2024 Air Quality Annual Status Report (ASR)

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

Date: June 2024

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Executive Summary: Air Quality in Our Area

Air Quality in Wokingham Borough Council

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

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

Table ES.0.1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the type of activities they might arise from.

Table ES.0.1 Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO_2)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO_2)	Sulphur dioxide (SO_2) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

[1] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

The major source of air quality pollutants in the Wokingham Borough is road transport, the main pollutant of concern being nitrogen dioxide (NO_2). Three Air Quality Management Areas (AQMAs) have been declared for exceedances of the Annual Mean NO_2 Objective. These are located in Wokingham Town Centre, Twyford Centre Crossroads, and 60m either side of the M4 throughout the entire borough (Local Authority Details - Defra, UK. (See Appendix D).

The 46 diffusion tube sites measuring NO_2 levels in Wokingham Borough, have shown a decreasing trend since 2018. No diffusion tube sites located within Wokingham exceeded the Annual Mean Objective. No annual diffusion tube results were recorded above 60µg/m^3, indicating there were no exceedances of the 1-hour NO_2 objective.

The continuous monitoring unit in Peach Street, Wokingham (within the Wokingham AQMA) recorded an Annual Mean NO_2 level of 30.6µg/m^3, which means the Annual Mean NO_2 Objective (40µg/m^3) was not exceeded. The continuous monitoring also met the 1-hour NO_2 objective.

Within the Twyford AQMA, the continuous monitoring recorded an Annual Mean NO_2 level of 21.5µg/m^3, which also met the objective. The continuous monitoring also met the 1-hour NO_2 objective.

Furthermore, there were no exceedances of the Annual Mean NO_2 Objective from the monitoring sites within the M4 AQMA.

Based on the all the NO_2 readings gathered in 2023, no extensions or amendments to the AQMAs are required for the Wokingham AQMA. In fact, due to the continual and stable decrease below the annual average NO_2 air quality objectives, the M4 and Twyford AQMAs are to be revoked in 2024, as recommend by DEFRA.

The Air Quality Action Plans (AQAPs) for the Wokingham Borough AQMA's were published in March 2018 and the new drafted plan will be submitted to DEFRA in 2024, for appraisal. Some areas of the 2018 AQAP have been completed and some are still awaiting funding.

Environmental Health/Public Protection Partnership (PPP) has continued to work in conjunction with the Transport Policy Team on the implementation of Local Transport Plan 3 (2011 – 2026). The Local Transport Plan (LTP) acknowledges the link with the M4 AQMA and any future AQAPs. A key objective of the Strategic Environmental Assessment for LTP3 was to improve air quality. As LTP3 is nearing end of life the next local transport plan is being developed. In 2023 the evidence base was completed and a draft plan (known as LTP4) is due to be consulted on with the public in Spring 2024. It is anticipated that a final

plan will be adopted in Autumn 2024. Work is underway on a “Local Plan Update” which will put in place a new planning strategy for the period to 2040. Once adopted, it will replace the current Core Strategy and Managing Development Delivery local plans. The Proposed Submission Plan is likely to be published in 2024.

Actions to Improve Air Quality

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

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

The Road to Zero[5] details the Government’s approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel, and the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations, heavily influenced by transport emissions.

All planning applications are scrutinised for their air quality impact and potential to introduce new receptors into areas of existing poor air quality in the Borough. Air quality assessments have been provided where necessary and appropriate mitigation requested. Applications have included several major residential and mixed use residential and commercial schemes, traffic flow changes to road schemes, new relief road schemes and any other applications which may have an impact to the AQMAs and other hotspot locations.

Environmental Health Officers have received appropriate training in fulfilling their LAQM duties and are part of appropriate internal working groups, to ensure that air quality impacts in specific projects or areas of highways works, are considered.

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[3] Defra. Environmental Improvement Plan 2023, January 2023

[4] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

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

Wokingham, Bracknell Forest, and West Berkshire Councils made a joint application to the Air Quality Grant Scheme 2020. We were successful in securing grant funding of £259,000 for a project creating an anti-idling campaign, measuring $PM_{2.5}$ at schools located near/within the AQMAs whilst looking at behaviour change in our residents. In 2021, an Air Quality Officer was appointed and successfully ran the "Bumper Stickers Competition", (Figure S.4), where children were asked to create a sticker to put in the rear of a car to remind those behind, to switch off their engines.

(https://publicprotectionpartnership.org.uk/environmental-health/air-quality/anti-idling-bumper-sticker-schools-competition/).

In 2022, the $PM_{2.5}$ School Monitoring and Behaviour Change project began and the results for the $PM_{2.5}$ project can be seen in Appendix C. The levels of $PM_{2.5}$ at those locations were below the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 for $PM_{2.5}$ (i.e., the annual mean should not exceed 25 µg/m³ and the interim target of 12 µg/m³ to be met by end 2027 and long-term target of 10 µg/m³ by 2040.)

In 2022/23, we ran the next phase of the anti-idling behaviours change project (The Biggest NO_2 Loser) outside 11 schools close to the AQMA's. Throughout 2022 and 2023, using diffusion tubes, we measured the monthly NO_2 outside each school. We established an average base line in 2022, and then in 2023 we launched the anti-idling campaign and for 3 to 4 months, we hung posters (see Figure S:1), on street furniture by the school gates where children were dropped off/collected in vehicles. We also sent literature to the schools including posters and an Air Quality assembly/lesson plan tool kit, put adverts on social media (Figure S.3) and gave the opportunity for consultants to visit schools and run air quality workshops. This project was successful, as all 11 schools monitored had an annual NO_2 reduction varying between 30% and 4%. The NO_2 annual averages were also well below the air quality objectives. The winning school was given a certificate, an anti-idling reusable water bottles (as it's thirsty work scooting, cycling, and walking to school), an air quality bookmark and the car bumper sticker.

Figure S.1 The Bumper Sticker

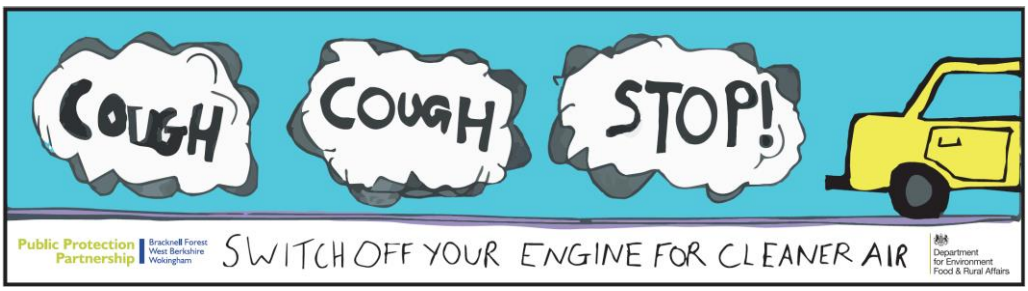


Figure S:0.2 Examples of Behaviour Change poster displayed outside schools and at level crossings.

MyJourney within the Wokingham Borough was successful and awarded a DEFRA Grant 2022/23 for £303,505, which is being put towards measures 10, 20, & 38 on the AQAP.

Measure 10. School Travel Plans (Mode Shift Stars)

Measure 20. Workplace and School Travel planning

Measure 38. Awareness campaign for the risks of poor air quality and promoting active and sustainable travel.

The project comprises activities and resources which support the Council's on-going behaviour change program (My Journey Wokingham) to encourage active and sustainable travel. The key objectives of the project are:

1: To reduce car travel and the demand on school bus services, in favour of active travel in areas in and around Air Quality Management Areas (AQMAs) and Urban Air Agglomeration Zones (UAAZs) in the Wokingham Borough.
2: To achieve long term behavioral change from car travel towards active travel, in the areas in and around AQMAs in Wokingham Borough.

This project continues Wokingham's successful DEFRA funded air quality project for another year, from October 2023, increasing the data, reach and impact of the project whilst adding an innovative element to the program.

Wokingham has two AQMAs, managed by Wokingham Borough Council; these are Wokingham Town Centre and Twyford Crossroads. In addition, Wokingham Town and Finchampstead fall within identified UAAZs. All areas within the AQMA and UAAZs form the target area for this bid. The target area has annual mean exposure levels, which exceed EU levels limits, rather than 1-hour exposure levels; hence, this bid focused on behaviour and specifically requests funding for:

- The continued provision of an Eco Travel Officer to intensively support 6 schools in AQMAs and UAAZs.
- Westcotec AQ monitors with good/poor signs to be installed within AQMAs close to the schools to provide real-time information and raise awareness of air quality issues.
- A range of resources, which include provision of classroom air quality resources, diffusion tubes for schools, anti-idling banners, school competitions and national campaigns.
- Beat the Street, a behaviour-change walking and cycling program, which engages schools and uses gamification to encourage schoolchildren, parents, and the wider community to participate.

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

The first anti–idling competition was run by My Journey in 2020, along with PPP to help children become aware of vehicle idling and how it can cause pollution. As the banners were so popular with Schools and the Local Parishes.

The anti-idling banner competition has been run by the My Journey Active travel officer, with subsequent air quality schools, since 2020 and school participating run a competition to design artwork that will go on a three-meter-long banner outside the school, which is designed to encourage parents to swich off their engine when dropping off and picking up their children. Once the banners are displayed schools are asked to send communications to parents, via their school newsletters and a parent survey is sent out monitoring the response to the banners.

Figure S:3 2023 Designs for the school anti-idling banner competition.

In 2023, Wokingham Borough Council was also awarded additional funding by DEFRA to My Journey to complete Air Quality education work in schools in and around its AQMAs. The borough had already appointed an Air Quality Active Travel Officer (Air Quality), who has been working with schools, raising awareness of the issues, and encouraging increased active travel since June 2021, over the duration of the project seventeen schools have participated in the school's air quality project.

My Journey's extension for their DEFRA funded Eco-Travel Officer role also continued for another year. The Active Travel Officers (Air Quality) continued to work with schools near the AQMAs. One of the main aspects of the project is to monitor their Nitrogen Dioxide levels around the school site using diffusion tubes. Results from the diffusion tube monitoring is incorporated into an air pollution workshop where the KS2 pupils at participating school use handheld monitoring equipment, to measure nitrogen dioxide levels at peak school drop off time and over the course of the morning. The fieldwork element of the workshop has been

well received by primary schools' teachers as it has direct links to the science and math's national curriculum.

The Active Travel Officer – Air Quality assists all the air quality schools develop their school travel plans, with the extra support and a large number of travel initiatives taking place as a result of participating in the air quality project, many of the air quality schools gain accreditation using the Modeshift STARS online platform. Many of the schools participating in the air quality project achieve a Good, Very Good or Excellent School Travel Plan which means that they are entitled to apply for grant funding to support further active travel initiatives.

The Active Travel Officer – Air Quality developed two animated online lessons for Key Stage two pupils, with accompanying teachers' packs, which are available to use for all Wokingham Primary School. Lesson one & two investigate the problems and solutions to air pollution and promote the benefits of using active travel to get to school and they have been promoted and widely used by Wokingham Borough primary schools.

The active travel officer has also run family competitions, attended community events, to promote active travel, delivered whole school assemblies, and worked in partnership with key stakeholders, such as parish and town council events.

The final year of the project with schools started in September 2023 and continues until October 2024. There are six schools involved in the project, five primary and one secondary. All participating schools are located around central Wokingham.

Conclusions and Priorities

In conclusion, there were no exceedances of the annual mean objective (40µg/m^3) in the last 12 months within the Twyford Crossroads, Wokingham Town Centre and M4 AQMAs. There have been no exceedances for five years in the M4 AQMA and for four years in both the Wokingham Town Centre and Twyford AQMAs. According to DEFRA (from the 2023 ASR appraisal), it is now deemed appropriate to revoke both the Twyford and M4 AQMAs as the results show three or more, consecutive years of data below the level of concern, 36µg/m^3. However, Wokingham Town Centre has only shown 1 year below 36µg/m^3, so the AQMA will remain in place (see Table 2.1 for more information). The data collected also indicated that no further extension is needed to be made to the AQMAs and we do not need to look at declaring any more.

The current Air Quality Action Plan is being implemented with more being actions progressed each year, see Table 2.3. The new draft plan has been submitted for appraisal by DEFRA.

One of Wokingham Borough Council's priorities is to "tackle traffic congestion in specific areas of the Borough" and one of its underpinning principles is to "improve health, wellbeing and quality of life".

The following local priorities have been set in Wokingham Borough:

- A priority is partnership working across key Council teams such as environmental health, public health, transport, and highways so as the ensure air quality is considered and informs local plans.
- Increase the community awareness of air pollution through involvement in Clean Air Day.
- Revocation of the M4 and Twyford AQMA.
- Completion of the new AQAP for the Wokingham Town Centre.

The following challenges have been identified:

- Budget allocation for progressing measures in the AQAP and actions, however funding applications will be applied for where possible/appropriate
- Linking of the Public Health Outcome Framework and health profiles to air quality, in order to identify any causal relationship.
- Local Engagement and How to get Involved

For further details on air quality in Wokingham Borough, please refer to our website

at https://publicprotectionpartnership.org.uk/environmental-health/air-quality

- Public Protection Partnership Vehicle Idling - PPP (publicprotectionpartnership.org.uk)
- Schools Resources Resources - PPP (publicprotectionpartnership.org.uk)
- School Resources My Journey Lesson 1 - What is Air Pollution? and

  Lesson 2 - Solutions to Air Pollution
- Modeshift STARS www.modeshiftstars.org/
- Domestic Fuel information Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020 - PPP (publicprotectionpartnership.org.uk)

- Visit our My Journey website - Your one stop destination for travel information and advice in and around Wokingham borough. My Journey Wokingham is a borough-wide active and sustainable travel campaign that aims to help and inspire Wokingham residents, employees and students to travel by alternative modes.
- Individuals or members of local groups are invited to share any ideas they have to reduce NO_2 levels in Wokingham Borough, by emailing:

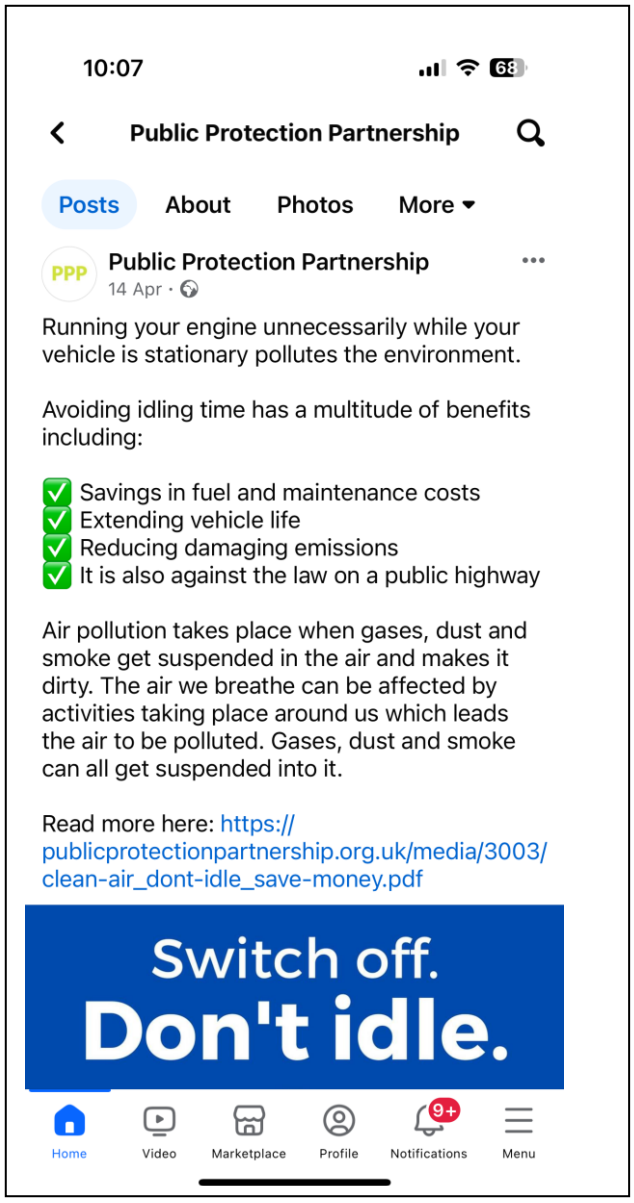
  environmental.health@wokingham.gov.uk
- Other useful websites include:

  Home - Defra, UK

  Scrutiny LTP4 Evidence Base.pdf (moderngov.co.uk)
- There are a number of ways members of the public can help to improve local air quality: Walk or cycle short distances of less than one or two miles rather than driving
- Search for car sharing opportunities using the Liftshare UK Car share with trusted, reviewed, and rated Liftshare.com members
- Use the bus or train regularly and keep up to date with the latest bus routes timetables.

We are also on Social Media including Twitter and **Facebook @PublicProtectionPartnershipUK, Twitter @PublicPP_UK)**

Figure S:3 - Social media post from PPPs Facebook



Local Responsibilities and Commitment

This ASR was prepared for Wokingham Borough Council by the Public Protection Partnership and the air quality working group, which includes officers from the following departments:

Highways Management

Transport Planning

Environmental Health

Public Health

My Journey Team

This ASR has been approved by: Georgio Framalicco

This ASR has been signed off by the Director of Place and Growth

This ASR has been approved by: Dr Ingrid Slade

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

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

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1 Local Air Quality Management

This report provides an overview of air quality in the Wokingham Borough during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Wokingham Borough 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.0.1

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Wokingham Borough Council can be found in Table 2.2. The table presents a description of the three AQMAs that are currently designated within Wokingham Borough Council Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean

Wokingham Borough Council have proposed to revoke the M4 and Twyford AQMAs (see appendix C for the Revocation Report details).

Revocation of the AQMAs

Wokingham, on advice from DEFRA, are proposing to revoke the M4 and Twyford AQMAs. The guidance LAQM.TG22 states *"The revocation of an AQMA should be considered following three consecutive years of compliance with the relevant objective as evidenced through monitoring. Where* NO_2 *monitoring is completed using diffusion tubes, to account for the inherent uncertainty associated with the monitoring method, it is recommended that revocation of an AQMA should be considered following three consecutive years of annual mean* NO_2 *concentrations being lower than 36µg/m*^{3} *(i.e., within 10% of the annual mean* NO_2 *objective). There should not be any declared AQMAs for which compliance with the relevant objective has been achieved for a consecutive five-year period."*. See Table 2.1 for the successful years of compliance.

Table 2.1 Maximum NO_2 level reached in each AQMA (µg/m3)

AQMA	2019	2020	2021	2022	2023	Total consecutive years below 36 (µg/m^3)
M4	27.0	19.3	18.7	21.5	19.8	5
Twyford Crossroads	**42.8**	31.3	32.5	32.8	31.5	4
Wokingham Town Centre	**41.8**	29.0	36.5	37.2	30.6	1

Table 2.2 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration (µg/m^3)	Level of Exceedance: Current Year (µg/m^3)	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
M4 AQMA	Declared 2001, Amended 2004 (WOK841)	NO_2 Annual Mean	Zone 60m either side of the M4 from the Council's boundaries with RBC & RBW&M throughout the borough and 10m either side of the A329 (M)/A3290. The AQMA was reduced to the Council's boundaries with RBC & RBW&M throughout the borough and 10m either side of the A329(M)/A3290 including an extended area along the A329 Reading Rd where its underpasses the M4.	YES	69 (2001) 56 (2004)	20.6	6 years (2018 to 2023	Refer to the LTP3	Local Authority Details - Defra, UK

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration (µg/m^3)	Level of Exceedance: Current Year (µg/m^3)	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Twyford Crossroads AQMA	Declared November 2015 (WOK 850)	NO_2 Annual Mean	Residential and commercial properties along parts of High St in the west, Wargrave Rd in the northwest, London Rd in the north-east and Church St the south-east	NO	54	31.5	5 years (2019 to 2023	WBC AQAP 2017	Local Authority Details - Defra, UK
Wokingham Town Centre AQMA	Declared 2015 (WOK838)	NO_2 Annual Mean	Residential and commercial properties along a small part of Reading Rd and Station Rd in the northwest, along Shute End and into Broad St and Denmark St in the south-west and Peach St into London Rd in the west.	NO	52	30.1	4 years (2020 to 2023)	WBC AQAP 2017	Local Authority Details - Defra, UK

☒ Wokingham Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date.

☒ Wokingham Borough Council confirm that all current AQAPs have been submitted to Defra.

2.2 Progress and Impact of Measures to address Air Quality in the Wokingham Borough

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

1. There is justification to revoke the Wokingham and Twyford Crossroads AQMA despite the ASR stating a further two years of data is required. Although TG.22 states three consecutive years, WDC have stated that data from 2020 and 2021 should be excluded in this period. This would still give three years below the AQO, however the trends in data showing a decrease from 2018 at all monitoring sites in the AQMA. As such there is considered sufficient evidence to suggest that NO_2 concentrations will not be exceeded in the Wokingham and Twyford Crossroads AQMA. Although there is merit in the exclusion of data from 2020 and 2021 due to COVID, given the concentrations within the Wokingham and Twyford Crossroads AQMA prior 2020 and the increase between 2022,2021 and 2020 with all results still well below the AQO, there is sufficient data to revoke the AQMA. It is considered that three consecutive years of data from 2022 is not necessary to revoke the AQMA. The 2024 ASR should look to revoke the Wokingham and Twyford Crossroads AQMA or discuss the data with the LAQM Helpdesk for support.

   Following these comments, we consulted with the LAQM helpdesk and were advised that both the M4 and Twyford Crossroads AQMA should be revoked, so a revocation report was written in November 2023 which will progress through governance processes in 2024

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

   This has been completed.

3. DEFRA wrote that: WOK841 is stated to be 0.2m from the kerb. This would classify the site as a kerbside site not a roadside site which is currently states in the ASR in Table A.2. this is also the case for WOK870. WOK874 states the distance to kerb and relevant exposure is 0 for both. Exceedances of the AQO in Table A.4 should be in bold. These should be clarified in future reports.

Updated the tables and data.

4. Detailed justification over the bias adjustment factor is provided, this is welcomed.

5. Trends of annual mean NO_2 concentrations are clearly presented in detail and discussed and a robust comparison with air quality objectives is provided.

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

7. Monitoring of $PM_{2.5}$ at 14 schools was undertaken in 2022, although this was undertaken using 'low-cost sensors' the results would be welcomed in an additional appendix in future reports.

The results are in Appendix C.

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

They are always deployed in line with DEFRA, as stated in the 2022 report and have been done so again in 2023. Details in Appendix C.

Measure to Improve Air Quality in Wokingham Borough Council

Wokingham Borough Council has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.3. 43 measures are included within Table 2.3, with the type of measure and the progress Wokingham Borough Council have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.3.

Key completed measures are:

- Construction on phase two of the Winnersh Relief Road to connect the B3030 King Street Lane to the A329 Reading Road, was completed in early 2022. This is part of the Council's multimillion-pound strategic new roads programme, which is being built to assist in improving network resilience to support the growth of the borough. The project has reduced the level of traffic passing through Winnersh Crossroads.
- Active Travel Fund Tranche 2 has been developed further with the selected scheme (Woodley to Reading Active Travel Route) consulted on in 2022. Following this third consultation a value engineering workshop was help with ATE to revise the scheme and bring the costs down to allow the full route to be delivered within budget. Currently detailed design is being undertaken on the entire route.
- Active Travel Fund Tranche 3 has awarded £2.95m to the borough to enable us to complete the route from Woodley to Reading.
- Active Travel Fund Tranche 4 has awarded £606,215 to the borough to enable us to design, up to detailed design phase, an active travel route along the A329 Reading Road between Wokingham town centre and neighbourhoods to the west near Winnersh. This scheme has recently gone through the consultation process and is in the detailed design phase.
- The Local Walking and Cycling Infrastructure Plan (LCWIP) has been completed the which can be located at https://www.myjourneywokingham.com/cycling/local-cycling-and-walking-infrastructure-plan-lcwip/

- The LCWIP is presently in the process of being sectioned into schemes for development and delivery. is underway with consultation on public views regarding walking and cycling in the borough completed. As part of the LCWIP outputs are cycling and walking network plans which identify preferred routes and core zones for further development and a prioritised schedule of infrastructure was produced in June 2022.
- In 2023 we complete personalised travel planning for new communities and delivered these enhanced PTP projects covering two development sites in 2023 in Arborfield.
- To assist residents with no access to private driveways transition to EVs and realise the benefits of owning one, in 2022, we secured £173,500 through the On-Street Residential Chargepoint Scheme (ORCS) for the installation of a small number of chargepoints in residential areas that lack off-street parking. 38 chargepoints have now been installed and are operational whilst our contractors are working on the delivery of road markings and signage. The EV FAQ document which is available on My Journey Platform, provides further information about the criteria on which the locations of the ORCS chargepoints were selected, it also provides answers to some of the most common questions raised by residents, regarding EV chargepoint provision in our borough. The above, was the first rollout of residential EV chargepoints, however, we have been recently awarded further funding (£264,000) through the Local Electric Vehicle Infrastructure (LEVI) scheme to scale up the deployment of local, primarily low power on-street charging infrastructure and accelerate the commercialisation of, and investment in, the local charging infrastructure sector.
- My Journey Promotion of active travel and travel choices website is on-going. There were approx. 6,000 visitors per month to the website. We have continued to promote active travel through our social media feeds, and our followers increased to 2,256 (Facebook) and 1,108 (Twitter) in 2022/23 (financial year) with our top Facebook post reaching 2,460 people. We have a monthly newsletter, that details all the My Journey Teams' activities and active travel campaigns, this reaches 8,738 subscribers.
    - My Journey has continued to partner with Love to Ride and once again ran four cycling campaigns across the borough. Since 1 April 2022/23 Love to Ride has achieved 127 workplaces, 2,782 people, 577 New riders.

