



# 2024 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995  
Local Air Quality Management, as amended by the  
Environment Act 2021

Date: June 2024

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## Executive Summary: Air Quality in Our Area

### Air Quality in Bracknell Forest

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year<sup>1</sup>.

Air pollution particularly affects the most vulnerable in society, children, the elderly and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution<sup>2</sup>.

Table S 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the type of activities from which they might arise.

**Table S.0.1 Description of Key Pollutants**

Pollutant	Description
Nitrogen Dioxide (NO <sub>2</sub> )	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO <sub>2</sub> )	Sulphur dioxide (SO <sub>2</sub> ) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM <sub>10</sub> and PM <sub>2.5</sub> )	<p>Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes.</p> <p>PM<sub>10</sub> refers to particles under 10 micrometres. Fine particulate matter or PM<sub>2.5</sub> are particles under 2.5 micrometres.</p>

<sup>1</sup> UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

<sup>2</sup> Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

The major source of air quality pollutants in Bracknell Forest is emissions from road transport. The contribution from the A322 in Bracknell, the B3348/High Street and Sandhurst Road, Crowthorne have all been identified as 'significant'. The main pollutant of concern is nitrogen dioxide (NO<sub>2</sub>) and whilst the PM<sub>10</sub> has been monitored alongside the NO<sub>2</sub> it has never exceeded the air quality objective. Two Air Quality Management Areas (AQMA's) were declared in 2011 following exceedances of the Annual Mean Objective for NO<sub>2</sub>; the Bracknell AQMA (Bagshot Road and Downshire Way) and the Crowthorne AQMA. There are no exceedances of PM<sub>10</sub>. Details can be found at: <https://uk-air.defra.gov.uk/aqma/list?view=W> and maps are in Appendix D.

Nitrogen dioxide (NO<sub>2</sub>) is the main pollutant of concern. The levels in 2023 have shown a decreasing trend since 2019 (33.6µg/m<sup>3</sup>). The annualised continuous monitored NO<sub>2</sub> Annual Mean in 2023 was 29.4µg/m<sup>3</sup> at Downshire Way and did not exceed the Air Quality Objective level of 40µg/m<sup>3</sup>, plus there were no exceedances of the 1-hour objective at Downshire Way. There have been no exceedances of the Objectives since before 2018.

There were no exceedances of the ratified, bias corrected, annualised and distance corrected diffusion tubes (NO<sub>2</sub>) within the entire borough, including the Bracknell and Crowthorne AQMA's. There were no locations reading greater than 60 µg/m<sup>3</sup>, which further indicates that there are unlikely to be any exceedances of the 1-hour Objective. All of the 2023 sites showed decreased levels compared with the data from 2019; since 2022, nine sites have marginally increased levels and seventeen have decreased. The fluctuation and gradually reducing trend is to be expected as more people are hybrid working and there is a general increase of cleaner cars on the roads.

There are no extensions or amendments to the Crowthorne AQMA, however the Bracknell AQMA has been recommended for revocation due to continuing low levels of NO<sub>2</sub>.

The PM<sub>10</sub>, which is monitored in the Bracknell AQMA (when annualised) measured 17.2µg/m<sup>3</sup> and did not exceed the Annual Mean Objective of 40µg/m<sup>3</sup>. The results also showed no exceedances of the 24-hour Annual Mean Objective of 50µg/m<sup>3</sup> (which is not to be exceeded more than 35 times a year). The PM<sub>10</sub> level also demonstrates a decreasing trend since 2019, and the levels remain stable.



## Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment, from the effects of air pollution.

The Environmental Improvement Plan<sup>3</sup> sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter (PM<sub>2.5</sub>), the pollutant of most harmful to human health. The Air Quality Strategy<sup>4</sup> provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero<sup>5</sup> details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel and the majority of Air Quality Management 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, Public Health 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 the local transport network, where feasible to do so.

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<sup>3</sup> Defra. Environmental Improvement Plan 2023, January 2023

<sup>4</sup> Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

<sup>5</sup> DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

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. Improve safety and reduce casualties on the local transport network.

The LTP3 and supporting documents can be accessed via the Council's website, at: <https://www.bracknell-forest.gov.uk/planning-and-building-control/planning/planning-policy/transport-policy>

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 contributor is emissions from vehicles in queuing traffic on the A322. This objective was met, with the 2023 results showing a decrease of 41.5% from 50.3 µg/m<sup>3</sup> NO<sub>2</sub> in 2011 to 29.4µg/m<sup>3</sup> NO<sub>2</sub> in 2023. A new AQAP for Crowthorne is required and after consultation, will be in place by early 2024.

This reduction has been helped by smoothing the traffic flow and reducing journey times in this part of the AQMA, plus a number of major highway improvements have been completed along the A329/A322 corridor, that links the M3 and M4 motorways. The remaining section, which had been a bottleneck at Downshire Way, secured funding for conversion to a dual carriageway in 2018 and was completed in June 2020. 2023 is the second year of seeing how successful the dual carriageway has been in improving the air quality and the NO<sub>2</sub> levels are still reducing (2023 levels), so we can conclude that the works have helped reduce the NO<sub>2</sub> along the A332.

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 more freely and at a more constant speed. This should improve journey time reliability, reduce idling traffic and prevent queues and congestion building in certain areas.

Within the Crowthorne AQMA, the main emissions source is slow moving traffic, primarily caused by vans delivering goods to shops along the High Street, where they create delays whilst loading and unloading, causing engine idling. 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<sub>2</sub>

has continued to reduce from  $41.7\mu\text{g}/\text{m}^3$  to  $21.5\mu\text{g}/\text{m}^3$  (at site 91xyz, The Mount, Bracknell Road, Crowthorne) in 2023 at the location of relevant exposure.

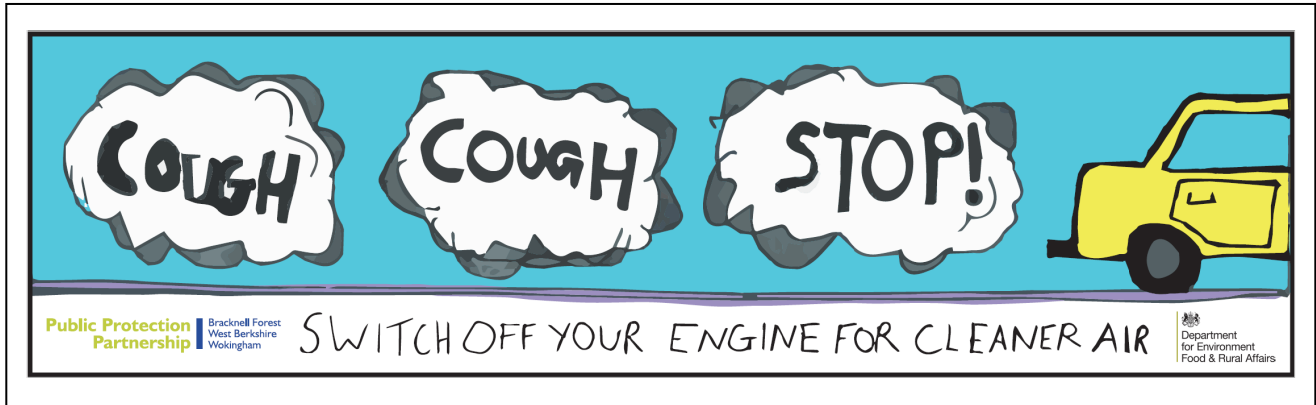
### Figure S.0.1 Speed Cushion in Crowthorne AQMA.



A joint application was made to the Air Quality Grant Scheme 2020, by the Public Protection Partnership (PPP) with West Berkshire, Bracknell Forest and Wokingham Councils. We were successful in securing funding for a project relating to a behaviour change anti-idling campaign, localised  $\text{PM}_{2.5}$  monitoring and action planning at schools located close to the AQMAs. As a result of this funding, we were able to appoint an Air Quality Officer and launch our “Bumper Sticker” competition to all Primary Schools within West Berkshire, Bracknell Forest & Wokingham Boroughs.

Ascot Health Primary School provided the winning design and the Pupils’ artwork was made into a rear bumper sticker. The idea of the sticker is to remind the driver behind to turn off their engines in a stationary traffic. These stickers are available to members of the public and can be found in our libraries or ordered online at <https://publicprotectionpartnership.org.uk/environmental-health/air-quality/anti-idling-bumper-sticker-schools-competition/>

**Figure S.0.2 The Bumper Sticker.**

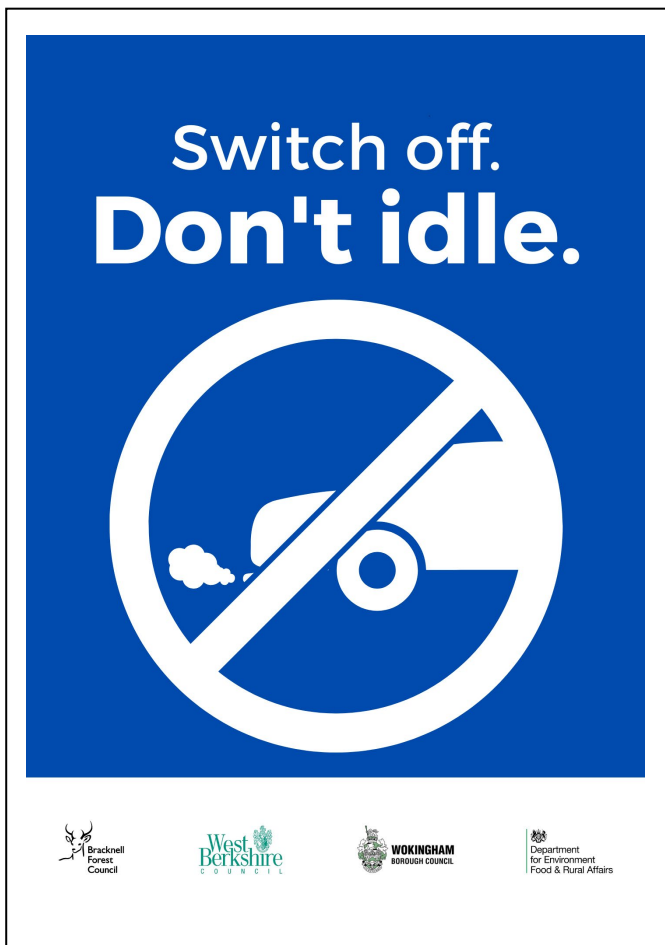


In 2022, the PM<sub>2.5</sub> School Monitoring and Behaviour Change project began and the results for the PM<sub>2.5</sub> project can be seen in Appendix C. The levels of PM<sub>2.5</sub> at those locations were below the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 for PM<sub>2.5</sub> (i.e., the annual mean should not exceed 25 µg/m<sup>3</sup> and the interim target of 12 µg/m<sup>3</sup> to be met by end 2027 and long-term target of 10 µg/m<sup>3</sup> by 2040.)

In 2022/23, we ran the next phase of the anti-idling behaviours change project (The Biggest NO<sub>2</sub> Loser) outside twelve schools close to the AQMAs. Throughout 2022 and 2023, we measured the monthly NO<sub>2</sub> outside each school, using diffusion tubes. We established an average base line in 2022, and then in 2023 we launched the anti-idling campaign and for 3 to 4 months, we hung posters (see Figure S:0.1), on street furniture by the school gates where children were dropped off/collected in vehicles. We also sent literature to the schools including posters and an Air Quality assembly/lesson plan tool kit, put adverts on social media (Figure S.0.3) and gave the opportunity for consultants to visit schools and run air quality workshops. This project was successful, as all twelve schools showed an annual NO<sub>2</sub> reduction, varying between 24.5% and 2%. The NO<sub>2</sub> annual averages were also well below the air quality objectives. The winning school received a certificate, anti-idling reusable water bottles (as it's thirsty work scooting, cycling, and walking to school) air quality bookmarks and the car bumper stickers.

During Clean Air Day in 2023, all the schools in Bracknell Forest were sent Air Quality Toolkits in order to run their own assembly/lessons on anti-idling. They were also asked to encourage parents to sign up to anti-idling by emailing information about idling prevention, back to home.

**Figure S:0.3 Examples of Behaviour Change poster displayed outside schools and at level crossings.**



## Conclusions and Priorities

The main focus for Bracknell Forest in terms of improving air quality is to reduce NO<sub>x</sub> emissions, particularly NO<sub>2</sub> 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.

- This year we have continued to work through the Action Plan and we have made significant progress, having achieved most of it already. As a result, we held a

stakeholder working group to revise and create a new Action Plan, which was submitted to DEFRA in December 2023.

- In 2023, we also proposed revocation of the Downshire Way AQMA having sufficient evidence to prove it has read below the air quality objective levels now for five years.
- In 2020/21 we were awarded a DEFRA AQ Grant to fund the Behaviour Change project on Anti-Idling campaign. Beginning in early 2022, we also monitored PM<sub>2.5</sub> at schools close to the AQMA. In 2023 an action plan was produced for each school in order to reduce the PM<sub>2.5</sub> to within the required limits. Please see Appendix C for more details on the project.
- In July 2022, PPP sent a request to the Secretary of State for the Environment, Food and Rural Affairs, requesting that Bracknell Forest Council be deemed a “designated local authority” for the purpose of the Road Traffic (Vehicle Emissions) (Fixed Penalty (England) Regulations 2002. Since then, the Enforcement Team have been visiting schools and educating parents on why to stop engine idling. The team have an A frame board which they put up outside schools whilst handing out leaflets to parents and children. To date, no enforcement action has been taken but it will happen if people persistently offend.



**Figure S.0.4 The A Frame board being used to assist Traffic Enforcement with the anti-idling campaign**



## Local Engagement and How to get Involved

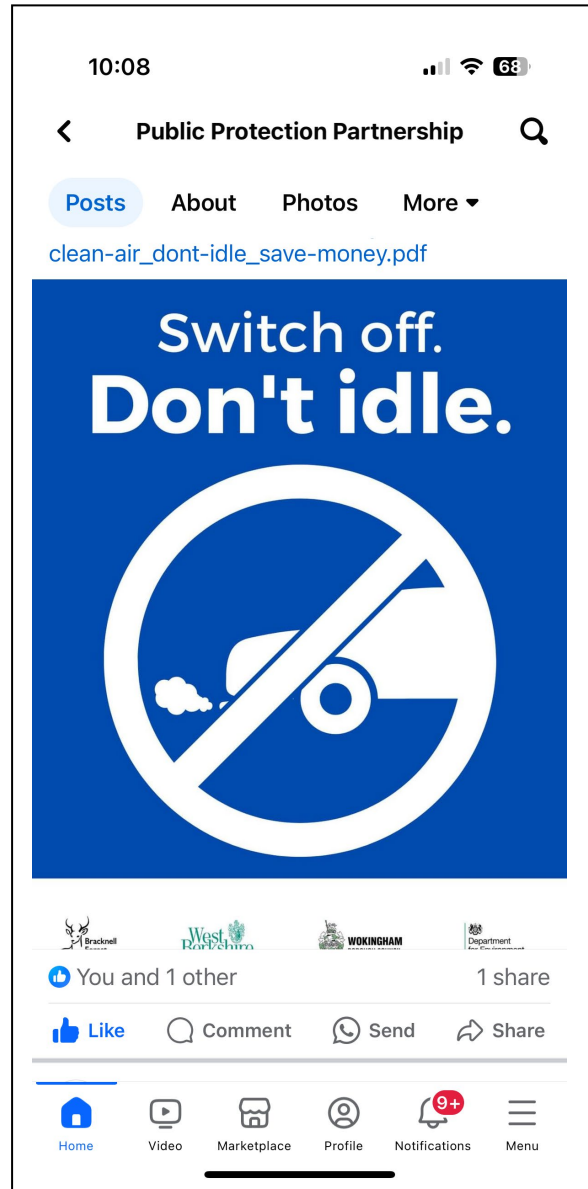
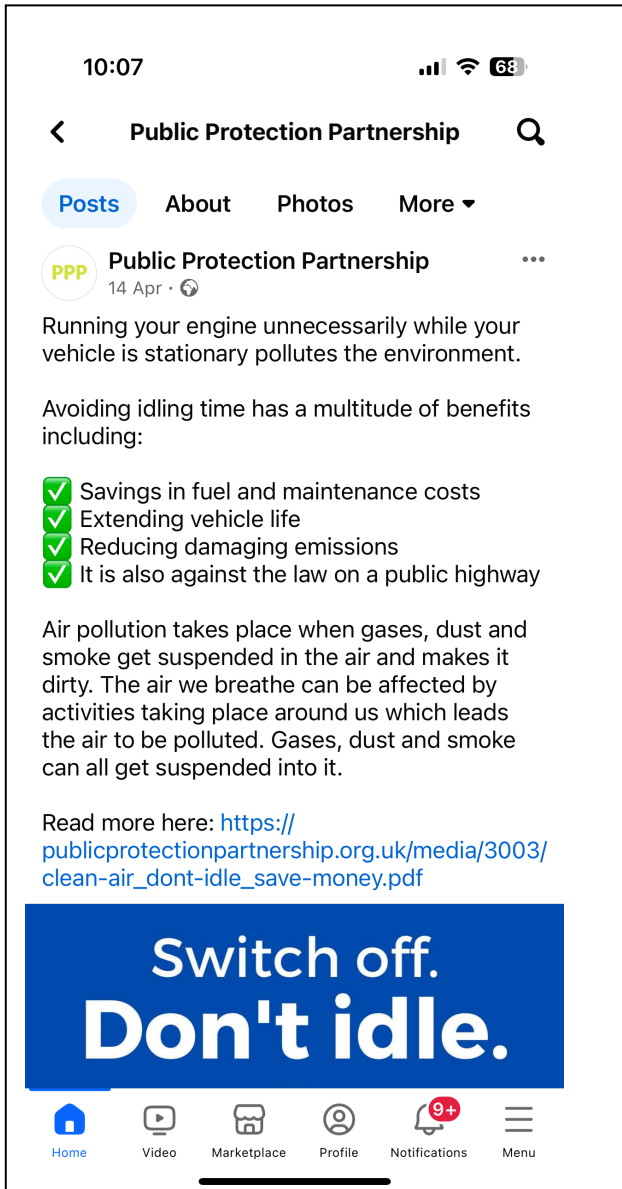
There are several ways the public can help to improve local air quality:

- Public Protection Partnership [Vehicle Idling - PPP \(publicprotectionpartnership.org.uk\)](http://publicprotectionpartnership.org.uk)
- Domestic Fuel information [Air Quality \(Domestic Solid Fuels Standards\) \(England\) Regulations 2020 - PPP \(publicprotectionpartnership.org.uk\)](http://publicprotectionpartnership.org.uk)
- Walk or cycle short distances of less than one or two miles, rather than driving.
- Eco Rewards Scheme [Get rewarded through the Eco Rewards app | Bracknell Forest Council \(bracknell-forest.gov.uk\)](http://bracknell-forest.gov.uk) is jointly funded by Public Health Reserve (£69,950), more information can be found on page 22.
- Search for car sharing opportunities using Bracknell Forest Travelshare at ([Car share with trusted, reviewed and rated Liftshare.com members](http://bracknell-forest.gov.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 [Buses | Bracknell Forest Council \(bracknell-forest.gov.uk\)](http://bracknell-forest.gov.uk) 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 [The Lexicon Shopping Centre In Bracknell | Travel Information \(thelexiconbracknell.com\)](https://thelexiconbracknell.com)
- Go to [Travel and public transport | Bracknell Forest Council \(bracknell-forest.gov.uk\)](https://bracknell-forest.gov.uk)

We are also on Social Media including Twitter and Facebook [click here](#), Twitter [click here](#))

**Figure S.0.5 Social media post from PPPs Facebook**





## Local Responsibilities and Commitment

This ASR was prepared by the Environmental Quality Team of Public Protection Partnership for Wokingham Borough Council with the support and agreement of the following officers and departments:

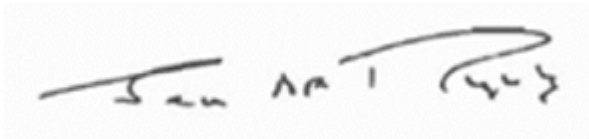
Highways Authority,

Planning Authority,

Environmental Health & Public Health,

*This ASR has been approved by: Sean Murphy*

*This ASR has been signed off by the manager of Public Protection Partnership.*

A handwritten signature in black ink, appearing to read 'Sean Murphy', on a light-colored background.

