



# 2023 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, 2023

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## Executive Summary: Air Quality in Our Area

### Air Quality in Bracknell Forest Council

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas<sup>1,2</sup>.

The mortality burden of air pollution within the UK is equivalent to 29,000 to 43,000 deaths at typical ages<sup>3</sup>, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017<sup>4</sup>.

The major source of air quality pollutants in Bracknell Forest is emissions from road transport, and in particular the contribution from the A322 in Bracknell, the B3348/High Street and Sandhurst Road Crowthorne have been identified as significant. The main pollutant of concern is nitrogen dioxide (NO<sub>2</sub>) and to a lesser extent the increased levels of particulate matter. Two Air Quality Management Areas (AQMAs) were declared in 2011 due to exceedances of the Annual Mean Objective for NO<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 2022 have shown a decreasing trend since 2018 (36.6µg/m<sup>3</sup>). The annualised continuous monitored NO<sub>2</sub> Annual Mean in 2022 was 31.1µg/m<sup>3</sup> at Downshire Way did not exceed the Air Quality Objective level of 40µg/m<sup>3</sup> and there were no exceedances of the 1-hour objective at Downshire Way. There have been no exceedances of the Objectives since before 2018.

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<sup>1</sup> Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

<sup>3</sup> Defra. Air quality appraisal: damage cost guidance, January 2023

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

There were no exceedances of the ratified, bias corrected, annualised and distance corrected diffusion tubes (NO<sub>2</sub>) within the whole borough including the Bracknell and Crowthorne AQMA's. There were no locations greater than 60 µg/m<sup>3</sup> which further indicates that there are unlikely to be any exceedance of the 1-hour Objective. All of the 2022 sites showed decreased levels compared with the data from 2018. All the locations within the borough showed an increase from the 2021 data, apart from 1 and this was, Site 58, Firmount, Bracknell Road (from 31.1 µg/m<sup>3</sup> to 30.6 µg/m<sup>3</sup>). The increase was expected in 2022, there were no lockdowns and traffic levels have increased.

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

The PM<sub>10</sub>, which is monitored in the Bracknell AQMA (when annualised) measured 18.5µg/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 2018, 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>5</sup> sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term PM<sub>2.5</sub> targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce PM<sub>2.5</sub> in their areas. The Road to Zero<sup>6</sup> details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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<sup>5</sup> Defra. Environmental Improvement Plan 2023, January 2023

<sup>6</sup> DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

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, where feasible, the local transport network.
3. Secure necessary transport infrastructure and services to support sustainable development.
4. Encourage and promote accessibility by sustainable modes of transport.
5. Reduce greenhouse gas emissions from transport.
6. Reduce casualties and improve safety on the local transport network.

The LTP3 and supporting documents can be accessed via the Council's website, at: <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 contribution of emissions from vehicles is when traffic is queuing on the A322. This is being accomplished with the 2022 results showing a decrease of 38.2% from 50.3 µg/m<sup>3</sup> NO<sub>2</sub> in 2011 to 31.1µg/m<sup>3</sup> NO<sub>2</sub> in 2022.

This has been helped by smoothing the traffic flow and reducing journey times in this part of the AQMA and a number of major highway improvements have been completed along the A329/A322 corridor that links the M3 and M4 motorway. The remaining section, which had proved to be a bottleneck at Downshire Way, secured funding to convert to a dual carriageway in 2018 and was completed in June 2020. This year (2022) is first full pandemic free year to see how successful it has been in improving the air quality to date. Considering the traffic has increased back to the levels of 2019 the NO<sub>2</sub> remains below the Objective

levels and the  $36.6 \mu\text{g}/\text{m}^3$  measured in 2018. Therefore it can be concluded that the works have helped reduce the  $\text{NO}_2$  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 through Bracknell. This should improve journey time reliability, reduce idling traffic and prevent queues and congestion building in certain areas.

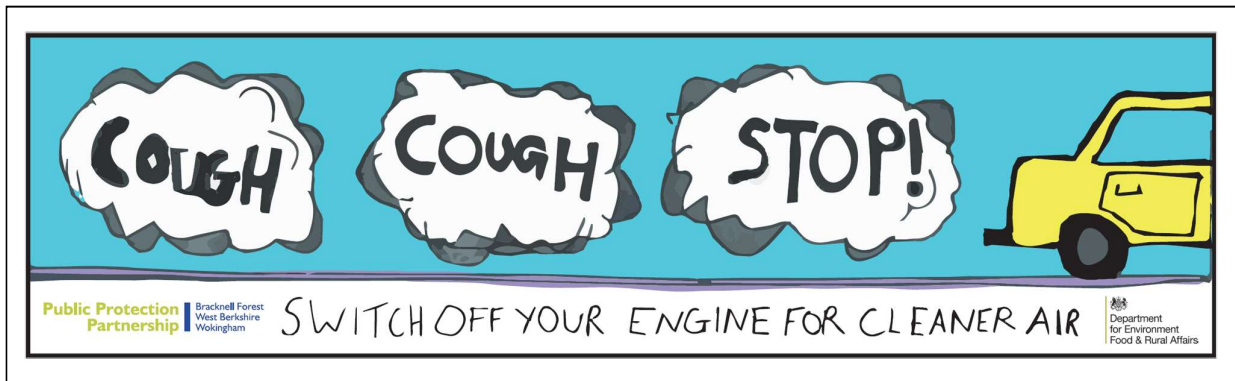
Within the Crowthorne AQMA the main emissions sources are from moving traffic, primarily from vans delivering goods to shops along the High Street where they can also delay traffic, causing engine idling, whilst loading and unloading goods. As part of the Action Plan, the speed humps on the High Street have been upgraded and replaced by speed cushions to reduce the stop-start driving style (Figure S.1). Since the declaration of the AQMA in 2011 the  $\text{NO}_2$  has continued to reduce from  $41.7 \mu\text{g}/\text{m}^3$  to  $20.1 \mu\text{g}/\text{m}^3$  (at site 91xyz, The Mount, Bracknell Road, Crowthorne) in 2022 at the location of relevant exposure.



**Figure S.1 - Speed Cushion in Crowthorne AQMA**

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

Ascot Health Primary school won the winning design and the Pupils artwork was made into a bumper sticker. The concept of the sticker is to remind the car driver behind (the car in front) to turn off their engines. The stickers are available to all members of the public and can be found in the libraries and can be order online at <https://publicprotectionpartnership.org.uk/environmental-health/air-quality/anti-idling-bumper-sticker-schools-competition/>



**Figure S.2 - The Bumper Sticker.**

For Clean Air Day 2022, we wrote to all the schools within Bracknell Forest and asked them to sign up to be an Air Quality Ninja , an every time they travelled to school by an alternative “green” method of transport, they received points, and the more point they received the higher the Ninja belts they achieved. Unfortunately, not many schools signed up, so going forward engaging with schools will require a more direct course.

## 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.

- We will continue to work through the Action Plan, and we have made significant progress as we have achieved most of it already. We have started a stakeholders working group to revise and start to look at a new Action Plan. Alongside this, we will be continuing to gather data to determine if we are able to revoke the AQMA's.
- In 2020 we were awarded a DEFRA AQ Grant which is being used for behaviour change project on Anti-Idling. We also monitoring the PM<sub>2.5</sub> at those schools which are located near to the AQMA (this commenced in early 2022), and an action plan will be produced for each one, if needed on how to reduce the PM<sub>2.5</sub> so that it is within the required limits. Please see Appendix C for more details on the project.
- In 2022 the Public Health Reserve (£80,000) funded work to further improve Air Quality in the borough to consider the anti-idling measures, and the environmental impact on planning applications. Further works in 2023 will consider more monitoring of PM<sub>2.5</sub> at other vulnerable settings. 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 designated a “designated local authority” for the purpose of the Road Traffic (Vehicle Emissions)(Fixed Penalty (England) Regulations 2002.

## Traffic Data for Bracknell Forest Council

In previous reports, traffic data has been provided from three monitoring points on the network. However, the Borough's traffic counting network has been undergoing an upgrade during 2022, and so many units have not recorded complete data.

A good proxy site, which has proved consistently reliable and remains in place is the A329 London Road, between Bracknell and Ascot. Data for 2019 – 2022 is provided here in graphical form.

You can see from the graph the decrease in traffic from the three national lockdowns which occurred in the UK during April 2020, November 2020 and January 2021. The graph also

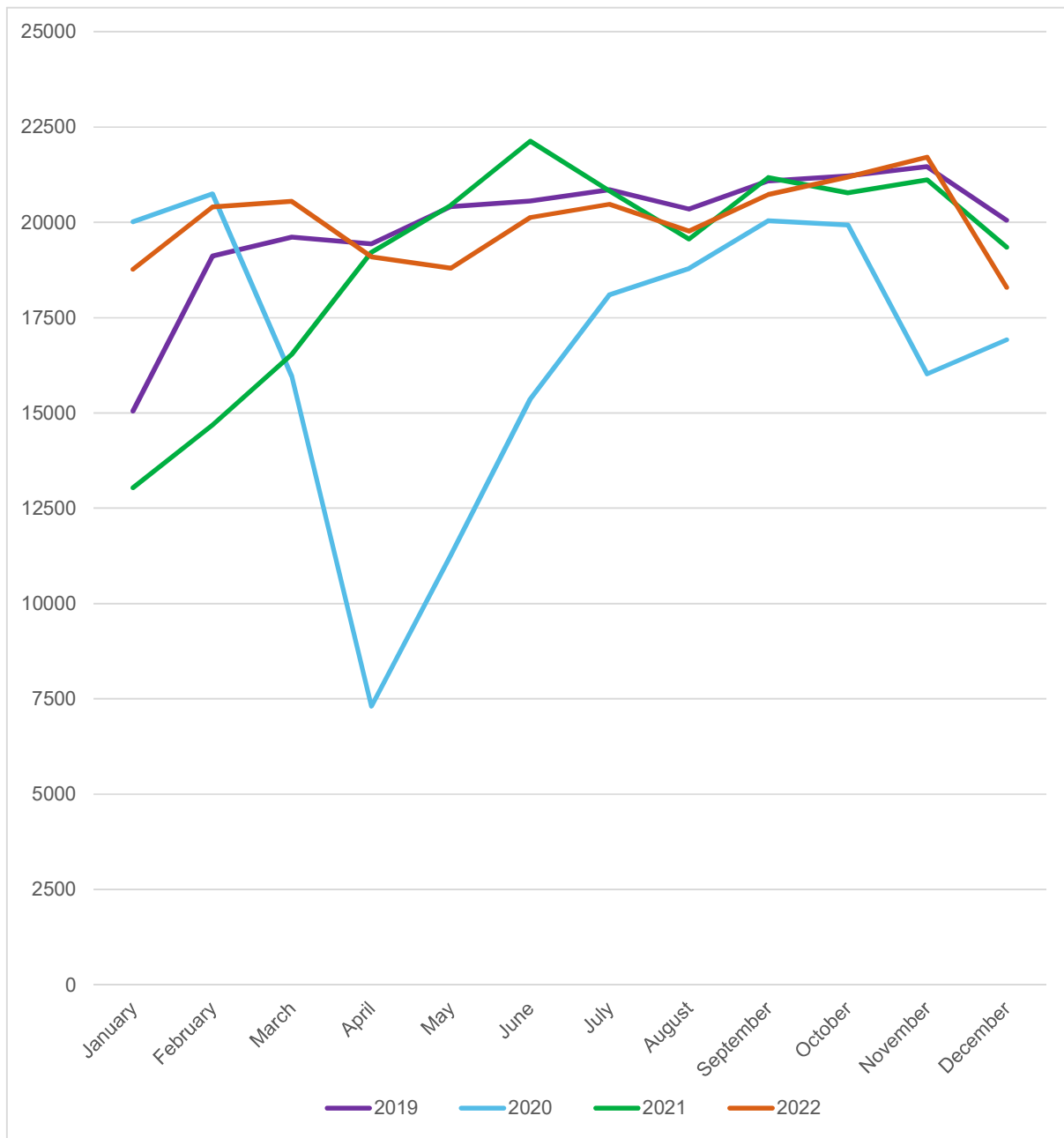


shows that the average traffic in 2021 and 2022 has in some cases exceeded that of 2019, although there are still variations.

There have also been changes in traffic trends during the day, for example peak traffic is typically slightly lower than pre-pandemic, but traffic during the inter-peak hours is higher.

There has also been an increase in LGVs, making up for a decrease in car traffic. This is likely partly attributable to increased home-working, but also increased home deliveries.

**Graph 2.1 - A329 London Road Traffic Flow Comparison between 2019-2022**  
(average daily traffic flow by month)

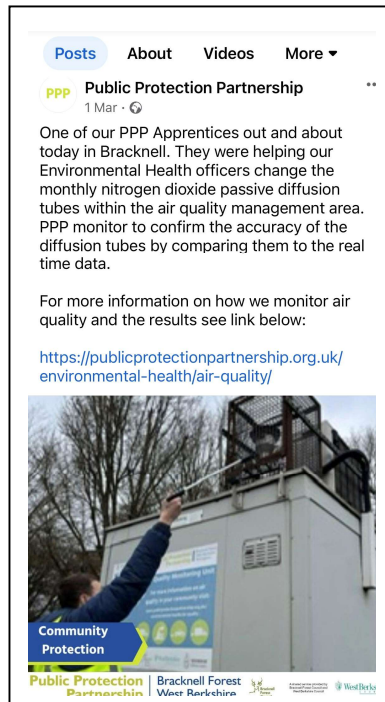


## Local Engagement and How to get involved

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

- Public Protection Partnership [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 \(thelexiconbracknell.com\)](http://thelexiconbracknell.com)
- Go to [Travel and public transport | Bracknell Forest Council \(bracknell-forest.gov.uk\)](http://bracknell-forest.gov.uk)

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



**Figure S.4 - A Social media Facebook post about AQ**

For further details on air quality in Bracknell Forest please refer to our website at:  
<https://publicprotectionpartnership.org.uk/environmental-health/air-quality/>

Individuals or members of local groups are invited to share any ideas they have to cut nitrogen dioxide levels in Bracknell Forest by emailing: [Environmental.Health@Bracknell-Forest.gov.uk](mailto:Environmental.Health@Bracknell-Forest.gov.uk)

Other useful websites are:

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

Other useful AQ sites are:

[https://uk-air.defra.gov.uk/2010 to 2015 government policy: environmental quality - GOV.UK](https://uk-air.defra.gov.uk/2010%20to%202015%20government%20policy%20environmental%20quality%20-%20GOV.UK)  
[www.gov.uk](http://www.gov.uk)

## 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:

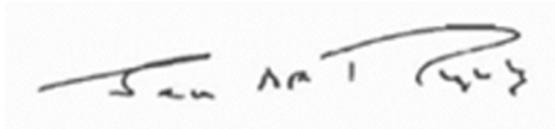
Highways Authority,

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.*



**Sean Murphy**

**Service Lead – Public Protection Partnership**

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



**Heema Shukla**

**Deputy Director of Public Health**

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# 1 Local Air Quality Management

This report provides an overview of air quality in Bracknell Forest Council during 2022. 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 and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Bracknell Forest Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1. **Actions to Improve Air Quality**

## Air Quality Management Areas

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

A summary of AQMAs declared by Bracknell Forest Council can be found in Table 1.1. The table presents a description of the 2 AQMAs that are currently designated within Bracknell Forest Council, Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

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

We have looked into proposing to revoke the AQMAs however 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.” We cannot use COVID years data for 2020 and 2021 therefore Bracknell Forest have achieve 1 consecutive year so far under the limit of 36µg/m<sup>3</sup> for both the Bracknell and Crowthorne AQMA’s as all the monitoring within these areas were below 36 µg/m<sup>3</sup>. See Table 2.0 for the revocation details.