Bikeability

- Bikeability Level 1 courses (training off road): April 2023 – March 2024: **206 places** delivered

- Bikeability Level 1/Level 2 courses (on road): April 2023 – March 2024: **1812 places**
- Bikeability Level 3 (advanced) courses: April 2023 – March 2024: **174 places**
- Bikeability Learn to Ride (teaching younger children to ride): 59 places through Bikeability and 155 from My Journey Team = **214 children trained**
- Wokingham have also been awarded a larger Bikeability Grant by the Department for Transport for 2023 – 2024: a grant of **£92,915** to train 2,251 children on Bikeability Courses.
- My Journey Team have run x47 Community Dr Bikes checks throughout the borough and x13 School Dr Bike checks between March 2023 and March 2024. During the Community Dr Bike check, members of the public can bring their bikes along to be assessed by a trained mechanic. School Dr Bikes are usually arranged with schools, before their pupils take part in Bikeability training, this ensures that children participating in Bikeability have a roadworthy bike.
- Between March 2023 and April 2024, x 21 Bikes were donated to the Ukrainian Community, for those who have been rehomed in Wokingham during the conflict with Russia.
- Most bus services have now recovered from the effects of the Covid-19 pandemic and are now operating above 90% of pre-covid levels. The Council is working with local bus operators to improve bus service in the borough through an Enhanced Partnership Agreement. Using Bus Service Improvement Plan Funding from the Department for Transport, free travel promotional days, additional afternoon journeys and the re-instatement of Winnersh Triangle Park and Ride service on Saturdays has been possible..
- WBC has opened the Coppid Beech Park and Ride facility and the expanded Winnersh Triangle Park and Ride site. In addition, WBC has worked in partnership with the Royal Berkshire Foundation Trust, Reading Buses, Heathrow and First, to deliver a Park and Ride service to the Royal Berkshire Hospital and a regular coach-based park and ride service to Heathrow from Thames Valley Park and Ride site. We are currently updating our Local Bus Service Improvement Plan as required by the Department for Transport. This will help us continue to improve bus services within the borough.

In 2023 WBC was awarded additional funding by DEFRA to My Journey, in order to complete Air Quality education work at schools in and around the AQMAs. The borough

had already appointed an Air Quality Active Travel Officer to work with schools in order to raise awareness of the issues and encourage increased active travel.

My Journey's extension of their DEFRA funded Eco-Travel Officer role continued for another year. The Active Travel Officer – Air Quality continued to work with schools in AQMAs. One of the main aspects of the project is to work closely with primary schools close to Wokingham's AQMAs, to monitor their Nitrogen Dioxide, assist with travel plans aiming for Modeshift Stars accreditations, deliver lesson packs, competitions, activities, assemblies, and events. Monitoring only outside the school and delivering resources digitally. The final year of the project with schools began in September 2023 and runs through to October 2024. There are six schools involved in the project, five are primary and one secondary. All participating schools are located around central Wokingham.

Modeshift STARS

The My Journey team works with schools to create and monitor school travel plans using the Modeshift STARS platform. Modeshift is a national non-profit organisation that promotes active travel, and their STARS online platform provides a step-by-step process for developing travel plans and a system of accreditation.

More than 20 schools across Wokingham Borough are actively engaged with Modeshift STARS.

Between April 2023 and March 2024, six schools either achieved new accreditation or moved up a level. Wescott Infant, Westende Junior and The Hawthorns Primary schools In particular, have made excellent progress.

In support of schools looking to earn or increase their Modeshift STARS accreditation, the My Journey team also runs regular competitions to promote active travel. Schools can put details into their parent newsletters and entries are emailed to the My Journey team. Between April 2023 and March 2024, the My Journey team ran four competitions. The competitions with the highest response rate were the Be Bright Be Seen competition in the autumn term (38 entries) and the Walk to School More in 2024 competitions in January 2024 (22 entries).

An annual school travel survey week is held in September or October each year. This is to support schools with their Modeshift STARS work. An annual survey is a requirement of Modeshift STARS accreditation, so the annual survey week helps schools with this work.

BetterPoints App

As part of the initiative, BetterPoints (Figure 2.1) has been running since March 2023 until March 2024, (previously known as Innovation Valley Reward app) the campaign with BetterPoints has now concluded in March 2024, during that time:

- A total of 1,131 participants downloaded the BetterPoints app and joined the My Journey Wokingham Challenge by 31 October 2023. 49% (n=550) were previously part of the programme on the IVR app.
- Engagement is measured by activity registered on the app and times the app is opened. 79% (n=898) of participants have recorded at least one activity.
- Engagement over time has remained high, with an average of 68% of participants active (recording at least one trip) each month. This is well above the industry standard for longstanding app interventions, where retention drops to 5.7% after 30 days.1
- The majority of participants were female (57%). The largest proportion of participants fall into the 35-44 age category (32%).
- A total of 202,884 active and sustainable journeys (walk, wheel, run, cycle, scoot, bus, and train) were recorded between 1 May 2023 and 31 October 2023. This total equates to an average of 179 activities per participant.
- Walking was the most popular, accounting for 75% of total active and sustainable journeys, followed by cycling at 14% and bus travel at 6%.
- The total share of journeys for all active modes (walk, wheel, run, cycle, scoot) was 91%, with public transport (bus and train) at 9%.

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

- Development of our new Local Transport Plan (LTP4) in conjunction with a new Local Plan to 2038 which will define the locations of major development in the borough.
- Continued promotion of Active Travel through the My Journey platforms.
- Development of EV Charging Strategy. The document outlines the likely demand for EVs and charge points across our borough and the role of the Council in meeting this demand. (This is nearing completion, and a public consultation is likely to take place end of summer 2024).

Figure 2.1 A My Journey promotion poster for BetterPoints Promotion.

- Development of a carbon accounting strategy which will identify potential carbons saving from transport and accompany the development of Local Transport Plan 4, which currently underway.
- Collaborative working with Public Health Colleagues on the Active Movement Programme, the overarching aim is to reduce the amount of time children are just sitting, both inside and outside of school and increase their participation in sport and pastime activity. As part of this programme, schools were invited to participate in Active Journey Month, during November 2023 and a competition was run, to promote the benefit of using active travel to get to school.
- Winnersh Triangle Park and Ride expanded to provide a minimum of 160 additional spaces on the site, with the aid of LEP funding.

Wokingham Borough Council worked to implement these measures in partnership with the following stakeholders during 2023:

- Neighbouring local authorities

- Town and Parish Councils
- Highways Authority
- Planning Authority
- My Journey
- Residents
- Local Schools
- Public Protection Partnership

The principal challenges and barriers to implementation that Wokingham Borough anticipates, relate to lack of resources and funding.

Sadly, progress on some measures has been slower than expected due to a lack of funding.

Whilst the measures stated above and in Table 2.3 will help to contribute towards compliance, Wokingham Borough Council is refreshing its AQAP to include additional measures to ensure ongoing compliance with Air quality standards across the borough and to achieve compliance in Wokingham Town Centre AQMA.

Table 2.3 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1 AQAP Twyford 1	Investigate the feasibility of alternative traffic routes around Twyford	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	2019	WBC	WBC	NO	Fully funded	£100k - £500k	Planning	12.1 µg/m3	Feasibility study carried out.	Local Plan update is ongoing. This will make recommendation regarding development and supporting infrastructure needs. The Local Transport Plan aims to reduce traffic in town centres and so this remains an aspiration but will require funding.	This work is likely to require significant funds, the source of which has not been identified but might come from development if there is any included in the forthcoming Local Plan.
2 AQAP Twyford 2	Twyford Railway station 1. Consider access for vehicles, taxis, cyclists, and pedestrians. 2. Consider integration of public transport. 3. consider car parking and cycling provisions	Transport Planning and Infrastructure	Other	2017	2025	WBC, GWR, Twyford PC	WBC, GWR, Twyford PC	NO	Partially Funded	£1 million - £10 million	Planning	12.1 µg/m3	Changes incorporated.	Some cycle parking added in 2020 and plans for bus stop realignment to improve the access for bus passengers and pedestrians to be delivered in 2024. GWR have produced a feasibility study to improve the forecourt and station for sustainable travel, but no programme has been provided for implementation of any of the works as they are reliant on funding.	To work with all partners to further promote and encourage sustainable transport to and from stations, this includes soft measures as well as infrastructure delivery. WBC has used S106 and GER "CCIF" funding to make minor improvements to date.
3 AQAP Twyford 3	Review cycle paths	Promoting Travel Alternatives	Promotion of cycling	2016	2025	WBC	WBC	NO	Partially Funded	£1 million - £10 million	Implementation	12.1 µg/m3	Increase in usage.	Local Cycling and Walking Infrastructure Plan has been completed which outlines some potential improvements. The LCWIP prioritises schemes based on funding availability and impact of change; one route from Charvil to Twyford has been subject of a bid to levelling up fund, but was not successful	This work requires significant funds, the source of which has not been identified but might come from development if there is any included in the forthcoming Local Plan.
4 AQAP Twyford 4	Investigate options of A4 and A3032 junction at Hare Hatch	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from	2018	2019	WBC	WBC	NO	Not Funded		Planning	12.1 µg/m3	Investigation carried out.	Potential changes may occur when new development nearby goes ahead.	Traffic more likely to travel east of village so avoiding AQMA

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
			cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane												
5 AQAP Twyford 5	Continue to monitor traffic lights and crossings to maximum efficiency and consider their functionality including left turns and peak hour use	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2016	2030	WBC	WBC	NO	Not Funded	£10k - 50k	Planning	12.1 µg/m3	Review of phases with traffic flow data and real time air quality data	The current operation has been optimised; the no further work is required.	
6 AQAP Twyford 6	Carry out feasibility study for Low Emission Zone for the crossroads	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2023	2025	WBC	WBC	NO	Not Funded	£100k - £500k	Planning	12.1 µg/m3	Feasibility study carried out.	Study on hold following council motion: "While recognising concerns about clean air and congestion, there has to be a balance with supporting the local economy, therefore this Council is committed not to introduce ULEZ (Ultra Low Emissions Zone) charges in any part of the Borough of Wokingham, but if the quality of air in the area were to give rise to a health requirement to improve air quality Council would, of course, reconsider its position."	This should remain as a potential option for the future but is unlikely to go ahead at this time.
7 AQAP Twyford 7	Review of bus fleet and consider alternative fuels.	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2016	2040	Bus companies as contracted by WBC	Bus companies as contracted by WBC	NO	Partially Funded	< £10k	Implementation	12.1 µg/m3	Increase in number of buses run on alternative fuels.	2017 RTL run hybrid buses. CNG all low emission. Courtney Buses Contract to be retendered in 2022 for implementation 2023.	

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8 AQAP Twyford 8	Install "Cut Pollution. Turn off your engine" signs when queuing traffic at traffic lights.	Public Information	Other	2018	2023	WBC	WBC	NO	Not Funded	< £10k	Completed	12.1 µg/m3	Drivers to follow advice.	Completed	
9 AQAP Twyford 9	Consider feasibility of Park and Ride strategy for Twyford	Alternatives to private vehicle use	Rail based Park & Ride	2017	2025	WBC	WBC	NO	Partially Funded	£1 million - £10 million	Planning	12.1 µg/m3	Feasibility study carried out.	Idea is not viable	
10 AQAP Twyford 10	School Travel Plans (Mode Shift Stars)	Promoting Travel Alternatives	School Travel Plans	2016	2040	WBC	WBC	YES	Funded	£10k - 50k	Implementation	12.1 µg/m3	Continue to be developed and reviewed.	Ongoing – DEFRA funding awarded to employ an Eco-Travel officer to end of September 2024 and to accelerate mode shift in AQMAs. After this date standard Modeshift offer will continue as My Journey Business as usual	The only barriers are gaining access to the right school governors/staff who are able to assist with the process within each school.
11 AQAP Wok TC 1	Intelligent traffic signals at Shute End	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2020	2030	WBC	WBC	NO	Funded (With drawn)	£100k - £500k	Implementation	15.5µg/m3	Installation of MOVA.	Currently under review	This scheme was originally designed using "Congestion Management Fund" however, this funding was removed and so no further progress until new funding can be allocated.
12 AQAP Wok TC 2	Consider speed reduction through town centre	Traffic Management	Reduction of speed limits, 20mph zones		2027	WBC Highways,	WBC Highways,	NO	Not Funded	£100k - £500k	Planning	15.5µg/m3	tbc	This is an aspiration of the (draft) Local Transport Plan (under review following consultation). It is likely to be implemented in combination with the new SWDR scheme which will enable vehicle to avoid the Town Centre more easily whilst also enabling/encouraging more active and sustainable travel.	Subject to consultation and funding closer to planned implementation date.

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13 AQAP Wok TC 3	Review traffic routes in town centre and consider if any roads require restricted access	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2022	2027	WBC	WBC	NO	Not Funded	£100k - £500k	Implementation	15.5µg/m3	Review carried out.	It will be started once the SWDR is completed in 2027.	
14 AQAP Wok TC 4	North Wokingham Distributor Road	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2020	2022	WBC	WBC/Developers	NO	Not Funded	> £10 million	Completed	15.5µg/m3	Completion.	Opened in May 2022	
15 AQAP Wok TC 5	South Wokingham Distributor Road	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2023	2027	WBC	WBC/Business Rates Retention Fund/Developer funding	NO	Partially Funded	> £10 million	Implementation	15.5µg/m3	Completion.	Commenced at Montague Park, new rail bridge completed, full SWDR will be completed as developers come forward and commence house building	Phase 1 completed. New Road still planned but awaiting funding/developer contributions.
16 AQAP Wok TC 6	Reconfiguration of Shute End / Broad Street / Rectory Road junction	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management	2020	2030	WBC	WBC	NO	Funded (With drawn)	£100k - £500k	Implementation	15.5µg/m3	Installation of MOVA.	Currently under review	This scheme was originally designed using "Congestion Management Fund" however, this funding was removed and so no further progress until new funding can be allocated.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
			, Selective vehicle priority, bus priority, high vehicle occupancy lane												
17 AQAP Wok TC 7	Consider outcome of feasibility study of improvements to Rectory Road / Wiltshire Road	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2020	2023	WBC	WBC	NO	Funded		Implementation	15.5µg/m3	Feasibility study carried out.	Design underway, but on hold.	Requires TRO supported by TVP. Consider design speed as well as speed limit. Traffic travels at approx. 20mph. This action requires a major remodelling of the highway. Scenarios will have to be modelled to ensure that the problem is not simply transferred to another part of the network.
18 AQAP Wok TC 8	Active management of car parking	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2017	2018	WBC	WBC	NO	Not Funded	£10k - 50k	Implementation	15.5µg/m3	Completed	Introduction of Civil Parking Enforcement 2018.	
19 AQAP Wok TC 9	Alternative arrangement for access to car parks	Traffic Management	Other	2017	2023	WBC	WBC	NO	Not Funded	£1 million - £10 million	Implementation	15.5µg/m3	Implementation (some of regen completed, more planned in future).	Coppid Beech P&R completed which could assist with this approach, however more work required around signage and potential smart working to encourage drivers to park at the first car park they reach when driving to town	This action requires a major remodelling of the highway. Scenarios will have to be modelled to ensure that the problem is not simply transferred to another part of the network.
20 AQAP Wok TC 10	Workplace and School travel planning	Promoting Travel Alternatives	School Travel Plans	2017	2030	WBC	WBC	YES	Funded	£10k - 50k	Implementation	15.5µg/m3	Continue to implement number of plans.	Long standing programme of school travel plans and supporting businesses in promoting sustainable travel to work.	

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21 AQAP Wok TC 11	Residential travel planning	Promoting Travel Alternatives	Personalised Travel Planning	2022	2030	WBC	S106 (developer)	NO	Partially Funded	£10k - 50k	Implementation	15.5µg/m3	Continue to implement number of plans.	The My Journey Team carries this out annually at one of the four strategic development locations (SDL's); those in the North and South Wokingham SDL's benefit from this; North Wokingham due in summer 2024.	Personalised travel planning promoting the benefits of sustainable travel to new residents coming to the borough's new developments.
22 AQAP Wok TC 12	Carry out feasibility study for Low Emission Zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2023	2025	WBC	WBC	NO	Not Funded	£100k - £500k	Planning	12.1 µg/m3	Feasibility study carried out.	Study on hold following council motion: "While recognising concerns about clean air and congestion, there has to be a balance with supporting the local economy, therefore this Council is committed not to introduce ULEZ (Ultra Low Emissions Zone) charges in any part of the Borough of Wokingham, but if the quality of air in the area were to give rise to a health requirement to improve air quality Council would, of course, reconsider its position."	This should remain as a potential option for the future but is unlikely to go ahead at this time.
23 AQAP Wok TC 13	Park and Ride for Wokingham Town Centre	Alternatives to private vehicle use	Bus based Park & Ride	2016	2022	WBC	WBC	NO	Funded	£1 million - £10 million	Completed	15.5µg/m3	Installation and number of journeys.	Coppid Beech P&R completed and open in 2023 though the bus does not currently serve the site directly and users need to walk to the nearest stop.	This actively manages car parking in the town centre and across the borough, however, until bus patronage improves in P&Rs we are unable to fund a service entering the site.
24 AQAP generic 1	Review locations and publication of EV charging points and increase provision	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2018	2023	WBC	DfT (OZEV)	NO	Partially Funded	£1 million - £10 million	Implementation	15.5µg/m3	Number of charging points	Ongoing. First tranche (ORCS) completed Nov 2023. We have been awarded additional funding for further publicly accessible charge points to be delivered in the next two years.	The fund requires match funding from suppliers who will enter a concession contract - the project is dependent on finding a supplier willing to work with us.

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25 AQAP generic 2	Consider implementation of parking charge related to vehicle type e.g., free for electric	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising uptake of low emission vehicles	2022	2024	WBC	WBC	NO	Not Funded	£10k - 50k	Planning	15.5µg/m3	No progress	No progress to date	Requirements to have low and zero emission vehicles and plant need to be included in any new WBC let contract.
26 AQAP generic 3	Low emission vehicles - consider implementation in Council contracts / fleet cars etc. EV pool cars for WBC staff	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising uptake of low emission vehicles	2016	2030	WBC	WBC	NO	Not Funded	£500k - £1 million	Implementation	15.5µg/m3	Vehicle usage.	WBC EH and TP/WSP have zero emission and hybrid company vehicles. Meetings/ Reports - Energy saving trust – recommending the best way forward for the Council (2022) “Green Fleet review – green mileage”	Climate Emergency Team are working with procurement to understand the best approach to add requirements to have low and zero emission vehicles and plant need to be included in any new WBC contract.
27 AQAP generic 4	Consider removal of on street parking to provide more space for cycle lanes, EVs, Car clubs, provision of on street charging points	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	2030	WBC	WBC	NO	Not Funded	£500k - £1 million	Planning	15.5µg/m3	tbc	Car Clubs strategy under development, draft car park strategy in the LCWIP. Local Cycling and Walking Infrastructure Plan (LCWIP) (myjourneywokingham.com)	LCWIP now adopted by council and makes recommendations for segregated cycle paths which will reduce parking availability in place
28 AQAP generic 5	No idling signs - for buses and taxis in waiting areas and at level crossings	Traffic Management	Anti-idling enforcement	2022	2023	WBC	WBC	YES	Partially Funded	£10k - 50k	Implementation	15.5µg/m3	Number of signs installed.	Installed as part of DEFRA grant behaviour change project in 2023 at Taxi ranks, results to been in 2024 ASR which will inform future work viability	No physical enforcement and FPN have been issued as the borough have not adopted this regulation from the secretary of state; also Wokingham would prefer to educate than enforce.
29 AQAP generic 6	Roadside emission testing, detecting and fining polluting vehicles	Traffic Management	Testing Vehicle Emissions	2017	2032	WBC	WBC	NO	Not Funded	£10k - 50k	Planning	15.5µg/m3	Number of vehicles failed.	No progress	Using RTLs existing hybrid buses (Lion 4).

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30 AQAP generic 7	Improvement of cycle routes to ensure continuous and integrated	Transport Planning and Infrastructure	Cycle network	2017	2018	WBC	WBC	NO	Not Funded	> £10 million	Implementation	S106 (Developer)	Increase in usage.	The LCWIP prioritises schemes based on funding availability and impact of change; in 2024 detailed design for Reading Road to Wokingham TC will be completed using Active Travel England funding	This work is likely to require significant funds, the source of which has not been identified but might come from development if there is any included in the forthcoming Local Plan.
31 AQAP generic 8	Residential Travel Planning	Promoting Travel Alternatives	Personalised Travel Planning	2016	2035	WBC	S106 (Developer)	NO	Funded	£500k - £1 million	Implementation	15.5µg/m3	Continue to implement number of plans.	The My Journey Team carries this out annually at one of the four strategic development locations (SDL's); those in the North and South Wokingham SDL's benefit from this; North Wokingham due in summer 2024.	Personalised travel planning promoting the benefits of sustainable travel to new residents coming to the borough's new developments.
32 AQAP generic 9	Encourage WBC staff to travel more sustainably	Promoting Travel Alternatives	Workplace Travel Planning	2017	2035	WBC	WBC	NO	Not Funded	£50k - £100k	Implementation	15.5µg/m3	Increase in commuting by alternative means.	WBC offices have adopted a travel plan for existing office and My Journey are advising the council on a plan for the new site if it comes forward	New site not yet confirmed
33 AQAP generic 10	Secure and sheltered bike parking provision	Promoting Travel Alternatives	Promotion of cycling	2017	2035	WBC	WBC	YES	Funded	£100k - £500k	Implementation	15.5µg/m3	Provided	Ongoing. 6 green roof shelters installed in schools and secure bike lockers in Wokingham TC added in 2022 using DEFRA funds. An annual fund of small cycle parking improvements is in the capital programme.	
34 AQAP generic 11	Partnership with MyJourney	Promoting Travel Alternatives	Promotion of cycling	2016	2028	WBC	WBC	NO	Not Funded	£500k - £1 million	Implementation	15.5µg/m3	Number of events.	MyJourney Wokingham continuing to promote sustainable and active travel. Ongoing, annual programme.	Ongoing – cost of MJ as a whole is around £350k/yr. but could be covered over many of the actions in this plan
35 AQAP generic 12	Promoting active travel via MyJourney website	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2017	2028	WBC	WBC	YES	Funded	£500k - £1 million	Implementation	15.5µg/m3	Opening of scheme.	Ongoing	Ongoing

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36 AQAP generic 13	Thames Valley Park and Ride	Alternatives to private vehicle use	Bus based Park & Ride	2016	2019	WBC/RBC	WBC	NO	Not Funded	£1 million - £10 million	Completed	Opening of scheme.	Completed 2021 access for hospital staff only in 2022, expanding to Public in 2023.	Link with work by Trading Standards re overloaded vehicles, will require implementation of legislation.	
37 AQAP generic 14	Provision of car clubs with or without EVs	Alternatives to private vehicle use	Car Clubs	2015	2023	WBC	WBC/Developers	NO	Not Funded	£100k - £500k	Implementation	15.5µg/m3	Usage of vehicles.	Car Clubs strategy to be delivered in 2024, Car clubs to follow depending on funding availability.	
38 AQAP generic 15	Awareness campaign for the risks of poor air quality and promoting active and sustainable travel	Public Information	Via other mechanisms	2017	2035	WBC PH	WBC/RBC	YES	Funded	£50k - £100k	Implementation	15.5µg/m3	Increased awareness.	MyJourney Wokingham promoting active travel and using social media to raise awareness of Clean Air Day	
39 AQAP generic 16	Air Quality included in to JSNA and Health and Wellbeing Strategy	Policy Guidance and Development Control	Other policy	2016	2018	WBC, PH Berkshire	WBC	NO	Not Funded	£10k - 50k	Completed	15.5µg/m3	Inclusion in JSNA reviews and Health and Wellbeing Strategy.	JSNA published in March 2019 and considers air quality. Active transport is a priority for the HWBS.	
40 AQAP generic 17	New Local Plan and LTP4 - Sustainable Transport, include EV charging points for new developments	Policy Guidance and Development Control	Other policy	2019	2035	WBC Planning and PH	WBC PH	NO	Funded	£100k - £500k	Implementation	15.5µg/m3	Implementation.	Public Health and Planning teams working together on Local Plan.	2019 - Aside from Travel Plan requirements there is a planning policy requirement to provide parking – including cycle storage – in line with standards so all development will include appropriate provision (including shelter for long-term storage - i.e., residential, employee.)
41 AQAP generic 18	Linking with Highway Asset Management Plans	Policy Guidance and Development Control	Other policy	2017	2025	WBC	WBC, PH Berkshire	NO	Not Funded	£10k - 50k	Planning	15.5µg/m3	tbc	No progress	Active Travel Officer promotes all forms of sustainable transport doing public demonstrations and events.
42 AQAP generic 19	Neighbourhood Development Plans to consider air quality	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2017	2040	WBC with Town and Parish Councils	WBC Planning & EH	NO	Not Funded	£10k - 50k	Implementation	15.5µg/m3	Inclusion in plans.	All applications commented on	Ongoing, PPP comment on all planning applications where necessary with regard to AQ.
43 AQAP generic 20	Freight Management Plan	Freight and Delivery Management	Delivery and Service plans	2023	2025	WBC	WBC	NO	Not Funded		Planning	15.5µg/m3	Review and implementation.	Freight Management Plan to be produced after LTP adoption, potentially early 2025	Delivered in partnership with RBC and funded through the Local Growth Fund.

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

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

As detailed in DEFRA's Policy Guidance LAQM.PG22 (Chapter 8), 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.

