2021 Air Quality Annual Status Report (ASR)

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

Date: June, 2021

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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, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

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 (NO_2) 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 NO_2; the Bracknell AQMA (Bagshot Road and Downshire Way) and the Crowthorne AQMA. There are no exceedances of PM_{10}. Details can be found at: https://uk-air.defra.gov.uk/aqma/list?view=W and maps are in Appendix D.

Nitrogen dioxide (NO_2) is the main pollutant of concern. The levels in 2020 have shown a decreasing trend since 2015. The annualised continuous monitored NO_2 Annual Mean in 2020, of 26.9 µg/m^3 at Downshire Way did not exceed the Air Quality objective level of

[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

[3] Defra. Air quality appraisal: damage cost guidance, July 2020

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

40µg/m^3 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/m^3 which further indicates that there are unlikely to be any exceedance of the 1-hour Objective. All of the 2020 sites showed decreased levels compared with 2019, due to the pandemic lockdowns. However, the levels have been reducing over the last 5 years since 2016.

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

5 new sites have been commissioned for 2020, all of which were under 40µg/m^3. The Continuous monitor in the Bracknell AQMA, showed another Annual Average (26.9µg/m^3) decrease of NO_2, and did not exceed the Annual Mean Objective 40µg/m^3. The NO_2 level also demonstrates a decreasing trend since 2016.

The PM_{10}, which is monitored in the Bracknell AQMA (when annualised) measured 18.35µg/m^3 and did not exceed the Annual Mean Objective 40µg/m^3. The results also showed no exceedances of the 24 hours Annual Mean 50µg/m^3, which is not to be exceeded more than 35 times a year. The PM_{10} level also demonstrates a decreasing trend since 2016.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management

[5] Defra. Clean Air Strategy, 2019

[6] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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 when traffic is queuing on the A322. This is being accomplished with the 2020 results showing a decrease of 50.50% from 50.3 µg/m^3 NO_2 in 2011 to 26.9µg/m^3 NO_2 in 2020.

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 was 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 (Figure S.1). Since the declaration of the AQMA in 2011 the NO_2 has continued to reduce from 41.7µg/m^3 to 32.9µg/m^3 in 2020 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 made by PPP with West Berkshire and Wokingham Councils was made to the Air Quality Grant Scheme 2020 and was successful in securing funding for a project related to a behaviour change anti-idling campaign, and localised $PM_{2.5}$ monitoring & action planning, at schools located near to the AQMAs.

For Clean Air Day in 2020 an Anti-idling competition was run in West Berkshire with all the Primary School, to help them spread the message. The winning drawings & strap lines were made into a banner given to the school, these banners have been made available for others to purchase as well. See Figure S.2 for the Banner.
https://publicprotectionpartnership.org.uk/environmental-health/air-quality/clean-air-day-schools-competition/

Figure S.2 - The Anti-idling Banner made from the Clean Air Days Entries in 2020.

Conclusions and Priorities

The main focus for Bracknell Forest in terms of improving air quality is to reduce NO_x emissions, particularly NO_2 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 2020 the NO_2 concentrations did not exceed the Air Quality Objectives at any of the diffusion tube sites once the distance correction was applied.

Concentrations at all of the diffusion tube sites have decreased in 2020 compared to 2019 levels and they are still showing a downward trend since 2016.

This year has been the only time in our history of AQ monitoring when we have had very limited vehicles in some months on the road network in Bracknell Forest

- Bracknell Forest saw a reduction of NO_2 between 33.97% and 43.84% in 2020 compared to 2019. This equated to a 25.89% reduction in annual mean concentration relative to 2019.
- We will continue to work through the Action Plan, however as we have achieved most of it already we will be concentrating gathering data to either revoke the AQMA's, or if not to look at producing a new AQAP. We will need a full pandemic free year to see what impact the alternations to the Downshire Way have made.
- We have been awarded a DEFRA AQ grant which will be used for behaviour change project on Anti-Idling. We will also be monitoring the $PM_{2.5}$ at those schools which are located near to the AQMA, and an action plan will be produced for each one, if needed on how to reduce the $PM_{2.5}$ so that it is within the required limits.

Local Engagement and How to get Involved

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

- Public Protection Partnership https://publicprotectionpartnership.org.uk/environmental-health/air-quality/vehicle-idling/
- Domestic Fuel information https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-domestic-solid-fuels-standards-england-regulations-2020/
- 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 2020. 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 are presented in Table E.1.

2 Actions to Improve Air Quality

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 should prepare an Air Quality Action Plan (AQAP) within 12 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. The table presents a description of the 2 AQMAs that are currently designated within Bracknell Forest. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMAs designations are as follows:

- NO_2 Annual Mean;

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA Bracknell	Declared 09/02/2011	NO2 Annual Mean	The A322 Bagshot Road and Downshire Way from Berkshire Way to juction with B3430	NO	50.3	26.9	BFBC Air Quality Action Plan	https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-management-areas/
AQMA Crowthorne	Declared 09/02/2011	NO2 Annual Mean	Part B3348, High Street & part of Sandhurst Road	NO	41.7	32.9	BFBC Air Quality Action Plan	https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-management-areas/

☒ **Bracknell Forest confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Bracknell Forest confirm that all current AQAPs have been submitted to Defra.**

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

Defra's appraisal of last year's ASR concluded that the report is well structured, detailed, and provides the information specified in the Guidance

1. Robust and accurate QA/QC procedures were applied. Distance correction calculations could be provided in future (when/if needed).
2. Annualisation for the diffusion tube site (124 - #229 Yorktown Road) and the automatic site on Bracknell Downshire Way (NO_2 and PM_{10}) was carried out in line with TG(16) guidance, all calculations provided.
3. The Council has included discussion and presented the NO_2 trends observed in both of the AQMAs located within the Council's boundaries.
4. The local monitoring strategy has been updated during the present year and justifications have been given. The movement of monitoring locations is welcomed, allowing the Council to prioritise other areas of higher air pollution as concentrations surrounding the AQMA have been below the Air Quality Objective. This demonstrates the Councils proactive and dedicated approach to improving air quality across Bracknell.
5. The comments from last year's ASR have been addressed.
6. The Council has multiple measures in place that will help to tackle $PM_{2.5}$. The Public Health Outcomes Frameworks were referred to, and this is encouraged to continue.
7. The report is a good source for members of the Public to find out about air quality in their area. The Council should continue their hard work.

Bracknell Forest has taken forward a number of direct measures during the current reporting year of 2020 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 18 measures are included within Table 2.2, with the type of measure and the progress Bracknell Forest have made during the reporting year of 2020 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

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

- Completion of dualling of Downshire Way between Twin Bridges and Horse & Groom junctions, 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. Early anecdotal evidence suggests flows through the two junctions are significantly improved, with congestion reduced and therefore likely improvements in Air Quality

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

- 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 (this connects to the Bracknell AQMA) 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 work commenced in the Summer of 2020.

- Continuing to work with Bracknell BID to encourage more sustainable travel; white lines indicating pedestrian/cycle paths have been refreshed and new signage added.

- Junction improvement at crossing of Warfield Road by junctions with Holy Spring Lane and Sandy Lane to make it easier for pedestrians and cyclists to cross.

- Work underway on new pedestrian and cycle crossing on Binfield Road near to junction with Harvest Ride underway.

- New pedestrian and cycle crossing on Forest Road near to junction with York Road underway.

- An Anti-idling competition was run in Bracknell Forest with all the Primary Schools, to help them spread the message. The winning drawing strap lines were made into a banner given to the schools, these banners have been made available for others to purchase as well. See Figure for the banner.

Bracknell Forest's priorities for the coming year are:

- Clean Air Day on 17th June 2021, all schools in Bracknell Forest have been asked to sign up to the "Clean Air Pledge". By doing this they are agreeing to send out our literature to all the parents about air quality and anti-idling. Also actively joining in our competitions as well.
- 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 2021 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.
- Officers have been meeting with the Energy Savings Trust and the Office for Zero Emission Vehicles to clarify criteria ahead of submitting a bid for funding of EV chargers in council-owned car parks.
- Officers have also been in discussion with a number of charge point providers to discuss options for privately funding rapid and fast chargers at Council-owned sites, including Bracknell Sports Centre.
- BFC chaired a Berkshire-wide meeting to discuss a consistent approach to the provision of EV infrastructure.
- A dedicated EV page has been added to the Council web site to reflect the growing importance of EV charging infrastructure, and the supporting EV chapter from the

Sustainable Modes strategy is being updated (https://www.bracknell-forest.gov.uk/roads-parking-and-transport/travel-and-public-transport/electric-vehicles).

- 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.
- The Council is working towards implementing a Bus Services Improvement Plan (BSIP) by 31 October 2021. The BSIP will identify ways to improve services and grow patronage, setting targets for journey times, reliability, patronage and customer satisfaction which will be reviewed every six months.
- The Eco Rewards scheme is continuing with a successful launch of the scheme at Warfield Primary school. In Q3 30,000 miles of sustainable journeys were logged on the system, and 9 tonnes of CO2 saved (compared to taking these trips by car). There are plans to further extend the scheme to St Michael's, Uplands, and Harmans Water primaries, Kings Academy and Ranelagh and Brakenhale secondary schools.
- A series of short films promoting walking and cycling in the borough including green spaces and the existing cycle path network have been commissioned.
- A bid has been submitted to the Government's Capability Fund and if successful will deliver further measures to promote walking and cycling, and a workplace intervention to promote more sustainable commuting options.

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

Progress on the following measures has been slower than expected due to:

- Bracknell Forest Council is aware that the AQAP will need updating and will be looking to develop this further over the next few years, or alternatively revoke the AQMA's, once all the major highway improvement works have finished and the impacts on the AQ has been measured on Downshire Way.
- The Covid-19 pandemic has also suppressed traffic volumes, and may change traffic patterns making monitoring comparisons more difficult. Once we are confident that traffic levels have returned to a degree of normality, and have taken time to evaluate

the success of recent schemes and wider corridor improvements, we will then be able to plan for future interventions. There is no doubt that the level of reduction in traffic seen through 2020 and 2021 has led to an improvement in air quality, and the Council is actively working to capitalise on the changes that residents and commuters have made to their lifestyles through reducing their commutes, working more flexibly and travelling at different times of day, and is also encouraging more local travel to be undertaken by foot, bicycle, and potentially new electrically assisted modes such as e-bikes and e-scooters (which it should be noted can only be legally used on private land with the land-owner's permission, unless as part of a trial hire scheme in certain defined locations)

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

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to 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	2020	BFC	BFC	NO	Funded		Completed	Reduction in NO2 concentrations to below the objective in the AQMA 1	Reduce queues on approach roads and journey time	Work complete. 2018 monitoring showing improved movement through junction and improved queuing times	These 4 measures are part of the wider improvements of the A322/A329 corridor.. Monitoring undertaken before further capacity improvements on Downshire Way 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, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2015	2021	BFC	BFC	NO	Funded		Completed	Reduction in NO2 concentrations to below the objective in the AQMA 1	Reduce queues and journey time	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	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, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2015	2020	BFC	BFC	NO	Funded		Completed	Reduction in NO2 concentrations to below the objective in the AQMA 1	Reduce queues in peak time. Improvement in flow should reduce the stop/start of the traffic and reduce NOx	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	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 NOx emitted.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
4	Widening of Downshire Way from Horse and Groom roundabout to Twin Bridges	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2015	2020	BFC	BFC	NO	Funded		Completed	Reduction in NO2 concentrations to below the objective in the AQMA 1	Reduce queues and journey time	Work complete	As above. Funding secured through NPIF for Downshire Way dualling, with detailed design completed in September 2018 and construction during 2020. The scheme appears to have improved flow through the Twin Bridges and Horse and Groom junctions significantly, however detailed monitoring has been affected by C19 as traffic levels are suppressed
5	Capacity and safety improvements at junction with B3348 Dukes Ride and A321 Wokingham Rd	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2015	2018	BFC and WBC	BFC and WBC	NO	Funded		Completed	Reduction in NO2 concentrations to below the objective in the AQMA 1	Reduce queues in peak time	Work complete	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, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2017	2021	BFC	BFC	NO	Funded		Completed	Reduction in NO2 concentrations to below the objective in AQMA 2	Reduce queues and journey time	Concept designed and consultation ongoing	New concept design, consulting Parish Council. Scheme aims to improve the flow of traffic through the junction.
7	Crowthorne High Street improvements – speed cushions replacing flat top humps	Traffic Management	Other	2016	2016	BFC	BFC	NO	Funded		Completed	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	Reduce stop start traffic to reduce emissions	Work complete 2014 except for zebra crossing	This should reduce the stop/start of the traffic and help maintain an even speed through the high street thus reducing the Nox

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8	Improvements to bus waiting times at stops to aid flow of traffic and reduce queuing	Transport Planning and Infrastructure	Bus route improvements	2019	2021	BFC	BFC	NO	Funded		Completed	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Reduce queueing at bus stops and bus station to smooth flow. increase in number of people using buses	Bus station complete. All local buses now accept contactless payment	All local buses in Bracknell now accept payment by contactless bank card which has speeded up boarding timesImprovements 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	2016	2016	BFC	BFC	NO	Funded		Completed	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Increase cycling rate by making people more aware and cycle paths made safe and inviting.	Complete	Data from annual walking and cycling survey shows Cycling levels across the wider Borough have increased by 7% from 2019 to 2020
10	Delivery plan and provision of rear service yard to reduce number of delivery vehicles unloading in Crowthorne High Street	Freight and Delivery Management	Freight Partnerships for city centre deliveries	2015	2032	BFC	BFC	NO	Not Funded		Planning	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Reduce unloading and loading by 50% along section of High Street and smooth traffic flow	In progress. Council is working with shop owners to gain planning permission to use rear access.	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.

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11	Provision of real time information at key bus stops	Promoting Travel Alternatives	Other	2018	2018	BFC	BFC	NO				Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Increase in number of people using bus and rail	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 and via specific smartphone apps	We continue to 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 time in real time	Promoting Travel Alternatives	Other	2018	2018	BFC	BFC	NO	Funded		Completed	Reduction in background NO2, PM10 and PM2.5 concentrations	Increase in number of people using bus and rail	Work is complete and website now has links to real-time information from external sites	
13	Commissioning further work with Government funding into smart ticketing	Promoting Travel Alternatives	Other	2015	2015	BFC	BFC	NO			Completed	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Increase in number of people using bus and rail	Both Reading Buses and Courtney Buses now offer mobile ticketing	All Courtney Buses accept payment by contactless bank card

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
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	2015	2015	BFC	BFC	NO	Funded		Completed	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Increase in cycling and walking	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.	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	2015	2032	BFC	BFC	NO			Implementation	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Reduction in local car journeys	34 out of 35 schools have implemented a school travel plan.	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.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
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	2015	2015	BFC	BFC	NO	Funded			Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Reduce local car journeys	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. Secured funding from two major housing developments to provide bus services as part of travel plan for development. TRL developer (Legal & General) are funding alterations to a bus service which will allow access to Crowthorne station Residents will have an alternative form of transportation to the retail sector and other amenities other than their own vehicle	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 - Prioritising uptake of low emission vehicles	2015	2032	BFC	BFC	NO	Partially Funded		Implementation	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Reduce vehicle NOx and PM emissions	Contractor fleet min Euro 4 standard on recent contracts (e.g. refuse and highway)	Electric pool car and van now on fleet with monitoring ongoing. Reducing the amount of high emitting NOx vehicles

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
18	Consider introducing electric cars as pool cars	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2015	2032	BFC	BFC	NO	Partially Funded		Implementation	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Reduce vehicle NOx and PM emissions	Pool cars and van now on fleet	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.

$PM_{2.5}$ – 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 12.8 µg/m^3, 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/m^3 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

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.

