2022 Air Quality Annual Status Report (ASR)

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

Date: July, 2022

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Executive Summary: Air Quality in Our Area

Air Quality in Slough Borough Council

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

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

It was reported in ASR 2021 that an unprecedented reduction in vehicle volumes across the nation caused by the pandemic led to widespread improvements in air quality. It was discussed whether the data should be treated as anomalous and excluded from future trend analysis, however ASR 2021 recommended that further data is obtained in subsequent years before this could be determined. The data from 2021 suggests that some areas may be experiencing prolonged benefits from the pandemic, with 70% of diffusion tube sites showing a continued reduction in NO_2 in 2021 when compared with 2020. There are however small pockets within each AQMA that are beginning to return to pre-pandemic concentrations, therefore air pollution remains a significant environmental and public health concern and further work is required to retain the positive effects of the pandemic on air quality.

Slough Borough Council, ‘the Council’, continues to work hard to improve air pollution and comply with national air quality objectives (AQOs) and EU limit values. Good air quality is not only important to improve health outcomes of our residents, but also for enhancing the

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

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

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

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

natural and built environment and for attracting residents, visitors and businesses to Slough.

The wellbeing of those living in Slough are the highest priority and continued implementation of strategies such as the Low Emission Strategy 2018-2025 (LES) and its programmes, and emerging strategies such as the new Air Quality Action Plan (AQAP), over the next few years will improve air quality and therefore health for all of those living and working in the borough.

Certain LES programmes have progressed since implementation in 2018, which includes:

- Slough Electric Car Club Programme
- Electric Vehicle (EV) Infrastructure Programme (rapid and public chargers for public and taxis)
- Taxi EV Rapid Charger Infrastructure Programme
- Bus Fleet Programme (retrofit and electric bus routes)
- Cycle Infrastructure and Hire Programme
- Clean Air Zone (CAZ) Feasibility Programme

However, 2020 saw a reduction in progress in the programme as resources were limited. These projects were expected to recommence in 2021, however in July 2021, the Council issued a Section 114 Notice, which has resulted in significant reductions in officer capacity and resource to deliver projects. This has also impacted the Council’s ability to progress with the new AQAP, however it should be noted that as vehicle emissions are the primary source of air pollution within the borough, the Council’s LES should be considered Slough’s most recent strategy to tackle poor air quality, which was last updated in December 2020. The emerging AQAP will build upon the themes of the LES.

Despite the challenges faced by the Council, the Climate Change Strategy was developed in 2021, and progress on the Access Fund programme by the Sustainable Transport Team was able to recommence, both of which have positive implications for air quality.

Air quality cannot be tackled alone by the Council. The public, businesses and other public and third party sectors need to also play a significant role; either through changes of lifestyle to reduce dependency on the car (modal shift away from the car), increased walking and cycling, adoption of sustainable travel plans, and adoption of EV infrastructure and operation of lower emission vehicles. The Council will continue to lead by example, by adopting policies to increase its EV fleet, reduce grey fleet emissions, and promote modal shift amongst its workforce.

Air Quality in Slough

Sources of Poor Air Quality

The principal source of poor air quality within Slough relates to road traffic emissions, but local construction activities (there is significant regeneration taking place in Slough), diesel trains operating on the Great Western Mainline (some of these are being changed to electric), the town centre bus station (as fleet is relatively old), local industrial processes, larger combustion processes (Energy from Waste Incinerators), airport emissions (affect our receptors in Colnbrook and Poyle), and back-up diesel generators (data centres), as well as transboundary pollutants (e.g. pollutants outside Slough) also contribute to the background pollution levels, and will continue to do so. The Council has declared 'smoke controlled areas' across Slough's wards, and have acknowledged that further initiates are required to reduce $PM_{2.5}$ further due to the health impacts associated with exposure.

Future significant sources of air pollution may arise from permitted local developments and Nationally Significant Infrastructure Projects in the wider area planned over the next 5-10 years, including:

- Construction and operation of M4 Smart Motorway - this is designed to allow up to 15,000 additional vehicle movements a day during its operation from 2022 (peaking by 2030) and re-routing of traffic through Slough at times during the construction phase (2019-2022) (Impacts: M4 AQMA, Tuns Lane AQMA, Town Centre AQMA and Brands Hill AQMA).
- Construction of M4 construction compound 9 at Sutton Lane on the edge of the Brands Hill AQMA (2019-2021).
- Operation of Sand and Gravel extraction 'Cemex' sites at Riding Court Road and North Park Road (up to 450 HGV movements a day through Brands Hill/M4 AQMAs and Langley area) (2018 – 2030).
- Significant Town Centre regeneration (construction HGV movements and operational vehicle movements) up to 6,000 residential properties, new offices and commercial and retail uses (Town Centre/Tuns Lane AQMA) (2016 – 2036).
- Slough Northern Extension – a shortfall is predicted in Slough being able to meet its housing allocation within the local plan term, and a proposal for at least 5,000 (and up to 10,000) new homes on Green Belt land within Buckinghamshire is being explored. If pursued, this urban extension could generate significant additional vehicle movements in both the construction and operational phases (2026 – 2036) (All AQMAs).

The following developments have potential to worsen local air quality, however due to the pandemic and legal challenges to the Airports National Policy Statement (ANPS), there is a lack of clarity on when these projects will be progressed, therefore the future potential impact on Slough's air quality is not known. This includes:

- Western Rail Access to Heathrow with significant construction HGV movements through Langley and Brands Hill AQMA (on hold).
- Heathrow Expansion – the legal challenge to the ANPS had delayed the Development Consent Order (DCO) process for permission to expand. An application for expansion could still be made in the next couple of years for Heathrow's 3rd runway (partially located within Slough) and changes to associated airport operations, with impacts including the re-routeing of the A4 and diversion of the A3044 into Slough, together with construction HGV and operational movements (on hold) (All AQMAs).
- Potential demolition, and construction and operation of the new Grundons Energy from Waste (EfW) facility 200m north of the current site to accommodate the 3rd runway, including a 55m stack (20m lower than the current stack) (on hold) (Iver AQMA and Brands Hill AQMA).

Air Quality Modelling

Updated baseline modelling and source apportionment commenced in 2020. Results indicate that road transport remains the greatest contributor to poor air quality in Slough. The specific sources were modelled in a source apportionment exercise, which indicates that source contributions vary across the borough. A greater proportion of emissions from buses and taxis occurs in the town centre when compared to other locations, and HGV emission sources are greatest in areas where industry is concentrated, such as the Slough Trading Estate and Poyle area, when compared to other locations. A significant proportion of NO_2 emissions arise from private diesel cars.

The future year projections (2022 and 2026), in conjunction with scenario modelling, will be completed to determine the effectiveness of measures at reducing NO_2 concentrations. The AQAP will determine:

- The baseline NO_2, PM_{10} and $PM_{2.5}$ concentrations within Slough.
- If any existing AQMAs should be revoked or amended.
- If any new AQMAs should be declared within Slough in future (particularly Langley due to the potential impact of the Western Rail Link to Heathrow).

- The effectiveness of the LES measures and additional measures brought up in the AQAP study, in addressing poor air quality.
- The effectiveness of implementing transport measures (e.g. dedicated bus lane, junction re-design etc.) in addressing poor air quality.

Air Quality Monitoring and Future Proposals

The Council has monitored air quality for over 20 years and operates both passive (diffusion tubes) and continuous air quality monitoring stations in the borough. The Council is continually looking to extend and improve the air quality network. An overview of both the continuous monitoring network, passive diffusion tube network and more recent air quality sensor network is given below.

Continuous Monitoring

During 2021, the Council continuously monitored air quality at six locations. Six monitoring stations monitor nitrogen dioxide (NO_2) concentrations, and four monitoring stations monitor particulate (PM_{10}) concentrations using established reference methods (TEOM or BAM).

The Council upgraded its air quality monitoring network by adding three new air quality monitoring stations within the AQMA 4 (Wellington Road, Town Centre), AQMA 2 (London Road, Brands Hill) and AQMA 3 extension (Windmill, Bath Road) in October 2017. The installation of two additional continuous monitoring stations was commissioned in 2020, to be installed in Langley (to monitor the impact of increasing transport infrastructure and development in the local area) and Chalvey (relocated from the waste depot to be more representative of residential exposure to emissions arising from the M4).

The new Chalvey monitoring station (Spackmans Way, SLH 13) began operating in September 2021. The data has been presented in this report however the data should be treated with caution due to having very low data capture in 2021.

The Langley monitoring station is not yet operational, due to ongoing conflicts with utilities, and logistical challenges associated with the concurrent Langley road widening scheme.

Pippins Colnbrook monitoring station was due to be replaced and was to include a $PM_{2.5}$ monitor. Due to the financial challenges faced by the Council, this project is currently on hold. Financial constraints have also led to the operation of Pippins Colnbrook monitoring station ceasing in March 2022, however monitoring at this site may be able to recommence at a later date.

Additionally, the Council has access to air quality data (NO_2, PM_{10} and $PM_{2.5}$) from a monitoring station operated by Grundons Lakeside EfW plant in Colnbrook. Access to real-time and historic monitoring data can be found in the following the following website Slough Air - AEAT..

Passive (Diffusion Tube) Monitoring

Slough Borough Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 94 sites (123 diffusion tubes) during 2021. Changes to the network from 2020 to 2021 are as follows:

- Spackmans Way (SLO 34 – SLO 36 Relocated) – introduction of a new diffusion tube site to co-locate with the new Spackmans Way continuous monitoring site (SLH 13).
- SLO 20 (Hencroft Street), SLO 27 (India Road), SLO 31 (Essex Avenue), SLO 41 (Sandringham Court), SLO 42 (Walpole Road), SLO 45 (London Road (C)), SLO 48 (Castle Street) – results recorded over the last five years indicate that these tubes have been consistently below 10% of the AQO (<36µg/m^3) therefore these sites were removed in June 2021.
- SLO 98 – SLO 111 – in support of the Slough Sensor Study, diffusion tubes were co-located with Vaisala sensors to compare the accuracy of the sensors. These tubes were deployed from June 2020 and were decommissioned in June 2021 when the project ended.

Please refer to Appendix D to see maps of all the air quality monitoring sites in the borough.