The latest $PM_{2.5}$ data available (2023) from DEFRA show that Wokingham Borough has a maximum level of 11.10 µg/m^3 (co-ordinates x 477500 y170500), and the average level of 9.33 µg/m^3. Background Mapping data for local authorities - 2018 - Defra, UK). Figure 2.2 below shows that 0.81% of $PM_{2.5}$ is produced by Road & Transport, the other 99.19% is from other factors.

The fraction of all-cause mortality in those aged 30 years and older attributable to particulate air pollution indicator' value for Wokingham Borough and other Berkshire Local Authorities in 2021 can be seen in Table 2.4.

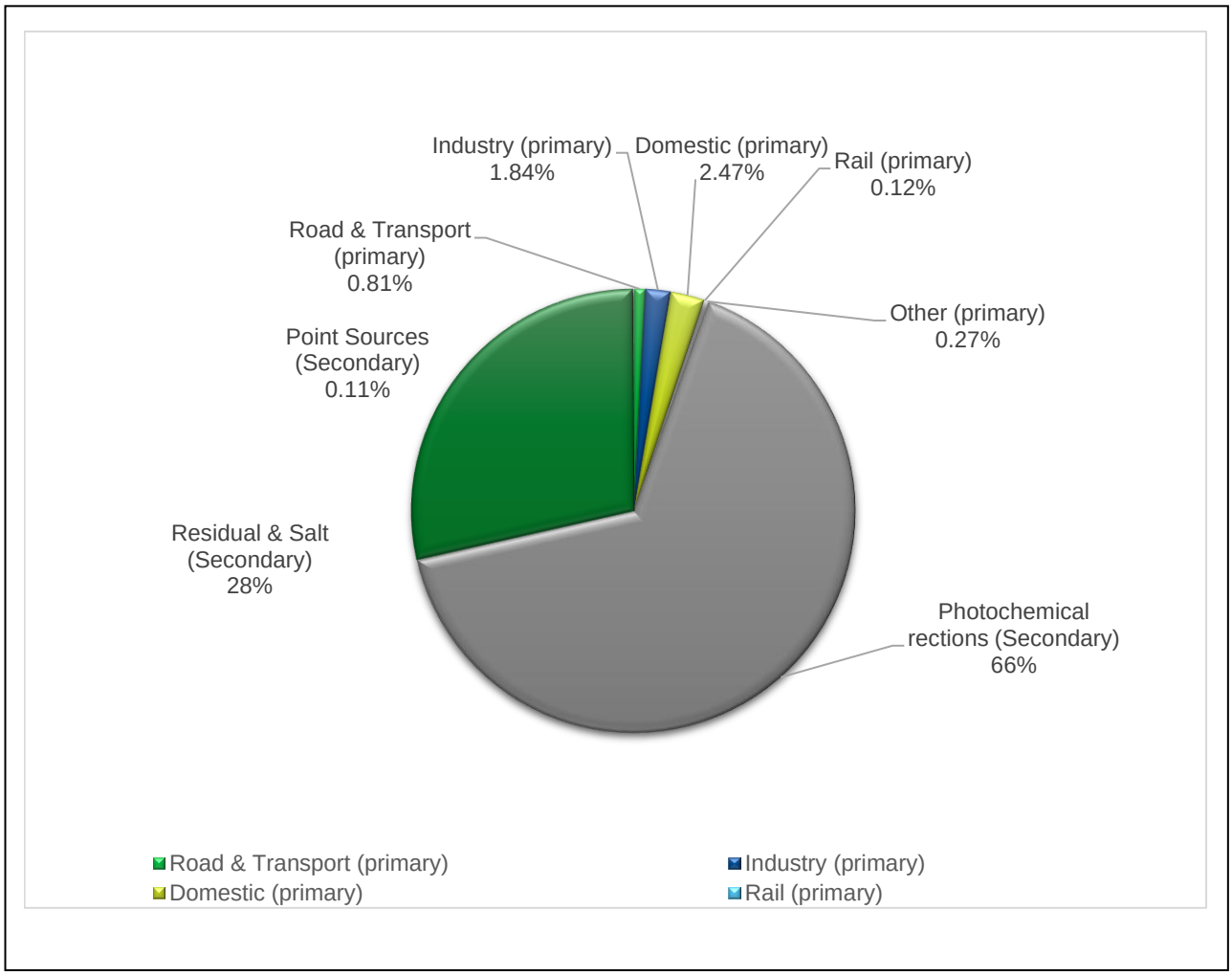
Table 2.4 Fraction of mortality attributable to particulate air (new method) 2022 within Berkshire, 2021.

National England Average	West Berkshire	Reading	**Wokingham**	Bracknell Forest	Windsor & Maidenhead	Slough
5.8%	5.8%	6.6%	5.9%	6.5%	6.6%	**7.1%**

(Public health profiles - OHID (phe.org.uk))

[6] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

Figure 2.2 A Pie Chart showing both the Primary and Secondary sources of $PM_{2.5}$.



Wokingham Borough Council is taking the following measures to address $PM_{2.5}$:

- Work on implementing the actions in the Local Transport Plan and the Local Development Framework Core Strategy, as well as reviewing Planning Applications and the District Plan. For example, a new housing development might contribute to alterations to nearby junctions to increase capacity whilst also improving cycle and pedestrian links and the provision of an electric vehicle charging infrastructure, also contributing to bus services so that the site is served by public transport and thereby linking many other measures together in a site travel plan to encourage people to choose sustainable travel.
- Wokingham Borough gives out advice, including via social media, regarding bonfires and commercial burning throughout the year and the website is regularly updated to assist

public information and understanding. Smoke and bonfires - PPP (publicprotectionpartnership.org.uk),

- The Council also offers advice on domestic burning whilst Trading Standards inspect the suppliers if a complaint is received, to ensure they comply with the regulations for the consumer.

  Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020 - PPP (publicprotectionpartnership.org.uk)

- In 2023 there was no statutory requirement for the Council to monitor and report on $PM_{2.5}$, however in 2022 we monitored the schools near the AQMA's for a three-month period to ascertain a "snapshot" of the PM levels and looked at each school individually. This was completed following the DEFRA grant 2020/21 award of £259,000 (which is split between the PPP Authorities). See Appendix C for more details of the project and results.

- Through the planning process, dust production and dispersion on construction and industrial sites is managed, as is the burning of any waste.

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

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

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

Wokingham Borough Council undertook non- automatic (i.e., passive) monitoring of NO_2 at 46 sites during 2023. 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.

3.2 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.

3.2.1 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 2023 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.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.

3.2.2 Continuous Monitoring Wokingham – Peach Street

An Annual Mean NO_2 concentration of 30.6µg/m^3 was recorded by the Wokingham town centre automatic monitoring (CM2) unit in 2023. This shows that within the Wokingham Town Centre AQMA, NO_2 levels were not exceeding the objective limit at the CM2. This is a decrease on the 2019 result (33.0µg/m^3) pre-pandemic years and the data capture was a good rate of 92.3%. However, it has increased slightly from 27.1µg/m^3 in 2022. This pre-pandemic evidence continues to help indicate that traffic is the main contributor to NO_2 in Wokingham Town Centre and that perhaps the hybrid working that some companies are carrying out is contributing to help reduce the NO_2, along with newer cars.

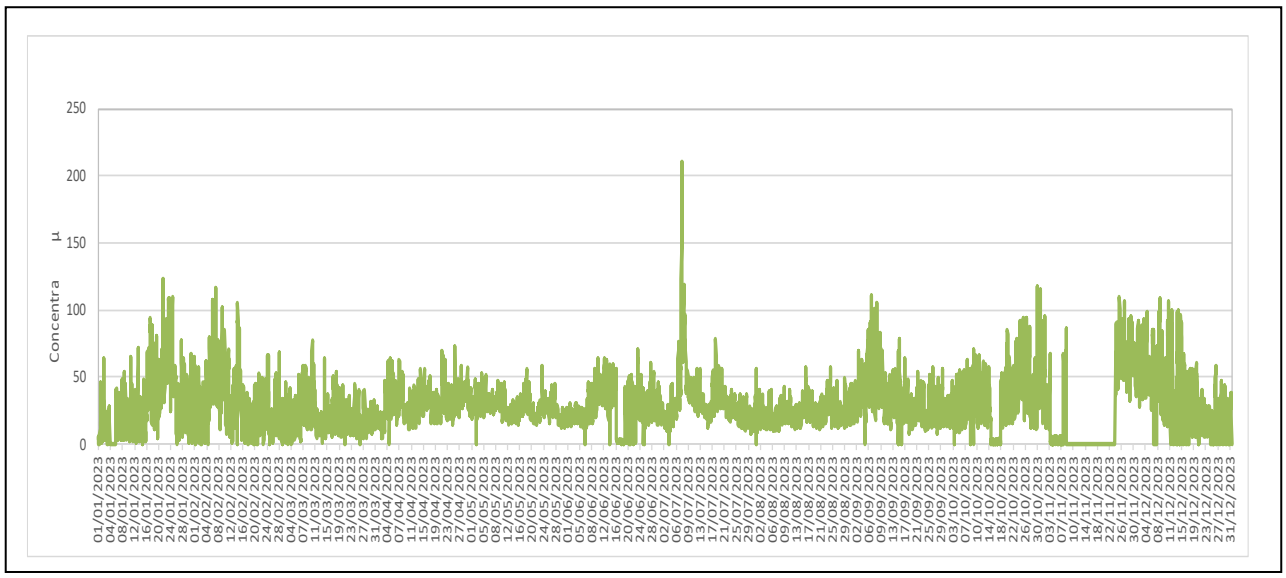
The results have been compared to other nearby sites. Seasonal data trends seen at Wokingham Continuous Monitor are similar to those at comparable AURN monitoring sites at Oxford, Swindon, and Reading New Town. The NO_2 levels increase in the colder weather due to the temperature inversions and this trend was observed at all the sites.

Figure 3.1 shows the annual trend over the last year. The 200µg/m^3 hourly mean objective was met, as we had only 1 exceedance, and this is also a decrease from the 15 in 2018.

This occurred on the 7th of July at 19:00 hours, which can be attributed to cold unseasonal weather and traffic conditions at the time.

The Wokingham continuous monitors also presented good correlation between diffusion tubes (passive data) and the continuous monitoring.

Figure 3.1 Showing the Wokingham Daily NO_2 2023.



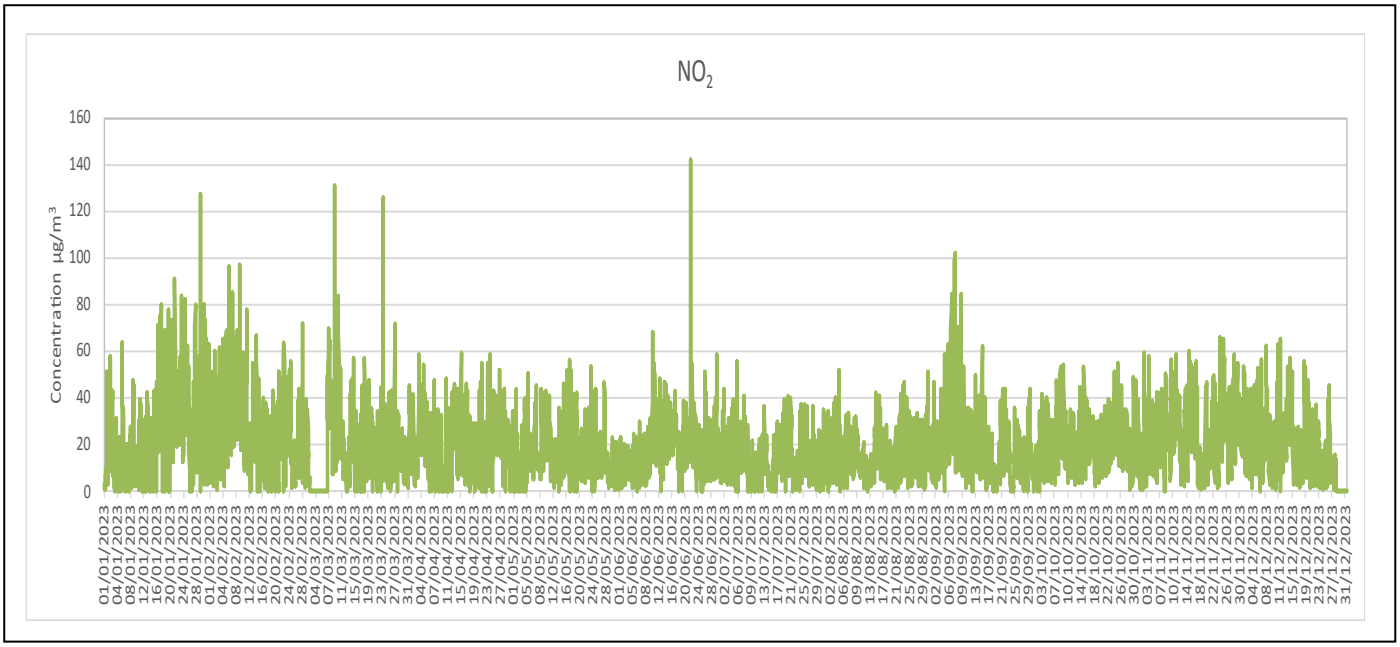
3.2.3 Continuous Monitoring Twyford Crossroads

An Annual Mean NO_2 concentration of 21.5 µg/m^3 was recorded by the Twyford automatic monitoring unit (CM3) in 2023. This is a decrease from the NO_2 recorded in 2019 (29.9µg/m^3) when it was installed and has decreased further from 23.6µg/m^3 measured in 2022. This shows that within the Twyford Crossroads AQMA, the NO_2 levels were not exceeding the objective limit (40 µg/m^3). The period of data capture was a good rate of 95.0%, see Figure 3.2 for the daily results.

There were no exceedances of the 200µg/m^3 hourly mean objective recorded, which is below the Air Quality Objective of 18 exceedances per year.

The Twyford continuous monitors also presented good correlation between Diffusion Tubes (passive data) and the continuous monitoring.

Figure 3.2 A graph showing the Twyford Daily NO_2 2023.



3.2.4 Wokingham Borough Diffusion Tube Data

The Annual Mean Objective of 40µg/m^3 was not exceeded at any of the monitoring sites within the Borough. The one site within Wokingham Town Centre AQMA, WOK838 Giggling Spring, Shute End, which exceeded in 2019, measured 30.1µg/m^3 in 2023, so has decreased from 37.2µg/m^3 in 2022 and continues to reduce from 41.8µg/m^3 in 2019. All the sites within the Twyford Crossroads AQMA were below the objective including, WOK850, 887, 888 - 19 High Street, which last exceeded in 2019 (42.8µg/m^3) measured 32.8 µg/m3 in 2022 and decreased to 31.5µg/m^3 in 2023. Therefore, there has been a decrease this year compared to 2022 and all remain below the air quality objective level (see Figure 3.4). All mean concentrations were less that 60µg/m^3 which therefore indicates no exceedances of the 1-hour NO_2 objective.

3.2.5 M4 AQMA Diffusion Tube Data

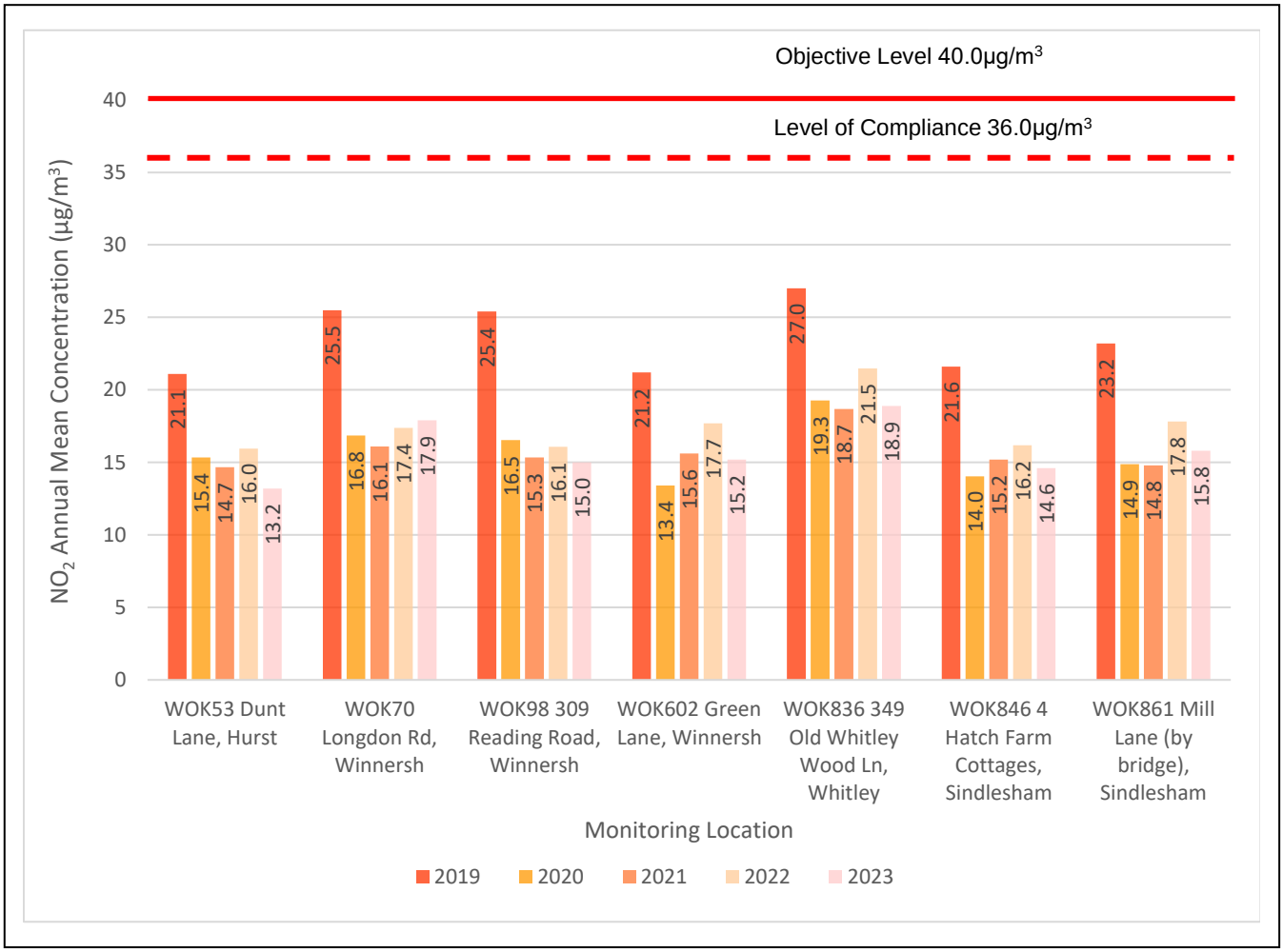
There were no exceedances of the Annual Mean Objective within the AQMA, and all sites except one decreased from 2022. The one site which increased was (WOK 70 Longdon Road) from 17.4 µg/m^3 to 17.9 µg/m^3, see figure 3.3.

The M4 within the Borough has now been completed and we are beginning to see the evidence of reduced emissions which may be due to the smart technology and the reduction of the start and stop traffic. The works finished in 2022 and the levels have continued to

stay well below the AQO in the AQMA. We have evidence from 2019 to demonstrate that the NO_2 around the M4 AQMA has constantly been meeting the AQO, see figure 3.1. Therefore, we can revoke the AQMA.

Monitoring within and outside this AQMA will continue in 2024 and after revocation.

Figure 3.3 Trends in Annual Mean NO_2 Concentrations within the M4 AQMA from 2019 to 2023.



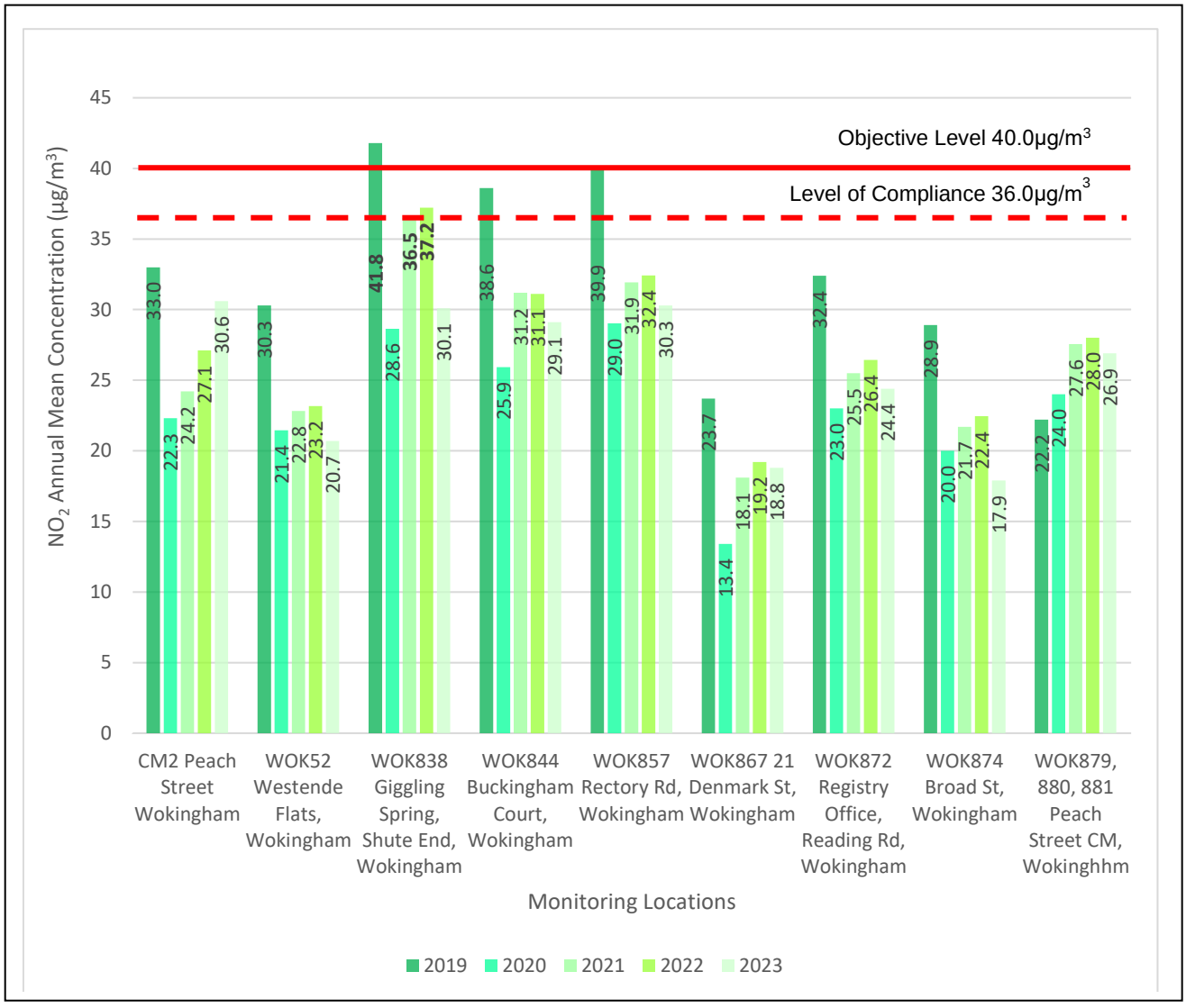
3.2.6 Wokingham Town Centre AQMA Diffusion Tube Data

8 Diffusion Tubes sites are located within the Wokingham AQMA, and one of the sites is a triplicate and co-located with the Continuous Monitor. Within this AQMA all eight sites NO_2 decreased in 2023, no site exceeded the Annual Mean (40µg/m^3) Objective in 2023, although, five years ago (2019) the following single location did:

WOK838 Giggling Spring, Shute End –This site represents relevant exposure and the NO_2 reading has dropped from 41.8µg/m^3 in 2019, to 37.2µg/m^3 in 2022, to 30.1µg/m^3 in 2023. See Figure 3.4, for the continuous monitor and diffusion tubes NO_2 levels.

The traffic queues at the traffic lights next to WOK838 before moving past WOK857; interestingly, both of these sites have reduced readings this year. Furthermore, at WOK838 NO_2 is slightly lower than WOK857 which suggests there may be fewer vehicles queuing at the junction, an increase of greener cars or that people have seen the anti-idling posters at this location and are switching off engines.

Figure 3.4 Trends in Annual Mean NO_2 Concentrations within the Wokingham Town Centre AQMA from 2019 to 2023.



None of the sites have increased beyond the pre COVID pandemic levels of 2019. It is positive to see that after a three years' worth of pandemic/lock down free monitoring that all the NO_2 levels remain below the 2019 results. Monitoring within and outside this AQMA will continue in 2024.