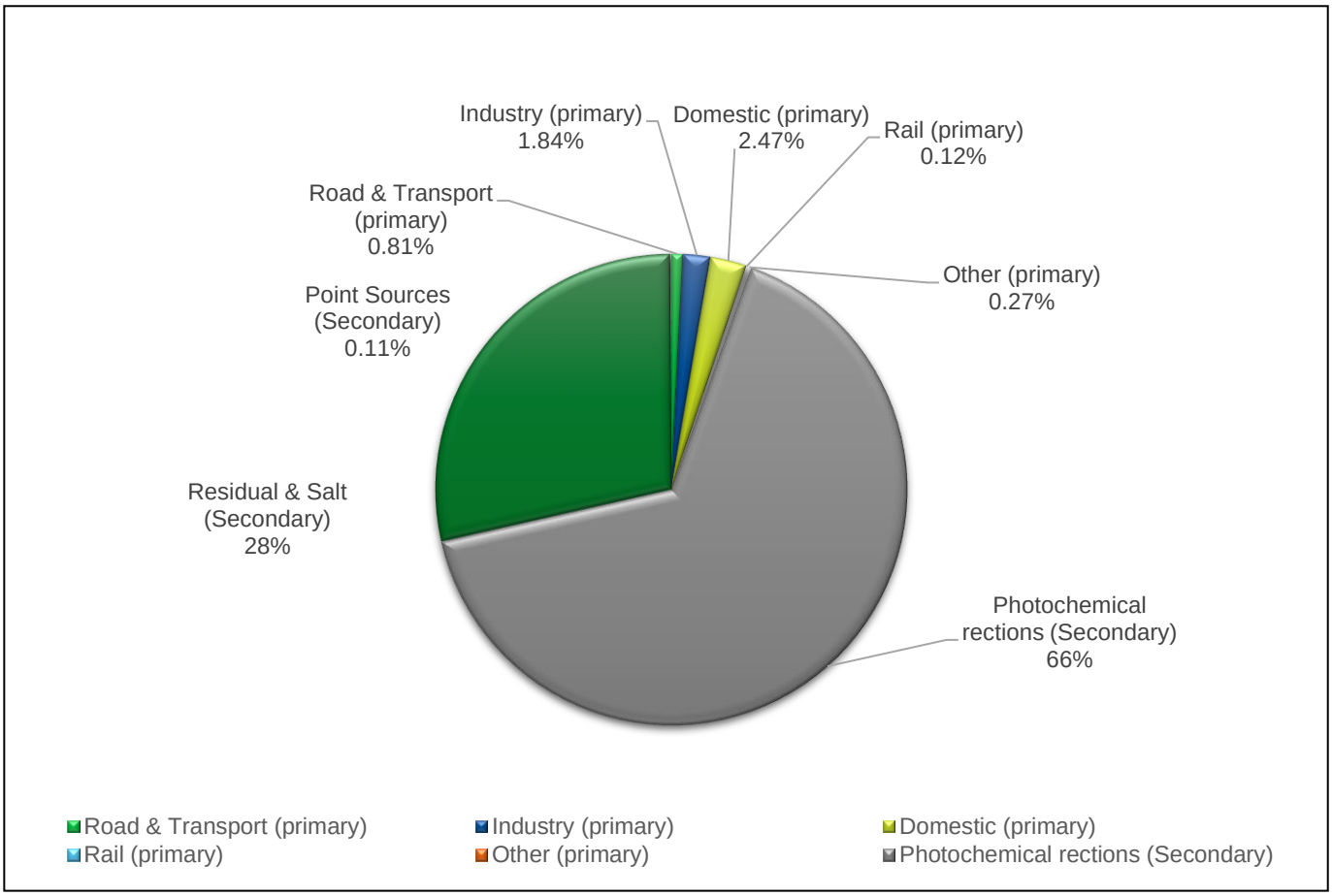


Table 2.4. A pie chart showing both the Primary and Secondary sources of $PM_{2.5}$ [4]

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

The Public Protection Partnership has been awarded a DEFRA Grant to measure into the $PM_{2.5}$ of the schools located near the AQMA, and to ascertained what mitigation measures can be taken to each specific site to help them achieve the National AQ Objectives.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

This section sets out the monitoring undertaken within 2020 by Bracknell Forest and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Bracknell Forest undertook automatic (continuous) monitoring at 1 site during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring site. NB DEFRA have stated that this Local authorities does 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 (diffusion tubes) 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 (i.e. passive) monitoring of NO_2 at 28 sites during 2020. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 33%), and distance correction. Further details on adjustments are provided in Appendix C.

3.1.3 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented 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 2020 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.2 - Trends in Annual Mean NO2 Concentrations in the Bracknell AQMA**

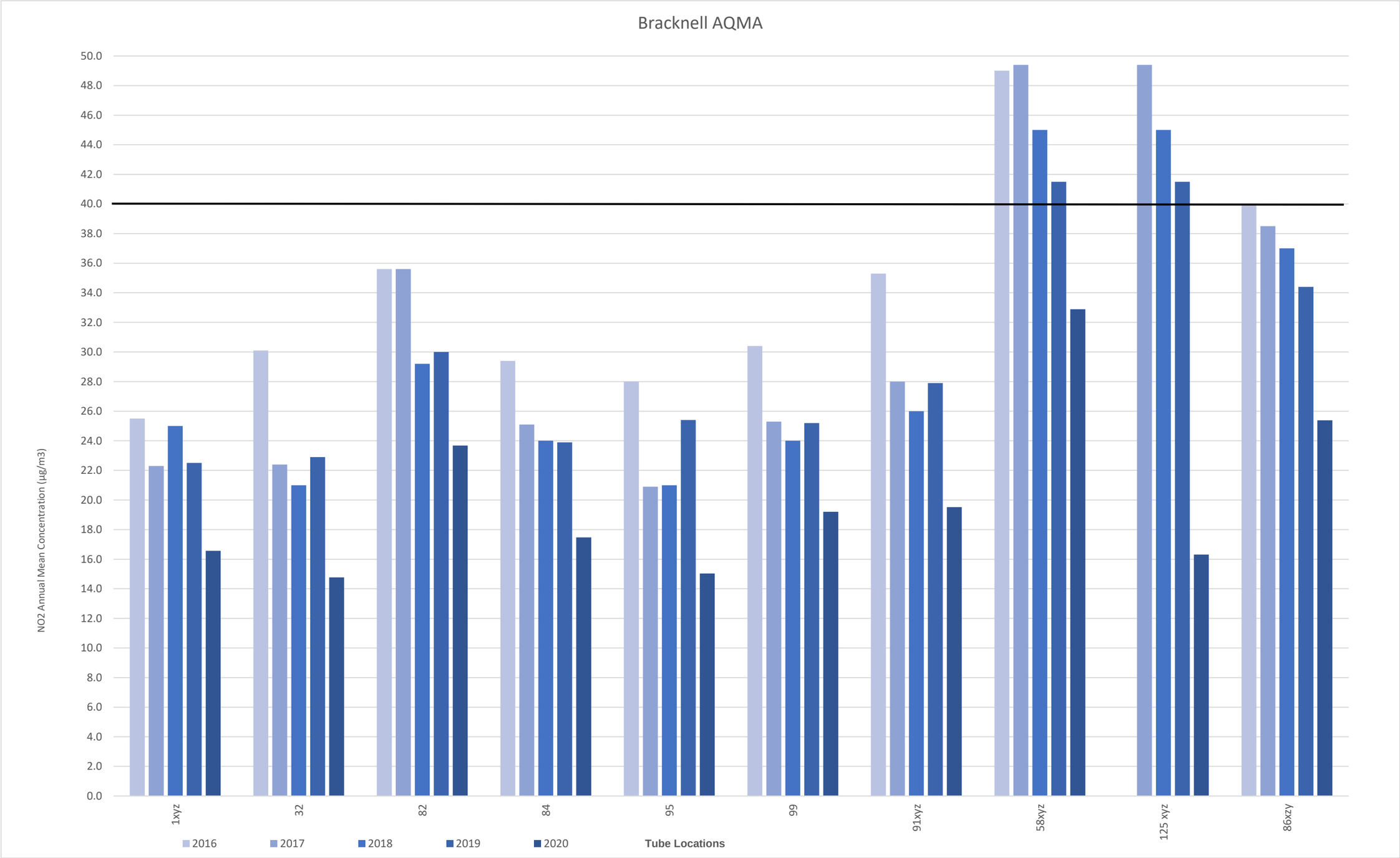


Figure **A.3 - Trends in Annual Mean NO2 Concentrations in the Crowthorne AQMA**

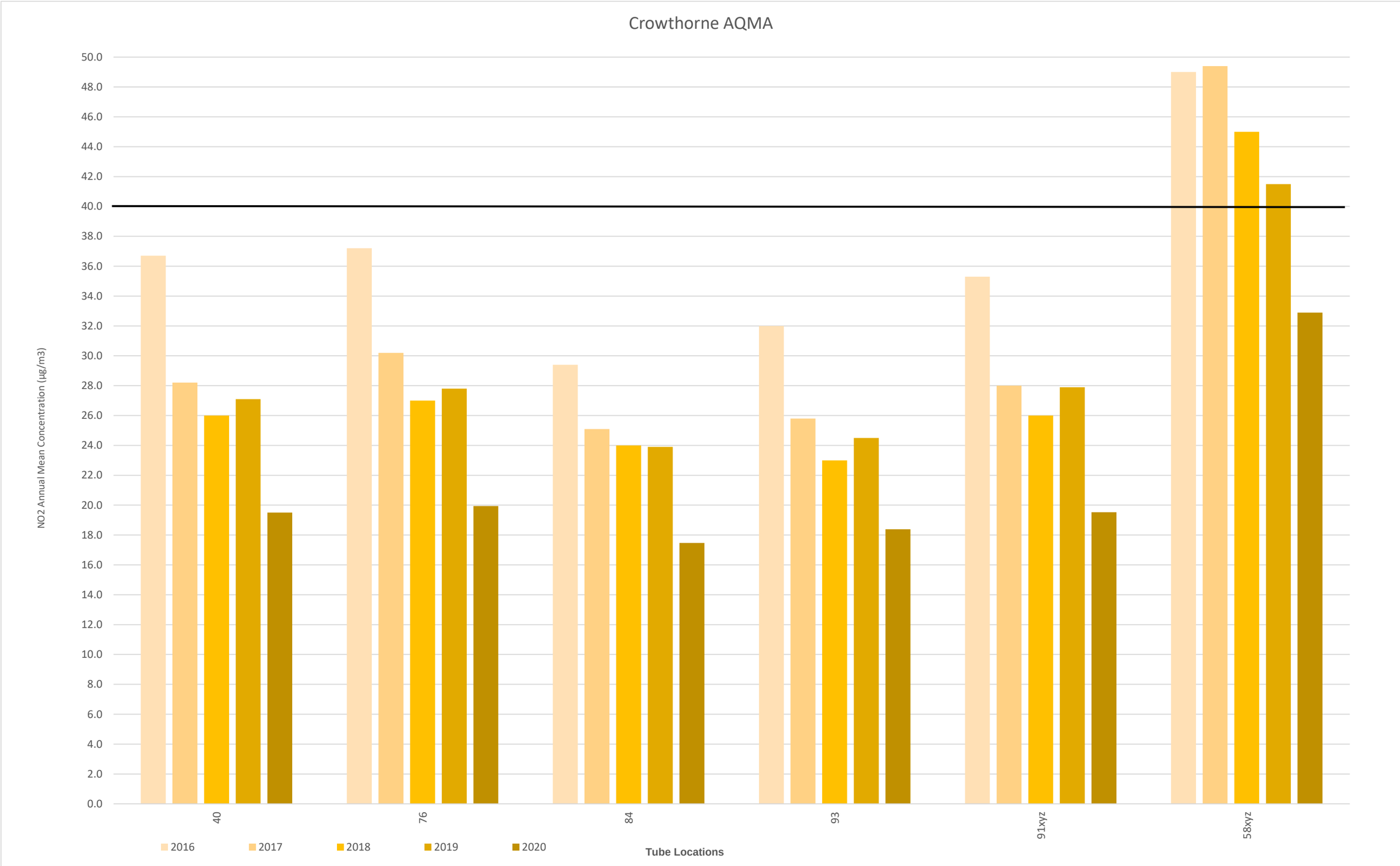


Figure A.4 - The Annual Average NO2 Data from the Continuous Monitoring in the Bracknell AQMA.

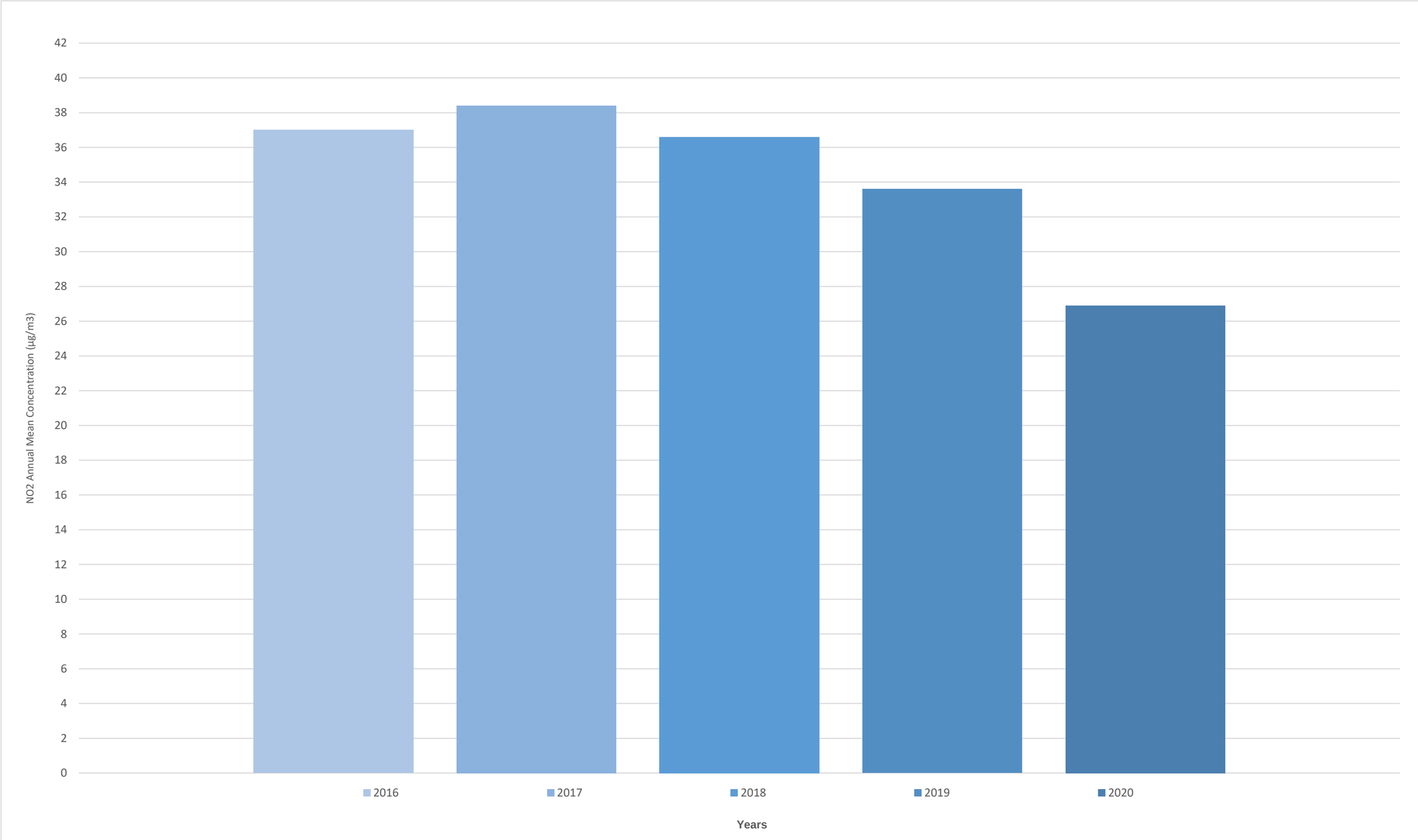


Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Continuous Monitoring Downshire Way Bracknell

The Annual Mean Objective at Downshire Way is below the Annual Mean Objective (40µg/m^3) at 26.9µg/m^3. This is a decrease compared to 2019. The co-location study result was slightly higher at 31.1µg/m^3 . There were no exceedances of the one hour objective (200µg/m^3 not to be exceeded more than 18 times a year), with the highest NO_2 level being 156.63µg/m^3 recorded on 24th Feburary 2020, bewteen 19.00-20.00 hours. There was a data capture of 99% during the 1st April to 31st December 2020, as the power supply was disconnected due to the Downshire Way road works, however as we were only able to obatain mointoring data from 9 months of the year October to December, the annual capture was 65.3%.

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

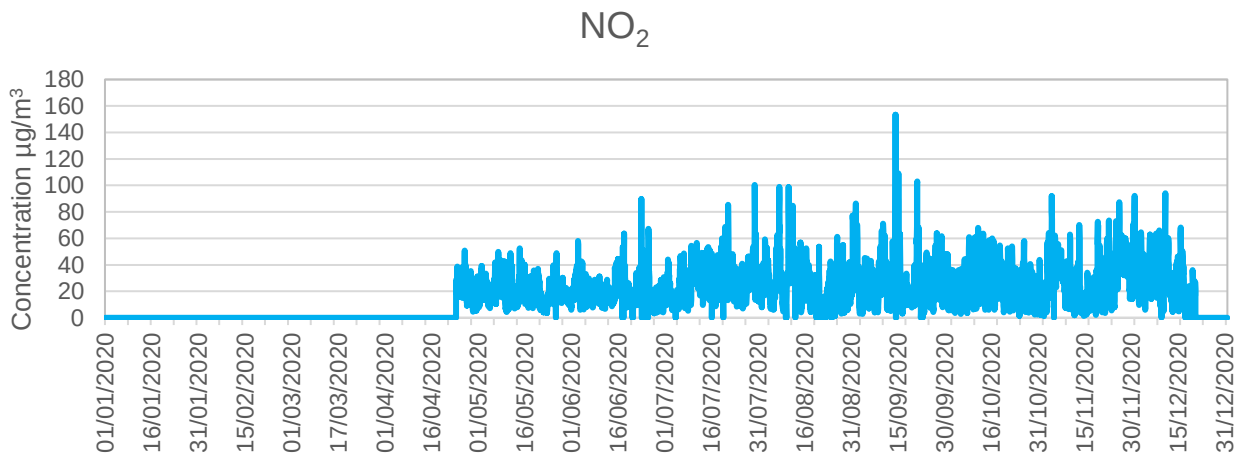


Figure 3.1 Downshire Way one hour Nitrogen Dioxide results

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 from 2017 to 2020, and have all been below the objective level, however due to COVID the

levels have been reduced considerabley this year. Discounting this year (2020) should this decrease 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. The true impact of the NO_2 from the road change will not been seen until the 2022/2023 results.