Sensor Study

In 2019, the Council were awarded funding towards a project to monitor NO_2 concentrations outside of four local primary schools, including Cippenham, Claycots, Pippins and Penn Wood Primary Schools, using 5 Vaisala AQT 410 and 10 AQT 420 sensors, each with a co-located diffusion tube. One sensor was also co-located with a continuous analyser (Colnbrook Pippins SLH 3). The project's initial focus was on monitoring NO_2 emissions originating from idling vehicles and congestion over 8-12 months, however, the pandemic resulted in disruption to the project as schools were required to deliver remote education to most pupils, therefore activity on school boundaries was greatly reduced. As a result, the project plan was adapted to report on the differences in pollutant concentrations before and after lockdown restrictions were introduced. Monitoring commenced in June 2020 and due to the pandemic, the monitoring period was extended to February 2021, therefore the results of the study are presented in this ASR (Appendix C, Figure C.2).

Air Quality Management Areas (AQMAs)

AQMAs are defined geographical areas where air pollution levels are, or are likely to, exceed national AQOs at relevant locations (where the public may be exposed to harmful air pollution over a period of time e.g. residential homes, schools etc.). These are also shown within Appendix D.

Five AQMAs have been declared within Slough due to breaches of the annual mean concentrations for NO_2 (40µg/m^3). Due to officer resource constraints, the number of residential properties within AQMAs has not yet been updated, therefore the information presented is in reference to 2019 data.

AQMA 1: including land adjacent to the M4 along the north bound carriageway (junctions 5-7) and southbound carriageway (junction 5 – Brands Hill) up to a distance of approximately 100m from the central carriageway. In June 2019, there were 559 residential properties located within AQMA1.

AQMA 2: incorporates A4 London Road east of junction 5 M4, 300m past Sutton Lane along the Colnbrook by-pass and covers the entire gyratory system on the A4 and both sides of the A4 carriageway. In June 2019 there were 28 residential properties located within AQMA 2. A new residential development (Rogans) being developed opposite the A4 gyratory (within the AQMA 2) will at least double the number of residential properties exposed in this location.

AQMA 3: incorporates the A355 Tuns Lane from junction 6 of the M4 motorway in a northerly direction to just past its junction with the A4 Bath Road approximately 200m north along A355 Farnham Road, the area is known as the "Three Tuns". In June 2019 there were 351 residential properties located within AQMA 3.

AQMA 4: incorporates the A4 Bath Road from the junction with Ledgers Road/Stoke Poges Lane, in an easterly direction, along Wellington Street, up to the Sussex Place junction. In June 2019, there were 823 residential properties located within the AQMA 4.

AQMA 3 Extension: The Council declared the new extended AQMA 3 on 10th May 2018 and formally submitted this to Defra. In June 2019, there were 227 residential properties located within the extended AQMA 3.

In June 2019, 1988 residential properties were located within one of Slough's AQMAs. There are no schools located within Slough's AQMAs. The playing grounds of Foxborough Primary School just skirts the edge of the AQMA 1 (M4). The number of residential properties is set to increase as more residential units will be built within the Town Centre and along the A4 Bath Road.

Air Quality Concentrations 2021

This report covers the air quality results obtained during 2021 and compares these results over the past five years at the same sites to determine if there are any clear trends in pollution levels. These rolling trends must be treated with caution as they do not include statistical confidence, and air quality can change significantly from one year to the next due to metrological conditions and pollution episodes.

National Trends – Nitrogen Dioxide (NO_2)

- Urban background and roadside nitrogen dioxide (NO_2) pollution has shown long-term improvement.
- In 2021, annual mean concentrations of NO_2 rose by 7% from 2020 levels (at both Roadside and Urban Background sites), yet concentrations are still 20% lower than concentrations in 2019, since concentrations fell the lowest point in the time series in 2020.
- As in previous years, NO_2 pollution tended to peak in the rush hours and during weekdays, particularly for roadside sites. Concentrations at roadside sites in 2021 were 26% greater during the working week compared to the weekend. This pattern of concentrations follows the daily and hourly trends in road traffic.
- In 2021 and 2020, concentrations of NO_2 at the roadside were consistently lower than the 2017-2019 average. This difference was greatest between the months of April 2020 and July 2020. It is likely that a reduction in road traffic as a result of COVID-19 restrictions was a large contributing factor to reductions in NO_2 during this period.[5]

National Trends – Particulate Matter (PM_{10} and $PM_{2.5}$)

- Urban background and roadside particulate pollution (PM_{10} and $PM_{2.5}$) has shown long-term improvement and in 2020, annual average concentrations at both Roadside and

[5] Air Quality Statistics Summary (GOV.UK)

Urban Background sites reached a low point in the time series (despite a period of relative stability between 2015 and 2019).

- In 2021, annual mean concentrations of PM_{10} at both Urban Background and Roadside locations fell by an average of 2.5% from 2020 levels, however annual mean concentrations of $PM_{2.5}$ at both Urban and Rural Background sites rose by an average 0.6%.
- Residential combustion of wood and coal in stoves and open fires is a large contributor to emissions of particulate matter both in the UK and across Europe, and is a large contributor towards elevated concentrations in winter months and during the evenings.
- PM_{10} concentrations also tend to peak in spring, which can be associated with air arriving from continental Europe, composed of fine particles ($PM_{2.5}$) and not coarse particles ($PM_{2.5-10}$), with nitrate playing a particularly important role. This nitrate appears to be largely associated with ammonium, derived from ammonia emissions which form secondary particulates and become Fine Particulate Matter ($PM_{2.5}$) in the United Kingdom.[5]

Slough Air Quality Trends

The headlines of the 2021 Slough monitoring results, compared with 2020 data and progress over the last five years (Table A.4.1 and Table B.1) are that:

- AQMA 1 has seen the greatest improvement of NO_2 concentrations on average (2.0μg/m^3 reduction) from 2020 to 2021. Over the last five years, AQMA 1 has shown the fastest rate of improvement at 13% on average from 2017 to 2021. Relative to 2017 data, AQMA 1 has experienced the greatest improvement in NO_2 concentrations by 16.9μg/m^3, equivalent to 45.3%. The fastest year on year rate of improvement on average is observed at Winvale (SLO 22) at 5.5μg/m^3 (16%).
- The average improvement within AQMA 2 from 2020 to 2021 is significantly lower than AQMA 1, at 0.2μg/m^3. This average arises as a result of some sites recording a deterioration of air quality (Brands Hill triplicate SLO 63, SLO 64 SLO 65 worsening by 3.2μg/m^3) and others showing an improvement (Brands Hill (A) SLO 18 improving by 2.0μg/m^3). The average rate of improvement over the last five years within AQMA 2 is greatest at Rogans (Colnbrook bypass) (SLO 28), primarily due to the large drop in NO_2 (13% relative to 2020) which has been sustained during 2021. Overall, NO_2 concentrations have improved by 33.8% relative to 2017 data.
- Various sites showing positive and negative changes in NO_2 concentrations has resulted in an overall worsening of NO_2 by 0.2μg/m^3 within AQMA 3 from 2020 to 2021.

The largest increase in NO_2 is observed on Farnham Road (SLO 30), however data capture was very low at this site (42.2%) and was annualised, so the data may be unreliable. Over five years, the average year on year rate of improvement is 2.9µg/m^3 (8%). Overall, NO_2 concentrations have improved by 31.2% relative to 2017 data.

- AQMA 3 Extension has experienced an overall worsening of NO_2 from 2020 to 2021 by 0.5µg/m^3, however there is limited diffusion tube data to support this. The two monitoring sites in AQMA 3 Extension have an improvement rate of 2.5µg/m^3 per year on average over the last five years, with a 34.5% improvement in 2021 relative to 2017.
- Within AQMA 4, the average improvement from 2020 to 2021 of NO_2 is 0.2µg/m^3. Similarly to AQMA 2, some sites have experienced a significant increase in NO_2 (+5.1µg/m^3 at Yew Tree Road, SLO 29) while others have experienced a decrease (-3.1µg/m^3 at Wellington Street, SLO 33), resulting in an overall slight improvement.
- All diffusion tube sites within AQMA 4 show an improvement rate above 1.0µg/m^3 on average over the last five years. Relative to 2017, 2021 data shows NO_2 concentrations have improved by 34.9% across the AQMA overall. The biggest improvement is observed at Cornwall House, Bath Road (SLO 46), by 43.2% relative to 2017 concentrations.

In contrast to the passive monitoring network, the majority of continuous monitoring sites show a worsening of air quality from 2020 to 2021. The greatest increase in NO_2 is observed at Brands Hill, by 4.8µg/m^3, which correlates with the increase seen at the co-located diffusion tubes (SLO 63, SLO 64 and SLO 65). Wellington Street, Windmill and Pippins monitoring stations have all seen increases in NO_2 by 2.7µg/m^3, 2.0µg/m^3 and 1.6µg/m^3, respectively. Relative to 2017 however, all sites have shown improvement in NO_2 concentrations, with Windmill having the greatest improvement by 12.6µg/m^3.

Outside of AQMAs, NO_2 concentrations have improved from 2020 to 2021 by 0.9µg/m^3 on average and have improved on average by 12.2µg/m^3 relative to 2017 data. Specifically by location category:

- Roadside and kerbside sites have been continually improving over the last five years, with a significant drop in 2020 where all concentrations reduced far below the AQO. 77.8% of Slough's kerbside and roadside sites have seen a further improvement from 2020 to 2021. The greatest improvement is observed at Sutton Lane (SLO 56), with a 3.0µg/m^3 reduction in NO_2. Windsor Road (SLO 49) in contrast has seen a worsening of air quality from 2020 to 2021 by 2.2ug/m^3, however, in reference to 2017 data, concentrations have reduced in this location by 20.5µg/m^3, indicating an overall improvement.

- Suburban and Urban Background sites show a downward trend in NO_2 concentrations from 2017 to 2021, with a less pronounced drop in 2020 and for the majority of sites, a continuation of this trend is shown in 2021.
- Industrial and Rail sites have seen a greater variation in concentrations over the last five years compared to other sites, specifically within Colnbrook and Poyle (Lakeside Road – SLO 12, and Horton Road – SLO 17). Both sites saw an increase in concentrations in 2018 before beginning a downward trend. Horton Road has seen an increase in NO_2 by 0.8µg/m^3 from 2020 to 2021, expected due to the recovery of industry after the pandemic. In contrast, Lakeside Road has seen an improvement in NO_2 by 4.3µg/m^3 from 2020 to 2021. Relative to 2017, each site has seen an improvement of >10µg/m^3, with the exception of Horton Road, which has seen very minimal change (0.1µg/m^3 reduction). Further initiatives are clearly required to focus on improvements in this area.

