2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June, 2022

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Executive Summary: Air Quality in Our Area

Air Quality in Bracknell Forest Borough 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[1,2].

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

The major source of air quality pollutants in Bracknell Forest is emissions from road transport, and in particular the contribution from the A322 in Bracknell, the B3348/High Street and Sandhurst Road Crowthorne have been identified as significant. The main pollutant of concern is nitrogen dioxide (NO_2) and to a lesser extent the increased levels of particulate matter. Two Air Quality Management Areas (AQMAs) were declared in 2011 due to exceedances of the Annual Mean Objective for NO_2; the Bracknell AQMA (Bagshot Road and Downshire Way) and the Crowthorne AQMA. There are no exceedances of PM_{10}. Details can be found at: https://uk-air.defra.gov.uk/aqma/list?view=W and maps are in Appendix D.

Nitrogen dioxide (NO_2) is the main pollutant of concern. The levels in 2021 have shown a decreasing trend since 2017. The annualised continuous monitored NO_2 Annual Mean in 2021, of 29.9 µg/m^3 at Downshire Way did not exceed the Air Quality objective level of

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

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

[3] Defra. Air quality appraisal: damage cost guidance, July 2021

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

40µg/m^3 and there were no exceedances of the 1-hour objective at Downshire Way. There have been no exceedances of the Objectives since before 2017.

There were no exceedances of the ratified, bias corrected, annualised and distance corrected diffusion tubes (NO_2) within the whole borough including the Bracknell and Crowthorne AQMA's. There were no locations greater than 60 µg/m^3 which further indicates that there are unlikely to be any exceedance of the 1-hour Objective. All of the 2021 sites showed decreased levels compared with 2019, due to the pandemic lockdowns. However, the levels have been reducing over the last 5 years since 2017. Only two locations within the borough showed an increase from the 2020 data and they were, 32 Old Bracknell road (from 14.8 µg/m^3 to 15.1 µg/m^3) and the Co-located Tubes on the continuous monitor at Downshire Way (25.4 µg/m^3 to a triplicate average of 29.8 µg/m^3).

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

The PM_{10}, which is monitored in the Bracknell AQMA (when annualised) measured 17.1µg/m^3 and did not exceed the Annual Mean Objective 40µg/m^3. The results also showed no exceedances of the 24 hours Annual Mean 50µg/m^3, which is not to be exceeded more than 35 times a year. The PM_{10} level also demonstrates a decreasing trend since 2017.

Actions to Improve Air Quality

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

The 2019 Clean Air Strategy[5] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

[5] Defra. Clean Air Strategy, 2019

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

Bracknell Forest produced an Air Quality Action Plan in 2014, updated in 2016, which outlines local measures to improve pollution levels within the AQMAs and more widely across the borough. The action plan is integrated with the delivery of the adopted Local Transport Plan (LTP) to improve local air quality and climate change, through joint working with the Council's Environmental Health, Transport Planning and Planning Divisions. The vision outlined in the LTP is:

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

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

1. Reduce delays associated with traffic congestion and improve reliability of journey times.

2. Maintain and improve, where feasible, the local transport network.

3. Secure necessary transport infrastructure and services to support sustainable development.

4. Encourage and promote accessibility by sustainable modes of transport.

5. Reduce greenhouse gas emissions from transport.

6. Reduce casualties and improve safety on the local transport network.

The LTP3 and supporting documents can be accessed via the Council's website, at: 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 2020 results showing a decrease of 59.2% from 50.3 µg/m^3 NO_2 in 2011 to 29.9µg/m^3 NO_2 in 2021.

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; however since it has been in place we have not had a pandemic free year to see how successful it has been in improving the air quality to date. Work on a number of the junctions has been funded through the LTP and

the Council also made a successful bid to the Department for Transport to improve the Twin Bridges roundabout. Since 2016 a number of adjustments have been made to traffic light timings on the roads around Bracknell to ensure that vehicles move at a more constant speed through Bracknell. This should improve journey time reliability, reduce idling traffic and prevent queues building in certain areas.

Within the Crowthorne AQMA the main emissions sources are from moving traffic, primarily from vans delivering goods to shops along the High Street where they can also delay traffic, causing engine idling, whilst loading and unloading goods. As part of the action plan, the speed humps on the High Street have been upgraded and replaced by speed cushions to reduce the stop-start driving style (Figure S.1). Since the declaration of the AQMA in 2011 the NO_2 has continued to reduce from 41.7µg/m^3 to 31.1/m^3 (91xyz) in 2021 at the location of relevant exposure.

Figure S.1 - Speed Cushion in Crowthorne AQMA

A joint application made by PPP with West Berkshire and Wokingham Councils was made to the Air Quality Grant Scheme 2020 and was successful in securing funding for a project related to a behaviour change anti-idling campaign, and localised $PM_{2.5}$ monitoring & action planning, at schools located near to the AQMAs. 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/

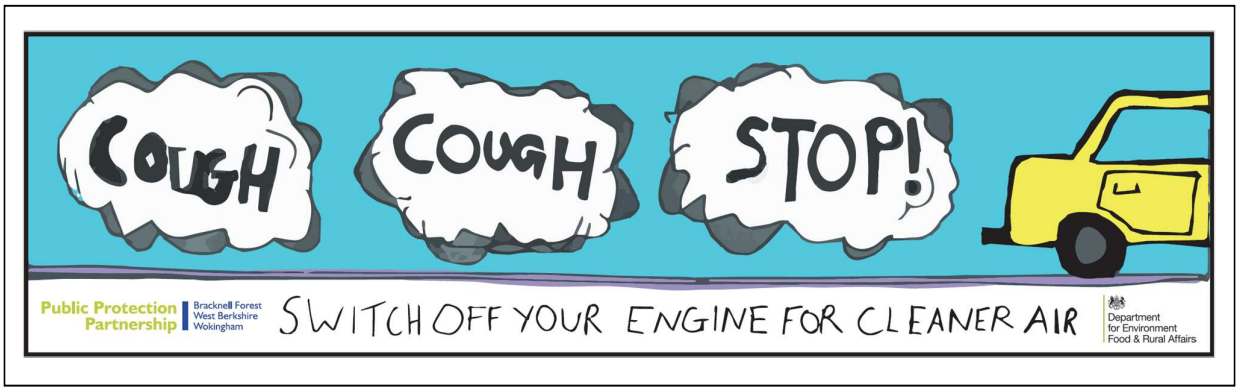


Figure S.2 - The Bumper Sticker.

For Clean Air Day 2021, we wrote to all the schools within Bracknell Forest and asked them to sign an Air Quality pledge, and in doing so, it meant that they disseminate all the literature that we give to them to all the school pupils and cares/guardians. Unfortunately, not many schools signed up.

Conclusions and Priorities

The main focus for Bracknell Forest in terms of improving air quality is to reduce NO_x emissions, particularly NO_2 concentrations, by focusing actions within the two declared AQMAs. The Council also recognises that wider improvements in air quality across the Borough can also improve concentrations within these AQMAs.

- We will continue to work through the Action Plan, and we have made significant progress as we have achieved most of it already. However, we will be continuing to gather data to determine if we are able to revoke the AQMA's. If not we will consider a further review of the AQAP. We will need a full pandemic free year to see what impact the alternations to the Downshire Way have made which should be the data collected in 2022 .

- In 2020 we were awarded a DEFRA AQ grant which is being used for behaviour change project on Anti-Idling. We are also monitoring the $PM_{2.5}$ 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 $PM_{2.5}$ so that it is within the required limits. Please see these webpages for updates, https://publicprotectionpartnership.org.uk/environmental-health/air-quality/defra-aq-grant/

The Pandemic and NO2

During 2020, the NO_2 concentrations did not exceed the Air Quality Objectives at any of the diffusion tube sites once the distance correction was applied.

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

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

- Bracknell Forest saw a reduction of NO_2 between 33.97% and 43.84% in 2020 compared to 2019. This equated to a 25.89% reduction in annual mean concentration relative to 2019. If you compare 2021 to 2019 this is still an average reduction of 12.37%. Graph shows the monthly averages for 2019, 2020, and 2021, the light blue lines show the percentage increase and decrease between 2019 (pre covid) and 2021 (the last year with a lock down). As you can see from the graph for the 6 months of January, February, May, July, August & September the NO_2 in 2021 was less than in 2019. It was higher in all the other months.

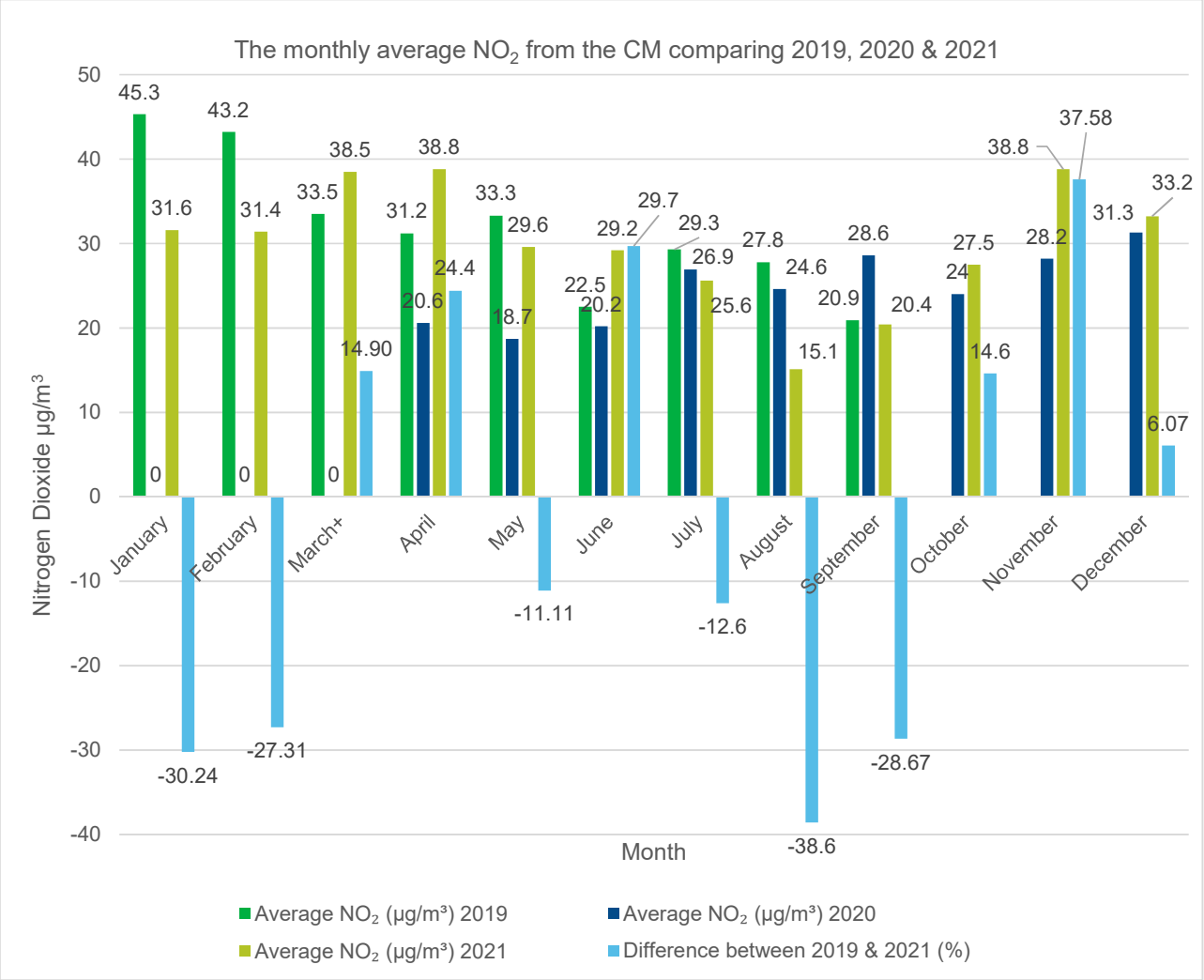


Figure S.3 - A graph comparing the annual NO_2 means for each month in 2019, 2020 & 2021 from the Continuous Monitor.

Local Engagement and How to get involved

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

- Public Protection Partnership https://publicprotectionpartnership.org.uk/environmental-health/air-quality/vehicle-idling/
- Domestic Fuel information https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-domestic-solid-fuels-standards-england-regulations-2020/
- Walk or cycle short distances of less than one or two miles rather than driving

- Search for car sharing opportunities using Bracknell Forest Travelshare at (https://liftshare.com/uk/community/bracknellforest) or Faxi (https://faxi.co.uk/) to share journeys with work colleagues

- Use the bus or train regularly and keep up-to-date with the latest bus routes timetables at https://www.bracknell-forest.gov.uk/roads-parking-and-transport/travel-and-public-transport/buses and live bus departures at http://www.bracknellrti.com/Naptan.aspx

- Go to The Lexicon website for the best ways to travel to the new Town Centre https://www.thelexiconbracknell.com/get-here/travel-information

- Go to https://www.bracknell-forest.gov.uk/roads-parking-and-transport/travel-and-public-transport for all cycling, walking, taxis and bus routes.