3.2.7 Twyford Crossroads AQMA Diffusion Tube Data

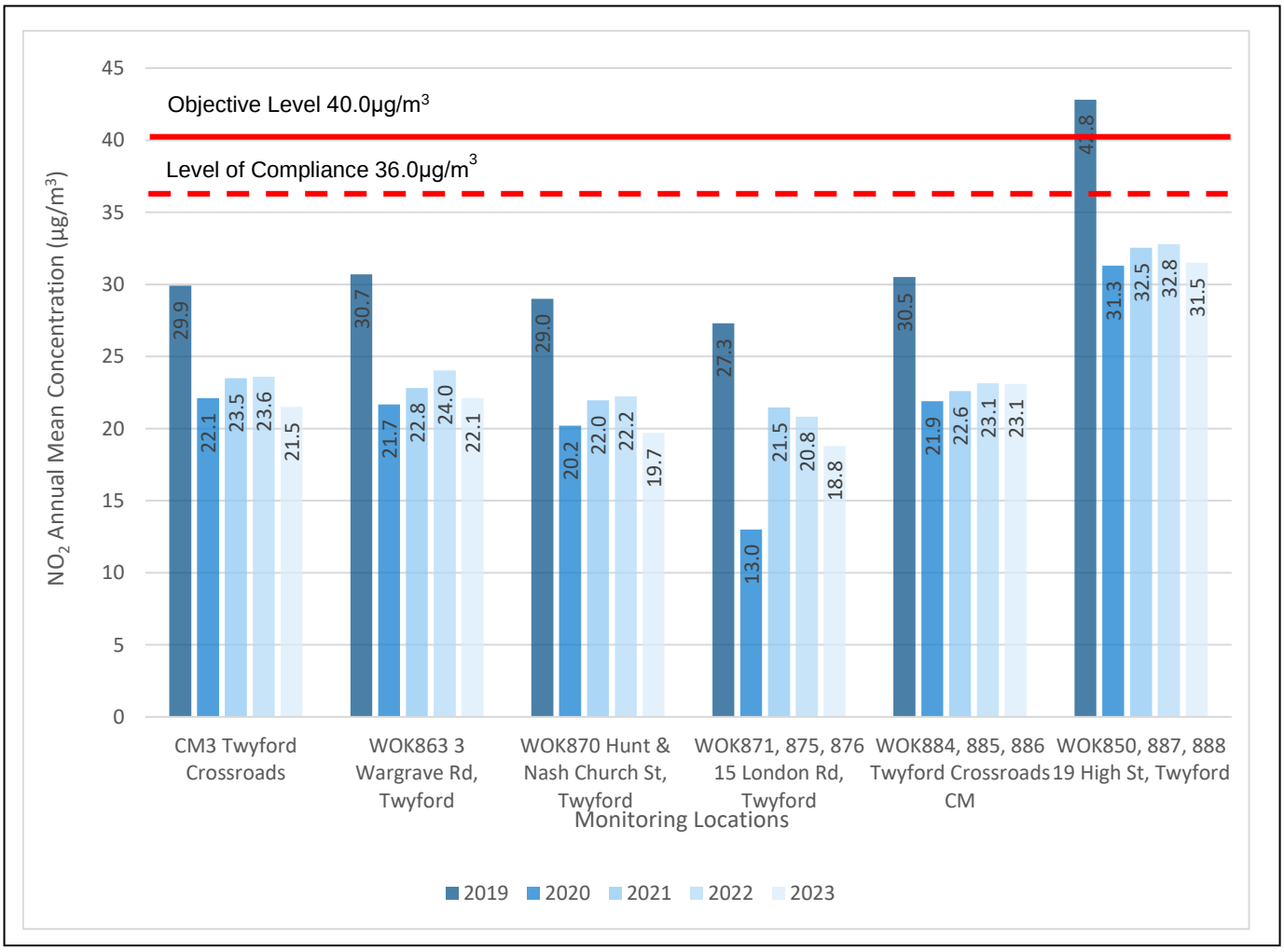
The Twyford Crossroads AQMA has five Diffusion Tubes sites, three of which are triplicate and one these is co-located with a Continuous Monitor. Within this AQMA, no site exceeded the Annual Mean Objective in 2023.

WOK (850, 887 & 888) 19 High Street has decreased in concentration since 2019 when the NO_2 exceeded the AQO, from a triplicated average of 42.8µg/m³, to 31.5µg/m³ in 2023, at the roadside, relevant exposure site.

Within the Twyford AQMA all of the sites decreased in NO_2 from 2019, one of which was a triplicate. In 2023 all five sites have decreased in NO_2, from 2022 to 2023, see Figure 3.5.

Due to proximity of the receptor to the road traffic queuing at the traffic lights at 19 High Street, the NO_2 has always been more elevated in this area.

Figure 3.5 Trends in Annual Mean NO_2 Concentrations within the Twyford Crossroads AQMA from 2019 to 2023.



The WOK864 1 Waltham Road site is not within the Twyford Crossroads AQMA but is only 22m to the southeast, located to assist in determining whether the AQMA boundary needed to be altered. This location decreased from 26.8 µg/m³ in 2022 to 25.2µg/m³ in 2023. This site has reduced from 37.0µg/m³ in 2019, therefore the AQMA boundary does not need altering.

As Twyford's results from the diffusion tubes and continuous monitor continue to measure below 36 µg/m³ (and have been since 2020), Wokingham Borough Council will be actioning the revocation of the AQMA, as advised by DEFRA.

It is positive to see that after three full years' worth of pandemic/lock down free monitoring that all the NO_2 levels remain below the 2019. Monitoring within and outside this AQMA will continue in 2024.

3.2.8 Outside of the AQMAs

Within the rest of the Wokingham Borough all of the sites met the NO_2 Annual Mean Objective of 40µg/m³, Since 2022, twenty of the sites have decreased and three have increased slightly, see Table 3.1 and see Figures A4, A5 and A6. This overall reduction is likely linked to the continuation of hybrid working and the increase of electric vehicles in the borough.

None of the passive monitoring sites within the Borough recorded an annual average above 60µg/m^{3,} which would indicate no exceedances of the 1 hour objective.

Table 3.1 Showing the increase of NO_2 from 2022 to 2023.

Tube Loction	2022 NO2 Levels (µg/m³)	2023 NO_2 Levels (µg/m³)
WOK 877 (Almshouses, London Rd)	16.7	17.3
WOK 817 (London Rd (298)	15.5	15.6
WOK 803 (3 Wellington Road)	18.4	20.7

In 2023, WOK835 (14 Robinhood Lane) was decomission as the results were always well below the objective level and it was close to tube WOK11 (Robinhood Lane), which was nearer the M4 AQMA. These results were also reading far below the objective levels, see Figure D.0.4 which shows a map of the tube locations.

3.2.9 Particulate Matter (PM_{10})

Currently indicative or reference PM_{10} monitoring is not carried out in the Wokingham Borough, in line with the DEFRA LAQM guidance. Further funding is required to carry out this monitoring.

3.2.10 Particulate Matter ($PM_{2.5}$)

Currently indicative or reference $PM_{2.5}$ monitoring is not carried out in the Wokingham Borough, in line with the DEFRA LAQM guidance. Further funding is required to carry out this monitoring.

3.2.11 Sulphur Dioxide (SO_2)

SO_2 monitoring is not required by DEFRA in the Wokingham Borough.

Appendix A: Monitoring Results

Table A.0.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM2	Peach Street Wokingham	Roadside	481348	168603	NO_2	YES Wokingham	Chemiluminescent	3	1.5	1.5
CM3	Twyford Crossroads	Kerbside	332200	433540	NO_2	YES Twyford	Chemiluminescent	3	1.5	1.5

Notes:

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

(2) N/A if not applicable

Table A.0.2 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)
WOK11	Direction Grp, Robinhood Lane,	Roadside	478133	170598	NO_2		4.0	2.4	No	2.3
WOK19	Thames St, Sonning	Roadside	475583	175704	NO_2		22.0	2.0	No	2.3
WOK52	Westende Flats, Peach St	Roadside	481521	168750	NO_2	Wokingham Town Centre AQMA	3.0	1.9	No	2.4
WOK53	Dunt Lane, Hurst	Roadside	479771	171093	NO_2	M4 AQMA	28.0	1.2	No	2.0
WOK70	Longdon Rd, Winnersh	Roadside	478011	170135	NO_2	M4 AQMA	25.0	1.7	No	2.4
WOK71	38 King St Lane, Winnersh	Roadside	477907	170191	NO_2		20.0	3.1	No	2.4
WOK98	309 Reading Road	Roadside	478611	170225	NO_2	M4 AQMA	0.0	11.8	No	1.7
WOK505	Church Road	Roadside	474444	172062	NO_2		10.0	1.8	No	2.2
WOK509	Henley Bridge	Roadside	476414	182648	NO_2		7.0	4.7	No	2.3
WOK602	Green Lane	Roadside	478739	170107	NO_2	M4 AQMA	3.0	1.7	No	1.7
WOK803	3 Wellington Road	Roadside	480651	168544	NO_2		3.0	1.1	No	2.3
WOK805	18 Barkham Road	Roadside	480547	168543	NO_2		0.0	5.7	No	1.9
WOK817	London Rd (298)	Roadside	483231	168817	NO_2		11.5	2.1	No	2.2
WOK825	54 High St Wargrave	Roadside	478541	178634	NO_2		0.0	2.2	No	2.1
WOK827	Station Rd, Twyford	Kerbside	479047	175831	NO_2		3.0	1.0	No	2.3
WOK829	Long Acre Thames St	Roadside	475806	175577	NO_2		0.0	1.7	No	2.3

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)
WOK836	349 Old Whitley Wood Ln	Roadside	472346	168684	NO_2	M4 AQMA	7.5	1.2	No	2.3
WOK838	Giggling Spring, Shute End	Roadside	480995	168726	NO_2	Wokingham Town Centre AQMA	0.0	2.8	No	2.3
WOK841	Lane End Villas	Kerbside	473130	168783	NO_2		4.5	0.2	No	2.4
WOK844	Buckingham Court	Roadside	481492	168775	NO_2	Wokingham Town Centre AQMA	1.3	1.2	No	2.4
WOK846	4 Hatch Farm Cottages	Roadside	477131	170019	NO_2	M4 AQMA	0.0	39.0	No	1.8
WOK 857	Rectory Rd, Wokingham	Roadside	481031	168725	NO_2	Wokingham Town Centre AQMA	0.3	1.2	No	2.4
WOK 861	Mill Lane (by bridge)	Roadside	476997	170107	NO_2	M4 AQMA	0.0	2.0	No	1.8
WOK 863	3 Wargrave Rd, Twyford	Roadside	478768	176012	NO_2	Twyford Crossroads AQMA	12.6	1.0	No	2.4
WOK 866	58 Denmark Street	Roadside	481033	168300	NO_2		0.0	3.4	No	2.4
WOK 867	21 Denmark St, Wok	Roadside	481104	168444	NO_2	Wokingham Town Centre AQMA	0.0	5.0	No	1.8
WOK 869	Mullie (26) High Street	Roadside	478681	175998	NO_2		0.5	1.4	No	2.5
WOK 870	Hunt & Nash Church St	Kerbside	478813	175975	NO_2	Twyford Crossroads AQMA	0.5	0.5	No	2.5

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)
WOK 872	Registry Office, Reading Rd	Roadside	480816	168793	NO_2	Wokingham Town Centre AQMA	0.8	1.6	No	2.5
WOK 873	27 The Terrace	Roadside	480863	168787	NO_2		0.3	2.6	No	2.5
WOK 874	Broad St, Wokingham	Kerbside	481182	168603	NO_2	Wokingham Town Centre AQMA	0.2	0.1	No	2.4
WOK 871 WOK 875 WOK 876	15 London Rd, Twyford 3	Roadside	478830	176025	NO_2	Twyford Crossroads AQMA	0.8	1.6	No	2.5
WOK 877	Almshouses, London Rd	Roadside	478904	176060	NO_2		0.8	1.6	No	2.4
WOK 878	17 Wargrave Rd Twyford	Roadside	478719	176100	NO_2		1.7	3.2	No	2.5
WOK 882	Sign Whitley Wd Ln	Roadside	472299	168677	NO_2		4.2	2.0	No	2.5
WOK 883	Evendons Pri Sch	Roadside	480483	167011	NO_2		3.0	1.0	No	2.5
WOK 50 WOK 887 WOK 888	19 High St Twyford 3	Roadside	478733	175985	NO_2	Twyford Crossroads AQMA	0.3	1.2	No	2.2
WOK 864 WOK 889 WOK 890	1 Waltham Rd 3	Roadside	478887	175945	NO_2		0.0	3.4	No	2.2
WOK 891	6 Budd Grove	Roadside	477498	170218	NO_2		0.0	3.4	No	2.2
WOK 892	3A Wellington Rd	Roadside	480547	168543	NO_2		10.0	1.0	No	2.4
WOK 893	6 Barkham Rd	Roadside	480571	168569	NO_2		0.0	2.5	No	2.4
WOK 894	181 Outfield Crescent	Roadside	480737	168442	NO_2		0.0	2.5	No	2.4
WOK 895	47 Barkham Road	Roadside	480375	168399	NO_2		0.0	1.0	No	2.4

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)
WOK 896	1A Alderman Wiley Close, Wokingham	Roadside	480703	168682	NO_2		0.0	8.0	No	2.4
WOK 879 WOK 880 WOK 881	Peach Street CM Unit 3	Roadside	481359	168606	NO_2	Wokingham Town Centre AQMA	3.0	1.5	Yes	2.0
WOK 884 WOK 885 WOK 886	Twyford CM Unit 3	Roadside	478765	175999	NO_2	Twyford Crossroads AQMA	3.0	1.5	Yes	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.0.3 Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
CM2 Peach Street Wokingham	481348	168603	Roadside	100	92.2	33	22.3	24.2	27.1	30.6
CM3 Twyford Crossroads	478765	176003	Kerbside	100	95.7	29.9	22.1	26.0	23.6	21.5

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

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

☐ **Where exceedances of the NO_2 annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023.**

Notes:

The annual mean concentrations are presented as µg/m^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.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Table A.0.4 Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2023 (%) [2]	2019	2020	2021	2022	2023
WOK11	478133	170598	Roadside	100	82.7	32.0	20.9	20.3	23.9	20.7
WOK19	475583	175704	Roadside	100	90.4	28.9	18.7	19.9	22.2	21.8
WOK52	481521	168750	Roadside	100	90.4	30.3	21.4	22.8	23.2	20.7
WOK53	479771	171093	Roadside	100	100.0	21.1	15.4	14.7	16.0	13.2
WOK70	478011	170135	Roadside	100	67.3	25.5	16.8	16.1	17.4	17.9
WOK71	477907	170191	Roadside	100	82.7	31.9	21.2	21.4	22.6	19.9
WOK98	478611	170225	Roadside	100	100.0	25.4	16.5	15.3	16.1	15.0
WOK505	474444	172062	Roadside	100	92.3	36.5	31.0	29.2	28.9	27.3
WOK509	476414	182648	Roadside	100	82.7	23.9	16.4	16.7	17.8	16.1
WOK602	478739	170107	Roadside	100	100.0	21.2	13.4	15.6	17.7	15.2
WOK803	480651	168544	Roadside	100	92.3	30.7	19.5	22.0	18.4	20.7
WOK805	480547	168543	Roadside	100	100.0	25.0	17.1	18.3	18.5	16.1
WOK817	483231	168817	Roadside	100	90.4	21.6	14.0	15.3	15.5	15.6

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 2023 (%) [2]	2019	2020	2021	2022	2023
WOK825	478541	178634	Roadside	100	92.3	31.1	21.3	23.2	23.8	22.3
WOK827	479047	175831	Kerbside	100	90.4	20.6	14.6	15.2	15.6	14.9
WOK829	475806	175577	Roadside	100	100.0	28.6	20.7	23.1	24.0	20.8
WOK836	472346	168684	Roadside	100	100.0	27.0	19.3	18.7	21.5	18.9
WOK838	480995	168726	Roadside	100	90.4	**41.8**	28.6	36.5	37.2	30.1
WOK841	473130	168783	Roadside	100	100.0	33.3	20.7	23.0	24.4	20.6
WOK844	481492	168775	Roadside	100	73.1	38.6	25.9	31.2	31.1	29.1
WOK846	477131	170019	Roadside	100	100.0	21.6	14.0	15.2	16.2	14.6
WOK857	481031	168725	Roadside	100	80.8	39.9	29.0	31.9	32.4	30.3
WOK861	476997	170107	Roadside	100	100.0	23.2	14.9	14.8	17.8	15.8
WOK863	478768	176012	Roadside	100	90.4	30.7	21.7	22.8	24.0	22.1
WOK866	481033	168300	Roadside	100	90.4	25.3	15.9	17.7	18.9	16.3
WOK867	481104	168444	Roadside	100	80.8	23.7	13.4	18.1	19.2	18.8
WOK869	478681	175998	Roadside	100	100.0	27.1	18.9	19.4	21.9	18.4

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 2023 (%) [2]	2019	2020	2021	2022	2023
WOK870	478813	175975	Roadside	100	100.0	29.0	20.2	22.0	22.2	19.7
WOK872	480816	168793	Roadside	100	100.0	32.4	23.0	25.5	26.4	24.4
WOK873	480863	168787	Roadside	100	80.8	24.7	17.3	19.3	19.4	16.7
WOK874	481182	168603	Roadside	100	75.0	28.9	20.0	21.7	22.4	17.9
WOK 871 WOK 875 WOK 876	478830	176025	Roadside	100	100.0	27.3	13.0	21.5	20.8	18.8
WOK 877	478904	176060	Roadside	100	82.7	22.9	14.9	16.6	16.7	17.3
WOK 878	478719	176100	Roadside	100	100.0	27.5	17.4	18.3	19.5	17.5
WOK 882	472299	168677	Roadside	100	100.0	32.6	20.7	23.8	24.9	23.9
WOK 883	480483	167011	Roadside	100	90.4	29.1	19.6	22.4	22.2	22.5
WOK 50 WOK 887 WOK 888	478733	175985	Roadside	100	100.0	**42.8**	31.3	32.5	32.8	31.5
WOK 864 WOK 889 WOK890	478887	175945	Roadside	100	100.0	37.0	24.4	26.9	26.8	25.2
WOK 891	477498	170218	Roadside	100	100.0	22.2	14.3	16.9	18.5	17.4
WOK 892	480547	168543	Roadside	100	100.0		15.4	18.7	22.5	16.7

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 2023 (%) (2)	2019	2020	2021	2022	2023
WOK 893	480571	168569	Roadside	100	100.0		18.5	20.4	20.4	17.3
WOK 894	480737	168442	Roadside	100	100.0		13.3	14.4	14.9	13.0
WOK 895	480375	168399	Roadside	100	90.4		13.5	16.4	16.6	14.1
WOK 896	480703	168682	Roadside	100	100.0			14.9	16.6	13.5
WOK 879 WOK 880 WOK 881	481359	168606	Roadside	100	73.1	22.2	24.0	27.6	28.0	26.9
WOK 884 WOK 885 WOK 886	478765	175999	Roadside	100	90.4	30.5	21.9	22.6	23.1	23.1

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

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

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

Notes:

The annual mean concentrations are presented as 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.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Figure A:0.1 Trends in Annual Mean NO_2 Concentrations within the Wokingham Town Centre AQMA.

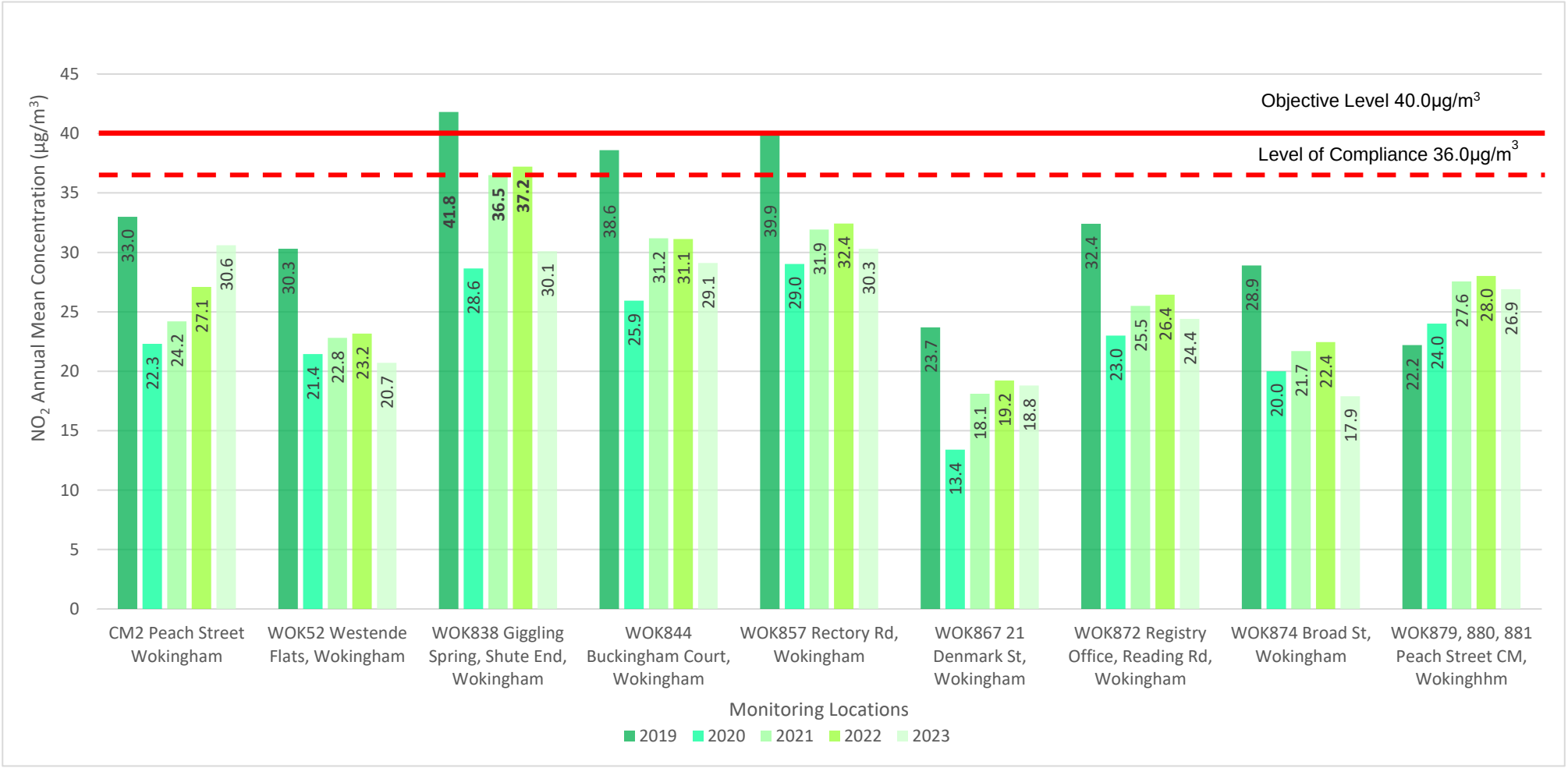


Figure A.0.1 presents NO_2 annual mean concentrations for sites within the Wokingham AQMA between years 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a general trend of reduction experienced across the sites since 2019.

Figure A:0.2 Trends in annual means NO_2 concentrations within the Twyford Crossroad AQMA.

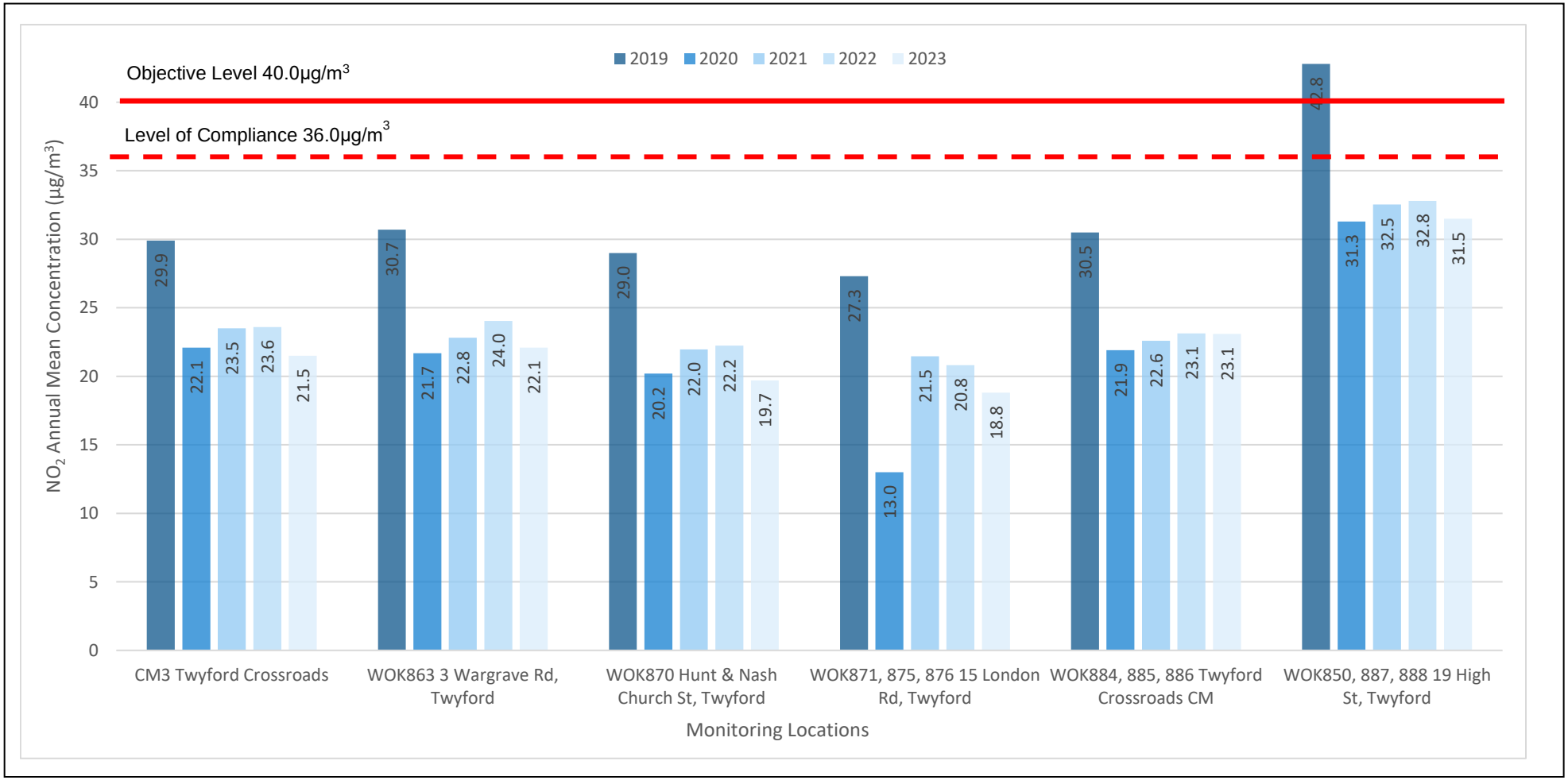


Figure A.0.2 presents NO_2 annual mean concentrations for sites within the Twyford Crossroads AQMA between years 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a general trend of reduction experienced across the sites since 2019.