Short term study trends outside of AQMAs show similar results, specifically:

- Diffusion tube monitoring at receptors closest to the M4 Smart Motorways scheme from initiation (2019) to 2021 show that concentrations initially dropped in 2020 and have continued to decline in 2021.
- Monitoring results for the bus lane scheme shows that all sites are compliant with the national AQO for NO_2. The highest concentration is observed at Ledgers Road (SLO 121 (b)), however this site only had 57.5% data capture, therefore further data is required for future years to determine whether or not this location suffers high NO_2 concentrations.

In regards to AQMA declaration and revokation, each AQMA has at least one area that has suffered from high NO_2 concentrations within the last five years. For an AQMA to be revoked, sustained compliance for a minimum of five consecutive years is required. This may be achievable for AQMA 1 and AQMA 3 Extension in future ASRs as all diffusion tube sites have been compliant with the AQO since 2018. All remaining AQMAs have had diffusion tube sites above the AQO in 2019 suggesting it is too early to revoke these AQMAs.

As the last two reporting years have been impacted by the pandemic, it is not yet clear whether the positive effects will be sustained in the long term, therefore making any adjustments to the AQMA boundaries is not recommended until a full year of data is obtained with no impact from the pandemic (i.e 2022). It is expected therefore that a full review of Slough's AQMAs and their bounadries will be completed as part of ASR 2023.

Actions to Improve Air Quality

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

The 2019 Clean Air Strategy[6] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[7] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of AQMAs are designated due to elevated concentrations heavily influenced by transport emissions.

The World Health Organisation (WHO) released updated air quality guidelines (AQG) based on renewed evidence and research conducted since the last publication of WHO air quality guidelines in 2006. Particularly, there has been a marked increase in evidence on the adverse health effects of air pollution, built on advances in air pollution measurement and exposure assessment and an expanded global database of air pollution measurements.

The overall objective of the updated global guidelines is to offer quantitative health-based recommendations for air quality management, expressed as long- or short-term concentrations for a number of key air pollutants, which if exceeded, can cause risks to public health. In the context of air quality in Slough, the following new guideline levels are relevant:

- NO_2:
  - NO_2 annual mean – reduced from 40µg/m^3 to 10µg/m^3
  - NO_2 24 hour mean – 25µg/m^3
- PM_{10}
  - PM_{10} annual mean – reduced from 20µg/m^3 to 15µg/m^3

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[6] Defra. Clean Air Strategy, 2019

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

    - PM_{10} 24 hour mean – reduced from 50µg/m^3 to 45µg/m^3
- $PM_{2.5}$
    - $PM_{2.5}$ annual mean – reduced from 10µg/m^3 to 5µg/m^3
    - $PM_{2.5}$ 24 hour mean – reduced from 25µg/m^3 to 15µg/m^3

These guidelines are not legally binding standards; however, they do provide WHO Member States with an evidence-informed tool that can be used to inform legislation and policy. It is noted that these are significantly lower than existing EU limit values and original WHO AQGs, and it will take time and significant intervention and funding within Slough to meet these targets.

The Council reported to Defra in 2021 on 46 measures that are aimed at directly or indirectly improving air quality in Slough. The number of measures reported within this ASR stands at 48, due to the progression of the school streets trials as part of the Access Fund programme, and successful award of the Defra Air Quality Grant in March 2021. A number of these measures are still ongoing, some have yet to start, and others are in the planning stage. Whilst these measures may have had some positive effects on air pollution concentrations and contribute towards the downward trend, there is a need for more robust measures to be co-ordinated through a live strategy (e.g. refreshed AQAP, the LES and emerging Strategic Transport Infrastructure Plan (STIP)).

It is also clear that improving air quality requires a multi-disciplinary approach across all Council Services and its Partners and across the wider residential and business community.

The Council has developed AQAPs for AQMAs 1-4, however there is a need to update these action plans and make them more relevant to reflect the significant regeneration of the town centre, as well as considering the transport impacts of major permitted infrastructure schemes (Smart M4) and future infrastructure plans associated with the expansion of Heathrow Airport and Western Rail Access to Heathrow.

Due to the disruption caused by the pandemic and the Council's financial situation, no measures were completed during 2020 or 2021, however many were newly introduced such as the A4 bus lane trial scheme and the eScooter trial, which have been extended and developed further during 2021.

Although the Council's financial position will continue to have a negative impact on project delivery, it is expected that once officer funding and support has been secured, projects within the LES can proceed to allow the LES to continue to be the driving force for emission reduction in Slough. Additional resource will also allow the initiatives within the Climate Change Strategy to be progressed, continue implementation of the Access Fund programme and enable the emerging AQAP to be developed, all of which will have a positive impact on air quality.

Conclusions and Priorities

The pandemic brought about widespread positive air quality impacts in Slough and across the nation. This trend has continued into 2021 at the majority of monitoring sites and although there are no exceedances of the AQO in 2021, a number of areas are beginning to recover to pre-pandemic levels, representing small pockets of poor air quality which persist within each AQMA. As such, no AQMAs can be revoked at this stage. It is also too early to consider amending the AQMA boundaries and it is recommended that a full review of the status of each AQMA is completed as part of ASR 2023 once a full year of data with no pandemic influence is obtained.

The key challenges Slough faces in addressing poor air quality are:

- Our population is growing at a significant rate. We are expected to build nearly 20,000 new homes over the next 20 years within a heavily populated and congested urban borough (Slough is only 32.54 km^2). We will need to reduce the amount of parking allocated to town centre residential developments and ensure significant EV charging infrastructure is installed and EV/ULEV car clubs are operating to enable residents to have a low emission vehicle option.
- The main challenges are non-conforming EURO 6 light passenger diesel cars and vans, coupled with the significant growth in diesel vehicles over the past 20 years, although these are now showing a significant decline in sales following the VW emissions scandal. The Government needs to ensure newer diesel vehicles entering the market will meet the tougher real-world emission standards. There needs to be more promotion and awareness of EVs and their air quality benefits over diesel cars. The Government has announced the ban of sale of all petrol and diesel cars from 2030.
- A lack of public awareness and understanding of air pollution is a significant barrier to change. There is a need for public awareness campaigns at national level and at a local level, and Slough will work collaboratively with Public Health and all its stakeholders and officers on local communication and awareness of air quality.
- Over the next 10 years – significant traffic growth locally, associated with the operation of M4 Smart Motorway, Town Centre Development, and potentially the expansion of

Heathrow airport will place significant strain on the highway network and will adversely impact air quality.

Local Engagement and How to get Involved

Slough residents can find out more about air quality by visiting the Councils Webpages[8], which have copies of the AQAPs, the AQMA maps and a dedicated page for the LES.

Slough residents have access to the free app, AirTEXT, which provides air quality alerts and health advice for at-risk groups and the general population[9].

In May 2019, Public Health Slough launched a new website. A dedicated air quality page has been set up and will be populated with information on air quality, how members of the public can reduce their impact on air quality and the health benefits[10].

Local Responsibilities and Commitment

This ASR was prepared by the Environment Management Department of Slough Borough Council with the support and agreement of the following officers and departments:

Transport Department:

Principal Transport Strategy Officer
Principal Transport Planning Officer
Transport Lead
Assistant Engineer I.T.S.

This ASR has been approved by:

Savio DeCruz – Associate Director of Operations

This ASR has not been signed off by a Director of Public Health due to resource constraints. The Council will endeavour to have the full report reviewed and endorsed by Public Health prior to publication of this ASR.

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[8] Air quality (Slough Borough Council)

[9] Airtext

[10] Air Quality - Slough Public Health

If you have any comments on this ASR, please send them to Sophia Norfolk at:

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1 Local Air Quality Management

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

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Slough 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.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 AQAP within 12 months, setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Slough Borough Council can be found in Table 0.1. The table presents a description of the five AQMAs that are currently designated within Slough Borough Council. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objective pertinent to the current AQMA designations is the NO_2 annual mean.

Table 0.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Slough AQMA 1	Declared 23/06/2005	NO_2 Annual Mean (40µg/m^3)	An area encompassing land adjacent to the M4 motorway along the north carriageway between junctions 5 and 7 and along the south carriageway between junction 5 and Sutton Lane.	YES	44	23.0	Annex C of the Local Transport Plan - 2006	Slough Local Transport Plan
Slough AQMA 2	Declared 23/06/2005	NO_2 Annual Mean (40µg/m^3)	An area encompassing the A4 London Road east of junction 5 of the M4 motorway as far as Sutton Lane	NO	62	36.5	Annex C of the Local Transport Plan - 2006	Slough Local Transport Plan
Slough AQMA 3	Declared 24/01/2011	NO_2 Annual Mean (40µg/m^3)	The Designated Area incorporates the A355 Tuns Lane from junction 6 of the M4 motorway in a northerly direction to just past its junction with the A4 Bath Road and A355 Farnham Road, known as the Three Tuns.	NO	51	30.7	Action Plan for Slough Air Quality Management Areas Nos. 3 and 4 (19/11/2012)	Action plan for Slough AQMA nos 3 and 4 (PDF) (DEFRA)
Slough AQMA 4	Declared 24/01/2011	NO_2 Annual Mean (40µg/m^3)	The Designated Area incorporates the A4 Bath Road from the junction with Ledgers Road/Stoke Poges Lane, in an easterly direction, along Wellington Street, up to Sussex Place junction.	NO	63	39.0	Action Plan for Slough Air Quality Management Areas Nos. 3 and 4 (19/11/2012)	Action plan for Slough AQMA nos 3 and 4 (PDF) (DEFRA)

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Slough AQMA Extended 3	Declared 10/05/2018	NO_2 Annual Mean (40µg/m^3)	The designated area incorporates a stretch of road between Tuns Lane Junction known as the "Three Tuns" and 30 Bath Road and also includes Quadrivium Point.	NO	42	28.2	Slough Low Emission Strategy (2018)	Slough Local Emission Strategy 2018 - 2025

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

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

2.2 Progress and Impact of Measures to address Air Quality in Slough Borough Council

Defra's appraisal of last year's ASR concluded the following:

- *The Council recorded no exceedances of the annual mean objective for NO_2 during 2020, although this is likely to have been at least partly due to the COVID-19 pandemic related lockdowns and traffic reductions. In 2019, an annual mean NO_2 concentration of 39.9 µg/m^3 was recorded at SLO53 in Langley, outside of an AQMA, and the intention is for a new roadside automatic NO_2 and PM_{10} monitor to be installed. The Council should continue to monitor concentrations in this area as restrictions lift and normality resumes, and be prepared to declare a new AQMA if necessary in the coming years.*

  NO_2 concentrations in Langley is presented in Figure A.7. In summary, all but one of the diffusion tube sites are showing a reduction in NO_2 concentrations when compared with 2020, suggesting that a new AQMA will not need to be declared in Langley. As both 2020 and 2021 were impacted by the pandemic, this will be discussed and concluded in ASR 2023, once a full year of uninfluenced data has been collected.

