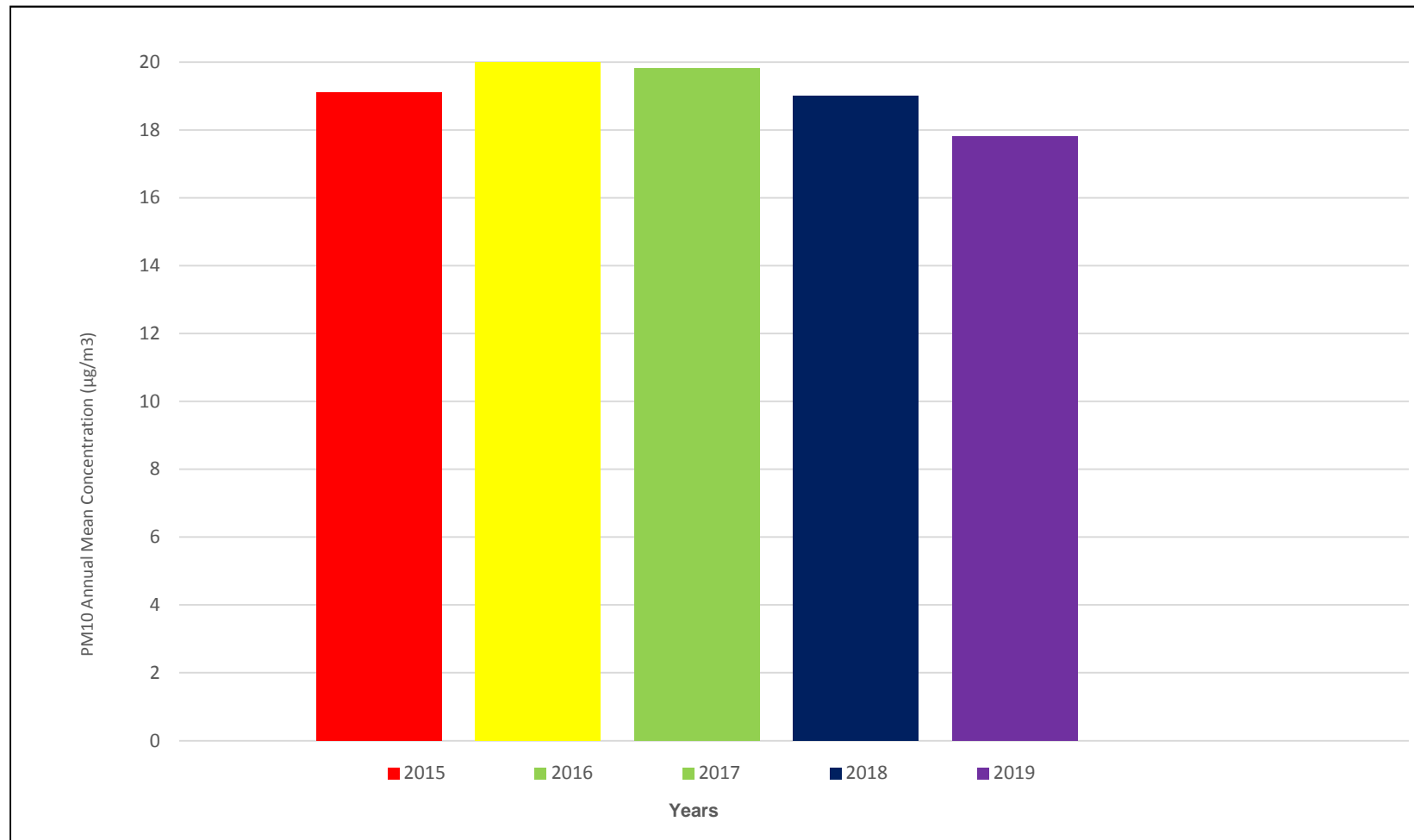


Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2019 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
						2015	2016	2017	2018	2019
CM3 Downshire Way	486501	168850	Roadside	98.9	67.5	5	8	3	1	6 (35.64)

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. (If 90.4th percentile >50 µg/m³ = more than 35 exceedances of 50 µg/m³ a year).

Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO₂ Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO ₂ Mean Concentrations (µg/m³)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Mean Raw Data	Bias Adjusted (0.93) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
1xyz - Rectory Close lampost	487140	168407	30.8	27.4	25.1	39.1	23.0	21.0	21.6	13.5	21.8	22.7		20.6	24.2	22.5	
130 - Stet house, albert road, rg42 2ab	486569	168824		38.6	27.8	24.4	23.9	25.8	25.3	28.4	28.3	30.3		26.7	28.0	26.0	
32xyz - 8 Old Bracknell Close	484054	163858	27.7	35.9	25.5	28.5	19.5	20.1	18.9	20.0	20.6	25.9	32.2	21.9	24.7	22.9	
40x - 229 Crowthorne High Street	484188	164178	31.3	30.2	26.7	38.1	25.6	27.4	25.5	21.5	26.5	28.9	40.5	22.8	29.1	27.1	
40y - 229 Crowthorne High Street	486751	168661	34.1	33.6	28.0	39.1	25.9	28.1	25.4	20.9	26.3	29.3	33.4	25.8			
40z - 229 Crowthorne High Street	484123	164189	34.0	35.1	27.9	37.4	25.7	27.9	24.3	21.6	26.7	30.6	33.8				
58x - Pine View Bracknell Road	484138	164075	60.3	52.1	41.5	42.9	41.4	43.8	43.5	37.8	49.4	40.0	60.9	26.5	44.6	41.5	36.2
58y - Pine View Bracknell Road	486501	168850	64.7	51.3	51.0	43.5	40.3	44.7	41.9	40.0	54.3	56.5	61.1	28.0			
58z - Pine View Bracknell Road	484352	164249	57.2	52.5	51.0	46.8	42.3	43.7	41.7	36.9	47.2	53.1	30.5	26.8			
76x - 2 Dukes Ride	484176	164159	39.1	34.6	27.8	34.5	26.1	25.0	23.4	22.0	29.1	29.2	37.6	28.3	29.9	27.8	
76y - 2 Dukes Ride	486941	168537	40.9	35.5	31.0	30.3	26.2	25.7	24.6	22.7	29.1	30.0	41.3	25.7			