**Table 2.0 – Maximum NO<sub>2</sub> level reached in each AQMA (µg/m<sup>3</sup>)**

| AQMA       | 2022 | 2023 | 2024 | 2025 | 2026 | Total consecutive years below 36 (µg/m <sup>3</sup> ) |
|------------|------|------|------|------|------|---|
| Bracknell  | 32.6 |      |      |      |      | 1   |
| Crowthorne | 30.6 |      |      |      |      | 1   |

**Table 1.1 – Declared Air Quality Management Areas**

| AQMA Name       | Date of Declaration | Pollutants and Air Quality Objectives    | One Line Description  | Is air quality in the AQMA influenced by roads controlled by Highways England? | Level of Exceedance: Declaration | Level of Exceedance: Current Year  | Number of Years Compliant with Air Quality Objective | Name and Date of AQAP Publication   | Web Link to AQAP  |
|-----------------|---------------------|--|---|--|----------------------------------|--|--|-------------------------------------|---|
| AQMA Bracknell  | Declared 09/02/2011 | NO <sub>2</sub> Annual Mean<br>(tube 86) | The A322 Bagshot Road and Downshire Way from Berkshire Way to junction with B3430 | NO   | 50.3 µg/m <sup>3</sup>           | Highest Level 32.6 µg/m <sup>3</sup><br>(tube 86)  | 5 years<br>(2018 to 2022)<br><i>None consecutive</i> | BFBC Air Quality Action Plan - 2014 | <a href="https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-management-areas/">https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-management-areas/</a> |
| AQMA Crowthorne | Declared 09/02/2011 | NO <sub>2</sub> Annual Mean<br>(tube 91) | Part B3348, High Street & part of Sandhurst Road                                  | NO   | 41.7 µg/m <sup>3</sup>           | 20.1 µg/m <sup>3</sup><br>(tube 91)<br>Highest Level 30.6 µg/m <sup>3</sup><br>(tube 58) | 5 years<br>(2018 to 2022)<br><i>None consecutive</i> | BFBC Air Quality Action Plan - 2014 | <a href="https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-management-areas/">https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-management-areas/</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.

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

Defra's appraisal of last year's ASR concluded that

1. Overall, the council have presented a detailed review of the existing air quality within Bracknell Forest.
2. Although the template has been used, the QA/QC procedures for the automatic and diffusion tubes are presented within 'Section 2 Actions to improve Air Quality' as well as in the relevant section in Appendix C. There are also some formatting issues in the contents page. If there are issues with using the template, the local authority are advised to contact the LAQM Helpdesk for assistance. The template should be used for future ASRs.
3. Values for the annual mean NO<sub>2</sub> concentration in 2021 within the AQMA in Table 2.1 are not the maximum concentrations in each AQMA and also do not match those within the ASR Excel Data table. All data in tables should be carefully reviewed prior to submission of future ASR's.
4. The current AQAP was published in 2014, the Council is aware that the AQAP is in need of a review. However, pending the completion of certain highways measures there is potential to revoke the AQMAs. As such no progress on a new AQAP has been made. Measures to improve air quality across the council should be continually reviewed and progressed.
5. Table A.2 states that no diffusion tubes were co-located with a continuous analyser, when it is understood that one triplicate site 86x, 86y and 86z was co-located with the automatic station as a local bias adjustment was calculated.
6. The ASR confirms that Gradko has been used as the laboratory for diffusion tube analysis. However, the ASR does not present the analysis methodology used within the ASR. This should be provided in future ASR's.
7. The ASR does not make clear that the monitoring was undertaken in accordance with the Defra Diffusion Tube Calendar. However, it is shown in the DTDPT which has been uploaded that it has been undertaken in accordance with the calendar. Whether monitoring was undertaken in accordance with the Defra Diffusion Tube Calendar should be made clear within the text of future ASR's.

8. Monitoring locations and AQMA plan maps are provided, however the AQMA boundary could be made clearer on the plans as the colour used is very similar to the colour of the roads on the map. A different colour for the AQMA boundary would be useful for future ASR's.
9. No justification is provided for the choice to use the local bias adjustment factor. The national factor was used in the previous ASR and the national factor is higher than the calculated local factor of 0.72. Justification behind the choice of a national or local factor should be provided in future ASR's.
10. There is a high level of detail on the measures currently implemented or completed and their potential impact on Air Quality across the council. This level of detailed is encouraged for future ASR's.
11. The ASR has included an additional section on "The Pandemic and NO<sub>2</sub>" within the ASR. This section details the comparison of 2019, 2020 and 2021 monthly data from the Automatic Station as a bar chart. This provides a basic overview of how COVID-19 has effected 2021 monitoring data when compared to pre-pandemic 2019 concentrations. This is welcomed.
12. The ASR has been signed off by the manager of Public Protection Partnership. This is welcomed.
13. Robust and accurate QA/QC procedures were applied for the automatic station.
14. The Council has included discussion and presented the NO<sub>2</sub> trends observed in both of the AQMAs located within the Council's boundaries.
15. The comments from last year's ASR have been addressed.
- 16. The report is a good source for members of the Public to find out about air quality in their area. The Council should continue their hard work whilst addressing the comments above.**

The above have been addressed in this ASR, however "the Pandemic and NO<sub>2</sub>" has now been removed as the pandemic is over.

Bracknell and Crowthorne AQMAs has taken forward a number of direct measures during the current reporting year of 2022 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 1.2. 18 measures are included within Table 1.2, with the type of measure and the progress Bracknell and Crowthorne AQMAs have made during the reporting year of 2022 presented. Where there

have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 1.2.

- More detail on these measures can be found in their respective Action. Key completed measures are: A3095 improvements 2020: This project aims to deliver significant improvements to one of the key highway corridors along the Thames Valley in Berkshire. The project will assist in terms of accommodating movements and reducing congestion between the M4 (J8/9/10) and M3 (J4) (Downshire Way AQMA).
- This scheme focuses upon the section of the A3095 from the Hanworth Roundabout through to the Golden Retriever Junction (this connects to the Bracknell AQMA) and includes the:
  1. Introduction of additional signalisation on Hanworth Roundabout
  2. Replacement of Golden Retriever Roundabout with a fully signalised junction.

The local junction modelling work and wider VISUM network modelling work has indicated that the preferred scheme options will deliver significant enhancement to the operation of the individual junctions as well as improved journey times along the A3095 corridor. In turn, this will support the continued growth of Bracknell as an employment centre and further residential growth across the region. The modelling results show that the introduction of the scheme will have a beneficial impact on air quality. It was completed in 2022 and works well.

- Continuing to work with Bracknell BID to encourage more sustainable travel; white lines indicating pedestrian/cycle paths have been refreshed and new signage added.
- In 2022 Bracknell Council completed the junction improvement at the crossing of Warfield Road by junctions with Holy Spring Lane and Sandy Lane to make it easier and safer for pedestrians and cyclists to cross. The new sections of traffic-free shared footway/cycleway have been implemented and the light-controlled crossing has been upgraded to a Toucan.
- In 2022 the work on the underway on new pedestrian and cycle crossing on Binfield Road near to the junction with Harvest Ride underway was completed.
- New pedestrian and cycle crossing on Forest Road near to the junction with York Road underway was also completed in 2022.

- The Bus Services Improvement Plan (BSIP) was published on the 31 October 2021. The BSIP will identify ways to improve services and grow patronage, setting targets for journey times, reliability, patronage and customer satisfaction which will be reviewed every six months. This in 2022 has been followed by an Enhanced Partnership Plan and Scheme which specifies the measures the Council and local operators will implement to improve services.

Bracknell Forest's priorities for the coming year are:

- Clean Air Day on 17<sup>th</sup> 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. Also actively joining in our competitions as well.
- To investigate other ways of improving traffic flow along Crowthorne High Street, following delays caused by objections to planning applications aimed at improving this location in the centre of the Crowthorne AQMA.
- Completion of the A3095 improvement project to be completed.
- Electric charging (EV) points, a study has been undertaken to look at the feasibility of installing charge points at key local community locations (i.e. shops and leisure facilities). During 2021 we pursued any that are identified as feasible subject to legal agreements. In 2022 11 car park sites were identified for the installation of 16 dual EV chargers, with works expected to be complete in March 2023.
- Aim to adopt stricter planning requirements for EV charge points in new developments. An update to the Parking Standards is in progress and includes stricter requirements on EV charging facilities in new developments in line with latest Government policy.
- Officers have been meeting with the Energy Savings Trust and the Office for Zero Emission Vehicles to clarify criteria ahead of submitting a bid for funding of EV chargers in council-owned car parks.
- Officers have also been in discussion with a number of charge point providers to discuss options for privately funding rapid and fast chargers at Council-owned sites, including Bracknell Sports Centre, this work is ongoing as part of our wider EV strategy.
- BFC chaired a Berkshire-wide meeting to discuss a consistent approach to the provision of EV infrastructure.

- A dedicated EV page has been added to the Council web site to reflect the growing importance of EV charging infrastructure, and the supporting EV chapter from the Sustainable Modes strategy is being updated (<https://www.bracknell-forest.gov.uk/roads-parking-and-transport/travel-and-public-transport/electric-vehicles>).
- Begin to implement the schemes identified in the Local Cycling and Walking Improvement Plan. Bracknell Forest are in the process of reviewing our LCWIP, following changes to government guidance and design standards. A successful online mapping engagement exercise through 'Commonplace' attracted over 2000 comments and contributions from the public, and these will help inform our refreshed plan and its schemes
- Discuss and promote anti-idling campaigns at schools and taxi ranks, is ongoing through the parking Enforcement Team.
- Bracknell Forest is continuing to promote and implement initiatives and measures specified in the Sustainable Modes Strategy.
- The Eco Rewards scheme (Public Health funding £69,950) is continuing to grow with 2624 residents and 17 schools and colleges participating. In 2022 372,000 miles of sustainable journeys were logged on the system, and 104 tonnes of CO2e saved (compared to taking these trips by car). There are plans to further extend the scheme to 3 more primary schools, rail stations and BID area. The scheme continues and is a success and Bracknell Forest are looking to roll out further e.g. to 150+ walking/cycle routes, parks and medical practices. The behaviour change saw a 51% switch to an active mode of travel
- A series of short films promoting walking and cycling in the borough including green spaces and the existing cycle path network have been commissioned and complete they can be seen on social media throughout the year.
- A bid was won in 2022 for the Government's Capability Fund to deliver further measures to promote walking and cycling, and a workplace intervention to promote more sustainable commuting options. The Government funding is delivering the following schemes: an on-line platform (Love to Ride) to promote cycling; a series of led walks and cycle rides; a refresh of the Local Walking and Cycling Infrastructure Plan; extension of the Eco Rewards scheme; a digitally interactive cycle map; a series of circular traffic-free routes to encourage leisure walking and cycling; family cycle training; a package of cycle

promotion events for workplaces; a new web portal and branding to promote all forms of active and sustainable travel.



**Figure 1.1 –Eco Rewards.**

Bracknell Forest Council worked to implement these measures in partnership with the following stakeholders during 2022:

- 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 anticipate relate to a lack of resources and funding.

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



- Bracknell Forest Council is aware that the AQAP will need updating and will be looking to develop this further over the next year, and look to revoke the AQMA's, if we have another 2 years of limits below the Objective Levels.
- Lack of funding and the Pandemic has also slowed bow the completion of all of the actions on the AQAP.

Whilst the measures stated above and in Table 1.2 will help to contribute towards compliance, Bracknell Forest anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of AQMA Bracknell & AQMA Crowthorne.

Table 1.2 – Progress on Measures to Improve Air Quality

| Measure No. | Measure  | 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 Gytratory. |
| 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 complete for Phase III. Now looking to implement Phase IV which will add an additional circulatory lane and an additional exit lane towards Nightingale Close                                | Improvement in movement of traffic providing reliable journey times with reduction in queues   |
| 3           | Capacity and safety improvements including full signalisation at Twin Bridges Roundabout | Traffic Management | Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane | 2015                            | 2020                               | 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 Groom   | Traffic Management | Strategic highway improvements, Re-prioritising road space away from  | 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 and journey time   | Work complete   | As above.  |

| Measure No. | Measure  | 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  |
|-------------|--|---------------------------------------|---|---------------------------------|------------------------------------|-------------------------------|-------------------------------|------------------------|----------------|---------------------------|----------------|---|---|--|--|
|             | roundabout to Twin Bridges   |                                       | cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane  |                                 |                                    |                               |                               |                        |                |                           |                |   |   |  |  |
| 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 NO2 concentrations to below the objective in the AQMA 1  | Reduce queues in peak time  | Work complete  | Improved traffic movement through junction in peak hour. Junction falls within Wokingham BC Work led by WBC.   |
| 6           | Improvements to Dukes Ride/Bracknell Road junction                                       | Traffic Management                    | Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane | 2017                            | 2025                               | BFBC                          | BFBC                          | NO                     | Funded         | £100k - £500k             | Planning       | Reduction in NO2 concentrations to below the objective in AQMA 2  | Reduce queues and journey time  | Concept designed and consultation ongoing.                           | New concept design, consulting Parish Council. Scheme aims to improve the flow of traffic through the junction.  |
| 7           | Crowthorne High Street improvements – speed cushions replacing flat top humps            | Traffic Management                    | Other   | 2016                            | 2016                               | 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 NO2 concentration in AQMA 2 | Reduce stop start traffic to reduce emissions   | Work complete 2014 except for zebra crossing                         | This should reduce the stop/start of the traffic and help maintain an even speed through the high street thus reducing the NOx   |
| 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 NO2, PM10 and PM2.5 concentrations across the borough   | Reduce queueing at bus stops and bus station to smooth flow. increase in number of people using buses | Bus station complete. All local buses now accept contactless payment | All local buses in Bracknell now accept payment by contactless bank card which has speeded up boarding times. Improvements have been made to bus fleet, 85 meet Euro VI, 65% meet Euro V and only 1 bus used for |

| Measure No. | Measure  | 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   |
|-------------|--|---------------------------------------|---|---------------------------------|------------------------------------|------------------------|----------------|------------------------|----------------|---------------------------|----------------|---|---|---|---|
|             |  |                                       |   |                                 |                                    |                        |                |                        |                |                           |                |   |   |   | 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 information at key bus stops  | Promoting Travel Alternatives         | Other   | 2018                            | 2018                               | BFC                    | BFC            | NO                     | Funded         | £250k                     | Completed      | Reduction in background NO2, PM10 and PM2.5 concentrations across the borough | Increase in number of people using bus and rail   | Real time information is provided at the bus station, rail station forecourt and a number of key hubs and shopping destinations. Council website gives details on the sites where real time | We continue to Encourage people to use the bus thus reducing the amount of vehicles on the road.  |

| Measure No. | Measure  | 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 (where available) for all stops in the borough and via specific smartphone apps.   |   |
| 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 across the borough | Reduction in local car journeys                 | 34 out of 35 schools have implemented a school travel plan.  | Council actively works with schools to use and update their plans and encourage cycling and walking. All but one of the non-independent schools in the borough have produced a school travel plan. Bikeability classes are run each year. No current information on impact on car journeys available. Promote walk to school week annually. |

| Measure No. | Measure  | 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   |
|-------------|--|-------------------------------|------------------------------|---------------------------------|------------------------------------|------------------------|----------------|------------------------|----------------|---------------------------|----------------|--|---------------------------|--|---|
| 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 NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations across the borough | Reduce local car journeys | LSTF project engaging with residents and businesses concluded in 2015 with positive results. "Travel in Bracknell" walking and cycling surveys showed broad increases in 2018 of around 25-30% on previous year. Secured funding from two major housing developments to provide bus services as part of travel plan for development. TRL developer (Legal & General) are funding alterations to a bus service which will allow access to Crowthorne station. Residents will have an alternative form of transportation to the retail sector and other amenities other than their own vehicle | Several large employers run mini-buses for staff travelling from the station to the office (e.g. Dell). Business travel plan produced and distributed to all businesses in 2016 are available on the Council website. In addition to this major new residential development in Bracknell are required to develop travel plans. The guidance and advice is well received by businesses. The developer of the Jennets park development are required to run the buses to the town centre for a number of years. TRL developer (Legal & General) are funding alterations to a bus service which will allow access to Crowthorne station. Several large employers run mini-buses for staff travelling from the station to the office (e.g. Dell). Business travel plan produced and distributed to all businesses in 2016 are available on the Council website. In addition to this major new residential development in Bracknell are required to develop travel plans. The guidance and advice is well received by businesses. The |

| Measure No. | Measure   | 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  |
|-------------|---|----------------------------------|---|---------------------------------|------------------------------------|------------------------|----------------|------------------------|------------------|---------------------------|----------------|---|-------------------------------------|--|--|
|             |   |                                  |   |                                 |                                    |                        |                |                        |                  |                           |                |   |                                     |  | 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. Electric pool car and van now on fleet. |

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), local authorities are expected to work towards reducing emissions and/or concentrations of PM<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The latest PM<sub>2.5</sub> data available (2018) from DEFRA show that Bracknell Forest Council has a maximum level of 11.28 µg/m<sup>3</sup> (co-ordinates x 487500 y167500), and the average level of 9.46 µg/m<sup>3</sup>. [Background Mapping data for local authorities - 2018 - Defra, UK](#). Figure 1.2 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 2.3. Further information about other areas in the UK can be can be found using the link below.