- *The Council have declared a new AQMA in 2018 that appears to be an extension of an existing AQMA, therefore should be submitted as an amendment order to AQMA 3 rather than a declaration of a new AQMA, please contact the LAQM Helpdesk to clarify the status of the AQMAs in the borough.*

  The extension of AQMA 3 was declared as such due to high concentrations recorded at the junction between Bath Road and Tuns Lane, following the installation of a continuous monitoring station outside of Windmill care centre in 2017. The continuous analyser and diffusion tubes co-located with this monitor have been compliant with the AQO from after 2018, therefore this extension could be revoked if shown to be compliant for the next two years. In the meantime, contact will be made with LAQM to amend the AQMA order.

- *The Council is in the process of updating and consolidating the AQAPs for the existing AQMAs in the borough, although it is acknowledged that the COVID-19 pandemic has delayed progress. This action should be prioritised as all the existing AQAPs are over five years old and the newest AQMA (AQMA No. 3 Extension) is yet to have an AQAP published. The Council should strive to have this completed and discussed in the Council's 2022 ASR.*

Due to the Council's financial situation, officer resource and capacity has been severely impacted, resulting in very little progress of the development of the AQAP. It has been acknowledged by the Corporate Management Team that additional resource is required to continue to deliver environmental projects. Additional funding opportunities are being explored to fund officer time to deliver these environmental projects. It is expected that work on the AQAP will continue in 2022 with an aim of publication in 2023.

- *The Council intend to install a new continuous roadside monitor in Langley, due to passive monitoring results showing increases in NO_2 since 2016 (excluding 2020), this ongoing review of monitoring sites based on air quality trends is welcomed to support the potential declaration of Langley as an AQMA.*

  The Langley monitoring station installation has been delayed due to ongoing conflicts with utilities. The area in which the monitoring station is to be located is narrow and is very challenging logistically to install, in conjunction with concurrent works on the Langley Road Widening scheme. It is expected that the utilities works will be completed in August 2022 and installation will follow shortly after.

  In regards to the AQMA declaration in Langley, as explained above, recent data suggests that air quality is improving in the area therefore a new declaration may not be necessary. The data from 2022 will be used to determine whether air quality is returning to previous conditions, or if the positive impact of the pandemic on NO_2 concentrations is being sustained in the longer term therefore indicating that a new AQMA is not necessary.

2.2.1 Progress and Challenges in 2021

In July 2021, the Council's S151 officer issued a Notice under Section 114 of the Local Government Finance Act (1988), that available resources are unlikely to meet planned budgetary demands in the financial year 2021/22. As a consequence, officer resource and capacity has significantly reduced, causing a delay to projects shown in Table 2.2 during 2021.

Slough Borough Council has taken forward some direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 0.2. 48 measures are included within Table 0.2, with the type of measure and the progress Slough Borough Council have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within

Table 0.2. As progress on specific projects during 2021 has been limited, the update in this ASR focuses on planned project progress during 2022.

With the specific mention of the borough's carbon footprint and the inclusion of air quality improvement as a target in the Corporate Recovery Plan, officers need to engage with the Commissioners about resourcing to continue to deliver environmental projects. The Council is in receipt of grant funding for provision of EV charging points for taxis and an EV loan and grant scheme for taxi drivers, together with S.106 developer contributions for public EV charging infrastructure and a borough wide car club scheme. However, none of this funding covers officer time to implement the schemes and there is currently insufficient officer resource to deliver these projects, exacerbated by the departure of the Council's Carbon Officer in January 2022.

In spite of this, the Sustainable Transport team have been successful in the full implementation of the A4 bus lane scheme, have been awarded £10.4m in a bid to develop the A4 cycleway scheme and have recommenced work on the Access Fund to improve uptake of sustainable transport, which was on hold over the Covid period.

In addition, the Climate Change Strategy was developed during 2021 and was officially adopted by Cabinet on 20th December 2021, which contains a number of measures specific to tackling transport emissions, with the dual benefit of improving air quality as well as carbon emissions. This includes:

- Travelling shorter distances: focusing on Council's ability to control carbon emissions through planning policy and spatial planning, and raising awareness and information sharing regarding car sharing, journey optimisation, plus options for support and guidance.
- Driving less: includes delivery of sustainable transport related strategy and schemes, behavioural change programmes, improvement of public transport and introduction of anti-idling restrictions.
- Switching to EVs: continued decarbonisation of Council fleet, organising EV leasing opportunities and funding schemes, and increase in EV infrastructure.
- Improving freight emissions: strengthening of procurement policies, exploring the feasibility of local distribution hubs, and prioritising local suppliers.
- Reducing aviation emissions: promoting the reduction of flights and alternative means of transport, plus collaboration with Berkshire Strategic Transport Forum and local businesses to reduce reliance on business air travel.

A significant decarbonisation and air quality improvement scheme is also in development. Slough Borough Council are working with the Local Enterprise Partnership (LEP) in setting up a feasibility study for a low emission hub to provide hydrogen generation, hydrogen refuelling for fleets, and an EV charging super hub at Brands Hill. The Council had an agreement for £5m of funding from the LEP via the Business Retention Fund for development of a park & ride scheme at this location. The feasibility study is to commence late June 2022 into whether the LEP should transfer this funding to a low emission hub scheme.

More detail on the measures detailed in Table 2.2. can be found in their respective Action Plans and within Slough's LES (2018-2025).

The principal challenges and barriers to implementation that Slough Borough Council anticipates facing are due to the Council's financial situation and resulting capacity issues. It is not clear at this stage which projects will be able to progress in the next reporting year. As a minimum, it is expected that work on the AQAP will recommence as it is recognised that an update to the action plans is long overdue and a new AQAP is a statutory requirement. As funding and resource is available to deliver sustainable transport projects, it is expected that the A4 cycleway scheme and ongoing works on the Access Fund will continue.

Slough Borough Council anticipates that the measures stated in Table 0.2 will achieve compliance in AQMA 3 and 4. Although air quality is improving in AQMA 1, the majority of emissions originate from the M4 which is managed by National Highways, therefore direct interventions from National Highways is likely to be required to achieve compliance. It is not yet clearly understood whether the Smart Motorways scheme will benefit air quality in the local area by reducing congestion on the M4, or if it will allow for more traffic capacity and subsequently result in a deterioration of air quality. A discussion of the air quality results of monitoring undertaken at receptors to the Smart Motorways scheme is presented in Appendix C.

Due to high volumes of HGVs using the Brands Hill gyratory and expected increases in traffic as a result of major infrastructure projects in the area, harder measures may be required to reduce NO_2 to meet compliance levels in AQMA 2. Currently, transport infrastructure works are ongoing in the Brands Hill area, including modifications to the gyratory and the introduction of a bus lane. The impact that these schemes have on air quality may be evident in data collected over 2022, reported in ASR 2023.

Whilst the measures stated in Table 0.2 will help to contribute towards compliance, Slough Borough Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of AQMA 1 and 2.

Table 0.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Access Fund Smarter Travel for Slough Business Programme	Promoting Travel Alternatives	Workplace Travel Planning	2017	2022	SBC, Slough Workplaces	DfT	NO	Funded	£1 million - £10 million	Implementation	Borough Wide	% mode share	No formal metrics to indicate modal shift. Active Travel and Behavioural change / modal shift remain a Council priority.	Introduced April 2017. Funding share of £2m. Further £500k awarded by DfT until 2021. Cycle September 2019 involved 21 organisations to participate. Currently no further funding by DfT, but work continuing where possible given existing funds. Extension has been given by DfT due to Covid. Businesses will be contacted in September 2022.
2	Access Fund Smarter Travel for Slough Schools Programme	Promoting Travel Alternatives	School Travel Plans	2017	2022	SBC, Slough Schools	DfT	NO	Funded	£1 million - £10 million	Implementation	Borough Wide	% mode share	No formal metrics to indicate modal shift. Active Travel and Behavioural change / modal shift remain a Council priority.	Introduced April 2017. Funding share of £2m. Further £500k awarded by DfT, now running until 2021. Cycle September 2019 involved 21 organisations to participate. Currently no further funding by DfT, but work continuing where possible given existing funds. 21 schools are now engaged with Modeshift STARS and through this platform schools will be encouraged to promote sustainable travel. Hands up surveys will be carried out at least once a year and we will be able to monitor the programme. 1 school has achieved Bronze level accreditation and we aim to have 20 more schools achieving at least bronze level.
3	Access Fund Smarter Travel for Slough residents Programme	Promoting Travel Alternatives	Other	2017	2022	SBC, charities, voluntary groups	DfT	NO	Funded	£1 million - £10 million	Implementation	Borough Wide	% mode share	No formal metrics to indicate modal shift. Active Travel and Behavioural change / modal shift remain a Council priority.	Introduced April 2017. Funding share of £2m. Further £500k awarded by DfT until 2021. Cycle September 2019 involved 21 organisations to participate. Currently no further funding by DfT, but work continuing where possible given existing funds. We plan to engage with communities through our events. We will be running more events during Sept-Dec 2022
4	Marketing and Promotion of Sustainable travel options in Slough	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2017	2022	SBC	DfT	NO	Funded	£1 million - £10 million	Implementation	Borough Wide	% mode share	No formal metrics to indicate modal shift. Active Travel and Behavioural change / modal shift remain a Council priority.	Introduced April 2017. Funding share of £2m. Further £500k awarded by DfT until 2021. Cycle September 2019 involved 21 organisations to participate. Currently no further funding by DfT, but work continuing where possible given existing funds. Information about our services can be found at events and via newsletters.
5	Promote use of rail SBC staff	Promoting Travel Alternatives	Promote use of rail and inland waterways	2011	2022	SBC	SBC / LEP	NO	Partially funded	£10k - 50k	Implementation	Borough Wide and Outside Borough	% mode share rail travel, % increase of travel warrants	No formal metrics to indicate modal shift. Data requested from GWR	Introduced January 2011. Increased partnership work with GWR recommended to further promote rail travel. LEP funded MIP Project for Stoke Road Regeneration ongoing. This includes joint working with Network Rail / GWR with the northern forecourt enhancements. Completion date of Stoke Road scheme extended to September 2022
6	Access Fund: Personalise Travel Planning	Promoting Travel Alternatives	Personalised Travel Planning	2017	2022	SBC, Slough schools and businesses	DfT	NO	Funded	£1 million - £10 million	Implementation	Borough Wide and Outside Borough	Numbers of personalised travel plans	No formal metrics to indicate modal shift. Active Travel	Introduced April 2017. Funding share of £2m. Further £500k awarded by DfT until 2021. Cycle September 2019 involved 21 organisations to participate. Currently no further funding by DfT, but work continuing where