In Bracknell, due to the technical issues (electrical power cut off on site during the roadworks), data only available from April to December and general trend is similar. However, in October the was substantial difference between data (a dip in automatic method and rise in DTs). However, the DTs trend was backed up by AURNs in Reading, Swindon and Oxford and the trend, collected by automatic method with 100% data capture, supported by AURN in Chilbolton Observatory.

Diffusion Tube NO2 data for diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B, which in not distance correction (as not over 37.0µg/m3) where the NO2 level is above 32.9µg/m3 to nearest exposure/receptor.

There were no levels where the annual mean was greater than 60µg/m^3, which indicates that the 1-hour mean objective is also likely to be met at these sites.

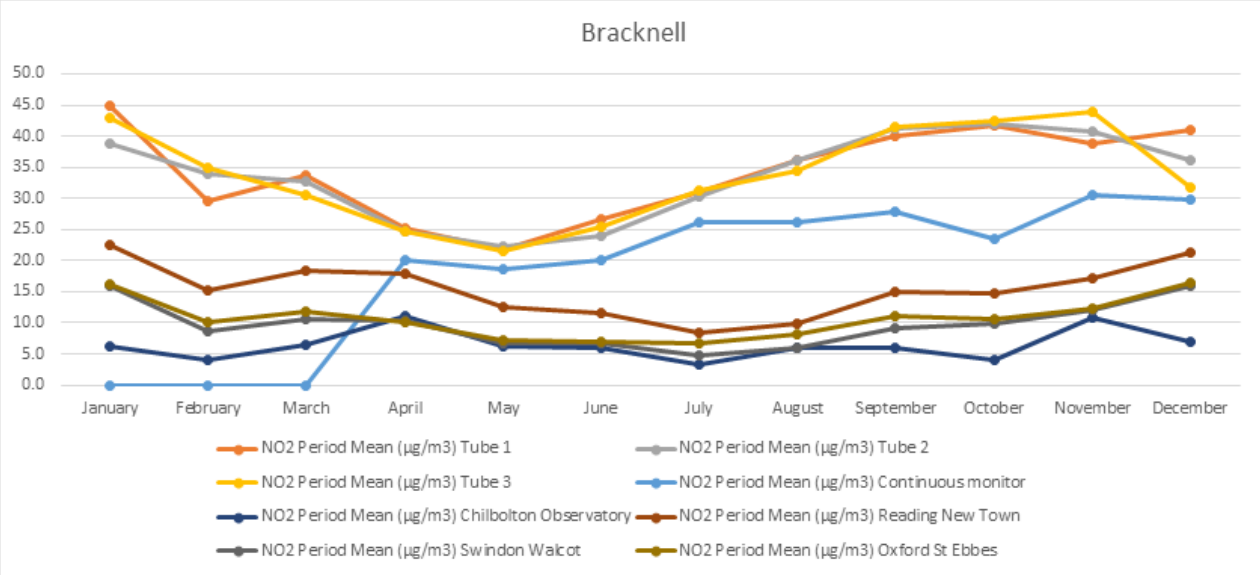


Figure 3.2 - Comparison Data

There were 28 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

135, 130, 132, 133 & 134). These have been places on new location where offices have had permission to be converted into flats, and in areas which we have seen an increase in local traffic such as near the Brants Bridge None Emergency NHS Centre.

1 monitoring site was decommissioned in 2019 (108), as this was on the Kelvin Gate residential development and showed low yearly readings of NO_2 for the past 5 years, however as this residential development is surrounded by roads the North side of the building (next to the traffic lights) is now being monitored (134). 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.

3.1.4 Bracknell AQMA

There were no sites within the Bracknell AQMA (Map D.6) which have exceeded the Annual Mean Objective (40µg/m^3). The co-location study at site ID 86 Downshire Way automatic monitor was below the objective level for the fith year and the result of 25.5µg/m^3 is slightly higher than the automatic level result of 26.9µg/m^3. All of the sites within AQMA reduced compared to the 2019 levels, due to the reduced of traffic as as result from the pandemic.

No changes are required to the AQMA, and we will continue to measure the area as the road layout has been changed. If this has been sucessful then we could be looking to revoke the AQMA, once we have 2/3 year pandemic free data to support this.

3.1.5 Crowthorne AQMA

For all 5 sites within the AQMA (Map D.9) there no exceedances of the annual objective (40.0 µg/m^3) however all of the sites within this AQMA have continued to reduce since 2016; obviously this year is in relation to the reduction of travel due during the pandemic.

No changes are required to the AQMA, and we will continue to measure the area as the area is continually changing and being developed. If the AQ contiues on a downward trend then we could be looking to revoke the AQMA, once we have 2/3 year pandemic free data to support this.

Outside of the AQMAs

For all 17 sites outside of the AQMA there were no exceedances of the annual objective (40µg/m^3). Which is not surprising due to the decrease in traffic by approximate 23% in the borough, in 2020 compared to that of 2019.

There were no levels where the annual mean was greater than 60µg/m^3, which indicates that an exceedance of the 1-hour mean objective is also unlikely at these sites.

3.1.6 Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

3.1.7 PM_{10} annual mean

The annual mean annualiased concentration was well below the objective at the monitoring site. The level at the roadside Downshire Way was 18.35µg/m^3, as during the first 3 months of the year the road was closed, and then this year we had less vehicles using the roads due to the Pandemic and national lockdowns. The concentration has reduced, due to less journeys made, however there has generally been a decrease in levels reported in previous years and have these declined slightly in the last 5 years. The data capture recorded was 64.9%. 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 finsihed in 2020 and is on the section immediately adjacent to the conitinuous monitor.

3.1.8 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ is the pollutant which has the biggest impact on public health and on which the Public Health Outcomes Framework (PHOF) indicator is based. However it is not currently covered by the LAQM regulations.

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 PM_{10} 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.5 you will find the method to estimate the local concentration of 12.8 µg/m^3, which is slightly higher than the recommend WHO (World Health Orgainisation) based guideline recommendation of an Annual Mean of 10 µg/m^3 9 https://apps.who.int/iris/bitstream/handle/10665/69477/WHO_SDE_PHE_OEH_06.02_eng.pdf?sequence=1).

3.1.9 Sulphur Dioxide (SO_2)

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? Which 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 Bracknell	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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
1xyz	Rectory Close lampost	Kerbside	487140	168407	NO2	Bracknell	6.5	1.4	No	1.7
32	8 Old Bracknell Close	Suburban	484054	163858	NO2	Bracknell	0.0	30.0	No	1.7
40	229 Crowthorne High Street	Kerbside	484188	164178	NO2	Crowthorne	0.0	3.0	No	1.6
76	2 Dukes Ride	Kerbside	484176	164159	NO2	Crowthorne	2.0	1.5	No	2.0
82	19 Boxford Ridge	Suburban	487626	169316	NO2	Bracknell	0.0	14.0	No	1.9
84	24/26 Dukes Ride (Playhouse)	Kerbside	484498	169700	NO2	Crowthorne	8.0	1.5	No	1.8
93	The Prince Alfred PH, 2 High Street	Roadside	488388	166666	NO2	Crowthorne	0.0	4.0	No	1.8
95	3 Leverkusen Road	Suburban	484686	161359	NO2	Bracknell	0.0	24.0	No	1.7
99	16 Firlands	Roadside	487140	168407	NO2	Bracknell	0.0	10.0	No	1.6
115	Blenheim Avenue (Rear 31 Hampden Cres)	Suburban	484188	164178	NO2	no	2.5	3.0	No	1.0
117	Blue Smoke House, The Ring	Kerbside	486751	168661	NO2	no	2.0	0.3	No	1.8
120	1-96 Platform (Station)	Kerbside	487140	168407	NO2	no	10.0	1.5	No	2.2
122	#1Meadowsweet Lane	Roadside	486569	168824	NO2	no	0.0	6.6	No	1.9
123	New Forest rRide 40 sign (27 Wards stone park)	Roadside	484054	163858	NO2	no	0.0	2.2	No	1.8
124	#229 Yorktown Road	Roadside	484188	164178	NO2	no	0.0	1.7	No	2.3
126	Byron Drive, crowthorne	Roadside	484123	164189	NO2	no	6.0	1.5	No	3.0
127	opp. #7 Old Wokingham Road (cycle sign)	Roadside	484138	164075	NO2	no	27.5	2.4	No	1.5
128	#10 Lucas Place (along footpath adjacent house 2nd lampost)	Kerbside	486501	168850	NO2	no	2.0	35.0	No	2.0
129	Spring Cottage, Rectory Close (lampost#3)	Kerbside	484352	164249	NO2	no	7.0	1.4	No	2.5
130	Stet House, Albert Road, RG42 2AB	Kerbside	486802	169617	NO2	no	0.0	13.8	No	2.0
132	2a Ralphs Ride	Roadside	488143	168901	NO2	no	3.0	0.5	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
133	Newlands Place (on london road)	Kerbside	487538	169281	NO2	no	0.0	10.0	No	2.0
134	Kelvin Gate (down pipe opp avis)	Kerbside	487487	169434	NO2	no	0.0	8.0	No	2.1
135	Woodleigh, Bracknell Road, Crowthorne, RG45 6SX	Kerbside	484289	164233	NO2	no	10.0	17.0	No	2.5
91xyz	The Mount, Bracknell Road	Roadside	486883	168992	NO2	Crowthorne	0.0	6.5	No	2.0
58xyz	FirMount (Pine View), Bracknell Road	Kerbside	484138	164075	NO2	Crowthorne	0.0	1.3	No	2.0
125 xyz	69 Oak Tree Cottage, Sandhurst Road	Roadside	484138	164075	NO2	no			No	2.0
86xzy	Downshire Way, Bracknell	Roadside	487265	168537	NO2	Bracknell	0.0	6.0	Yes	3.5

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 NO_2 Monitoring Results: Automatic Monitoring (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM3 Downshire Way	486501	168850	Roadside	100	65.3	37	38.4	36.6	33.6	26.9

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16.**

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

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the NO_2 annual mean objective of 40µg/m³ are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

(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%).

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
1xyz	487140	168407	Kerbside	100	100.0	25.5	22.3	25.0	22.5	16.6
32	484054	163858	Suburban	100	100.0	30.1	22.4	21.0	22.9	14.8
40	484188	164178	Kerbside	100	92.9	36.7	28.2	26.0	27.1	19.5
76	484176	164159	Kerbside	100	100.0	37.2	30.2	27.0	27.8	19.9
82	487626	169316	Suburban	100	82.7	35.6	35.6	29.2	30.0	23.7
84	484498	169700	Kerbside	100	75.5	29.4	25.1	24.0	23.9	17.5
93	488388	166666	Roadside	100	100.0	32.0	25.8	23.0	24.5	18.4
95	484686	161359	Suburban	100	92.3	28.0	20.9	21.0	25.4	15.0
99	487140	168407	Roadside	100	80.8	30.4	25.3	24.0	25.2	19.2
115	484188	164178	Suburban	100	92.3		22.5	23.0	22.7	16.9
117	486751	168661	Kerbside	100	83.0		23.2	23.0	24.1	17.4
120	487140	168407	Kerbside	100	75.0		25.0	26.0	27.3	15.9
122	486569	168824	Roadside	100	92.3			19.0	22.0	15.7
123	484054	163858	Roadside	100	92.9			33.0	35.2	24.5
124	484188	164178	Roadside	100	100.0			31.0	28.3	26.6
126	484123	164189	Roadside	100	84.6				23.4	12.9
127	484138	164075	Roadside	100	100.0				22.4	14.3
128	486501	168850	Kerbside	100	90.7				18.4	15.3
129	484352	164249	Kerbside	100	100.0				20.4	13.2
130	486802	169617	Kerbside	100	84.6					18.8
132	488143	168901	Roadside	100	90.4					17.6
133	487538	169281	Kerbside	100	92.9					15.9

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
134	487487	169434	Kerbside	100	100.0					19.2
135	484289	164233	Kerbside	100	84.6					13.6
91xyz	486883	168992	Roadside	100	92.3	35.3	28.0	26.0	27.9	19.5
58xyz	484138	164075	Kerbside	100	100.0	**49.0**	**49.4**	**45.0**	**41.5**	32.9
125 xyz	484138	164075	Roadside	100	82.7	**n\a**	**49.4**	**45.0**	**41.5**	16.3
86xzy	487265	168537	Roadside	100	100.0	39.9	38.5	37.0	34.4	25.4

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16**

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

☒ **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 correction (**

Notes:

The annual mean concentrations are presented as µg/m^3.

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

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

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

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

(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%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