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

| National England Average | South East Region | West Berkshire | Reading | Wokingham | Bracknell Forest | Windsor & Maidenhead | Slough |
|--------------------------|-------------------|----------------|---------|-----------|------------------|----------------------|--------|
| 5.5%                     | 5.4%              | 5.4%           | 5.9%    | 5.9%      | <b>5.9%</b>      | 5.9%                 | 6.3%   |

Many of the actions that Bracknell Forest are working on to reduce vehicle related emissions will address PM<sub>2.5</sub> concentrations. 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:

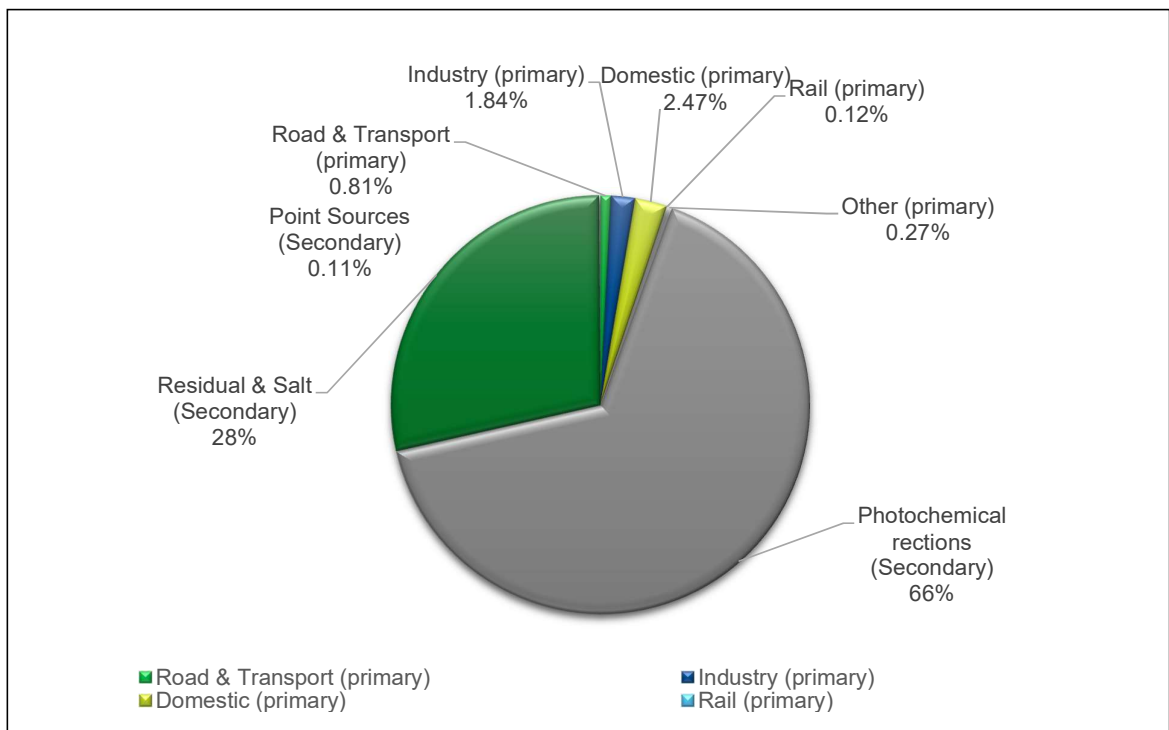
- Cycle network and promoting cycling and walking.
- Promoting low emission Council vehicles.
- Implemented Traffic calming measures in Crowthorne High Street, and
- Strategic highway improvements to smooth traffic flow and reduce journey times.



- Bracknell Forest Council also condition the use of Bonfires for Commercial development through the Planning process.
- Domestic bonfires is discouraged, and further action can be taken under the Environmental Protection Act 1990, and Clean Air Act 1993 is necessary.
- Also advice is available to the Public who wish to use on open fire or wood burner at <https://publicprotectionpartnership.org.uk/environmental-health/neighbourhood-concerns/smoke-and-bonfires/>
- The industrial process within the Borough as permitted under Environmental Permitting (England & Wales) Regulations 2016, are inspected as per the permit requirements to make sure that they comply.
- 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 what mitigation measures can be taken to each specific site to help them achieve the National AQ Objectives.

**Table 2.4. A pie chart showing both the Primary and Secondary sources of PM<sub>2.5</sub> <sup>(4)</sup>**

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



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

This section sets out the monitoring undertaken within 2022 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 2018 and 2022 to allow monitoring trends to be identified and discussed.

### Summary of Monitoring Undertaken

#### 2.1.1 Automatic Monitoring Sites

Bracknell Forest undertook automatic (continuous) monitoring at 1 site during 2022. Table A.1 in Appendix A shows the details of the automatic monitoring site. NB DEFRA have stated that this Local authorities does not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. National monitoring results are available at: <https://uk-air.defra.gov.uk/data/> .

Maps showing the location of the monitoring 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.

#### 2.1.2 Non-Automatic Monitoring Sites

Bracknell Forest undertook non- automatic (i.e. passive) monitoring of NO<sub>2</sub> at 26 sites during 2022. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

### Individual Pollutants

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

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

Table A.3 and Table A.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 2022 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Figure A.5 presents NO<sub>2</sub> annual mean concentrations from the Downshire Way Continuous Monitor between years 2018 to 2022. There have been no exceedances of the annual mean objective over the past 5 years and there is a general mixed trend of reduction in NO<sub>2</sub> since 2018.

Table A.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>, not to be exceeded more than 18 times per year.

### Continuous Monitoring Downshire Way Bracknell

The Annual Mean Objective at Downshire Way is below the Annual Mean Objective (40µg/m<sup>3</sup>) at 31.1 µg/m<sup>3</sup>. This is an increase compared to 2021 (29.9µg/m<sup>3</sup>), however a decrease since 2018 (36.6µg/m<sup>3</sup>). The co-location study result was slightly higher at 32.6µg/m<sup>3</sup>. There were no exceedances of the one hour objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times a year), and there was an annual data capture of 96.1%.

The monthly average NO<sub>2</sub> concentration was consistently lower in January to June and November to December compared to 2021, and higher from July to October. The increase in NO<sub>2</sub> could be linked to the increase in traffic now that new “hybrid” ways of working have become the new normal.

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

Figure A.1.1 shows the 5 year trends in annual mean concentrations at the automatic monitoring unit. The concentrations at the roadside site have remained consistent from 2018

to 2019, and have all been below the objective level, however due to COVID the levels have been reduced considerably this year and in 2020. Discounting the 2020 and 2021 years should we continue to see NO<sub>2</sub> maintain a level below 36 µg/m<sup>3</sup> for at least 3 consecutive years then revocation of the AQMA for Bracknell will be considered.

The layout of the Downshire Way was altered in 2019/2020, and the results is positive as there are no exceedances of the Air Quality Objectives and the NO<sub>2</sub> has only increase by 1.2 µg/m<sup>3</sup>. This increase is the results of an accumulative effect of the traffic increasing and the road widening near to the monitoring unit.

The full 2022 dataset of the Diffusion Tube NO<sub>2</sub> data for monthly mean values is provided in Appendix B, which are not required to be distance corrected (as not over 37.0µg/m<sup>3</sup>) where the NO<sub>2</sub> levels were not above the annual mean objective of 40µg/m<sup>3</sup>.

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

There were 26 diffusion tube (passive monitoring) locations, of which 3 were triplicate and 1 was triplicate co-located at the continuous monitor.

#### **2.1.4 Bracknell AQMA**

There were no sites within the Bracknell AQMA (Map D.6) which have exceeded the Annual Mean Objective (40µg/m<sup>3</sup>). The co-location study at site ID 86 Downshire Way automatic monitor was below the objective level for the fifth year and the result of 32.6 µg/m<sup>3</sup> is only slightly higher than the automatic level result of 31.1µg/m<sup>3</sup>. In 2022, all 5 of the sites increased from 2021 which was to be expected as the road traffic has increased, and from the monitoring during COVID it showed the NO<sub>2</sub> in Bracknell Forest is mainly from vehicle emissions. The NO<sub>2</sub> levels can be seen on Figure A.1 & Graph 3.1. However all of the sites within AQMA are still reduced compared to the 2019 levels, this may be due to more electric cars on the road, and a great number of people continuing to work in a “hybrid” way. Also the traffic data shows that there are less cars in peak hours and more in non-peak hours, so perhaps the traffic congestion is less, and less start stop traffic.

No changes are required to the AQMA, and we will continue to measure the area as the road layout has been changed. If this continues to be successful then we could be looking to revoke the AQMA, once we have 3 years of consecutive data below 36 µg/m<sup>3</sup>, starting from 2022.

### 2.1.5 Crowthorne AQMA

For all 6 sites within the AQMA (Map D.3 & D.4) 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 reduce since 2018. This year 5 out of the 6 sites have increased in NO<sub>2</sub> compared to 2021. Site 58 (Firmount) reduced from 31.1 µg/m<sup>3</sup> to 30.6 µg/m<sup>3</sup>. See Graph 3.2 for the NO<sub>2</sub> levels over the past 5 years.

No changes are required to the AQMA, and we will continue to measure the area as this Parish is continually changing and being developed. If the NO<sub>2</sub> continues on a downward trend then we could revoke the AQMA, once we have 3 years of consecutive data below 36 µg/m<sup>3</sup>.

**Graph 3:1 Showing the Bracknell AQMA NO<sub>2</sub> diffusion tube results**

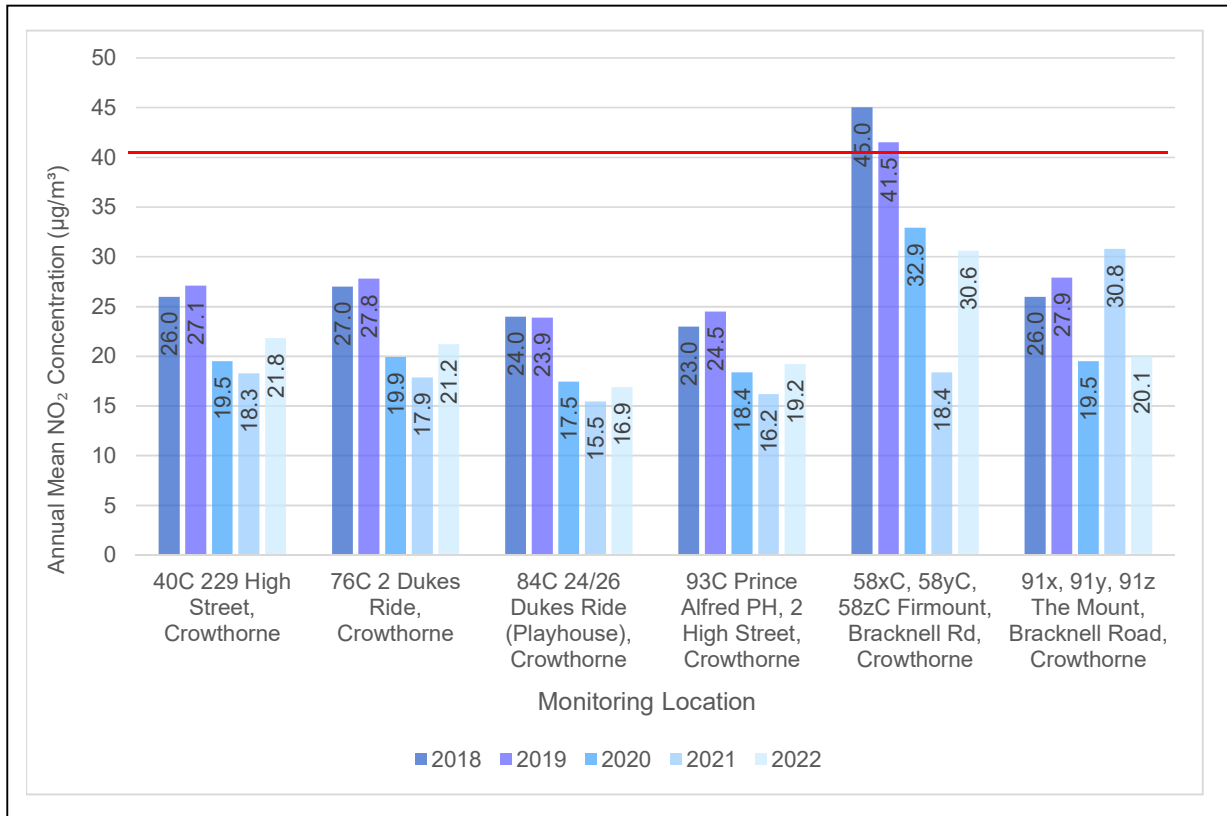


### Outside of the AQMAs

For all 15 sites outside of the AQMA there were no exceedances of the annual objective (40µg/m<sup>3</sup>). All the sites have increased in NO<sub>2</sub>, from 2021 which is to be expected as the traffic has increased. However they all remain below the 2018 levels.

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

**Graph 3:2 Showing the Crowthorn AQMA NO<sub>2</sub> diffusion tube results**



### 2.1.6 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  $40\mu\text{g}/\text{m}^3$ .

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  $50\mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times per year.

The annual mean annualised concentration was well below the  $40\mu\text{g}/\text{m}^3$  objective at the monitoring site. The level at the roadside site at Downshire Way was  $18.5\mu\text{g}/\text{m}^3$ . There has generally been a decrease in levels reported in previous years and have these declined from

19.0µg/m<sup>3</sup> to 18.5µg/m<sup>3</sup> in the last 5 years. The data capture recorded was 96.4%. The A322 corridor is a stretch of road which forms the AQMA Bracknell which over the past 5 years has seen widening in order to manage congestion. This work completed in 2020 and the section immediately adjacent to the continuous monitor.

### **2.1.7 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 as it was not a statutory requirement in 2022. 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.5 you will find the method to estimate the local concentration of 12.1 µg/m<sup>3</sup>. Which 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 is currently within the target area.

The Council is currently looking into PM<sub>2.5</sub> monitoring for the 2024 report, this is subject to funding and the guidelines for the Local Authorities to be produced by DEFRA.