- We are also on Social Media including Twitter and Facebook **click here**, Twitter **click here**)

Figure S.4 - A Social media Facebook post about the 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

Other useful websites are:

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

Other useful AQ sites are:

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

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

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,

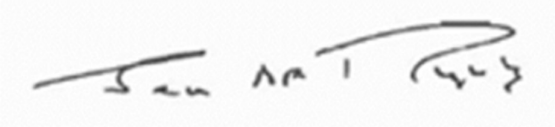
Environmental Health & Public Health,

Planning Authority

This ASR has been approved by: Sean Murphy

This ASR has not been signed off by a Director of Public Health.

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



Sean Murphy

If you have any comments on this ASR please send them to Environmental Health at:

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Environmental.health@bracknell-frest.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in Bracknell Forest Council during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Bracknell Forest 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.

2 Actions to Improve Air Quality

Air Quality Management Areas

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

A summary of AQMAs declared by Bracknell Forest can be found in Table 2.1. The table presents a description of the 2 AQMAs that are currently designated within Bracknell Forest. QA/QC of Diffusion Tube Monitoring

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

The Performance criteria are due to be changed, 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.

Diffusion Tube Annualisation

As annualisation is required for any site with data capture less than 75% but greater than 25%. 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 is provided in Table C.. The raw data annual mean was 23.1 µg/m3 and the annualised data annual mean was 21.2 µg/m

Graph C.1 - AIR PT Nitrogen Dioxide Proficiency Scheme Results 2020

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.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NOx/NO2 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 0.72 to the 2021 monitoring data. A summary of bias adjustment factors used by Bracknell Forest Council

over the past five years is presented in Table C.1. The co-location study has taken place at the Downshire Way Monitoring Station and had a good over all capture rate of 98.4%.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	n/a	0.74
2020	National	03/21	0.81
2019	National	09/20	0.84
2018	Local	06/19	0.82
2017	Local	09/18	0.85

NO2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO2 concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO2 monitoring locations within Bracknell Forest required distance correction during 2021.

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 judgement. On completion of this data correction procedure, these data were converted to hourly means and a summary of these data were provided to Bracknell Forest Council at quarterly intervals and a calendar year annual report is prepared.

Independent Site Audits

In addition to these checks an independent site audit is carried out to ensure the nitrogen dioxide analyser is operating correctly. The audit that is carried out utilises procedures that

are applied within DEFRA's National Automatic Air Monitoring Networks Quality Control Programme. The efficiency of the analyser's convertor is checked and the analyser is also leak tested. The gas bottle used for calibrations on site is also checked against the auditor's gas bottle to ensure the stability of the gas concentration.

The site audit for the Bracknell automatic monitoring unit was carried out on 20th December 2021.

Oxides of Nitrogen Analysers

A major factor governing the analyser's performance is the NOx analyser's converter and its ability to reduce the nitrogen dioxide to nitric oxide. The recommended range for instrumentation in the national automatic air monitoring network is in the range of 98% - 102% efficient. Our tests show the converter in the Bracknell, Downshire Way analyser to be 99.3% efficient at an NO2 concentration of 322 ppb. This is a good result.

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

The analyser flow rate was measured using a calibrated flow meter and compared against the analyser's flow rate sensor to evaluate its accuracy. The measured flow rate passed within the ±10% advisory limit, it was also noted the analyser flow was observed as slightly unstable and recommended these flow issues are investigated.

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

Based on the Wokingham NOx analyser's response to the audit standard and audit zero, the concentrations of the stations NO cylinder have been reassessed. This provides an indication of the on-site standards stability (the gas concentration stabilities). For the purpose of these stability checks, the criteria adopted within the national network, and used here, is that the recalculated concentration should lie within 10% of the suppliers stated concentrations.

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

Table C.3 Bracknell Forest Council, Downshire Way

TRL Bracknell, Downshire Way – NO cylinder 21901300088296				
	NOx (ppb)	**% change from stated**	**NO (ppb)**	**% change from stated**
Manufacturers Stated Concentration	**464**	**---**	**464**	**---**
Recalculated concentration (21/12/20)	494	6.4	491	5.9
Recalculated concentration (20/12/21)	476	2.6	474	2.1

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

Particulate Matter TEOM 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 ±2.5% of the stated factors. The difference between the calculated and stated factors was +0.45%, this is a good result.

Further tests indicated that the instruments were free of major leaks.

PM10 and PM2.5 Monitoring Adjustment

The type of PM10 monitor(s) utilised within Bracknell Forest Council do not required the application of a correction factor.

PM2.5 Estimation

In the absence of PM2.5 monitoring, and where a local authority carries out PM10 monitoring, it is recommended to consult Chapter 7 Section 1 of Technical Guidance LAQM.TG16 (7.107 – 7.111) in order to include an estimate of PM2.5 concentrations.

The estimated annual mean PM10 concentration at a roadside site in 2021 was 17.1 µg/m3. The PM2.5 concentration at this site can be estimated as follows:

Table C.4 - Predicted PM2.5 at Downshire Way

Site ID	Bias Adjusted Annual Mean PM10 (µg/m3) (A)	Nationally Derived Correction Factor (0.7) (B)	Predicted PM2.5 (µg/m3) (A*B=(C)
Downshire Way Continuous Monitor (CM3)	17.1	0.7	11.97

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.

NO2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO2 concentration at the nearest location relevant for exposure has been estimated using the NO2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO2 concentrations corrected for distance are presented in Table B.1.

No automatic NO2 monitoring locations within Bracknell Forest Council required distance correction during 2021.

Table C.5 – Annualisation Summary (concentrations presented in µg/m3)

Site ID	Annualisation Factor Swindon	Annualisation Factor Oxford	Annualisation Factor Reading	Average Annualisation Factor	Raw Data Annual Mean (µg/m3)	Annualised Annual Mean (µg/m3)
120	0.8657	0.9829	0.8901	0.9129	23.1	21.1

Table C.6 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2 -5
Periods used to calculate bias	12	-
Bias Factor A	0.72 (0.6 - 0.91)	-
Bias Factor B	39% (9% - 68%)	-
Diffusion Tube Mean (µg/m3)	41.4	-
Mean CV (Precision)	4.0%	-
Automatic Mean (µg/m3)	29.9	-
Data Capture	99%	-
Adjusted Tube Mean (µg/m3)	30 (25 - 38)	-

Notes:

A single local bias adjustment factor has been used to bias adjust the 2021 diffusion tube results.

Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMAs designations are as follows:

- NO_2 Annual Mean.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA Bracknell	Declared 09/02/2011	NO_2 Annual Mean (Tube 86)	The A322 Bagshot Road and Downshire Way from Berkshire Way to juction with B3430	NO	50.3	30.1	BFBC Air Quality Action Plan - 2014	https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-management-areas/
AQMA Crowthorne	Declared 09/02/2011	NO_2 Annual Mean (Tube 91)	Part B3348, High Street & part of Sandhurst Road	NO	41.7	31.1	BFBC Air Quality Action Plan - 2014	https://publicprotectionpartnership.org.uk/environmental-health/air-quality/air-quality-management-areas/

☒ **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 the majority of the report is well structured, detailed, and provides the information specified in the Guidance. The following comments were designed by DEFRA to help inform future reports, and we have completed them all for the 2022 report.

1. Robust and accurate QA/QC procedures were applied for the diffusion tubes. The wrong diffusion tube tool was uploaded, but this was not a requirement.
2. Annualisation for the automatic site on Bracknell Downshire Way (NO_2 and PM_{10}) was carried out in line with TG (16) guidance for the annual means.
3. The Council has included discussion and presented the NO_2 trends observed in both of the AQMAs located within the Council's boundaries.
4. The local monitoring strategy has been updated during the present year and justifications have been given. The movement of monitoring locations is welcomed, allowing the Council to prioritise other areas of higher air pollution or closer to new developments as concentrations surrounding the AQMA have been below the Air Quality Objective. This demonstrates the Councils proactive and dedicated approach to improving air quality across Bracknell.
5. Most tables were filled correctly but a few details could be improved: Table 2.1 does not state the date of AQAP Publication. In Table 2.2, a couple of measures are missing the "Measure Status" and all are missing the "Estimated Cost of Measure".
6. The labels and location of some diffusion tubes within one or the other AQMA on the maps do not match the data in table A.2. Please can this be updated in next year's report for avoidance of doubt.
7. The comments from last year's ASR have been addressed.
8. The Council has multiple measures in place that will help to tackle $PM_{2.5}$. However, measures focus only on emissions from transport. Actions would also be possible on domestic emissions (through awareness campaigns for example). The Public Health Outcomes Frameworks were referred to, and this is encouraged to continue.
9. The report is a good source for members of the Public to find out about air quality in their area. The Council should continue their hard work.

Bracknell Forest Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 18 measures are included within Table 2.2, with the type of measure that the Bracknell Forest Council have made during the reporting year of 2021 are presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective Air Quality Action Plan. Key completed measures are during 2021/22 (finical year) are to be:

- A3095 improvements 2020/21: This project aimed to deliver significant improvements to one of the key highway corridors along the Thames Valley in Berkshire. The project is instrumental in accommodating movements and reducing congestion between the M4 (J8/9/10) and M3 (J4) (Downshire Way AQMA).

- The scheme focussed upon the section of the A3095 from the Hanworth Roundabout through to the Golden Retriever Junction (this connects to the Bracknell AQMA) and included 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 indicated that the preferred scheme options would deliver significant enhancement to the operation of the individual junctions as well as improved journey times along the A3095 corridor. In turn, this supports the continued growth of Bracknell as an employment centre and further residential growth across the region. The modelling results showed that the introduction of the scheme would have a beneficial impact on air quality. The work commenced in the Summer of 2020, and was completed by June 2021. Further data collection and analysis is needed, but anecdotally and based on the evidence we have, the scheme is working 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.

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

in April 2021, with new sections of traffic-free shared footway/cycleway implemented and the light-controlled crossing has been upgraded to a Toucan.

- A new pedestrian and cycle crossing on Binfield Road near to junction with Harvest Ride is now complete
- A new pedestrian and cycle crossing on Forest Road near to junction with York Road is now complete.
- A bid was submitted to the Office for Zero Emissions Vehicles (OZEV) and Energy Saving Trust with funding successfully secured for the installation of 16 EV chargepoints across 11 Council owned car parks
- A bid was submitted to the Government's Capability Fund to deliver further measures to promote walking and cycling, and a workplace intervention to promote more sustainable commuting options, this was successful and work is being delivered through 2022
- An Anti-idling competition was run in Bracknell Forest with all the Primary Schools, to help them spread the message. The winning drawing strap lines were made into a banner given to the schools, these banners have been made available for others to purchase as well. See Figure for the banner.

Bracknell Forest Council expects the following measures to be completed over the course of the next reporting year and the priorities for the coming year can be seen below. 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

- Clean Air Day on 16th June 2021, all schools in Bracknell Forest were asked to sign up to the "Clean Air Pledge". By doing this they were agreeing to send out our literature to all the parents about air quality and anti-idling. Also actively joining in our competitions as well. Unfortunately not many schools signed up to the pledge.

- 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.
- To deliver 16 dual EV chargers in the 11 car park sites that have been identified (and funded) by OZEV grant, in partnership with Joju Charging, with works expected to be complete in March 2023.
- Officers have also been in discussion with a number of charge point providers to discuss options for privately funding rapid and fast chargers at other Council-owned sites, including Bracknell Sports Centre, this work is ongoing as part of our wider EV strategy. https://www.westberks.gov.uk/article/38776/Ultra-Low-Emission-Vehicle-Strategy
- 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.
- BFC are chairing 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).
- We are in the process of reviewing our Local Cycling and Walking Infrastructure Plan, 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 within Schools.
- Continue to promote and implement initiatives and measures specified in the Sustainable Modes strategy.
- The Council is working towards implementing a Bus Services Improvement Plan (BSIP) by 31 October 2022. 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. - A BSIP was published on 31 October 2021, setting out plans for improvements to local services, subject to funding.

This has been followed by an Enhanced Partnership Plan and Scheme which specifies the measures the Council and local operators will implement to improve services.