**Sean Murphy**

**Service Lead – Public Protection Partnership**

*This ASR has been signed off by the Deputy Director of Public Health.*

A handwritten signature in black ink, appearing to read 'Heema Shukla', on a light-colored background.

**Heema Shukla**

**Deputy Director of Public Health**

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LAQM Annual Status Report 2024

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# 1 Local Air Quality Management

This report provides an overview of air quality in Bracknell Forest during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021) 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 order to achieve and maintain the objectives, including the dates by when each measure will be carried out. This Annual Status Report (ASR) is an yearly requirement showing the strategies employed by Bracknell Forest to improve air quality and describe what progress 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

### 2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance, or likely exceedance, of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained, whilst providing dates by when measures will be carried out.

A summary of AQMAs declared by Bracknell Forest can be found in Table 2.2. 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 the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO<sub>2</sub> annual mean

### Revocation of the AQMAs

Bracknell Forest Council on advice from DEFRA, proposed to revoke the Bracknell Area AQMA in 2024. The guidance LAQM.TG22 states *“The revocation of an AQMA should be considered following three consecutive years of compliance with the relevant objective as evidenced through monitoring. Where NO<sub>2</sub> monitoring is completed using diffusion tubes, to account for the inherent uncertainty associated with the monitoring method, it is recommended that revocation of an AQMA should be considered following three consecutive years of annual mean NO<sub>2</sub> concentrations being lower than 36µg/m<sup>3</sup> (i.e., within 10% of the annual mean NO<sub>2</sub> objective). There should not be any declared AQMAs for which compliance with the relevant objective has been achieved for a consecutive five-year period.”*. See Table 2.1 for the years of successful compliance. We cannot use COVID years' data for 2020 and 2021, unless 2019 also measured below 36µg/m<sup>3</sup>. Therefore, at the moment, we can only revoke the Bracknell AQMA and will wait until the 2024 results are available before we can request the revocation of the Crowthorne AQMA.



**Table 2.1 Maximum NO<sub>2</sub> level reached in each AQMA (µg/m<sup>3</sup>)**

<b>AQMA</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Total consecutive years below 36 (µg/m<sup>3</sup>)</b>
Bracknell	34.4	25.4	30.1	32.6	30.3	5
Crowthorne	41.5	32.9	31.1	30.6	33.2	4

**Table 2.2 – 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	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
AQMA Bracknell  (Area 1: The Bagshot Road A322 Horse and Groom Roundabout/ Downshire Way)	Declared 09/02/2011	NO2 Annual Mean	The A322 Bagshot Road and Downshire Way from Berkshire Way to junction with B3430	NO	50.3 µg/m3	Highest Level 30.3 µg/m3  (tube 86)	5 years  (2019 to 2023)  Revocation to be submitted in 2024.	BFBC Air Quality Action Plan - 2014	<a href="#">Executive summary (publicprotectionpartnership.org.uk)</a>
AQMA Crowthorne  (Area 2: The Bracknell Road B3348 and Crowthorne High Street)	Declared 09/02/2011	NO2 Annual Mean	Part B3348, High Street & part of Sandhurst Road	NO	41.7 µg/m3	21.5 µg/m3  (tube 91)  Highest Level 33.2 µg/m3  (tube 58)	4 years  (2020 to 2023)	BFBC Air Quality Action Plan - 2014	<a href="#">Executive summary (publicprotectionpartnership.org.uk)</a>

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

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

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

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed, and provides some information specified in the Guidance. The following comments are designed to help inform future reports.

1. There is justification to revoke the Bracknell AQMA despite the ASR stating a further two years of data is required. Although TG.22 states three consecutive years, BFBC have stated that data from 2020 and 2021 should be excluded in this period. This would still give three years below the AQO, however the trends in data showing a decrease from 2018 at all monitoring sites in the AQMA. As such there is considered sufficient evidence to suggest that NO<sub>2</sub> concentrations will not be exceeded in the Bracknell AQMA. Although there is merit in the exclusion of data from 2020 and 2021 due to COVID, given the concentrations within the Bracknell AQMA prior to 2020 and the increase between 2022, 2021 and 2020 with all results still well below the AQO, there is sufficient data to revoke the AQMA. It is considered that three consecutive years of data from 2022 is not necessary to revoke the AQMA. The 2024 ASR should look to revoke the Bracknell AQMA or discuss the data with the LAQM Helpdesk for support.

*The revocation of the Bracknell AQMA will be submitted to DEFRA in 2024.*

2. BFBC should confirm if the information on UK-Air regarding their AQMAs is up to date however this should be reviewed as the description of the AQMA on the LAQM portal and in the 2023 ASR compared to UK-Air differs slightly.

*This has been updated via the LAQM help desk.*

3. Table 2.2 Progress on measures should be regularly updated, the details within the 2023 ASR are similar to the 2022 ASR despite many measures being progressed. It should also be noted that BFBC AQAP is to be developed over the next year, this is welcomed.

4. Most of the measures are completed and cannot be updated. However, a new AQAP was submitted to DEFRA in 2023, and any alterations will be carried out and the report submitted in 2024 for publication.

5. No justification over the selected bias adjustment factor is provided. Although the National and local factor are very similar, given the trend over the last 5 years with three using the National Factor and now two years using the local bias adjustment factor, additional justification as to the reason one is selected should be provided in future reports.

*This information has been provided in Appendix C.*

6. Monitoring of PM2.5 at 14 schools was undertaken in 2022, although this was undertaken using 'low-cost sensors' the results would be welcomed in an additional appendix in future reports.

*The results can be seen in Appendix C.*

7. It is not clearly stated whether Diffusion Tubes have been deployed in line with the Defra Calendar. Please clearly state this in future ASRs.

*Bracknell Forest Council confirm that they change diffusion tubes in line with the DEFRA Calendar as always, this is stated in Appendix C.*

8. Trends of annual mean NO<sub>2</sub> concentrations are clearly presented in detail and discussed and a robust comparison with air quality objectives is provided.

9. Maps of the diffusion tube network are clear and comprehensive, showing the AQMA boundaries and monitoring undertaken in this area.

10. The ASR has been signed off by a Director of Public Health, this is welcomed.

Bracknell Forest Council has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.3. 18 measures are

included within Table 2.3, with the type of measure and the Bracknell Forest Council have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.3. More detail on these measures can be found in the respective Action Plan.

Key completed measures are:

- Capacity and junction improvements along the A322, A329 and A3095 corridors (all completed within the past 10 years) which have improved journey times, reduced congestion and had a positive overall impact on air quality, as seen in the reductions at the A322 Downshire Way AQMA monitoring station. In turn, this will support the continued growth of Bracknell as an employment centre and further residential growth across the region.
- Installation of 38 fast 22kw Electric Vehicle chargepoints across 12 council owned car parks, and a dual 75kw rapid chargepoint, to provide local residents without off-street parking with opportunities to charge EVs at local community facilities. This was part-funded by the government's On-Street Residential chargepoint fund.
- New stricter planning requirements have been adopted requiring EV chargepoints in all new developments (Building Regs Part-S)
- Work has commenced with guidance from the Energy Saving Trust and Office for Zero Emission Vehicles on a plan for further major roll-out of EV chargepoints in residential areas using LEVI funding
- A Berkshire EV working group has been established which was initially set up by BFC, and now has a dedicated project manager to coordinate further EV roll-out across Berkshire in particular using LEVI funding
- Continuing to work with Bracknell BID to encourage more sustainable travel; A new shuttle bus service has been launched linking Bracknell rail station with the BID area, and a cycle hire scheme for employees has been established. White lines indicating pedestrian/cycle paths have also been refreshed and new signage added.

- A new pedestrian crossing has been installed on Temple Way to provide safer links to the new Blue Mountain development and new schools and community facility
- On Saturdays during December, a free bus service was provided for local residents to access the Lexicon shopping centre.
- Bikeability Cycle training was delivered to 941 school pupils in the Borough, ranging from 'Learn to Ride' courses through to Advanced Level 3 courses.
- Summer of Fun events – during 2023, council staff attended six of the 'Summer of Fun' events around the borough. At four of the events, our cycle training partner Avanti, hosted a cycle obstacle course for young riders, while at others we held colouring competitions and gave away prizes, maps, leaflets and walking and cycling promotional items.
- Led Walks and Rides – Sustrans officers funded by Public Health, are providing a series of led walks in the borough and we have been in discussion with them to broaden this offer to include led cycle rides.
- The Eco Rewards scheme (Public Health funding £69,950) is continuing to grow with nearly 3000 residents and 20 schools and colleges participating. In 2023, 510,000 miles of sustainable journeys were logged on the system and 142 tonnes of CO<sub>2</sub>e saved (compared to taking these trips by car). The scheme was expanded to cover Martins Heron and Winkfield, using funding from Southwestern Railways CCIF fund and there are plans to further extend the scheme to the BID area.
- Love to Ride platform and challenges – Love to Ride is an online community of people who cycle for any purpose. People are encouraged to sign-up friends and work colleagues and take part in a number of challenges that run throughout the year. During the 2023 'Cycle September' event, seventeen workplaces joined in and 1,839 bike trips were recorded with 42% of participants being either new or occasional riders.

- ‘Dr Bike’ events – at these events people bring their own bikes to a mechanic who gives them a basic M.O.T and performs minor fixes, as well as giving advice and guidance for future maintenance. We delivered four workplace events in 2023, two community events and one staff event.
- Walk to School Week – we offered free resources to all schools in the borough to help them join in this National Walking Promotion which takes place each May. Nineteen schools took participated this year.
- Clean Air Day on 17th June 2023, 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 and actively joining in our competitions.

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

- Finalise our plan and proposals for significant expansion of EV charging in residential areas, backed by govt LEVI funding, with a view to commence roll out of further chargers in partnership with a competitively procured supplier by 2025
- Update our EV Strategy and web page, so residents are clear on our plans and can find useful locally relevant information about electric vehicles (<https://www.bracknell-forest.gov.uk/roads-parking-and-transport/travel-and-public-transport/electric-vehicles>).
- Produce a new Local Transport Plan (LTP4) for the Borough, which will set out our plans, policies and ambitions for the transport network over the next 10 years and beyond, with a core focus on decarbonisation, improving air quality and using our networks more efficiently

- Hold a Cycling Festival on Saturday 14<sup>th</sup> September, in partnership with Trek, Avanti, Sustrans and The Lexicon, to promote cycling in the Borough and showcase what we have to offer.
- To investigate other ways of improving traffic flow along Crowthorne High Street, following delays caused by objections to plans aimed at improving this location in the centre of the Crowthorne AQMA.
- Begin to implement the schemes identified in the Local Cycling and Walking Improvement Plan. Bracknell Forest are in the process of reviewing our LCWIP, following changes to government guidance and design standards. In 2022, a successful online mapping engagement exercise through 'Commonplace' attracted over 2000 comments and contributions from the public; these will help inform our refreshed plan and its schemes.
- Work with the Climate Change Transport Working Group to identify issues on our extensive walking and cycling network, including encroaching vegetation, in an effort to make our routes more attractive for active travel and engage more positively with the local community.
- Discussions and promoting the anti-idling campaign at schools and taxi ranks continues through the parking Enforcement Team.
- Continue to use our series of short films that promote walking and cycling in the borough, including green spaces and the existing cycle path network.

Bracknell Forest Council worked to implement these measures in partnership with the following stakeholders during 2023:

- Neighbouring local authorities
- The Highways Authority
- Public Health



- Climate Change Group
- Neighbourhood Environmental Groups
- Parish Councils

The principal challenges and barriers to implementation that Bracknell Forest Council anticipates facing are;

- The Bracknell Forest AQAP needs updating, as most of the measure have been completed and have shown positive results and lead to the revocation of the Bracknell AQMA. This will be completed by 2024.
- The new AQAP which will focus on Crowthorne's AQMA will be published in 2024.

Bracknell Forest Council anticipates that the measures stated above and in Table 2.3 are/will achieve compliance in Bracknell AQMA and anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Crowthorne AQMA.

**Table 2.3 – Progress on Measures to Improve Air Quality**

The top three measures to be focused on in 2024 have been highted in yellow.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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	BFBC	BFBC	NO	Funded	£500k - £1 million	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	BFBC	BFBC	NO	Funded	£1 million - £10 million	Completed	Reduction in NO2 concentrations to below the objective in the AQMA 1	Reduce queues and journey time	Work completes 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	BFBC	BFBC	NO	Funded	£1 million - £10 million	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.
4	Widening of Downshire Way from Horse and	Traffic Management	Strategic highway improvements, Re-prioritising	2015	2020	BFBC	BFBC	NO	Funded	£1 million - £10 million	Completed	Reduction in NO2 concentrations to below the	Reduce queues and journey time	Work complete	As above.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
	Groom roundabout to Twin Bridges		Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane									objective in the AQMA 1			
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	Bracknell & Wokingham Council	Bracknell & Wokingham Council	NO	Funded	£50k - £100k	Completed	Reduction in NO <sub>2</sub> 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	2025	BFBC	BFBC	NO	Funded	£100k - £500k	Planning	Reduction in NO <sub>2</sub> 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	BFBC	BFBC	NO	Funded	£10k - 50k	Completed	Reduction in emissions from these types of measures can be in the order of 5% leading to a reduction in NO <sub>2</sub> 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
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	BFBC	BFBC	NO	Funded	£50k - £100k	Completed	Reduction in background NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations across the borough	Reduce queueing at bus stops and bus station to smooth flow. increase in	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 times.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
													number of people using buses		Improvements have been made to bus fleet, 85 meet Euro VI, 65% meet Euro V and only 1 bus used for emergencies only falls below Euro IV. Less use to the knock-on effect from COVID.
9	Improve signage along key routes including Bagshot Road in the AQMA	Transport Planning and Infrastructure	Cycle network	2016	2016	BFBC	BFBC	NO	Funded	< £10k	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 and walking levels across the wider Borough have increased by 13% from 2021 to 2022.
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	2035	BFBC	BFBC	NO	Not Funded	£100k - £500k	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.
11	Provision of real time	Promoting Travel Alternatives	Other	2018	2018	BFC	BFC	NO	Funded	£250k	Completed	Reduction in background NO2, PM10	Increase in number of	Real time information is provided at the	We continue to Encourage people to use the bus thus

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
	information at key bus stops											and PM2.5 concentrations across the borough	people using bus and rail	bus station, rail station forecourt and a number of key hubs and shopping destinations. Council website gives details on the sites where real time information (where available) for all stops in the borough and via specific smartphone apps.	reducing the number 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	£20k	Completed	Reduction in background NO2, PM10 and PM2.5 concentrations across the borough	Increase in number of people using bus and rail	Work is complete and website now has links to real-time information from external sites	BFBC has launched a MyJourney microsite, where you can get all your info for transport.
13	Commissioning further work with Government funding into smart ticketing	Promoting Travel Alternatives	Other	2015	2015	BFC	BFC	NO	Partially Funded	£50k	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 Thames Valley Buses accept payment by contactless bank card, no need now due to changing technology, smart phones, back cards etc.
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	£10k	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.
15	Development of travel plans by schools within the Borough	Promoting Travel Alternatives	School Travel Plans	2015	2032	BFC	BFC	NO	Not Funded	£20k	Completed	Reduction in background NO2, PM10 and PM2.5 concentrations	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

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
												across the borough			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. Promote walk to school week annually.
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	£340K	Completed	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 are 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. Several large employers run mini-buses for staff travelling from the station to the office (e.g. Dell).



Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
															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 are 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	£1 million - £10 million	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)	The fleet is increasing each time a new lease is required.
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	>£50,000	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.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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	
																Electric pool car and van now on fleet.



## 2.3 PM<sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy<sup>6</sup>, local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter (PM<sub>2.5</sub>). There is clear evidence that PM<sub>2.5</sub> (particulate matter smaller than 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The latest PM<sub>2.5</sub> data available (2023) from DEFRA show that Bracknell Forest Council has a maximum level of 10.44 µg/m<sup>3</sup> (co-ordinates x 487500 y167500), and the average level of 9.20 µg/m<sup>3</sup>. [Background Mapping data for local authorities - 2018 - Defra, UK](#). Figure 2.1 below shows that 0.81% of PM<sub>2.5</sub> is produced by Road & Transport, the other 99.19% is from other factors.

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 2.4. Further information about other areas of the UK can be found using the link below.