### **2.1.8 Sulphur Dioxide (SO<sub>2</sub>)**

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

## Appendix A: Monitoring Results

**Table A.1 – Details of Automatic Monitoring Sites**

| Site ID | Site Name     | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored               | In AQMA? Which AQMA? | Monitoring Technique   | Distance to Relevant Exposure (m) <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 AQMA 1           | Chemiluminescent; TEOM | n/a  | 5   | 2.4              |

**Notes:**

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

(2) N/A if not applicable



**Table A.2 – Details of Non-Automatic Monitoring Sites**

| Diffusion Tube ID | Site Name                                   | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? Which AQMA? | Distance to Relevant Exposure (m) <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                   | NO2                  | Bracknell            | 0.0  | 30.0  | No  | 1.7             |
| 40C               | 229 High Street, Crowthorne                 | Kerbside  | 484054                  | 163859                   | NO2                  | Crowthorne           | 0.0  | 3.0   | No  | 1.6             |
| 76C               | 2 Dukes Ride, Crowthorne                    | Kerbside  | 484188                  | 164180                   | NO2                  | Crowthorne           | 2.0  | 1.5   | No  | 2.0             |
| 82B               | 19 Boxford Ridge, Bracknell                 | Suburban  | 486751                  | 168658                   | NO2                  | Bracknell            | 0.0  | 14.0  | No  | 1.9             |
| 84C               | 24/26 Dukes Ride (Playhouse), Crowthorne    | Kerbside  | 484127                  | 164189                   | NO2                  | Crowthorne           | 8.0  | 1.5   | No  | 1.8             |
| 93C               | Prince Alfred PH, 2 High Street, Crowthorne | Roadside  | 484176                  | 164159                   | NO2                  | Crowthorne           | 0.0  | 4.0   | No  | 1.8             |
| 95B               | 3 Leverkusen Road, Bracknell                | Suburban  | 486941                  | 168537                   | NO2                  | Bracknell            | 0.0  | 24.0  | No  | 1.7             |
| 99B               | 16 Firlands, Bracknell                      | Roadside  | 487258                  | 167948                   | NO2                  | Bracknell            | 0.0  | 10.0  | No  | 1.6             |
| 117               | Blue Smoke House, The Ring, Bracknell       | Kerbside  | 486989                  | 169392                   | NO2                  | No                   | 2.0  | 0.3   | No  | 1.8             |
| 120               | 1-96 Platform Station, Bracknell            | Kerbside  | 486883                  | 168992                   | NO2                  | No                   | 10.0   | 1.5   | No  | 2.2             |
| 122               | 1 Meadowsweet Lane, Warfield                | Roadside  | 486163                  | 170565                   | NO2                  | No                   | 0.0  | 6.6   | No  | 1.9             |
| 123               | 123 New Forest Ride, Winkfield Row          | Roadside  | 488388                  | 166666                   | NO2                  | No                   | 0.0  | 2.2   | No  | 1.8             |

| 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) |
|------------------------|--|-----------|-------------------------|--------------------------|----------------------|----------------------|--|---|---|-----------------|
| 124                    | 229 Yorktown Road, Sandhurst             | Roadside  | 484686                  | 161359                   | NO2                  | No                   | 0.0  | 1.7   | No  | 2.3             |
| 126                    | Byron Drive, Crowthorne                  | Roadside  | 483805                  | 163367                   | NO2                  | No                   | 6.0  | 1.5   | No  | 3.0             |
| 127                    | 7 Old Wokingham Road, Crowthorne         | Roadside  | 484397                  | 164420                   | NO2                  | No                   | 27.5   | 2.4   | No  | 1.5             |
| 128                    | 10 Lucas Place, Binfield                 | Kerbside  | 484893                  | 168748                   | NO2                  | No                   | 2.0  | 35.0  | No  | 2.0             |
| 129                    | Spring Cottage, Rectory Close, Bracknell | Kerbside  | 487124                  | 168360                   | NO2                  | No                   | 7.0  | 1.4   | No  | 2.5             |
| 130                    | Stet House, Albert Road, Bracknell       | Kerbside  | 486802                  | 169618                   | NO2                  | No                   | 0.0  | 13.8  | No  | 2.0             |
| 132                    | 2a Ralphs Ride, Bracknell                | Roadside  | 488145                  | 168900                   | NO2                  | No                   | 3.0  | 0.5   | No  | 2.0             |
| 133                    | Newlands Place, London Road, Bracknell   | Kerbside  | 487454                  | 169297                   | NO2                  | No                   | 0.0  | 10.0  | No  | 2.0             |
| 134                    | Kelvin Gate, Bracknell                   | Kerbside  | 487466                  | 169430                   | NO2                  | No                   | 0.0  | 8.0   | No  | 2.1             |
| 135                    | Woodleigh, Bracknell Road, Crowthorne    | Kerbside  | 484289                  | 164234                   | NO2                  | No                   | 10.0   | 17.0  | No  | 2.5             |
| 58xC,<br>58yC,<br>58zC | Firmount, Bracknell Road, Crowthorne 3   | Kerbside  | 484371                  | 164285                   | NO2                  | 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                   | NO2                  | Crowthorne           | 0.0  | 6.5   | No  | 2.0             |
| 125x, 125y, 125z  | 69 Oak Tree Cottage, Sandhurst Rd, Crowthorne 3 | Roadside  | 483776                  | 163240                   | NO2                  | No                   | 5.0  | 5.0   | No  | 2.0             |
| 86xB, 86yB, 86zB  | Downshire Way Continuous Monitor, Bracknell 3   | Roadside  | 486501                  | 168850                   | NO2                  | Bracknell            | 0.0  | 6.0   | Yes   | 3.5             |

**Notes:**

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

(2) N/A if not applicable.

**Table A.3 – Annual Mean NO<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 2022 (%) <sup>(2)</sup> | 2018 | 2019 | 2020 | 2021 | 2022 |
|-------------------|-------------------------|--------------------------|-----------|---|--|------|------|------|------|------|
| CM3 Downshire Way | 486501                  | 168850                   | Roadside  | 100   | 96.4                                       | 36.6 | 33.6 | 24.9 | 29.9 | 31.1 |

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.

**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.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 2022 (%) <sup>(2)</sup> | 2018 | 2019 | 2020 | 2021 | 2022 |
|-------------------|-------------------------|--------------------------|-----------|---|--|------|------|------|------|------|
| 32B               | 486567                  | 168824                   | Suburban  | 83.3  | 82.1                                       | 21.0 | 22.9 | 14.8 | 15.1 | 18.4 |
| 40C               | 484054                  | 163859                   | Kerbside  | 91.7  | 91.8                                       | 26.0 | 27.1 | 19.5 | 18.3 | 21.8 |
| 76C               | 484188                  | 164180                   | Kerbside  | 83.3  | 84.1                                       | 27.0 | 27.8 | 19.9 | 17.9 | 21.2 |
| 82B               | 486751                  | 168658                   | Suburban  | 100.0   | 99.7                                       | 30.0 | 31.8 | 23.7 | 22.9 | 26.4 |
| 84C               | 484127                  | 164189                   | Kerbside  | 83.3  | 84.3                                       | 20.4 | 23.9 | 17.5 | 15.5 | 16.9 |
| 93C               | 484176                  | 164159                   | Roadside  | 66.7  | 64.8                                       | 23.0 | 24.5 | 18.4 | 16.2 | 19.2 |
| 95B               | 486941                  | 168537                   | Suburban  | 100.0   | 99.7                                       | 21.0 | 25.4 | 15.0 | 15.2 | 17.2 |
| 99B               | 487258                  | 167948                   | Roadside  | 75.0  | 75.3                                       | 24.0 | 25.2 | 19.2 | 18.3 | 23.3 |
| 117               | 486989                  | 169392                   | Kerbside  | 91.7  | 91.8                                       | 20.1 | 24.1 | 17.4 | 15.7 | 17.8 |
| 120               | 486883                  | 168992                   | Kerbside  | 50.0  | 49.7                                       | 21.1 | 27.3 | 15.9 | 16.6 | 19.2 |
| 122               | 486163                  | 170565                   | Roadside  | 75.0  | 74.7                                       | 19.0 | 22.0 | 15.7 | 14.5 | 18.0 |
| 123               | 488388                  | 166666                   | Roadside  | 91.7  | 92.0                                       | 33.0 | 35.2 | 24.5 | 22.6 | 25.1 |
| 124               | 484686                  | 161359                   | Roadside  | 91.7  | 91.5                                       | 31.0 | 28.3 | 26.6 | 24.6 | 25.5 |
| 126               | 483805                  | 163367                   | Roadside  | 66.7  | 67.3                                       |      | 23.4 | 12.9 | 11.4 | 13.6 |
| 127               | 484397                  | 164420                   | Roadside  | 100.0   | 99.7                                       |      | 22.4 | 14.3 | 13.3 | 15.0 |
| 128               | 484893                  | 168748                   | Kerbside  | 91.7  | 90.7                                       |      | 18.4 | 15.3 | 13.3 | 15.5 |
| 129               | 487124                  | 168360                   | Kerbside  | 91.7  | 90.1                                       |      | 20.4 | 13.2 | 12.2 | 12.8 |
| 130               | 486802                  | 169618                   | Kerbside  | 100.0   | 99.7                                       |      |      | 18.8 | 16.6 | 18.5 |
| 132               | 488145                  | 168900                   | Roadside  | 91.7  | 91.8                                       |      |      | 17.6 | 17.2 | 18.1 |

| 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 2022 (%) <sup>(2)</sup> | 2018        | 2019        | 2020 | 2021 | 2022 |
|------------------------|-------------------------|--------------------------|-----------|---|--|-------------|-------------|------|------|------|
| 133                    | 487454                  | 169297                   | Kerbside  | 100.0   | 99.7                                       |             |             | 15.9 | 13.7 | 16.6 |
| 134                    | 487466                  | 169430                   | Kerbside  | 66.7  | 66.8                                       |             |             | 19.2 | 17.9 | 20.4 |
| 135                    | 484289                  | 164234                   | Kerbside  | 100.0   | 99.7                                       |             |             | 13.6 | 13.1 | 14.3 |
| 58xC,<br>58yC,<br>58zC | 484371                  | 164285                   | Kerbside  | 91.7  | 90.7                                       | <b>45.0</b> | <b>41.5</b> | 32.9 | 18.4 | 30.6 |
| 91x,<br>91y,<br>91z    | 484352                  | 164249                   | Roadside  | 100.0   | 99.7                                       | 26.0        | 27.9        | 19.5 | 30.8 | 20.1 |
| 125x,<br>125y,<br>125z | 483776                  | 163240                   | Roadside  | 91.7  | 90.1                                       |             | 24.2        | 16.3 | 15.7 | 17.9 |
| 86xB,<br>86yB,<br>86zB | 486501                  | 168850                   | Roadside  | 91.7  | 92.0                                       | 37.0        | 34.4        | 25.4 | 29.8 | 32.6 |

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 NO<sub>2</sub> annual mean objective of 40 $\mu\text{g}/\text{m}^3$  are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60 $\mu\text{g}/\text{m}^3$ , indicating a potential exceedance of the NO<sub>2</sub> 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.1 – 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 between years 2018 to 2022. There are no exceedances of the annual mean objective in 2022 and there is a general trend of reduction experienced across the sites since 2018.



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

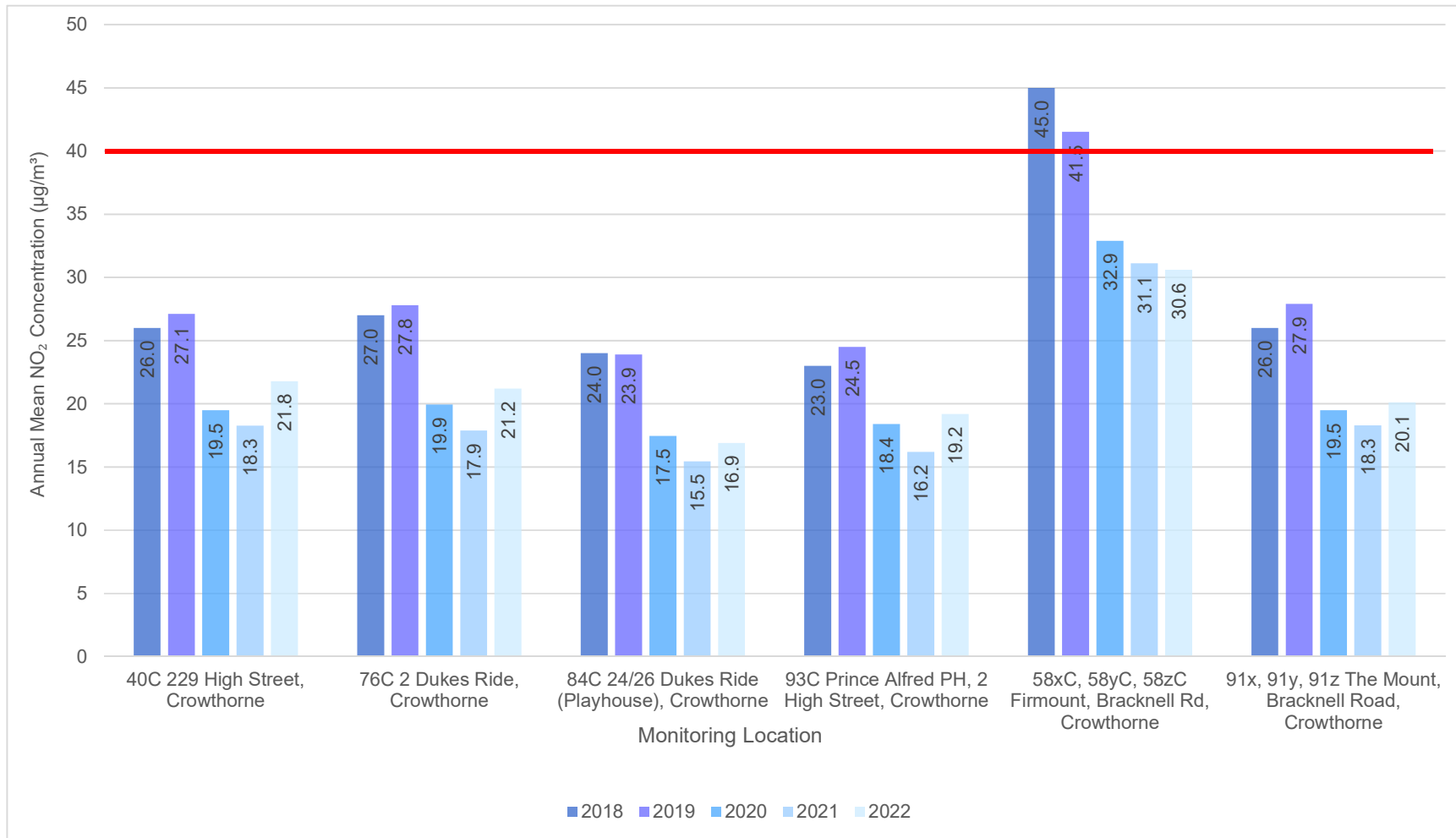


Figure A.2 presents NO<sub>2</sub> annual mean concentrations for sites within the Crowthorne AQMA between years 2018 to 2022. There are no exceedances of the annual mean objective in 2022 and there is a general trend of reduction experienced across the sites since 2018.