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														and Behavioural change / modal shift remain a Council priority.	possible given existing funds. My PtP will be delivered to interested schools and businesses. To date we have had 1 school take up this offer.
7	Home Working	Promoting Travel Alternatives	Encourage / Facilitate home-working	2019		SBC	SBC	NO	Not funded		Implementation	Borough Wide and Outside Borough	% take up of staff	No formal metrics to indicate modal shift. Data likely to be available vis SBC HR	Ongoing since April 2019. Currently happening successfully en masse as part of the COVID-19 impacts. Flexible / agile working arrangements still in place on an ongoing basis.
8	Promotion of cycling	Promoting Travel Alternatives	Promotion of cycling	2017		SBC	SBC	NO	Not funded		Implementation	N/A	cycling counts	Limited cycle count data across the borough. Some indications of increased cycling levels	Ongoing, first introduced April 2017. LCWIP SD signed off in May 2020. Subsequently, the plan has been amended to include new scheme proposals, including the A4 cycle route (from Huntercombe to Uxbridge Road – major West to East route). Cycling still permitted as part of the EATF bus lane scheme on the A4. New A4 Cycle Highway scheme being developed; to include monitoring and reporting.
9	Promotion of walking	Promoting Travel Alternatives	Promotion of walking	2017		SBC	SBC	NO	Not funded		Implementation	N/A	walking counts	No formal metrics to indicate walking levels	Ongoing, first introduced in April 2017. LCWIP SD signed off in May 2020. Currently no major schemes proposed specifically for walking improvements. However, included in the Stoke Road Regeneration scheme in progress. No funding received for the most recent bids for funding for redevelopment of the transport interchange in the town centre.
10	Freight Partnerships	Freight and Delivery Management	Freight Partnerships for town centre deliveries	2021		SBC	SBC	NO	Not funded	£10k - 50k	Planning	AQMA2 & AQMA 4	Reduction in emissions of freight deliveries	Not yet introduced	Not yet introduced. Freight sub-strategy (SSD) still to be prepared as part of the overall LTP4 project 2020/21. Ongoing requirement. LTP4 programme currently under review. Freight strategy also being reviewed at regional level by TFSE.
11	Slough Cycle Hire Scheme	Transport Planning and Infrastructure	Public cycle hire scheme	2013	2022	SBC	SBC	NO	Partially funded	£50k - £100k	Implementation	Borough Wide	cycle usage	Expanded via community funds. 17 docking stations.	Ongoing, first introduced October 2013. The current scheme has been closed and a new combined cycle hire / eScooter hire scheme and service is due to be introduced later in 2022.
12	Pedestrian Wayfinding System	Transport Planning and Infrastructure	Other	2017	2022	SBC	S.106	NO	Partially funded	£50k - £100k	Completed	Borough Wide	% mode share	No formal metrics to indicate level of success	Introduced April 2017. Funded by S106 funding. Proposed to introduce wayfinding totems at Farnham Road pending bid application outcome (2022)
13	Local safety and accessibility schemes to schools and businesses	Transport Planning and Infrastructure	Cycle network	2017		SBC	SBC & DfT	NO	Partially funded	£50k - £100k	Implementation	Borough Wide	% mode share	No formal metrics to indicate level of success	Ongoing, first introduced April 2017. Addressed via the Access fund programme. 20mph policy introduced around schools in Slough – measures being implemented as resources allow. Policy now in place for response to requests for speed management. Cycle Training, launch of new cycle hire contract, A4 cycle lane, LUF2 bid - 1.2km of off road cycle improvement infrastructure. Cycle parking at Farnham Road, BC team take up of scheme, introduction of new cycle hire
14	Bus route improvements	Transport Planning and Infrastructure	Bus route improvements	2010		SBC	SBC, DfT, Bus Operators	NO	Not Funded	£100k	Implementation	Borough Wide	Bus patronage	On hold	Ongoing, first introduced 2001. The main focus is currently on the Slough response to the National Bus Strategy. SBC has developed a Bus Service Improvement Plan (BSIP) in partnership with the local bus operators, in an Enhanced Partnership arrangement. The BSIP includes extensive reviews of and proposals for all aspects, including route planning and funding sources for scheme proposals.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															However, all BSIP / EP measures are subject to feasibility, funding and consultation outcomes. There is currently no funding available for such purposes. Furthermore, a number of existing, supported services are at risk for the same reason.
15	Public transport improvements-interchanges stations and services	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2011	2022	SBC	LEP	NO	Partially Funded	£1 million - £10 million	Implementation	Borough Wide	Bus patronage	Improved central transport interchange and out of town station facilities. No formal metrics to indicate level of modal shift or improved connectivity	Bus station completed in 2011. Burnham Station access scheme with LEP funding is complete. Langley station access scheme now complete, also LEP funded. Stoke Road Regeneration including enhancements to northern forecourt of Slough railway station in progress, due to complete September 2022. Scheme proposals developed for redevelopment of the town centre transport interchange, but no funding currently available. Strategic Transport Infrastructure Plan approved in principle by cabinet in February 2021. No major schemes currently planned. Possible improvements via the BSIP / EP, but as above, all subject to feasibility and funding.
16	Slough Mass Rapid Transit	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, bus priority (dedicated bus lane). Includes Park and Ride in phase 2	2018	2022	SBC	LEP, bus operators, utility companies, developers, HE	NO	Funded	> £10 million	Implementation	AQMA 2, AQMA 3, AQMA 4	Bus usage & NO_2 concentration	Early reports from Stewarts (the service operator) report a high level of patronage by business users, very limited patronage by the public.	SMaRT 1 infrastructure completed early 2018. Bus operations from Slough Trading Estate to town centre using Euro VI buses become operational December 18'. SMaRT 2 (LEP funded again) split into two phases now (MRT and P&R). Construction of phase 1 in progress. Due to be completed in April 2022 but currently overrunning. Phase 2 for the P&R has now been withdrawn. This is now proposed to be revised and included as part of a decarbonisation hub being proposed by the LEP. All subject to successful land purchase.
17	Reduction of speed limits, 20mph zones	Traffic Management	Reduction of speed limits, 20mph zones	2010		SBC	SBC, residents, schools	NO	Partially funded	£50k - £100k	Implementation	Borough Wide	Number of Zones	Reduction in accident levels to be assessed.	Ongoing, first introduced 2010. No AQMA declared in areas with 20 mph zone. New 20mph zones will be declared. Additionally, some 40mph roads are being reduced to 30mph along the A4. 20mph policy in place. Infrastructure measures being introduced as funds become available. Foxborough Ward area has become 20mph, Goodman Park 20mph introduced. A4 Consultation to be launched on consistent 30mph.
18	Parking Enforcement on highway	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2018		SBC	SBC, DfT	NO	Partially funded	£50k - £100k	Implementation	Borough Wide	Congestion	No data available	Ongoing. Parking contract commenced with Indigo, June 2018. Moving traffic enforcement commenced on the A4 (SMaRT) 2019. Enforcement currently in place for the EATF experimental bus lane scheme. To be reviewed.
19	Emissions based parking charges	Traffic Management	Emission based parking or permit charges	2022		SBC	SBC	NO	Funded	£10k - 50k	Planning	Borough Wide	Number of spaces		Ongoing. Will be introduced in 2022. Additional spaces to be secured over 2018-2025
20	EV Parking Provision – New Developments	Policy Guidance and Development Control	Low Emission Strategy	2018		SBC	SBC	NO	Not Funded		Implementation	Borough Wide	Number of new EV Parking spaces	No data available	Ongoing, first introduced September 2018. New Parking must include at least 10% EV provision all new parking
21	Air Quality Assessments for new developments in AQMAs and all Major Developments	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance (Low Emission Strategy)	2018		SBC	SBC	NO	Not funded		Implementation	All AQMAs	Negligible Air Quality Impacts (following mitigation and offsetting)	No data available	Ongoing, first introduced in 2018. Included in the Planners Developers Guide