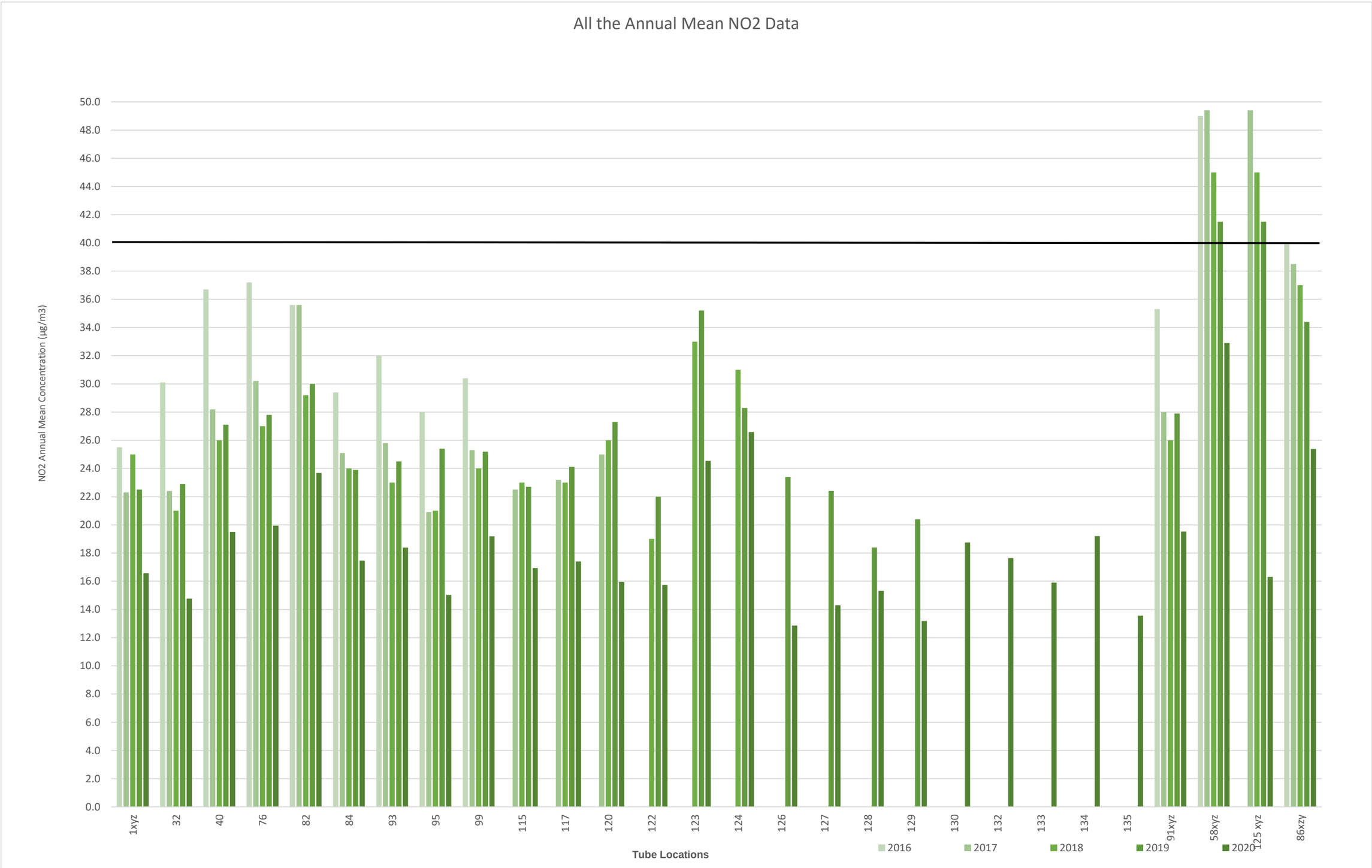


Figure A.2 - Trends in Annual Mean NO_2 Concentrations in the Bracknell AQMA

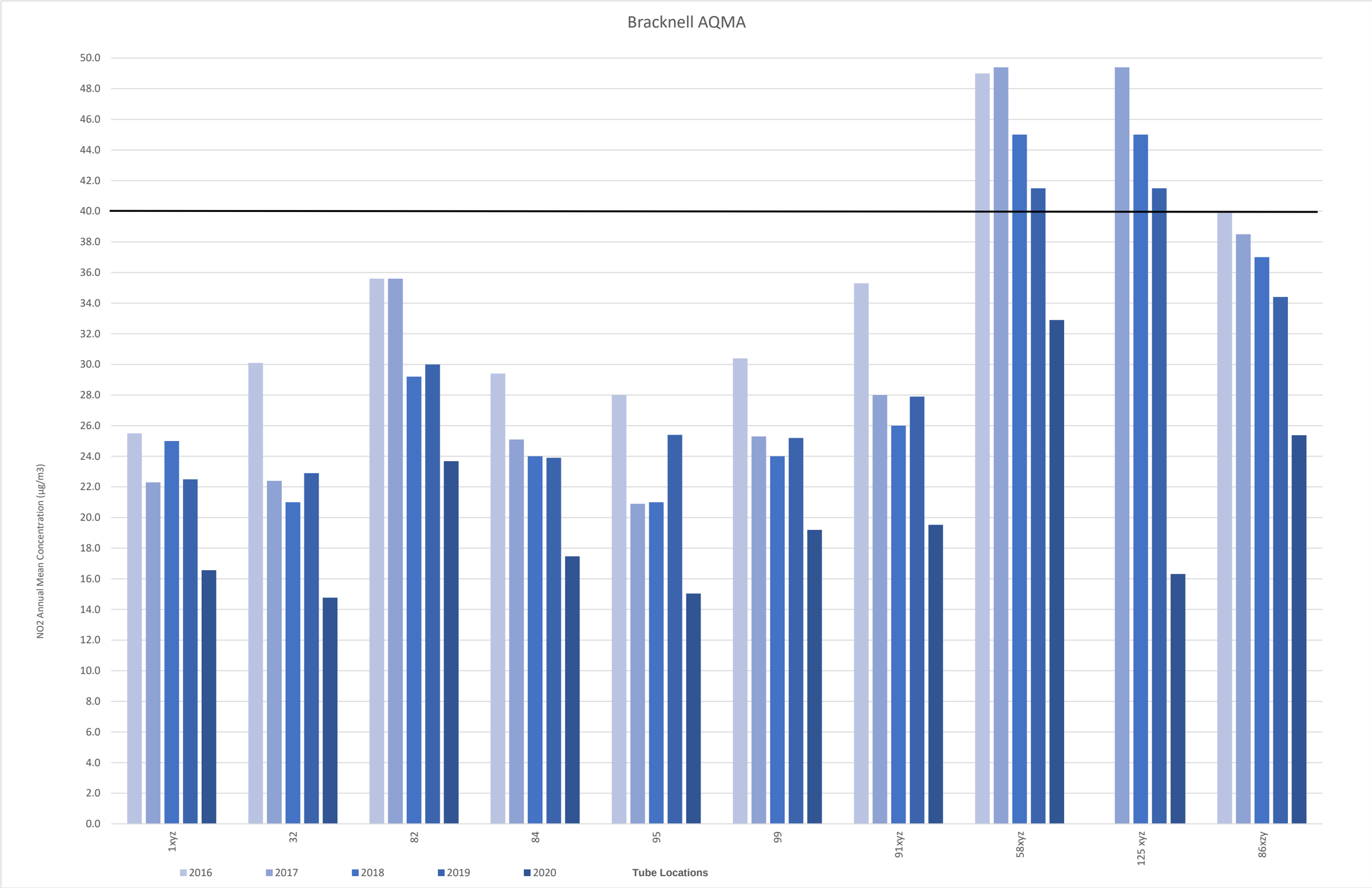


Figure A.3 - Trends in Annual Mean NO_2 Concentrations in the Crowthorne AQMA

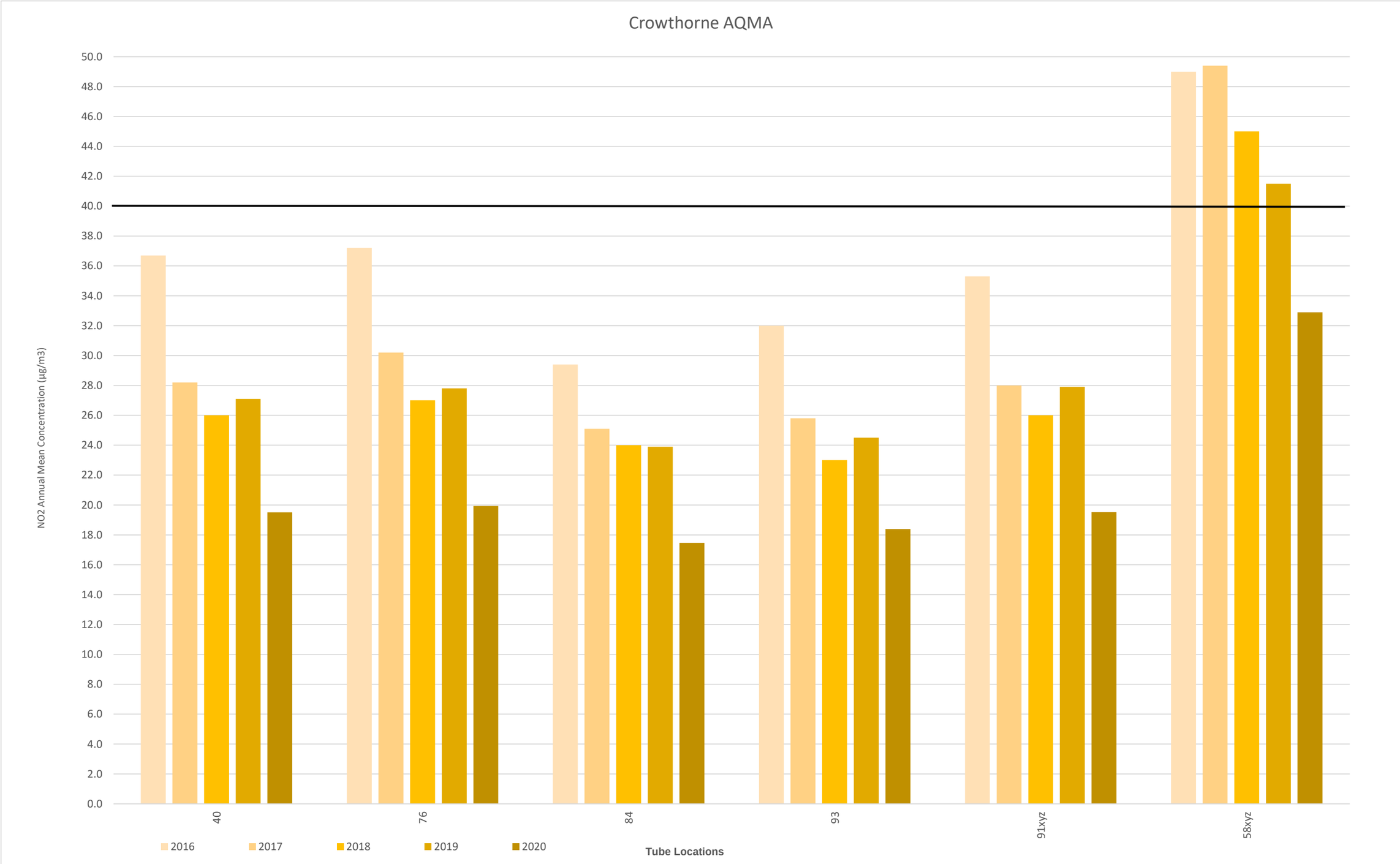


Figure A.4 - The Annual Average NO2 Data from the Continuous Monitoring in the Bracknell AQMA.

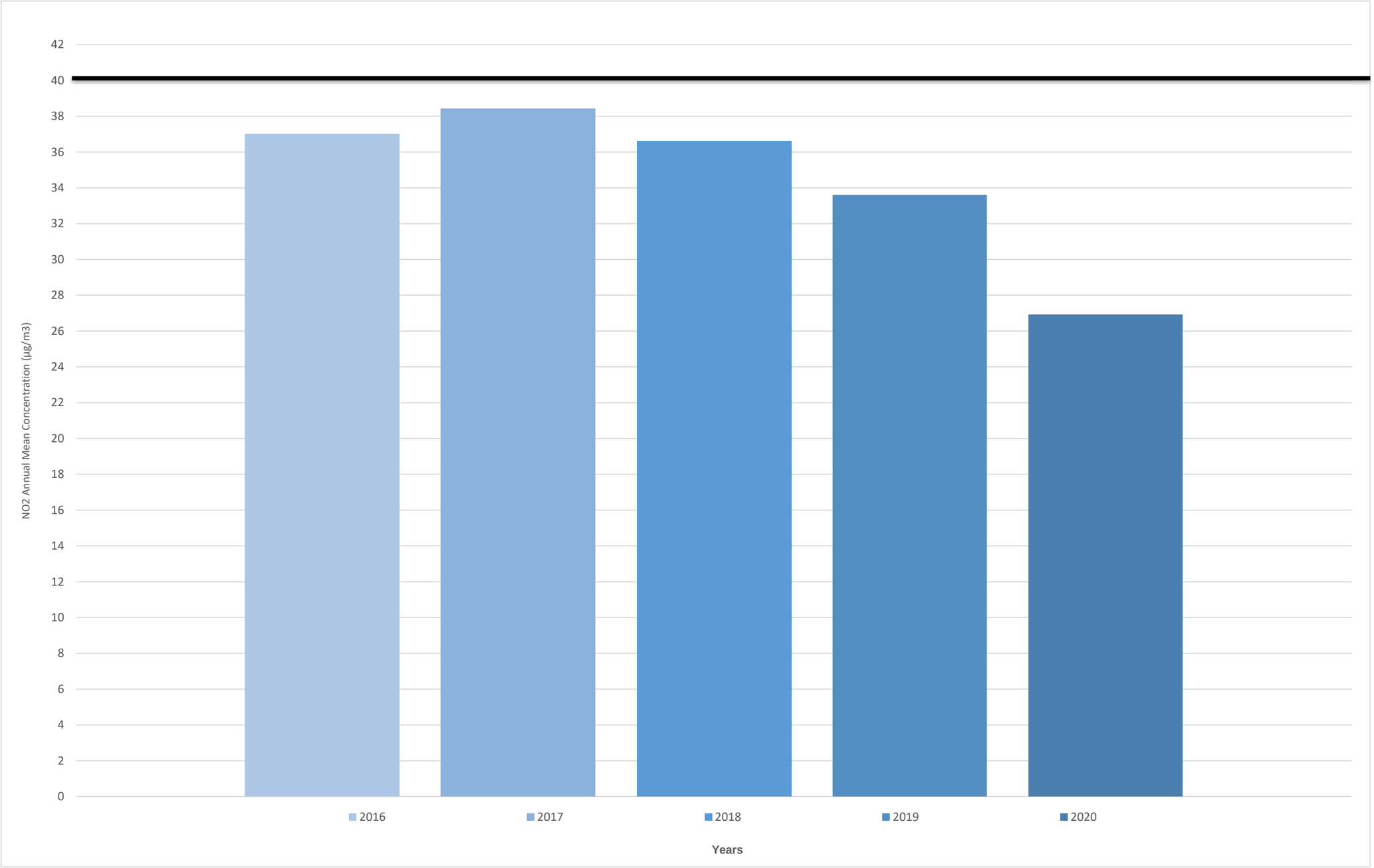


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM3 Downshire Way	486501	168850	Roadside	100	65.3	0	2	4	**0 (127.07)**	**0 (127.07)**

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m³ have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

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

(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%).

Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM3 Downshire Way	486501	168850	Roadside	100	64.9	**20**	**19.8**	**19**	**17.18**	**18.35**

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16**

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the PM_{10} annual mean objective of 40µg/m³ are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(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%).

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

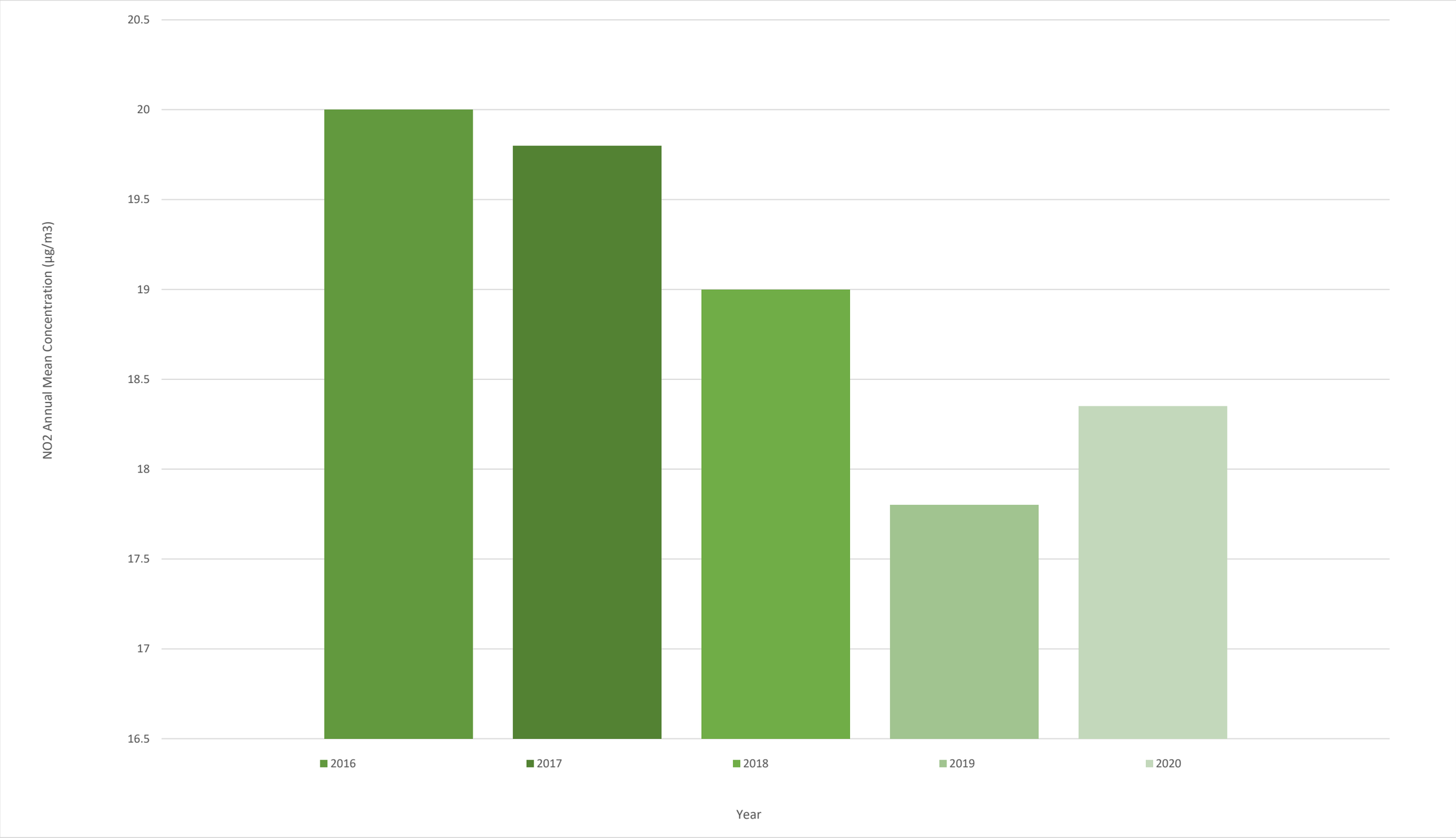


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM3 Downshire Way	486501	168850	Roadside	100	64.9	8	3	1	**6 (35.64)**	**0 (127.07)**

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

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

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

(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%).

Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure
1xyz	487140	168407	24.3	16.3	21.3	17.9	17.4	16.3	15.3	21.2	24.2	16.3	29.5	25.4	20.5	16.6	
32	484054	163858	27.7	21.1	20.2	16.0	11.6	15.0	15.5	18.8	20.7	20.8	7.9	23.6	18.2	14.8	
40	484188	164178	26.4	23.8	24.5		19.6	21.1	14.7	23.6	24.2	26.0	29.3	31.7	24.1	19.5	
76	484176	164159	29.0	27.0	25.0	18.9	17.5	20.4	16.7	23.7	26.3	27.9	33.9	29.0	24.6	19.9	
82	487626	169316	30.3	32.2	26.7	17.5	16.2		29.9	34.8	37.0	33.5	34.2		29.2	23.7	
84	484498	169700	27.4	23.2	21.8		15.3	17.4	13.7			21.7	28.6	24.9	21.6	17.5	
93	488388	166666	31.2	21.7	20.8	16.0	34.3	16.1	15.5	18.0	23.3	22.6	29.1	23.8	22.7	18.4	
95	484686	161359		18.5	19.5	15.3	11.0	12.9	12.6	20.1	19.5	20.1	29.8	24.8	18.6	15.0	
99	487140	168407	38.1	28.6	22.7	14.9	13.9	17.5	19.4	22.7	27.7		31.4		23.7	19.2	
115	484188	164178	29.5	22.3	21.2	15.8	12.4	14.9	17.5	20.0		24.4	28.8	23.5	20.9	16.9	
117	486751	168661	23.0	21.0	19.9	15.6		23.3		18.9	20.8	22.2	26.5	23.7	21.5	17.4	
120	487140	168407		23.5	20.8	19.7	14.8	14.0	12.0	20.9	21.9			29.6	19.7	15.9	
122	486569	168824	23.6		19.4	16.8	15.0	14.3	13.3	17.1	20.7	21.0	29.6	22.8	19.4	15.7	
123	484054	163858	31.7	35.5	29.3		22.0	29.1	24.7	31.8	30.0	32.9	36.6	29.5	30.3	24.5	
124	484188	164178	37.1	40.6	32.9	24.9	25.5	27.0	25.5	33.0	38.5	36.3	38.2	34.4	32.8	26.6	
126	484123	164189	20.9	15.1	15.7	14.2	10.0			12.9	16.4	13.9	23.6	16.0	15.9	12.9	
127	484138	164075	22.0	17.0	17.2	16.2	12.5	14.8	11.0	16.8	19.5	16.0	25.6	23.2	17.7	14.3	
128	486501	168850	22.7	17.7	21.3	20.4		14.5	13.4	18.5	20.3	17.1	24.6	17.6	18.9	15.3	
129	484352	164249	19.0	13.5	16.5	16.5	12.2	11.6	9.5	14.3	17.9	21.5	23.2	19.6	16.3	13.2	
130	486802	169617	32.5	30.4	22.6	16.2	15.3		16.7	22.7	24.7	26.2		24.2	23.2	18.8	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.81)	Annual Mean: Distance Corrected to Nearest Exposure
132	488143	168901	24.6	23.2	23.2	19.3	16.3	18.0	16.0	22.2	24.9		26.9	25.0	21.8	17.6	
133	487538	169281	26.7	22.0	18.8		12.4	14.6	14.2	18.7	21.1	21.4	27.3	18.7	19.6	15.9	
134	487487	169434	31.8	31.0	23.9	17.9	15.1	17.6	16.0	20.0	23.9	28.7	32.2	26.4	23.7	19.2	
135	484289	164233			16.3	15.4	11.7	15.1	10.7	15.8	18.2	17.0	26.1	21.2	16.8	13.6	
91xyz	486883	168992	29.1	21.6	22.4	18.6	17.5		19.2	24.2	27.4	26.5	32.5	26.1	24.1	19.5	
58xyz	484138	164075	46.9	48.1	38.2	27.8	33.4	37.2	35.0	37.4	47.8	46.5	45.4	43.6	40.6	32.9	
125 xyz	484138	164075	28.4	22.3	18.8	16.4	14.9	15.5	15.6	21.6	22.5			25.4	20.1	16.3	
86xzy	487265	168537	42.0	33.0	32.0	25.0	22.0	25.0	21.0	36.0	21.0	42.0	41.0	36.0	31.3	25.4	

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1**

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16**

☒ **National bias adjustment factor used**

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

☒ **Bracknell Forest confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Bracknell Forest During 2020

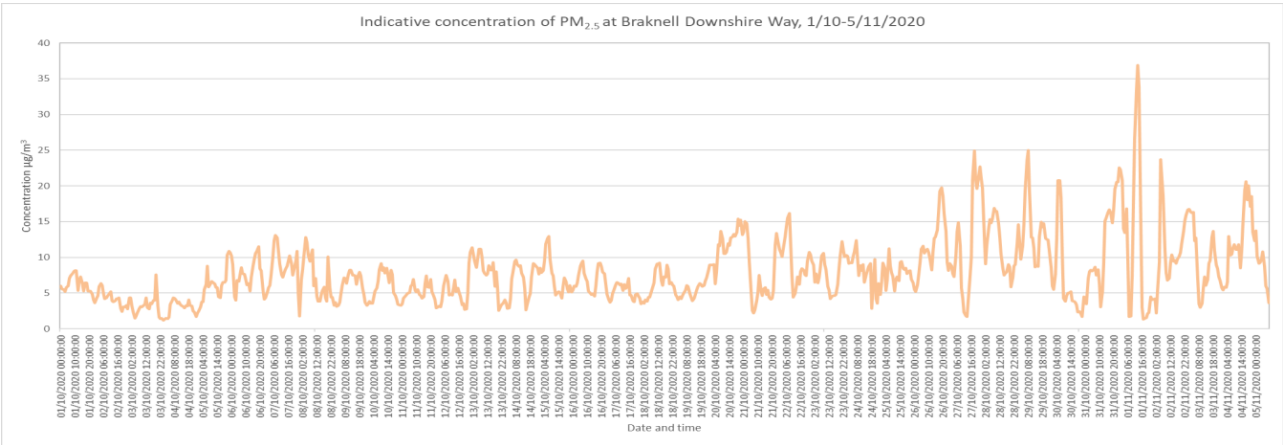
Bracknell Forest has not identified any new sources relating to air quality within the reporting year of 2020.

Additional Air Quality Works Undertaken by Bracknell Forest During 2020

TRL $PM_{2.5}$ Monitoring

During the 1st October 2020 to 5th November 2020 installed indicative monitoring devices to measure $PM_{2.5}$. The MCERTS certified Osiris instrument was located next to the Continuous monitor on the Downshire Way (Figure C.1). The instrument employs a light scattering measuring technique and provide continuous and simultaneous, indicative concentrations of the airbourne particulate matter. The air is continuously passed through a nephelometer, where a laser beam analyses individual particles and finally collects them on the reference filter. The period average for the Downshire Way was 7.95 µg/m^3, and had no exceedances of the 24-hour mean. The WHO advised limited of 10 µg/m^3 for an annual mean and 25 µg/m^3 as a 24-hour mean.

Figure C.1 – The Indicative concentration of $PM_{2.5}$ at the Downshire Way



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 NO_2 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 environmental
(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 2020

Methods: GLM 7 – CARY 60 Spectrophotometer

AIR PT Proficiency Scheme - Nitrogen Dioxide 2020					
Date	Round	Assigned value	Procedure GLM 7		
			Measured concentration	z-Score	% Bias
Feb-20	AIR PT 36-1	2.06	2.15	0.58	4.4%
Feb-20	AIR PT 36-2	2.06	2.03	-0.19	-1.5%
Feb-20	AIR PT 36-3	1.26	1.26	0	0.0%
Feb-20	AIR PT 36-4	1.21	0.98	-2.43	-19.0%
May-20	AIR PT 31-1	Proficiency scheme not available			
May-20	AIR PT 31-2				
May-20	AIR PT 31-3				
May-20	AIR PT 31-4				
Aug-20	AIR PT 33-1	Proficiency scheme not available			
Aug-20	AIR PT 33-2				
Aug-20	AIR PT 33-3				
Aug-20	AIR PT 33-4				
Oct-20	AIR PT 34-1	2.38	1.99	-2.08	-16.4%
Oct-20	AIR PT 34-2	2.28	1.93	-1.90	-15.4%
Oct-20	AIR PT 34-3	0.87	0.87	0	0.0%
Oct-20	AIR PT 34-4	0.88	0.88	0.08	0.0%

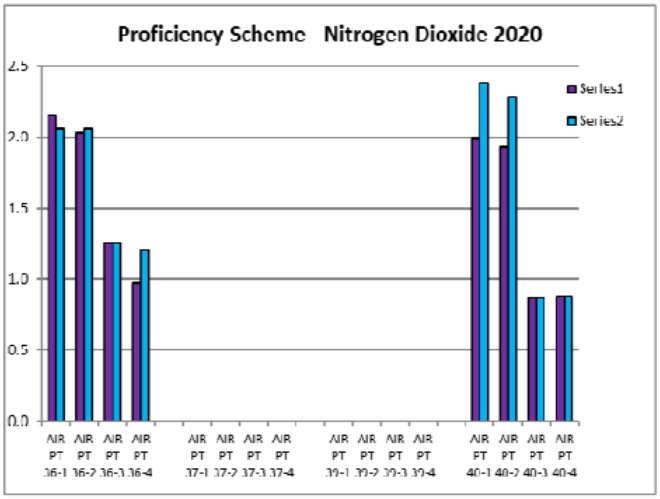


Figure C.2 - AIR PT Nitrogen Dioxide Proficiency Scheme Results 2020

Sep-20

	Analysed	Prepared	%Bias
1	2.78	2.67	4.1
2	1.43	1.38	3.1
3	2.71	2.67	1.7
4	0.57	0.55	4.3
5	1.43	1.38	3.1
6	0.57	0.55	4.1
7	2.75	2.67	3.1
8	1.43	1.38	3.1
9	0.57	0.55	4.3
10	0.56	0.55	2.3
			Average %bias
	RSD 0.55	0.95	3.33
	RSD 1.38	0.04	
	RSD 2.67	1.15	

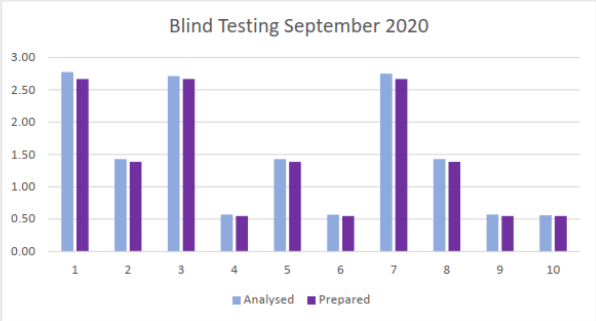


Figure C.2 - AIR PT Nitrogen Dioxide Proficiency Scheme Results 2020

Gradko's performance for AIR PT 36 (Feb-20) = -4.025 (average) and AIR PT 34 (Oct-20) = -7.95 (average), which relates GOOD and ACCEPTABLE performance.

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 Figure C.2).

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.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Bracknell Forest recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 33% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor

based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Bracknell Forest have applied a national bias adjustment factor of 0.81 to the 2020 monitoring data. A summary of bias adjustment factors used by Bracknell Forest over the past five years is presented in Table C.1.

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

The national study of bias adjustment factors spreadsheet (ref. 03/21 update) suggested a bias adjustment factor of **0.81** be applied.

Due to roadworks in Bracknell town centre, when electricity supply to the chemiluminescent analyser was disconnected from early September 2019 until late April 2020, data became limited, i.e. less than required 90%. Therefore, for the purposes of the ASR 2020, the National bias adjustment factor of 0.81 was used (Table C.2).

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.93
2019	National	09/20	0.84
2018	Local	06/19	0.82
2017	Local	09/18	0.85
2016	Local	06/17	0.91

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO_2 monitoring locations within Bracknell Forest required distance correction during 2020.

Table C.2 – Precision and Accuracy of Triplicate Tubes

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

	Diffusion Tubes Measurements									Automatic Method		Data Quality Check	
	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	07/01/2020	04/02/2020	44.8	38.9	43.0	42	3.1	7	7.6		0	Good	Poor Data Capture
2	04/02/2020	03/03/2020	29.6	33.9	34.8	33	2.8	8	6.9		0	Good	Poor Data Capture
3	03/03/2020	03/04/2020	33.6	32.7	30.6	32	1.5	5	3.8		0	Good	Poor Data Capture
4	03/04/2020	29/04/2020	25.3	24.8	24.6	25	0.4	1	0.9	22.4	34.4	Good	Poor Data Capture
5	29/04/2020	02/06/2020	21.9	22.4	21.6	22	0.4	2	0.9	18.5	99.9	Good	Good
6	02/06/2020	30/06/2020	26.5	23.9	25.4	25	1.3	5	3.3	20.3	98	Good	Good
7	30/06/2020	28/07/2020	31.0	30.2	31.3	31	0.6	2	1.4	25.8	99.5	Good	Good
8	28/07/2020	01/09/2020	36.0	36.2	34.3	36	1.0	3	2.6	25.7	98.2	Good	Good
9	01/09/2020	29/09/2020	40.0	41.2	41.6	41	0.8	2	2.1	28.5	99.3	Good	Good
10	29/09/2020	03/11/2020	41.8	41.9	42.4	42	0.3	1	0.8	23.3	100	Good	Good
11	03/11/2020	01/12/2020	38.9	40.7	43.8	41	2.5	6	6.3	29.7	99.9	Good	Good
12	01/12/2020	05/01/2021	40.9	36.2	31.8	36	4.5	12	11.3	30.0	63.7	Good	Poor Data Capture
13													

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

Overall survey --> Good precision | Poor Overall DC

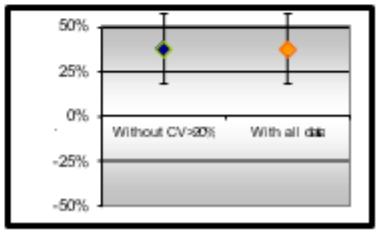
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

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

Accuracy (with 95% confidence interva
without periods with CV larger than 20%
Bias calculated using 7 periods of data
Bias factor A 0.72 (0.63 - 0.84)
Bias B 38% (19% - 58%)
Diffusion Tubes Mean: 34 μgm^{-3}
Mean CV Precision: 3
Automatic Mean: 25 μgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 24 (21 - 29) μgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 7 periods of data
Bias factor A 0.72 (0.63 - 0.84)
Bias B 38% (19% - 58%)
Diffusion Tubes Mean: 34 μgm^{-3}
Mean CV Precision: 3
Automatic Mean: 25 μgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 24 (21 - 29) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

QA/QC of Automatic 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 site audit for the Bracknell automatic monitoring unit was carried out on 21st December 2020.

Oxides of Nitrogen Analysers

A major factor governing the analyser's performance is the NOx analyser's converter and its ability to reduce the nitrogen dioxide to nitric oxide. The recommended range for instrumentation in the national automatic air monitoring network is in the range of 98% - 102% efficient. Our tests show the converter in the Bracknell, Downshire Way analyser to be 98.5% efficient at an NO_2 concentration of 293 ppb. This is a good result.

To ensure that the analyser was sampling only ambient air the instrument was leak checked. The result was satisfactory, indicating that the analyser sampling systems was free of significant leaks. The analyser exhibited good steady state responses to both zero and span (calibration) gases with acceptable levels of variation (noise).

The analyser flow rate was measured using a calibrated flow meter and compared against the analyser's flow rate sensor to evaluate its accuracy. The measured flow rate passed within the ±10% advisory limit.

Please note the following cylinder recalculation test was undertaken at the Wokingham station on the same day.

Based on the Wokingham NOx analyser's response to the audit standard and audit zero, the concentrations of the stations NO cylinder 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.

The results of the recalculations are presented in Table C.3

Table C.3 Bracknell Forest Council, Downshire Way

TRL Bracknell, Downshire Way – NO cylinder 21901300088296				
	NOx (ppb)	**% change from stated**	**NO (ppb)**	**% change from stated**
Manufacturers Stated Concentration	**464**	**---**	**464**	**---**
Recalculated concentration (21/12/20)	494	6.4	491	5.9

The recalculated results for the site NO cylinder 21901300088296 (Table C.3) indicates the concentrations are stable, within the definition adopted above, and can therefore reliably be used to scale ambient data.

Particulate Matter TEOM PM_{10}

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 -1.23%, 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. The inlet head was clean, and the settings were correct.

The temperature and pressure sensors were checked against our 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 instrument sensors passed these tests.

Certificate of Calibration

Calibration factors and zeros have been produced on the basis of the audit calibrations conducted. All of these calibrations were conducted with transfer standards traceable to national metrology standards. The Certificate of Calibration (available upon request from TRL) provides the calibration and zero response factors for the oxides of nitrogen analyser under test on the day of the audit as well as the measured flows and calculated calibration constant for the particulate analyser.

Automatic Monitoring Annualisation

NO_2, PM_{10} and $PM_{2.5}$ Monitoring Adjustment

Annualisation NO_2

It has only been possible to carry out monitoring at Bracknell Downshire Way for just over 7 months between 24/04/2020 and 31/12/20. The NO_2 measured mean concentration M for this period is 24.9 µg/m^3.

Multiplying the NO_2 measured mean concentration M by the annualisation factor R_a, estimates the annualised mean is 26.9 µg/m^3.

Annualisation of PM_{10}

It has only been possible to carry out monitoring at Bracknell Downshire Way for just over 7 months between 24/04/2020 and 31/12/20. The PM_{10} measured mean concentration M for this period is 17.15 µg/m^3.

Multiplying the PM_{10} measured mean concentration M by the annualisation factor R_a, estimates the annualised mean is 18.4 µg/m^3.

$PM_{2.5}$ Estimation

In the absence of $PM_{2.5}$ monitoring, and where a local authority carries out PM_{10} 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. Through annualisation, the estimated annual mean PM_{10} concentration at a roadside site in 2020 was 18.4 µg/m^3. The $PM_{2.5}$ concentration at this site can be estimated as follows:

Table C.4 - Predicted $PM_{2.5}$ at Downshire Way

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)	18.4	0.7	12.8

Annualisation Methodology of NO_2

It has only been possible to carry out monitoring at Bracknell Downshire Way for just over 7 months between 24/04/2020 and 31/12/20. The NO_2 measured mean concentration M for this period is 24.9 µg/m^3.

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:

- Reading New Town (RNT)
- Oxford St Ebbes (OSE)
- Swindon Walcot (SwW)

Table C.5 – Annualisation Method for NO_2 data

Background Site	Data Capture Rate [%]	Annual Mean (A_m) (µg/m³)	Period Mean (Pm) (µg/m³)	Ratio (Am/Pm) (µg/m³)		
SwW	Urban Background	9.89	9.18	1.08		
OSE	Urban Background	10.71	10.10	1.06		
RNT	Urban Background	15.41	13.96	1.10		
Continuous Monitor		**Annual Mean (A_m) (µg/m³)**			**Average Ratio (µg/m³)**	**Annualised Annual Mean (µg/m³)**
Downshire Way (CM3)		24.9			1.08	26.9

Multiplying the NO_2 measured mean concentration M by the annualisation factor R_a, estimates the annualised mean is 26.9 µg/m³.

Annualisation Methodology of PM_{10}

It has only been possible to carry out monitoring at Bracknell Downshire Way for just over 7 months between 24/04/2020 and 31/12/20. The PM_{10} measured mean concentration M for this period is 17.15 µg/m³.