Figure A.3 – Trends in Annual Mean NO<sub>2</sub> Concentrations within Bracknell (outside AQMA's)

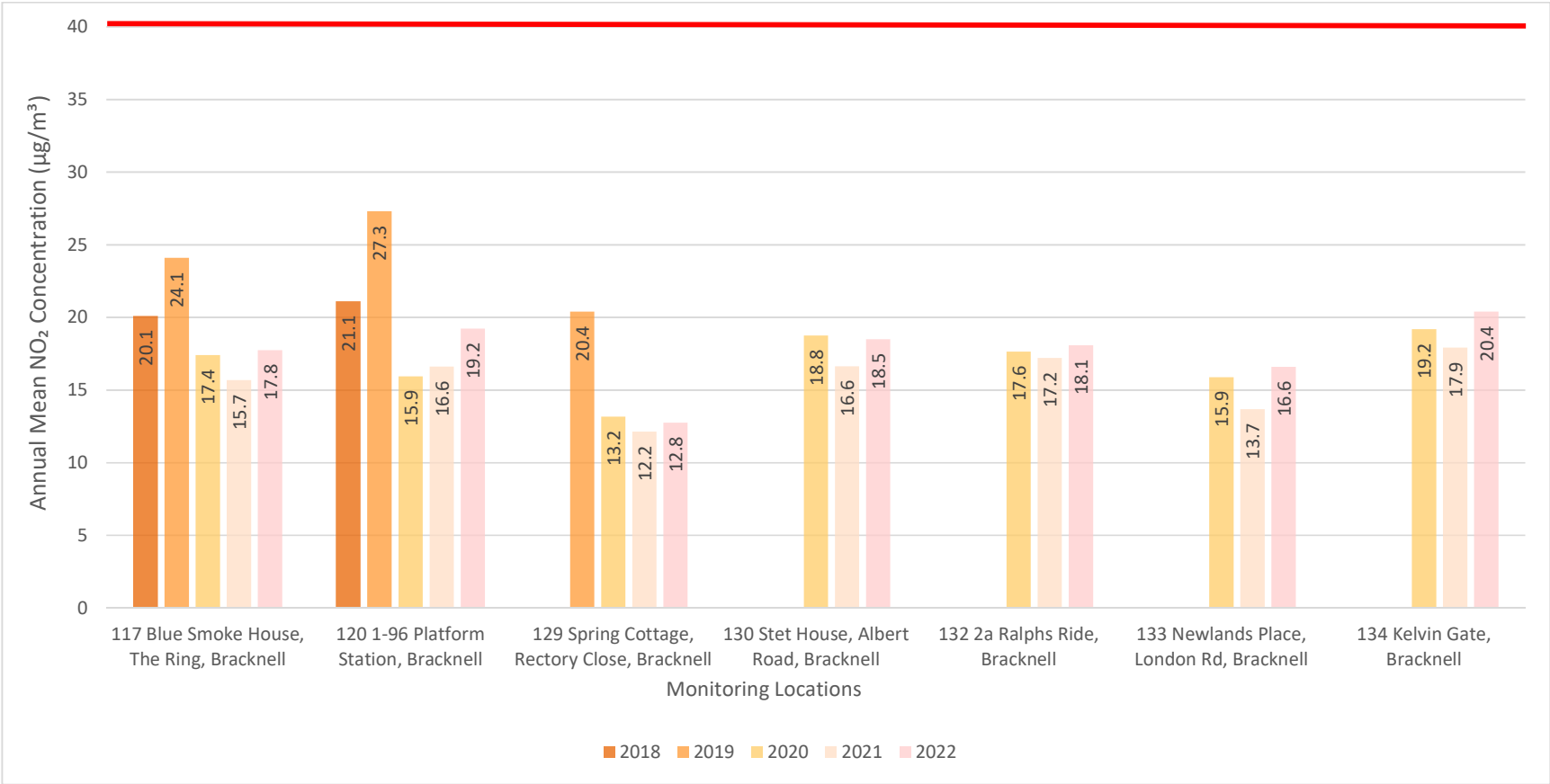


Figure A.3 presents NO<sub>2</sub> annual mean concentrations for sites within the Bracknell (outside AQMA) between years 2018 to 2022. There are no exceedances of the annual mean objective in 2022 and there is a general mixed trend of reduction and minor increases experienced across the sites since 2018.

**Figure A.4 – Trends in Annual Mean NO<sub>2</sub> Concentrations within the Wider Bracknell Forest Borough (outside AQMAs)**

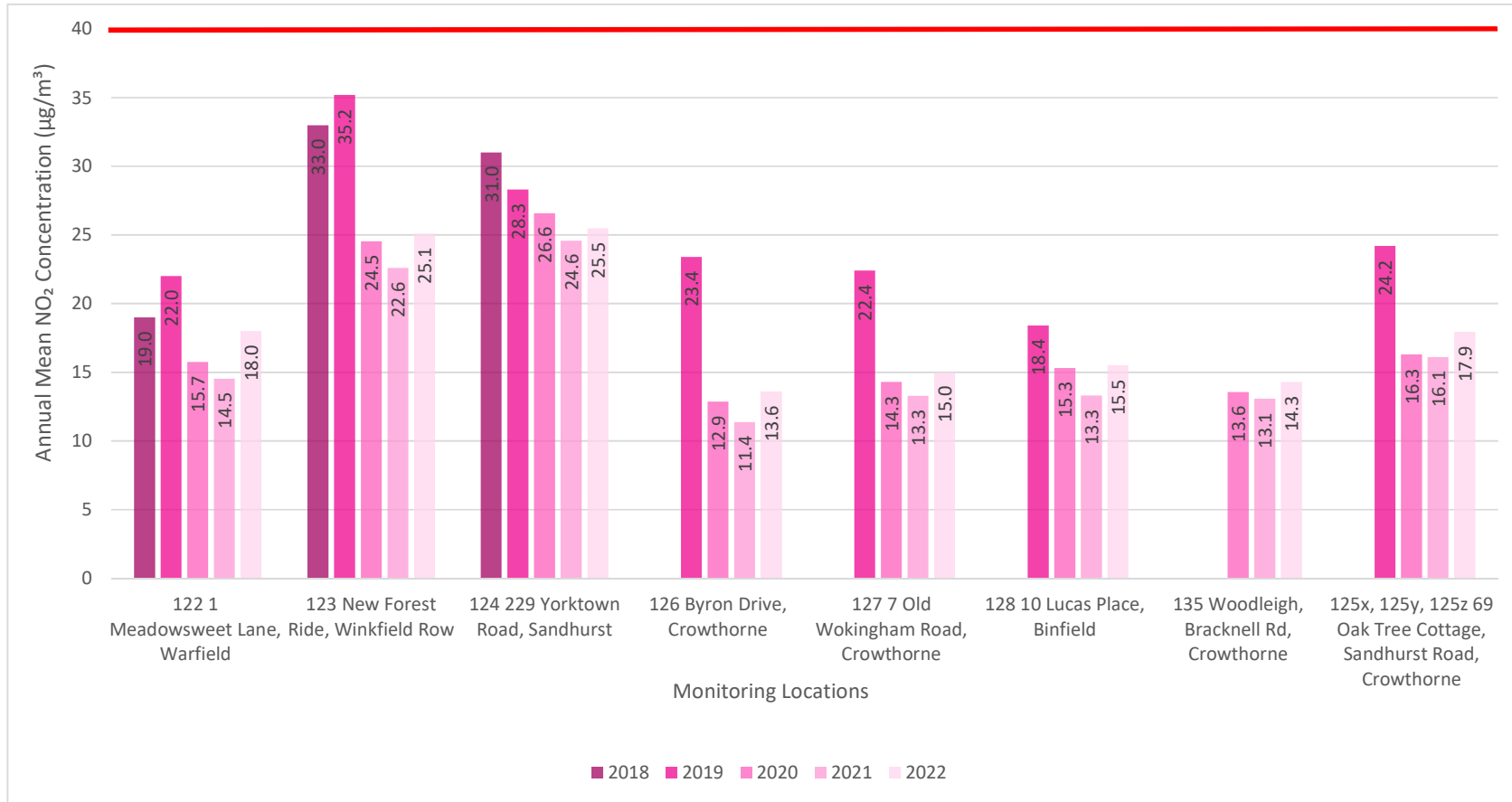


Figure A.4 presents NO<sub>2</sub> annual mean concentrations for sites within the Bracknell (outside AQMA) between years 2018 to 2022. There are no exceedances of the annual mean objective in 2022 and there is a general trend of reduction experienced across the sites since 2018.

**Figure A.5 – Trends in Annual Mean NO<sub>2</sub> Concentrations from the Downshire Way Continuous Monitor**

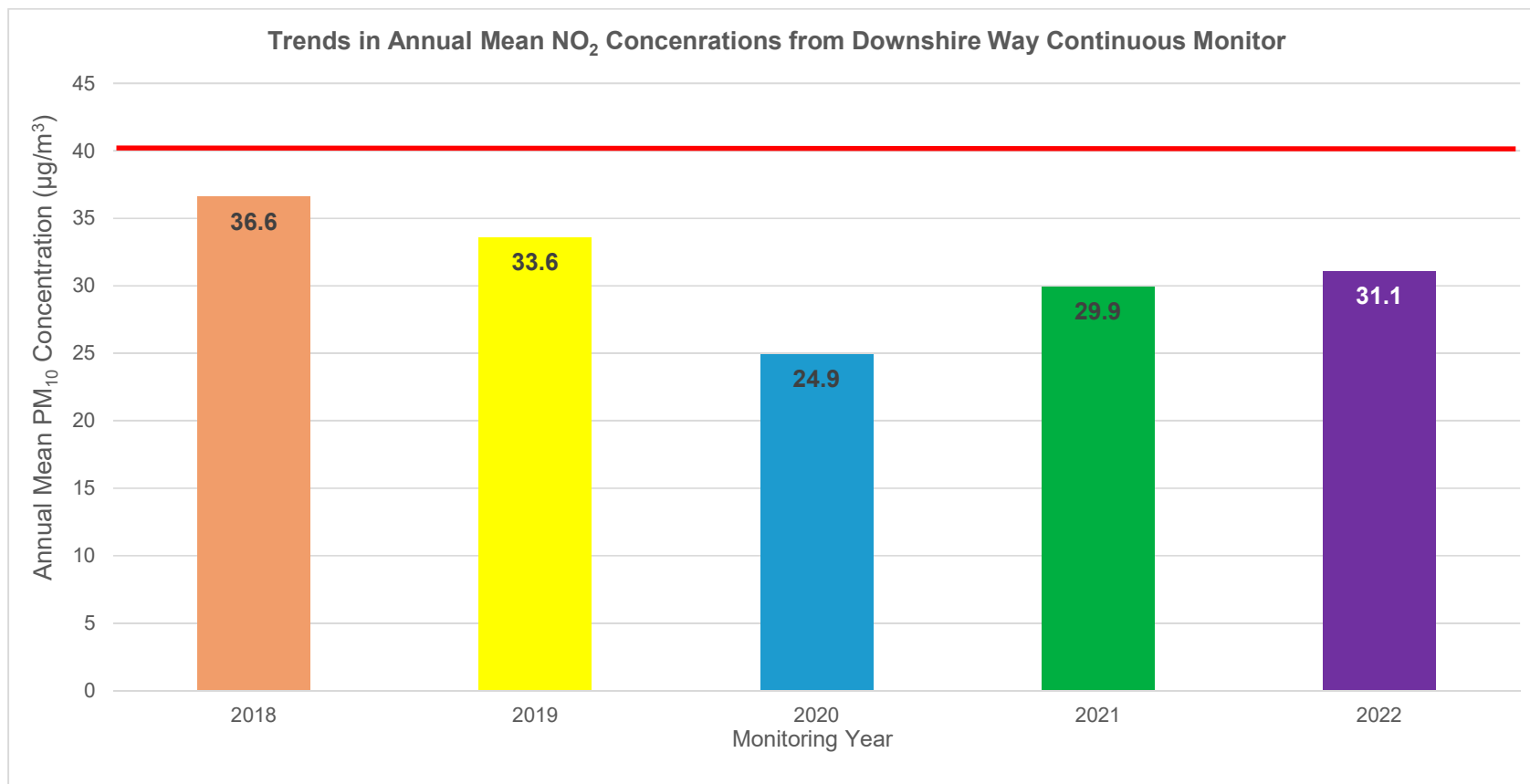


Figure A.5 presents NO<sub>2</sub> annual mean concentrations from the Downshire Way Continuous Monitor between years 2018 to 2022. There have been no exceedances of the annual mean objective over the past 5 years and there is a general mixed trend of reduction in NO<sub>2</sub> since 2018.

**Table A.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 2022 (%) <sup>(2)</sup> | 2018 | 2019       | 2020      | 2021 | 2022 |
|-------------------|-------------------------|--------------------------|-----------|---|--|------|------------|-----------|------|------|
| CM3 Downshire Way | 486501                  | 168850                   | Roadside  | 100   | 96.4                                       | 4    | 0 (127.07) | 0 (92.02) | 0    | 0    |

**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 6 months, the maximum data capture for the full calendar year is 50%).

**Table A.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 2022 (%) <sup>(2)</sup> | 2018 | 2019  | 2020        | 2021 | 2022 |
|-------------------|-------------------------|--------------------------|-----------|---|--|------|-------|-------------|------|------|
| CM3 Downshire Way | 486501                  | 168850                   | Roadside  | 100   | 96.4                                       | 19   | 17.18 | 18.4 (31.3) | 17.1 | 18.5 |

**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 6 months, the maximum data capture for the full calendar year is 50%).

**Figure A.5 – Trends in Annual Mean PM<sub>10</sub> Concentrations from Downshire Way Continuous Monitor**

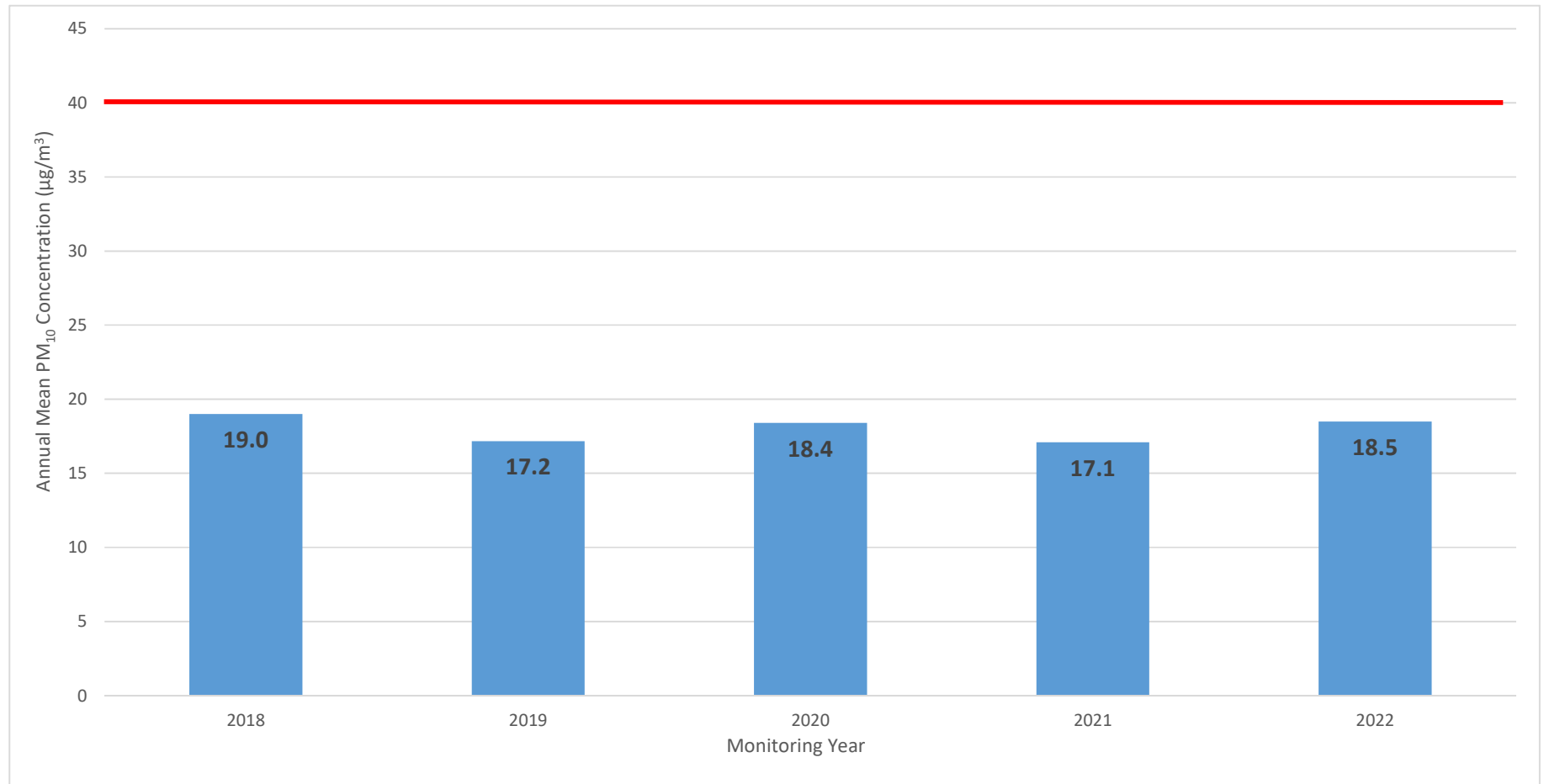


Figure A.5 presents PM<sub>10</sub> annual mean concentrations from the Downshire way continuous monitor between years 2018 to 2022. There have never been any exceedances of the annual objective and level remains fairly constant over the past 5 years.