Bracknell Forest Borough Council

76z - 2 Dukes Ride	487258	167948	38.4	32.3	31.2	33.6	24.5	26.3	24.3	20.5	28.0	30.1	40.4	28.6			
82xyz - 19 Boxford Ridge	487626	169316	44.0	43.1	34.2	28.8	30.0	33.8	34.9	41.1	34.6	21.5	33.1	31.9	34.3	31.8	
84xyz - 24/26 Dukes Ride (Playhouse)	484498	169700	31.3	32.7	27.8	33.8	19.7	22.8	19.5	17.9	21.4	25.7	32.2	25.3	25.8	23.9	
86xyz Downshire Way continuous monitor	487265	168537	50	49	38	33	34	31	38	28	28.5	30	38	31	37	34.4	
91x - The Mount, Bracknell Road	4869894	169392	33.7	31.9	31.9	35.0	27.8	24.3	23.5	20.0	28.3	37.0	38.5	44.1	30.0	27.9	
91y - The Mount, Bracknell Road	486883	168992	37.5	35.1	29.7	34.8	25.7	26.1	25.0	21.9	27.5	30.6	39.3	41.6			
91z - The Mount, Bracknell Road	486163	170565	36.5	32.5	29.6	35.0	27.1	25.6	25.7	22.3	27.8	33.3	61.0	46.8			
93xyz - The Prince Alfred PH, 2 High Street	488388	166666	31.5	30.4	19.9	31.3	25.1	24.0	21.7	19.9	23.7	27.0	39.7	21.7	26.3	24.5	
95xyz - 3 Leverkusen Road	484686	161359	30.3	33.5	24.5	26.6	17.4	19.2	18.5	17.4	21.6	32.3	34.8	20.7	24.7	25.8	
99xyz - 16 Firlands	487140	168407	30.8		22.5	24.0	21.9	28.4	26.0	27.7	25.0	31.2	32.8	28.4	27.1	25.2	
108 - 251-269 Kelvin Gate	486569	168824	29.5	28.5	22.9	30.0	21.9	18.2	20.9	22.1	24.9	27.0	32.6	23.9	25.2	23.4	
114 - 1-10 Crossways, St Marks Road	484054	163858	34.0	39.5	26.2	26.8	17.1	23.8		25.1	21.3	31.7	31.9		27.7	25.8	
115 - Blenheim Avenue (Rear 31 Hampden Cres)	484188	164178	31.3	31.5	25.4	26.6	19.6	19.3	21.3	18.6	25.8			24.9	24.4	22.7	
117 - Blue Smoke House, The Ring	486751	168661	32.0	30.3	25.9	27.2	22.4	22.3	18.6	21.3	23.4	28.1	33.9		25.9	24.1	
120 - 1-96 Platform (Station)	487140	168407	35.4	32.1	27.9	33.2	24.5	26.5	23.4	22.4	24.7	29.0	39.6	33.8	29.4	27.3	
122 - #1Meadowsweet Lane	486569	168824	30.0	24.2	23.5	27.7	19.7	20.3	17.4	17.7	22.8	25.8	33.7	21.7	23.7	22.0	
123 - new forest ride 40 sign (27 Wards stone park)	484054	163858	45.8	46.8		42.7	35.3	30.6	33.0	32.4	34.2	38.4	42.8	35.0	37.9	35.2	

Bracknell Forest Borough Council

124 - #229 yorktown road	484188	164178	42.6	43.6	39.1	41.9					36.7	39.3	27.3	35.1	38.2	28.3*	
125 - 69 oak tree cottage, sandhurst road, crowthorne (lamppost)	486751	168661	30.2	33.1			22.3	23.4	20.8	20.1	25.6	25.5	33.0	26.7	26.1	24.2	
126 - byron drive, crowthorne	484123	164189	24.3	31.3			22.6	22.2	20.9	19.7	24.1	25.3	33.2	28.3	25.2	23.4	
127 - opp. #7 old wokingham road (cycle sign)	484138	164075	30.5	18.8			22.1	23.0	21.9	18.0	25.5	26.2	28.2	26.4	24.1	22.4	
128 - #10 Lucas Place (along footpath adjacent house 2nd lamppost)	486501	168850	22.6	20.6	13.8	22.2	15.7	15.5	14.0	11.6	16.3	16.9	41.9	25.9	19.8	18.4	
129 - spring cottage, rectory close (lamppost#3)	484352	164249	29.2	27.4	19.5	30.7	18.9	17.9	16.3	13.7	18.5	21.2	29.0	20.8	21.9	20.4	

☐ Local bias adjustment factor used

☒ National bias adjustment factor used

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

☒ Where applicable, data has been distance corrected for relevant exposure in the final column

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, below is their QA/QC procedure.

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 Evista 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 Bracknell Forest 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 convertor 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 audit was planned to be undertaken in October 2019 but due to the re-development of the road and street furniture along Downshire way, the power was disconnected on the 6th September 2019.

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 2019 – Feb 2019) = 100%, AR025 (Apr 2019- May 2019) = 100%, AR027 (July 2019 – Aug 2019) = 100% , and AR028 (Sept 2019 – Oct 2019) = 100%, which relates to the % of results which are satisfactory.

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 please see the attachment (or figure) **Error!**

Reference source not found.

(Nitrogen Dioxide AIR PT 2019 – see Table C.1)

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. 03/20 update) suggested a bias adjustment factor of **0.93** 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 **0.92**.

Due to roadworks in Bracknell town centre, when electricity supply to the chemiluminescent analyser was disconnected from early September, data became limited, i.e. less than required 90%. Therefore, for the purposes of the ASR 2020 for the 2019 data the National bias adjustment factor of 0.93 was used.

Precision and Accuracy

Table C.1 – Precision & Accuracy of the Continuous Monitor

Checking Precision and Accuracy of Triplicate Tubes										AEA Energy & Environment From the AEA group			
Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
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	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	07/01/2019	04/02/2019	51.0	52.1	45.8	50	3.4	7	8.3	44.2	98.6	Good	Good
2	04/02/2019	04/03/2019	52.2	43.6	50.2	49	4.5	9	11.2	45.8	92	Good	Good
3	04/03/2019	05/04/2019	43.5	37.6	32.5	38	5.5	15	13.7	34.8	99.5	Good	Good
4	05/04/2019	29/04/2019	35.2	32.0	30.9	33	2.2	7	5.6	32.9	100	Good	Good
5	29/04/2019	05/06/2019	34.3	33.5	33.0	34	0.7	2	1.7	33	100	Good	Good
6	05/06/2019	02/07/2019	29.9	31.1		31	0.8	3	7.5	23	95.1	Good	Good
7	02/07/2019	05/08/2019	50.1	32.1	31.5	38	10.5	28	26.2	29	99.1	Poor Precision	Good
8	05/08/2019	02/09/2019	30.0	26.7		28	2.3	8	20.8	28	99.8	Good	Good
9	02/09/2019	02/10/2019	28.5							21	99.6		Good
10	02/10/2019	04/11/2019	31.1	28.8	28.7	30	1.4	5	3.5		0	Good	or Data Capture
11	04/11/2019	02/12/2019	41.6	36.3	36.9	38	2.9	8	7.2		0	Good	or Data Capture
12	02/12/2019	07/01/2020	29.0	32.8	29.8	31	2.0	7	5.0		0	Good	or Data Capture
13											0		or Data Capture

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

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

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	Precision 10 out of 11 periods have a CV smaller than 20%
Bias calculated using 7 periods of data	Accuracy (with 95% confidence interval) WITH ALL DATA
Bias factor A 0.92 (0.84 - 1.03)	Bias calculated using 8 periods of data
Bias B 8% (-3% - 19%)	Bias factor A 0.9 (0.83 - 1)
Diffusion Tubes Mean: 37 μgm^{-3}	Bias B 11% (0% - 21%)
Mean CV (Precision): 7	Diffusion Tubes Mean: 37 μgm^{-3}
Automatic Mean: 34 μgm^{-3}	Mean CV (Precision): 10
Data Capture for periods used: 98%	Automatic Mean: 34 μgm^{-3}
Adjusted Tubes Mean: 34 (31 - 38) μgm^{-3}	Data Capture for periods used: 98%
	Adjusted Tubes Mean: 34 (31 - 37) μgm^{-3}

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

Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Table C.2 - Nitrogen Dioxide AIR PT 2019



(A division of Gradko International Ltd.)