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	(significant net increase in trip rates														
22	Securing developer air quality contributions for low emission infrastructure and EV car clubs	Policy Guidance and Development Control	Low Emission Strategy	2018		SBC, Developers	S.106	NO	Not funded		Implementation	All AQMAs	Financial Contributions amount (£s)	Latest update - approx. £1.8m secured towards LES to date	Ongoing. Funded by S106 Funding
23	Ceiling figure on long stay car parking in town centre (5000 spaces)	Policy Guidance and Development Control	Other	2020		SBC	SBC	NO	Not funded		Implementation	AQMA 4	Number of spaces		Introduced October 2020. To be reviewed as part of new Local Plan. Possible MIP bid submission for LEP funding for MSCP projects. TBA
24	EV infrastructure	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging	2018		SBC	SBC, S.106, OLEV	NO	Funded	£500k - £1 million	Implementation	All AQMAs and Wider Borough	Number of EV chargers in Borough. Number of EV charge events		Ongoing since 2018. S106/OLEV
25	Taxi emission incentives	Promoting Low Emission Transport	Taxi emission incentives – free charging and licensing for early adopters	2018		SBC	SBC, S.106, OLEV	NO	Funded	£10k - 50k	Implementation	AQMA 4, and Borough Wide	Number of Taxi Rapid Chargers	On hold	Funding for 7 Rapid Chargers awarded but not yet been actioned due to capacity issues
26	Taxi Licensing	Promoting Low Emission Transport	Taxi Licensing conditions	2018		SBC	SBC, Taxi Operators	NO	Not Funded		Implementation	AQMA 4, and Borough Wide	Number of ULEV taxi/PHVs licenses		Report to sub-licensing committee – approved all PHVs/ taxis (except disabled access) to be ULEVs by 2025
27	Council Electric Pool Car and Bike Scheme	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2018	2022	SBC	SBC	NO	Not Funded		Implementation	Borough Wide	Number of electric business miles travelled. Reduction in CO2 (tonnes). Reduction in NO_2 and PM (Kg and grams)		Objective is to reduce 90% CO2 and 85% NOx emissions from grey fleet. Bike Scheme. Slough Bike Hire has now ceased and we are undergoing procurement to set up a new scheme with a new provider.
28	Council – ULEV staff company salary sacrifice car scheme	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2018		SBC	SBC	NO	Funded	£50k - £100k	Implementation	Borough Wide	Number of ULEV Company cars		Aim was 50 ULEV company lease cars by Dec 2020 in the Councils grey fleet. Initially postponed due to pandemic. On hold due to council financial situation.
29	Council – Low Emission Hire Car Scheme	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles			SBC	SBC	NO	Funded	£50k - £100k	Planning	Outer Borough	Number of miles in Low Emission - EURO 6 hire case and Car club car		Not yet introduced. Funding is available. Objective is to reduce 90% CO2 and 85% NOx emissions from grey fleet and operational cost
30	Clean Air Zone Feasibility Study	Promoting Low Emission Transport	Ultra Low Emission Zone (ULEZ)			SBC	SBC	NO	Not Funded	£500k - £1 million	Planning	AQMA 2, AQMA3 and AQMA 4 to be modelled	Successful feasibility study	On hold	On hold due to council financial situation.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
31	SBC Car & lift sharing schemes	Alternatives to private vehicle use	Car and Lift Sharing Schemes	2019		SBC	SBC					Borough Wide	Car share %		First introduced June 2019. Car sharing still promoted, but in limited use. Faxi app trialled 2019 but limited take-up so not continued. Move to Observatory House HQ has prompted changes in staff commuting habits. To be analysed. Parking options very limited at OH.
32	Town Centre E car club	Alternatives to private vehicle use	Car Clubs			SBC	S.106, SBC	NO	Funded	£1 million - £10 million	Planning	AQMA 4	Number of Electric Cars operating and number of E-Car clubs users	On hold	S106 funding being secured. Capital money secured, but not yet implemented.
33	Bus park and ride	Alternatives to private vehicle use	Bus based Park & Ride	2018	2022	SBC	LEP, Heathrow PTL, bus operators, utility companies, private land owners, HE	NO	Partially funded	£1 million - £10 million	Planning	Borough Wide	Number of journeys		See line 16 above for both MRT phase 1 (in operation) and P&R as part of the MRT2 (phase 2) scheme (now withdrawn). Ongoing design and land negotiations. No further progress with P&R plans for the west of the borough.
34	Rail based park and ride	Alternatives to private vehicle use	Rail based Park & Ride			SBC	SBC	NO	Not Funded	£1 million - £10 million	Planning	AQMA 4 and Borough Wide	Number of journeys	Not being progressed	Not successful. No current plans for re-submission
35	Promoting Low Emission Public Transport	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2018		SBC	DfT	NO	Not Funded	£500k - £1 million	Planning	AQMA 4 and Borough Wide	Euro Fleet Emissions		Introduced July 2018. Next round of funding to be used for retrofit of Euro V bus. Expression of Interest for the DfT's All Electric Bus Town
36	Air Quality Comms Plan	Public Information	Via all Media	2021		SBC	SBC	NO	Not funded		Planning	Borough Wide	Number of re-tweets	On hold	Using Defra six principles of communication. Communication plan as part of CAP on hold due to council financial situation.
37	New Air Quality Action Plan	Public Information	via leaflets and social media	2021	2022	SBC	SBC	NO	Funded	£100k - £500k	Planning	Borough Wide	Leaflets	On hold	Action plan significantly delayed due to council financial situation.
38	Clean Air Campaigns	Public Information	Signed up	2020		SBC, GAP	SBC	NO	Not funded		Planning	Borough Wide	Various media sources	On hold	On hold due to council financial situation.
39	AirText Service	Public Information	Via the Internet and text (smart phones	2017	2021	SBC	SBC	NO	Funded	< £10k	Aborted	Borough Wide	Number of subscribers	Not being progressed	Public Awareness Campaign. Due to insufficient funding, the services will be aborted from June 2021.
40	Stoke Road Sustainable Transport Infrastructure and Highways Works (regeneration)	Transport Planning and Infrastructure	Public Transport and Infrastructure	2020	2022	SBC	LEP, bus operators, utility companies, developers, Network Rail, Canal and Rivers Trust, Slough Urban Renewal	NO	Funded	> £10 million	Implementation	Town Centre	Number of journeys (via sustainable modes)		Initiated February 2020. Total cost £10.9m. Part of the wider town centre regeneration. See line 15 re Stoke Road Regeneration.
41	A4 Bus Lane experimental scheme	Transport Planning and Infrastructure	Bus route improvements	2020	2022	SBC	DfT	NO	Partially funded	£500k - £1 million	Implementation	A4 from Huntercombe roundabout to Uxbridge Road roundabout	Journey time, volume, flow, plus a raft of related metrics		Reduced level of bus patronage during the COVID-19 period has countered the encouragement for PT uptake. Network conditions remain challenging. The scheme has been approved by Cabinet and made permanent in 2022.
42	eScooter trial	Alternatives to private vehicle use	Other	2020	2023	SBC	DfT	NO	Funded	£50k - £100k	Implementation	Borough wide	Number of users		Trial in progress. Proving to be a popular scheme with Slough subject to a high level of participation. DfT have announced an extension to the trial until May 2023. Slough will continue with the trial until this date.
43	A4 cycle way scheme	Transport Planning and Infrastructure	Other	TBA	TBA	SBC	SBC	NO	Partially funded	£500k - £1 million	Planning	A4 from Huntercombe roundabout to Uxbridge	Volume of cyclists (plus any available modal shift metric)		£10.9m funding awarded by the DfT. Project in progress. Expected to be delivered by the end of 2023.

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												Road roundabout			
44	Strategic Transport Infrastructure Plan (STIP)	Transport Planning and Infrastructure	Other	2020		SBC	SBC, likely to include British Land, GWR and others	NO	Not funded	£100k - £500k	Planning	Borough wide, with a focus on the town centre	Various metrics re modal shift	On hold	Adopted in principle February 2021. Includes plans for town centre redevelopment, plus infrastructure developments in key out of town locations. Potentially resistance from the Planning team re the need for greater alignment with the emerging local plan . Principles have been endorsed by Cabinet. Work needs to be revisited due to the impact of Covid and S114.
45	Local Transport Plan revision	Transport Planning		2020	2022	SBC	SBC	NO	Funded	£100k - £500k	Planning	Borough wide	Various metrics	.	Initial reviews of LTP3 complete. LTP4 still to follow (currently in progress - needs to be revisited). To be aligned with the Strategic Transport Infrastructure Plan (STIP) and the Carbon Strategy.
46	Electric Bus Trial	Transport Planning and Infrastructure	Bus route improvements	2020	2020	SBC, Thames Valley Buses, BYD UK.	SBC	NO	Funded	£50k - £100k	Completed	Cippenham to Uxbridge Road	Number of passengers	On hold	13 week trial, ended December 2020, and was free to customers, ran from Cippenham to Uxbridge Road roundabout and back again on a variation of route 4 known as 4a. Funding is not provided by DfT at this time therefore on hold.
47	School Street	Promoting Travel Alternatives	Reduction of car use at schools	2020	2020	SBC	SBC	NO	Funded	< £10k	Implementation	Boroughwide	No of School Streets		2 school streets were implemented in 2020. One school street has been with withdrawn and the other has been made permanent. A further 3 school streets are planned for Sept/Oct 2022.
48	EV taxi loan and grant scheme	Promoting Low Emission Transport	Taxi emission incentives			SBC	Defra	YES	Funded	£100k - £500k	Planning	Boroughwide	Trip data, running cost savings, emissions savings	On hold	Limited progress to date due to capacity issues

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

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

Work carried out by Public Health England as part of the Public Health Outcomes Framework (PHOF) shows that the fraction of mortality associated with particulate air pollution in 2020 within Slough Borough Council is 6.8%. It should be noted that this concentration is based on a new background modelling methodology, whereby the background annual average $PM_{2.5}$ concentrations for the year are modelled on a 1km x 1km grid using an air dispersion model, and calibrated using measured concentrations taken from background sites in Defra's Automatic Urban and Rural Network[11]. By approximating local authority boundaries to the 1km by 1km grid, and using census population data, population weighted background $PM_{2.5}$ concentrations for each lower tier local authority are calculated. This work is completed under contract to Defra, as a small extension of its obligations under the Ambient Air Quality Directive (2008/50/EC) (COMEAP, 2022).

2.3.1 Public Health Data

Figure 2.1 and Figure 2.2 below shows the fraction of mortality attributable to particulate air pollution calculated for Slough Borough Council from 2010 to 2019 using previous methodology, and from 2018 to 2020 using the new methodology, compared with the South East and England averages.

In both trends, Slough has consistently had a higher fraction of mortality attributable to particulate air pollution compared to England and the South East, although this has shown to reduce from 2018 onwards. With the new modelling methodology, the mortality rates are much higher, for example, in 2018, mortality rates were at 8.9% when this was previously modelled at 6.5%. However, as a note of caution regarding the trends; Slough

[11] Air Quality Interactive map (DEFRA)

does not monitor $PM_{2.5}$ using reference methods and there may be local sources that could give rise to higher concentrations.