- The Eco Rewards scheme is continuing with a successful launch of the scheme at Warfield Primary school in 2021. In Q3 30,000 miles of sustainable journeys were logged on the system, and 9 tonnes of CO_2 saved (compared to taking these trips by car). There are plans to further extend the scheme to St Michael's, Uplands, and Harmans Water primaries, Kings Academy and Ranelagh and Brakenhale secondary schools. As the scheme continues to be a success, BFBC is looking to roll it out further e.g. to Leisure sites in 2022.
- A series of short films promoting walking and cycling in the borough including green spaces and the existing cycle path network have been completed and being shared on social media throughout the year
- The Govt Capability 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

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

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

- Bracknell Forest Council is aware that the AQAP will need updating and will be looking to develop this further over the next few years, or alternatively revoke the AQMA's, once all the major highway improvement works have finished and the impacts on the AQ has been measured on Downshire Way.
- The Covid-19 pandemic had suppressed traffic volumes. Moreover, we are now seeing that it has changed traffic patterns making monitoring comparisons more difficult. Once we are confident that traffic levels have returned to a degree of normality, and have taken time to evaluate the success of recent schemes and wider corridor improvements, we will then be able to plan for future interventions. There is no doubt that the level of reduction in traffic seen through 2020 and 2021 has led to an improvement in air quality, and the Council is actively working to capitalise on the changes that residents and

commuters have made to their lifestyles through reducing their commutes, working more flexibly and travelling at different times of day, and is also encouraging more local travel to be undertaken by foot, bicycle, and potentially new electrically assisted modes such as e-bikes and e-scooters (which it should be noted can only be legally used on private land with the land-owner's permission, unless as part of a trial hire scheme in certain defined locations)

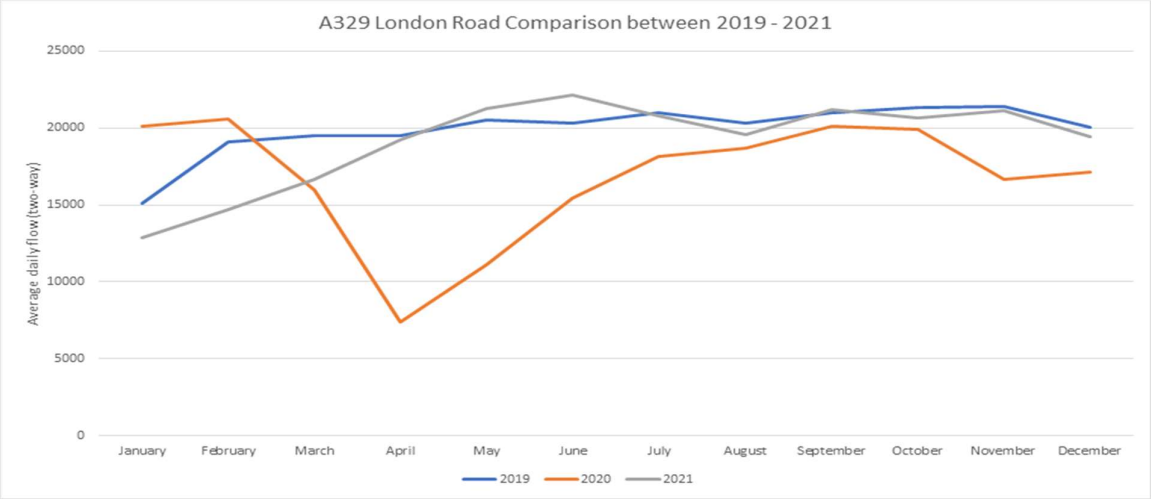
Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Bracknell Forest anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of AQMA Bracknell & AQMA Crowthorne.

Traffic Data for Bracknell Forest Council

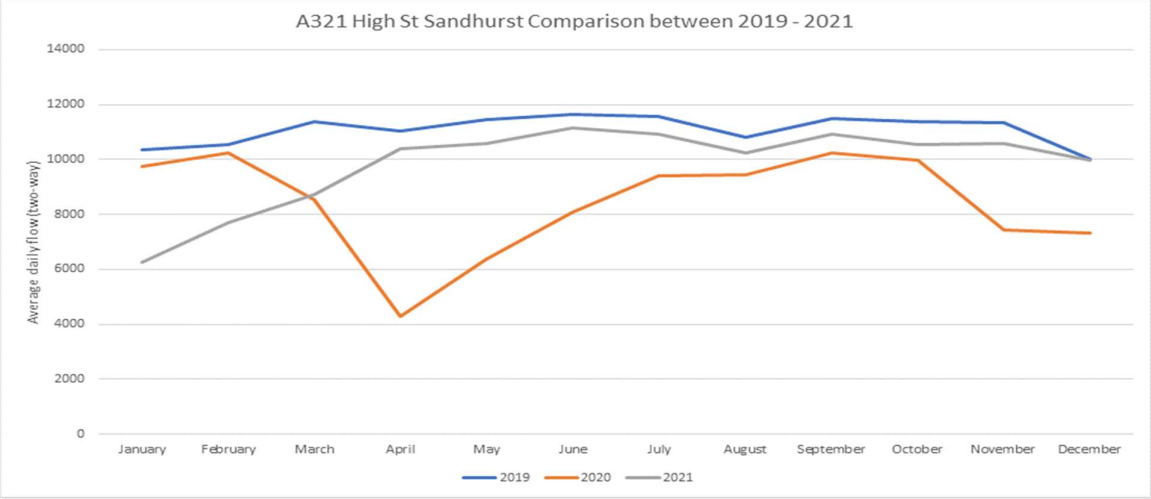
The traffic is monitored at three places in Bracknell the A329 London Road, the A321 High Street Sandhurst and the B3408 Wokingham Road.

You can see from the three graphs the decrease in the traffic from the three national lockdowns which occurred in the UK during April 2020, November 2020 and January 2021. The 3 graphs also show that the average traffic from 2021 has still not increased past the average 2019 traffic, however is above 2020. The only time the 2020 traffic increases past the 2019 data is in May, June and September the A329.

Graph 2.1 - A329 London Road Traffic Flow Comparison between 2019-2021



Graph 2.2 - A321 High St Sandhurst Traffic Flow Comparison between 2019-2021



Graph 3.3 - A321 High St Sandhurst Traffic Flow Comparison between 2019-2021

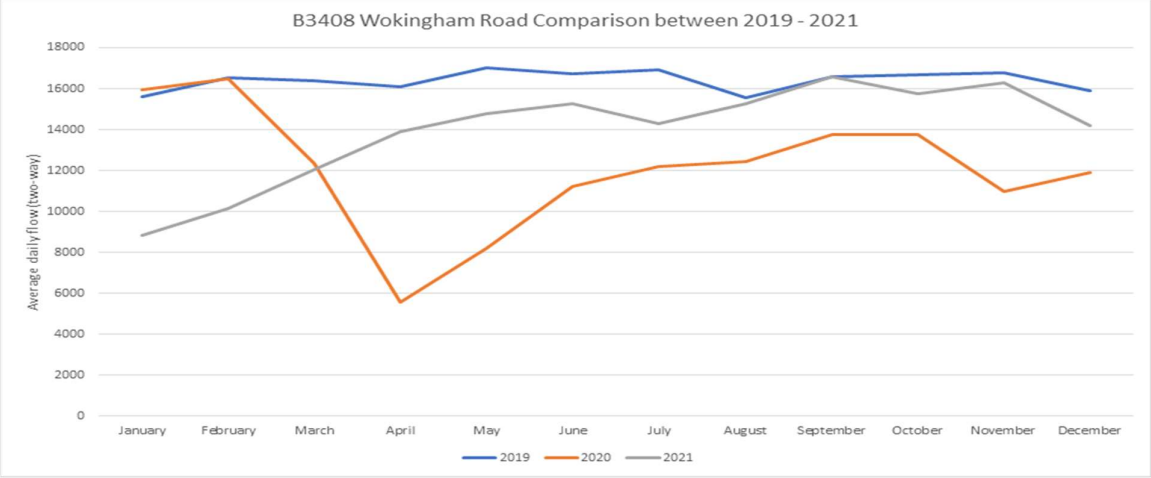


Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Improvements and signalisation of the Horse and Groom Roundabout	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2012	2020	BFC	BFC	NO	Funded	£650k	Completed	Reduction in NO_2 concentrations to below the objective in the AQMA 1	Reduce queues on approach roads and journey time	Work complete. 2018 monitoring showing improved movement through junction and improved queuing times	These 4 measures are part of the wider improvements of the A322/A329 corridor.. Monitoring undertaken before further capacity improvements on Downshire Way showed an overall improvement in peak hour journey times along the whole corridor (inc. above schemes) between Coppid Beech roundabout and Swinley Gyratory.
2	Improvements and signalisation of the Sports Centre Roundabout	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2015	2021	BFC	BFC	NO	Funded	£2m	Completed	Reduction in NO_2 concentrations to below the objective in the AQMA 1	Reduce queues and journey time	Work complete for Phase III. Now looking to implement Phase IV which will add an additional circulatory lane and an additional exit lane towards Nightingale Close	Improvement in movement of traffic providing reliable journey times with reduction in queues
3	Capacity and safety improvements including full signalisation at Twin Bridges Roundabout	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2015	2020	BFC	BFC	NO	Funded	£3m	Completed	Reduction in NO_2 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.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
4	Widening of Downshire Way from Horse and Groom roundabout to Twin Bridges	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2015	2020	BFC	BFC	NO	Funded	£5m	Completed	Reduction in NO_2 concentrations to below the objective in the AQMA 1	Reduce queues and journey time	Work complete	As above.
5	Capacity and safety improvements at junction with B3348 Dukes Ride and A321 Wokingham Rd	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2015	2018	BFC and WBC	BFC and WBC	NO	Funded	£50k - £100k	Completed	Reduction in NO_2 concentrations to below the objective in the AQMA 1	Reduce queues in peak time	Work complete	Improved traffic movement through junction in peak hour. Junction falls within Wokingham BC Work led by WBC.
6	Improvements to Dukes Ride/Bracknell Road junction	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2017	2021	BFC	BFC	NO	Funded	£250k	Not Complete – Works on hold	Reduction in NO_2 concentrations to below the objective in AQMA 2	Reduce queues and journey time	Concept designed and consultation ongoing	New concept design, consulting Parish Council. Scheme aims to improve the flow of traffic through the junction.
7	Crowthorne High Street improvements – speed cushions replacing flat top humps	Traffic Management	Other	2016	2016	BFC	BFC	NO	Funded	£10k - 50k	Completed	Reduction in emissions from these types of measures can be in the order of 5% leading to a reduction in NO_2 concentration in AQMA 2	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

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
8	Improvements to bus waiting times at stops to aid flow of traffic and reduce queuing	Transport Planning and Infrastructure	Bus route improvements	2019	2021	BFC	BFC	NO	Funded	Ticket machine upgrades funded by bus operators	Completed	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Reduce queueing at bus stops and bus station to smooth flow. increase in number of people using buses	Bus station complete. All local buses now accept contactless payment	All local buses in Bracknell now accept payment by contactless bank card which has speeded up boarding timesImprovements have been made to bus fleet, 85 meet Euro VI, 65% meet Euro V and only 1 bus used for emergencies only falls below Euro IV.
9	Improve signage along key routes including Bagshot Road in the AQMA	Transport Planning and Infrastructure	Cycle network	2016	2016	BFC	BFC	NO	Funded	£5,000	Completed	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Increase cycling rate by making people more aware and cycle paths made safe and inviting.	Complete	Data from annual walking and cycling survey shows Cycling levels across the wider Borough have increased by 7% from 2019 to 2020
10	Delivery plan and provision of rear service yard to reduce number of delivery vehicles unloading in Crowthorne High Street	Freight and Delivery Management	Freight Partnerships for city centre deliveries	2015	2032	BFC	BFC	NO	Not Funded		Planning	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ 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.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
11	Provision of real time information at key bus stops	Promoting Travel Alternatives	Other	2018	2018	BFC	BFC	NO		£250k		Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Increase in number of people using bus and rail	Real time information is provided at the bus station, rail station forecourt and a number of key hubs and shopping destinations. This is supplemented by a website which shows real time information (where available) for all stops in the borough and via specific smartphone apps	We continue to Encourage people to use the bus thus reducing the amount of vehicles on the road.
12	Updating the Council's website to include rail and bus time in real time	Promoting Travel Alternatives	Other	2018	2018	BFC	BFC	NO	Funded	£20k	Completed	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ 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	
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 NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Increase in number of people using bus and rail	Both Reading Buses and Courtney Buses now offer mobile ticketing	All Courtney Buses accept payment by contactless bank card
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 NO_2, PM_{10} and $PM_{2.5}$ 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.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
15	Development of travel plans by schools within the Borough	Promoting Travel Alternatives	School Travel Plans	2015	2032	BFC	BFC	NO	Not Funded	£20k	Implementation	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ 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.
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		Implementation	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Reduce local car journeys	LSTF project engaging with residents and businesses concluded in 2015 with positive results. "Travel in Bracknell" walking and cycling surveys showed broad increases in 2018 of around 25-30% on previous year. Secured funding from two major housing developments to provide bus services as part of travel plan for development. TRL developer (Legal & General) are funding alterations to a bus service which will allow access to Crowthorne station Residents will	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

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														have an alternative form of transportation to the retail sector and other amenities other than their own vehicle	employers run mini-buses for staff travelling from the station to the office (e.g. Dell). Business travel plan produced and distributed to all businesses in 2016 are available on the Council website. In addition to this major new residential development in Bracknell are required to develop travel plans. The guidance and advice is well received by businesses. The developer of the Jennets park development are required to run the buses to the town centre for a number of years. TRL developer (Legal & General) are funding alterations to a bus service which will allow access to Crowthorne station.
17	Through the programme of replacement ensure that fleet vehicles continue to comply with current emission levels	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2015	2032	BFC	BFC	NO	Partially Funded		Implementation	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Reduce vehicle NOx and PM emissions	Contractor fleet min Euro 4 standard on recent contracts (e.g. refuse and highway)	Electric pool car and van now on fleet with monitoring ongoing. Reducing the amount of high emitting NOx vehicles

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
18	Consider introducing electric cars as pool cars	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2015	2032	BFC	BFC	NO	Partially Funded	>£50,000	Implementation	Reduction in background NO_2, PM_{10} and $PM_{2.5}$ concentrations across the borough	Reduce vehicle NOx and PM emissions	Pool cars and van now on fleet	Provision for electric car charging increasing to encourage use of vehicles. Currently available in Council staff and public car parks, fleet depot, Waitrose and new multi-storey car park. The council are looking to move to electric vehicles once their lease on the petrol cars expires. Electric pool car and van now on fleet.

$PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Bracknell Forest is taking the following measures to address $PM_{2.5}$, although England has not set an air quality objective for $PM_{2.5}$, the Public Health Outcome Framework (PHOF) enables Council's Public Health and Environment departments to work together to priorities action on air quality. The estimate of the local concentration of $PM_{2.5}$ is 11.97 µg/m^3, Table 2.4 shows that only 0.81% of $PM_{2.5}$ comes from primary Road & Transport sources [(4)], the other 99.19% come from other sources. Therefore only 0.097 µg/m^3 of Bracknell Forest $PM_{2.5}$ is from Road & Transport.

The fraction of mortality attributable to particulate air pollution indicator' value for Bracknell Forest and other Local Authorities within Berkshire can be seen in Table 2.3. Further information about other areas in the UK can be can be found using the link below.https://fingertips.phe.org.uk/profile/public-health-outcomesframework/data#page/0/gid/1000043/pat/6/par/E12000005/ati/101/-are/E07000194 This link does not work

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

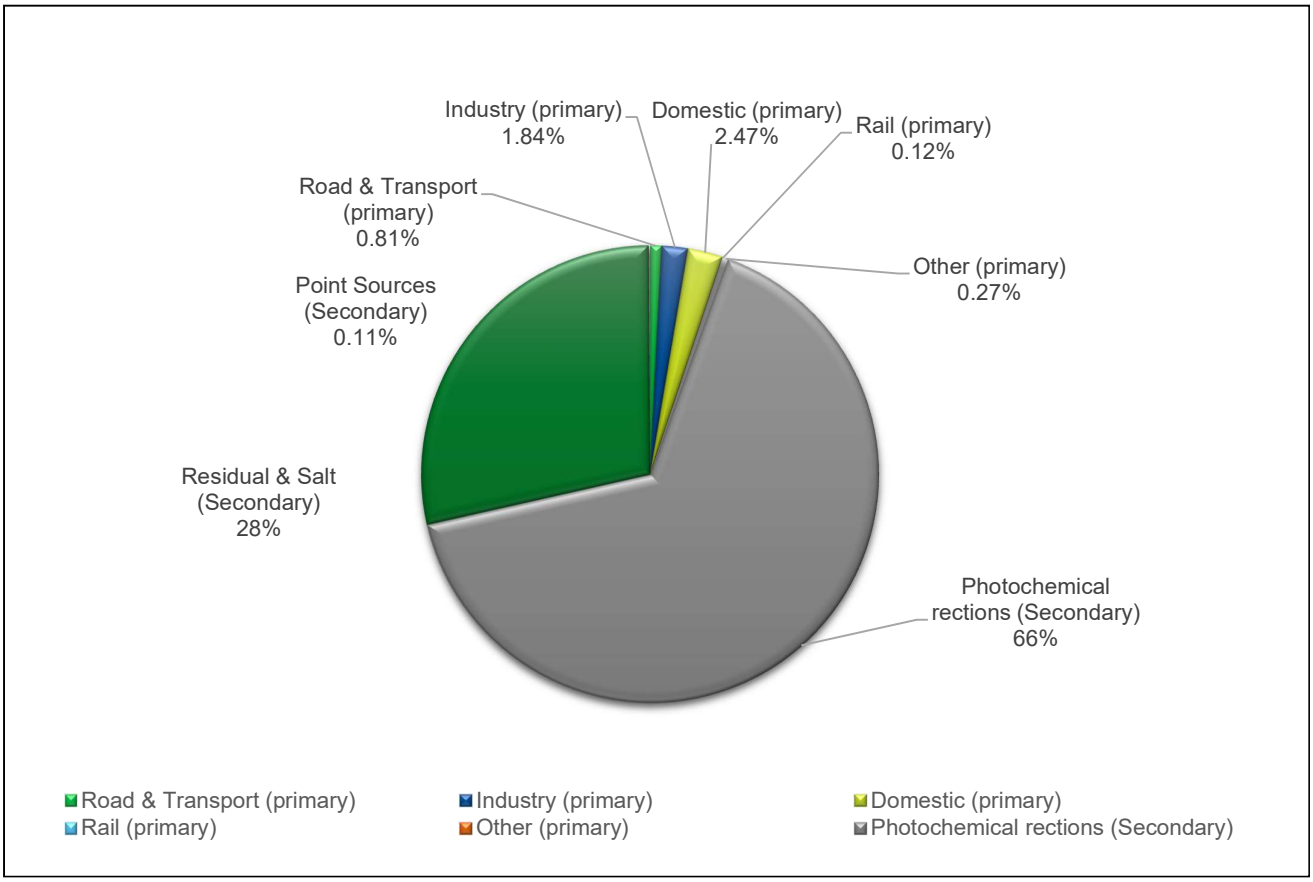
Bracknell Forest	Reading	Slough	West Berkshire	Windsor & Maidenhead	Wokingham
5.7	6.3	6.5	5.3	5.8	5.9

Many of the actions that Bracknell Forest are working on to reduce vehicle related emissions will address $PM_{2.5}$ concentrations. Of those measures in the action plan, the following are examples of those that will contribute towards $PM_{2.5}$ reductions of the 0.81% are:

- Cycle network and promoting cycling and walking.

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

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



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

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

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

This section sets out the monitoring undertaken within 2021 by Bracknell Forest and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Bracknell Forest undertook automatic (continuous) monitoring at 1 site during 2021. 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.

3.1.2 Non-Automatic Monitoring Sites

Bracknell Forest undertook non- automatic (i.e. passive) monitoring of NO_2 at 26 sites during 2021.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.

3.1.3 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

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

Continuous Monitoring Downshire Way Bracknell

The Annual Mean Objective at Downshire Way is below the Annual Mean Objective (40µg/m^3) at 29.9µg/m^3. This is an increase compared to 2020 (26.9µg/m^3). The co-location study result was slightly lower at 29.8µg/m^3 . There were no exceedances of the one hour objective (200µg/m^3 not to be exceeded more than 18 times a year), and there was an annual data capture of 96.1%.

The monhtly average NO_2 concentration was consistently higher in 2021 than 2020, apart from August & September. Concetrations throughout 2021 will have been impacted by lifting COVID-19 UK lockdown restrictions.

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 2017 to 2019, and have all been below the objective level, however due to COVID the levels have been reduced considerabley this year and in 2020. Discounting these years (2020 & 2021) should we continue to see a decrease then revocation of the AQMA for Bracknell may need to be considered, however further data will need to be collected as the layout of the Downshire Way had been altered in 2019/2020. The true impact of the NO_2 from the road change will not been seen until the 2022/2023 results.

The full 2021 dataset Diffusion Tube NO_2 data for monthly mean values is provided in Appendix B, which are not distance correction (as not over 37.0µg/m3) where the NO_2 level is above 18.3µg/m^3 to nearest exposure/receptor.

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

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

2 monitoring sites were decommissioned in 2021 (1xyz), as this was on the road side and not representative of a sensitive receptor, it had also showed continual low yearly readings of NO_2 for the past 5 years, below the National Air Quality Objectives

3.1.4 Bracknell AQMA

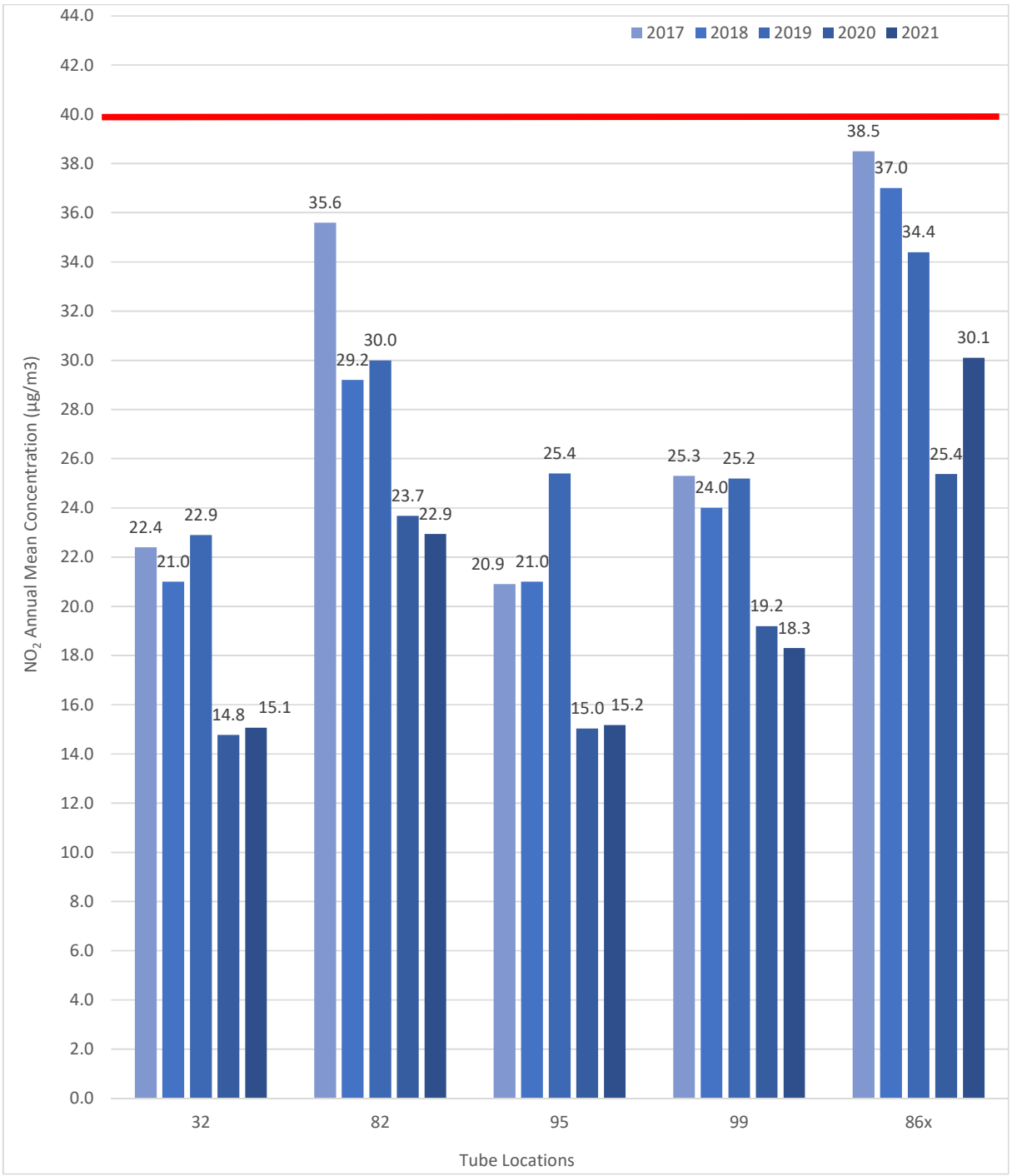
There were no sites within the Bracknell AQMA (Map D.6) which have exceeded the Annual Mean Objective (40µg/m^3). The co-location study at site ID 86 Downshire Way automatic monitor was below the objective level for the fith year and the result of 26.9µg/m^3 is slightly lower than the automatic level result of 29.9µg/m^3. In 2021, 3 of the sites increased from 2020 (Site 32, 96 & 86), and 2 decreased (Site 99 & 82). The NO_2 levels can been seen on Graph 3.1. However all of the sites within AQMA are still reduced compared to the 2019 levels, due to the reduction of traffic as as result from the pandemic and the new ways of working.

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

3.1.5 Crowthorne AQMA

For all 5 sites within the AQMA (Map D.3 & D.4) there no exceedances of the NO_2 annual objective (40.0 µg/m^3) however all of the sites within this AQMA have continued to reduce since 2017 accept site 58 which has increased. This site was also the only one which increased in NO_2 compared to the 2020 data. See Graph 3.2 for the NO_2 levels

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_2 continues on a downward trend then we could be looking to revoke the AQMA, once we have 3 year of data with out Air Quality Objective exceeedances to support this.



Graph 3:1 Showing the Bracknell AQMA NO_2 diffusion tube Results

Graph 3:2 Showing the Crowthorn AQMA NO_2 diffusion tube results

Outside of the AQMAs

For all 17 sites outside of the AQMA there were no exceedances of the annual objective (40µg/m^3). Which is not surprising due to the traffic in 2021, only increasing by approximate 15% in the borough, compared to that of 2019. In 2020 it had decreased by 23% from 2019. So we are still 8% lower than a pandemic free year.