**Table 2.4 Fraction of mortality attributable to particulate air (new method) 2022 within Berkshire, 2021.**

National England Average	West Berkshire	Reading	Wokingham	Bracknell Forest	Windsor & Maidenhead	Slough
5.8%	5.8%	6.6%	5.9%	<b>6.5%</b>	6.6%	<b>7.1%</b>

[\(Public health profiles - OHID \(phe.org.uk\)\)](#)

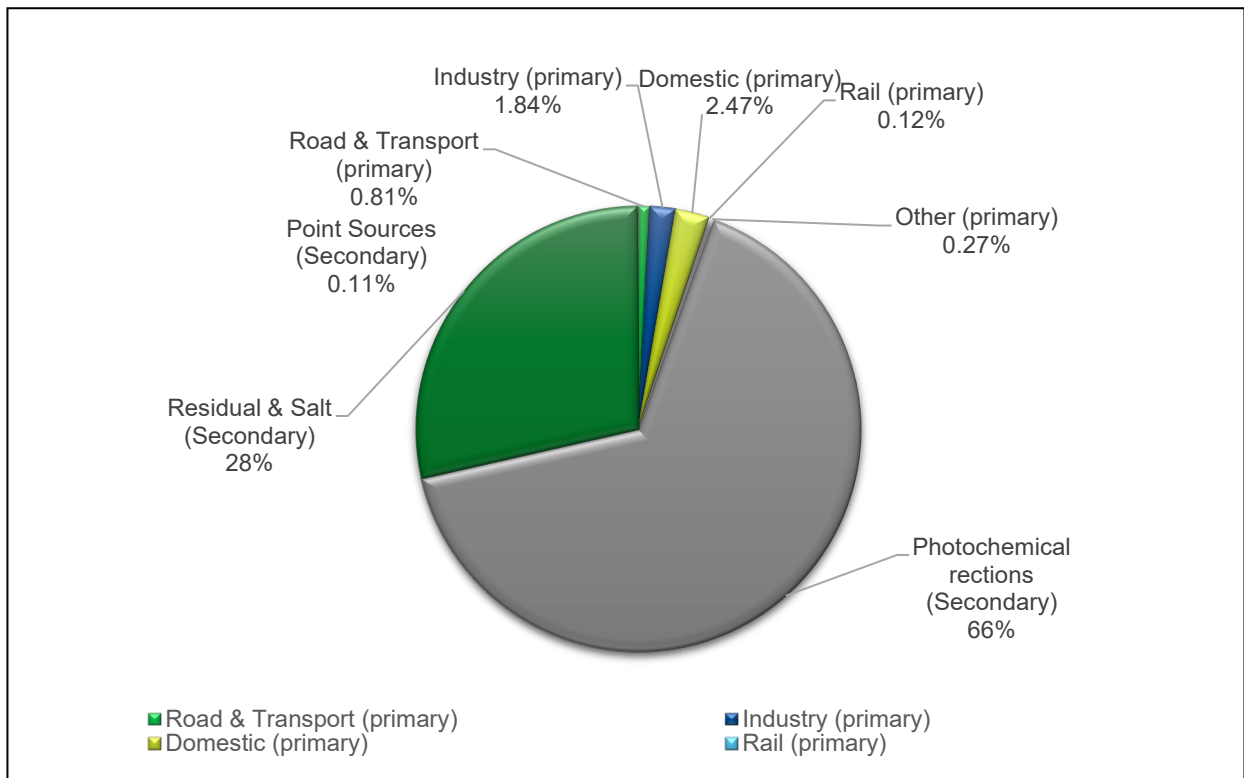
Many of the measures that Bracknell Forest are working on to address PM<sub>2.5</sub> reduction are regarding vehicle related emissions. Of those measures in the action plan, the following are examples of those that will contribute towards PM<sub>2.5</sub> reductions of the 0.81% are:

- Cycle network and promoting cycling and walking.

<sup>6</sup> Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

- Promoting low emission Council vehicles.
- Implemented Traffic calming measures in Crowthorne High Street
- Strategic highway improvements to smooth traffic flow and reduce journey times.
- Bracknell Forest Council also condition the use of Bonfires for Commercial development through the Planning process.
- Domestic bonfires are discouraged and further action can be taken under the Environmental Protection Act 1990 and the Clean Air Act 1993, if necessary.
- Advice is available to people who wish to use on open fire or wood burner:  
<https://publicprotectionpartnership.org.uk/environmental-health/neighbourhood-concerns/smoke-and-bonfires/>
- The industrial processes within the Borough, as permitted under Environmental Permitting (England & Wales) Regulations 2016, are inspected to make sure that they comply with their limit requirements .
- During the planning process, major sites are conditioned with dust suppression methods and bonfires are not allowed on the sites.
- The Public Protection Partnership has been awarded a DEFRA Grant to measure the PM<sub>2.5</sub> of the schools located near the AQMAs and to ascertain which mitigation measures can be taken at each specific site, to help them achieve the National AQ Objectives.

**Figure 2.1 A pie chart showing both the Primary and Secondary sources of PM2.5 <sup>(4)</sup>**



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

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

This section sets out the monitoring undertaken during 2023 by Bracknell Forest Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

### 3.1 Summary of Monitoring Undertaken

#### 3.1.1 Automatic Monitoring Sites

Bracknell Forest Council undertook automatic (continuous) monitoring at one site during 2023. Table A.0.1 in Appendix A shows the details of the automatic monitoring site. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide or lead, unless local circumstances indicate there is a problem.

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

#### 3.1.2 Non-Automatic Monitoring Sites

Bracknell Forest Council undertook non- automatic (i.e., passive) monitoring of NO<sub>2</sub> at 26 sites during 2023. Table A.0.2 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.

### 3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where necessary, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

### 3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Table A.0.3 and Table A.0.4 in Appendix A, compare the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past five years, with the air quality objective of 40µg/m<sup>3</sup>. 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 2023 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.

Table A.0.5 in Appendix A, compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past five years, with the air quality objective of 200µg/m<sup>3</sup>, which must not be exceeded more than 18 times per year.

There were 26 diffusion tube (passive monitoring) locations, of which three were triplicate and one was triplicate and co-located with the continuous monitor.

### Continuous Monitoring Downshire Way Bracknell

The Annual Mean Objective at Downshire Way, is below the Annual Mean Objective (40µg/m<sup>3</sup>) at 29.4µg/m<sup>3</sup> which is a decrease compared to 2022 (31.1µg/m<sup>3</sup>) (see Figure 3.1). The co-location study (diffusion tubes) result was slightly higher at 30.3µg/m<sup>3</sup>. There was one exceedance of the one hour objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times a year). There was an annual data capture of 96.8% which was very good and the site ran consistently throughout 2023.

The Bracknell continuous monitor also presented good correlation between Diffusion Tubes (passive data, triplicated site) and the continuous monitoring.

In general, the monthly average NO<sub>2</sub> concentration was higher in quarter 1 and quarter 2 during 2023 compared to 2022, except for March and June. For quarter 3 and quarter 4, the concentration were lower in 2023 than 2022, except for November.

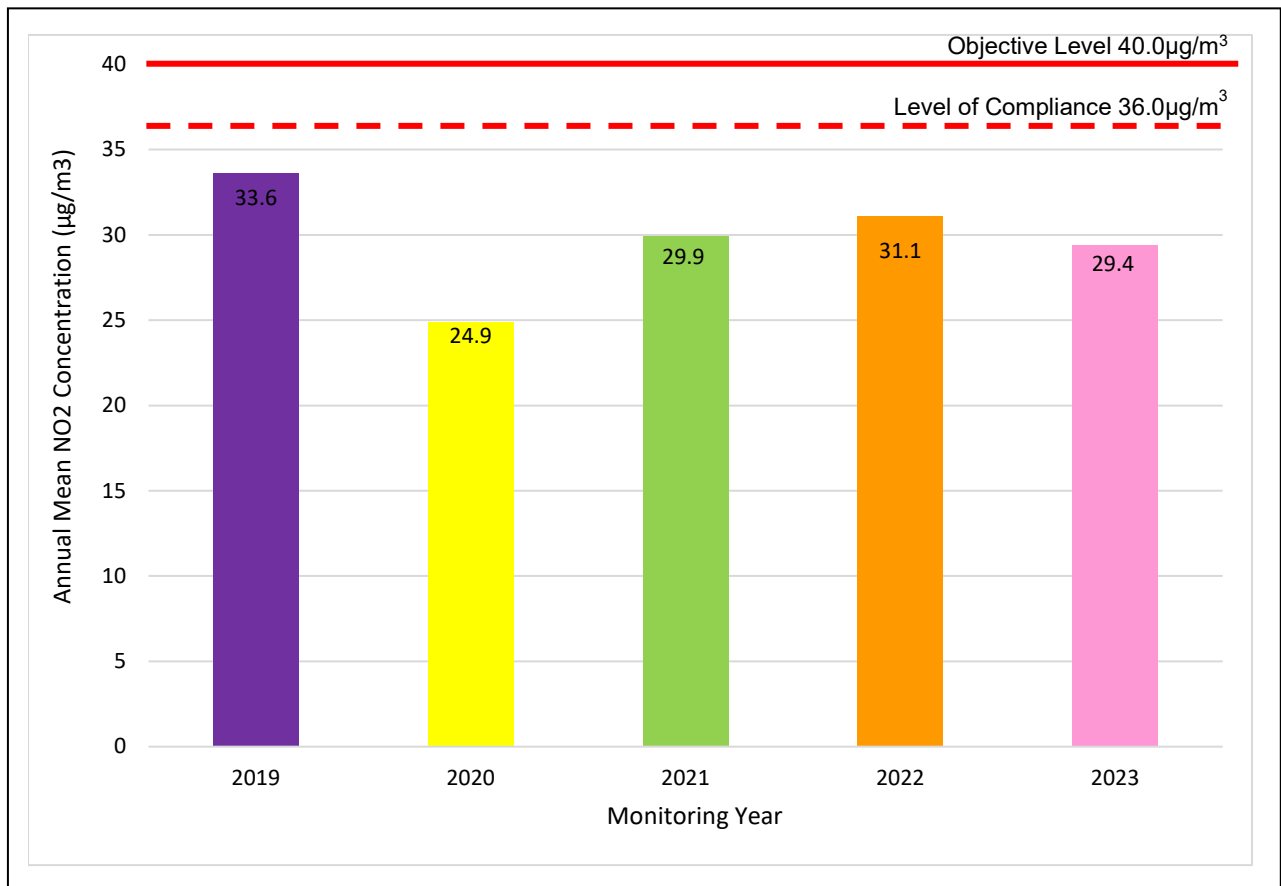
One exceedance of the 1 hour objective was recorded during 30th January, which would be due to a cold temperature inversion (see Figure 3.2 for the trends in the daily NO<sub>2</sub>).

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 consistently below

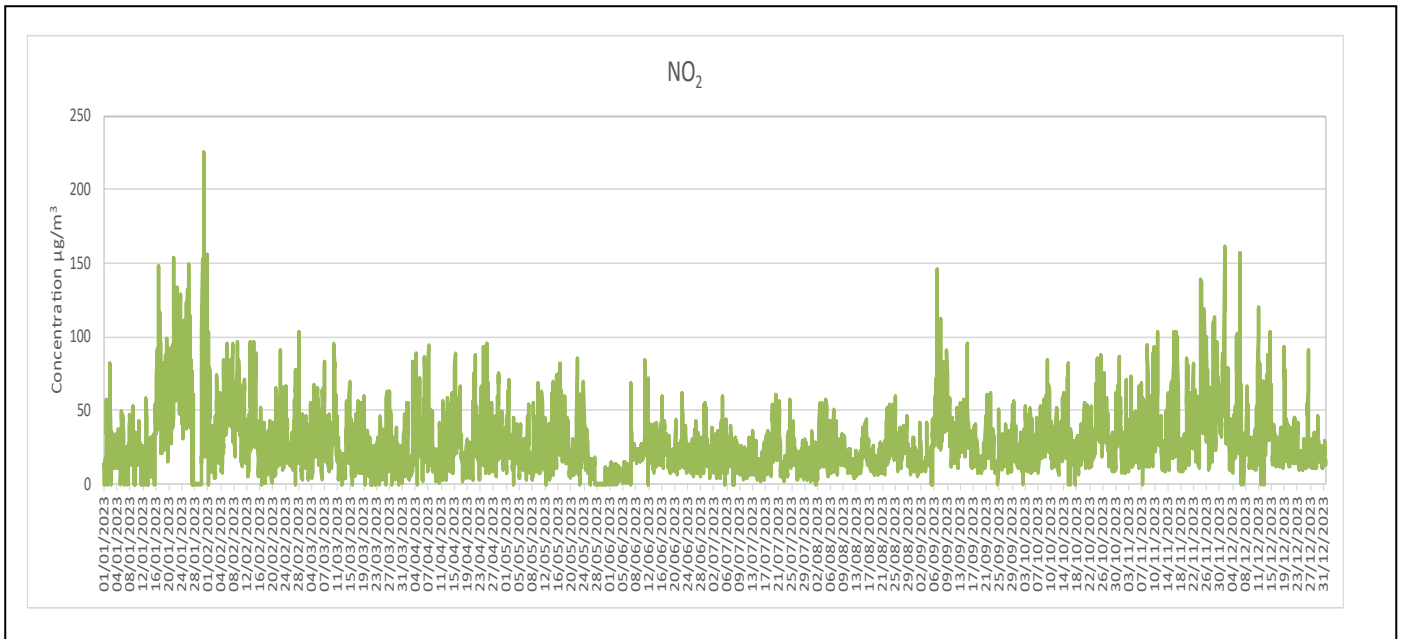
the objective level from 2019 to 2023. As we have seen the NO<sub>2</sub> maintain a level below 36 µg/m<sup>3</sup> for at least 3 consecutive years, the revocation of the AQMA for Bracknell has been started and will be completed in 2024.

The road layout of Downshire Way was altered in 2019/2020, since then, there have been no exceedances of the Air Quality Objectives and the NO<sub>2</sub> has also decreased. These decreases are a result of the road widening and improved traffic flow.

**Figure 3.1 Trends in annual mean NO<sub>2</sub> concentrations from the Downshire Way Continuous monitor.**



**Figure 3.2 A graph showing the Downshire Way Daily NO<sub>2</sub> 2023.**



### 3.3 Bracknell AQMA

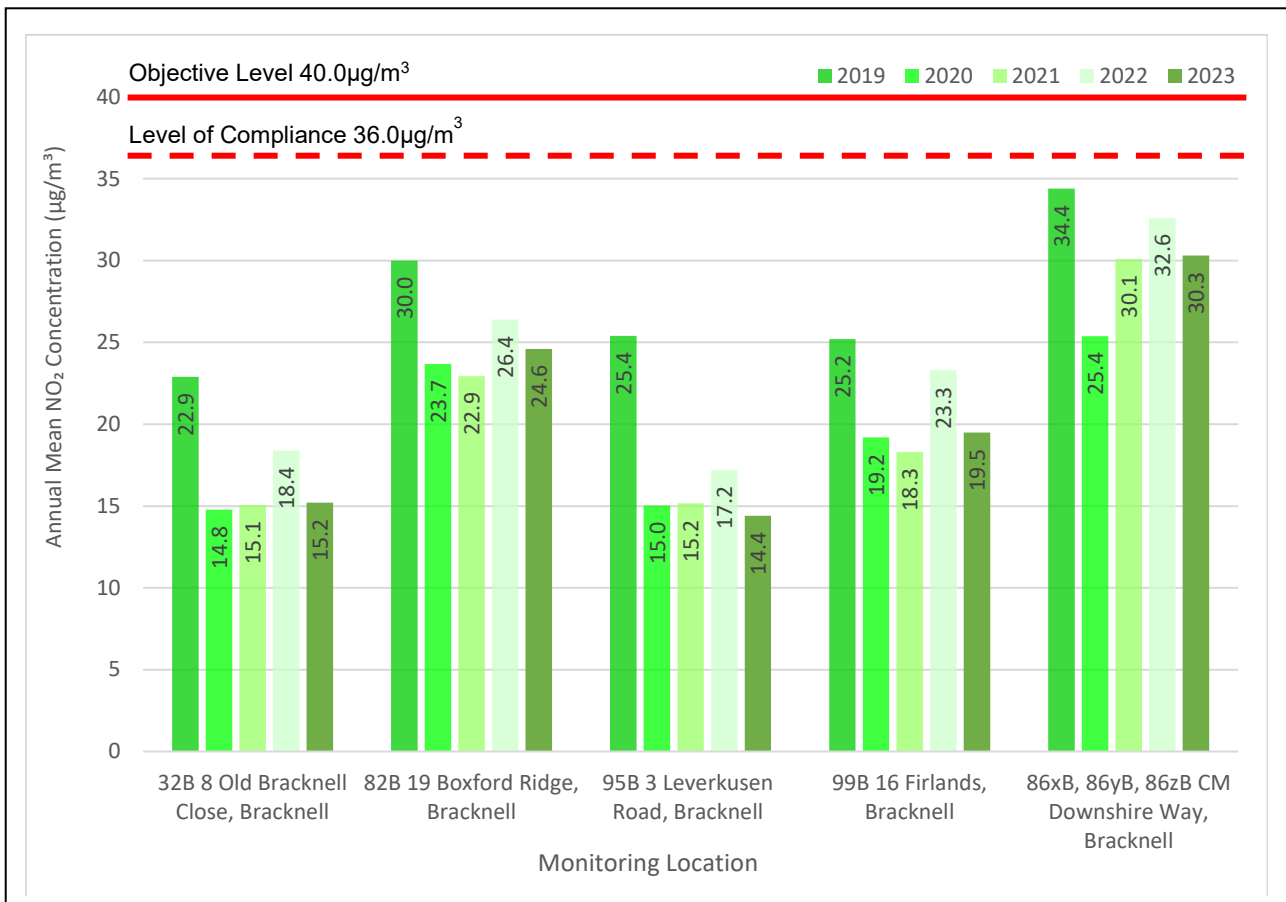
No diffusion tube sites within the Bracknell AQMA (for maps see Figures D.0.3 & D.0.4) have exceeded the Annual Mean Objective ( $40\mu\text{g}/\text{m}^3$ ). The co-location study at site ID 86 Downshire Way automatic monitor, read below the objective level for the fifth continuous year and the result of  $30.3\mu\text{g}/\text{m}^3$  is only slightly higher than the automatic level result of  $29.4\mu\text{g}/\text{m}^3$ . In 2023, all five of the sites' results had decreased from the 2022 readings. The NO<sub>2</sub> levels can be seen on Figure 3.3. All of the sites within AQMA remain below the 2019 levels, this may be due to more electric cars being used and a greater number of people continuing to work in a “hybrid” manner. Perhaps there is less traffic congestion and maybe, due to our campaigns, fewer people are idling in stop/start traffic.

Revocation of this AQMA has been recommended and this will happen in 2024, we will continue to measure the NO<sub>2</sub> using the diffusion tubes but the continuous monitor will be decommissioned, as the levels have been consistently below the air quality objective for over five years.

The full 2023 dataset of the Diffusion Tube NO<sub>2</sub> data for monthly mean values, is provided in Appendix B, these do not need to be distance corrected, as not over  $37.0\mu\text{g}/\text{m}^3$ . In addition, the NO<sub>2</sub> levels were not above the annual mean objective of  $40\mu\text{g}/\text{m}^3$ .

There were no exceedances of the  $200\mu\text{g}/\text{m}^3$  hourly mean objective recorded, which is below the Air Quality Objective of 18 exceedances per year.