Figure 2.1 – Fraction of Mortality Attributable to Particulate Air Pollution for Slough (2010-2019, Old Methodology)

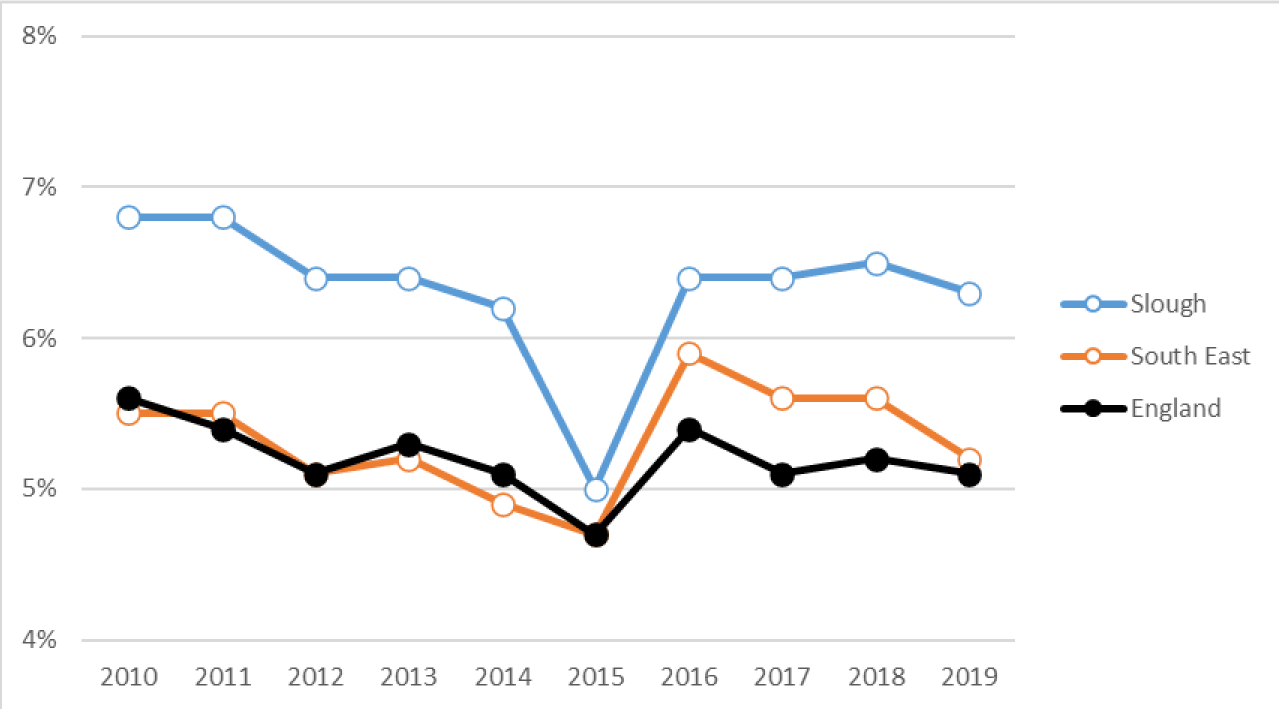
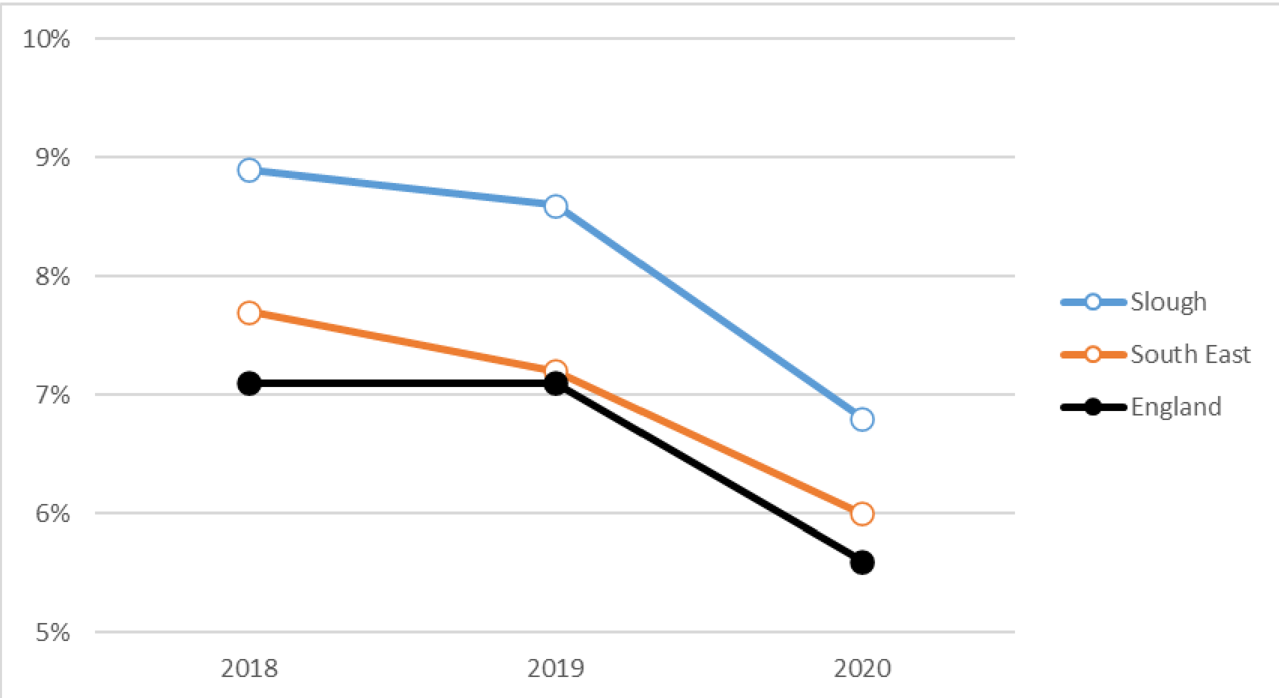


Figure 2.2 - Fraction of Mortality Attributable to Particulate Air Pollution for Slough (2018-2020, New Methodology)



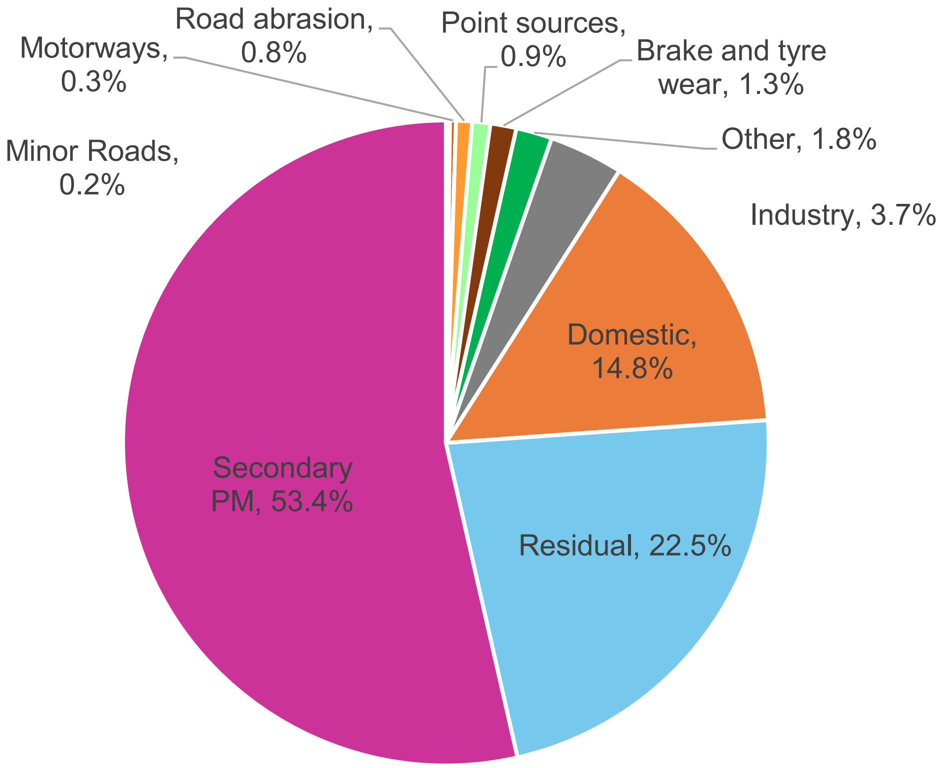
Provisional air quality modelling undertaken as part of the emerging AQAP, using a baseline year of 2017, indicates that across Slough, concentrations of $PM_{2.5}$ range from 12.4µg/m^3 to 17.1µg/m^3. Over 80% of $PM_{2.5}$ concentrations are attributable to background sources, almost half of which is attributable to secondary particulate matter, major sources of such include power plants and industrial processes, including oil refining. The remaining primary emissions include road traffic vehicles (especially those with diesel engines); wood burning; cooking; dust from roads and construction, and agricultural operations. Emissions of the primary gaseous pollutants ammonia, oxides of nitrogen and sulphur dioxide from sources in the UK and Europe act as precursor species to $PM_{2.5}$, as they contribute to the formation of secondary PM through chemical reactions in the atmosphere.

It should be noted, however, that modelling concentrations of $PM_{2.5}$ from emissions data is complicated by the fact that it requires inventories for a range of pollutants, including direct emissions of $PM_{2.5}$ itself as well as its precursor gases SO_2, NOx, NH_3 and NMVOCs. These pollutants are emitted in varying amounts from different sources and exhibit different spatial and temporal behaviour. To understand $PM_{2.5}$ concentrations in Slough, continuous monitoring using accredited monitors is recommended.

2.3.2 Background Data

Figure 2.3 below shows the proportions of $PM_{2.5}$ concentrations by different sources, informed by Defra's background data maps. The $PM_{2.5}$ background modelling data indicates that $PM_{2.5}$ concentrations range from 10.2 µg/m^3 to 12.7µg/m^3, with secondary particulate matter is the greatest contributor to background $PM_{2.5}$ in Slough during 2021.

Figure 2.3 – Proportion of $PM_{2.5}$ Emission Sources in Slough During 2021



Particulate matter is a transboundary pollutant and can travel long distances, therefore the portion of secondary particulate matter in Slough is unlikely to have been created within the borough, therefore national initiatives are required to reduce this concentration.