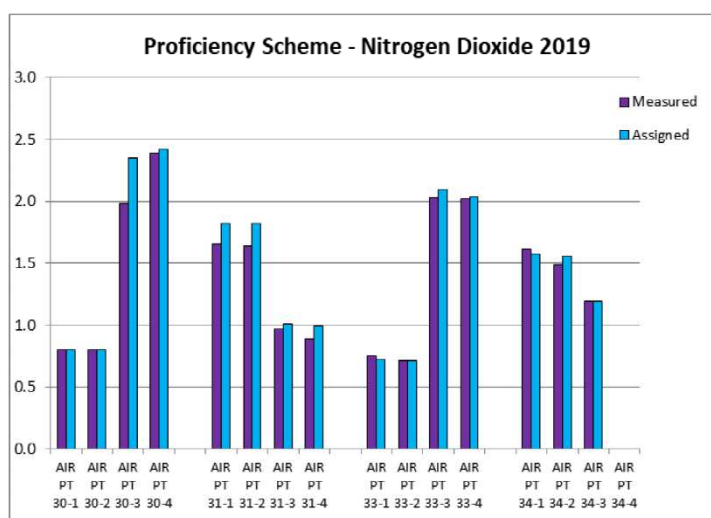
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH

tel.: 01962 860331 fax: 01962 841339 email:diffusion@gradko.com

AIR PT Nitrogen Dioxide Proficiency Scheme Results 2019

Methods: GLM 7 – CARY 60 Spectrophotometer

AIR PT Proficiency Scheme - Nitrogen Dioxide 2019					
Date	Round	Assigned value	Procedure GLM 7		
			Measured concentration	z-Score	% Bias
Feb-19	AIR PT 30-1	0.8	0.8	0	0.0%
Feb-19	AIR PT 30-2	0.8	0.8	0	0.0%
Feb-19	AIR PT 30-3	2.35	1.98	-2.1	-15.7%
Feb-19	AIR PT 30-4	2.42	2.39	-0.16	-1.2%
May-19	AIR PT 31-1	1.82	1.65	-1.24	-9.3%
May-19	AIR PT 31-2	1.82	1.64	-1.31	-9.9%
May-19	AIR PT 31-3	1.01	0.97	-0.53	-4.0%
May-19	AIR PT 31-4	0.99	0.89	-1.35	-10.1%
Aug-19	AIR PT 33-1	0.72	0.75	0.56	4.2%
Aug-19	AIR PT 33-2	0.71	0.71	0	0.0%
Aug-19	AIR PT 33-3	2.09	2.03	-0.38	-2.9%
Aug-19	AIR PT 33-4	2.04	2.02	-0.13	-1.0%
Oct-19	AIR PT 34-1	1.57	1.61	0.38	2.5%
Oct-19	AIR PT 34-2	1.56	1.49	-0.56	-4.5%
Oct-19	AIR PT 34-3	1.19	1.19	0	0.0%
Oct-19	AIR PT 34-4		Sample wasted not submitted		



Annualisation NO₂

In order to annualise, two to four background monitoring sites must be identified. These must form part of the AURN network, be within 50 miles of the site, have >85% data capture and should be background urban suburban or rural locations.

The selected sites for the **diffusion tubes** were:

- Oxford St Ebbs
- Swindon Walcot
- London Hillingdon

Table C.3 – Average Annualisation Factor for the Diffusion Tubes

Annualisation Factor Oxford St Ebbs	Annualisation Factor Swindon Walcot	Annualisation Factor London Hillingdon	Average Annualisation Factor
0.9182	0.8157	0.8341	0.8560

The selected sites for the **continuous monitor** were:

- London Hillingdon (LH)
- Oxford St Ebbs (OSE)

Table C.4 – Average Annualisation Factor for the Continuous Monitor

Annualisation Factor Oxford St Ebbs	Annualisation Factor London Hillingdon	Average Annualisation Factor
0.99	1.01	1.0

As required annualisation of data was carried out for 2 separate sites, referring to procedure in TG(16) (updated Feb 2017) Box 7.9.

Table C.5 – Annualisation Method for NO₂ data

Site	Annual Mean (M)	Annualise Mean ($\mu\text{g}/\text{m}^3$) (*0.856)	Bias Corrected Mean ($\mu\text{g}/\text{m}^3$) (*0.93)
124 - #229 Yorktown Road	35.50	30.39	28.3
Site	Annual Mean (M)	Annualise Mean ($\mu\text{g}/\text{m}^3$) (*1.0)	
Downshire Way (CM)	33.63	33.6	

It has only been possible to carry out monitoring at Bracknell Downshire Way for 9 months between Jan and Sep 2019. The NO₂ measured mean concentration M for this period is 33.63 $\mu\text{g}/\text{m}^3$, and the annualised mean is 33.63 $\mu\text{g}/\text{m}^3$. Site 124#229Yorktown road also only captured 8 months of data, the NO₂ measured mean concentration M for this period is 35.5 $\mu\text{g}/\text{m}^3$, and the annualised bias corrected mean is 28.3 $\mu\text{g}/\text{m}^3$.

Annualisation PM₁₀

It has only been possible to carry out monitoring at Bracknell Downshire Way for 9 months between Jan and Sep 2019. The PM₁₀ measured mean concentration M for this period is 18.97.

In order to annualise, two to four background monitoring sites must be identified. These must form part of the AURN network, be within 50 miles of the site, have >85% data capture and should be background urban, suburban or rural locations. Selected sites:

- Chilbolton Observatory (ChOb)
- Oxford St Ebbes (OSE)

ChOb instrument is a FIDAS and OSE instrument is a TEOM-FDMS (according to units within csv files available at https://uk-air.defra.gov.uk/data/flat_files?site_id=CHBO and https://ukair.defra.gov.uk/data/flat_files?site_id=REA1).