**Figure 3.3 Showing the diffusion tube trends in annual mean NO<sub>2</sub> concentrations within Bracknell AQMA.**



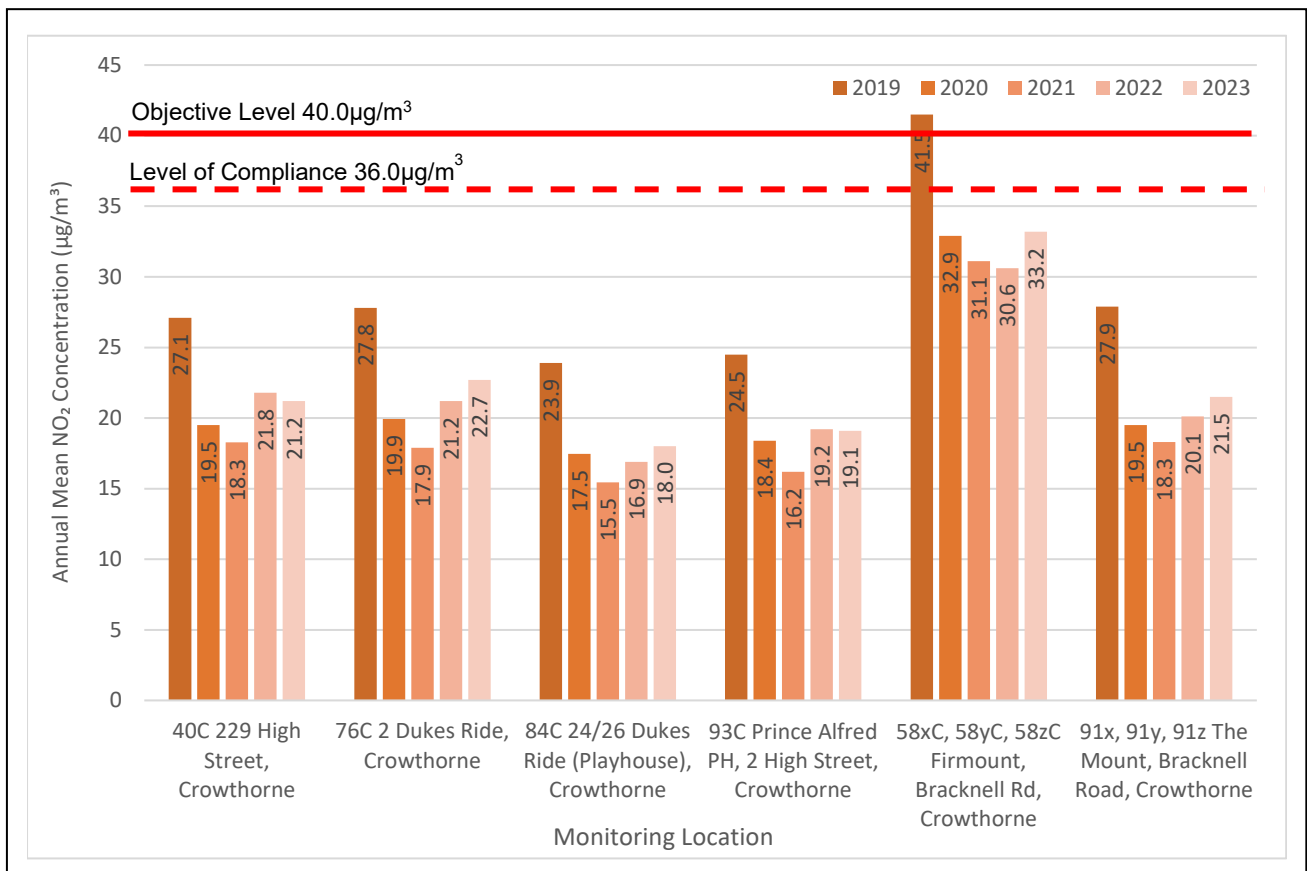
### 3.3.1 Crowthorne AQMA

For all six sites within the AQMA (for maps see Figures D.0.5 & D.0.6), there were no exceedances of the NO<sub>2</sub> annual objective (40.0 µg/m<sup>3</sup>) and all of the sites within this AQMA have continued to show reductions since 2019. Although, this year, four of the six sites show increased NO<sub>2</sub>, compared to 2022. Site 93 (Prince Alfred) reduced from 19.2 µg/m<sup>3</sup> to 19.1 µg/m<sup>3</sup>, and 40 (229 High Street) reduced from 21.8 µg/m<sup>3</sup> to 21.2 µg/m<sup>3</sup>. See Figure 3.4 for the NO<sub>2</sub> levels over the past five years.

No changes are required to the AQMA and we will continue to monitor around the increasing residential development. If the NO<sub>2</sub> continues on a downward trend, then we could revoke the AQMA once we have three years of consecutive data below 36 µg/m<sup>3</sup> from 2021.



**Figure 3.4 Showing the Crowthorne AQMA NO<sub>2</sub> diffusion tube results.**



**Outside of the AQMAs**

All fifteen sites outside the AQMA showed no exceedances of the annual objective (40µg/m<sup>3</sup>), five sites have increased NO<sub>2</sub>, since 2022 and ten sites show decreases, this may indicate the use of electric vehicles has increased, more people are working flexibly and perhaps fewer engines are left idling. All the tube results remain below the 2019 levels. (For maps see Figures D.0.6 to D.0.9) for the site NO<sub>2</sub> levels and locations.

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

### 3.3.2 Particulate Matter (PM<sub>10</sub>)

Table A.6 in Appendix A: Monitoring Results, compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past five years, with the air quality objective of 40µg/m<sup>3</sup>.

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

The annual mean annualised concentration, was well below the 40 µg/m<sup>3</sup> objective at the monitoring site. The level at the roadside site at Downshire Way was 17.2µg/m<sup>3</sup>, having decreased from 18.5µg/m<sup>3</sup> in 2022. There has been general decrease in levels reported from previous years which have improved from 19.0µg/m<sup>3</sup> to 17.2µg/m<sup>3</sup> over the last five years. The data capture recorded was 92.3%. The A322 corridor, is a stretch of road which forms the Bracknell AQMA, over the last five years this has been widened in order to manage congestion. At the section immediately adjacent to the continuous monitor, the work was completed in 2020.

There were no exceedances of the PM<sub>10</sub> daily mean concentrations (objective of 50µg/m<sup>3</sup>), not to be exceeded more than 35 times per year.

### 3.3.3 Particulate Matter (PM<sub>2.5</sub>)

PM<sub>2.5</sub> 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<sub>2.5</sub> monitoring since it was not a statutory requirement in 2023. However, in the absence of PM<sub>2.5</sub> monitoring and where a local authority carries out PM<sub>10</sub> monitoring, it is recommended to consult Chapter 7 Section 1 of [LAQM-TG22-August-22-v1.0.pdf \(defra.gov.uk\)](#) in order to include an estimate of PM<sub>2.5</sub> concentrations. In Appendix C, Table C.0.7 you will find the method of estimating the local concentration of 11.3 µg/m<sup>3</sup>. According to the new Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 for PM<sub>2.5</sub>, (i.e., the annual mean should not exceed 25 µg/m<sup>3</sup> and the interim target of 12 µg/m<sup>3</sup> to be met by end 2027 and long-term target of 10 µg/m<sup>3</sup> by 2040), Bracknell Forest currently falls within the target limits.

### 3.3.4 Sulphur Dioxide (SO<sub>2</sub>)

No sulphur dioxide monitoring is undertaken as BFBC are not required to by DEFRA.

## Appendix A: Monitoring Results

**Table A.0.1 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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
CM3	Downshire Way	Roadside	486501	168850	NO <sub>2</sub> , PM <sub>10</sub>	YES	CM3	Downshire Way	Roadside	486501

**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.0.2 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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
32B	8 Old Bracknell Close, Bracknell	Suburban	486567	168824	NO <sub>2</sub>	Bracknell	0.0	30.0	No	1.7
40C	229 High Street, Crowthorne	Kerbside	484054	163859	NO <sub>2</sub>	Crowthorne	0.0	3.0	No	1.6
76C	2 Dukes Ride, Crowthorne	Kerbside	484188	164180	NO <sub>2</sub>	Crowthorne	2.0	1.5	No	2.0
82B	19 Boxford Ridge, Bracknell	Suburban	486751	168658	NO <sub>2</sub>	Bracknell	0.0	14.0	No	1.9
84C	24/26 Dukes Ride (Playhouse), Crowthorne	Kerbside	484127	164189	NO <sub>2</sub>	Crowthorne	8.0	1.5	No	1.8
93C	Prince Alfred PH, 2 High Street, Crowthorne	Roadside	484176	164159	NO <sub>2</sub>	Crowthorne	0.0	4.0	No	1.8
95B	3 Leverkusen Road, Bracknell	Suburban	486941	168537	NO <sub>2</sub>	Bracknell	0.0	24.0	No	1.7
99B	16 Firlands, Bracknell	Roadside	487258	167948	NO <sub>2</sub>	Bracknell	0.0	10.0	No	1.6
117	Blue Smoke House, The Ring, Bracknell	Kerbside	486989	169392	NO <sub>2</sub>	NO	2.0	0.3	No	1.8
120	1-96 Platform Station, Bracknell	Kerbside	486883	168992	NO <sub>2</sub>	NO	10.0	1.5	No	2.2
122	1 Meadowsweet Lane, Warfield	Roadside	486163	170565	NO <sub>2</sub>	NO	0.0	6.6	No	1.9

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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
123	123 New Forest Ride, Winkfield Row	Roadside	488388	166666	NO <sub>2</sub>	NO	0.0	2.2	No	1.8
124	229 Yorktown Road, Sandhurst	Roadside	484686	161359	NO <sub>2</sub>	NO	0.0	1.7	No	2.3
126	Byron Drive, Crowthorne	Roadside	483805	163367	NO <sub>2</sub>	NO	6.0	1.5	No	3.0
127	7 Old Wokingham Road, Crowthorne	Roadside	484397	164420	NO <sub>2</sub>	NO	27.5	2.4	No	1.5
128	10 Lucas Place, Binfield	Kerbside	484893	168748	NO <sub>2</sub>	NO	2.0	35.0	No	2.0
129	Spring Cottage, Rectory Close, Bracknell	Kerbside	487124	168360	NO <sub>2</sub>	NO	7.0	1.4	No	2.5
130	Stet House, Albert Road, Bracknell	Kerbside	486802	169618	NO <sub>2</sub>	NO	0.0	13.8	No	2.0
132	2a Ralphs Ride, Bracknell	Roadside	488145	168900	NO <sub>2</sub>	NO	3.0	0.5	No	2.0
133	Newlands Place, London Road, Bracknell	Kerbside	487454	169297	NO <sub>2</sub>	NO	0.0	10.0	No	2.0
134	Kelvin Gate, Bracknell	Kerbside	487466	169430	NO <sub>2</sub>	NO	0.0	8.0	No	2.1
135	Woodleigh, Bracknell Road, Crowthorne	Kerbside	484289	164234	NO <sub>2</sub>	NO	10.0	17.0	No	2.5
58xC, 58yC, 58zC	Firmount, Bracknell Road, Crowthorne 3	Kerbside	484371	164285	NO <sub>2</sub>	Crowthorne	0.0	1.3	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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
91x, 91y, 91z	The Mount, Bracknell Road, Crowthorne 3	Roadside	484352	164249	NO <sub>2</sub>	Crowthorne	1.0	6.5	No	2.0
125x, 125y, 125z	69 Oak Tree Cottage, Sandhurst Rd, Crowthorne 3	Roadside	483776	163240	NO <sub>2</sub>	NO	5.0	5.0	No	2.0
86xB, 86yB, 86zB	Downshire Way Continuous Monitor, Bracknell 3	Roadside	486501	168850	NO <sub>2</sub>	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.0.3 Annual Mean NO<sub>2</sub> Monitoring Results: Automatic Monitoring (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
CM3 Downshire Way	486501	168850	Roadside	96.8	100	33.6	24.9	29.9	31.1	29.4

**Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22**

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

**Where exceedances of the NO<sub>2</sub> annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023**

#### **Notes:**

The annual mean concentrations are presented as µg/m<sup>3</sup>.

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

All means have been “annualised” as per LAQM.TG22 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.0.4 Annual Mean NO<sub>2</sub> Monitoring Results: Non-Automatic Monitoring (µg/m<sup>3</sup>)**

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
32B	486567	168824	Suburban	100	90.4	22.9	14.8	15.1	18.4	15.2
40C	484054	163859	Kerbside	100	92.3	27.1	19.5	18.3	21.8	21.2
76C	484188	164180	Kerbside	100	75.0	27.8	19.9	17.9	21.2	22.7
82B	486751	168658	Suburban	100	100.0	31.8	23.7	22.9	26.4	24.6
84C	484127	164189	Kerbside	100	90.4	23.9	17.5	15.5	16.9	18.0
93C	484176	164159	Roadside	100	92.3	24.5	18.4	16.2	19.2	19.1
95B	486941	168537	Suburban	100	100.0	25.4	15.0	15.2	17.2	14.4
99B	487258	167948	Roadside	100	100.0	25.2	19.2	18.3	23.3	19.5
117	486989	169392	Kerbside	100	92.3	24.1	17.4	15.7	17.8	19.4
120	486883	168992	Kerbside	100	76.9	27.3	15.9	16.6	19.2	17.1
122	486163	170565	Roadside	100	100.0	22.0	15.7	14.5	18.0	14.7
123	488388	166666	Roadside	100	92.3	35.2	24.5	22.6	25.1	25.3
124	484686	161359	Roadside	100	100.0	28.3	26.6	24.6	25.5	25.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
126	483805	163367	Roadside	100	92.3	23.4	12.9	11.4	13.6	12.5
127	484397	164420	Roadside	100	84.6	22.4	14.3	13.3	15.0	15.7
128	484893	168748	Kerbside	100	100.0	18.4	15.3	13.3	15.5	13.8
129	487124	168360	Kerbside	100	92.3	20.4	13.2	12.2	12.8	12.2
130	486802	169618	Kerbside	100	100.0		18.8	16.6	18.5	18.2
132	488145	168900	Roadside	100	80.8		17.6	17.2	18.1	20.1
133	487454	169297	Kerbside	100	100.0		15.9	13.7	16.6	14.9
134	487466	169430	Kerbside	100	100.0		19.2	17.9	20.4	19.0
135	484289	164234	Kerbside	100	100.0		13.6	13.1	14.3	15.1
58xC, 58yC, 58zC	484371	164285	Kerbside	100	100.0	<b>41.5</b>	32.9	31.1	30.6	33.2
91x, 91y, 91z	484352	164249	Roadside	100	100.0	27.9	19.5	18.3	20.1	21.5
125x, 125y, 125z	483776	163240	Roadside	100	100.0	24.2	16.3	16.1	17.9	16.4
86xB, 86yB, 86zB	486501	168850	Roadside	100	90.4	34.4	25.4	30.1	32.6	30.3

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

☒ 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  $\mu\text{g}/\text{m}^3$ .

Exceedances of the  $\text{NO}_2$  annual mean objective of  $40\mu\text{g}/\text{m}^3$  are shown in **bold**.

$\text{NO}_2$  annual means exceeding  $60\mu\text{g}/\text{m}^3$ , indicating a potential exceedance of the  $\text{NO}_2$  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.TG22 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.0.1 Trends in Annual Mean NO<sub>2</sub> Concentrations within the Crowthorne AQMA**

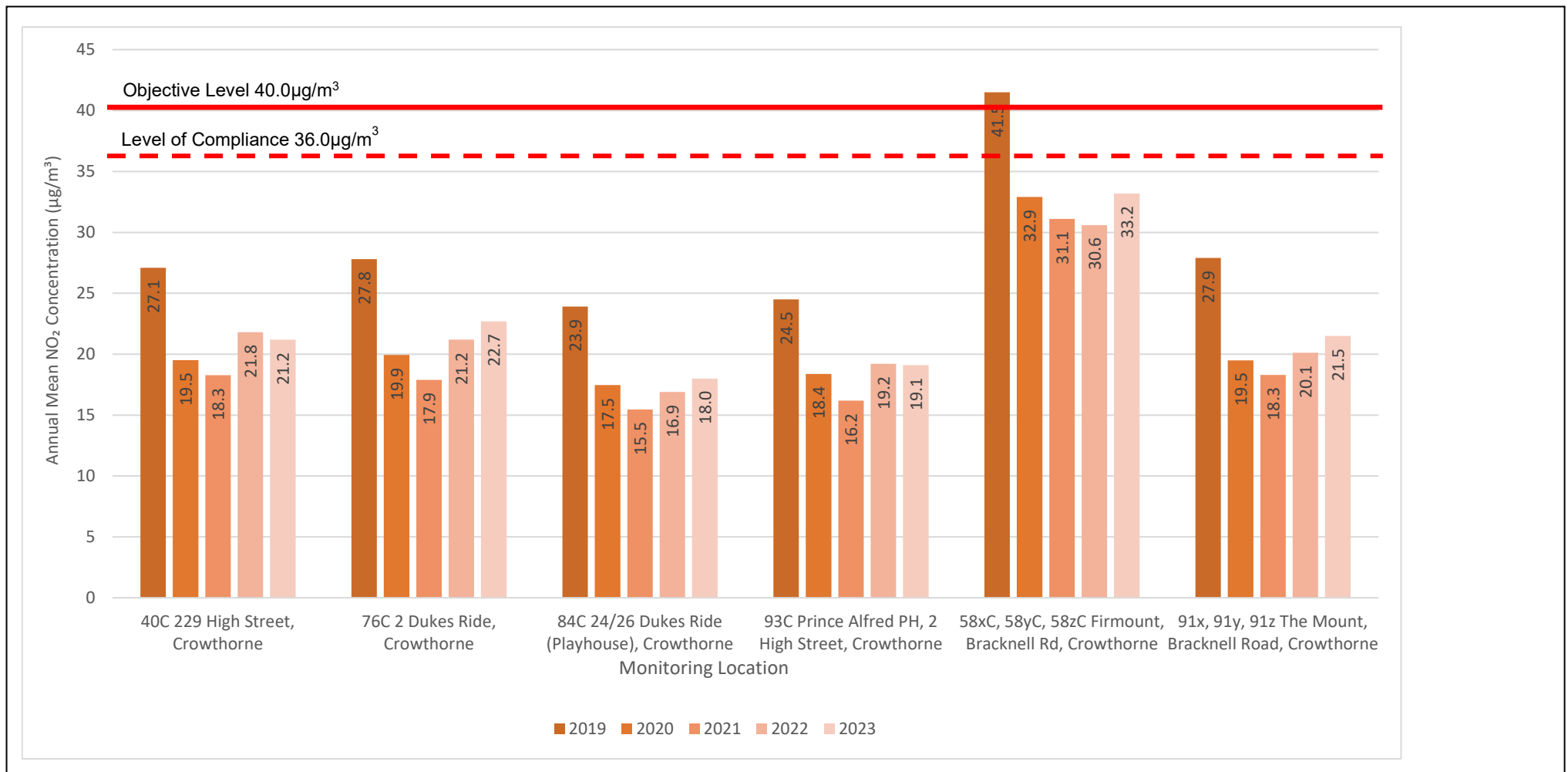


Figure A.1 presents NO<sub>2</sub> annual mean concentrations for sites within the Crowthorne AQMA from 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a general trend of reduction across the sites since 2019.