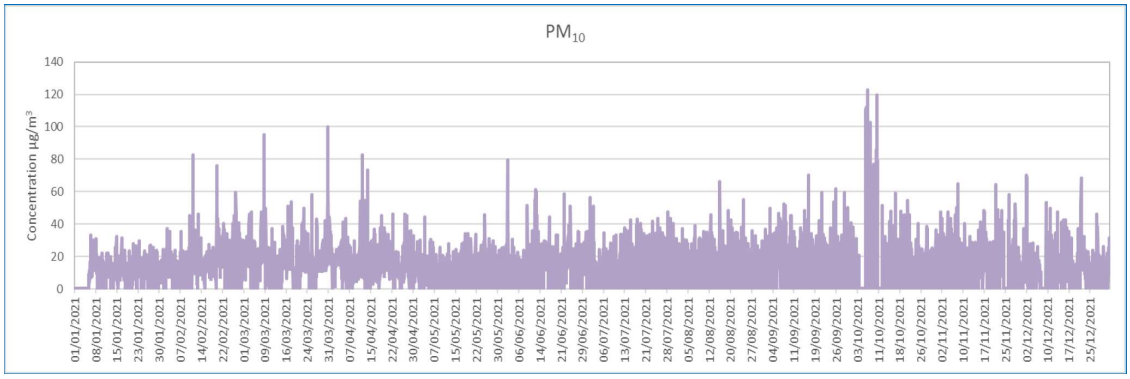
There were no levels where the annual mean was greater than 60µg/m^3, which indicates that an exceedance of the 1-hour mean objective is also unlikely at these sites.

3.1.6 Particulate Matter (PM_{10})

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

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

The annual mean annualiased concentration was well below the 40 µg/m^3, objective at the monitoring site. The level at the roadside Downshire Way was 17.1µg/m^3, the PM10 reduction may be due to new road lay out or the increase of “greener” vechicles on the road. There has generally been a decrease in levels reported in previous years and have these declined from 19.8µg/m^3 to 17.1µg/m^3 in the last 5 years. The data capture recorded was 96.1%. The A322 corridor is a stretch of road which forms the AQMA Bracknell which over the past 5 years has seen widening in order to manage congestion. This work finsihed in 2020 and is on the section immediately adjacent to the conitinuous monitor.



Graph 3.3 - Downshire Way PM_{10} results

3.1.7 Particulate Matter ($PM_{2.5}$)

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

Bracknell Forest does not carry out $PM_{2.5}$ monitoring as it was not a statutory requirement in 2021 nor has there been any legal limited value set. However, in the absence of $PM_{2.5}$ monitoring, and where a local authority carries out PM_{10} monitoring, it is recommended to consult Chapter 7 Section 1 of Technical Guidance LAQM.TG16 (7.107 – 7.111) in order to include an estimate of $PM_{2.5}$ concentrations. In Appendix C, Table C.5 you will find the method to estimate the local concentration of 11.97 µg/m^3, which is slightly higher than the recommend WHO (World Health Orgainisation) based guideline recommendation of an Annual Mean of 10 µg/m^3, but lower that last years 12.8 µg/m^3. https://apps.who.int/iris/bitstream/handle/10665/69477/WHO_SDE_PHE_OEH_06.02_eng.pdf?sequence=1).

3.1.8 Sulphur Dioxide (SO_2)

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

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM3	Downshire Way	Roadside	486501	168850	NO_2, PM_{10}	YES 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) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
32	32xyz - 8 Old Bracknell Close	Suburban	486567	168824	NO2	Bracknell	0.0	30.0	No	1.7
40	40x - 229 Crowthorne High Street	Kerbside	484054	163859	NO2	Crowthorne	0.0	3.0	No	1.6
76	76x - 2 Dukes Ride	Kerbside	484188	164180	NO2	Crowthorne	2.0	1.5	No	2.0
82	82xyz - 19 Boxford Ridge	Suburban	486751	168658	NO2	Bracknell	0.0	14.0	No	1.9
84	84xyz - 24/26 Dukes Ride (Playhouse)	Kerbside	484127	164189	NO2	Crowthorne	8.0	1.5	No	1.8
93	93xyz - The Prince Alfred PH, 2 High Street	Roadside	484176	164159	NO2	Crowthorne	0.0	4.0	No	1.8
95	95xyz - 3 Leverkusen Road	Suburban	486941	168537	NO2	Bracknell	0.0	24.0	No	1.7
99	99xyz - 16 Firlands	Roadside	487258	167948	NO2	Bracknell	0.0	10.0	No	1.6
117	117 - Blue Smoke House, The Ring	Kerbside	486989	169392	NO2	No	2.0	0.3	No	1.8
120	120 - 1-96 Platform (Station)	Kerbside	486883	168992	NO2	No	10.0	1.5	No	2.2
122	122 - #1Meadowsweet Lane	Roadside	486163	170565	NO2	No	0.0	6.6	No	1.9

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
123	123 - new forest ride 40 sign (27 Wards stone park)	Roadside	488388	166666	NO2	No	0.0	2.2	No	1.8
124	124 - #229 yorktown road	Roadside	484686	161359	NO2	No	0.0	1.7	No	2.3
126	126 - byron drive, crowthorne	Roadside	483805	163367	NO2	No	6.0	1.5	No	3.0
127	127 - opp. #7 old wokingham road (cycle sign)	Roadside	484397	164420	NO2	No	27.5	2.4	No	1.5
128	128 - #10 Lucas Place (along footpath adjacent house 2nd lampost)	Kerbside	484893	168748	NO2	No	2.0	35.0	No	2.0
129	129 - spring cottage, rectory close (lampost#3)	Kerbside	487124	168360	NO2	No	7.0	1.4	No	2.5
130	130 - stet house, albert road, rg42 2ab	Kerbside	486802	169618	NO2	No	0.0	13.8	No	2.0
132	132 -2a Ralphs Ride	Roadside	488145	168900	NO2	No	3.0	0.5	No	2.0
133	133- Newlands Place (on london road)	Kerbside	487454	169297	NO2	No	0.0	10.0	No	2.0
134	134 - kelvin gate down pipe opp avis	Kerbside	487466	169430	NO2	No	0.0	8.0	No	2.1

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
135	135 - Woodleigh, Bracknell Road, Crowthorne, RG45 6SX	Kerbside	484289	164234	NO2	No	10.0	17.0	No	2.5
58x, 58y, 58z	58z - Firmount (pine viewBracknell Road	Kerbside	484371	164285	NO2	Crowthorne	0.0	1.3	No	2.0
91x, 91y, 91z	91z - The Mount, Bracknell Road	Roadside	484352	164249	NO2	Crowthorne	0.0	6.5	No	2.0
125x, 125y, 125z	125 - 69 oak tree cottage, sandhurst road, crowthorne (lampost)	Roadside	483776	163240	NO2	Crowthorne	2.5	1.0	No	2.0
86x, 86y, 86z	86z - Downshire Way continous monitor	Roadside	486501	168850	NO2	Bracknell	0.0	6.0	No	2.0

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM3 Downshire Way	486501	168850	Roadside	100	97.9	38.4	36.6	33.6	24.9	29.9

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

☒ **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^3.

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

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

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

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

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

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
32	486567	168824	Suburban	100	92.3	22.4	21.0	22.9	14.8	15.1
40	484054	163859	Kerbside	100	90.4	28.2	26.0	27.1	19.5	18.3
76	484188	164180	Kerbside	100	100.0	30.2	27.0	27.8	19.9	17.9
82	486751	168658	Suburban	100	100.0	35.6	29.2	30.0	23.7	22.9
84	484127	164189	Kerbside	100	100.0	25.1	24.0	23.9	17.5	15.5
93	484176	164159	Roadside	100	100.0	25.8	23.0	24.5	18.4	16.2
95	486941	168537	Suburban	100	92.3	20.9	21.0	25.4	15.0	15.2
99	487258	167948	Roadside	100	82.7	25.3	24.0	25.2	19.2	18.3
117	486989	169392	Kerbside	100	84.6	23.2	23.0	24.1	17.4	15.7
120	486883	168992	Kerbside	100	50.0	25.0	26.0	27.3	15.9	15.3
122	486163	170565	Roadside	100	90.4		19.0	22.0	15.7	14.5
123	488388	166666	Roadside	100	92.3		33.0	35.2	24.5	22.6
124	484686	161359	Roadside	100	90.4		31.0	28.3	26.6	24.6

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
126	483805	163367	Roadside	100	82.7			23.4	12.9	11.4
127	484397	164420	Roadside	100	100.0			22.4	14.3	13.3
128	484893	168748	Kerbside	100	92.3			18.4	15.3	13.3
129	487124	168360	Kerbside	100	82.7			20.4	13.2	12.2
130	486802	169618	Kerbside	100	90.4				18.8	16.6
132	488145	168900	Roadside	100	90.4				17.6	17.2
133	487454	169297	Kerbside	100	100.0				15.9	13.7
134	487466	169430	Kerbside	100	82.7				19.2	17.9
135	484289	164234	Kerbside	100	100.0				13.6	13.1
58x, 58y, 58z	484371	164285	Kerbside	100	100.0	28.0	26.0	27.9	19.5	18.4
91x, 91y, 91z	484352	164249	Roadside	100	100.0	35.3	28.0	26.0	27.9	30.8
125x, 125y, 125z	483776	163240	Roadside	100	100.0	**49.4**	**45.0**	**41.5**	16.3	15.7
86x, 86y, 86z	486501	168850	Roadside	100	100.0	38.5	37.0	34.4	25.4	29.8

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

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

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

Notes:

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

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

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

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

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

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

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

Graph A.1 – Trends in Annual Mean NO_2 Concentrations

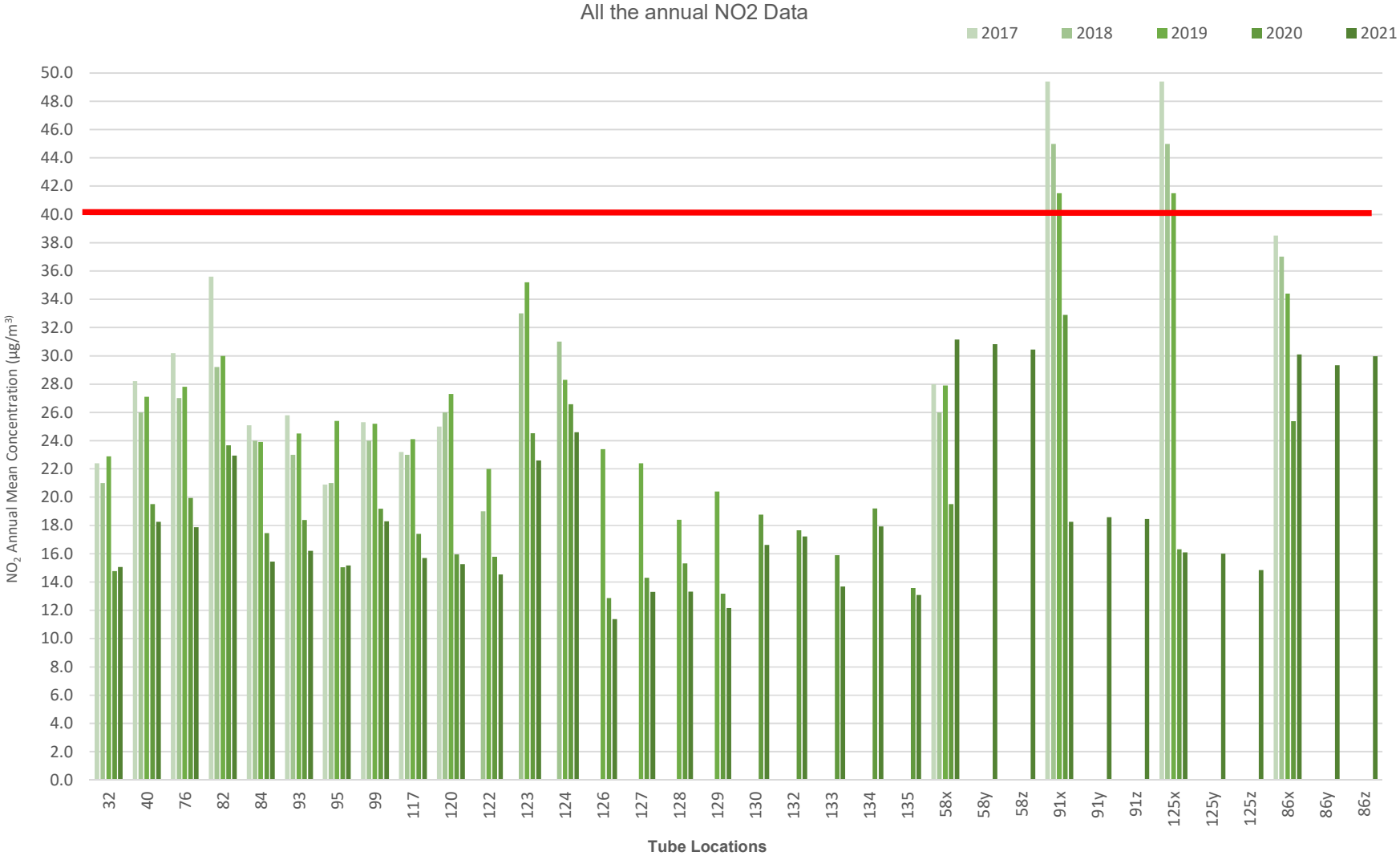


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1 Downshire Way	486501	168850	Roadside	100	97.9	2	4	**0 (127.07)**	**0 (92.02)**	0

Notes:

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

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 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%).