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:

- Reading New Town (RNT)
- Oxford St Ebbes (OSE)
- Chilbolton Observatory (ChOb)

ChOb and OSE are FIDAS instruments, and RNT instrument is a BAM 1020 Heated instrument according to list:

https://uk-air.defra.gov.uk/latest/currentlevels?view=site#R

According to TG16 guidance for Met One PM10 Smart Heated BAM 1020 can be used by local authorities after correction for slope by dividing the data by 1.035. The data

downloaded from https://uk-air.defra.gov.uk/data/flat_files?site_id=REA1 for RNT has been ratified so it is assumed that this factor has been applied.

The Palas Fidas 200 measures both PM_{10} 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 PM_{10} data can be used by Local Authorities without the need for correction for slope and/or intercept.

Table C.6 – Annualisation Method for PM_{10} data

Background Site	Data Capture Rate [%]	Annual Mean (A_m) (µg/m³)	Period Mean (Pm) (µg/m³)	Ratio (Am/Pm) (µg/m³)		
ChOb	Rural Background	12.26	11.45	1.07		
OSE	Urban Background	10.75	9.93	1.08		
RNT	Urban Background	15.29	14.44	1.06		
Continuous Monitor		**Annual Mean (A_m) (µg/m³)**			**Average Ratio (µg/m³)**	**Annualised Annual Mean (µg/m³)**
Downshire Way (CM3)		17.15			1.07	18.4

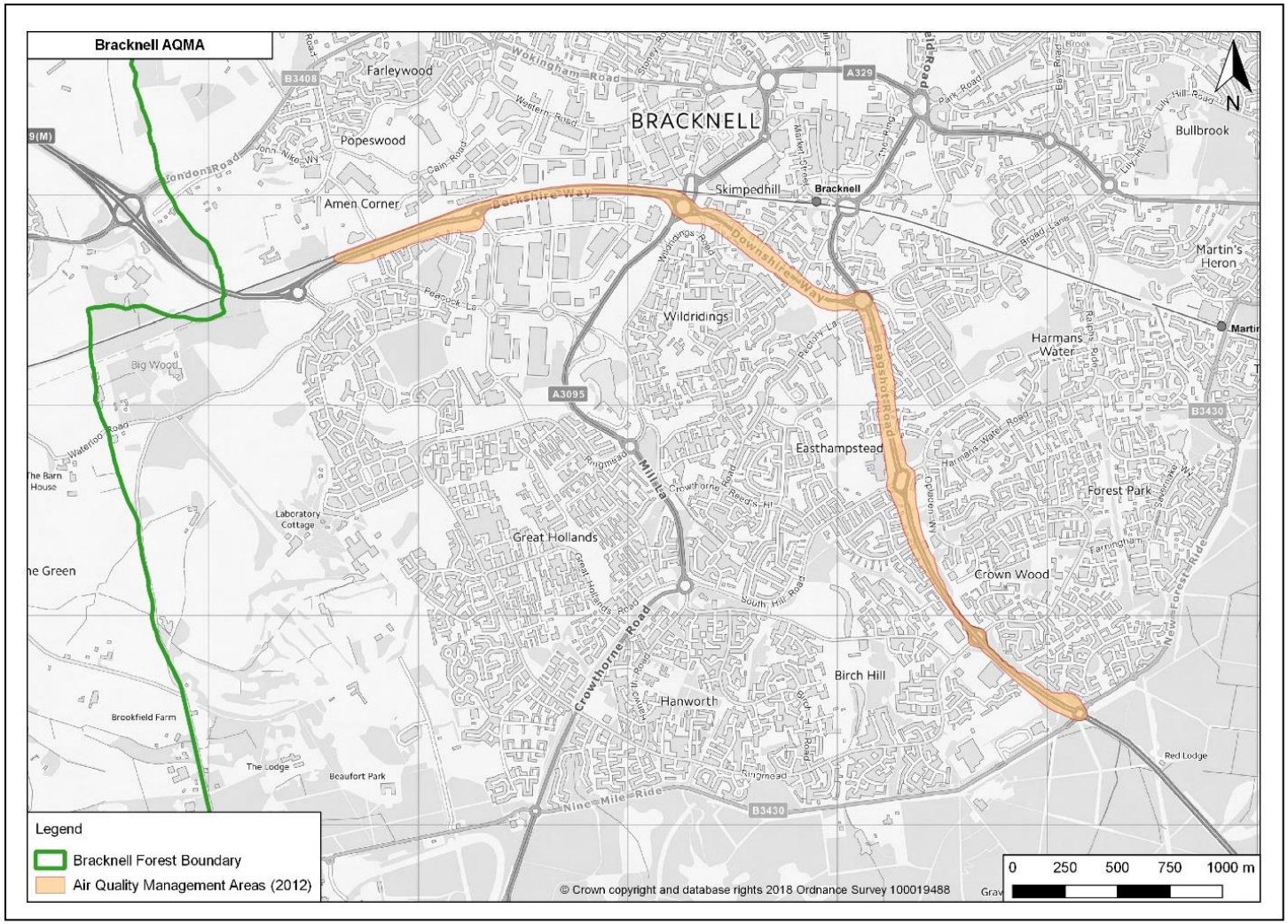
Multiplying the PM_{10} measured mean concentration M by the annualisation factor R_a, estimates the annualised mean is 18.35 µg/m³.

NO_2 Fall-off with Distance from the Road

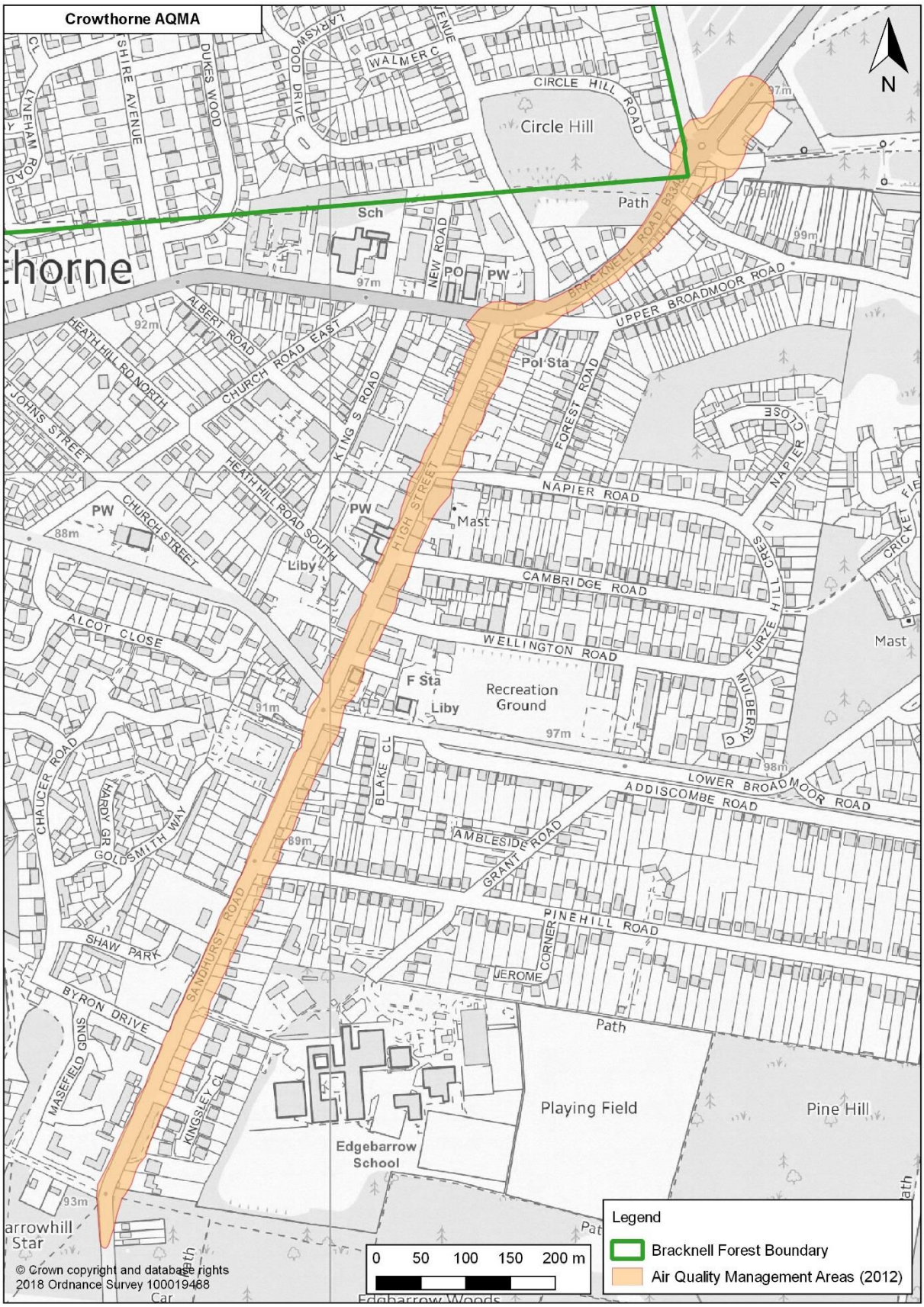
No automatic NO_2 monitoring locations within Bracknell Forest required distance correction during 2020.