Figure A:0.3 Trends in Annual Mean NO_2 Concentrations within the M4 AQMA.

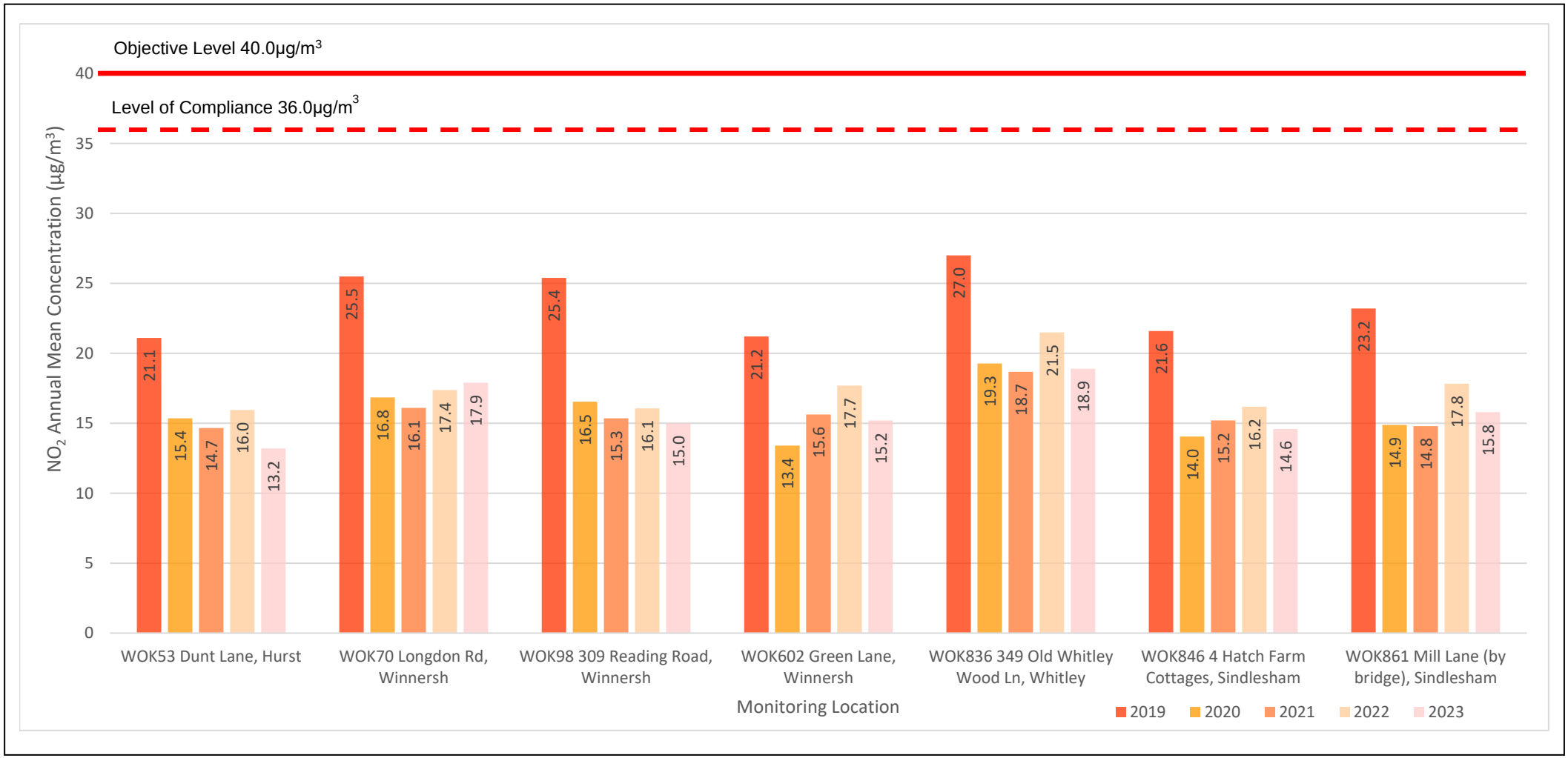


Figure A.0.3 presents NO_2 annual mean concentrations for sites within the M4 AQMA between years 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a general trend of reduction experienced across the sites since 2019.

Figure A:0.4 trends in Annual Mean NO_2 Concentrations within Wokingham (outside AQMAs).

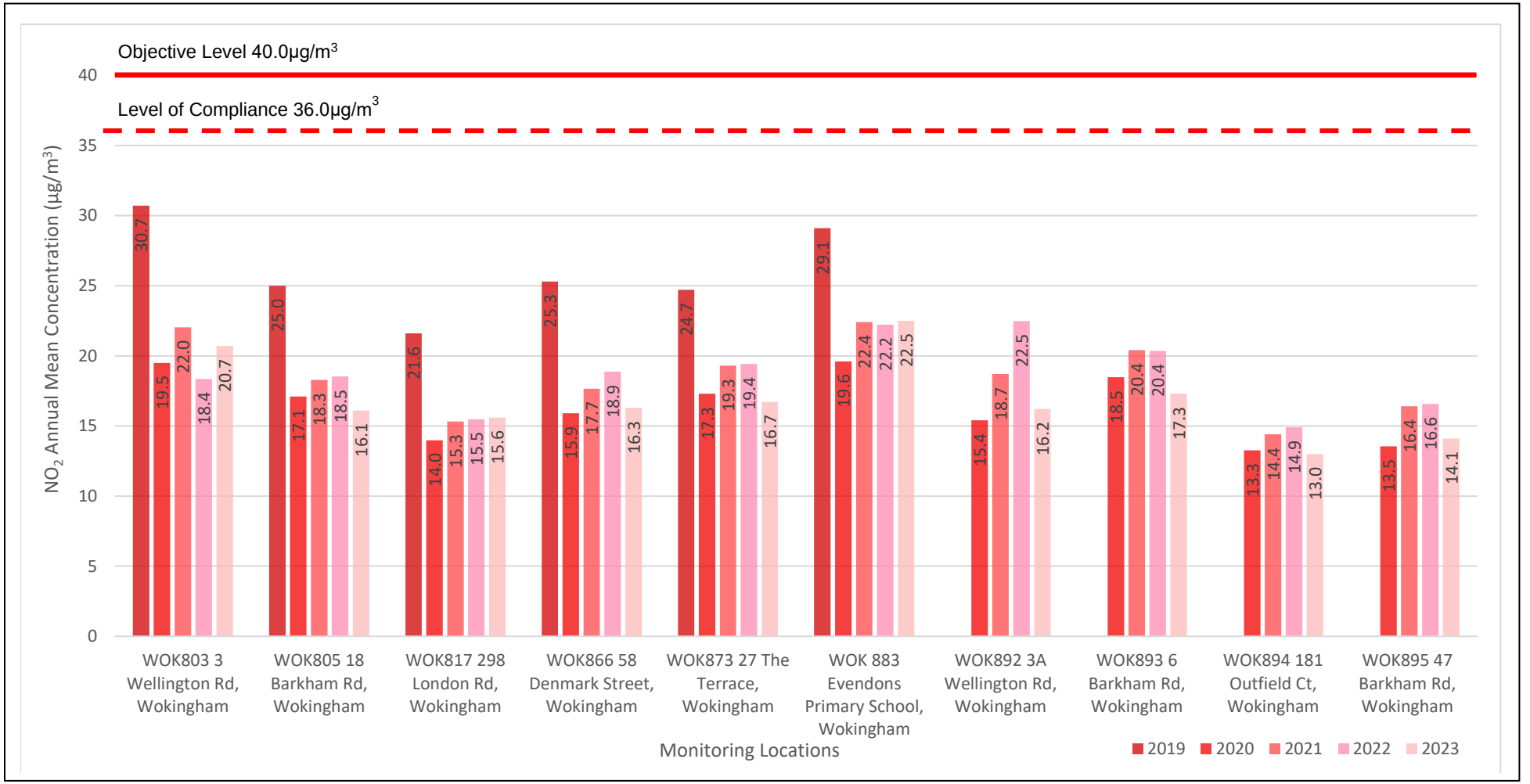


Figure A.0.4 presents NO_2 annual mean concentrations for sites within Wokingham (outside the AQMAs) between years 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a general trend of reduction experienced across the sites since 2019.

Figure A:0.5 Trends in Annual Mean NO_2 Concentrations within Winnersh, Earley & Shinfield (outside AQMAs).

Figure A.0.5 presents NO_2 annual mean concentrations for sites within Wokingham (outside the AQMAs) between years 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a general trend of reduction experienced across the sites since 2019.

Figure A:0.6 Trends in Annual Mean NO_2 Concentrations within Twyford, Sonning and Wargrave (outside AQMAs).

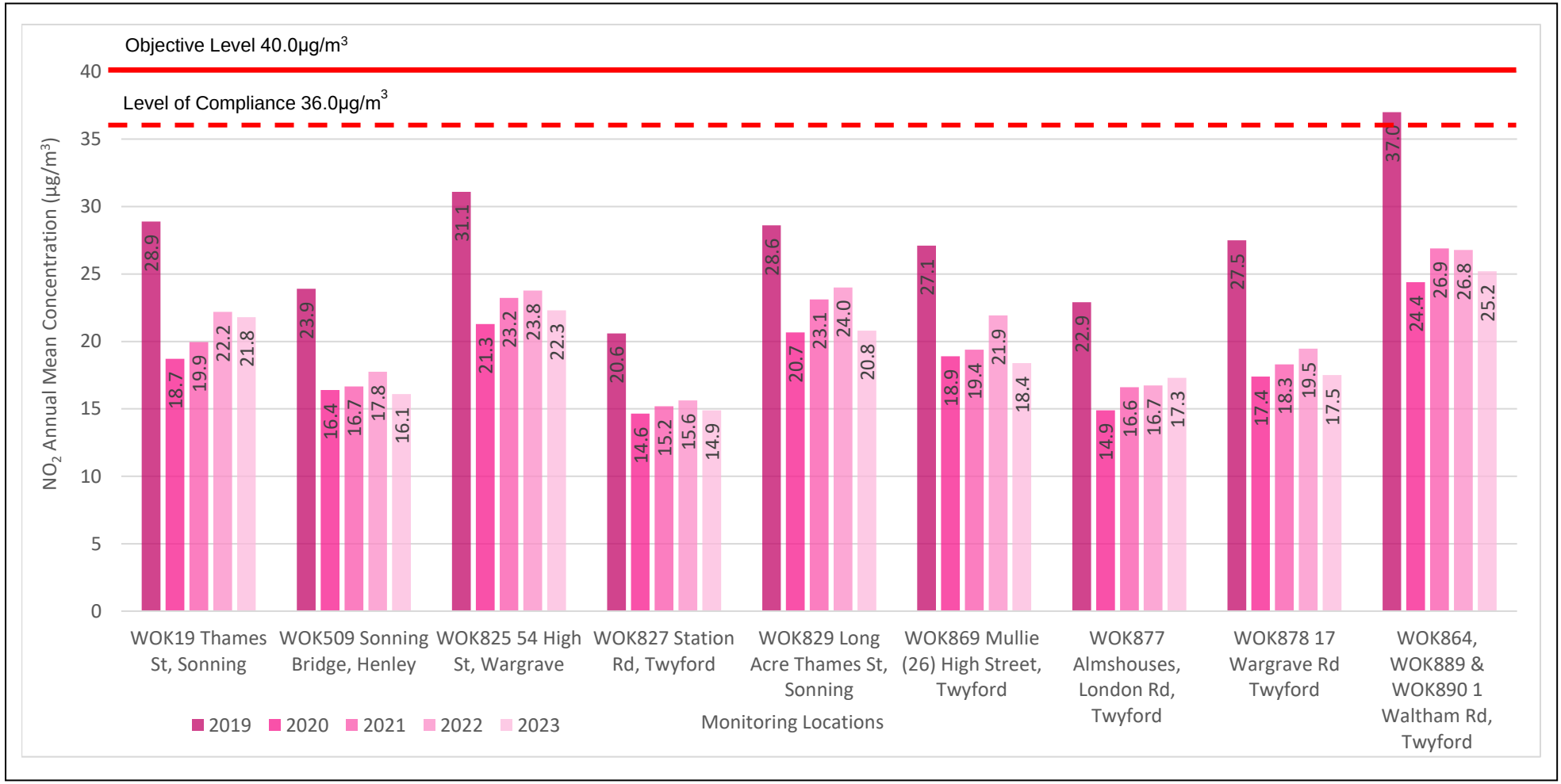


Figure A.0.6 presents NO_2 annual mean concentrations for sites within Wokingham (outside the AQMAs) between years 2019 to 2023. There are no exceedances of the annual mean objective in 2023 and there is a general trend of reduction experienced across the sites since 2019.

Figure A.0.7 Trends in Monthly Average NO_2 Concentrations from Wokingham Continuous Monitor for 2019-2023.

Figure A.7 presents NO_2 monthly trends for the Continuous monitor in Wokingham Town Centre from 2019 to 2023. There have been no exceedances of the annual mean objective since before 2018 this year the annual average was 30.6µg/m^3. You can see the typical NO_2 trend clearly represented by the change in the weather, as the NO_2 increases during colder months due to the temperature inversions.

Figure A.0.8 Trends in Monthly Average NO_2 Concentrations from Twyford Continuous Monitor for 2019-2023.

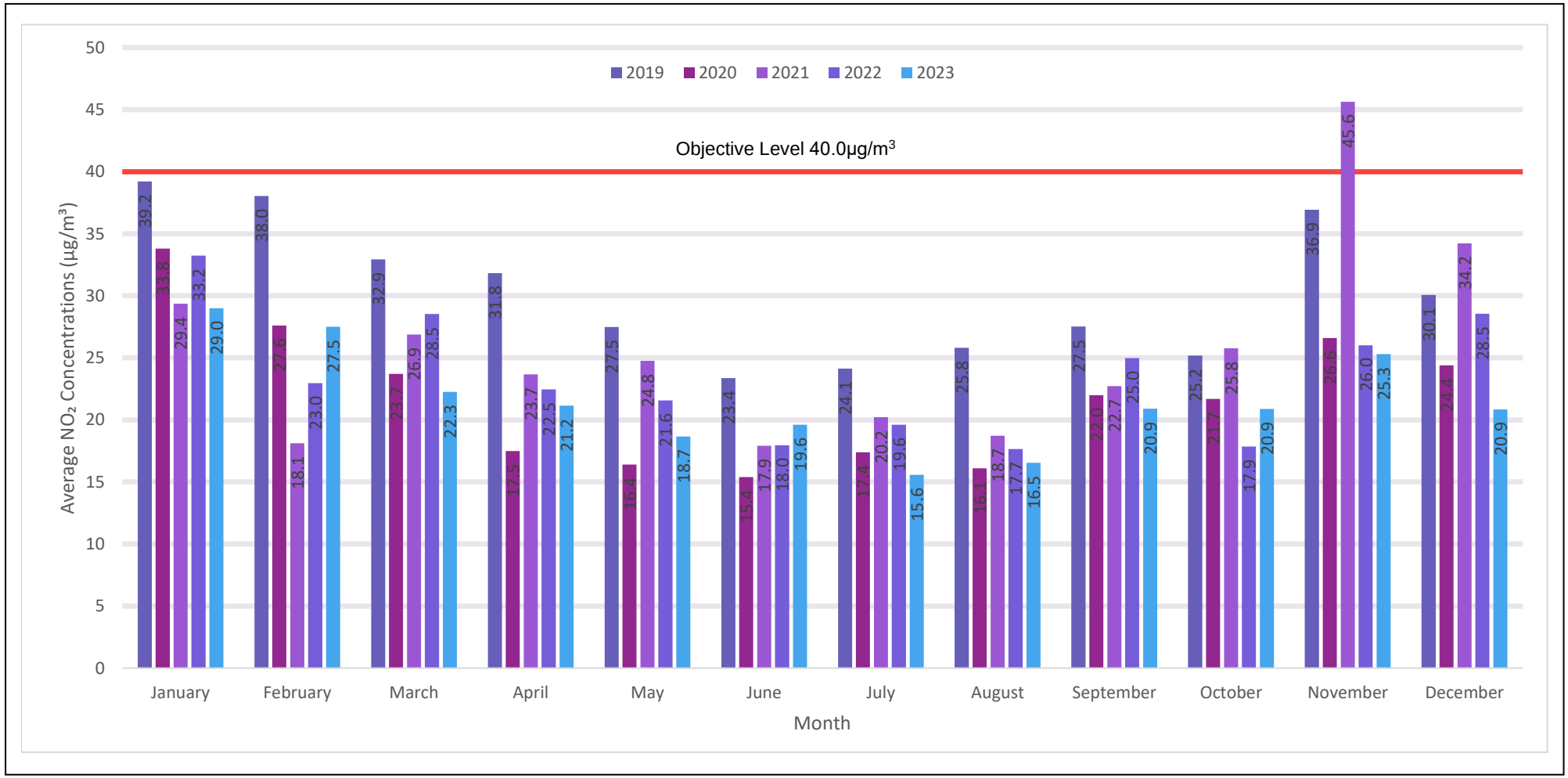


Figure A.8 presents NO_2 monthly trends for the Continuous monitor in Twyford from 2019 to 2023. There have been no exceedances of the annual mean objective since is starting monitoring in 2018 this year the annual average was 21.5µg/m^3. You can see the typical NO_2 trend clearly represented by the change in the weather, as the NO_2 increases in colder months due to the temperature inversions.

Table A.0.5 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 2023 (%) (2)	2019	2020	2021	2022	2023
CM2 Peach Street Wokingham	481348	168603	Roadside	100	92.2	0	**0 (112.34)**	0	0	1
CM3 Twyford Crossroads	478765	176003	Kerbside	100	95.7		0	13	0	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 six months, the maximum data capture for the full calendar year is 50%).

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.0.1 NO_2 2023 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.83	Annual Mean: Distance Corrected to Nearest Exposure	Comment
WOK11	478133	170598	30.7	29.0		23.0	19.7	20.1		29.1	25.9	27.5		19.4	24.9	20.7	-	
WOK19	475583	175704	28.4	28.4	25.7	23.1	20.6	21.7	18.7	<0.48	50.2	25.5	27.1	19.6	26.3	21.8	-	
WOK52	481521	168750	30.4	31.8	24.1	27.2	21.4		18.2	21.2	25.6	28.3	26.2	19.6	24.9	20.7	-	
WOK53	479771	171093	22.4	21.0	17.2	15.3	10.0	12.3	12.3	14.8	15.4	21.8	15.7	13.0	15.9	13.2	-	
WOK70	478011	170135		28.3	20.3	20.4			17.8	18.4		23.9	22.8	17.7	21.2	17.9	-	
WOK71	477907	170191	31.0	29.2	23.7	22.6	19.8	22.2	19.2		28.1		25.6	18.3	24.0	19.9	-	
WOK98	478611	170225	24.8	24.3	17.1	17.8	11.3	14.2	14.1	15.2	20.5	22.3	19.6	15.3	18.0	15.0	-	
WOK505	474444	172062	39.0	**40.8**	30.7	34.6	31.6	30.9	25.3	27.0	35.0	34.5	32.9		32.9	27.3	-	
WOK509	476414	182648	23.0	22.3	18.7	19.0	13.6	19.0	15.7		21.1	20.8	20.9		19.4	16.1	-	
WOK602	478739	170107	22.0	23.1	19.2	21.2	22.3	21.0	11.1	18.2	15.3	17.3	20.0	8.8	18.3	15.2	-	
WOK803	480651	168544	32.0	31.3	24.9	26.9	23.9	21.5		21.6	22.7	26.6	26.0	16.5	24.9	20.7	-	
WOK805	480547	168543	24.0	24.9	20.6	21.9	17.0	18.9	12.1	17.0	19.9	22.0	21.6	13.5	19.4	16.1	-	
WOK817	483231	168817	22.4	23.7	16.7	18.2	12.9	13.9	10.1	15.0	19.1	19.5		35.9	18.8	15.6	-	
WOK825	478541	178634	33.4	31.5	25.8	25.3	24.0	25.6		22.4	28.6	27.5	29.0	22.9	26.9	22.3	-	
WOK827	479047	175831	23.4	21.2	17.4	0.6	13.5	14.8	13.4		36.8	20.2	20.8	15.4	18.0	14.9	-	
WOK829	475806	175577	29.9	30.7	26.3	25.6	21.9	24.8	20.5	22.0	26.0	27.0	27.5	18.5	25.1	20.8	-	
WOK836	472346	168684	33.8	26.9	22.6	21.3	13.2	17.9	20.3	20.6	26.0	27.5	24.5	18.1	22.7	18.9	-	
WOK838	480995	168726	**42.2**	**45.9**	38.4	**44.8**	**40.6**		25.4	32.0	38.4	37.7	37.6	15.8	36.3	30.1	-	
WOK841	473130	168783	23.8	35.4	26.7	24.5	22.9	22.9	19.3	22.7	24.5	23.3	29.0	22.9	24.8	20.6	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.83	Annual Mean: Distance Corrected to Nearest Exposure	Comment
WOK844	481492	168775	**42.8**	**45.9**	33.0	32.7	31.3		26.1	29.1	37.4	37.6			35.1	29.1	-	
WOK846	477131	170019	20.7	23.6	18.1	19.2	19.5	20.6	11.1	16.7	15.4	17.0	19.0	10.3	17.6	14.6	-	
WOK857	481031	168725	38.6	42.0	33.3	38.2	33.7		23.5		37.4	36.5	33.8	**48.3**	36.5	30.3	-	
WOK861	476997	170107	27.3	22.5	18.5	19.3	15.6	18.5	14.8	17.4	19.3	20.8	20.2	14.5	19.1	15.8	-	
WOK863	478768	176012	32.5	32.5	25.2	26.4	22.4		20.9	24.4	28.2	28.6	30.6	20.8	26.6	22.1	-	
WOK864	478887	175945	34.6	34.8	33.1	27.6	21.1	26.0	26.9	26.9	36.2	34.6	31.5	24.7	-	**-**	-	Triplicate Site with WOK864, WOK 889 and WOK890 - Annual data provided for WOK890 only
WOK866	481033	168300	25.8	23.8	21.4	18.8	14.2		15.2	18.7	20.4	21.8	19.9	15.8	19.6	16.3	-	
WOK867	481104	168444	27.3	27.1	20.9	20.4	18.9		12.1		**40.5**	23.0	23.8	13.3	22.7	18.8	-	
WOK869	478681	175998	19.8	26.4	22.0	21.3	18.0	19.7	18.6	21.9	27.9	26.6	27.0	17.2	22.2	18.4	-	
WOK870	478813	175975	28.1	28.9	25.5	23.5	20.0	21.1	18.7	21.6	25.6	27.2	25.8	19.0	23.8	19.7	-	
WOK871	478830	176025	26.7	28.9	22.2	21.7	18.8	19.8	16.9	19.9	24.0	25.5	25.8	18.2	-	**-**	-	Triplicate Site with WOK871, WOK875 and WOK876 - Annual data provided for WOK876 only
WOK872	480816	168793	36.4	36.3	27.9	28.3	22.1	25.0	24.6	24.3	33.5	34.8	30.4		29.4	24.4	-	
WOK873	480863	168787	26.8	27.1	20.6	22.4	18.8		12.2	17.7	19.6	22.2		13.9	20.1	16.7	-	
WOK874	481182	168603		31.6	23.1	25.5	19.3		15.2	21.6		22.7	19.2	15.8	21.6	17.9	-	
WOK875	478830	176025	29.5	29.8	21.7	21.9	19.3	18.6	18.7	20.0	24.2	25.8	29.9	18.2	-	**-**	-	Triplicate Site with WOK871, WOK875 and WOK876 - Annual data provided for WOK876 only
WOK876	478830	176025	21.6	29.8	22.7	22.3	20.3	19.2	17.8	20.7	23.6	25.6	27.4	18.4	22.6	18.8	-	Triplicate Site with WOK871, WOK875 and WOK876 - Annual data provided for WOK876 only
WOK 877	478904	176060	24.4	23.5	19.8		12.4	14.7	13.4		37.6	23.1	23.8	16.3	20.9	17.3	-	
WOK 878	478719	176100	26.4	24.6	23.3	22.0	17.0	17.8	15.3	18.6	22.9	24.8	24.8	15.6	21.1	17.5	-	
WOK 882	472299	168677	33.8	33.6	27.6	28.1	23.2	26.7	25.1	26.8	33.4	33.7	29.5	24.6	28.8	23.9	-	
WOK 883	480483	167011	29.7	32.1	26.2	24.4	21.0	22.7	19.2	21.6	26.2	27.2		48.4	27.1	22.5	-	
WOK 850	478733	175985	**40.6**	**42.5**	38.5	34.1	29.8	35.1	34.2	35.2	**44.6**	**41.4**	38.7	29.5	-	**-**	-	Triplicate Site with WOK 850, WOK 887 and WOK 888 - Annual data provided for WOK 888 only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.83	Annual Mean: Distance Corrected to Nearest Exposure	Comment
WOK 887	478733	175985	**40.8**	**40.8**	38.3	34.3	31.8	34.9	32.9		**44.3**	**40.6**	38.5	30.9	-	**-**	**-**	Triplicate Site with WOK 850, WOK 887 and WOK 888 - Annual data provided for WOK 888 only
WOK 888	478733	175985	**43.5**	**52.0**	39.0	33.0	30.9		31.3	31.9	**80.1**	38.3	36.3	29.6	38.0	31.5	**-**	Triplicate Site with WOK 850, WOK 887 and WOK 888 - Annual data provided for WOK 888 only
WOK 889	478887	175945	35.1	35.1	29.5	27.7	20.8	22.9	26.7		**64.2**	34.8	33.8	22.4	-	**-**	**-**	Triplicate Site with WOK864, WOK 889 and WOK890 - Annual data provided for WOK890 only
WOK890	478887	175945	34.1	35.3	30.5	29.4	20.5	26.5	25.9	27.1	36.4	33.2	31.3	24.3	30.3	25.2	**-**	Triplicate Site with WOK864, WOK 889 and WOK890 - Annual data provided for WOK890 only
WOK 891	477498	170218	33.4	26.2	19.5	19.8	14.4	16.8	15.9	17.6	22.8	24.4	24.2	16.9	21.0	17.4	**-**	
WOK 892	480547	168543	24.7	25.8	19.9	21.9	18.3	17.9	16.5	18.5	19.7	21.5	23.1	13.9	20.1	16.7	**-**	
WOK 893	480571	168569	26.3	27.0	23.0	23.2	18.1	19.9	13.4	18.4	22.1	24.0	20.5	14.3	20.9	17.3	**-**	
WOK 894	480737	168442	24.7	23.0	15.3	16.9	11.5	11.1	8.9	13.2	14.3	17.6	18.9	12.2	15.6	13.0	**-**	
WOK 895	480375	168399	21.5	21.9	15.8	16.2	14.2	12.9	8.4	13.0	14.2	16.6		31.8	17.0	14.1	**-**	
WOK 896	480703	168682	24.0	23.5	16.7	17.2	10.4	13.4	10.7	14.1	15.5	18.8	18.9	12.7	16.3	13.5	**-**	
WOK 879	481359	168606		32.4	32.2	31.7	23.5		23.6	26.7	34.1	36.4		**60.8**	-	**-**	**-**	Triplicate Site with WOK 879, WOK 880 and WOK 881 - Annual data provided for WOK 881 only
WOK 880	481359	168606		30.6	31.5	32.6	24.1		24.9	26.9	30.9	34.7		**55.0**	-	**-**	**-**	Triplicate Site with WOK 879, WOK 880 and WOK 881 - Annual data provided for WOK 881 only
WOK 881	481359	168606		16.0	31.2	32.1	25.6		24.0	26.8	32.4	34.2		**59.5**	32.4	26.9	**-**	Triplicate Site with WOK 879, WOK 880 and WOK 881 - Annual data provided for WOK 881 only
WOK 884	478765	175999	31.0	30.1	24.5	25.5	22.4	22.9	19.4	22.3	26.2	27.4		**54.6**	-	**-**	**-**	Triplicate Site with WOK 884, WOK 885 and WOK 886 - Annual data provided for WOK 886 only
WOK 885	478765	175999	30.9	30.3	25.2	26.0	23.1	23.8	19.7	22.2	26.0	26.8		**52.5**	-	**-**	**-**	Triplicate Site with WOK 884, WOK 885 and WOK 886 - Annual data provided for WOK 886 only
WOK 886	478765	175999	30.6	30.7	25.0	25.4	21.4	24.1	19.7	23.1	26.1	27.3		**51.1**	27.8	23.1	**-**	Triplicate Site with WOK 884, WOK 885 and WOK 886 - Annual data provided for WOK 886 only