According to TG16 guidance for TEOM - Filter Dynamics Measurement System (TEOM-FDMS). The PM₁₀ FDMS 8500, PM_{2.5} FDMS 8500, PM₁₀ FDMS 1405F, PM_{2.5} FDMS 1405F and the FDMS1405DF (which measures both PM₁₀ and PM_{2.5} at the same time) have all been declared equivalent to the reference method. Local

authorities can use any of these FDMS variants without the need for correction for slope and/or intercept.

The Palas Fidas 200 measures both PM₁₀ and PM_{2.5} at the same time. Data are processed by an inbuilt algorithm, and the algorithm known as Method 11 has been certified in the UK. The Method 11 PM₁₀ data can be used by Local Authorities without the need for correction for slope and/or intercept.

All means 2019 are exclusive of recorded negative data.

Average ratio of background sites is 0.91.

Therefore multiplying the measured period mean concentration for Bracknell by the annualisation factor will give the annual mean of 17.18 ug/m³.

Table C.6 - Annualisation Method for the PM₁₀ Data

Background Site	Data Capture Rate [%]	Annual Mean (A _m) (µg/m ³)	Period Mean (P _m) (µg/m ³)	Ratio (A _m /P _m) (µg/m ³)		
ChOb	97.5%	11.91	12.97	0.92		
OSE	99.7%	14.25	15.95	0.89		
Continuous Monitor		Annual Mean (A _m) (µg/m ³)			Average Ratio (µg/m ³)	Annualised Annual Mean (µg/m ³)
Downshire Way (CM3)		18.8			0.91	17.18

Distance Correction

Distance correction was required at one of the bias corrected sites as it reported above 36mg/m³ [\(TG.16 para 7.78\)](#) and there is influence from the one road present in relation to the nearest sensitive receptor (receptor within 20m of monitoring location). Only site 58xyz - Pine View Bracknell Road required distance correction calculation using the NO₂ fall off with distance calculator v4.2.

Table C.7 - Distance corrected site

Site ID	Bias Adjusted Annual Mean NO ₂ (µg/m ³)	Predicted Annual Mean NO ₂ at Receptor (µg/m ³)
58x - Pine View Bracknell Road	41.7	36.2

PM_{2.5} Estimation

In the absence of PM_{2.5} monitoring, and where a local authority carries out PM₁₀ monitoring, it is recommended to consult Chapter 7 Section 1 of [Technical Guidance LAQM.TG16](#) (7.107 – 7.111) in order to include an estimate of PM_{2.5} concentrations.

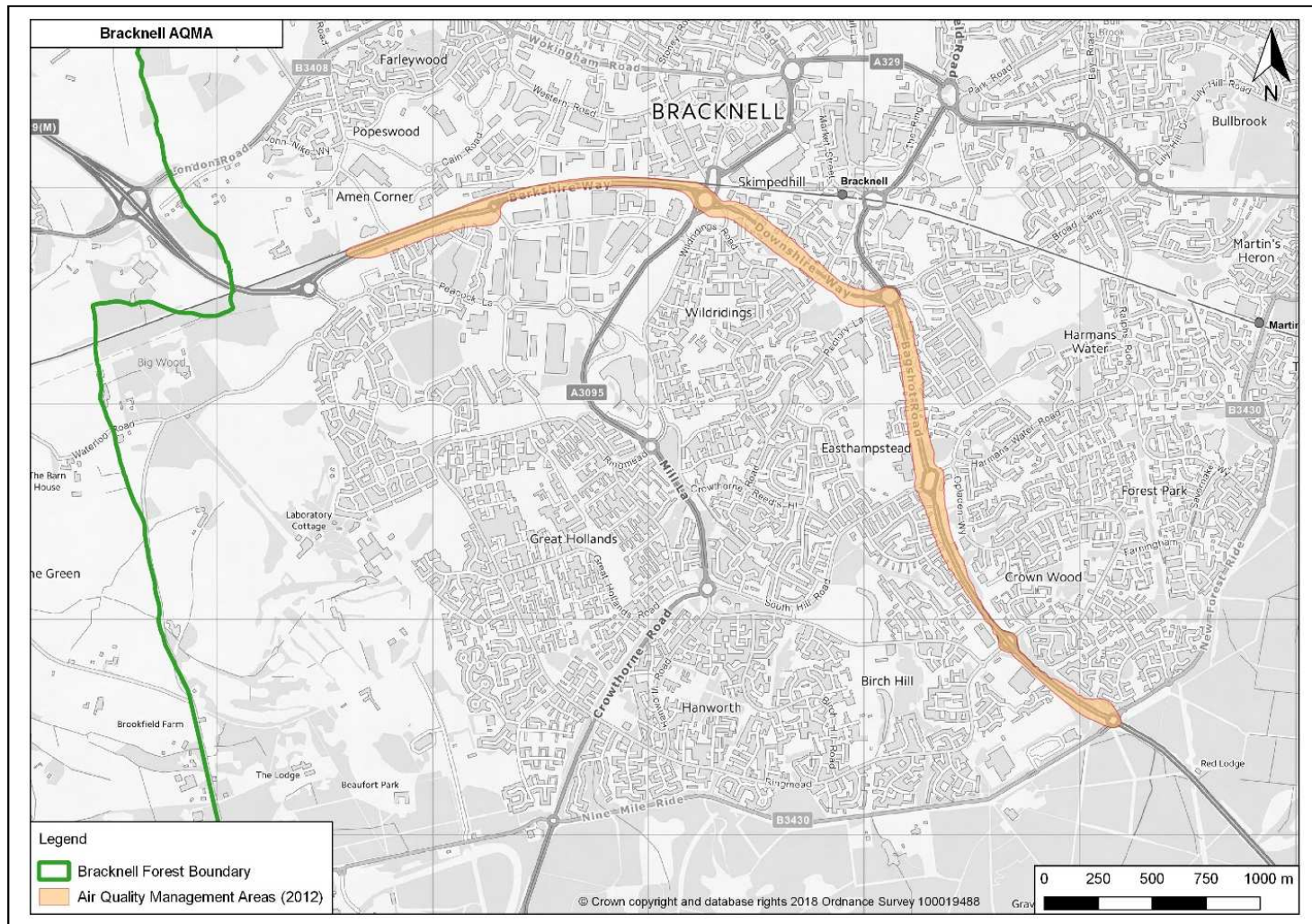
The recorded annual mean PM₁₀ concentration at a roadside site in 2019 was 17.18µg/m³. The PM_{2.5} concentration at this site can be estimated as follows:

Table C.8 - Predicted PM_{2.5} in Bracknell Forest

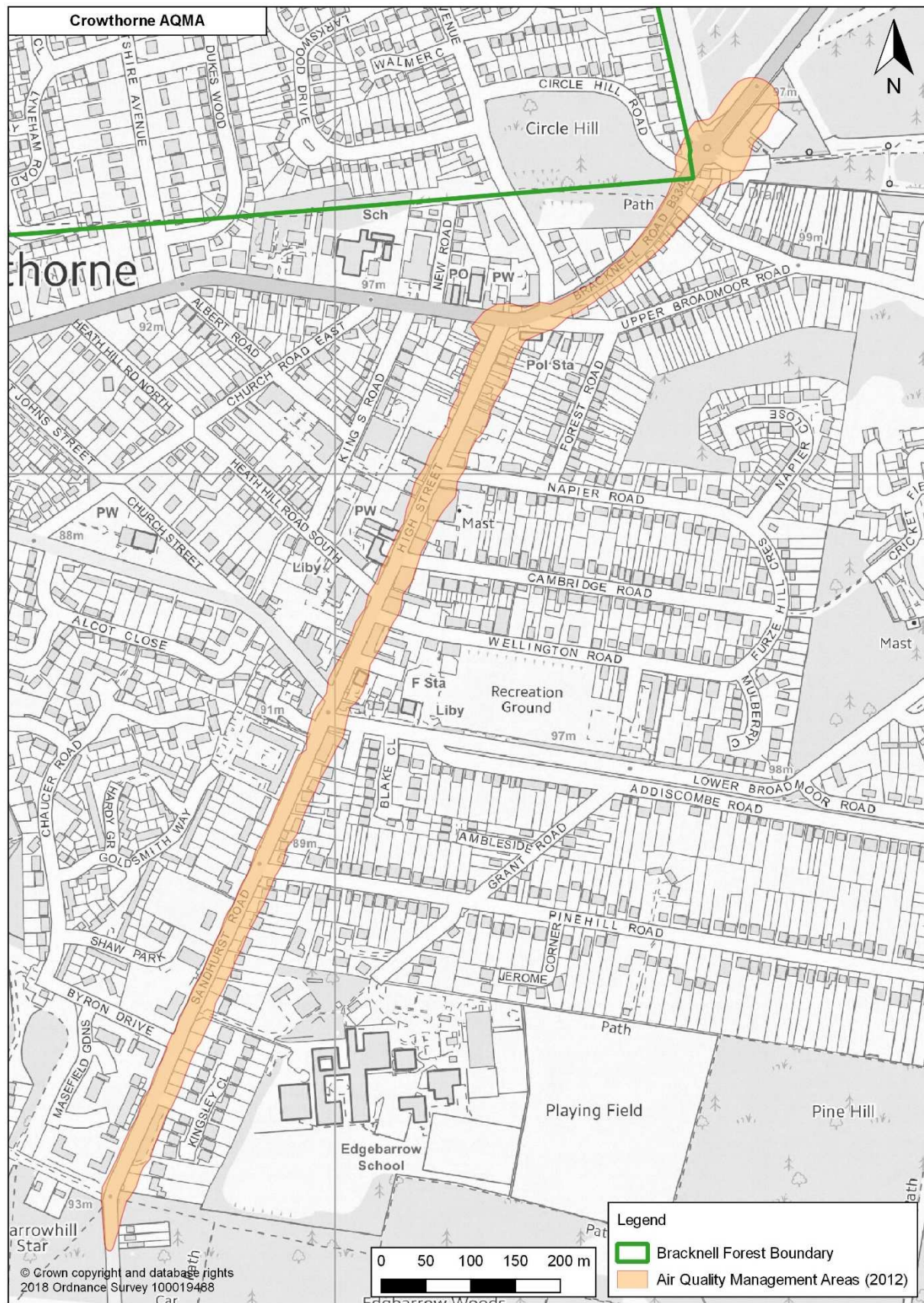
Site ID	Bias Adjusted Annual Mean PM ₁₀ (µg/m ³) (A)	Nationally Derived Correction Factor (0.7) (B)	Predicted PM _{2.5} (µg/m ³) (A*B=(C))
Downshire Way Continuous Monitor (CM3)	17.18	0.7	12.0