Graph A.2 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

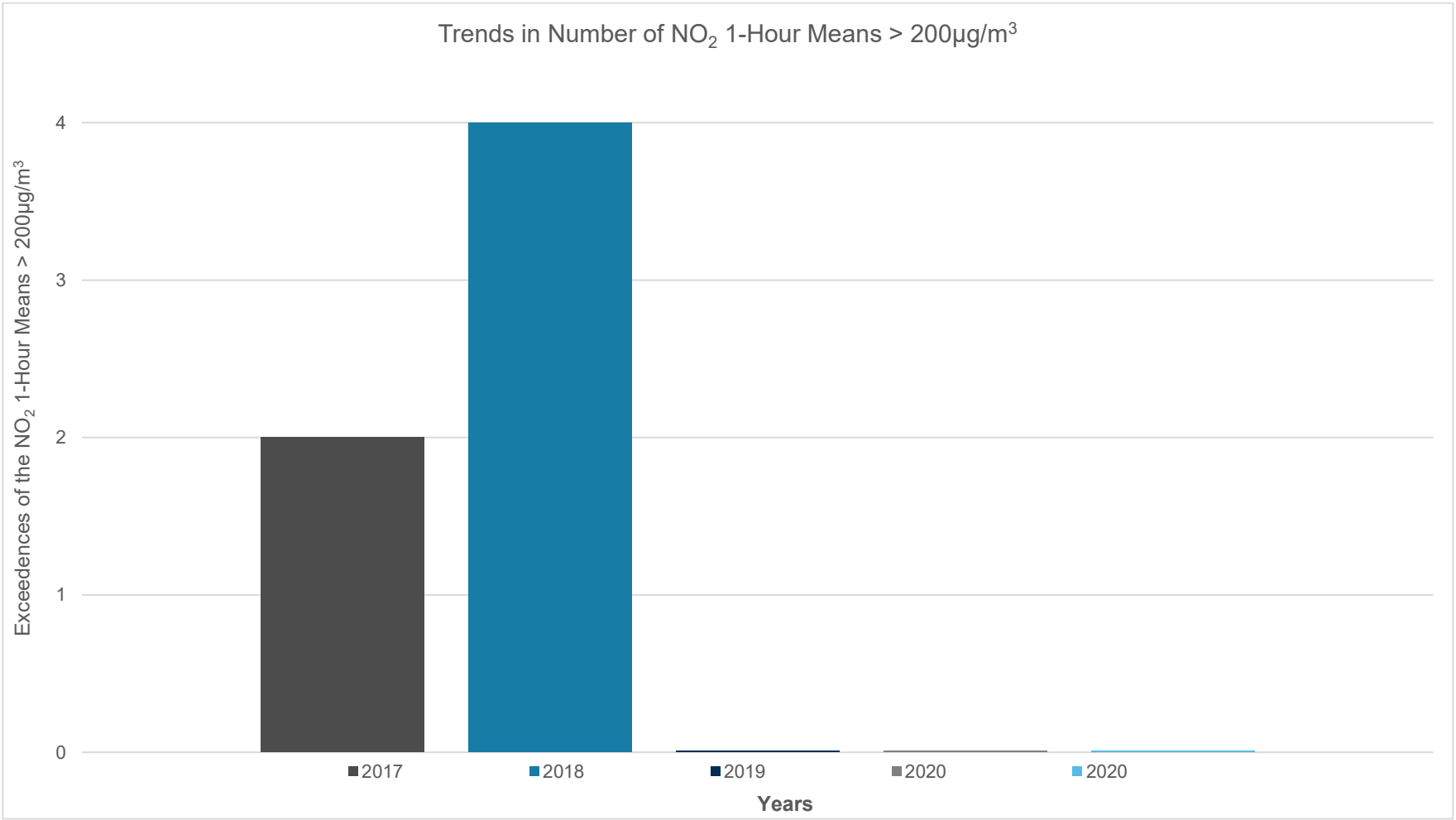


Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM3 Downshire Way	486501	168850	Roadside	100	96.1	**19.8**	**19**	**17.18**	**18.4 (31.3)**	**17.1**

☐ **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^3.

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold**.

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

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

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

Graph A.3 – Trends in Annual Mean PM_{10} Concentrations

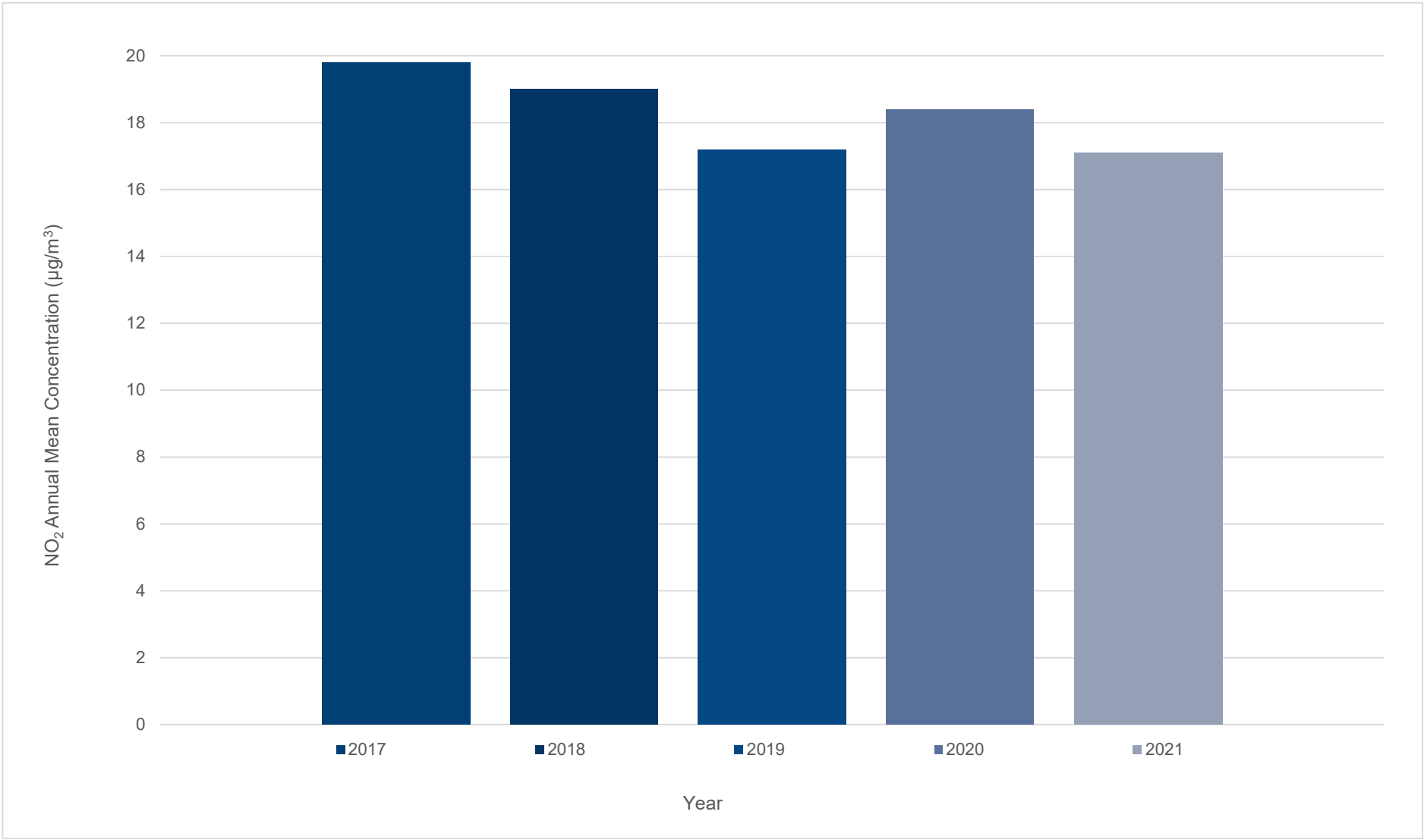


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM3 Downshire Way	486501	168850	Roadside	100	96.1	3	1	**6 (35.64)**	**0 (18.4)**	0

Notes:

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

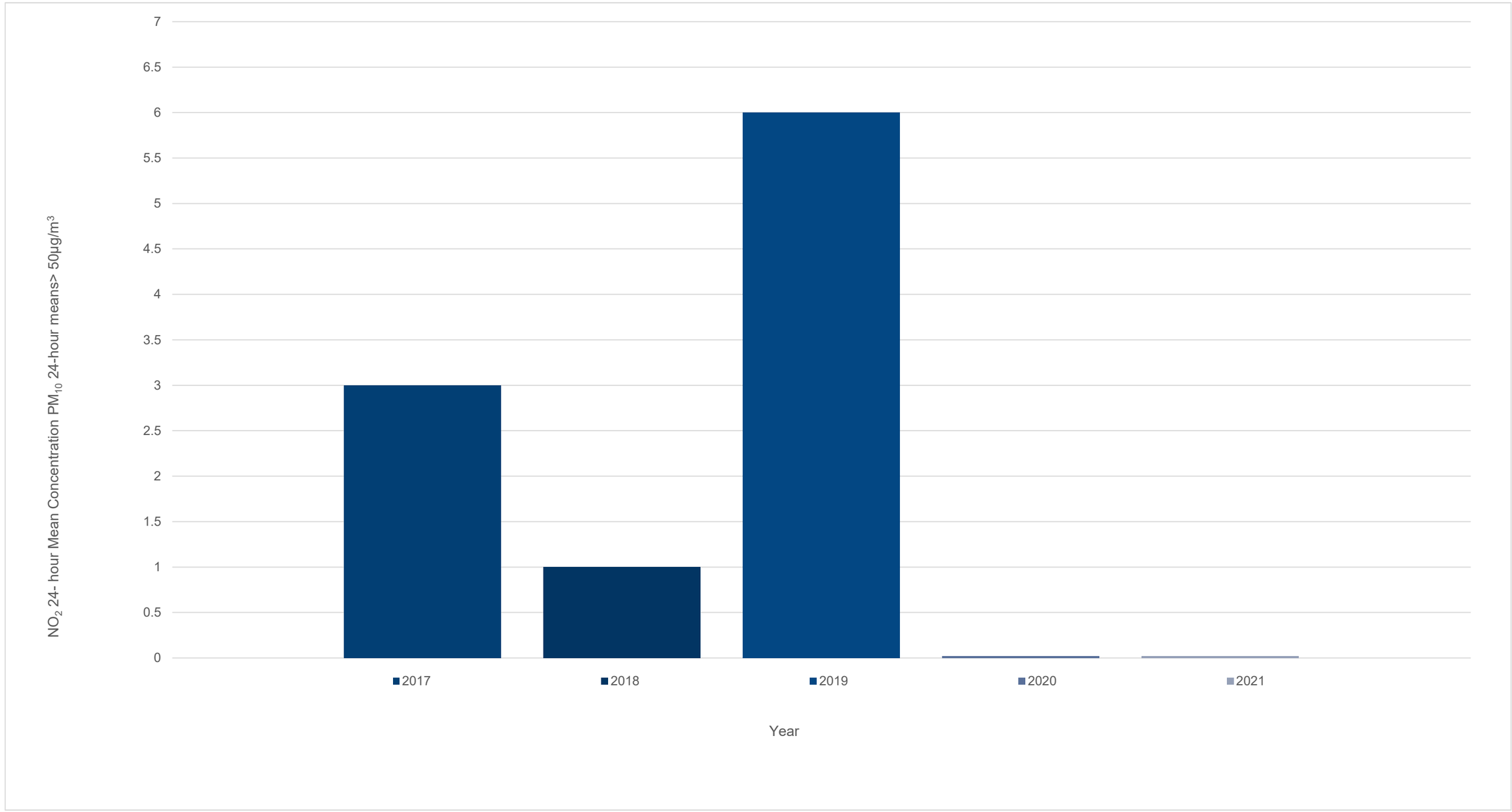
Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