☒ **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.TG22).**

☒ **Local bias adjustment factor used.**

☐ **National bias adjustment factor used.**

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

☒ **Wokingham Borough Council** confirm **that all 2023 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 Wokingham Borough Council During 2023

A number of new or changed, sources have been identified, relating to environmental permits or approved planning applications:

- Biomass Digester Power Generator – Farley Hill, Permitted by the Environment Agency in 2023.
- South Wokingham Distribution roads as part of the South Wokingham strategic development. Outlining planning permission approved in 2019, the construction has now commenced. The planning application included an air quality assessment for the 1400 homes, primary school, play area and community facilities.
- Arborfield Development - has commenced including residential development, primary and secondary schools, community centre, medical practice plus a new Sainsburys is proposed from 2024 (which will attract people away from the AQMA if they wish to shop there).
- Shinfield Studios – is now operational and will increase traffic in this area.
- In the Wokingham AQMA - 19/21 Market Place an application has been approved for sixty new dwellings, plus commercial floor space (office conversion to residential). Conditions to mitigate dust have been included in the CENP (construction environment noise plan).
- A 230 residential development in Twyford, Land to the North A4 Bath Road.

Additional Air Quality Works Undertaken by Wokingham Borough Council During 2023

DEFRA Air Quality Grant 2020/21

The combined grant awarded to three local authorities (Bracknell Forest, West Berkshire, and Wokingham) was £259,000 for the projects creating an anti-idling campaign, measuring

$PM_{2.5}$ and NO_2 at the schools located near/within the AQMAs and looking at behaviour change (anti-idling) of our residents, with the aim of reducing exposure of children at school and raising awareness of parents /carers and children and the wider community.

$PM_{2.5}$ Monitoring

AECOM, air quality consultants, were appointed to monitor $PM_{2.5}$ and PM_{10} plus weather, at or close to, fourteen selected schools within, or close to, the AQMAs. Monitoring at the schools, took place between February 2022 and February 2023 for a minimum of 3 months, to include term-time and holiday periods. This provided a snapshot of the levels around schools using a low-cost air quality sensor unit (Vortex) providing real-time measurements at five-minute intervals. As the data was not ratified nor calibrated against a reference equivalent monitor, the data only provides an indicative measurement. The monitors were paired with weather sensors to continuously measure parameters including wind speed and direction, temperature, and rainfall. The air quality monitoring equipment was attached to a lamp post or streetlight and the weather station were close by on different lamp post or streetlight.

The data has not been annualised to represent an annual mean and are therefore the results are indicative only. However, the 'period means were all below the relevant air quality objectives. All the schools were within the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 for $PM_{2.5}$ (i.e., the annual mean should not exceed 25 µg/m³ and the interim target of 12 µg/m³ to be met by end 2027 and long-term target of 10 µg/m³ by 2040.)

Hourly, daily, and weekly results were analysed for temporal distribution and also plotted to compare the difference between school term-time and holidays. Lower concentrations seen in the daytime were due to warmer temperature allowing PM to disperse; the nighttime cooler temperatures reduce the atmospheric boundary layer and increase stability acting to trap PM closer to the ground. The concentrations did vary, weather clearly influenced concentrations i.e. rainfall acts to disperse and deplete pollution more readily. During the winter, higher concentrations from the continent were seen, as opposed to the cleaner maritime air from the Atlantic. Patterns in road traffic flow effects were not as significant as weather conditions though. The morning rush hour increase in concentration was evident, as were higher concentrations recorded around 9am, the beginning and then again around 4pm coinciding with the end of the school day. Concentrations were higher in the middle of the week and then at the end of the week and weekends, due to changes in road traffic and

commercial/industrial activity in the post-covid hybrid working pattern. Overall, lower concentrations were noted in holiday periods.

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

While the study did not identify any significant health risks associated with exposure to $PM_{2.5,}$ recommendations have been made to reduce the levels of $PM_{2.5}$ in the air, wherever possible. See Table C.0.1 Full the school results.

Table C.0.1 showing the $PM_{2.5}$ measured at schools using Vortex sensors during the DEFRA project.

School	Data capture	Average concentration $PM_{2.5}$ ($\mu g/m^3$)	Below annual mean objective (25 $\mu g/m^3$)	Monitoring Dates
All Saints CofE (Aided) Primary School	80.4	1.7	Y	21/10/2022 to 19/01/2034
Bearwood Primary School	100	3.2	Y	20/10/2022 to 18/01/2023
Hillside Primary School	78.2	1.1	Y	28/04/2022 to 16/08/2023
Keep Hatch Primary School	70	1.9	Y	28/04/2022 to 17/08/2023
Polehampton Church of England Junior School	100	6	Y	14/11/2022 to 12/02/2023
St Crispin's School	82	0.2	Y	29/04/2022 to 16/08/2022
St Paul's CofE Junior School	100	10.1	Y	14/11/2022 to 12/02/2022
St Teresa's Catholic Academy	92.1	2.3	Y	19/10/2022 to 17/01/2023
The Colleton Primary School	100	2.3	Y	20/10/2022 to 18/01/2023
The Holt School	98.3	1.9	Y	19/10/2022 to 17/01/2023
Walter Infant School	100	3.7	Y	14/11/2022 to 12/02/2023
Wescott Infant School	99.9	5.6	Y	19/10/2022 to 17/01/2023
Westende Junior School	100	2	Y	21/10/2022 to 19/01/2023
Wheatfield Primary School	99.9	4.1	Y	20/10/2022 to 18/01/2023

Biggest NO_2 Loser

During 2022, the Biggest NO_2 Loser section of the DEFRA Grant award began, this involved using diffusion tubes to measure the NO_2 outside eleven Schools within Wokingham Borough Council located closest to the three AQMA's. The 2022 results were compared with the 2023 results to see if the Behaviour Change experiment (educating children and carers by hanging anti-idling signs and asking the schools to send out information on idling to the guardians who drop off the children) actually made a difference outside schools.

The results were excellent with all schools reducing the NO_2 from 2022 to 2023. The school with the greatest reduction won a certificate, reusable water bottles for each child, air quality bookmarks and posters to go up in the school. Plus a leaflet to accompany the school newsletter and another copy of the School Air Quality Tool Kit and educational lesson plan air-quality-school-toolkit-final-version-1-003.pdf (publicprotectionpartnership.org.uk)). See Table C.0.2 for the NO_2 data for each school monitored.

The results show that the greatest reduction occurred at Walter Infant School, with an incredible reduction of 30.4%, St Crispin's School reduced NO_2 by the smallest amount at 4.8% but this is still a good, as the school is located alongside a busy main road. These results prove that the Behaviour Change Project is working in Wokingham and that people are driving more mindfully and in environmentally friendly manner.

Table C.0.2 Showing the raw NO_2 results for 2022 and 2023, plus the percentage reduction for the bigger NO_2 loser competition

School	2022 NO_2 ($\mu g/m^3$)	2023 NO_2 ($\mu g/m^3$)	Percentage Difference (%)
Walter Infant School	19.30	13.43	-30.4
Keep Hatch Primary School	14.64	11.08	-24.3
All Saints CofE (Aided) Primary School	13.45	10.25	-23.8
Hillside Primary School	20.84	16.76	-19.6
Wheatfield Primary School	18.23	14.97	-17.9
Wescott Infant School	14.98	12.64	-15.6
Polehampton Church of England Junior School	12.52	10.73	-14.3
The Colleton Primary School	13.60	11.84	-13.0
Westende Junior School	14.06	12.67	-9.9
The Holt School	16.77	15.36	-8.4
St Crispin's School	16.33	15.55	-4.8

The Revocation of the M4 and Twyford AQMA

Wokingham Borough Council created a report about revoking both the M4 and Twyford AQMAs. The state revocation report was drafted in November 2023, and it is anticipated that revocations will occur in 2024

The M4 AQMA

The M4 AQMA was declared for the NO_2 annual mean and the NO_2 hourly mean in 2001 and amended in 2004. It is a Zone of 60m either side of the M4 from the Council's boundaries with Reading Borough Council, in the West and the Royal Borough of Windsor & Maidenhead, in the East. The AQMA runs throughout the borough to include an extended area along the A329 Reading Road, where its underpasses the M4, (See Appendix A Map 1).

The M4 Nitrogen Dioxide Levels

The NO_2 levels for the M4 AQMA, have been monitored using diffusion tubes since 2001 at seven locations (see Map 3 and 4). These are all within the AQMA.

- WOK53 – Dunt Lane, Hurst
- WOK70 - London Road, Winnersh
- WOK98 – 309 Reading Road, Winnersh
- WOK602 - Green Lane, Winnersh
- WOK 836 – 349 Old Whitley Wood Lane, Whitley
- WOK846 – 4 Hatch Farm Cottages, Sindlesham
- WOK861 - Mill Lane, Sindlesham

The results (see Figure 1 below) have been 36.0 µg/m^3 or below for the past five years, within the highest level reaching 31.0 µg/m^3 in 2018. Whilst the levels have started to rise slightly since 2020-2021 when the M4 had reduced traffic volumes due to the pandemic lockdowns, the levels have not risen to the levels measured pre-2020. A number of factors may have contributed to this e.g. an increased use of electric vehicles, more people working from home and "hybrid working" and the implementation of the M4 smart motorway. Highways England commenced the smart motorway construction in 2018 and it was fully implemented in 2022.

From 2018 – 2021 the section from Junction 8 to Junction 12, within which is the AQMA, the traffic was speed was limited to 50 mph in three lanes. The speed limit was increased to 60 mph in the four lanes for the final few months before completion. From December

2021 the motorway was fully opened to traffic at the national speed limit.

Figure C:0.1 Diffusion tube Nitrogen Dioxide Levels in the M4 AQMA from 2019 to 2023.

Historic Continuous Monitoring

Between 25/03/2013 and 31/12/2016 automatic monitoring at Old Whitely Wood Lane, north of the M4 was carried out. (See results in Table 2 below). During this period (when 18 exceedances were permitted), there were only two exceedances of the 1-hour Objective in 2016 and the highest annual average of 36.9 µg/m^3 was recorded in 2014.

Table C.0.3 The results from the continuous monitoring unit from 2013 to 2016 at the M4 AQMA.

Year	NO_2 1 Hourly mean	NO_2 Annual Mean (µg/m^3)
2016	2 exceedances	34.2
2015	Unit offline	Unit offline
2014	0 exceedances	36.9
2013	0 exceedances	30.2

Future Monitoring of the 4 AQMA

Monitoring will continue at the seven sites using diffusion tubes, as advised in LAQM.TG (22) to ensure that the levels remain at 36.0 µg/m^3 or below, for the next three years, unless advised otherwise by DEFRA.

The Twyford Crossroads AQMA

The Twyford Crossroads AQMA was declared for the exceedance of annual mean NO_2 in 2015. It includes the residential and commercial properties along parts of High Street in the west, Wargrave Road in the northwest, London Road in the north-east and Church Street the south-east (see Appendix A Map 2).

The Nitrogen Dioxide Levels

The nitrogen dioxide levels for the Twyford Crossroads AQMA, have been monitoring the NO_2 Annual mean objective using diffusion tubes five sites (three of which are triplicate) and a continuous monitoring unit (see Appendix A Map 5).

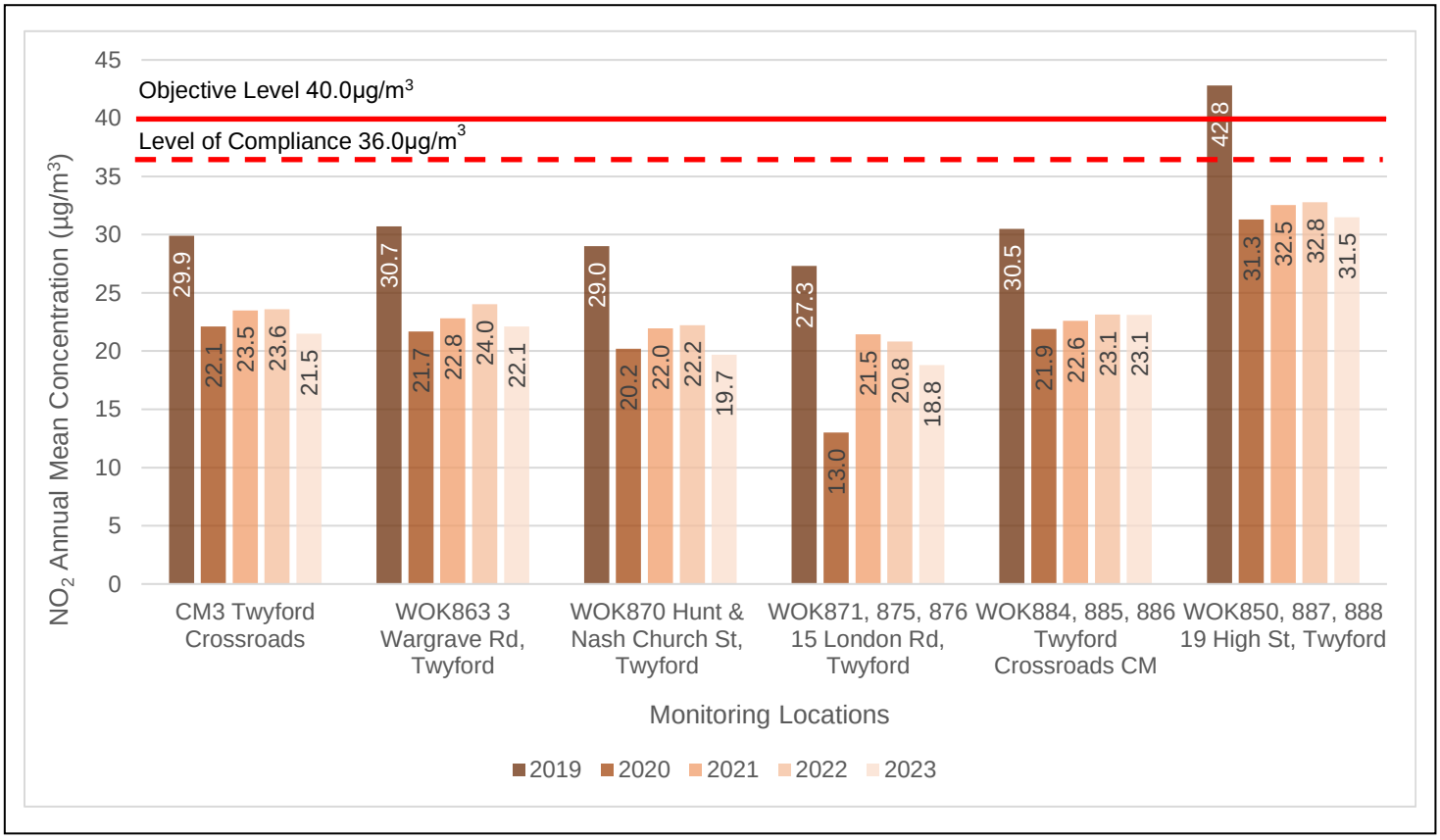
The sites are located as followed.

- WOK863 - 3 Wargrave Road, Twyford
- WOK870 - Hunt & Nash Church St, Twyford
- WOK871, 875, 876 - 15 London Road, Twyford
- WOK884, 885, 886 - Twyford Crossroads Continuous Monitor
- WOK850, 887 888 - 19 High Street, Twyford.

The results have been 36.0 µg/m^3 or below for the past five years, in four of the diffusion tube locations and continuous monitor (shown in Figure 2 below). One of the diffusion tube locations, 19 High Street, has been 36.0 µg/m^3 or below since 2020. Whilst the NO_2 has started to rise slightly since 2020, they remain below the 2019 levels.

A number of factors can attribute to these reduced levels including an increased use of electric vehicles, more people working from home and "hybrid working", an increase in public transport use and reduction in vehicle idling.

Figure C:0.2 Continuous Monitor (CM) and diffusion tube Annual NO_2 concentrations at Twyford Crossroads AQMA from 2019 to 2023.



Monitoring

Throughout 2023 the five diffusion tubes site within the AQMA have remained in place, along with the continuous monitor. For twelve months, the continuous monitoring results show that the annual NO_2 remains below 36.0µg/m^3 (Figure 3), with an annual NO_2 level of 21.5 µg/m^3. The results from the diffusion tubes also all remain below 36µg/m^3.

Future Monitoring

Monitoring will continue at the five diffusion tubes sites to ensure that the levels remain at 36.0 µg/m3 or below, for the next three years.

Table C.0.4 The Continuous Monitoring results for Twyford AQMA for both 2023 and 2022.

Month	Average NO_2 concentration ($\mu g/m^3$)		NO_2 Monthly comparison (%)	Quarterly Annual Average		Quarterly comparison (%)
	2022	2023		2022	2023	
January	33.2	28.9	-6.7	28.4	26.2	- 8
February	23.0	27.4	6.2			
March	28.5	22.2	-3.5			
April	26.2	21.3	-23	20.9	20.0	- 4.4
May	26.7	19.0	-41			
June	23.5	19.7	-19			
July	19.6	15.5	-27	20.7	17.6	-16.2
August	16.5	16.5	-7			
September	25.0	20.8	-20			
October	17.9	20.8	14	24.1	22.2	-7.8
November	26.0	25.3	-3			
December	28.5	20.9	-37			

QA/QC of Diffusion Tube Monitoring

Wokingham Borough Council uses GRADKO International as the supplier for diffusion tubes within 2023 and the method of preparation, e.g. 20% TEA in water. The monitoring that has been completed is in adherence with the 2023 Diffusion Tube Monitoring Calendar, as supplied to the LAQM website.

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). WASP

formed a key part of the former UK NO_2 Network's QA/QC and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management. The laboratory participants analyse four spiked tubes and report the results to HSL. HSL assign a performance score to each laboratory's result, based on their deviation from the known mass of nitrite in the analyte. The Performance criteria are due to be changed, at present the criteria are based on the z-score method, and equates to the following:

GOOD: Results obtained by the participating laboratory are on average within 13% of the assigned value. This equates to a Rolling Performance Index (RPI) of 169 or less.

ACCEPTABLE: Results obtained by the participating laboratory are on average within 13-26% of the assigned value. This equates to an RPI of 169 - 676.

WARNING: Results obtained by the participating laboratory are on average within 26 – 39% of the assigned value. This equates to an RPI of 676 - 1521.

FAILURE: Results obtained by the participating laboratory differ by more than 39% of the assigned value. This equates to an RPI of greater than 1521.

However, from April 2009, the criteria have been based upon the Rolling Performance Index (RPI) statistic and will be tightened to the following:

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

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

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

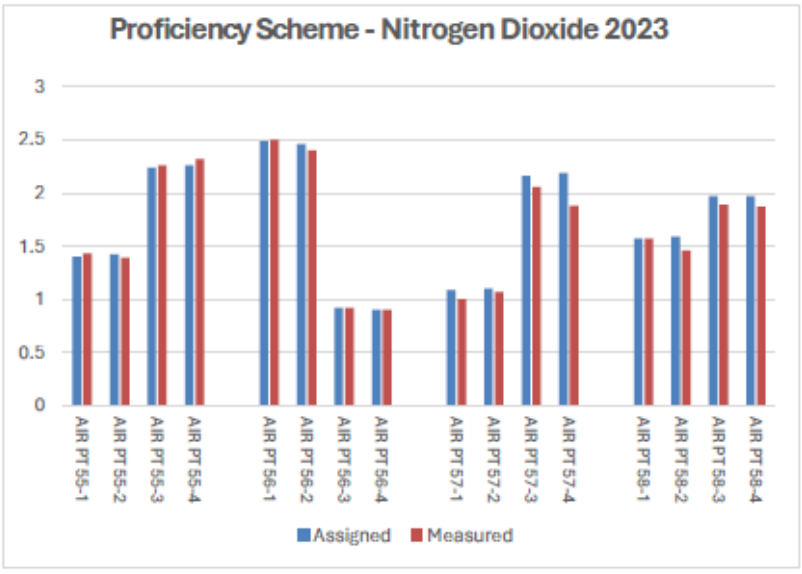
Wokingham Borough Council use Gradko International for the supply and analysis of the nitrogen dioxide diffusion tubes for their non-automatic monitoring programme. Gradko's proficiency scheme results for 2023s AIR PT please see Figure C.2. Nitrogen Dioxide AIR PT 2023.

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

AIR PT Nitrogen Dioxide Proficiency Scheme Results 2023

Methods: GLM 7 – CARY 60 Spectrophotometer

AIR PT Proficiency Scheme - Nitrogen Dioxide 2023					
Date	Round	Assigned value	Procedure GLM 7		
			Measured concentration	z-Score	% Bias
Feb-23	AIR PT 55-1	1.4	1.43	0.29	2.1%
Feb-23	AIR PT 55-2	1.42	1.39	-0.28	-2.1%
Feb-23	AIR PT 55-3	2.24	2.26	0.11	0.9%
Feb-23	AIR PT 55-4	2.26	2.32	0.34	2.7%
Jun-23	AIR PT 56-1	2.49	2.5	0.05	0.4%
Jun-23	AIR PT 56-2	2.46	2.4	-0.33	-2.4%
Jun-23	AIR PT 56-3	0.92	0.92	0	0.0%
Jun-23	AIR PT 56-4	0.9	0.9	0	0.0%
Aug-23	AIR PT 57-1	1.09	1.00	-1.1	-8.3%
Aug-23	AIR PT 57-2	1.10	1.07	-0.36	-2.7%
Aug-23	AIR PT 57-3	2.16	2.06	-0.62	-4.6%
Aug-23	AIR PT 57-4	2.19	1.88	-1.89	-14.2%
Oct-23	AIR PT 58-1	1.57	1.57	0	0.0%
Oct-23	AIR PT 58-2	1.59	1.46	-1.09	-8.2%
Oct-23	AIR PT 58-3	1.97	1.89	-0.54	-4.1%
Oct-23	AIR PT 58-4	1.97	1.87	-0.68	-5.1%



Diffusion Tube Annualisation

Three Sites WOK70 (single), WOK844 (single) WOK879, WOK 880 and WOK 881 (triplicate) required annualisation as the data capture was less than 75% but greater than 25%. Details of the calculation method undertaken provided in Table C.1 and details of the capture rate and missing months can be seen in Table C.2. If all of the sites had continued to have data missing, then they would have been relocated to a new nearby receptor or lamppost. Three sites have been used for annualisation as the fourth nearest site Reading (URN REA1 2022) had insufficient (<85%) data capture and could not be used.