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

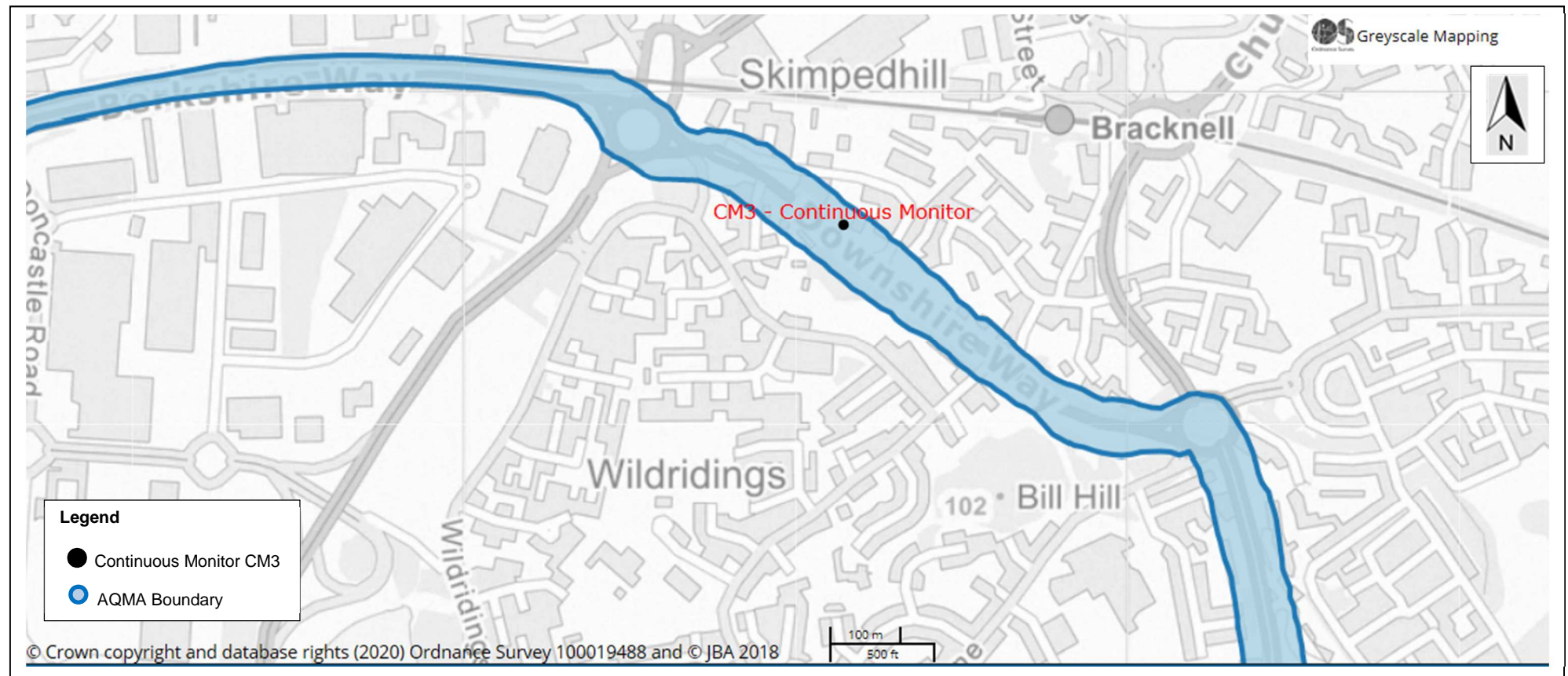
Map D.1: Bracknell AQMA



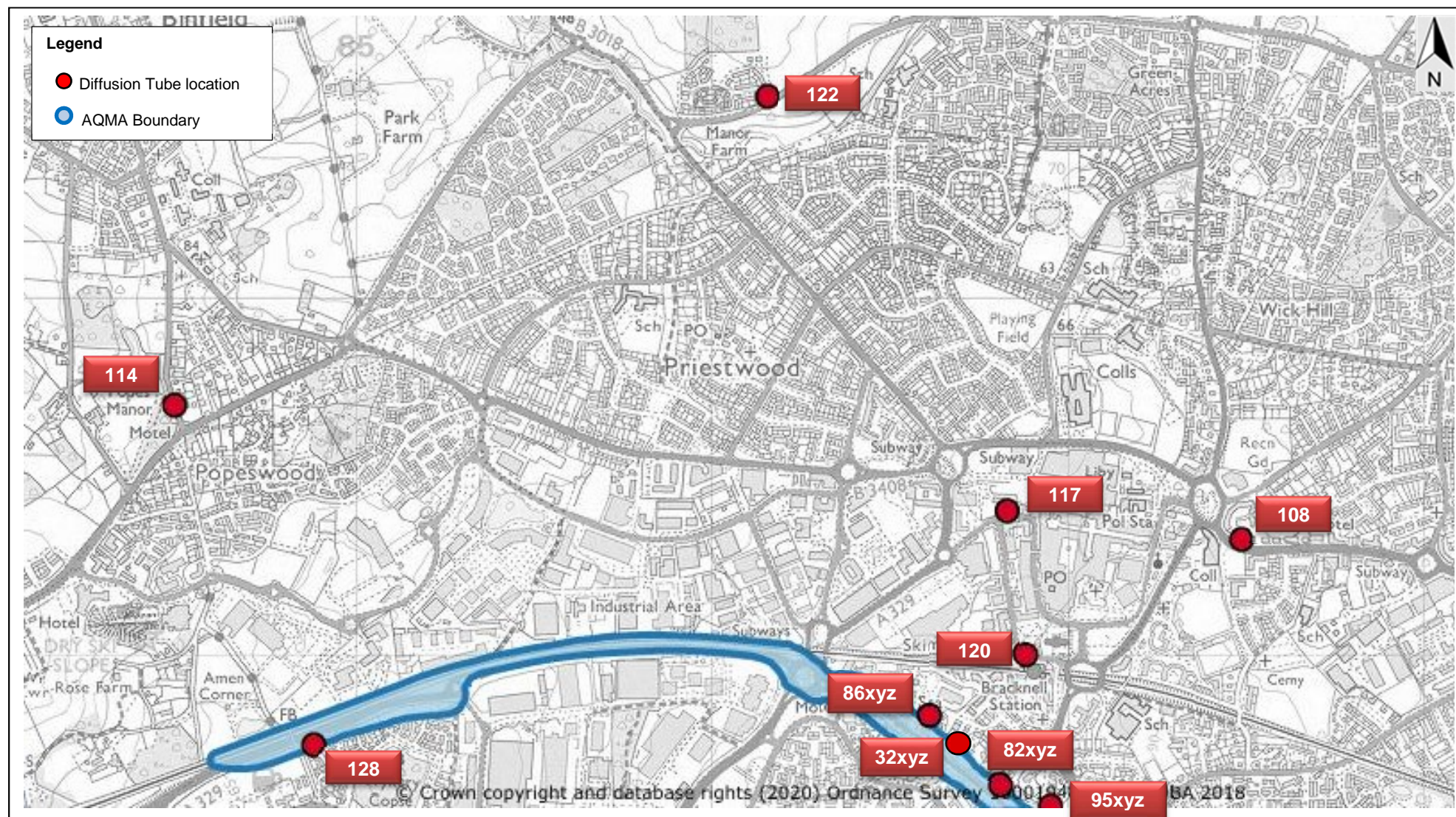
Map D.2: Crowthorne AQMA



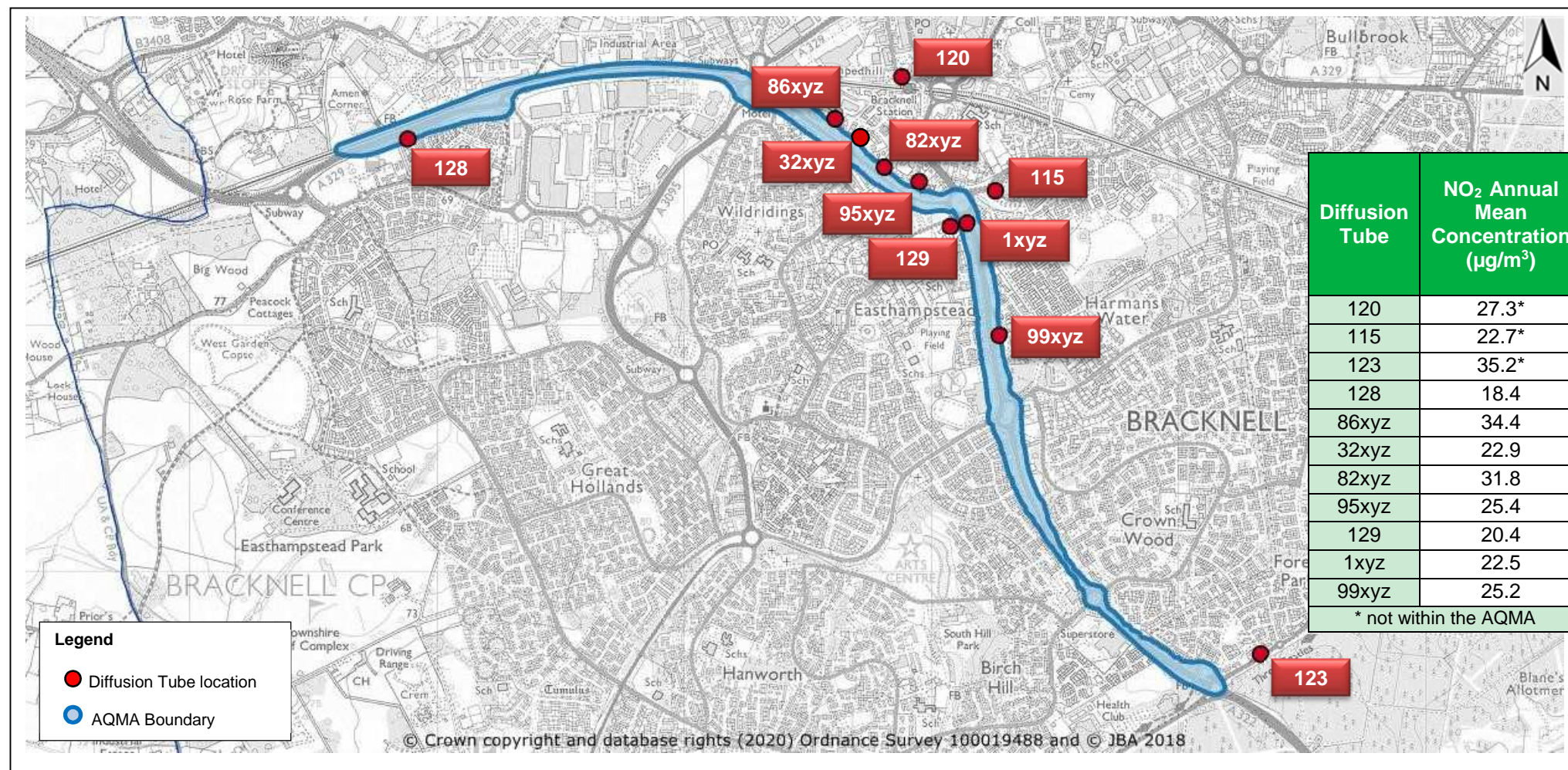
Map D.3: Automatic monitoring in Bracknell Forest (CM3) within the Bracknell AQMA