**Figure A.0.2 Trends in Annual Mean NO<sub>2</sub> Concentrations within the Bracknell AQMA**



Figure A.1 presents NO<sub>2</sub> annual mean concentrations for sites within the Bracknell AQMA from 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a general trend of reduction across the sites since 2019.

**Figure A.0.3 Trends in Annual Mean NO<sub>2</sub> Concentrations within Bracknell (outside AQMA's)**



Figure A.3 presents NO<sub>2</sub> annual mean concentrations for sites within the Bracknell (outside AQMA) from 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a mixed trend of reduction and minor increases, across the sites since 2019.

**Figure A.0.4 Trends in Annual Mean NO<sub>2</sub> Concentrations within the Wider Bracknell Forest Borough (outside AQMAs)**



Figure A.4 presents NO<sub>2</sub> annual mean concentrations for sites within the Bracknell (outside AQMA) from 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a trend of reduction across the sites since 2019.

**Figure A.0.5 Trends in Annual Mean NO<sub>2</sub> Concentrations from the Downshire Way Continuous Monitor**



Figure A.5 presents NO<sub>2</sub> annual mean concentrations from the Downshire Way Continuous Monitor from 2019 to 2023. There have been no exceedances of the annual mean objective over the past five years and there is a mixed trend of reduction and increase in NO<sub>2</sub> since 2019.



**Table A.0.5 1-Hour Mean NO<sub>2</sub> Monitoring Results, Number of 1-Hour Means > 200µg/m<sup>3</sup>**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
CM3 Downshire Way	486501	168850	Roadside	100	96.8	0 (127.07)	0 (92.02)	0	0	1

**Notes:**

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m<sup>3</sup> have been recorded.

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> 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 six months, the maximum data capture for the full calendar year is 50%).

**Table A.0.6 Annual Mean PM<sub>10</sub> Monitoring Results (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
CM3 Downshire Way	486501	168850	Roadside	100	92.3	17.18	18.4 (31.3)	17.1	18.5	17.2

**Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.**

**Notes:**

The annual mean concentrations are presented as µg/m<sup>3</sup>.

Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

All means have been “annualised” as per LAQM.TG22 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 six months, the maximum data capture for the full calendar year is 50%).

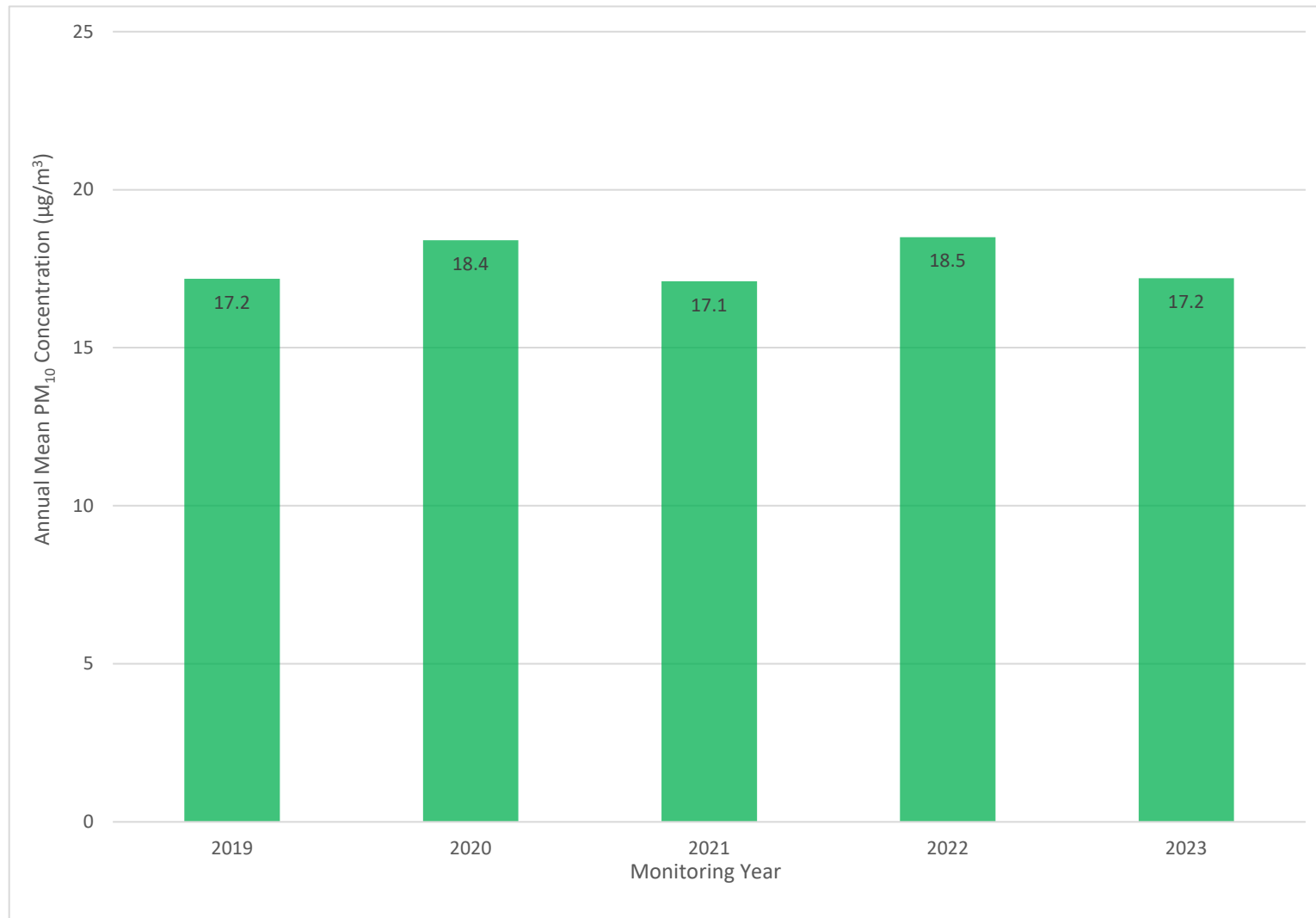
**Figure A.0.6 Trends in Annual Mean PM<sub>10</sub> Concentrations from Downshire Way Continuous Monitor**

Figure A.5 presents PM<sub>10</sub> annual mean concentrations from the Downshire Way continuous monitor from 2019 to 2023. There have never been any exceedances of the annual objective and level remains fairly consistent over the past five years.

**Table A.0.7 24-Hour Mean PM<sub>10</sub> Monitoring Results, Number of PM<sub>10</sub> 24-Hour Means > 50µg/m<sup>3</sup>**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
CM3 Downshire Way	486501	168850	Roadside	100	92.3	<b>6</b> (35.64)	<b>0</b> (18.4)	0	1	0

**Notes:**

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

Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> 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 six months, the maximum data capture for the full calendar year is 50%).

## Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.0.1 NO<sub>2</sub> 2023 Diffusion Tube Results (µg/m<sup>3</sup>)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.83	Annual Mean: Distance Corrected to Nearest Exposure	Comment
32B	486567	168824	24.9	25.1		19.0	14.5	13.4	12.4	15.5	20.5	20.6	21.6	14.4	18.3	15.2	-	
40C	484054	163859	28.8	31.7	25.0	26.6	24.2	22.7		26.3	28.5	26.4	24.3	16.3	25.5	21.2	-	
76C	484188	164180	32.1	31.8	26.4	23.8	23.3	23.2			28.5	28.5	28.1		27.3	22.7	-	
82B	486751	168658	35.5	32.5	28.4	25.3	20.5	26.2	33.8	28.2	36.4	33.9	28.7	26.0	29.6	24.6	-	
84C	484127	164189	27.4	28.3	22.2	21.2	19.1	18.0	18.7		21.5	21.7	23.9	16.9	21.7	18.0	-	
93C	484176	164159	30.2	28.0	21.9	22.6	20.5	19.5		25.0	23.5	21.9	24.0	16.0	23.0	19.1	-	
95B	486941	168537	25.9	24.8	19.0	18.9	1.7	12.8	12.1	16.4	22.7	21.0	20.6	12.8	17.4	14.4	-	
99B	487258	167948	30.9	26.2	25.3	19.4	18.1	17.3	19.8	20.1	29.7	27.8	25.7	21.9	23.5	19.5	-	
117	486989	169392	25.0	26.7	38.9	20.0	17.6	17.5	15.2	17.1	23.7		38.7	17.1	23.4	19.4	-	
120	486883	168992	27.9		21.7	22.8	18.5	17.9	12.3	17.1	25.6		21.8		20.6	17.1	-	
122	486163	170565	23.4	23.4	17.1	18.3	17.7	15.4	10.7	14.4	19.4	19.6	20.2	13.0	17.7	14.7	-	
123	488388	166666	38.8	36.4	30.8	30.8	28.0	29.4	24.0	24.2	32.4	30.8	29.2		30.4	25.3	-	
124	484686	161359	<b>41.1</b>	39.4	1.0	32.5	32.9	30.1	23.8	27.0	36.8	34.4	34.3	28.4	30.1	25.0	-	
126	483805	163367	19.7	20.5	21.4	18.7	12.7	11.9	7.1	10.0	14.2	14.8	14.5		15.0	12.5	-	
127	484397	164420	22.2	24.0	18.8	17.6	17.2	15.4		18.0	19.2	18.4	18.4		18.9	15.7	-	
128	484893	168748	23.2	24.7	16.1	15.5	17.2	15.5	8.5	14.3	18.8	17.3	18.2	9.9	16.6	13.8	-	
129	487124	168360	18.0	17.3	15.3	16.6	15.8	12.8	7.5	11.6	16.3	13.4	17.0		14.7	12.2	-	
130	486802	169618	28.3	26.5	21.9	19.6	13.6	16.9	18.9	18.4	27.1	27.2	24.6	20.4	21.9	18.2	-	
132	488145	168900	27.2	27.8		20.5	21.4	21.1	14.6		<b>44.1</b>	23.8	24.9	16.8	24.2	20.1	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.83	Annual Mean: Distance Corrected to Nearest Exposure	Comment
133	487454	169297	26.1	24.7	18.0	18.6	14.4	18.6	12.5	15.8	21.3	21.5	22.7	0.6	17.9	14.9	-	
134	487466	169430	32.1	27.6	23.5	22.4	16.8	14.4	17.0	19.2	27.0	26.6	26.8	21.9	22.9	19.0	-	
135	484289	164234	32.1	25.7	17.2	15.8	15.2	16.3	11.2	13.3	19.3	19.7	19.7	12.6	18.2	15.1	-	
58xC	484371	164285	<b>44.2</b>	<b>48.5</b>	<b>42.0</b>	<b>42.2</b>	22.0	38.1	35.0	35.5	<b>43.3</b>	<b>41.5</b>	<b>49.4</b>	32.3	-	-	-	Triplicate Site with 58xC, 58yC and 58zC - Annual data provided for 58zC only
58yC	484371	164285	<b>46.5</b>	<b>48.9</b>	<b>41.8</b>	<b>40.2</b>	22.2	41.3		<b>49.4</b>	<b>44.4</b>	<b>41.9</b>	<b>44.1</b>	32.6	-	-	-	Triplicate Site with 58xC, 58yC and 58zC - Annual data provided for 58zC only
58zC	484371	164285	<b>49.1</b>	<b>48.0</b>	<b>45.3</b>	<b>41.5</b>	22.1	39.4	35.7	34.3	<b>44.1</b>	<b>41.3</b>	<b>43.8</b>	34.0	<b>40.0</b>	33.2	-	Triplicate Site with 58xC, 58yC and 58zC - Annual data provided for 58zC only
91x	484352	164249	30.6	32.2	25.3	23.6	38.2	16.3	16.9	20.0	28.2	27.8	28.8	20.1	-	-	-	Triplicate Site with 91x, 91y and 91z - Annual data provided for 91z only
91y	484352	164249	29.4	32.8	24.7	23.5	36.7	21.1	17.5	20.4	28.8	28.9	28.1	19.2	-	-	-	Triplicate Site with 91x, 91y and 91z - Annual data provided for 91z only
91z	484352	164249	28.7	31.6	24.4	24.0	37.4	23.4	18.0	21.0	29.1	28.9	27.9	18.7	25.9	21.5	-	Triplicate Site with 91x, 91y and 91z - Annual data provided for 91z only
125x	483776	163240	26.7	26.2	21.1	19.2	19.7	16.9		24.8	22.2	19.7	10.4	14.4	-	-	-	Triplicate Site with 125x, 125y and 125z - Annual data provided for 125z only
125y	483776	163240	29.2	27.1	21.6	13.0	19.4	16.4		16.3	22.3	20.0	21.9	14.9	-	-	-	Triplicate Site with 125x, 125y and 125z - Annual data provided for 125z only
125z	483776	163240	27.3	27.3	7.0	19.0	19.9	17.0	15.2	23.8	22.8		21.8	15.2	19.7	16.4	-	Triplicate Site with 125x, 125y and 125z - Annual data provided for 125z only
86xB	486501	168850	<b>42.4</b>	<b>44.0</b>		38.1	36.5	33.3	31.0	32.4	<b>40.4</b>	35.0	40.5	27.1	-	-	-	Triplicate Site with 86xB, 86yB and 86zB - Annual data provided for 86zB only
86yB	486501	168850	<b>43.0</b>	<b>43.7</b>		38.3	38.2	33.3	31.7	32.5	37.8	36.4	35.4	29.0	-	-	-	Triplicate Site with 86xB, 86yB and 86zB - Annual data provided for 86zB only
86zB	486501	168850	<b>43.0</b>	<b>44.5</b>		39.3	37.9	34.0	31.7	33.5	37.6	37.1	36.9	29.0	36.5	30.3	-	Triplicate Site with 86xB, 86yB and 86zB - Annual data provided for 86zB only

- All erroneous data has been removed from the NO<sub>2</sub> diffusion tube dataset presented in Table B.1.
- Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.
- Local bias adjustment factor used.
- National bias adjustment factor used.
- Where applicable, data has been distance corrected for relevant exposure in the final column.
- Bracknell Forest Council confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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 2023**

Bracknell Forest Council has not identified any new sources relating to air quality within the reporting year of 2022.

### **Additional Air Quality Works Undertaken by Bracknell Forest During 2023**

#### **DEFRA Air Quality Grant 2020/21**

The combined grant awarded to three local authorities (Bracknell Forest, West Berkshire and Wokingham) was £259,000 for the projects creating an anti-idling campaign, measuring PM<sub>2.5</sub> and NO<sub>2</sub> at the schools located near/within the AQMAs and looking at behaviour change (anti-idling) of our residents, with the aim of reducing exposure of children at school and raising awareness of parents /carers and children and the wider community.

#### **PM<sub>2.5</sub> Monitoring**

AECOM, air quality consultants, were appointed to monitor PM<sub>2.5</sub>, PM<sub>10</sub> and weather, at or close to, fourteen selected schools within, or close to, the AQMAs. Monitoring at the schools, took place between February 2022 and February 2023 for a minimum of 3 months, including term-time and holiday periods. This provided a snapshot of the levels around schools using a low-cost air quality sensor unit (Vortex) providing real-time measurements, at five-minute intervals. As the data was not ratified or calibrated against a reference equivalent monitor, the data only provides an indicative measurement. The monitors were paired with weather sensors to continuously measure parameters including wind speed and direction,



temperature and rainfall. The air quality monitoring equipment was attached to a lamp post or streetlight and the weather stations were close by on another lamp post, or streetlight.

The data has not been annualised to represent an annual mean so the results are indicative only. However, the 'period means' were all below the relevant air quality objectives. All the schools fell within the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 for PM<sub>2.5</sub> (i.e., the annual mean should not exceed 25 µg/m<sup>3</sup> and the interim target of 12 µg/m<sup>3</sup> to be met by end 2027 and long-term target of 10 µg/m<sup>3</sup> by 2040.)

Hourly, daily and weekly results were analysed for temporal distribution and plotted to compare the difference between school term-time and holidays. Lower concentrations seen in the daytime were due to warmer temperatures allowing PM to disperse; night time cooler temperatures reduce the atmospheric boundary layer and increase stability, acting to trap PM closer to the ground. The concentrations did vary, weather clearly influenced concentrations i.e., rainfall acts to disperse and deplete pollution more readily. During the winter, higher concentrations from the continent were noted, compared to the cleaner maritime air from the Atlantic. Interestingly, patterns in road traffic flow effects were not as significant as the weather conditions. The morning rush hour increase in concentration was evident, with higher concentrations recorded around 09.00 and then again around 16.00, coinciding with the end of the school day. Concentrations were higher in the middle of the week than at the end of the week and weekends, due to changes in road traffic and commercial/industrial activity in the post-covid hybrid working pattern. Overall, lower concentrations were noted in holiday periods.

The schools have all been sent their site-specific Particulate Monitoring Report and Action Plan. This details the monitoring, results, analysis and a number of actions to further investigate the sources of pollution and target air quality improvements for children at the school and the surrounding area. It is recommended that an audit of sources around the school is carried out before considering the most appropriate actions to take. The audit could include looking at the age of boilers and where their flues are positioned, the location of the playground adjacent to busy roads and whether any screening exists, school travel plans and accessibility for cycling/scooting to school and a review of vehicle engine idling or traffic queuing outside the school. In addition, a number of mitigation measures were identified, divided into generic, (which could be applicable across the district/borough) and more specific, to each school. For each measure an approximate timescale and cost was given based on the following criteria: potential air quality benefits, cost, deliverability and wider benefits (e.g., improved safety, child health and promotion of sustainable transport).

While the study did not identify any significant health risks associated with exposure to PM<sub>2.5</sub>, recommendations have been made to reduce the levels of PM<sub>2.5</sub> in the air, wherever possible. See Table C.0.1 Full the school results.