**Table A.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 2022 (%) <sup>(2)</sup> | 2018 | 2019      | 2020     | 2021 | 2022 |
|-------------------|-------------------------|--------------------------|-----------|---|--|------|-----------|----------|------|------|
| CM3 Downshire Way | 486501                  | 168850                   | Roadside  | 100   | 91.5                                       | 1    | 6 (35.64) | 0 (18.4) | 0    | 1    |

**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 6 months, the maximum data capture for the full calendar year is 50%).



## Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO<sub>2</sub> 2022 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 (0.82) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|------------------------|-------------------------|--------------------------|-------------|------|------|------|------|------|-------------|------|-------------|------|------|------|-----------------------|--|---|---------|
| 32B                    | 486567                  | 168824                   | 29.9        | 18.8 | 25.6 |      | 15.8 | 16.0 |             | 30.2 | 20.9        | 21.3 | 21.4 | 25.0 | 22.5                  | 18.4   |   |         |
| 40C                    | 484054                  | 163859                   | 29.7        | 18.3 | 34.6 | 25.3 | 17.2 | 19.8 |             | 37.8 | 26.2        | 25.4 | 24.6 | 33.7 | 26.6                  | 21.8   |   |         |
| 76C                    | 484188                  | 164180                   | 33.4        | 22.2 | 30.5 | 22.0 | 18.0 |      |             | 22.2 | 25.4        | 25.9 | 27.4 | 31.5 | 25.8                  | 21.2   |   |         |
| 82B                    | 486751                  | 168658                   | 37.3        | 34.1 | 27.9 | 24.4 | 31.7 | 38.0 | 33.0        | 29.1 | 30.1        | 33.8 | 35.2 | 31.5 | 32.2                  | 26.4   |   |         |
| 84C                    | 484127                  | 164189                   | 31.8        | 18.3 |      | 19.1 | 16.7 | 15.0 | 16.6        |      | 21.3        | 20.2 | 20.5 | 26.6 | 20.6                  | 16.9   |   |         |
| 93C                    | 484176                  | 164159                   | 33.8        | 21.0 |      |      |      | 18.0 |             | 20.7 | 23.4        | 21.7 | 21.6 | 29.9 | 23.8                  | 19.2   |   |         |
| 95B                    | 486941                  | 168537                   | 30.2        | 17.5 | 30.3 | 17.6 | 15.3 | 15.0 | 15.7        | 17.7 | 20.8        | 22.8 | 22.2 | 27.1 | 21.0                  | 17.2   |   |         |
| 99B                    | 487258                  | 167948                   | 31.0        | 24.7 | 25.7 | 19.2 | 29.6 |      | 23.4        |      | 43.0        |      | 30.5 | 29.0 | 28.4                  | 23.3   |   |         |
| 117                    | 486989                  | 169392                   | 32.3        | 20.0 | 27.2 | 19.0 | 15.7 | 16.7 |             | 18.5 | 22.0        | 23.0 | 21.9 | 22.0 | 21.7                  | 17.8   |   |         |
| 120                    | 486883                  | 168992                   | 32.3        |      |      |      |      |      |             | 23.9 | 26.3        | 24.0 | 24.4 | 28.5 | 26.6                  | 19.2   |   |         |
| 122                    | 486163                  | 170565                   | 25.9        |      | 23.4 | 19.2 |      | 28.5 |             | 18.2 | 20.7        | 19.3 | 18.4 | 24.3 | 22.0                  | 18.0   |   |         |
| 123                    | 488388                  | 166666                   | 38.8        | 15.9 | 38.7 | 28.0 | 26.6 |      | 28.3        | 29.5 | 30.9        | 30.7 | 32.1 | 36.7 | 30.6                  | 25.1   |   |         |
| 124                    | 484686                  | 161359                   | 25.4        | 35.4 | 34.3 | 29.7 | 26.5 | 29.9 | 32.5        | 33.7 |             | 28.7 | 26.8 | 38.7 | 31.1                  | 25.5   |   |         |
| 126                    | 483805                  | 163367                   | 24.0        |      |      |      | 12.4 |      | 21.1        | 12.7 | 15.5        | 14.1 | 14.6 | 21.3 | 17.0                  | 13.6   |   |         |
| 127                    | 484397                  | 164420                   | 24.0        | 13.2 | 26.2 | 18.5 | 13.2 | 13.9 | 15.7        | 18.4 | 19.2        | 18.2 | 14.5 | 25.0 | 18.3                  | 15.0   |   |         |
| 128                    | 484893                  | 168748                   | 27.0        | 14.0 | 26.2 | 20.2 | 14.5 | 13.0 | 18.5        | 19.3 | 20.1        |      | 15.0 | 20.0 | 18.9                  | 15.5   |   |         |
| 129                    | 487124                  | 168360                   | 20.7        | 9.3  | 24.8 | 17.7 |      | 10.0 | 13.9        | 16.0 | 16.3        | 13.8 | 10.8 | 18.0 | 15.6                  | 12.8   |   |         |
| 130                    | 486802                  | 169618                   | 29.7        | 24.4 | 26.4 | 17.0 | 19.0 | 20.9 | 15.8        | 18.5 | 20.1        | 27.2 | 24.2 | 28.1 | 22.6                  | 18.5   |   |         |
| 132                    | 488145                  | 168900                   | 30.6        | 19.9 | 30.8 | 21.6 | 17.7 | 17.5 |             | 21.8 | 24.9        | 21.3 | 6.2  | 30.2 | 22.0                  | 18.1   |   |         |
| 133                    | 487454                  | 169297                   | 28.4        | 18.1 | 24.7 | 17.5 | 16.2 | 16.1 | 17.2        | 17.2 | 21.3        | 19.1 | 21.9 | 25.8 | 20.3                  | 16.6   |   |         |
| 134                    | 487466                  | 169430                   | 38.5        | 25.3 |      | 21.2 |      |      |             | 21.5 | 23.8        | 24.0 | 27.2 | 30.8 | 26.5                  | 20.4   |   |         |
| 135                    | 484289                  | 164234                   | 27.1        | 12.8 | 24.1 | 15.5 | 12.0 | 12.5 | 12.9        | 17.1 | 17.7        | 18.3 | 16.1 | 23.2 | 17.4                  | 14.3   |   |         |
| 58xC,<br>58yC,<br>58zC | 484371                  | 164285                   | <b>49.5</b> | 39.3 | 24.0 | 36.5 | 37.6 | 38.4 | <b>40.0</b> | 38.8 | <b>43.5</b> |      | 39.0 | 24.0 | 37.3                  | 30.6   |   |         |
| 91x,<br>91y,<br>91z    | 484352                  | 164249                   | 33.7        | 19.6 | 27.0 | 22.0 | 20.4 | 19.8 | 21.3        | 22.8 | 27.2        | 26.0 | 25.2 | 29.4 | 24.5                  | 20.1   |   |         |
| 125x,<br>125y,<br>125z | 483776                  | 163240                   | 31.1        | 18.5 | 23.5 |      | 16.3 | 18.5 | 19.4        | 19.8 | 22.9        | 21.6 | 20.3 | 28.9 | 21.9                  | 17.9   |   |         |

| 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 (0.82) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|------------------------|-------------------------|--------------------------|-------------|------|-------------|------|------|-----|------|-------------|-------------|------|------|-------------|-----------------------|--|---|---------|
| 86xB,<br>86yB,<br>86zB | 486501                  | 168850                   | <b>45.9</b> | 34.5 | <b>44.2</b> | 35.3 | 38.1 |     | 36.3 | <b>42.3</b> | <b>45.6</b> | 37.0 | 37.7 | <b>41.0</b> | 39.8                  | 32.6   |   |         |

- 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 Borough Council confirm that all 2022 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 Council During 2022**

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 Council During 2022**

#### **DEFRA Grant 2021**

The grant awarded was £259,000 for the projects of creating an anti-idling campaign, measuring PM<sub>2.5</sub> at the schools located near/within the AQMAs and looking at behaviour change 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> and PM<sub>10</sub> and weather at or close to 14 selected schools that were within or close to the AQMAs. Monitoring at the schools, took place between February 2022 to February 2023 for a minimum of 3 months to include term time and holiday period. This provided a snap shot of the levels around schools using a low-cost air quality sensor unit (Vortex) providing real-time measurements at 5 minute intervals. As the data was not ratified nor calibrated against a reference equivalent monitor, the data only provides an indicative measurement. The monitors were paired with weather sensors located close by to continuously measure parameters including wind speed and direction, temperature and rainfall. The air quality monitoring equipment was attached to a lamp post or street light and the weather station positions close by but on another lamp post or street light.

The data have not been annualised to represent an annual mean and are therefore the results are indicative only. However, the period means were all below the relevant air quality

objectives. All the schools were 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 also plotted to compare the difference between school term time and holiday. Lower concentrations seen in the daytime were due to warmer temperature allowing PM to disperse; the 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 such as rainfall acts to disperse and deplete pollution more readily. The winter higher concentrations from the continent were seen as opposed to the cleaner maritime air from the Atlantic. Patterns in road traffic flow effects but not as significant as weather conditions though. The morning rush hour increase in concentration was evident, as were higher concentrations recorded around 9am and then again around 4pm coinciding with the end of the school day. Concentrations seen to be higher in the middle of the week and then at the end of the week and weekends, these are 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 detailed the details of the monitoring, the results and details analysis, a number of actions to further investigate the sources of pollution and to 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 considered before considering the most appropriate actions are taken forward. The audit could include looking at the age of boilers and where flues are positioned; considering the location of the playground to busy roads and does any screening exist; school travel plans and how accessibility for cycling/scooting to school; 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 the 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). See Appendix A for an example of a generic and specific mitigation measure table.

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.

### **Biggest Loser**

During 2022 the Biggest Loser section of the DEFRA Grant award was started and this involved using diffusion tubes to measure the NO<sub>2</sub> outside 14 Schools within Wokingham Borough Council which are located closest to the 3 AQMA's. The 2022 results will be compared against the 2023 results to see if the Behaviour change experiment of education children & carers and erecting signs asking for the guardians who drop off the children actually makes a difference outside a school.

### **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 has been based upon the Rolling Performance Index (RPI) statistic and will be tightened to the following:

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

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

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

Bracknell Forest Council use Gradko International for the supply and analysis of the nitrogen dioxide diffusion tubes for their non-automatic monitoring programme 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 NO<sub>2</sub> 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 NO<sub>2</sub> ambient air or workplace monitoring. It can be used for co-location projects alongside an automatic analyzer 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

### **Diffusion Tube Annualisation**

As annualisation is required for any site with data capture less than 75% but greater than 25%. 4 of the diffusion tube sites in Bracknell Forest needed to be annualised, 93C, 120, 126 and 134. The following sites all required annualisation as only 8 months (66%) of data was captured.

Site 93C located on the Prince Alfred Public House in the Crowthorne AQMA,

Site 134 located at the Kelvin Gate flats outside of the Bracknell AQMA,

Site 126 located on Bryon Drive outside of the Crowthorne AQMA.

Diffusion Tube 120, which was located near the railways station flats required annualisation as only 6 months (50%) of the data was captured. The details of the calculation method

undertaken and results for all the tubes annualised is provided in **Error! Reference source not found.**

**Table C.1 – Annualisation Summary (concentrations presented in  $\mu\text{g}/\text{m}^3$ )**

| Site ID | Annualisation Factor Oxford URN Site OX8 2022 | Annualisation Factor Swindon URN Site SWHO 2022 | Annualisation Factor Chilbolton Observatory URN CHBO 2022 | Average Annualisation Factor | Raw Data Annual Mean | Annualised Annual Mean |
|---------|---|---|---|------------------------------|----------------------|------------------------|
| 93C     | 0.9647  | 0.9628  | 1.0273  | 0.9849                       | 23.8                 | 23.4                   |
| 120     | 0.8764  | 0.8531  | 0.9185  | 0.8827                       | 26.6                 | 23.4                   |
| 126     | 0.9683  | 0.9697  | 0.9956  | 0.9779                       | 17.0                 | 16.6                   |
| 134     | 0.9474  | 0.9088  | 0.9606  | 0.9389                       | 26.5                 | 24.9                   |

### Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.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  $\text{NO}_x/\text{NO}_2$  continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Bracknell Forest Council have applied a local bias adjustment factor of 0.82 to the 2022 monitoring data. A summary of bias adjustment factors used by Bracknell Forest Council over the past five years is presented in Table C.2. The co-location study has taken place at the Downshire Way Monitoring Station and had a good over all capture rate of 95%, therefore it was decided to use the local factor.

### Table C.2 – Bias Adjustment Factor

| Monitoring Year | Local or National | If National, Version of National Spreadsheet | Adjustment Factor |
|-----------------|-------------------|--|-------------------|
| 2022            | Local             | -  | 0.82              |
| 2020            | National          | 03/21  | 0.81              |
| 2019            | National          | 09/20  | 0.84              |
| 2018            | Local             | -  | 0.82              |
| 2020            | National          | 03/21  | 0.81              |

**Table C.3 – Local Bias Adjustment Calculation**

|  | Local Bias Adjustment Input 1 |
|--|-------------------------------|
| Periods used to calculate bias                   | 10                            |
| Bias Factor A                                    | 0.82 (0.71 - 0.97)            |
| Bias Factor B                                    | 22% (4% - 41%)                |
| Diffusion Tube Mean ( $\mu\text{g}/\text{m}^3$ ) | 39.7                          |
| Mean CV (Precision)                              | 3.0%                          |
| Automatic Mean ( $\mu\text{g}/\text{m}^3$ )      | 32.5                          |
| Data Capture                                     | 95%                           |
| Adjusted Tube Mean ( $\mu\text{g}/\text{m}^3$ )  | 33 (28 - 39)                  |

**Notes:**

A single local bias adjustment factor has been used to bias adjust the 2022 diffusion tube results.

**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 2022.



## 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 Campbell CR10x data logger as 15-minute mean data. The logger was interrogated via a Siemens TC35i GSM modem at 8-hourly intervals by the ENVIEW 2000 software hosted at TRL. This was used to retrieve, check and archive data. TRL's internal QA/QC procedures require all data to be backed up on a secure server and all documentation associated with each site to be uniquely identified and securely stored to provide an audit trail.

Daily data inspections are undertaken during office hours using the facilities of the Data Management System. Initial observations of the Management System indicate whether the site has been contacted during its nominated 'poll time' overnight. If this has not been successful a manual poll of the site may be required. If this is not successful further investigation of the communications integrity will be required to establish contact with the site modem and data logger.

Three-day plots of recorded data are viewed for the requested site, and these are inspected and assessed for continuity, validity, minimum and maximum values, date and time, power failures and general integrity. All anomalies are recorded on the Daily Check sheet, as required. Any anomalies or queries arising from daily inspection of data, or system operation, are brought to the attention of the Project Manager who will evaluate the situation and initialise any necessary action. In the event that the PM is not available, contact will be made with the next available senior person within the monitoring team.

Any issues identified with equipment operation will be referred to the client for attention within 24 hours (excluding weekends). On a weekly basis, data are examined using summary statistics and outlier analysis to establish data validity. In the event that unusual

data episodes are recorded, these would be routinely examined over longer data periods to establish their impact on trends but would also be cross referenced with data peaks and troughs recorded at other national monitoring stations. In addition, integrity and validity of data logger clock times are checked, and any significant errors recorded in the Data Management System logbook.

All site data recorded through the Data Management System is archived on TRL's Network. The data is backed up daily, and the TRL IT Department maintains these data within their long-term and secure archives. This secures all data in the event of any system failure.