Table C.0.5 Annualisation Summary (concentrations presented in µg/m3)

Site ID	Annualisation Factor Swindon Walcot	Annualisation Factor Oxford St Ebbes	Annualisation Factor Reading New Town	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
WOK 70	1.0062	1.0107	1.0283	1.0151	21.2	21.5
WOK 844	0.9977	0.9907	0.9631	0.9838	35.1	-
WOK 879	1.1034	1.0766	1.0815	1.0872	-	-
WOK 880	1.1034	1.0766	1.0815	1.0872	-	-
WOK 881	1.1034	1.0766	1.0815	1.0872	32.4	-

Table C.0.6 Showing the capture rate and months missing for the annualised tubes

Tube	Data Capture (%)	Months missing
WOK 70	67.3	January, May, June, and September
WOK 844	73.1	June, November, and December
WOK 879	73.1	January, June, and November
WOK 880	73.1	January, June, and November
WOK 881	73.1	January, June, and November

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 ASR has been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_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.

Wokingham Borough Council have applied a local bias adjustment factor of 0.83 to the 2023 monitoring data. A summary of bias adjustment factors used by Wokingham Borough Council over the past five years is presented in Table C.2. **Wokingham Borough Council have also followed the DEFRA timetable for tube collection as published on the LAQM website**. The sites which were used were both Peach Street in Wokingham Town Centre (AQMA) and Twyford Crossroads (AQMA). Gradko International Ltd of St Martin's House 77 Wales Street Winchester Hampshire is the supplier and analyst of the nitrogen dioxide diffusion tubes. The tubes are analysed by U.V. spectrophotometry. The limit of detection is 20% TEA/Water.

Table C.0.7 Bias Adjustment Factor

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

Table C.0.8 Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2
Periods used to calculate bias	8	11
Bias Factor A	0.92 (0.75 - 1.18)	0.76 (0.62 - 0.99)
Bias Factor B	9% (-16% - 33%)	32% (1% - 62%)
Diffusion Tube Mean (µg/m^3)	33.1	27.8
Mean CV (Precision)	3.0%	1.7%
Automatic Mean (µg/m^3)	30.5	21.1
Data Capture	99%	99%
Adjusted Tube Mean (µg/m^3)	30 (25 - 39)	21 (17 - 28)

Notes: A combined local bias adjustment factor 0.83 has been used to adjust the 2023 diffusion tube results.

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

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

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

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

- Where the diffusion tube exposure periods are weekly or fortnightly – *the Wokingham Town Centre sites, Twyford Crossroads and the co-location study sites are 28-day exposures.*
- For co-location sites with "good" precision on diffusion tubes and with high quality chemiluminescence results – *It can be seen from Figure C.4 below that both the Wokingham Town Centre and Twyford Crossroads co-location study achieved "good" precision and "good Data Capture" at 99%. The chemiluminescence monitor results (automatic monitoring) are high quality (see the QA/QC of Automatic Monitoring section above).*

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

- Where the survey consists of tubes exposed over a range of settings, which differ from the co-location site – *this is not the case for the Wokingham Borough.*

- Where the co-location study is for less than nine months, although the diffusion tube monitoring is for a longer period - *The Wokingham Town Centre and Twyford Crossroads co-location study and diffusion tube surveys take place over a full calendar year.*
- Where the automatic analyser has been operated using local, rather than national, QA/QC procedures. *The Wokingham town centre chemiluminescence results (automatic monitoring) are high quality, see the QA/QC of Automatic Monitoring section above.*
- Where data capture from the automatic analyser is less than 90%, or there have been problems with data quality. *Data capture from the Wokingham Town centre automatic monitor was 92.3% in 2023 (Figure C.3) & the data capture from the Twyford Crossroads automatic monitor was 95% in 2023 (Figure C.3).*
- For co-location sites with "poor" precision or laboratories with predominately "poor" precision, as set out on the Review & Assessment Helpdesk website - *It can be seen from the table below that both the Wokingham Town Centre and Twyford Village Crossroads co-location study achieved "good" precision and the laboratory precision was also "good". See the QA/QC of Diffusion Tube Monitoring section above.*

In conclusion, it can be seen from the discussion above that due to the high data capture rate from the both the automatic analyser in Twyford (99%) and Wokingham (99%) that the combined Local Bias Adjustment Factor of 0.83 was appropriate.

NO_2 Fall-off with Distance from the Road

This was not required as per the advice given the LAQM guidance.

QA/QC of Automatic Monitoring

TRL carry out the QA/QC on behalf of Wokingham Borough Council, below is their QA/QC procedure.

Site operation

Routine instrument calibrations are conducted approximately once a month, these involve zero and span checks, a written record of the gas analyser diagnostics and a general visual inspection of all equipment. 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, Journey 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, then 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. Any anomalies or queries arising from daily inspection of data, or system operation, are brought to the attention of the Project Manager who will evaluate the situation and initialise any necessary action. In the event that the PM is not available, contact will be made with the next available senior person within the monitoring team. Any issues identified with equipment operation will be referred to the client for attention within 24 hours (excluding weekends). On a weekly basis, data is examined using summary statistics and outlier analysis to establish data validity. If 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 software-based calibration and ratification process 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, the data set is converted to hourly means and a summary of the data is provided to Wokingham Borough 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 every 12 months to ensure the monitoring equipment is operating correctly. The audits that are carried out utilise 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 flow and 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.

Wokingham Town Centre

The site audit for the Wokingham Town Centre automatic monitoring unit was carried out on the 14th of December 2023. The equipment audits utilise procedures that are applied within the National Automatic Air Monitoring Network Quality Control Programme.

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 Wokingham analyser to be 100% efficient at an NO_2 concentration of 270ppb and 99.4% efficient at an NO_2 concentration of 173ppb. These are good results.

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

The analyser flow rate was measured using a calibrated flow meter and compared against the analyser's flow rate sensor to evaluate its accuracy. The analyser's flow rate was measured to be low at and just outside the ±10% tolerance and was therefore a failure of the test. Post audit, this was found to be a failure of the internal flow sensor and not the operation of the instrument, therefore, no impact to the reading would have occurred.

Based on the NOx analyser's response to the audit standard and audit zero, the concentrations of the stations NO cylinder have been reassessed. This provides an indication of the on-site standards stability (the gas concentration stabilities). For the purpose of these stability checks, the criteria adopted within the national network and used here, is that the recalculated concentration should lie within 10% of the supplier's stated concentrations. The site cylinder was tested at all four TRL air quality monitoring stations and at each station the cylinder recalculation results were all within 4%. The results of the recalculations are presented in Table C.3.

Table C.0.9 Wokingham Town Centres Recalculated Concentrations

TRL Wokingham – NO cylinder 113914				
	NOx (ppb)	**% change from stated**	**NO (ppb)**	**% change from stated**
Manufacturers Stated Concentration	**540**	**---**	**538**	**---**
Recalculated Concentration (14/12/23)	**540**	**-0.4**	**543**	**0.9**

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

Twyford Crossroads

The site audit for the Twyford Crossroads automatic monitoring unit was carried out on 12th December 2023. 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 Twyford analyser to be 93.5% efficient at an NO_2 concentration of 252ppb and 91.6% efficient at an NO_2 concentration of 166ppb.

Post audit, a small leak was repaired which, when retested at TRL brought the converter reading back in specification to 98.2%. The data from this site was critically assessed by the data team before reporting based on this information.

To ensure that the analyser was sampling only ambient air, the instrument was leak checked. The results were satisfactory, indicating that the analyser sampling systems were 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 analyser's flow rate sensor was within ±10% of the calibrated flow meter and therefore passed this test.

Based on the NOx analyser's response to the audit standard and audit zero, the concentrations of the stations NO cylinder have been reassessed. This provides an indication of the on-site standards stability (the gas concentration stabilities). For the purpose of these stability checks, the criteria adopted within the national network, and used here, is that the recalculated concentration should lie within 10% of the suppliers' stated concentrations. The site cylinder was tested at all four TRL air quality monitoring stations and at each station the cylinder recalculation results were all within 3%. The results of the recalculations are presented in Table C.4.

Table C.0.10 Twyford Crossroads Recalculated Concentrations

TRL Twyford – TRL site NO cylinder 113914 calculated at other sites.				
	NOx (ppb)	**% change from stated**	**NO (ppb)**	**% change from stated**
Manufacturers Stated Concentration	**540**	**---**	**538**	**---**
Recalculated Concentration (14/12/23)	**540**	**-0.4**	**543**	**0.9**

Certificate of Calibration

Calibration factors and zeros have been produced on the basis of the audit calibrations conducted. All of these calibrations were conducted with transfer standards traceable to national metrology standards. The Certificate of Calibration provides the calibration and zero response factors for the oxides of nitrogen analysers under test on the day of the audits. It is available upon request from TRL.

Data Management

The following recommendations and comments can be made as a result of these audits:

- Compare the TRL database scaling factors for the day of the audit, with the factors and zeros on the Certificate of Calibration. If a deviation greater than the uncertainty associated with the calibration factor on the certificate is found, investigate the underlying reason, and implement suitable data management actions.
- Consider the impact of the outlying NOX converter efficiency result. NOx datasets where converter results are less than 98% efficient can be rescaled, provided any impact on data quality is accounted for in the rescaling process. It is the responsibility of the data ratification team to critically assess all evidence including calibrations, audits, and engineer reports, to quantify this impact.

Automatic Monitoring Annualisation

All automatic monitoring locations within Wokingham Borough Council recorded data capture of greater than 75% therefore it was not necessary 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

This was not required.

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

Figure D.0.1 Map of Wokingham Town Centre AQMA

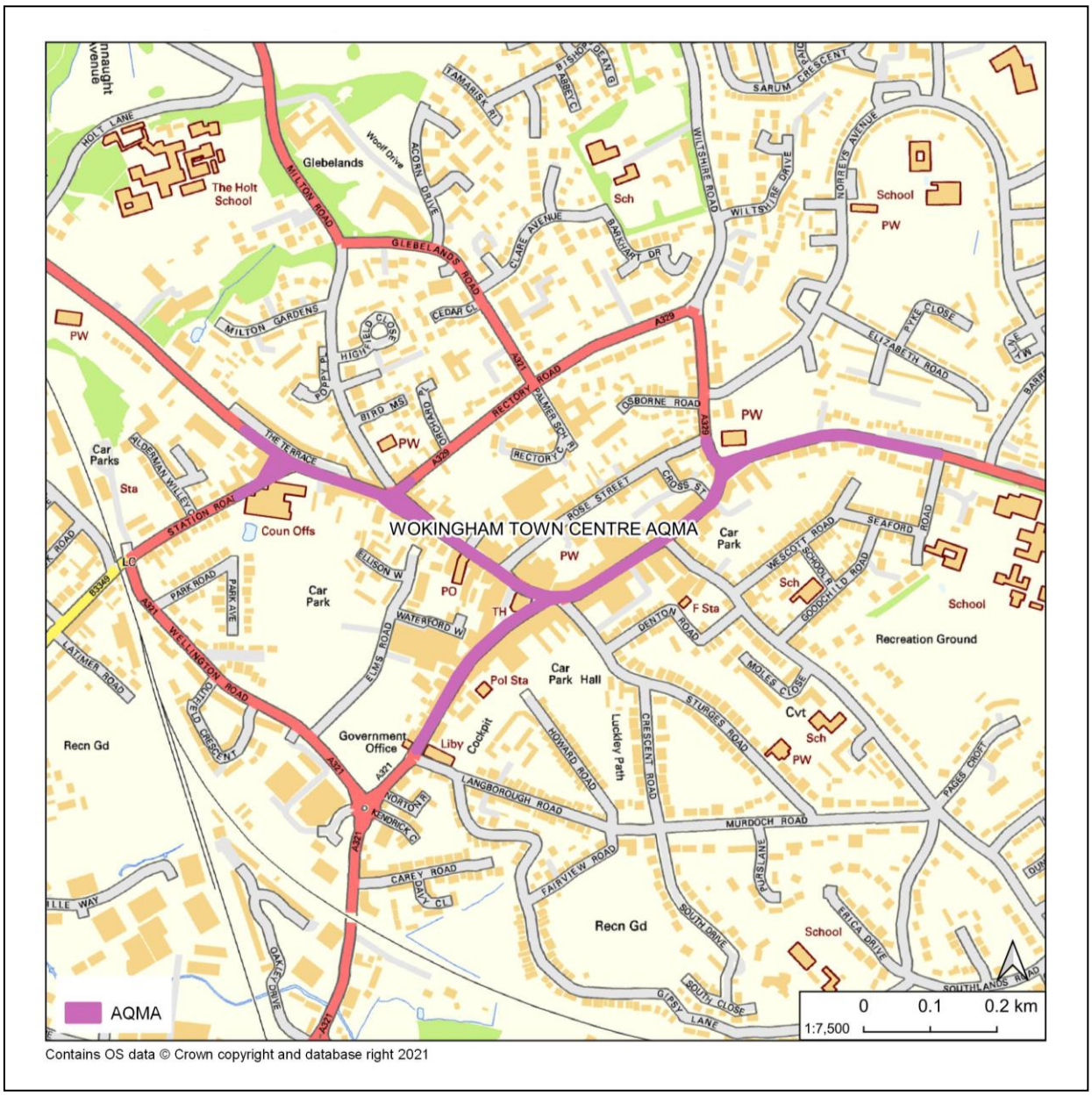


Figure D.0.2 Map of Twyford Crossroads AQMA

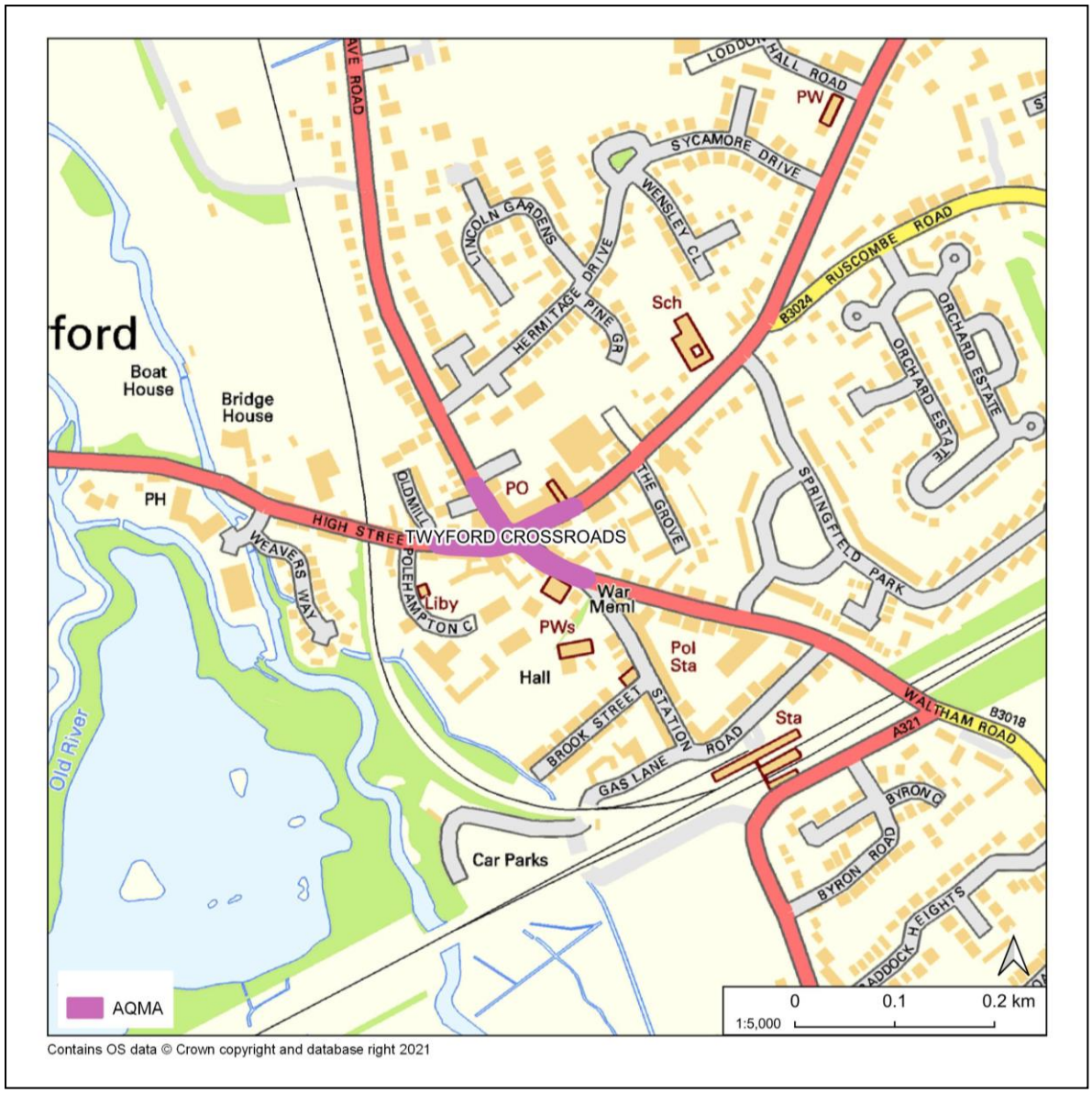
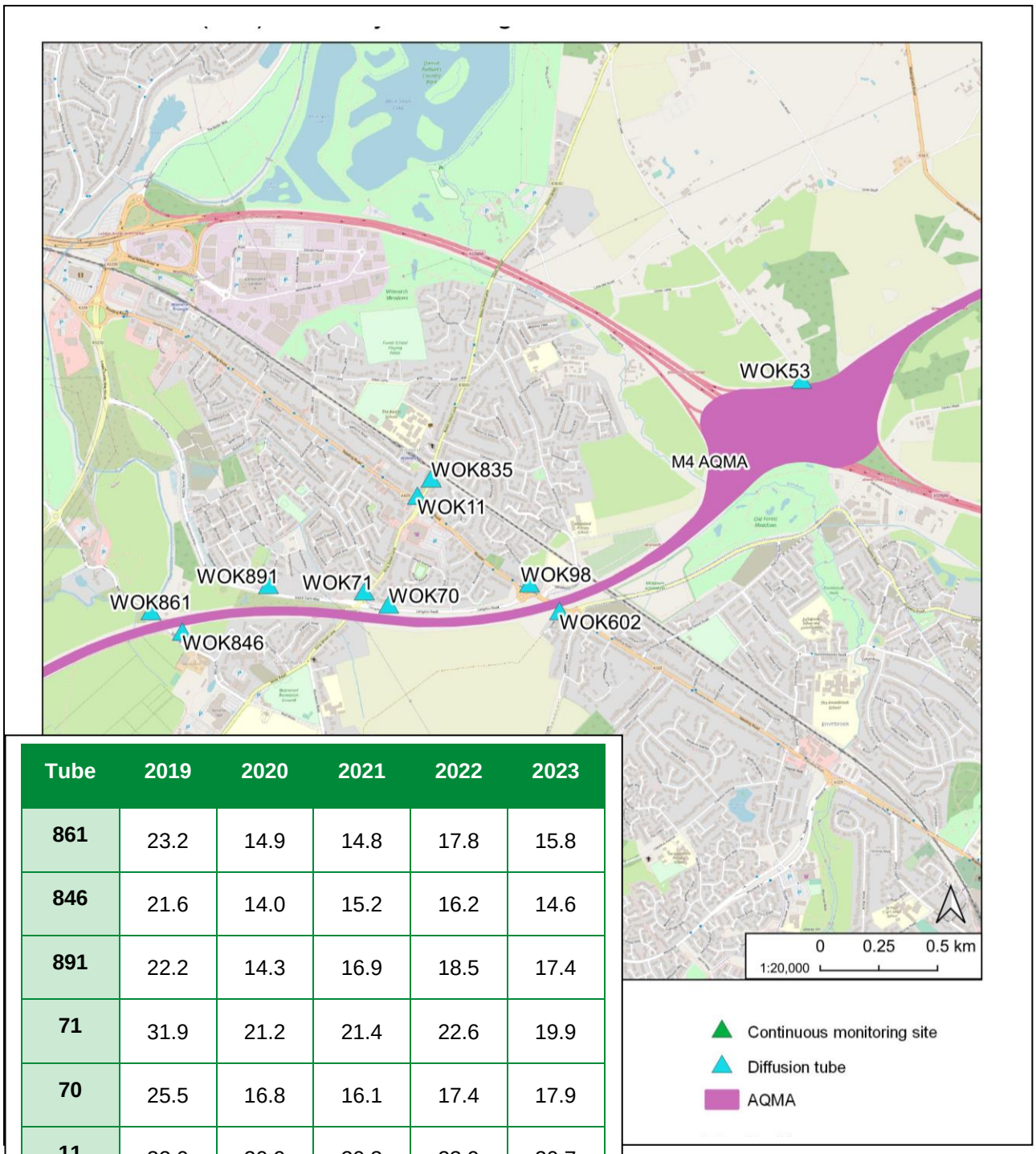


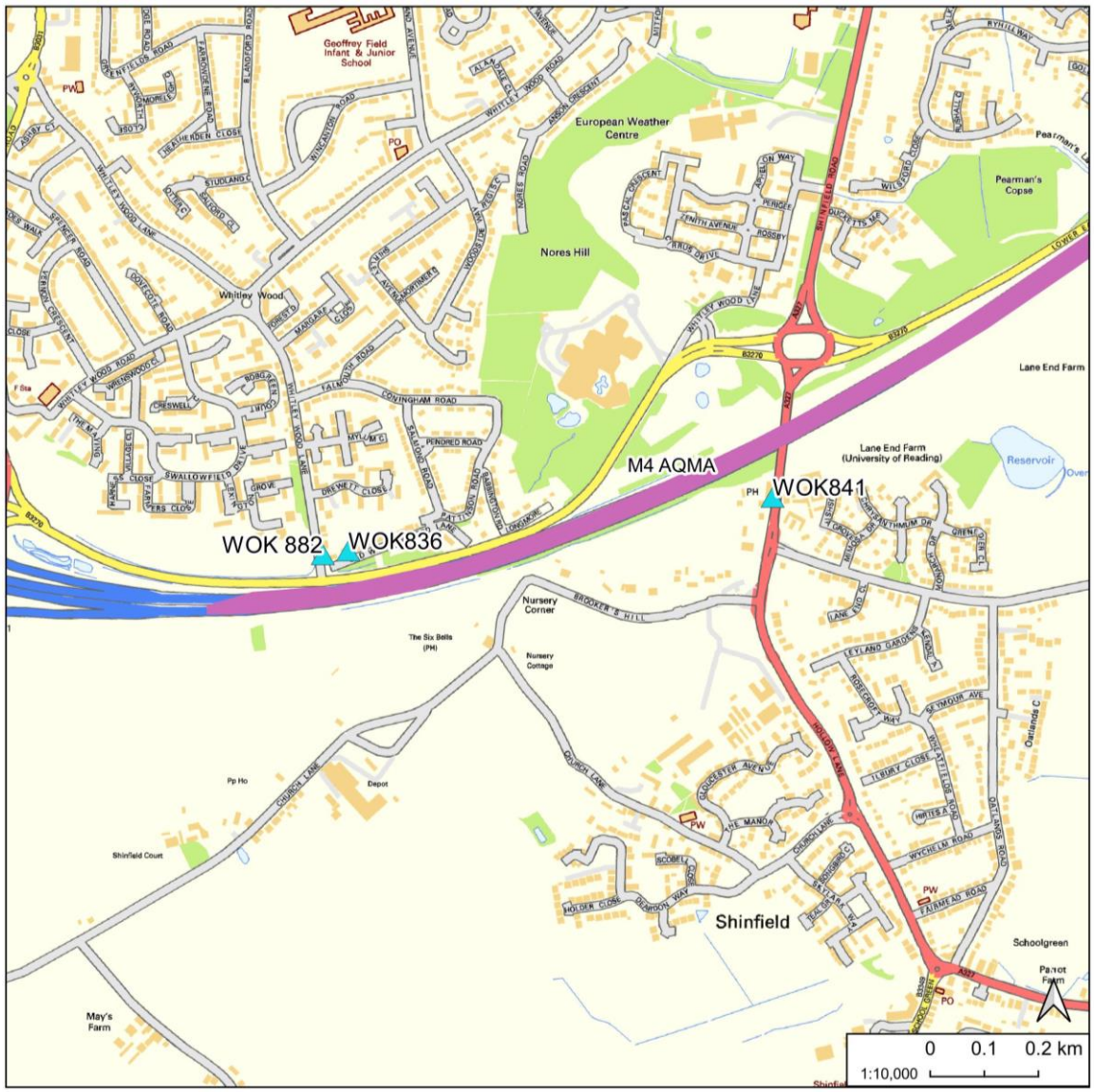
Figure D.0.3 Map of M4 AQMA

Figure D.0.4 Map of M4 (East) Air Quality Monitoring Sites



Tube	2019	2020	2021	2022	2023
861	23.2	14.9	14.8	17.8	15.8
846	21.6	14.0	15.2	16.2	14.6
891	22.2	14.3	16.9	18.5	17.4
71	31.9	21.2	21.4	22.6	19.9
70	25.5	16.8	16.1	17.4	17.9
11	32.0	20.9	20.3	23.9	20.7
98	25.4	16.5	15.3	16.1	15.0
602	21.2	13.4	15.6	17.7	15.2
53	21.1	15.4	14.7	16.0	13.2