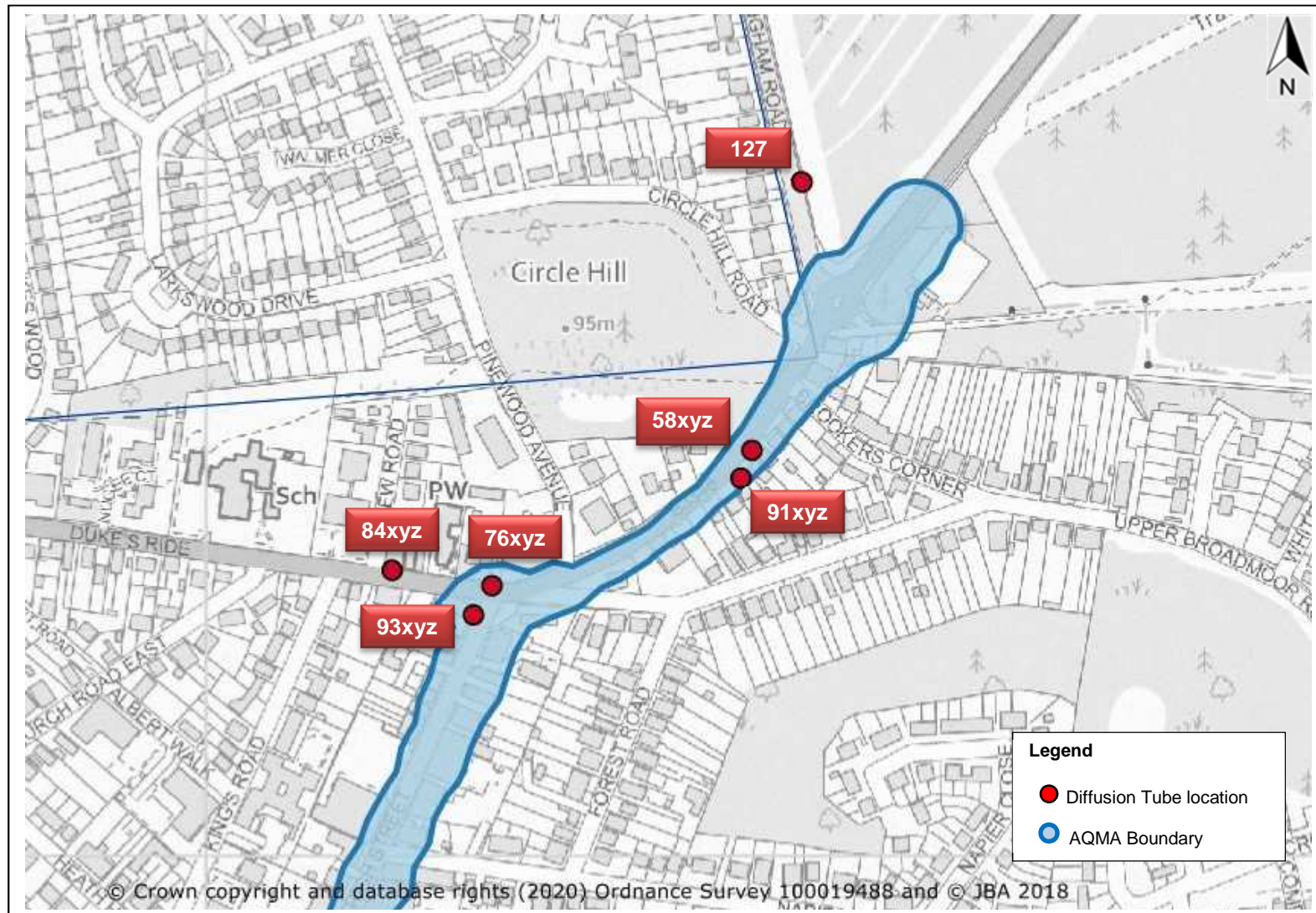
Map D.4: Diffusion Tube monitoring sites in Bracknell and at the Northern end of the Bracknell AQMA