### **Data calibration and ratification**

Data is ratified as per AURN recommended procedures. The calibration and ratification process for automatic gas analysers corrects the raw dataset for any drift in the zero baseline and the upper range of the instrument. This is done using Evista calibration and ratification file which incorporates the zero and span check information from the calibration visits. The zero-reading recorded during the calibration visits is used to adjust any offset of the baseline of the data. The difference between the span value obtained between one calibration visit and the next visit is used to calculate a factor. This change is assumed to occur at the same rate over the period between calibrations and as such the factor is used as a linear data scaler. This effectively results in the start of the period having no factor applied and the end of the period being scaled with the full factor with a sliding scale of the factor in-between. After applying the calibration factors, it is essential to screen the data, by visual examination, to see if they contain any unusual measurements or outliers. Errors in the data may occur as a result of equipment failure, human error, power failures, interference or other disturbances. Data validation and ratification is an important step in the monitoring process. Ratification involves considerable knowledge of pollutant behaviour and dispersion, instrumentation characteristics, field experience, and 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 convertor is checked and the analyser is also leak tested. The gas bottle used for calibrations on site is also checked against the auditor's gas bottle to ensure the stability of the gas concentration.

The site audit for the Bracknell automatic monitoring unit was carried out on 27<sup>th</sup> January 2023. Please note, the site was originally audited on the 21<sup>st</sup> December 2022 however, as the analyser exhibited a very unstable response to the site zero system, we repeated the audit on the later date. The repeat visit using an audit zero cylinder gave a good steady state response in stark contrast to the site zero system. 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 99.6% efficient at an NO<sub>2</sub> concentration of 226ppb and 98.6% efficient at an NO<sub>2</sub> concentration of 138ppb. This are good results.

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 NO<sub>x</sub> 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 NO<sub>x</sub> 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 3%.

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

**Table C.3 Bracknell Forest Council, Downshire Way**

| <b>TRL Bracknell, Downshire Way – NO cylinder 21901300298589</b> |                  |                             |                 |                             |
|--|------------------|-----------------------------|-----------------|-----------------------------|
|  | <b>NOx (ppb)</b> | <b>% change from stated</b> | <b>NO (ppb)</b> | <b>% change from stated</b> |
| Manufacturers Stated Concentration                               | <b>445</b>       | ---                         | <b>444</b>      | ---                         |
| Recalculated concentration (26/01/23)                            | 457              | 2.8                         | 448             | 1.0                         |

The recalculated results for the site NO cylinder 21901300298589 (Table C.3) 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  $+0.92\%$ , 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 required 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 18.5 µg/m<sup>3</sup>. The PM<sub>2.5</sub> concentration is 12.1 µg/m<sup>3</sup> at this site, see below for the estimation calculation.

**Table C.4 - 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 road side sites (B) | Estimated PM <sub>2.5</sub> (µg/m <sup>3</sup> ) (A-B=C) |
|--|---|--|--|
| Downshire Way Continuous Monitor (CM3) | 18.5  | 6.4  | 12.1   |

### Automatic Monitoring Annualisation

All automatic monitoring locations within Bracknell Forest Council recorded data capture of greater than 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.

### 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 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 automatic NO<sub>2</sub> monitoring locations within Bracknell Forest Council required distance correction during 2022.



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

Figure D.1 – Map of the Bracknell AQMA

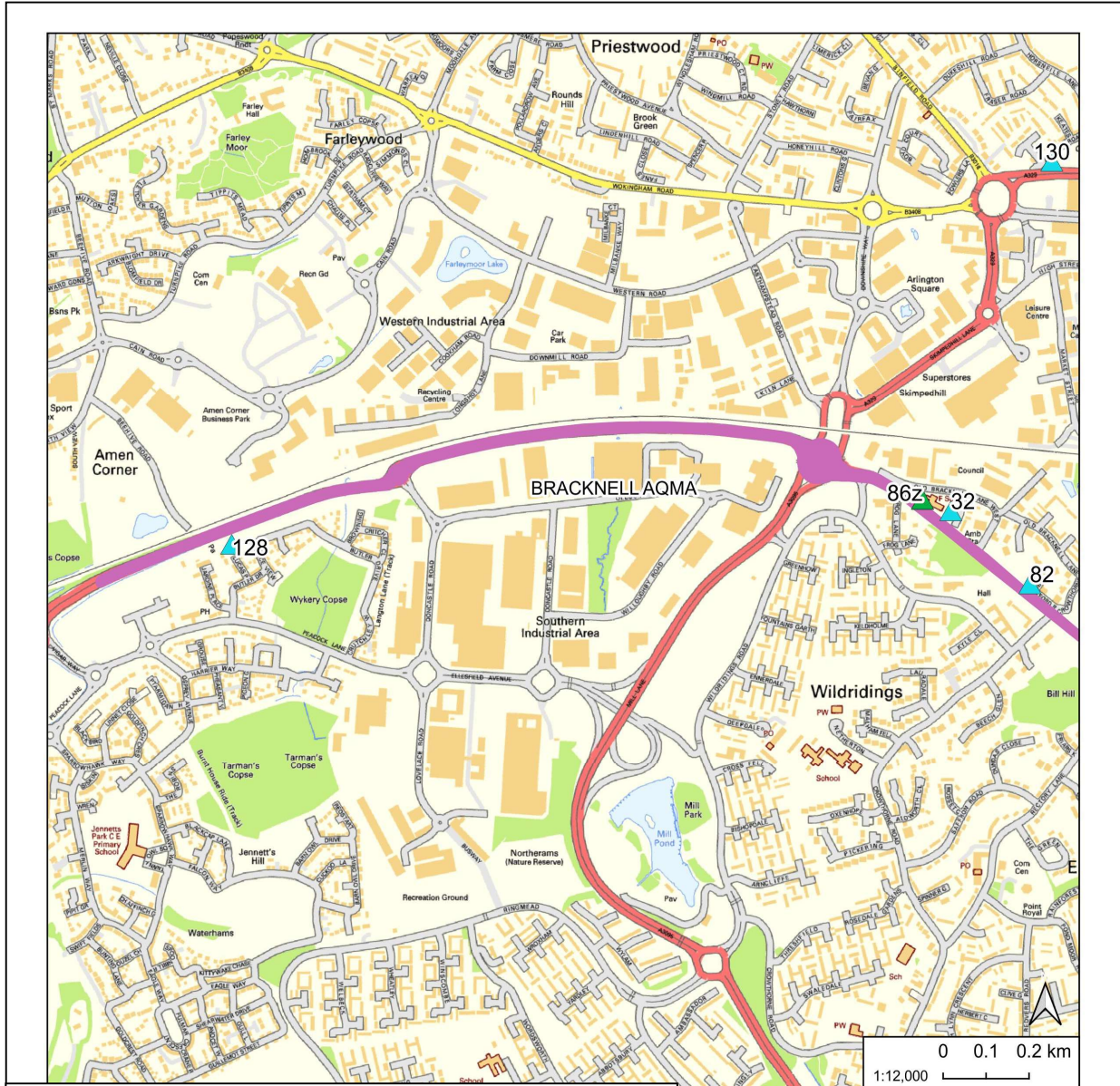


Figure D.2 – Map of Crowthorne AQMA





Figure D.3 – Map of Bracknell AQMA monitoring locations (North)

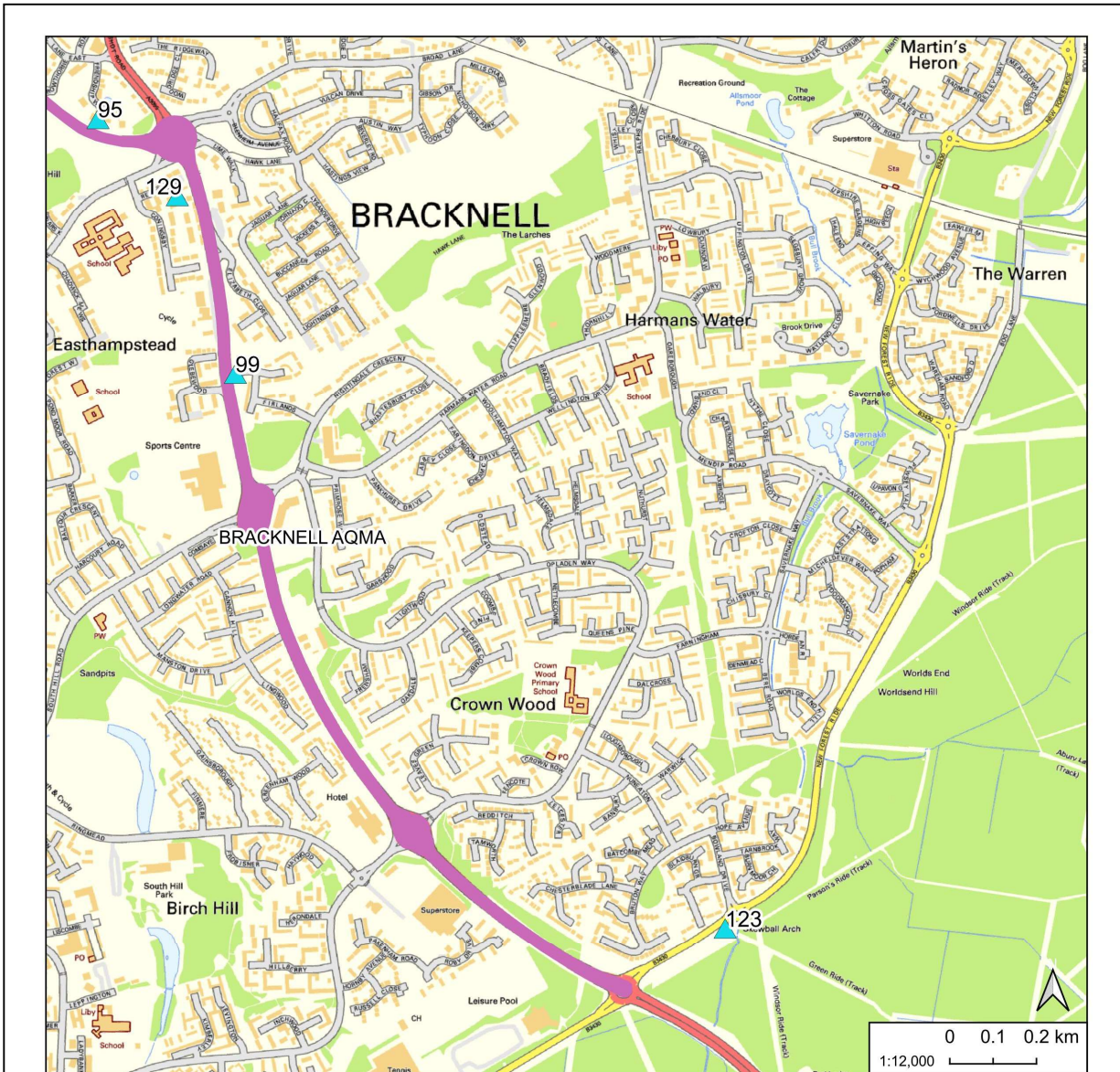


| Tube       | 2018 | 2019 | 2020 | 2021 | 2022 |
|------------|------|------|------|------|------|
| <b>CM</b>  |      |      |      |      |      |
| <b>86</b>  | 37.0 | 34.4 | 25.4 | 29.8 | 32.6 |
| <b>32</b>  | 21.0 | 22.9 | 14.8 | 15.1 | 18.4 |
| <b>82</b>  | 30.0 | 31.8 | 23.7 | 22.9 | 26.4 |
| <b>128</b> |      | 18.4 | 15.3 | 13.3 | 15.5 |

- ▲ Continuous monitoring site
- ▲ Diffusion tube
- AQMA

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Figure D.4 – Map of Bracknell AQMA monitoring locations (South)



| Tube | 2018 | 2019 | 2020 | 2021 | 2022 |
|------|------|------|------|------|------|
| 129  |      |      | 18.8 | 16.6 | 18.5 |
| 99   | 24.0 | 25.2 | 19.2 | 18.3 | 23.3 |
| 123  | 33.0 | 35.2 | 24.5 | 22.6 | 25.1 |
| 95   | 21.0 | 25.4 | 15.0 | 15.2 | 17.2 |

- ▲ Continuous monitoring site
- ▲ Diffusion tube
- AQMA

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Figure D.5 – Map of Crowthorne AQMA monitoring locations (North)

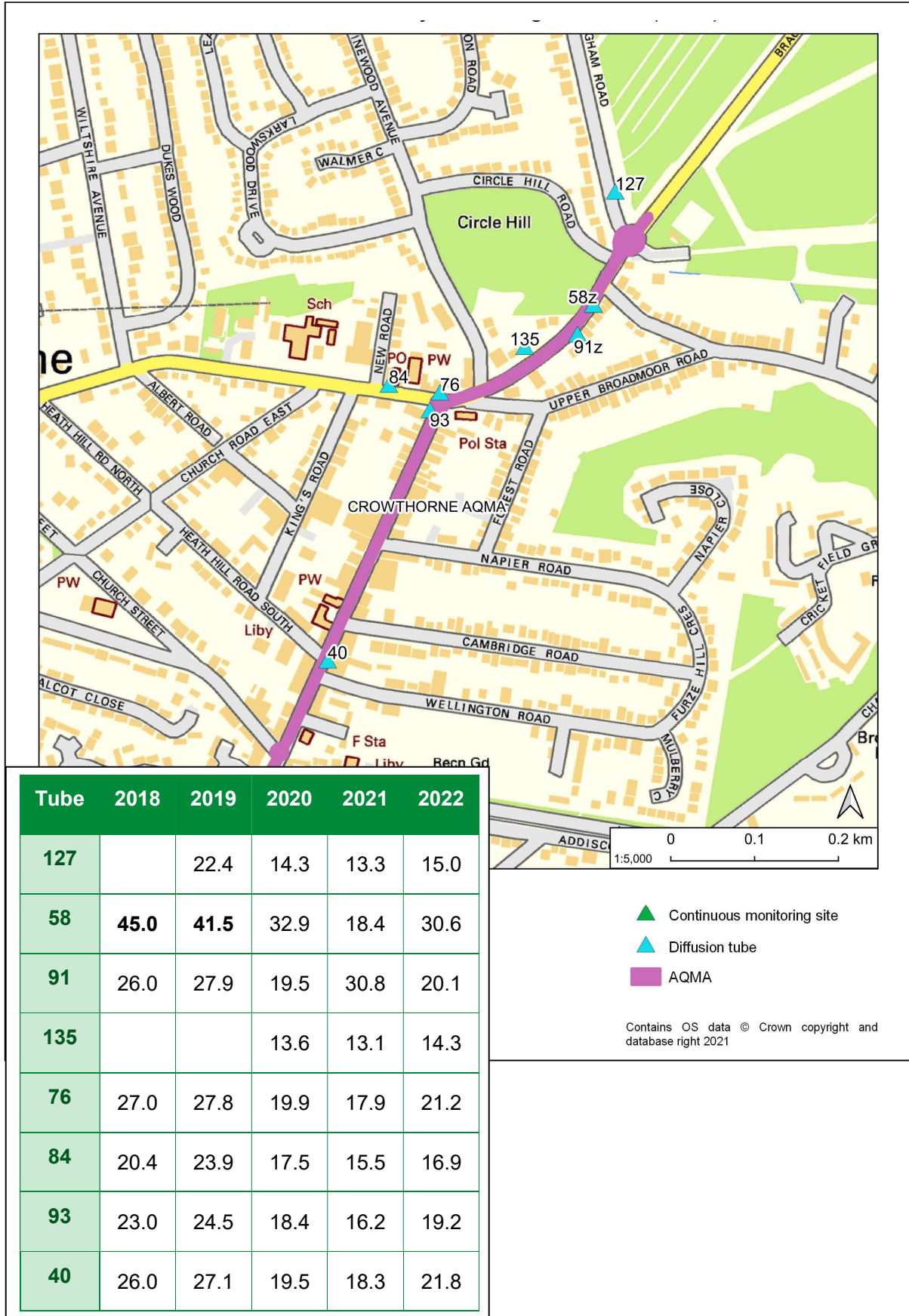


Figure D.6 – Map of Crowthorne AQMA monitoring locations (South)