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

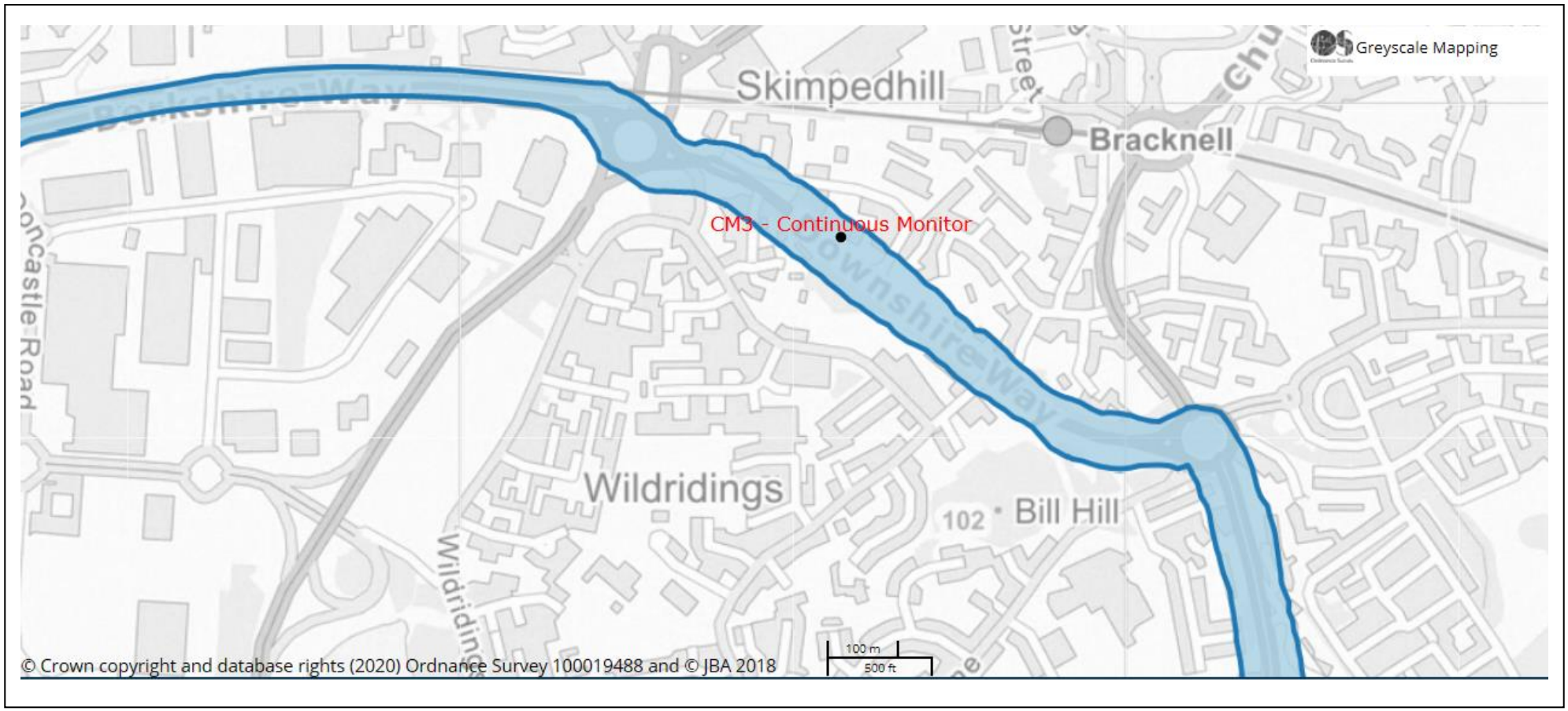
Map D.1 – Map of the Bracknell AQMA



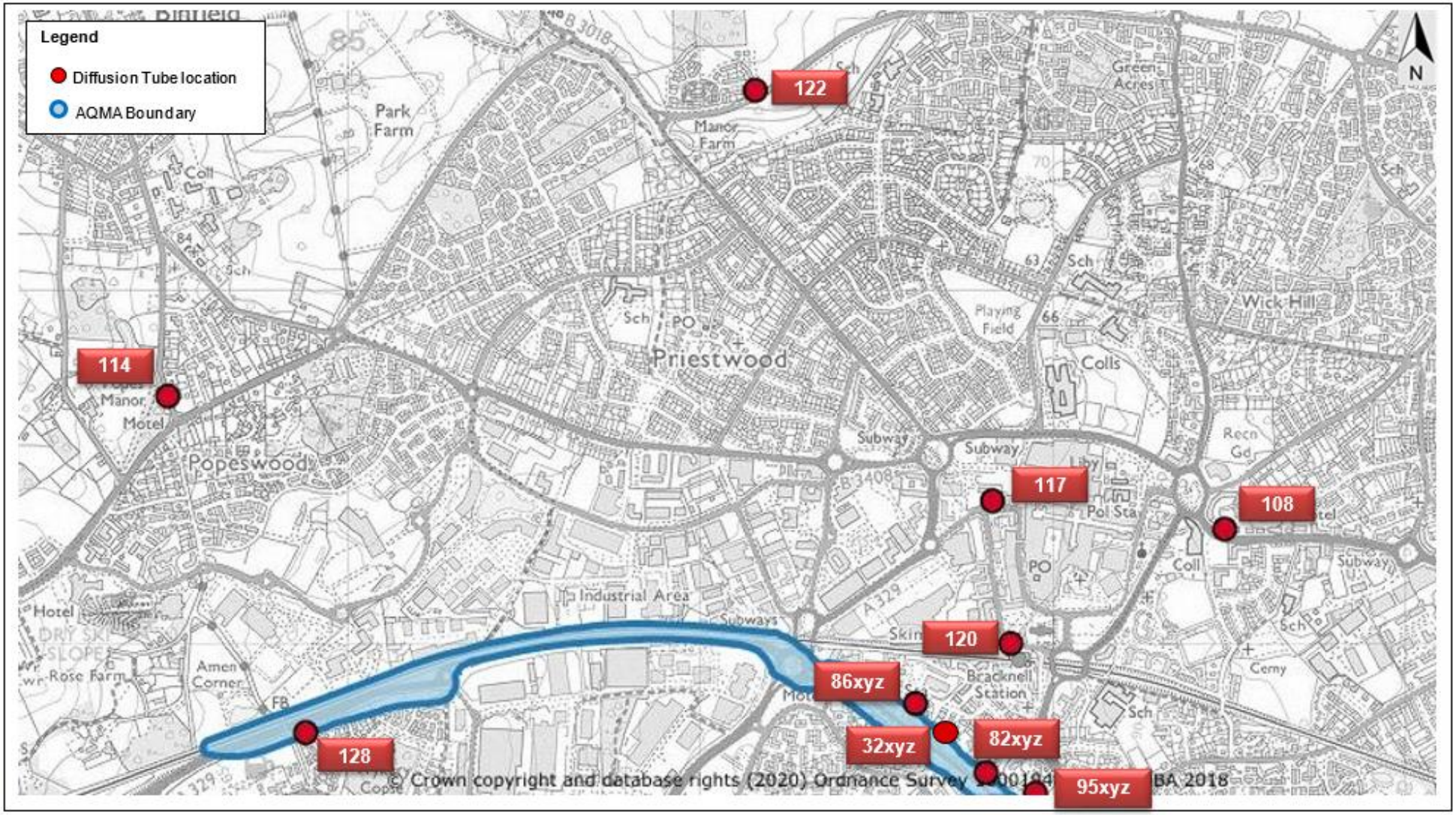
Map D.2 – Map of the Crowthorne AQMA



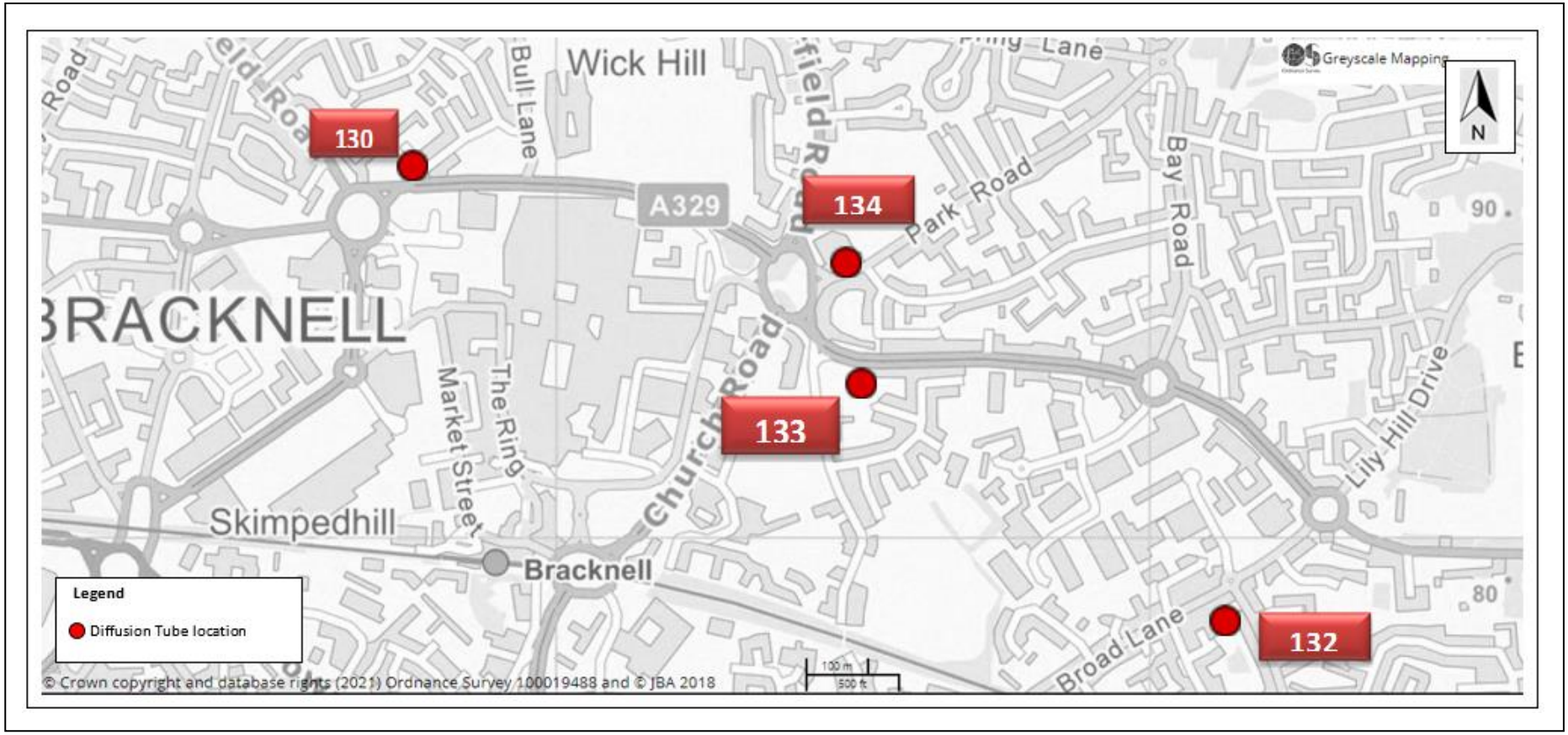
Map D.3 - Automatic monitoring in Bracknell Forest (CM3) within the Bracknell AQMA



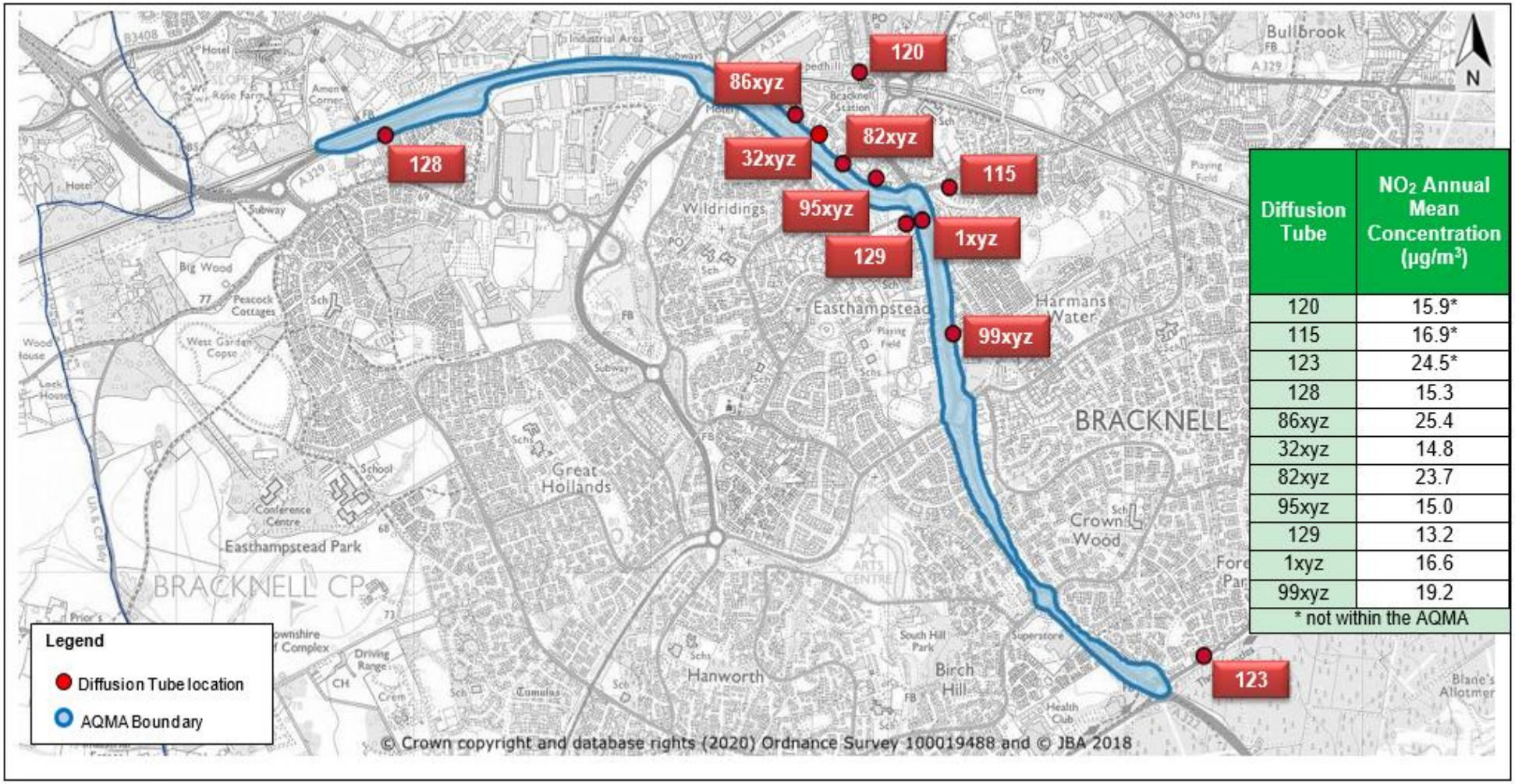
Map D.4 - showing the Diffusion Site with the Bracknell AQMA and the Northern End of Bracknell



Map D.5 – The new sites for 2020, 130, 132, 133 & 134

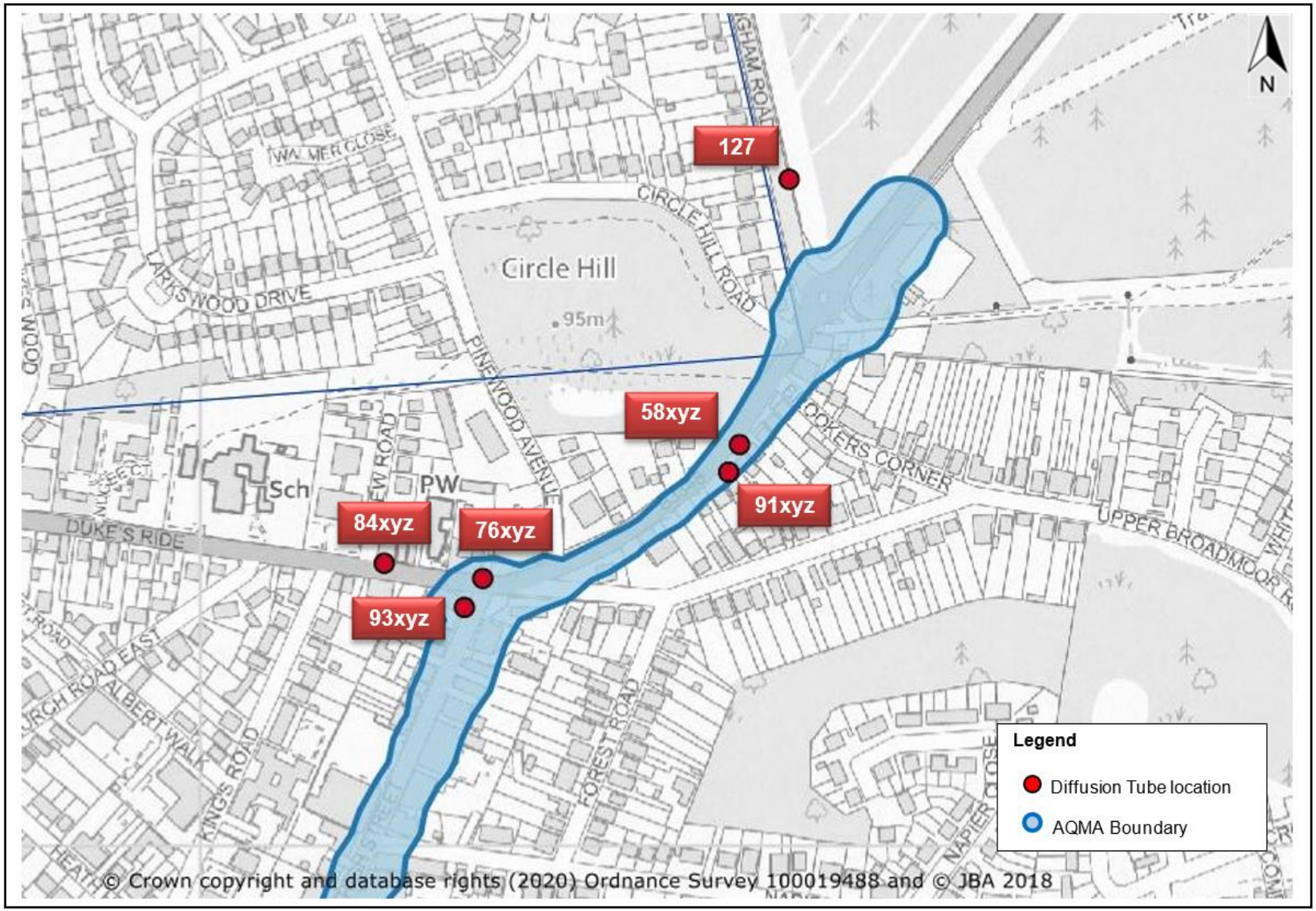


Map D.6 - Diffusion Tube Monitoring sites in and around the Bracknell AQMA.

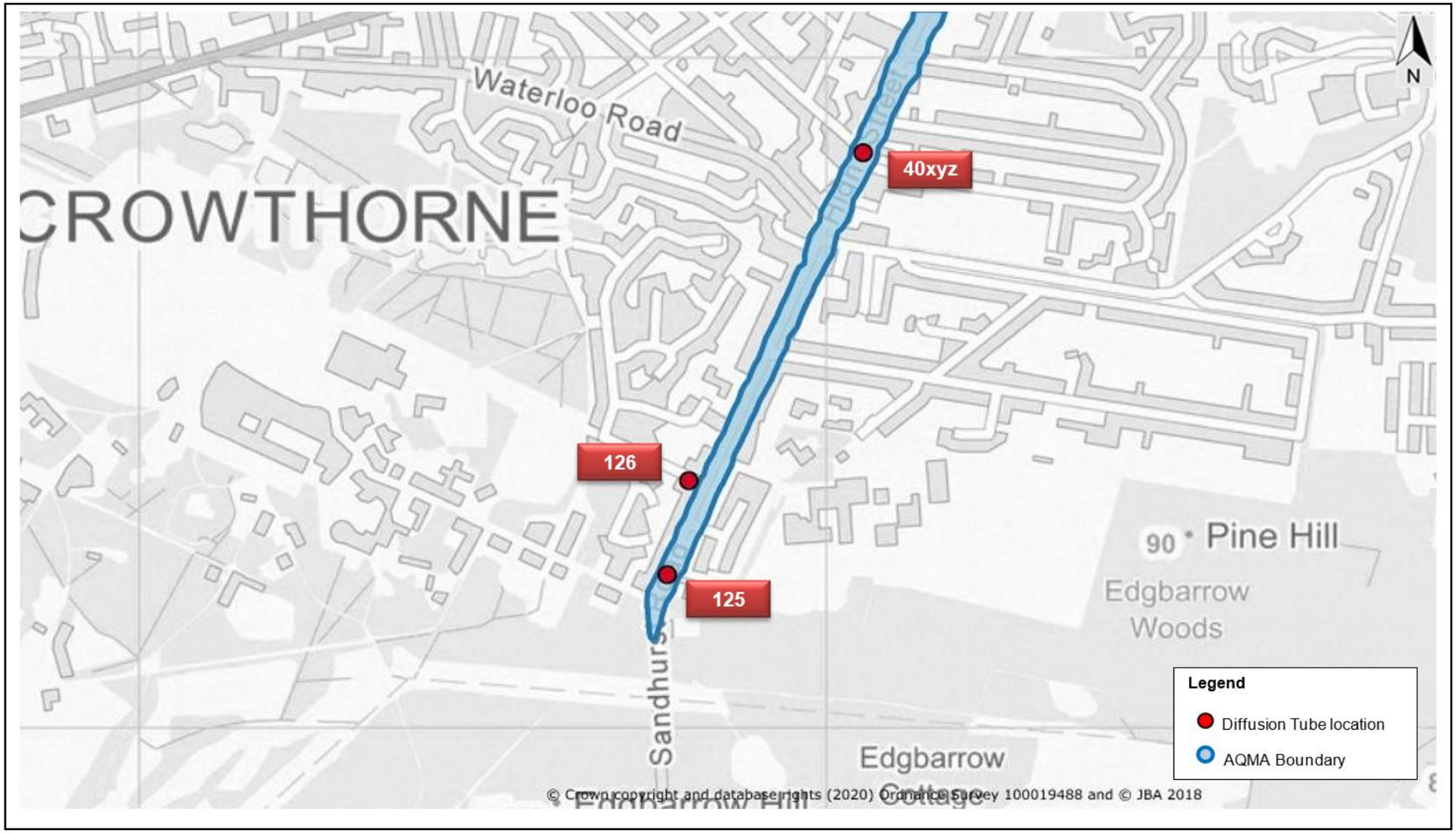


Diffusion Tube	NO_2 Annual Mean Concentration (µg/m³)
120	15.9*
115	16.9*
123	24.5*
128	15.3
86xyz	25.4
32xyz	14.8
82xyz	23.7
95xyz	15.0
129	13.2
1xyz	16.6
99xyz	19.2
* not within the AQMA	

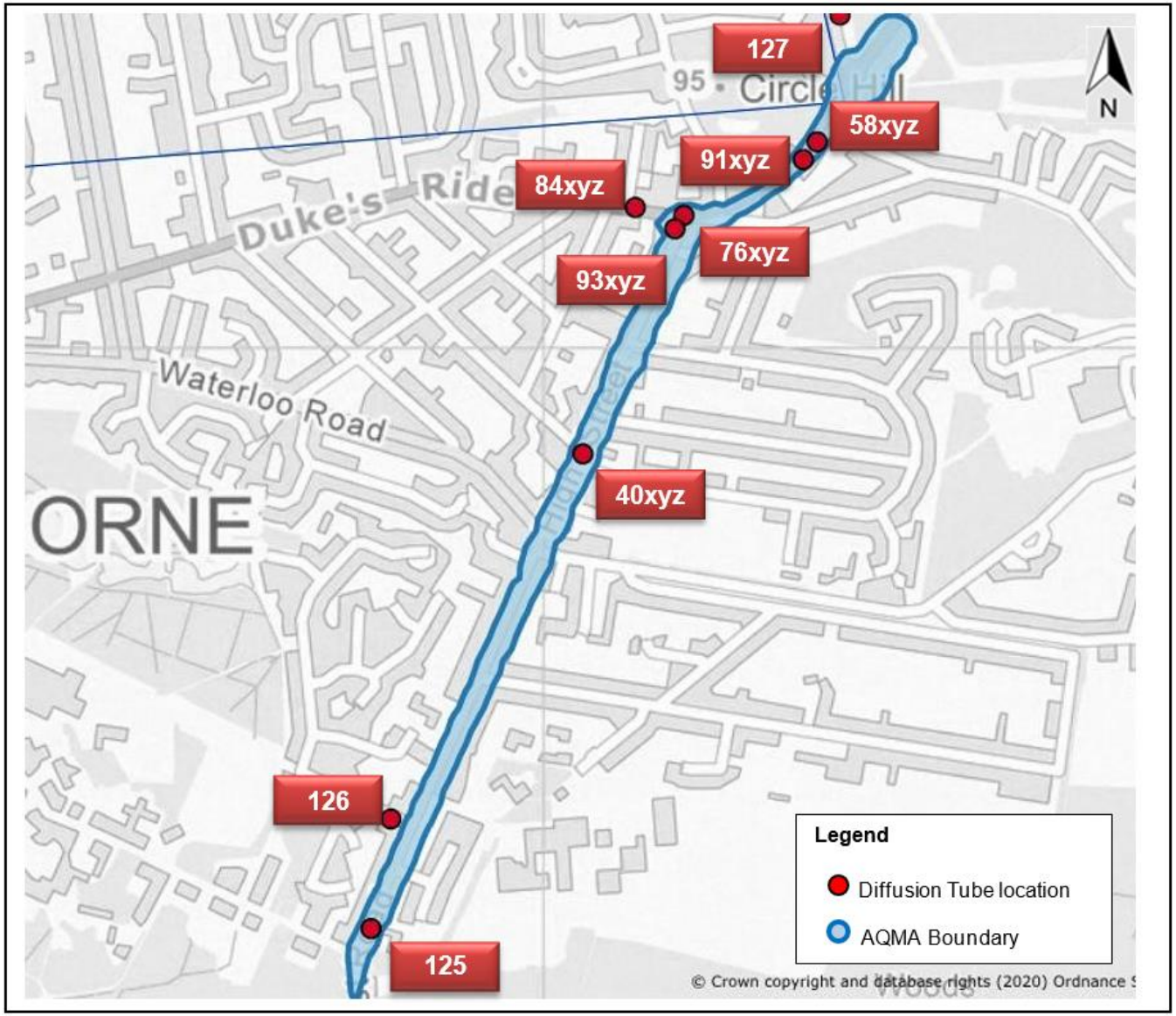
Map D.7 - Diffusion Tubes monitoring sites at the Northern end of the Crowthorne AQMA