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

Graph A.4 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3



Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.72)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
32	486567	168824		22.9	23.1	20.8	17.7	17.7	15.5	15.4	22.9	22.5	28.6	23.1	20.9	15.1	-	
40	484054	163859	24.6	29.4	23.6	26.4	22.4	22.3		18.6	29.3	25.2	30.7	26.7	25.4	18.3	-	
76	484188	164180	25.1	26.9	25.4	23.1	20.8	23.0	21.4	18.1	28.5	26.4	32.8	26.6	24.8	17.9	-	
82	486751	168658	32.6	28.2	30.8	23.8	35.1	29.7	29.5	32.2	30.9	38.9	38.7	31.8	31.9	22.9	-	
84	484127	164189	21.9	27.0	22.8	20.1	17.9	19.6	17.4	13.8	23.4	21.7	30.5	21.5	21.5	15.5	-	
93	484176	164159	19.6	23.8	22.8	22.2	19.7	21.5	19.8	17.6	23.6	22.0	32.9	24.4	22.5	16.2	-	
95	486941	168537	24.3	25.0	22.1	19.8	16.4		16.5	13.6	23.1	20.5	27.0	23.4	21.1	15.2	-	
99	487258	167948	27.0	27.2	27.3	18.4	19.8	22.0			23.6	30.0	30.3	28.7	25.4	18.3	-	
117	486989	169392	23.2	23.3	23.5	18.7	19.7		20.1	17.5	25.1	22.5		24.4	21.8	15.7	-	
120	486883	168992	24.8	29.9	22.9	20.9				14.0				26.0	23.1	15.3	-	
122	486163	170565	22.3	23.2	21.7	19.3	16.8	17.0		15.0	22.8	17.5	26.1	20.3	20.2	14.5	-	
123	488388	166666	32.5		34.1	27.3	28.6	30.2	29.7	26.0	34.9	33.5	36.8	31.9	31.4	22.6	-	
124	484686	161359	35.1	32.2	37.7	30.6	30.4	31.4		30.7	34.4	34.8	43.9	34.5	34.2	24.6	-	
126	483805	163367	15.9	20.2	16.2	15.9	12.9		12.1	10.4	16.8		20.5	17.0	15.8	11.4	-	
127	484397	164420	18.1	22.8	15.1	23.1	16.4	17.4	14.9	12.6	20.9	16.8	23.5	20.2	18.5	13.3	-	
128	484893	168748	22.5	22.3	22.2	21.7		16.7	16.3	14.3	21.8	0.5	24.2	21.0	18.5	13.3	-	
129	487124	168360	18.8	21.6	10.1	22.0	15.3	15.9			18.8	12.7	17.4	16.3	16.9	12.2	-	
130	486802	169618	24.5	24.9	23.9	18.2	19.9	18.3		17.7	25.2	26.6	30.1	24.8	23.1	16.6	-	
132	488145	168900	24.4	27.5	22.4		21.9	23.3	18.2	18.2	27.1	24.2	31.4	24.5	23.9	17.2	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.72)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
133	487454	169297	22.3	21.4	20.7	20.9	18.7	17.6	17.8	14.5	22.8	21.7	27.9	1.6	19.0	13.7	-	
134	487466	169430	27.0	25.7	26.9	23.2	21.6	19.0	20.6		26.2	26.5	32.2		24.9	17.9	-	
135	484289	164234	17.6	21.8	19.8	18.4	15.1	16.5	14.6	13.7	19.8	17.2	24.0	19.6	18.2	13.1	-	
58x	484371	164285	21.9	27.3	27.8	22.6	22.3	24.4	23.4	18.2	28.1	28.2	34.8	25.5	25.4	18.3	-	
58y	484371	164285	24.6	27.8	27.7	24.1	24.6	24.7	22.6	19.5	29.0	26.9	35.1	23.4	25.8	18.6	-	
58z	484371	164285	24.8	27.7	26.9	24.6	24.4	24.2	21.2	18.8	27.0	26.0	36.0	26.0	25.6	18.5	-	
91x	484352	164249	40.6	40.2	45.9	39.0	43.2	47.0	40.8	35.3	46.4	45.1	54.1	41.5	40.6	40.2	-	
91y	484352	164249	39.5	40.7	42.5	38.3	43.1	42.2	42.5	36.4	48.0	43.6	55.7	41.4	39.5	40.7	-	
91z	484352	164249		39.0	42.6	37.4	41.6	43.3	38.9	36.6	46.7	40.6	55.7	42.6		39.0	-	
125x	483776	163240	22.4	26.0	24.7	19.5	20.5	21.7	20.8	18.1	24.7	20.6	29.0	20.4	22.4	16.1	-	
125y	483776	163240	24.1	23.7	24.9	20.8	20.8	18.9	19.8	17.0	22.6	23.0	29.6	21.7	22.2	16.0	-	
125z	483776	163240	23.5	25.1	23.8	19.7	20.3	21.8	0.6	17.3	23.1	20.3	30.1	21.8	20.6	14.9	-	
86x	486501	168850	39.2	36.5	45.5	41.8	43.4	41.4	36.6	39.4	40.7	40.1	55.0	42.3	41.8	30.1	-	
86y	486501	168850	40.8	37.5	38.3	38.9	37.6	43.2	37.0	37.6	43.0	41.2	53.8	39.8	40.7	29.3	-	
86z	486501	168850	42.1	36.3	44.3	41.0	39.7	45.3	36.0	38.0	41.6	44.1	52.4	38.8	41.6	30.0	-	

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

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Local bias adjustment factor used.**

☐ **National bias adjustment factor used.**

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

☒ **Bracknell Forest Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Bracknell Forest Council During 2021

Bracknell Forest Council has not identified any new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by Bracknell Forest Council During 2021

Bracknell Forest Council has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO_2 Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management. The laboratory participants analyse four spiked tubes, and report the results to HSL. HSL assign a performance score to each laboratory's result, based on their deviation from the known mass of nitrite in the analyte.

The Performance criteria are due to be changed, 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.

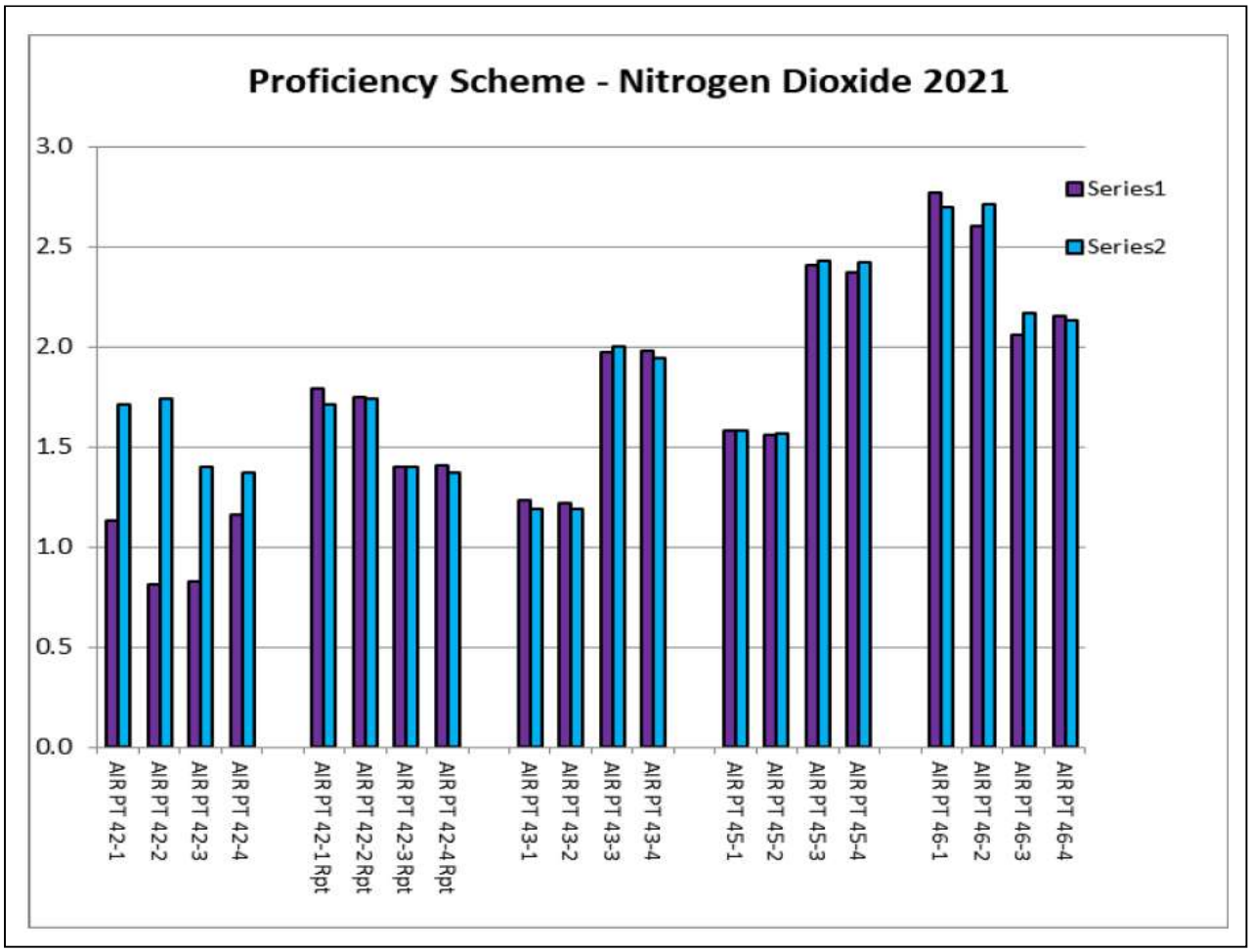
ACCEPTABLE: Results obtained by the participating laboratory are on average within 15% of the assigned value. This equates to an RPI of 225 or less.

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.

Diffusion Tube Annualisation

As annualisation is required for any site with data capture less than 75% but greater than 25%. 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 is provided in Table C.. The raw data annual mean was 23.1 µg/m^3 and the annualised data annual mean was 21.2 µg/m



Graph C.1 - AIR PT Nitrogen Dioxide Proficiency Scheme Results 2020

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.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Bracknell Forest Council have applied a local bias adjustment factor of 0.72 to the 2021 monitoring data. A summary of bias adjustment factors used by Bracknell Forest Council over the past five years is presented in Table C.1. The co-location study has taken place at the Downshire Way Monitoring Station and had a good over all capture rate of 98.4%.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	n/a	0.74
2020	National	03/21	0.81
2019	National	09/20	0.84
2018	Local	06/19	0.82
2017	Local	09/18	0.85

NO_2 Fall-off with Distance from the Road

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

No diffusion tube NO_2 monitoring locations within Bracknell Forest required distance correction during 2021.

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 judgement. On completion of this data correction procedure, these data were converted to hourly means and a summary of these data were provided to Bracknell Forest Council at quarterly intervals and a calendar year annual report is prepared.

Independent Site Audits

In addition to these checks an independent site audit is carried out to ensure the nitrogen dioxide analyser is operating correctly. The audit that is carried out utilises procedures that

are applied within DEFRA's National Automatic Air Monitoring Networks Quality Control Programme. The efficiency of the analyser's convertor is checked and the analyser is also leak tested. The gas bottle used for calibrations on site is also checked against the auditor's gas bottle to ensure the stability of the gas concentration.

The site audit for the Bracknell automatic monitoring unit was carried out on 20th December 2021.

Oxides of Nitrogen Analysers

A major factor governing the analyser's performance is the NOx analyser's converter and its ability to reduce the nitrogen dioxide to nitric oxide. The recommended range for instrumentation in the national automatic air monitoring network is in the range of 98% - 102% efficient. Our tests show the converter in the Bracknell, Downshire Way analyser to be 99.3% efficient at an NO_2 concentration of 322 ppb. This is a good result.

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

The analyser flow rate was measured using a calibrated flow meter and compared against the analyser's flow rate sensor to evaluate its accuracy. The measured flow rate passed within the ±10% advisory limit, it was also noted the analyser flow was observed as slightly unstable and recommended these flow issues are investigated.

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

Based on the Wokingham NOx analyser's response to the audit standard and audit zero, the concentrations of the stations NO cylinder have been reassessed. This provides an indication of the on-site standards stability (the gas concentration stabilities). For the purpose of these stability checks, the criteria adopted within the national network, and used here, is that the recalculated concentration should lie within 10% of the suppliers stated concentrations.

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

Table C.3 Bracknell Forest Council, Downshire Way

TRL Bracknell, Downshire Way – NO cylinder 21901300088296				
	NOx (ppb)	**% change from stated**	**NO (ppb)**	**% change from stated**
Manufacturers Stated Concentration	**464**	**---**	**464**	**---**
Recalculated concentration (21/12/20)	494	6.4	491	5.9
Recalculated concentration (20/12/21)	476	2.6	474	2.1

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

Particulate Matter TEOM 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 ±2.5% of the stated factors. The difference between the calculated and stated factors was +0.45%, this is a good result.

Further tests indicated that the instruments were free of major leaks.

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

The type of PM_{10} monitor(s) utilised within Bracknell Forest Council do not required the application of a correction factor.

$PM_{2.5}$ Estimation

In the absence of $PM_{2.5}$ monitoring, and where a local authority carries out PM_{10} monitoring, it is recommended to consult Chapter 7 Section 1 of Technical Guidance LAQM.TG16 (7.107 – 7.111) in order to include an estimate of $PM_{2.5}$ concentrations.