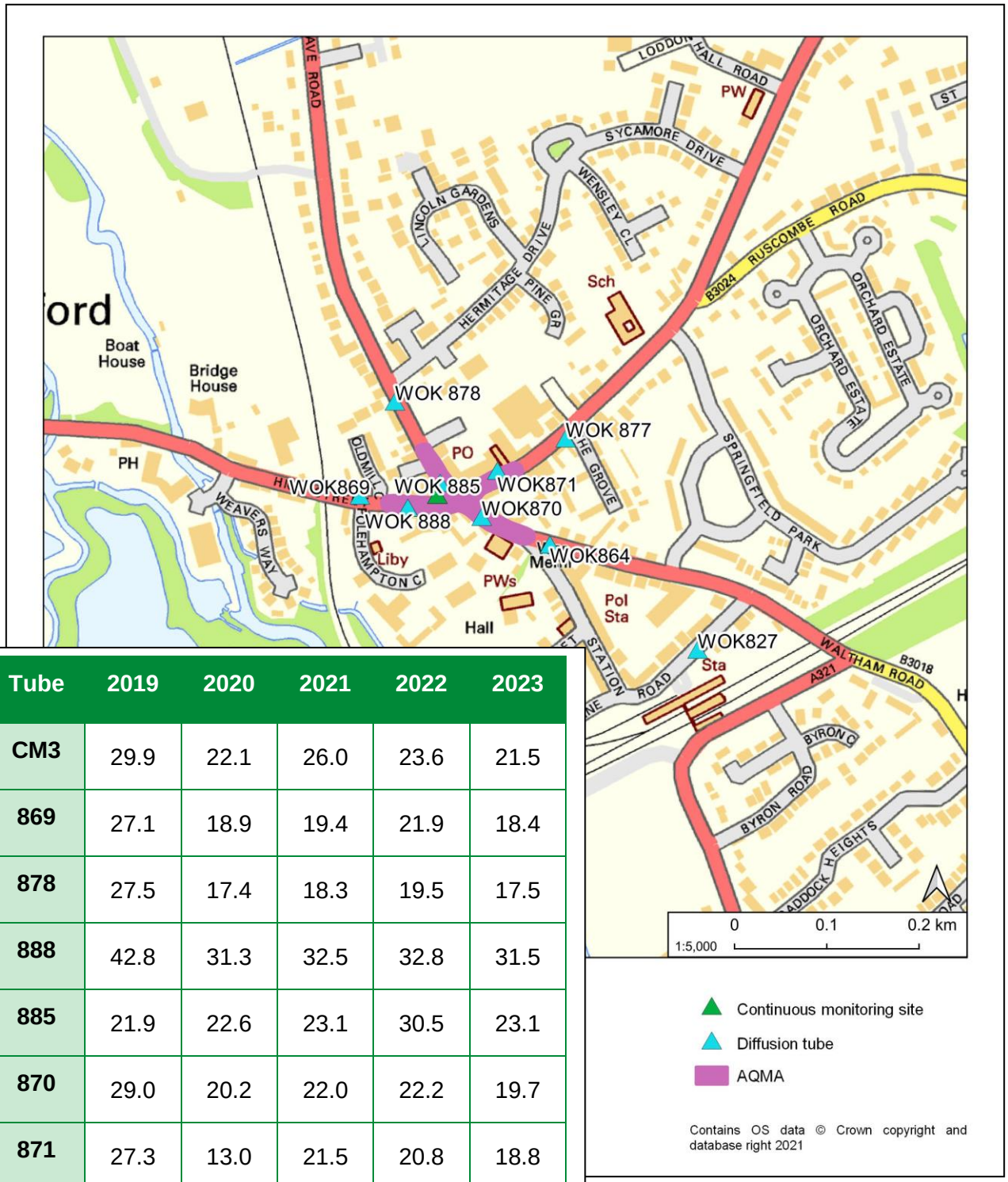
Figure D.0.5 Map M4 (West) Air Quality Monitoring Sites



Tube	2019	2020	2021	2022	2023
882	32.6	20.7	23.8	24.9	23.9
836	27.0	19.3	18.7	21.5	18.9
841	33.3	20.7	23.0	24.4	20.6

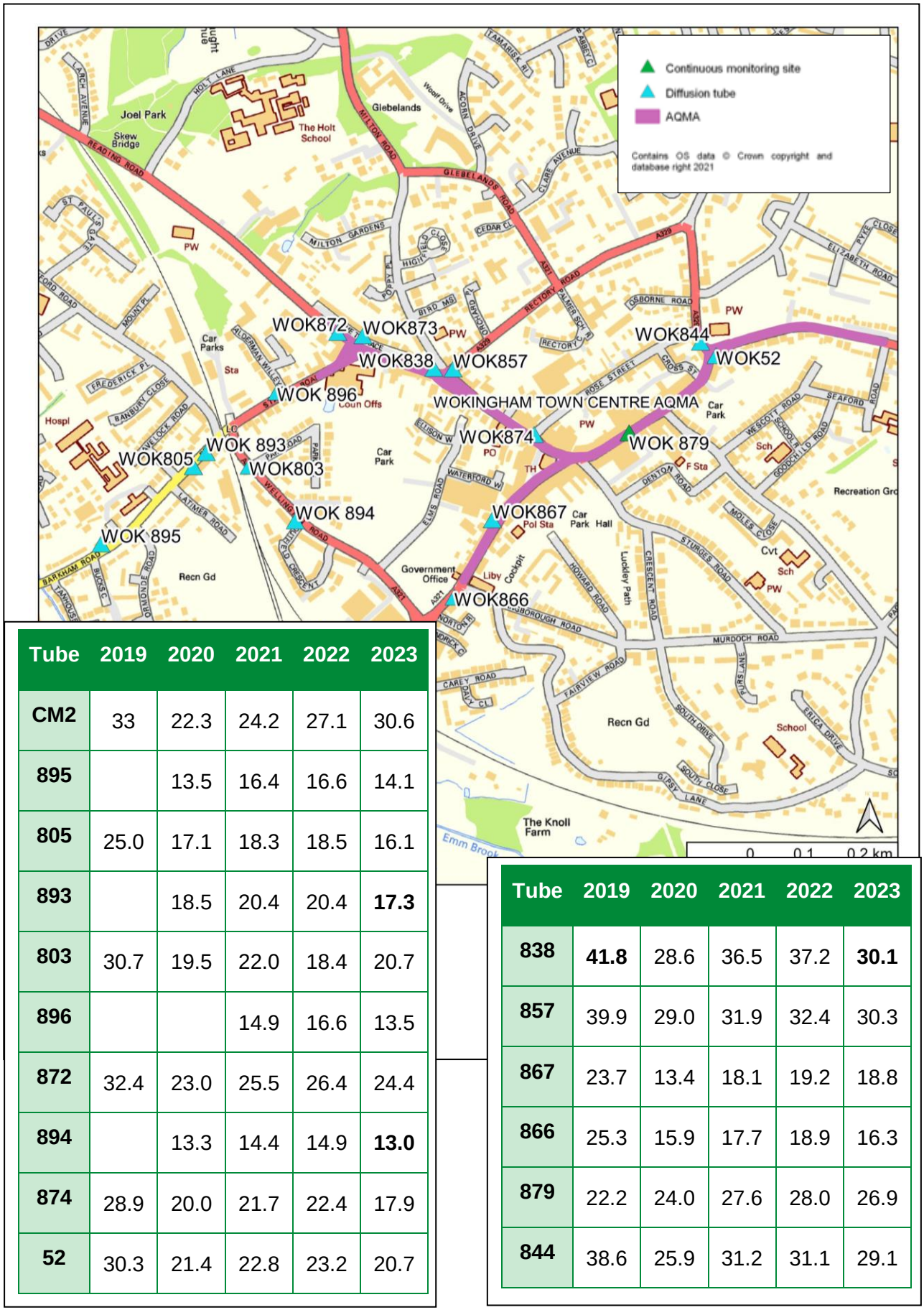
Continuous monitoring site
Diffusion tube
AQMA

Figure D.0.6 Map of Twyford Crossroads AQMA Air Quality Monitoring sites



Tube	2019	2020	2021	2022	2023
CM3	29.9	22.1	26.0	23.6	21.5
869	27.1	18.9	19.4	21.9	18.4
878	27.5	17.4	18.3	19.5	17.5
888	42.8	31.3	32.5	32.8	31.5
885	21.9	22.6	23.1	30.5	23.1
870	29.0	20.2	22.0	22.2	19.7
871	27.3	13.0	21.5	20.8	18.8
864	37.0	24.4	26.9	26.8	25.2
877	22.9	14.9	16.6	16.7	17.3
827	20.6	14.6	15.2	15.6	14.9

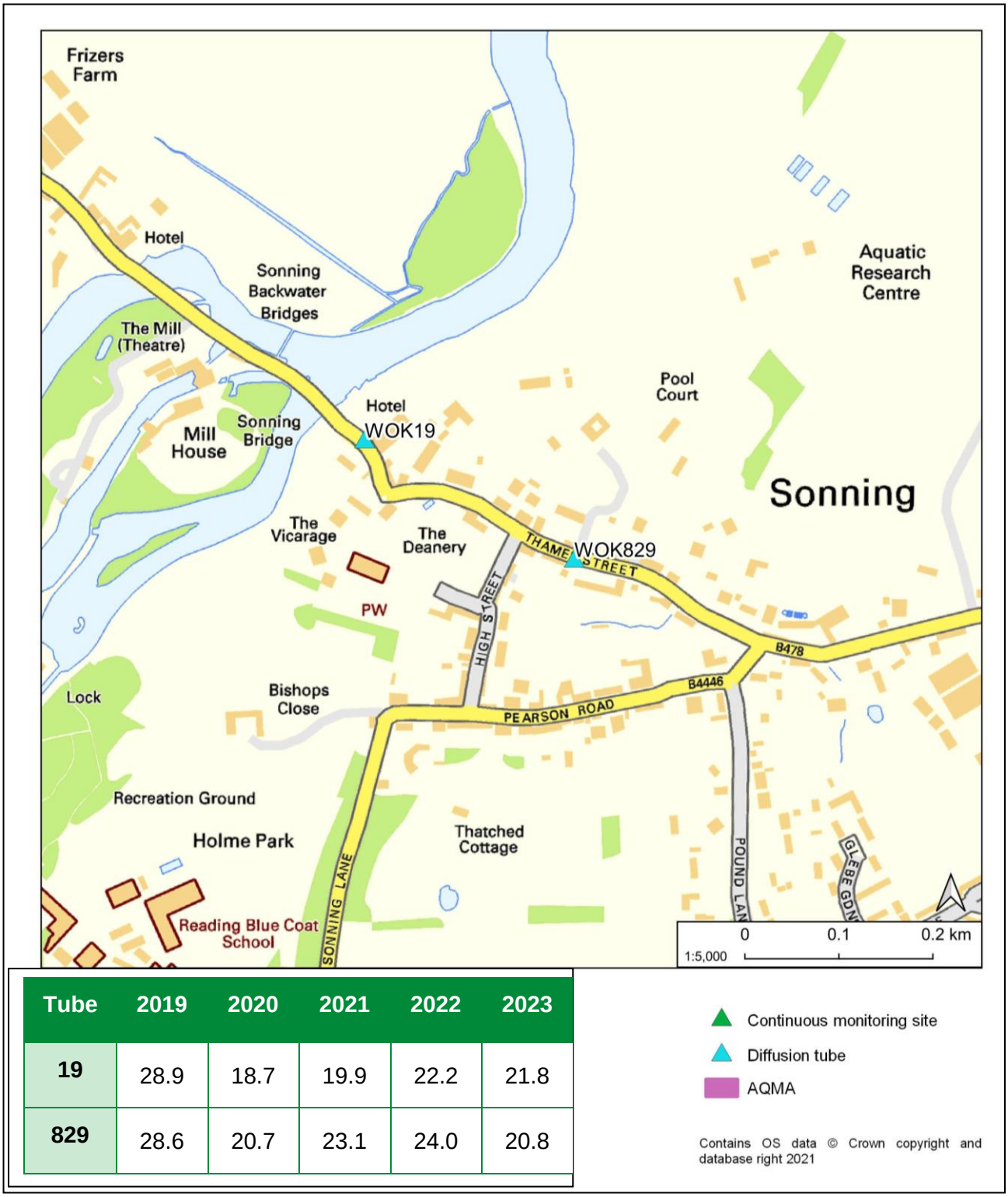
Figure D.0.7 Map of Wokingham Town Centre including AQMA Monitoring Locations



Tube	2019	2020	2021	2022	2023
CM2	33	22.3	24.2	27.1	30.6
895		13.5	16.4	16.6	14.1
805	25.0	17.1	18.3	18.5	16.1
893		18.5	20.4	20.4	**17.3**
803	30.7	19.5	22.0	18.4	20.7
896			14.9	16.6	13.5
872	32.4	23.0	25.5	26.4	24.4
894		13.3	14.4	14.9	**13.0**
874	28.9	20.0	21.7	22.4	17.9
52	30.3	21.4	22.8	23.2	20.7

Tube	2019	2020	2021	2022	2023
838	**41.8**	28.6	36.5	37.2	**30.1**
857	39.9	29.0	31.9	32.4	30.3
867	23.7	13.4	18.1	19.2	18.8
866	25.3	15.9	17.7	18.9	16.3
879	22.2	24.0	27.6	28.0	26.9
844	38.6	25.9	31.2	31.1	29.1

Figure D.0.8 Map of Sonning Air Quality Monitoring Locations



Tube	2019	2020	2021	2022	2023
19	28.9	18.7	19.9	22.2	21.8
829	28.6	20.7	23.1	24.0	20.8

Figure D.0.9 Map of (WOK 883) Evendons Primary School

Tube	2019	2020	2021	2022	2023
883	29.1	19.6	22.4	22.2	22.5

Figure D.0.10 Map of (WOK 825) 54 High St Wargrave

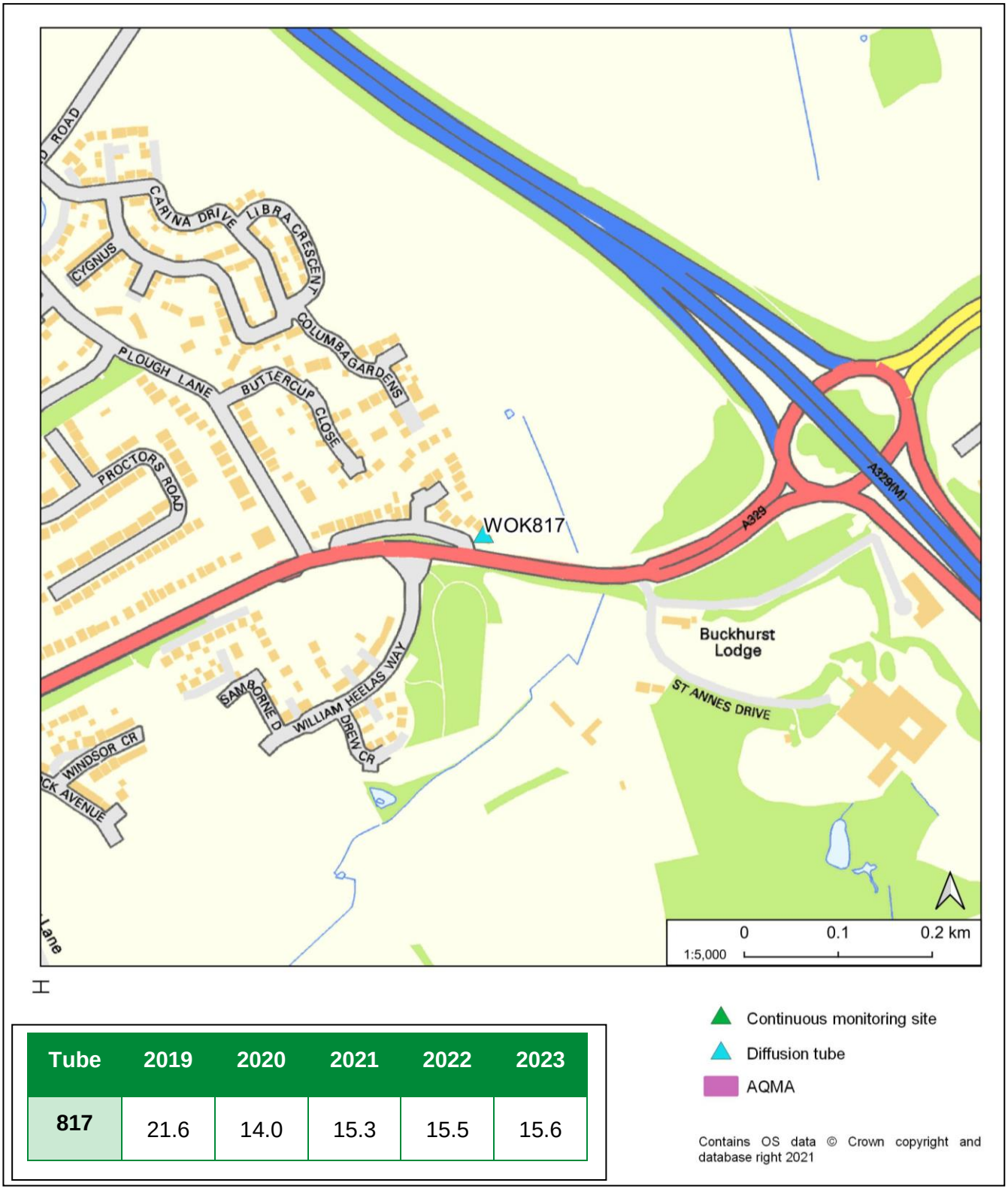
Tube	2019	2020	2021	2022	2023
825	31.1	21.3	23.2	23.8	22.3

Continuous monitoring site

Diffusion tube

AQMA

Figure D.0.11 Map of (WOK 817) 298 London Road

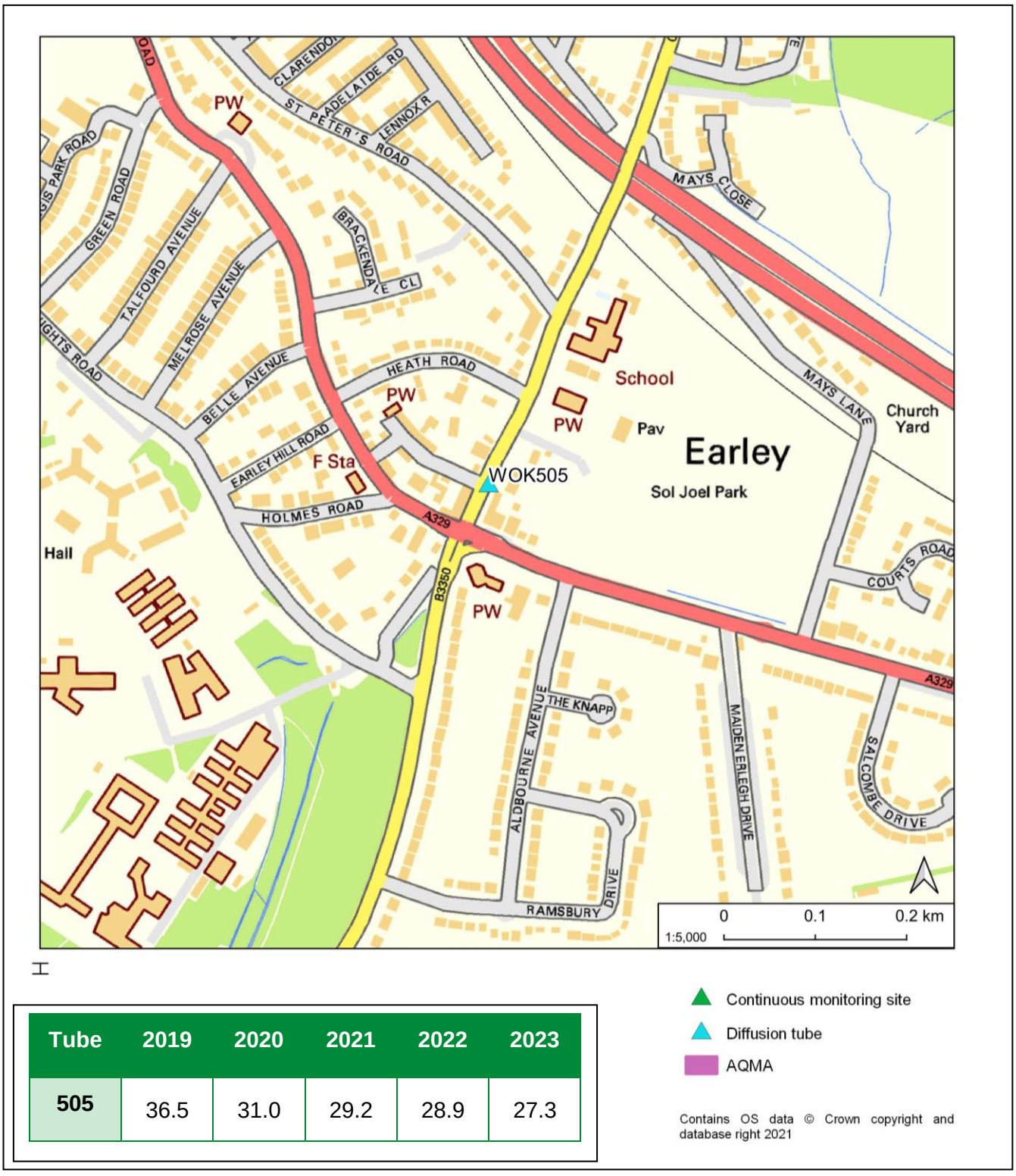


Tube	2019	2020	2021	2022	2023
817	21.6	14.0	15.3	15.5	15.6

Figure D.0.12 Map of (WOK509) Henley Bridge

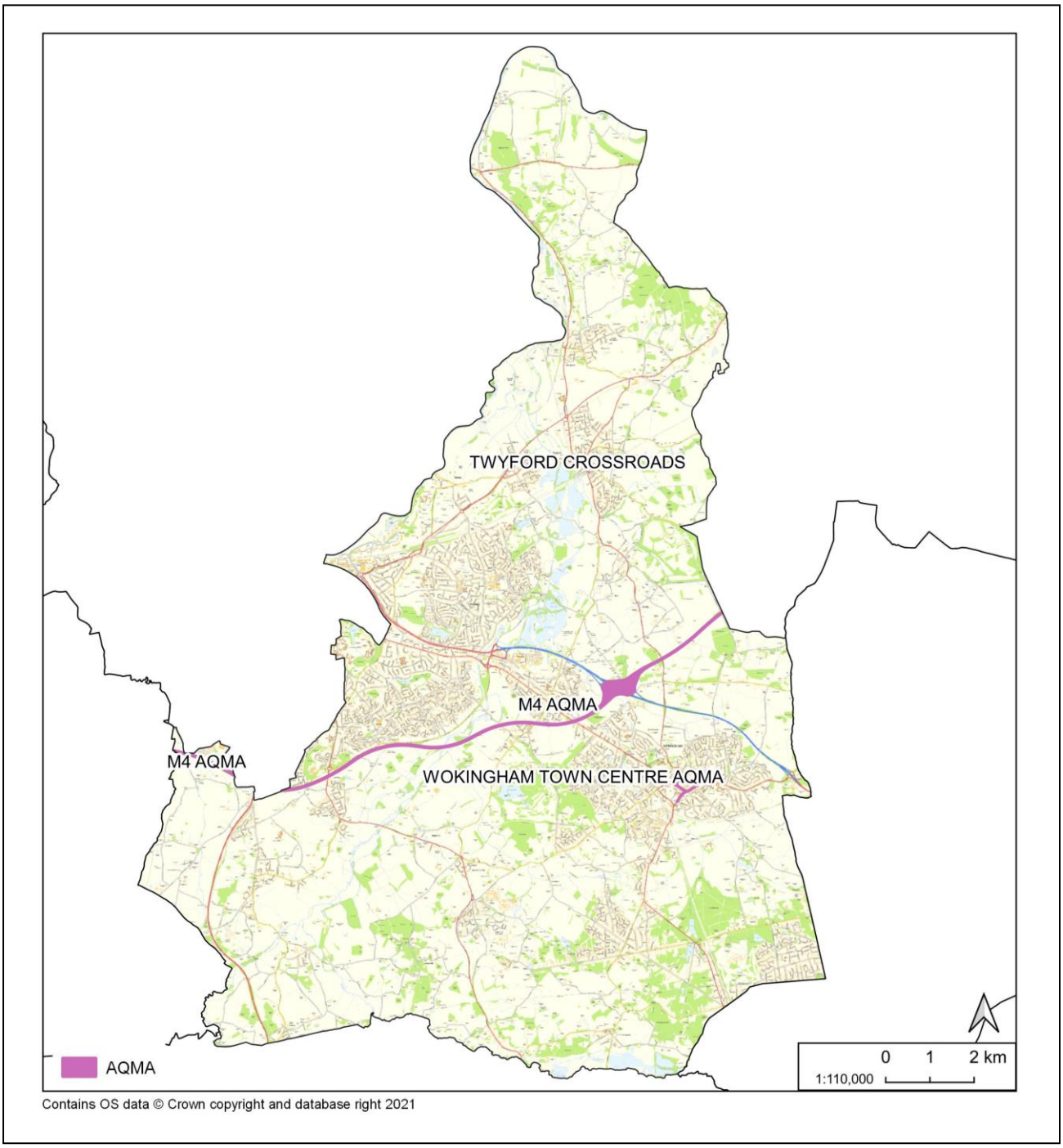
Tube	2019	2020	2021	2022	2023
509	23.9	16.4	16.7	17.8	16.1

Figure D.0.13 Map of (WOK505) Church Road



Tube	2019	2020	2021	2022	2023
505	36.5	31.0	29.2	28.9	27.3

Figure D.0.14 Map of Wokingham Borough Council



Appendix E: Summary of Air Quality Objectives in England

Table E.0.1 Air Quality Objectives in England

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

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

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- Chemical Hazards and Poisons Report: Issue 28. June 2022. Published by UK Health Security Agency
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