Map D.8 - Diffusion Tubes monitoring sites at the Southern end of the Crowthorne AQMA

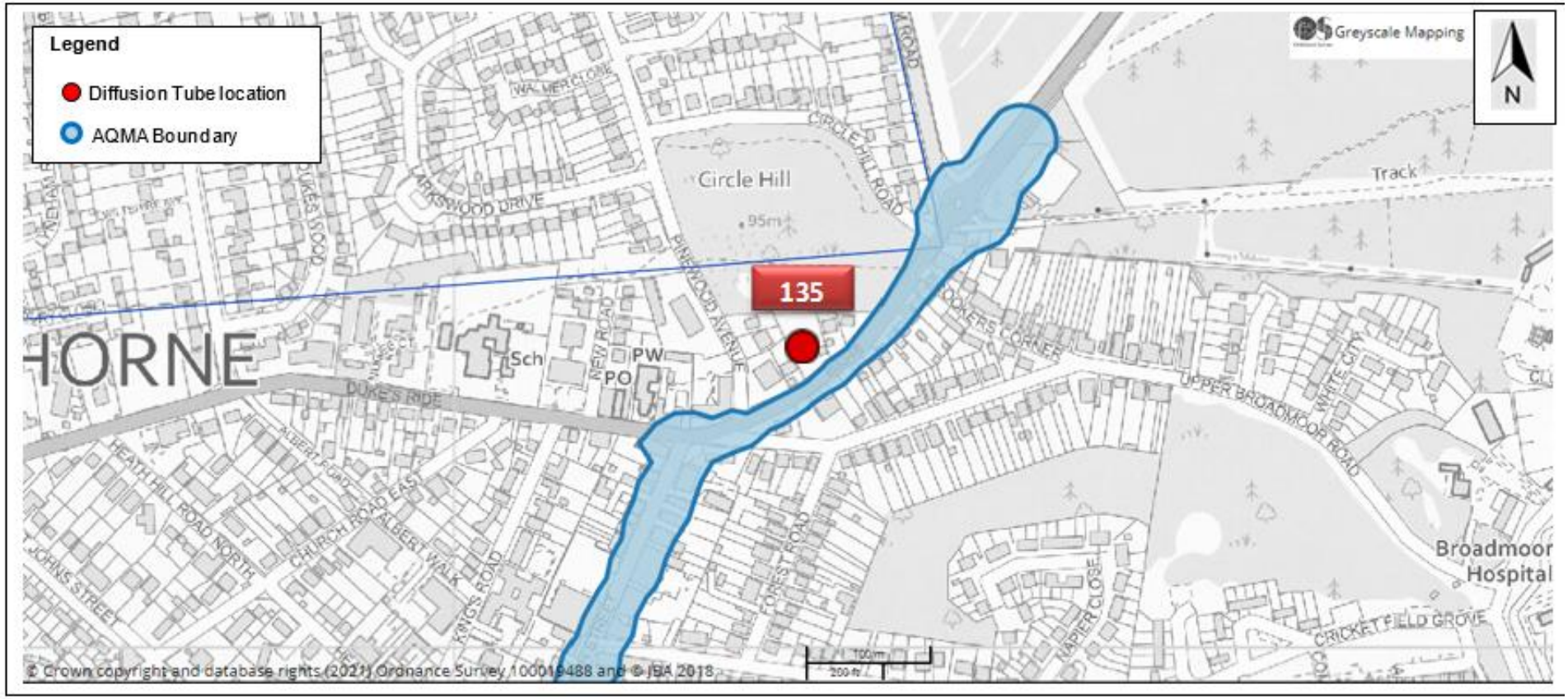


Map D.9 - Diffusion Tube monitoring sites in the Crowthorne AQMA



Diffusion Tube	NO_2 Annual Mean Concentration (µg/m³)
127	14.3
58xyz	32.9
91xyz	19.5
76xyz	19.9
84xyz	17.5
93xyz	18.4
40xyz	19.5
126	12.9
125xyz	16.3
135	12.3

D.10 – The new Crowthorne Diffusion Tube 135, outside of the AQMA



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[8] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[9] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

[8] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[9] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Bracknell Forest

- The Pandemic has had a positive impact on the air quality throughout the whole of the borough, this can be seen clearly in Figure E.1 for the diffusion tubes, and the percentage reductions of NO_2 during the national lock downs can be seen in Table E.2. During the first nation lockdown from the 23rd March 2020 to the 1st June 2020 (when the schools reopened) the reduction of NO_2 was between 33.97% and 43.84%. This equated to a 25.89% reduction in annual mean concentration relative to 2019. The reduction in NO_2 experienced within 2020 has allowed the Council to provide an evidence base in relation to the annual mean objective being achievable, if the low volume of vehicles continue to use the roads.

- Traffic counts on the,
    - A322 Bagshot Road (nr Coral Reef)
    - A329 London Road, Martins Heron
    - A321 Sandhurst High Street
    - B3408 Wokingham Road

  were in operation during 2020 and have allowed a comparison of traffic numbers with the reduction of monthly NO_2 concentrations experienced at the CM monitoring location. This has allowed estimations to be made for the reduction in traffic numbers required to continue to achieve compliance with the annual mean NO_2 objective in the Bracknell AQMA. During 2020 the traffic in the Borough was 23% lower than in 2019 see Graph E.2).

Table E.2 - Showing the Comparison of the 2020 Data NO2 with the two pervious years in Bracknell AQMA2data captured by the CM)

Month (Lock downs)	Average NO_2 (µg/m³) 2018	Average NO_2 (µg/m³) 2019	Average NO_2 (µg/m³) 2020	Difference between 2019 & 2020 (%) *(comparing 2018 & 2020 data)*
January	31.5	45.3	Off line	
February	33.5	43.2	Off line	
March+	35.7	33.5	Off line	
April	32	31.2	20.6	-33.97
May	37.4	33.3	18.7	-43.84
June	31.6	22.5	20.2	-10.22
July	40	29.3	26.9	-08.19
August	39.7	27.8	24.6	-11.51
September	40.4	20.9	28.6	+36.84
October	42.6	Off line	24.0	*-43.66**
November	35.9	Off line	28.2	*-21.45**
December	42.3	Off line	31.3	*-26.00**
Annual Annualised Average	**36.6**	**33.6**	**26.9**	***-25.89***

+23rd March Lockdown occurred

Figure E.1 - Showing the Comparison of the 2020 Data NO_2 with the two previous years in Bracknell AQMA (data captured by the CM).

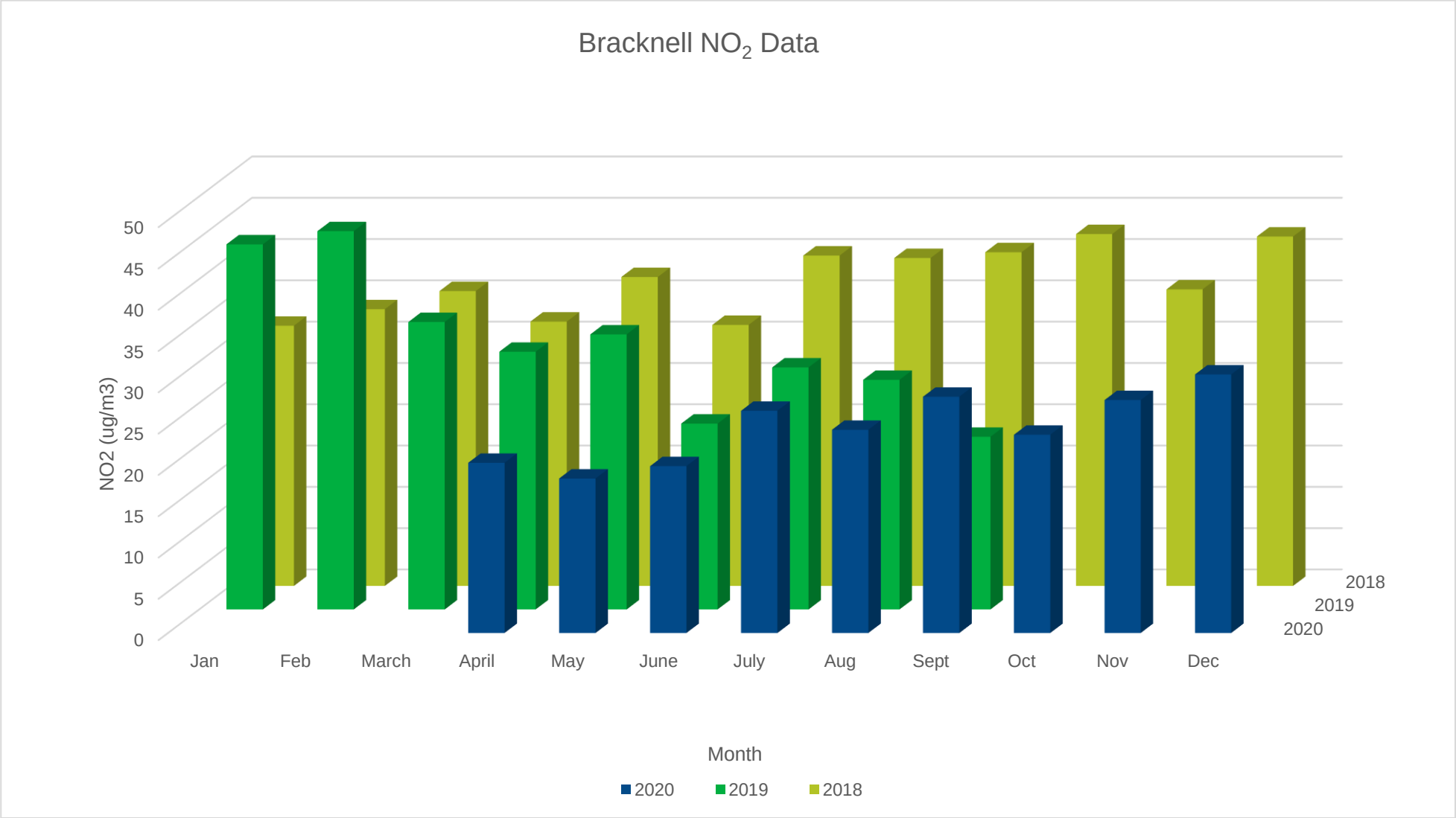
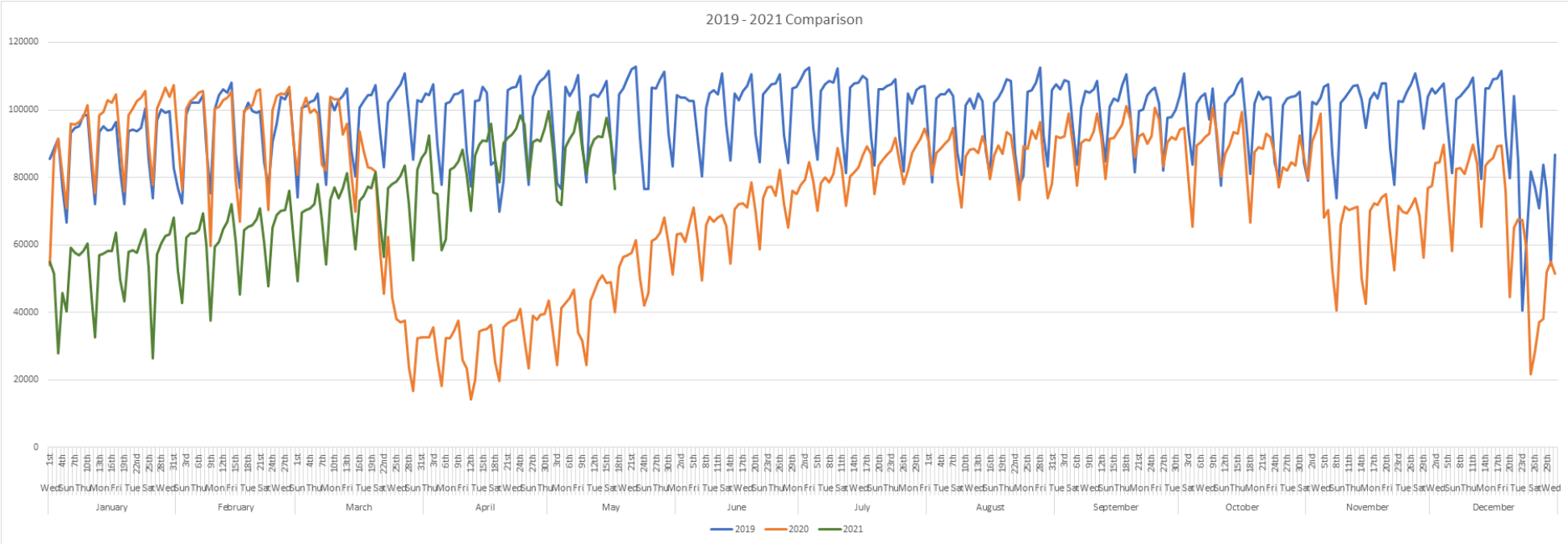


Figure E.2 -This shows the 2019/ 2020 Traffic data comparison in the Bracknell AQMA



Opportunities Presented by COVID-19 upon LAQM within Bracknell Forest

During the pandemic the following occurred within BFBC.

- The Passive and Continuous Monitor Air Quality monitoring was continued throughout the whole of the pandemic, in line with the national monitoring calendar for a number of sites. This was decided as high priority as this gave the borough the unique opportunity to see BFBC with reduced traffic data that make up the daily commute, the school run and those who are just getting on with their lives using the roads. We could gauge a baseline within the two AQMA's.

- Home working as had a positive impact on the Bracknell AQMA, as this is known as the M3/M4 corridor and a major commuter & HGV link road, the table below shows the CM monthly results and percentage reductions. It is hoped that as the technology is now in place for many businesses that this will continue. Bracknell is also home to large corporations such as Waitrose who have both their goods depot & head office in the Borough, and Panasonic have their head office. Unfortunately due to road works over the last three months of 2019 and the first three months 2020 the CM was without power, so we missed the pre pandemic traffic pollution, and panic buying of pasta and toilet rolls. However the traffic data shows only a slight increase at the end of January & February 2020, then a dramatic drop in the first lockdown.

- The residents of the borough are now more aware on the impact their journeys (big or small) have on both the national and local AQ, so hopefully the new habits they have made, for example WFH, doing a weekly shop, not a daily one, walking & cycling to school as they have more time (as they don't have to commute) as the roads are quieter will continue. People seem to have established a better life work balance and use the car less. The increase in internet Food Shopping has also reduced the amount of vehicles on the roads, as one lorry can take up to 10+ households shop in one delivery slot.

Challenges and Constraints Imposed by COVID-19 upon LAQM within Bracknell Forest.

Whilst PPP successfully carried out the Passive and Continuous AQ Monitoring throughout the Pandemic we were not without challenges and constraints from other departments, as AQ is not just about monitoring it is about working with many different department who strive together to create an action plan to reduce the pollutants. The Pandemic placed many restrictions and problems all, of a different nature, throughout the Council as a whole, and as a result of this many projects have, naturally been delayed.

- A revised AQAP was to be developed for AQMA 1 and AQMA 2. However, owing to the reallocation of Council resources during 2020, the development and implementation of the AQAP has been delayed. Also as the residents behaviour has been changing and people are now naturally reducing none essential journeys, am having weekly shops rather than daily, we may need to look at alternative options in the AQAP in light of what we have learnt from recent traffic patterns & habits. These alternative options will now be created in 2022, once we have looked into the changes of peoples habits in greater depth and what our residents need from us to help reduce the pollution.
  High Impact

- Unfortunately we cannot use this years or last year's data to establish whether we can revoke any of our AQMAs, also as the Pandemic pans out we do not know if we can use any of 2022 either, it is still too early to tell. Also we need to establish what the residents new "normal" travel patterns are going to be to ensure that we revoke the AQMAs at the correct time. **High Impact**

The impacts as presented above are aligned with the criteria as defined in Table F 1, with professional judgement considered as part of their application.

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: High
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

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	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 or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.