The estimated annual mean PM_{10} concentration at a roadside site in 2021 was 17.1 µg/m^3. The $PM_{2.5}$ concentration at this site can be estimated as follows:

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

Site ID	Bias Adjusted Annual Mean PM_{10} ($\mu g/m^3$) (A)	Nationally Derived Correction Factor (0.7) (B)	Predicted $PM_{2.5}$ ($\mu g/m^3$) (A*B=(C)
Downshire Way Continuous Monitor (CM3)	17.1	0.7	11.97

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_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations within Bracknell Forest Council required distance correction during 2021.

Table C.5 – Annualisation Summary (concentrations presented in $\mu g/m^3$)

Site ID	Annualisation Factor Swindon	Annualisation Factor Oxford	Annualisation Factor Reading	Average Annualisation Factor	Raw Data Annual Mean ($\mu g/m^3$)	Annualised Annual Mean ($\mu g/m^3$)
120	0.8657	0.9829	0.8901	0.9129	23.1	21.1

Table C.6 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2 -5
Periods used to calculate bias	12	-
Bias Factor A	0.72 (0.6 - 0.91)	-
Bias Factor B	39% (9% - 68%)	-
Diffusion Tube Mean (µg/m^3)	41.4	-
Mean CV (Precision)	4.0%	-
Automatic Mean (µg/m^3)	29.9	-
Data Capture	99%	-
Adjusted Tube Mean (µg/m^3)	30 (25 - 38)	-

Notes:

A single local bias adjustment factor has been used to bias adjust the 2021 diffusion tube results.

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

Figure D.1 – Bracknell AQMA

Figure D.2 – Crowthorne AQMA

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Figure D.3 – Crowthorne AQMA Air Quality Monitoring Locations (North)

Diffusion Tube ID	Site Name	NO2 Annual Mean
40	40x - 229 Crowthorne High Street	18.27
76	76x - 2 Dukes Ride	17.88
84	84xyz - 24/26 Dukes Ride (Playhouse)	15.45
93	93xyz - The Prince Alfred PH, 2 High Street	16.2
127	127 - opp. #7 old wokingham road (cycle sign)	13.29
135	135 - Woodleigh, Bracknell Road, Crowthorne, RG45 6SX	13.08
58x	58x - Firmount (pine view) Bracknell Road	18.26
58y	58y - Firmount (pine view Bracknell Road	18.6
58z	58z - Firmount (pine viewBracknell Road	18.45
91x	91x - The Mount, Bracknell Road	31.15
91y	91y - The Mount, Bracknell Road	30.83
91z	91z - The Mount, Bracknell Road	30.43

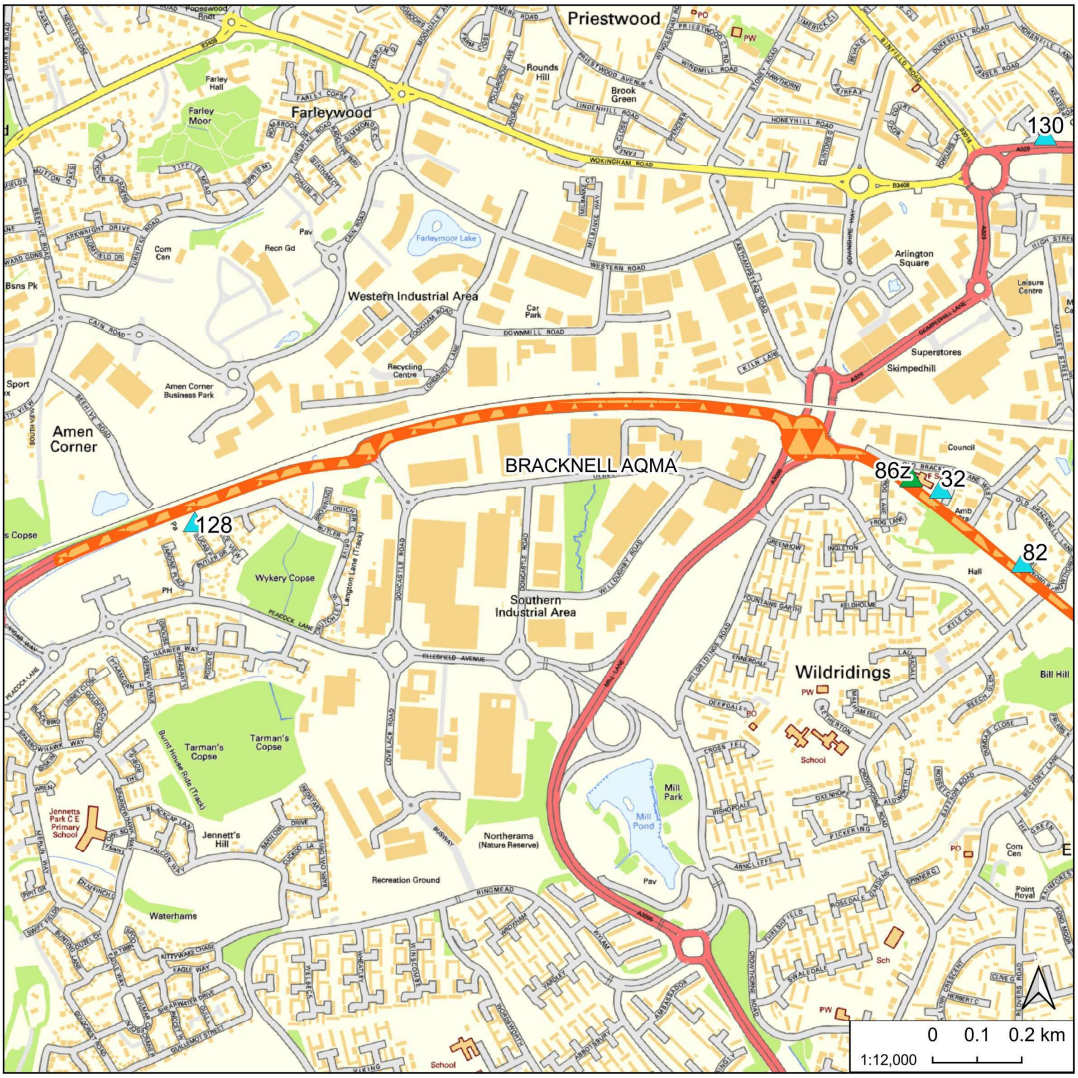
Continuous monitoring site
Diffusion tube
AQMA

Figure D.4 – Crowthorne AQMA Air Quality Monitoring Locations (South)

Diffusion Tube ID	Site Name	NO2 Annual Mean
126	126 - byron drive, crowthorne	11.37
125x	125 - 69 oak tree cottage, sandhurst road, crowthorne (lampost)	16.1
125y	125 - 69 oak tree cottage, sandhurst road, crowthorne (lampost)	16.01
125z	125 - 69 oak tree cottage, sandhurst road, crowthorne (lampost)	14.85

Continuous monitoring site
Diffusion tube
AQMA

Figure D.5 – Bracknell AQMA Air Quality Monitoring Locations (North)



Diffusion Tube ID	Site Name	NO2 Annual Mean
32	32xyz - 8 Old Bracknell Close	15.06
82	82xyz - 19 Boxford Ridge	22.94
128	128 - #10 Lucas Place (along footpath adjacent house 2nd lampost)	13.32
130	130 - stet house, albert road, rg42 2ab	16.63
86x	86x - Downshire Way continous monitor	30.1
86y	86y - Downshire Way continous monitor	29.33
86z	86z - Downshire Way continous monitor	29.97

Continuous monitoring site

Diffusion tube

AQMA

Figure D.6 – Bracknell AQMA Air Quality Monitoring Locations (South)

MAP D.6 – Bracknell AQMA Air Quality Monitoring Locations (South)

Diffusion Tube ID	Site Name	NO2 Annual Mean
95	95xyz - 3 Leverkusen Road	15.17
99	99xyz - 16 Firlands	18.3
123	123 - new forest ride 40 sign (27 Wards stone park)	22.61
129	129 - spring cottage, rectory close (lampost#3)	12.16

Continuous monitoring site

Diffusion tube

AQMA

Figure D.7– Bracknell Town Centre Air Quality Monitoring Locations

Diffusion Tube ID	Site Name	NO2 Annual Mean
82	82xyz - 19 Boxford Ridge	22.94
95	95xyz - 3 Leverkusen Road	15.17
117	117 - Blue Smoke House, The Ring	15.69
120	120 - 1-96 Platform (Station)	15.26
130	130 - stet house, albert road, rg42 2ab	16.63
132	132 -2a Ralphs Ride	17.22
133	133- Newlands Place (on london road)	13.67
134	134 - kelvin gate down pipe opp avis	17.92

Continuous monitoring site

Diffusion tube

AQMA

Figure D.8 – Tube 122 – Meadowsweet Lane

Diffusion Tube ID	Site Name	NO2 Annual Mean
122	122 - #1Meadowsweet Lane	14.54

Continuous monitoring site
Diffusion tube
AQMA

Figure D.9 – Tube 124 – 229 Yorktown Road

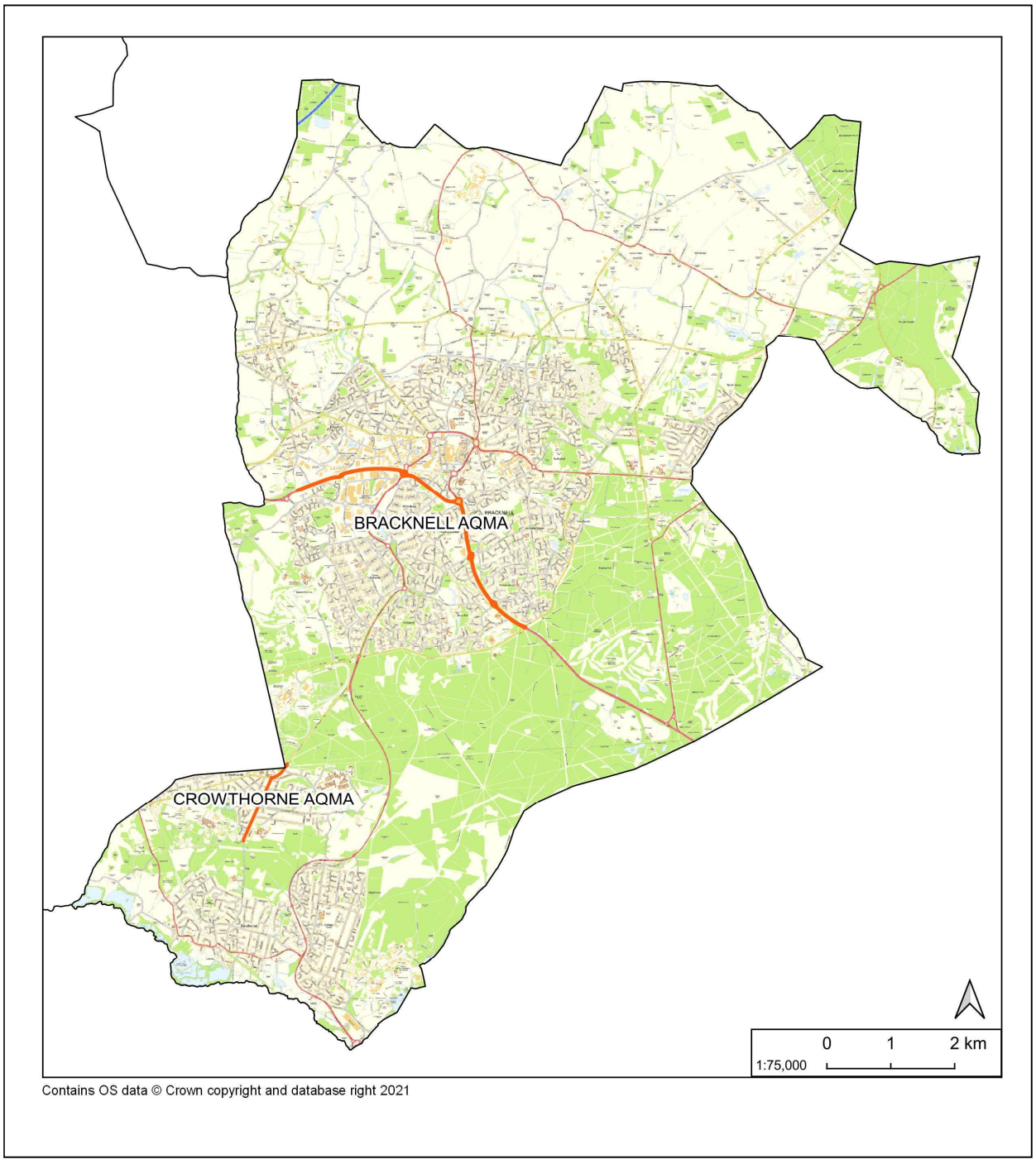
Diffusion Tube ID	Site Name	NO2 Annual Mean
124	124 - #229 yorktown road	24.59

Continuous monitoring site

Diffusion tube

AQMA

Figure D.10 – Map of Bracknell Forest and all the AQMA's



Appendix E: Summary of Air Quality Objectives in England

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

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

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

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_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Annual Screening Report 2021, Bracknell Forest Council, Public Protection Partnership.