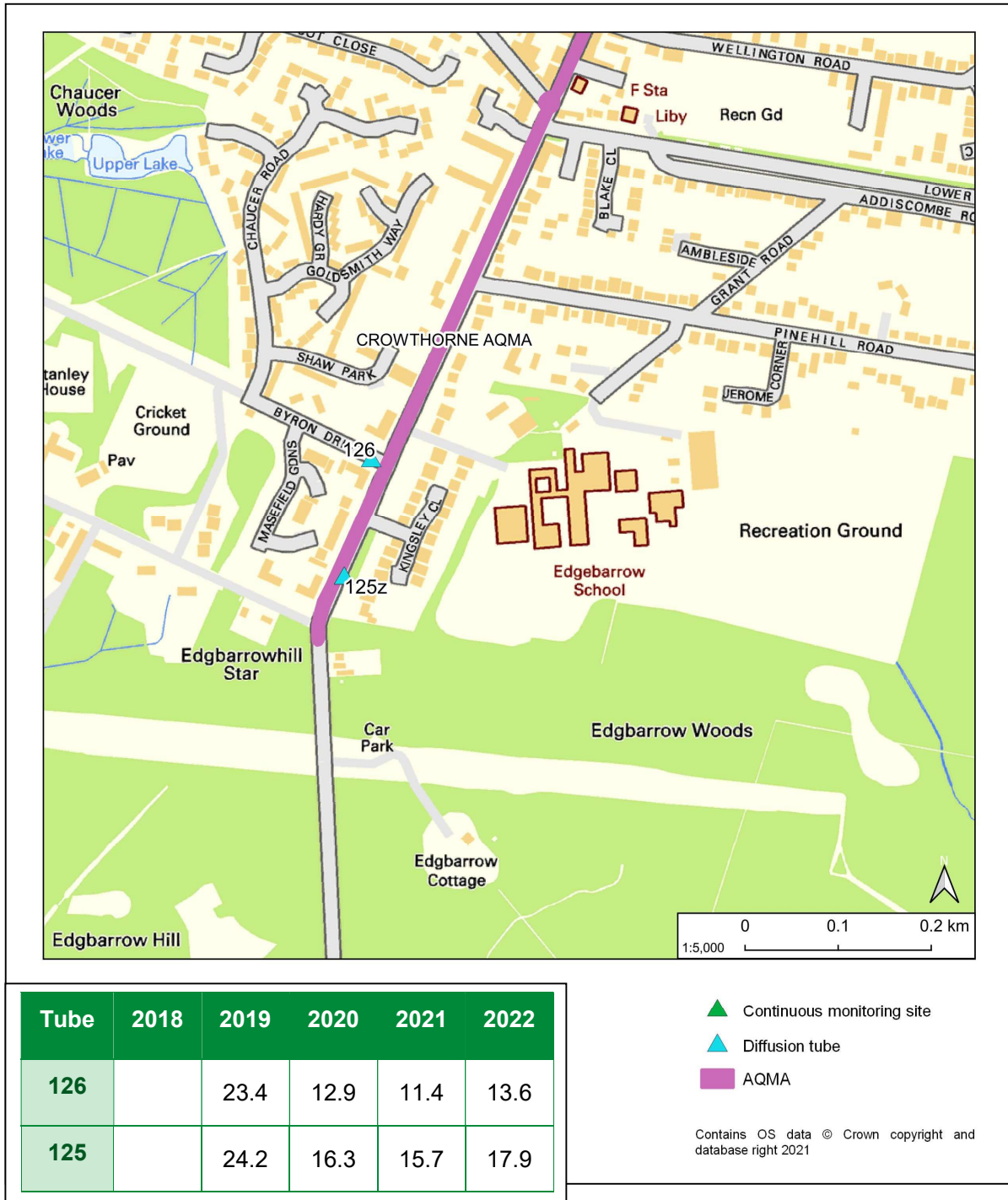
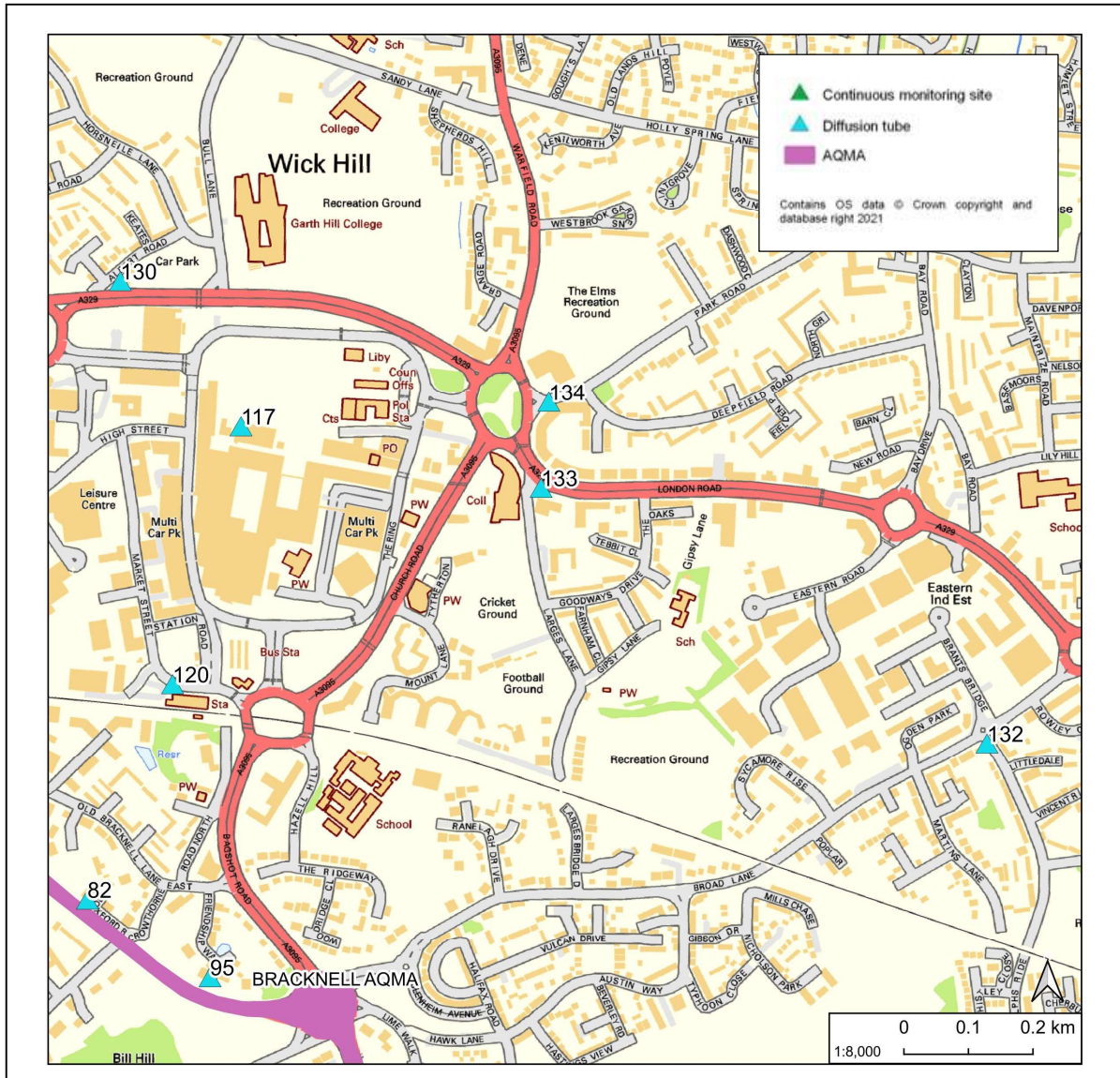


Figure D.7 – Map of Bracknell Town Centre monitoring locations



| Tube | 2018 | 2019 | 2020 | 2021 | 2022 |
|------|------|------|------|------|------|
| 82   | 30.0 | 31.8 | 23.7 | 22.9 | 26.4 |
| 95   | 21.0 | 25.4 | 15.0 | 15.2 | 17.2 |
| 120  | 21.1 | 27.3 | 15.9 | 16.6 | 19.2 |
| 133  |      |      | 15.9 | 13.7 | 16.6 |

| Tube | 2018 | 2019 | 2020 | 2021 | 2022 |
|------|------|------|------|------|------|
| 134  |      |      | 19.2 | 17.9 | 20.4 |
| 117  | 20.1 | 24.1 | 17.4 | 15.7 | 17.8 |
| 132  |      |      | 17.6 | 17.2 | 18.1 |
| 130  |      |      | 18.8 | 16.6 | 18.5 |

**Figure D.8 – Map of Meadowsweet Lane (Tube 122)**



Figure D.9 – Map of 229 Yorktown Road (Tube 124)

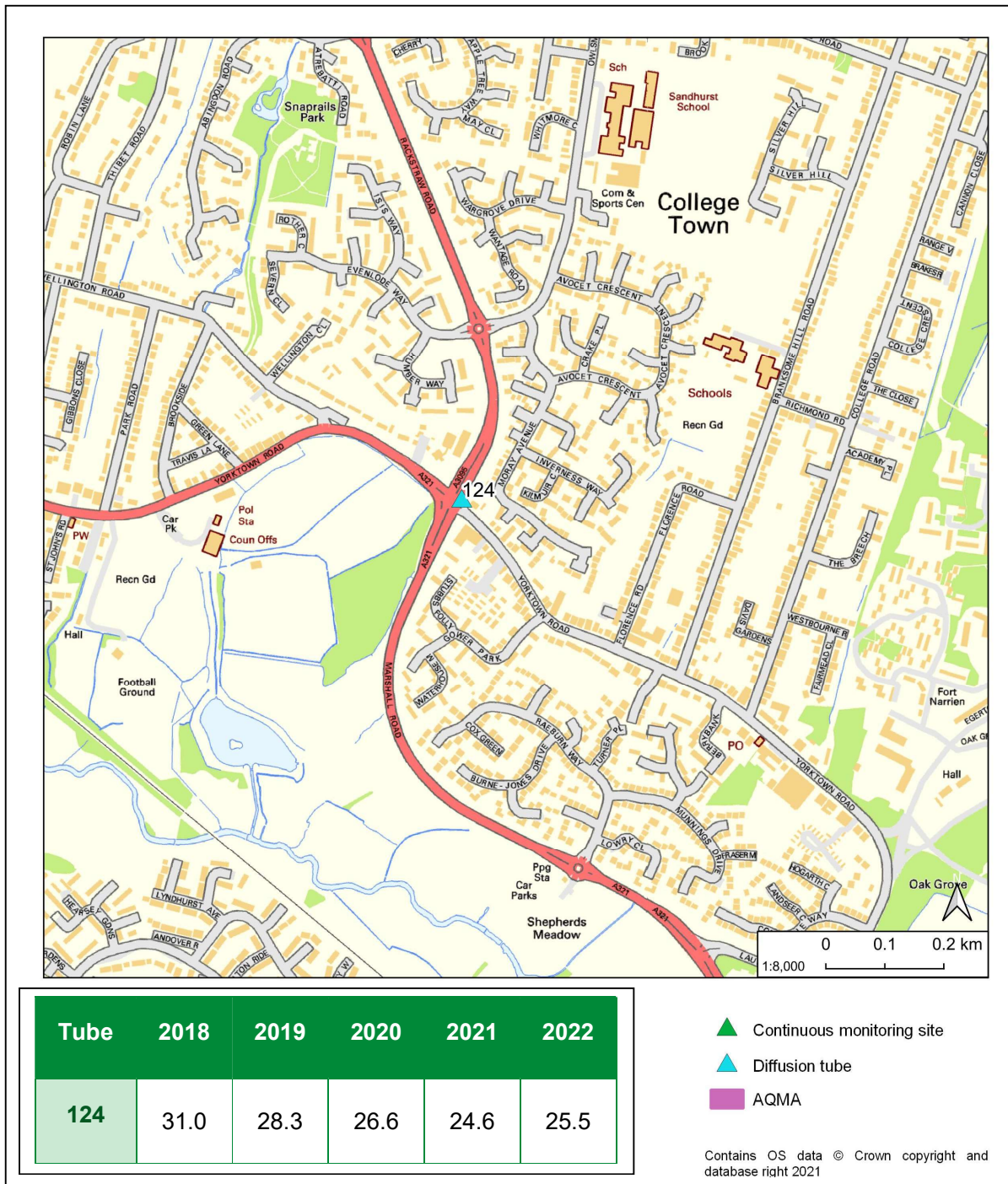
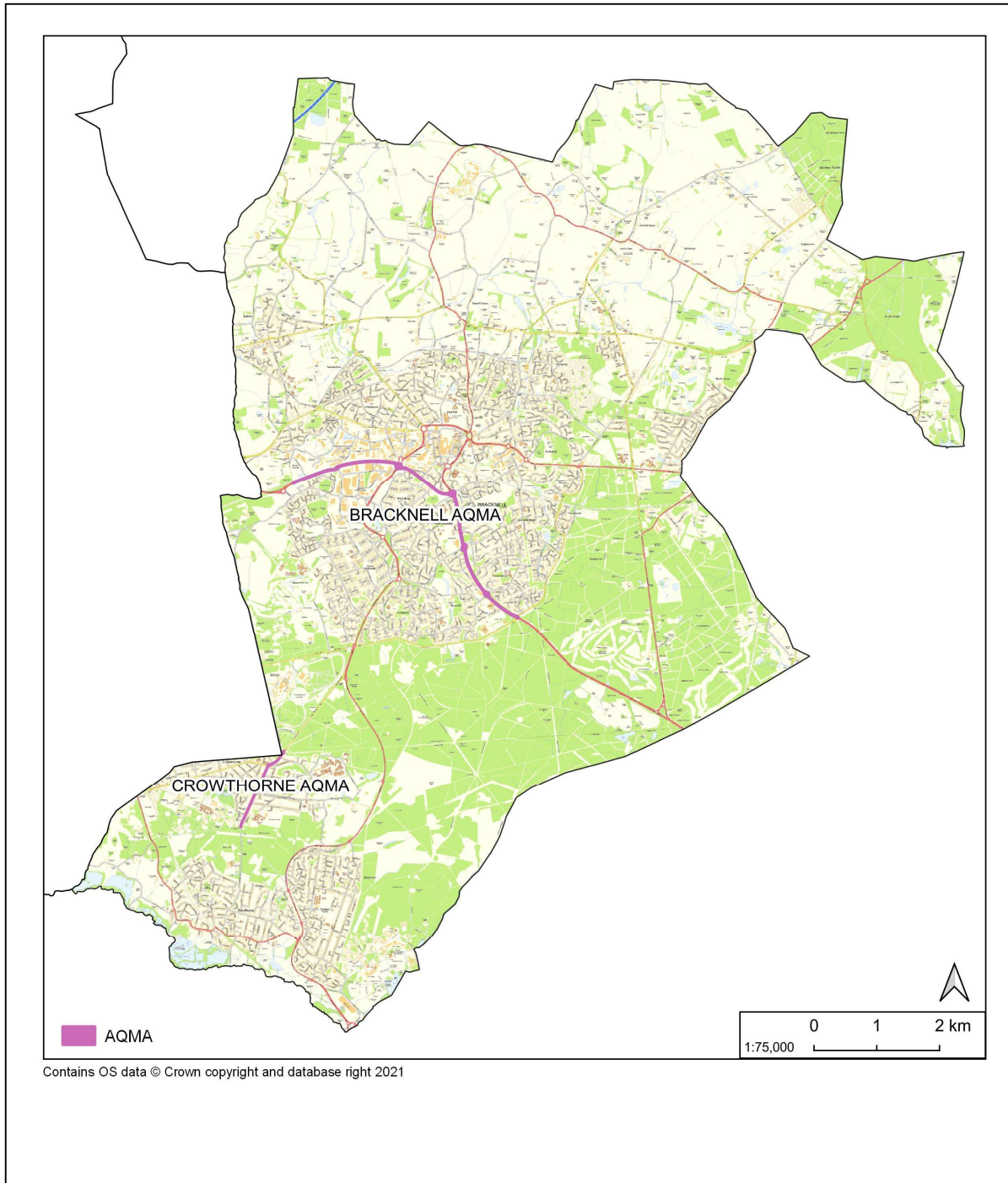


Figure D.10 – Map of Bracknell Forest





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

**Table E.1 – Air Quality Objectives in England<sup>7</sup>**

| 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                     |

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<sup>7</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## 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.