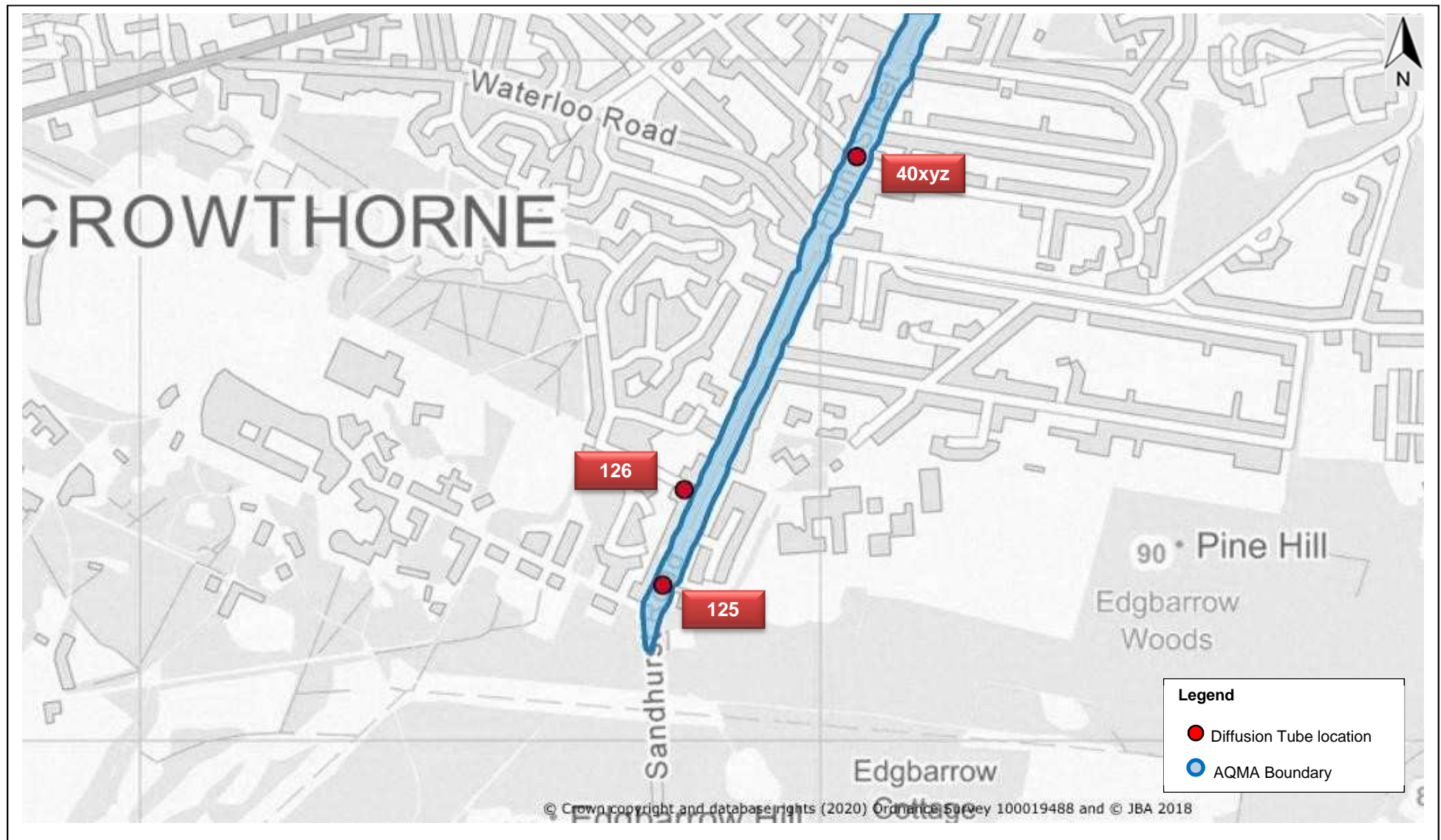
Map D.5: Diffusion Tube monitoring sites in and around the Bracknell AQMA



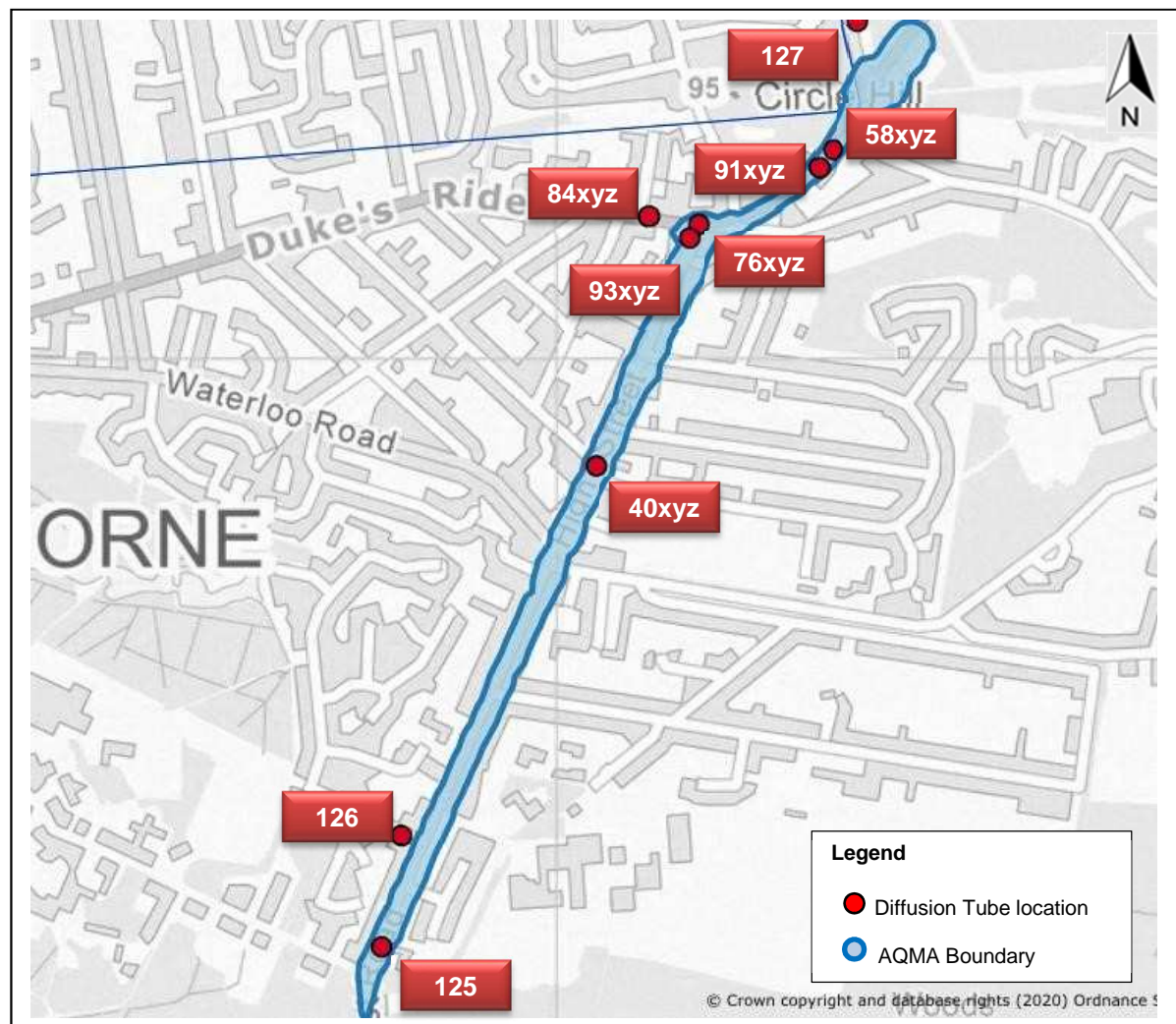
Map D.6: Diffusion Tubes monitoring sites at the Northern end of the Crowthorne AQMA



Map D.7: Diffusion Tubes monitoring sites at the Southern end of the Crowthorne AQMA



Map D.8: Diffusion Tube monitoring sites in the Crowthorne AQMA



Diffusion Tube	NO ₂ Annual Mean Concentration (µg/m ³)
127	22.4
58xyz	41.5 (36.2*)
91xyz	27.9
76xyz	27.8
84xyz	23.9
93xyz	24.5
40xyz	27.1
126	23.4
125	24.2

* Distance corrected to nearest receptor

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/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
CM	Continuous Monitor
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