**Table C.0.1 showing the PM<sub>2.5</sub> measured at schools using Vortex sensors during the DEFRA project.**

School	Data capture	Average concentration PM <sub>2.5</sub> (µg/m <sup>3</sup> )	Below annual mean objective (25 µg/m <sup>3</sup> )	Monitoring Dates
Birch Hill Primary School	98.4	1.4	Y	27/06/2022 to 25/09/2022
Crown Wood Primary School	99.9	4.6	Y	24/02/2022 to 20/05/2022
Crowthorne Church of England Primary School	96.9	2.1	Y	29/03/2022 to 27/06/2022
Edgbarrow School	99.9	2.2	y	16/08/2022 to 14/11/2022
Fox Hill Primary School	91.7	1.4	Y	31/05/2022 to 20/09/2022
Harmans Water Primary School	97.1	1.1	Y	30/05/2022 to 28/08/2022
King's Academy Oakwood	100	5.4	Y	19/10/2022 to 17/01/2022
New Scotland Hill Primary School	61.2	2.2	Y	17/08/2022 to 15/11/2022
Ranelagh School	87.1	3.4	Y	29/03/2022 to 27/06/2022
St Joseph's Catholic Primary School, Bracknell	91.7	3.7	Y	24/02/2022 to 20/05/2022
St Michael's Easthampstead Church of England Primary School	96.8	1.8	Y	31/05/2022 to 20/09/2022
The Brakenhale School	80.7	1.2	Y	31/05/2022 to 20/09/2022
Wildmoor Heath School	96	3.8	Y	16/08/2022 to 14/11/2022
Wildridings Primary School	79.9	1.5	Y	31/05/2022 to 20/09/2022

## Biggest NO<sub>2</sub> Loser

During 2022, the Biggest NO<sub>2</sub> Loser section of the DEFRA Grant award began, this involved using diffusion tubes to measure the NO<sub>2</sub> outside those twelve schools within Bracknell

Forest Council, located closest to the three AQMA's. The 2022 results were compared with the 2023 results to see whether the Behaviour Change experiment (educating children and carers by posting anti-idling signs and asking the schools to send out information on idling to the guardians who drop off the children,) actually made a difference outside schools.

The results were excellent with all schools reducing the NO<sub>2</sub> during the experiment. The school with the greatest reduction won a certificate, reusable water bottles for each child, air quality bookmarks and posters to go up in the school. Plus a leaflet to accompany the school newsletter and another copy of the School Air Quality Tool Kit and educational lesson plan [air-quality-school-toolkit-final-version-1-003.pdf](https://publicprotectionpartnership.org.uk/air-quality-school-toolkit-final-version-1-003.pdf) ([publicprotectionpartnership.org.uk](https://publicprotectionpartnership.org.uk)). See Table C.0.2 for the NO<sub>2</sub> data for each school monitored.

The results show that the greatest reduction occurred at St Michael's Easthampstead Church of England Voluntary Aided Primary School, with an incredible reduction of 24.5%, King's Academy Oakwood reduced NO<sub>2</sub> by the smallest amount, at 2.0% but this is still a positive. These results prove that the Behaviour Change Project is working in Bracknell and that people are driving more mindfully and in environmentally friendly manner.

**Table C.0.2 Showing the raw NO<sub>2</sub> results for 2022 and 2023, plus the percentage reduction for the bigger NO<sub>2</sub> loser competition**

School	2022 NO <sub>2</sub> (µg/m <sup>3</sup> )	2023 NO <sub>2</sub> (µg/m <sup>3</sup> )	Percentage Difference (%)
St Michael's Easthampstead Church of England Voluntary Aided Primary School	23.83	17.99	-24.5
Wildridings Primary School	13.62	10.54	-22.6
St Joseph's Catholic Primary School	13.54	11.24	-17.0
Fox Hill Primary School	14.24	12.19	-14.4
Wildmoor Heath School	10.80	9.31	-13.8
New Scotland Hill Primary School	11.01	9.66	-12.2
Edgbarrow School	12.63	11.16	-11.6
Crown Wood Primary School	18.56	16.64	-10.4
Crowthorne Church of England Primary School	18.65	17.91	-4.0

Harmans Water Primary School	12.83	12.33	-3.9
Birch Hill Primary School	13.44	13.00	-3.3
King's Academy Oakwood	18.63	18.26	-2.0

## The Revocation of the Bracknell AQMA

### The AQMA

The original Bracknell AQMA was declared for the NO<sub>2</sub> annual mean in 2011 but was reduced in size during 2013 following further assessment. It was then designated along the A322 Bagshot Road and Downshire Way from Berkshire Way to the junction with B3430.

### The Nitrogen Dioxide Levels

The nitrogen dioxide levels for the Bracknell AQMA, have been monitored using diffusion tubes at five sites, (one of which is triplicate) and a reference continuous monitor (see Appendix A Map 2). The diffusion tubes sites are located as follows:

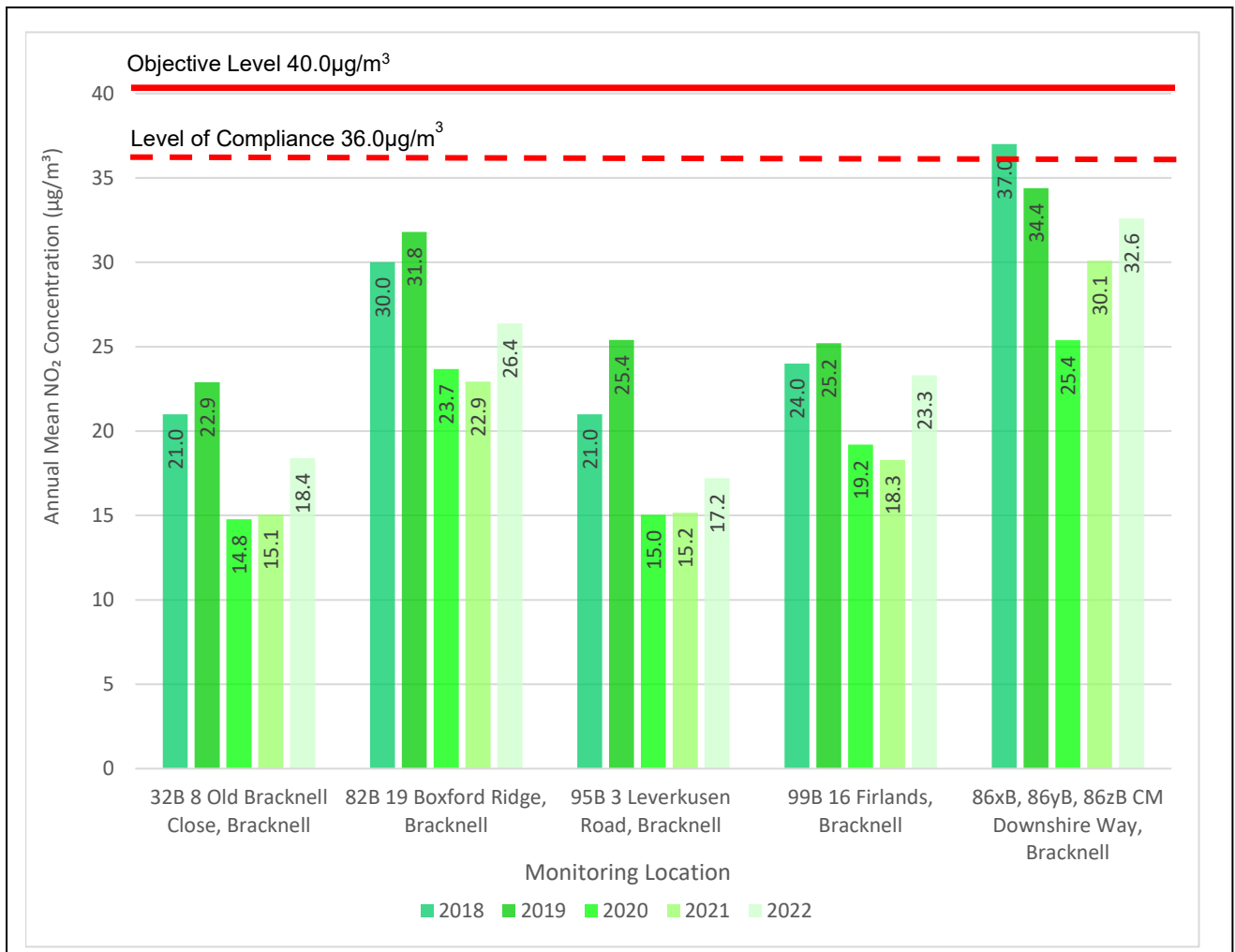
- 32b – 8 Old Bracknell Close, Bracknell
- 82b – 19 Boxford Ridge, Bracknell
- 95b – 3 Leverkusen Road, Bracknell
- 99b – 16 Firlands, Bracknell
- 86xb, 86yb, 86zb – Continuous monitor Downshire Way, Bracknell.

The results have been 36.0µg/m<sup>3</sup> or below, for the past five years, at four of the diffusion tube locations (Figure D.0.3, D.0.4, D.0.7) and continuous monitor (Figure D.0.3). One of the diffusion tube locations (86xb, 86yb, 86zb), co-located with the Continuous monitor, has been at 36.0µg/m<sup>3</sup> or below since 2019. Whilst the NO<sub>2</sub> has started to rise slightly since 2020, it remains below the 2019 levels (as shown in Figures C.0.1 & C.0.2 below).

A number of factors may have contributed to this reduction in NO<sub>2</sub>, including significant capacity improvement works carried out on Downshire Way (A322) between the Twin

Bridges and Horse and Groom junctions. Traffic flow and movement have improved on what was a bottleneck with significant congestion. This has been complemented by wider traffic management improvements at all junctions along the AQMA/ A322 corridor, with new traffic signals and junction layout changes, improving traffic flow and reducing congestion. There has also been a change in traffic trends during the day, i.e. peak traffic is typically slightly lower than pre-pandemic levels but traffic during the inter-peak hours is higher, consequently there is less congestion and queuing within the AQMA. There has also been an increase in LGVs making up for a decrease in car traffic. This is likely partly because of increased homeworking but also increasing home deliveries.

**Figure C.0.1 Diffusion Tube NO<sub>2</sub> Levels in the Bracknell AQMA from 2018 to 2022**



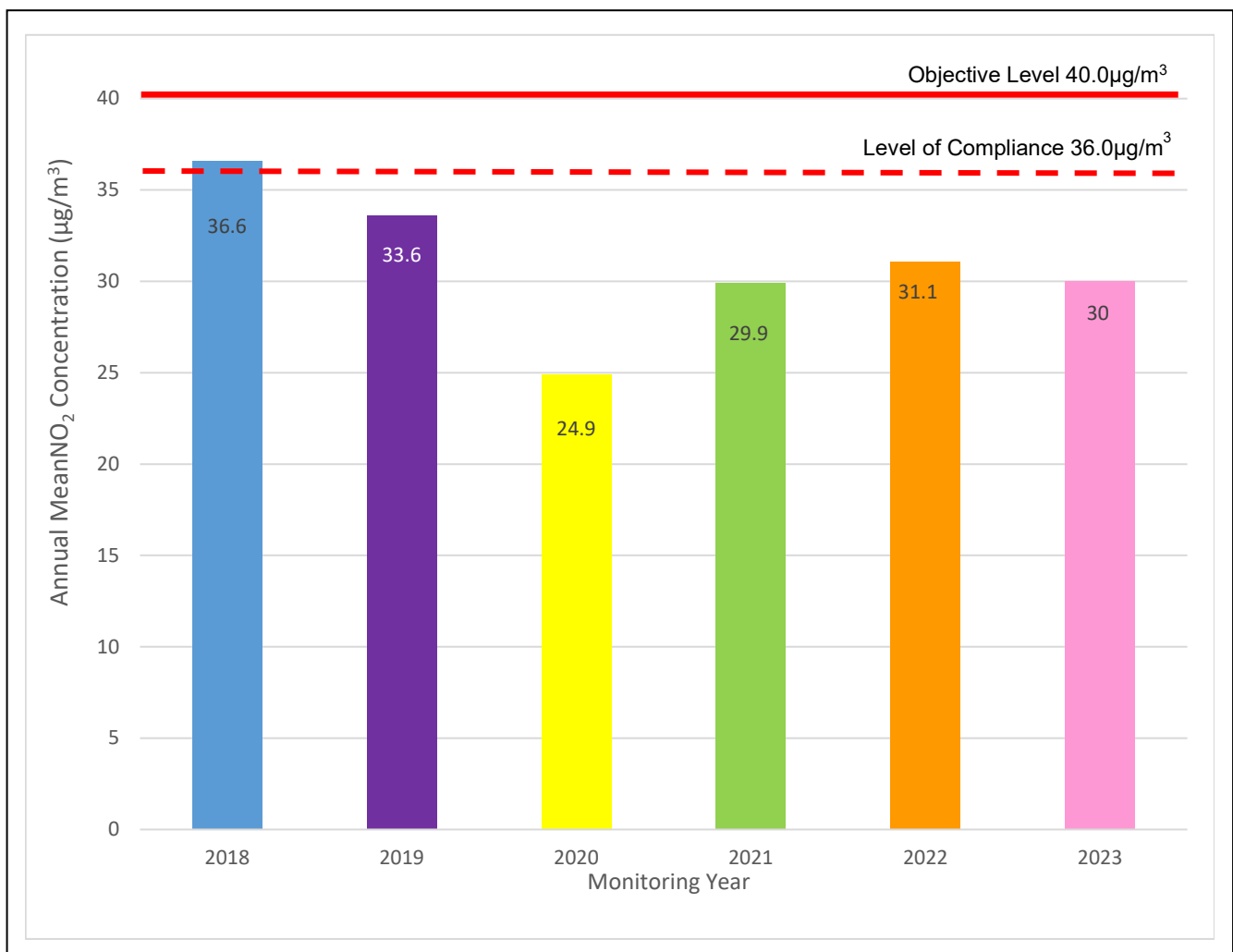
## Monitoring

Monitoring will continue for NO<sub>2</sub> at the sites using diffusion tubes as advised in LAQM.TG (22) to ensure that the levels remain at 36.0µg/m<sup>3</sup> or below, for the next 3 years.

## 2023 Monitoring Results

Throughout 2023 the five diffusion tubes site within the AQMA, have remained in place along with the continuous monitor. The 2023 data from the continuous monitor has shown a reduction in an annual average NO<sub>2</sub> to 30µg/m<sup>3</sup> from 31.1 µg/m<sup>3</sup> in 2022 and remains below 36.0µg/m<sup>3</sup> (as shown in Figures C.0.1 and C.0.2), The results from the diffusion tubes are below 36µg/m<sup>3</sup> from analysis and comparison with 2022 data and the current data from the continuous monitor.

**Figure C.0.2 Continuous monitor NO<sub>2</sub> Levels in the Bracknell AQMA from 2018 to 2023**



**Table C.0.3 A table showing the 2023 Continuous monitoring data for the Downshire Way.**

Month	Average NO concentration ( $\mu\text{g}/\text{m}^3$ )		Monthly comparison (%)	Quarterly Annual Average		Quarterly comparison (%)
	2022	2023		2022	2023	
January	45.1	53.6	+17	32.4	38.0	+16
February	25.2	35.8	+35			
March	27.6	25.3	-9			
April	23.9	27.1	+12	24.6	24.4	-0.8
May	22.7	25.7	+12			
June	27.5	20.3	-35			
July	34.8	18.8	-85	33.2	23	-36
August	30.4	21.8	-39			
September	34.5	28.6	-21			
October	31.0	30.2	-3	33.8	34.6	+2
November	28.5	39.7	28			
December	41.8	33.9	-23			
<b>Annual Average</b>	<b>31.1</b>	<b>30.0</b>	<b>- 3</b>			

## 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<sub>2</sub> 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, as 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 have 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.

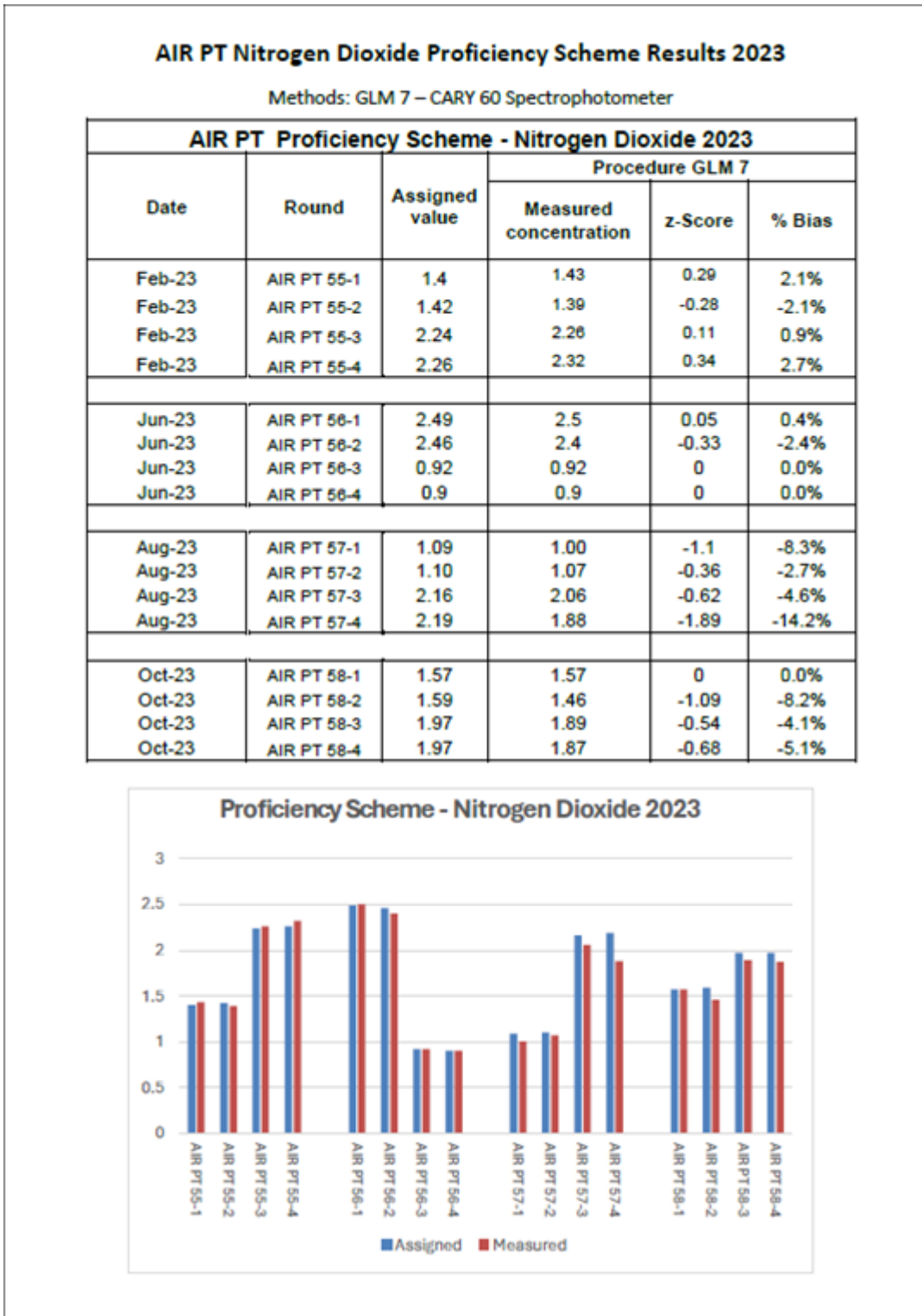
**UNACCEPTABLE:** Results obtained by the participating laboratory differ by more than 15% of the assigned value. This equates to an RPI of greater than 225.

Bracknell Forest Council use Gradko International for the supply and analysis of the nitrogen dioxide diffusion tubes for their non-automatic monitoring programme and they are changed in-line with DEFRA monitoring calendar.



The diffusion tube is designed for passively monitoring gaseous airborne Nitrogen dioxide. It is an acrylic tube fitted with coloured and white thermoplastic rubber caps. The coloured cap contains the absorbent. The concentrations of Nitrite ions and hence  $\text{NO}_2$  chemically adsorbed are quantitatively determined by UV/ Visible Spectrophotometry with reference to a calibration curve derived from the analysis of standard nitrite solutions (UKAS Accredited Methods). They are suitable for carrying out spatial or localized assessments for  $\text{NO}_2$  ambient air or workplace monitoring. It can be used for co-location projects alongside an automatic analyser to obtain bias correction factors. The tube Dimensions: 71.0mm length x 11.0mm internal diameter. Bracknell Forest uses the absorbent preparations of Triethanolamine (TEA) absorbent are available: 20% Triethanolamine / De-ionised Water. Gradko's proficiency scheme results for 2023s AIR PT please see Figure C.3. Nitrogen Dioxide AIR PT 2023.

Figure C.0.3 Gradko’s performance for AIR PT 2023



**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 25% do not require annualisation.

## Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 ASR has 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.TG22 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<sub>x</sub>/NO<sub>2</sub> continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Bracknell Forest Council have applied a local bias adjustment factor of 0.83 to the 2023 monitoring data (as shown in Table C.0.5). A summary of bias adjustment factors used by Bracknell Forest Council over the past five years is presented in Table C.0.4. **Bracknell Forest Council have also followed the DEFRA timetable for tube collection 2023 as published on the LAQM website.**

**Table C.0.4 Bias Adjustment Factor**

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	Local	-	0.83
2022	Local	-	0.87
2021	Local	-	0.83
2020	National	-	0.81
2019	National	09/20	0.88

**Table C.0.5 Local Bias Adjustment Calculation**

	Local Bias Adjustment Input 1
Periods used to calculate bias	11
Bias Factor A	0.83 (0.71 - 0.99)
Bias Factor B	21% (1% - 41%)
Diffusion Tube Mean (µg/m <sup>3</sup> )	36.5
Mean CV (Precision)	2.5%
Automatic Mean (µg/m <sup>3</sup> )	30.2
Data Capture	99%
Adjusted Tube Mean (µg/m <sup>3</sup> )	30 (26 - 36)

**Notes:**

A single local bias adjustment factor has been used to bias adjust the 2023 diffusion tube results.

The local co-located sites combined are used as bias adjustment, so factor 0.83 was applied. A copy of the co-location spreadsheet used is provided below.

In determining the bias adjustment factor for the 2023 data, the following were taken into account:

Cases where the locally obtained bias adjustment factor may be more representative:

- Where the diffusion tube exposure periods are weekly or fortnightly – *Downshire Way the co-location study sites are 28-day exposures.*
- For co-location sites with “good” precision on diffusion tubes and with high quality chemiluminescence results – *It can be seen from Table C.5 above that the co-location study achieved “good” precision and “good Data Capture” at 99%. The chemiluminescence monitor results (automatic monitoring) are high quality (see the QA/QC of Automatic Monitoring section above).*

Cases where the combined (national) bias adjustment factor may be more representative:

- Where the survey consists of tubes exposed over a range of settings, which differ from the co-location site – *this is not the case for Bracknell Forest.*
- Where the co-location study is for less than nine months, although the diffusion tube monitoring is for a longer period - *The Downshire Way co-location study and diffusion tube surveys take place over a full calendar year.*
- Where the automatic analyser has been operated using local, rather than national, QA/QC procedures. *The Downshire Way chemiluminescence results (automatic monitoring) are high quality, see the QA/QC of Automatic Monitoring section above.*
- Where data capture from the automatic analyser is less than 90%, or there have been problems with data quality. *Data capture from the Downshire Way automatic monitor was 99% in 2023 (Figure C.5).*
- For co-location sites with “poor” precision or laboratories with predominately “poor” precision, as set out on the Review & Assessment Helpdesk website - *It can be seen from the table above that the Downshire Way co-location study achieved “good” precision and the laboratory precision was also “good”. See the QA/QC of Diffusion Tube Monitoring section above.*

**In conclusion, it can be seen from the discussion above that due to the high data capture rate from the automatic analyser in The Bracknell AQMA on the Downshire Way (99%), that the Local Bias Adjustment Factor was of 0.83 was appropriate.**

### **NO<sub>2</sub> Fall-off with Distance from the Road**

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO<sub>2</sub> concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO<sub>2</sub> fall-off with distance calculator, available on the LAQM Support website. Where appropriate, non-automatic annual mean NO<sub>2</sub> concentrations corrected for distance, are presented in Table B.1. No diffusion tube NO<sub>2</sub> monitoring locations within Bracknell Forest required distance correction during 2023.

### **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 month, 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 Envidas 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 is 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 judgment. 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 converter is checked and the analyser is 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 13<sup>th</sup> December 2023. The equipment audits utilise procedures that are applied within the Environment Agency automatic air monitoring network quality control programme.

### **Oxides of Nitrogen Analysers**

A major factor governing the analyser's performance is the NO<sub>x</sub> 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 97.8% efficient at an NO<sub>2</sub> concentration of 266ppb and 97.8% efficient at an NO<sub>2</sub> concentration of 138ppb. But due to an unstable response these results should be treated with caution.

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).

As mentioned in the introduction, the site zero system produced a very unstable response, therefore the audit zero cylinder was used to determine the zero response of the analyser. In order to provide reliable zero calibration results, we recommend the zero scrubber materials are changed at the next available opportunity.

Please note, the NOx analyser response to span gases was around double the expected results. It is recommended that the analyser is recalibrated at the next available opportunity.

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 analyser's flow rate sensor was within  $\pm 10\%$  of the calibrated flow meter and therefore passed this test.

Based on the 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 site cylinder was tested at all four TRL air quality monitoring stations and at each station the cylinder recalculation results were all within 4%.

The results of the recalculations are presented in Table C.0.6

**Table C.0.6 Bracknell Forest Council, Downshire Way NO Cylinder.**

<b>TRL Bracknell, Downshire Way – NO cylinder 113914</b>				
	<b>NOx (ppb)</b>	<b>% change from stated</b>	<b>NO (ppb)</b>	<b>% change from stated</b>
Manufacturers Stated Concentration	<b>540</b>	---	<b>538</b>	---
Recalculated concentration (26/01/23)	521	-3.5	523	-2.7



The recalculated results for the site NO cylinder 113914 (Table C.4) indicates the concentrations are stable, within the definition adopted above, and can therefore reliably be used to scale ambient data.

### **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 can be provided by TRL upon request.

### **Particulate Matter TEOM PM10**

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  $\pm 2.5\%$  of the stated factors. The difference between the calculated and stated factors was  $+0.31\%$ , this is a good result.

### **PM<sub>10</sub> and PM<sub>2.5</sub> Monitoring Adjustment**

The type of PM<sub>10</sub> monitor(s) utilised within Bracknell Forest Council do not require the application of a correction factor.

### **PM<sub>2.5</sub> Estimation**

In the absence of PM<sub>2.5</sub> monitoring and where a local authority carries out PM<sub>10</sub> monitoring, it is recommended to consult Chapter 7 Section 1 of [LAQM-TG22-August-22-v1.0.pdf \(defra.gov.uk\)](#) in order to include an estimate of PM<sub>2.5</sub> concentrations.

The estimated annual mean PM<sub>10</sub> concentration at a roadside site in 2022 was  $17.2 \mu\text{g}/\text{m}^3$ , with the PM<sub>2.5</sub> concentration being  $11.3 \mu\text{g}/\text{m}^3$ , see below for the estimation calculation.

**Table C.0.7 Predicted PM<sub>2.5</sub> at Downshire Way**

Site ID	Bias Adjusted Annual Mean PM <sub>10</sub> (µg/m <sup>3</sup> ) (A)	Nationally Derived Correction Factor for roadside sites (B)	Estimated PM <sub>2.5</sub> (µg/m <sup>3</sup> ) (A-B=C)
<b>Downshire Way Continuous Monitor (CM3)</b>	17.2	5.9	<b>11.3</b>

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

Figure D.0.1 Map of the Bracknell AQMA



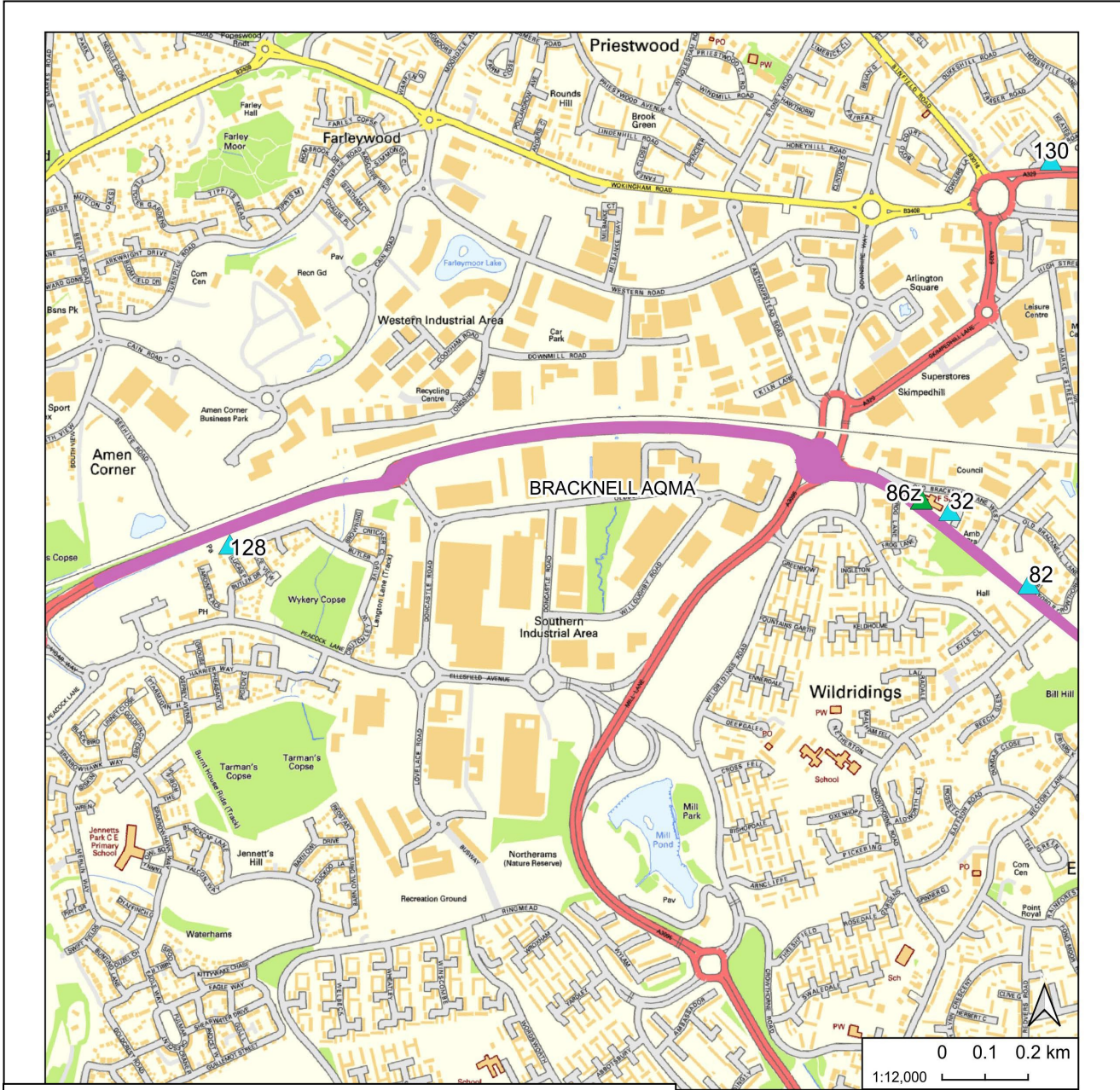


Figure D.0.2 Map of Crowthorne AQMA





Figure D.0.3 Map of Bracknell AQMA monitoring locations (North)



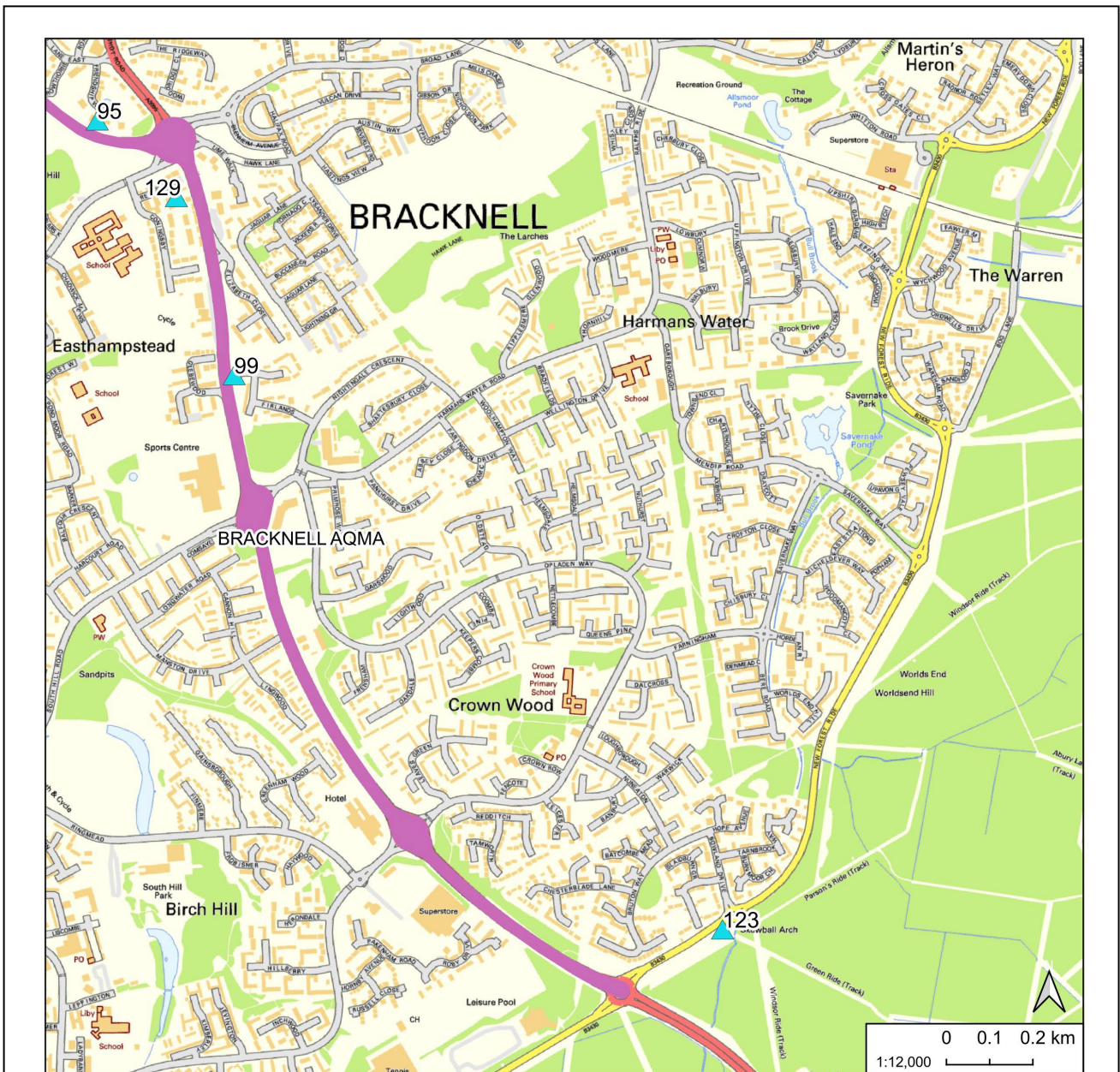
Tube	2019	2020	2021	2022	2023
CM	33.6	24.9	29.9	31.1	29.4
86	34.4	25.4	30.1	32.6	30.3
32	22.9	14.8	15.1	18.4	15.2
82	30.0	23.7	22.9	26.4	24.6
128	18.4	15.3	13.3	15.5	13.8

- ▲ Continuous monitoring site
- ▲ Diffusion tube
- AQMA

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Figure D.0.4 Map of Bracknell AQMA monitoring locations (South)



Tube	2019	2020	2021	2022	2023
129	20.4	13.2	12.2	12.8	12.2
99	25.2	19.2	18.3	23.3	19.5
123	35.2	24.5	22.6	25.1	25.3
95	25.4	15.0	15.2	17.2	14.4

- ▲ Continuous monitoring site
- ▲ Diffusion tube
- AQMA

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Figure D.0.5 Map of Crowthorne AQMA monitoring locations (North)

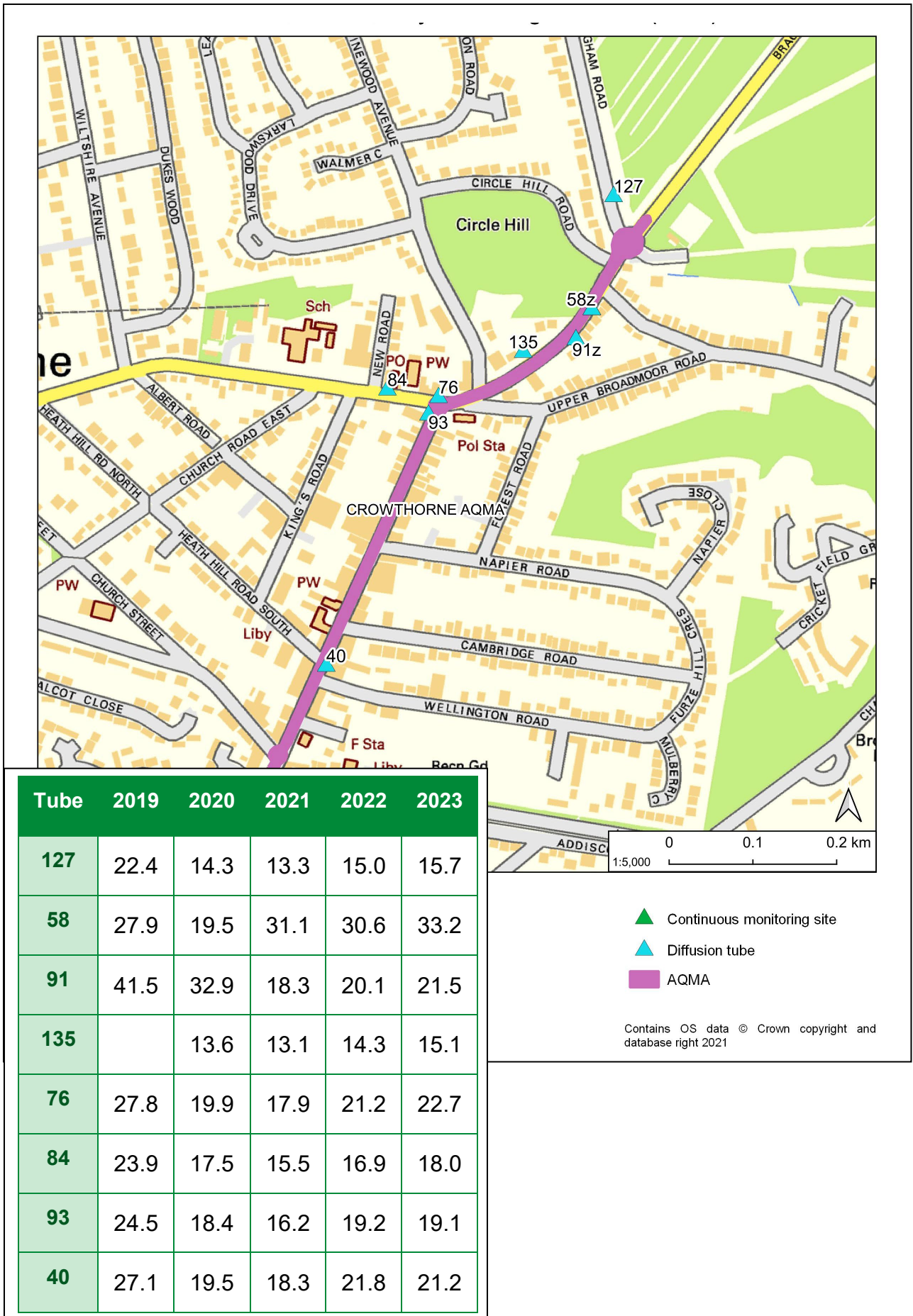




Figure D.0.6 Map of Crowthorne monitoring locations (South)

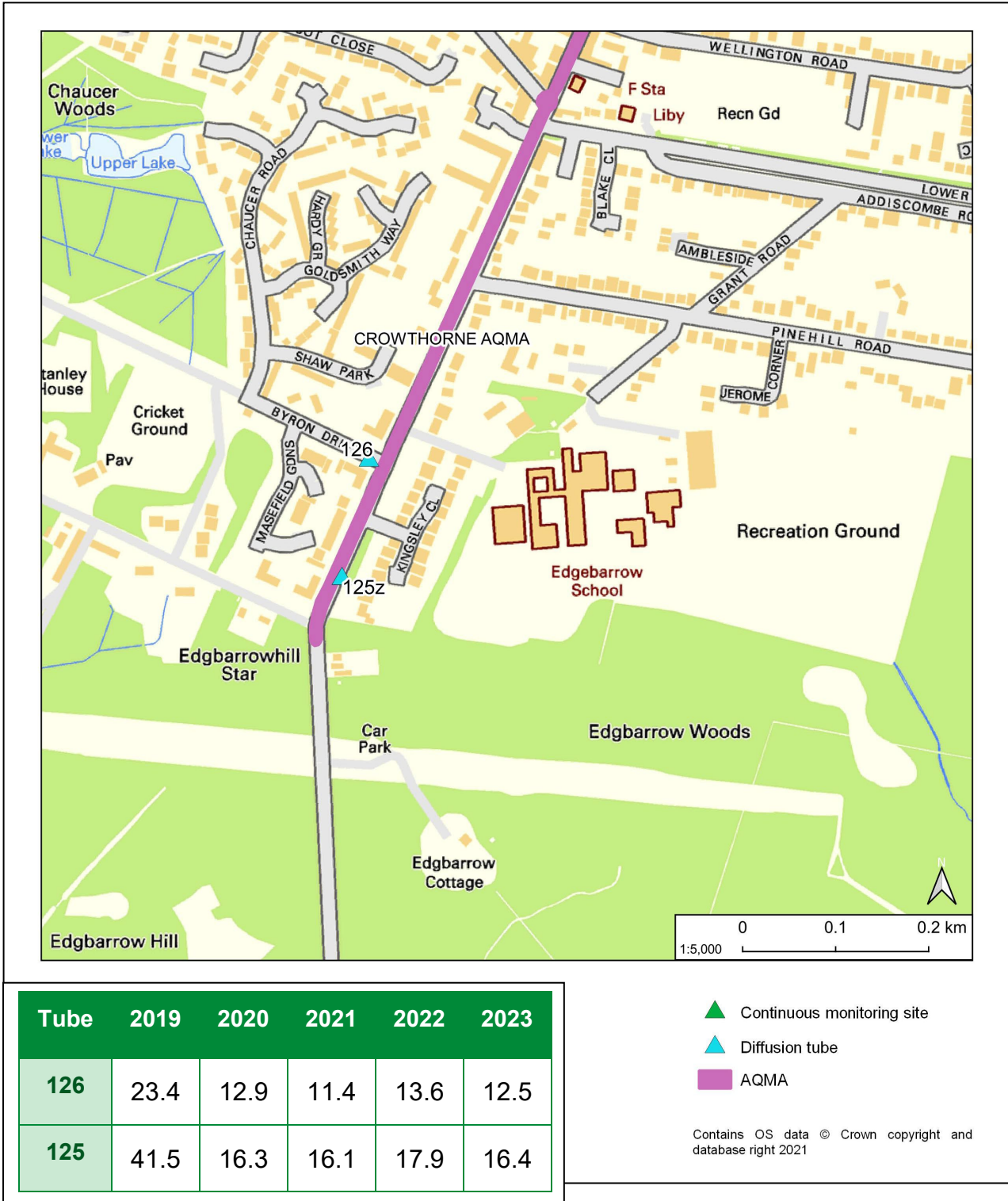
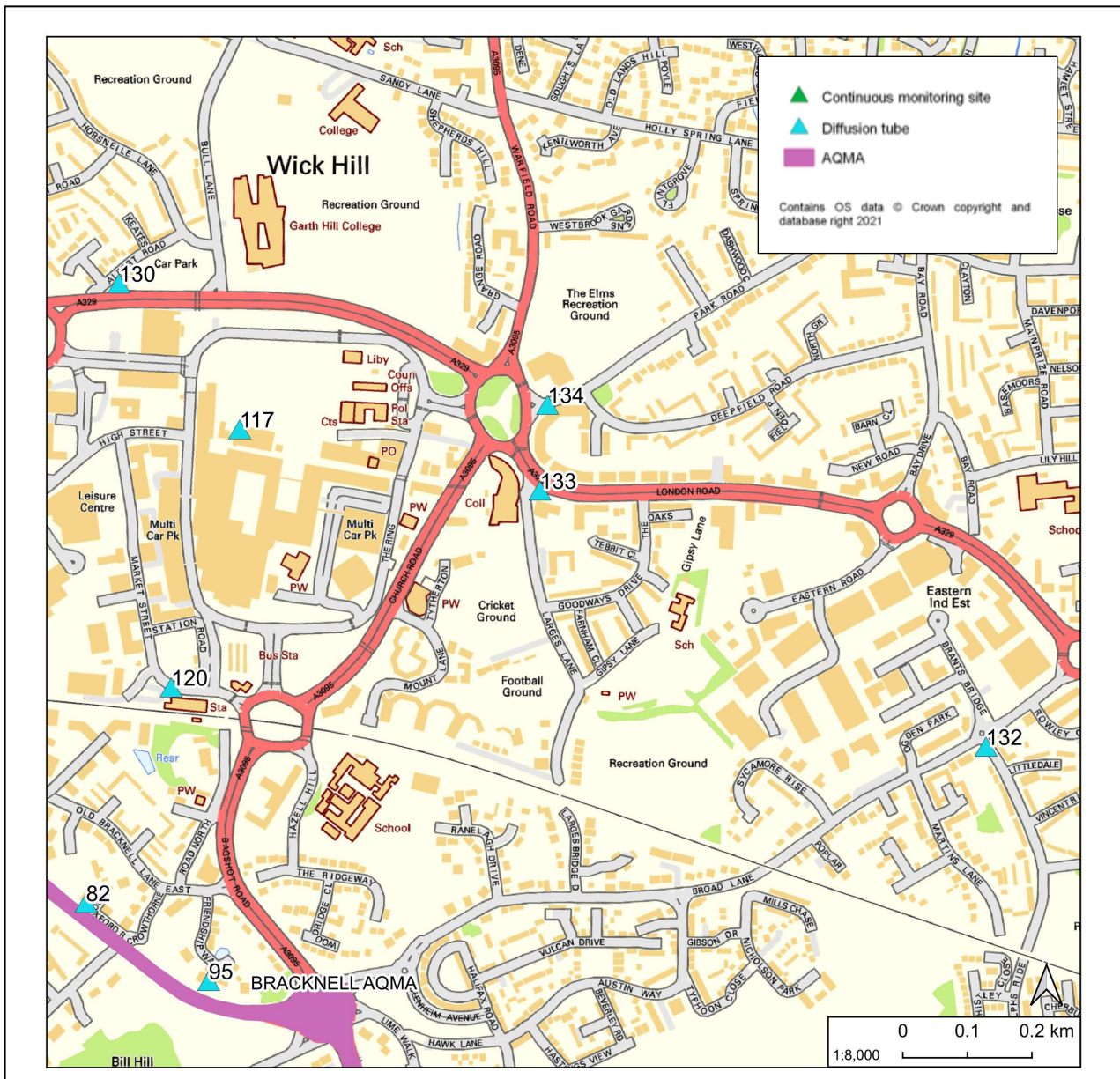




Figure D.0.7 Map of Bracknell Town Centre monitoring locations



Tube	2019	2020	2021	2022	2023
82	30.0	23.7	22.9	26.4	24.6
95	25.4	15.0	15.2	17.2	14.4
120	27.3	15.9	16.6	19.2	17.1
133		15.9	13.7	16.6	14.9

Tube	2019	2020	2021	2022	2023
134		19.2	17.9	20.4	19.0
117	24.1	17.4	15.7	17.8	19.4
132		17.6	17.2	18.1	20.1
130		18.8	16.6	18.5	18.2

Figure D.0.8 Map of Meadowsweet Lane (Tube 122)





Figure D.0.9 Map of 229 Yorktown Road (Tube 124)

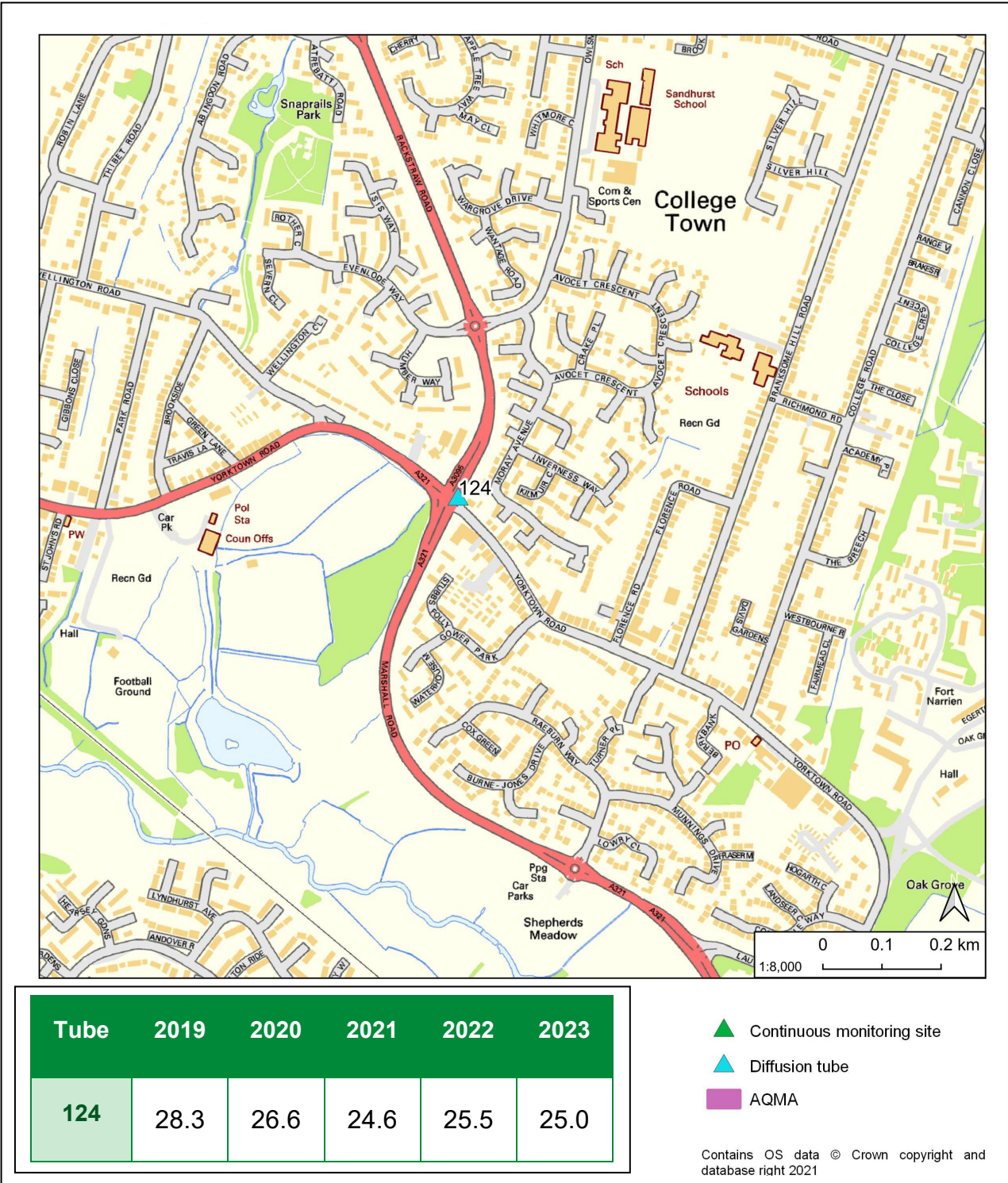
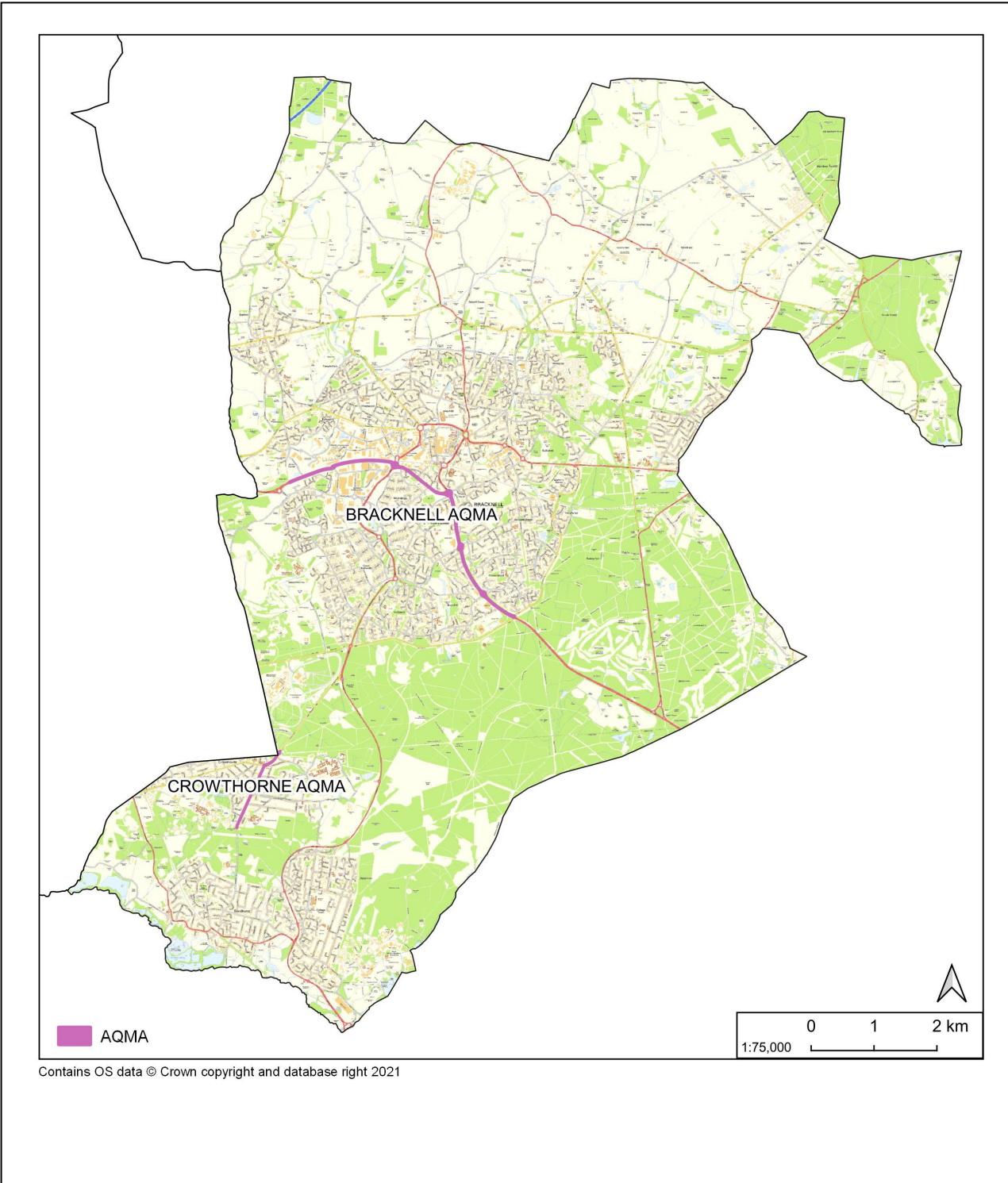


Figure D.10 Map of Bracknell AQMA and Crowthorne AQMA



## Appendix E: Summary of Air Quality Objectives in England

**Table E.1 Air Quality Objectives in England**

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

## 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 National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide



## References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. 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.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.
- Revocation outcome from JPPC, [Report Format for Select Committee Meetings \(westberks.gov.uk\)](#), agreed on 29<sup>th</sup> November 2023.