There are, however, sources of $PM_{2.5}$ that can be controlled further by Slough Borough Council. Recent changes to Smoke Control Area (SCA) enforcement under the Environment Act 2021 came into effect on 1st May 2022 which has brought about the following changes to help reduce PM emissions associated with combustion:

- A financial penalty can be issued to those emitting substantial amounts of smoke from their chimney in a SCA, applicable to people and businesses. The financial penalties range from a minimum of £175 to a maximum of £300.
- An abatement notice can be issued for smoke emissions that are harmful to human health or a nuisance in a SCA.
- Solid fuel retailers must notify potential customers that it is illegal to buy unauthorised fuel for use in a SCA unless used in an exempt appliance. A local authority can prosecute a retailer if they break this rule. The court will decide on the amount of the fine.

14.8% of Slough's background $PM_{2.5}$ originates from domestic sources, therefore it is expected that the enforcement actions described above will help to reduce emissions from this source. It is noted however that is this only applicable to chimney emissions and there are limited enforcement options to address garden bonfires. Bonfires are currently acceptable in SCAs under the condition that certain rules are adhered to regarding the type of waste burnt and complaints are dealt with under statutory nuisance covered by the Environmental Protection Act 1990.

Slough Borough Council strive to reduce $PM_{2.5}$ concentrations in Slough through the following measures:

- All of the Slough area is covered by Smoke Control orders. These were made to reduce air pollution in the town, mainly arising from the use of coal for heating purposes.
- The Corporate Recovery Plan 2022 – 2025 replaces the Five Year Plan, however the health of Slough's residents remains a key priority and the plan details a specific aim to revoke Slough's AQMAs.
- The LES is aimed at enabling and accelerating the uptake of ULEVs through the installation of more EV chargers, setting up of a town centre EV car club, and promoting electric taxis. This in turn will reduce NOx and some PM emissions.
- The LES is also aimed at promoting best practice dust controls on construction sites including adoption of Non Road Mobile Machinery Emission (NRMM) standards; construction machinery above net power rating of 37kW will be required to meet stage BIII, enforced as a requirement of the planning permission on the development, normally through a S106.
- The LES requires planning controls on major developments that all HDVs travelling through the AQMAs will use best endeavours to operate to EURO VI standards (i.e. CAZ compliant).
- The emerging STIP (a development of the Slough Transport Vision) supports the new Local Plan that is being developed for Slough. The strategy is aimed at reducing congestion by significantly increasing modal shift away from dependency on cars in Slough, as well as road widening to enable traffic to flow more smoothly, a new mass rapid transit system on the A4, future proposals for park and ride schemes and improved cycle infrastructure.
- The Slough Wellbeing Board takes a lead on promoting a healthier Slough. A new Health and Wellbeing Strategy (2020-2025) developed in June 2020 outlines the

plans to improve the health and wellbeing of its residents over the lifetime of the plan. The strategy highlights how the densely populated urban nature of Slough with high levels of personal car use result in high levels of congestion and poor air quality, and aims to address air quality as part of the SMART neighbourhood plans.

Slough Borough Council will be taking the following additional measures to address $PM_{2.5}$:

- Publication of the emerging AQAP. Although the measures within the action plan are aimed at reducing NO_2 emissions, particularly from road transport sources, there will be co-benefits in reducing $PM_{2.5}$ through modal shift and sustainable transport related measures.
- Finalising and publishing the borough wide $PM_{2.5}$ dispersion modelling and source apportionment completed as part of the emerging AQAP, to create more targeted measures.
- Revision of Slough's Smoke Control Policy to determine whether stricter controls on burning can be implemented, such as an outright ban on burning fuels outdoors.
- Creation of the Air Quality and Health group. The Council has an aspiration to establish a partnership between health professionals and air quality experts, which aims to be an informative and technical group, to build a stronger relationship between public health and air quality, and improve public awareness of air quality impacts to health. An element of this will be to develop guidance on how to reduce emissions of PM.
- To aid awareness of $PM_{2.5}$, Slough Borough Council require a means of gathering live data on $PM_{2.5}$ concentrations across the borough and to begin seeking funding to support introduction of $PM_{2.5}$ monitors in key hotspot areas (for example, introducing a $PM_{2.5}$ monitor at Pippins Colnbrook, to monitor the impact of increased aviation at Heathrow airport).
- Restricted NRMM controls to reduce $PM_{2.5}$ emissions from construction sites. Currently, NRMM are required to meet Stage BIII controls, however this may be restricted further with the development of the AQAP.

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

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Slough Borough Council undertook automatic (continuous) monitoring at 6 sites during 2021, which includes:

- Slough-Colnbrook-(Pippins) SLH 3 (non-AQMA)
- Slough-Chalvey, M4 SLH 7 (AQMA 1)
- Slough Town Centre (Wellington Street) SLH 10 (AQMA 4)
- Slough Brands Hill (London Road) SLH 11 (AQMA 2)
- Slough Windmill (Bath Road) SLH 12 (AQMA 3)
- Slough Spackmans Way, Chalvey SLH 13 (AQMA 1)

Additionally Lakeside EfW Ltd operate an EfW in Colnbrook since 2010. The plant processes over 450,000 tonnes of residual waste per year, generating up to 37MW of power. The operator of the site as well as undertaking continuous stack monitoring as part of their Permit, operate ambient air quality monitoring as part of their planning consent, and the data is released to Slough to report on an annual basis. The monitoring includes NOx, PM_{10} and $PM_{2.5}$ monitoring.

- Slough-Lakeside-2 (Lakeside Road) SLH 8 & SLH 9

Notable following changes to Slough Borough Council's continuous monitoring network are underway or expected to be implemented during 2022 are as follows:

- Decommissioning of Slough-Colnbrook-(Pippins) SLH 3
- Installation and operation of Slough Spackmans Way, Chalvey SLH 13 (AQMA 1)
- Installation of Station Road, Langley (non-AQMA, not yet operational).

As reported in ASR 2021, the indicative Osiris monitors of $PM_{2.5}$ were removed from both the Colnbrook Pippins (SLH 6) and Lakeside Tan House Farm (SLH 5) sites, in anticipation of providing an MCERTs accredited continuous $PM_{2.5}$ analyser at the Pippins site. Due to the Council's financial situation, the replacement of the monitoring equipment at this site has not been able to progress, and monitoring was ceased in March 2022, therefore this site is no longer recording data. The Council's ambition to monitor $PM_{2.5}$ at this site remains, particularly due to the proximity of the site to Heathrow and potential expansion plans, which will be reviewed once the Council's finances have recovered.

The Spackmans Way (SLH 13) site in Chalvey was installed in July 2021, and began reporting data from September 2021. This monitoring station replaces the Chalvey monitoring station (SLH 7). SLH 7 was located within the Chalvey waste depot, and although within AQMA 1, the site did not represent residential exposure therefore the new site on Spackmans Way was chosen to represent exposure at the nearest residential receptor to the M4.

A new roadside monitoring station has been installed on Station Road, Langley. Due to passive monitoring results showing increases in NO_2 since 2016, there is a need to continuously monitor NO_2 and PM at this location. This will produce an evidence base of air quality trends which will allow the Council to determine whether Langley will be declared an AQMA, in conjunction with recent diffusion tube data. This monitor will also allow the Council to observe the impact of planned and proposed infrastructure projects, which may influence traffic volumes and subsequently worsen air quality. This site is not yet monitoring air quality and is due to be connected to the DNO by August 2022. Ongoing delays have been caused by conflicts with the upcoming Langley Road Widening Scheme which is being developed concurrently.

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. Automatic monitoring results are available through the UK-Air website.

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

Slough Borough Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 94 sites (123 diffusion tubes) during 2021. Table A.2 in Appendix A presents the details of the non-automatic sites.

During 2021, one new diffusion tube site was established, for the purpose of triplicate co-location monitoring with the new site at Spackmans Way, Chalvey. As this site replaces the previous continuous monitoring station within the Chalvey waste depot, the diffusion tubes from that monitoring site have been transferred to this new site. These have subsequently been renamed as SLO 34, SLO 35 and SLO 36 Relocated within this report and the Diffusion Tube Data Processing Tool.

21 sites were decommissioned in June 2021 due to either showing concentrations lower than 10% below the AQO continuously for five years, suggesting that air quality is not an issue at these monitoring locations, or no longer being required for co-location purposes:

- SLO 20 (Hencroft Street), SLO 27 (India Road), SLO 31 (Essex Avenue), SLO 41 (Sandringham Court), SLO 42 (Walpole Road), SLO 45 (London Road (C)), SLO 48 (Castle Street) – results recorded over the last five years indicate that these tubes have been consistently lower than 10% below the AQO (<36µg/m^3).
- SLO 98 – SLO 111 – in support of the Slough Sensor Study, diffusion tubes were co-located with Vaisala sensors to compare the accuracy of the sensors. These tubes were deployed from June 2020 and have been decommissioned now the project has ceased.

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.

During 2021, these tubes were collected on a 4 or 5 weekly basis and analysed at a UKAS accredited laboratory (Gradko International Ltd). Sites that have been included for distance correction include all sites that are within 10% or above the AQO and locations where the receptors are closer to the road than the monitoring location.

Due to changes to the network mid-year, the diffusion tube locations described above had to be annualised, alongside a number of sites which suffered from frequent thefts.

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

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

The distance correction concentration to the nearest site for relevant exposure (normally a residential property unless otherwise indicated) is shown in Appendix C.7. The 2018 national background modelled concentrations (adjusted to the monitoring year 2020 for Slough) were used within the Defra tool. The distance to 'relevant exposure' and nearest main road was obtained through a combination of on-site measurements and GIS map measurements.

The main roads which have the greatest influence on NO_2 concentrations are:

- M4 (experiences >100,000 vehicle movements/day)
- A4 Wellington Street, Bath Road, London Road, Brands Hill (average more than 20,000-30,000 vehicle movements/day)
- Sutton Lane, Windsor Road, High Street Langley (all experience >10,000 vehicle movements/day

3.2.2 2021 NO_2 Results

3.2.2.1 Comparison between 2020 and 2021 Diffusion Tube Concentrations

All data in this section has been adjusted for bias. As reported in ASR 2020, monitoring across Slough demonstrated widespread compliance with the NO_2 AQO due to the impact of the pandemic on traffic flows. It was also discussed that the data from 2020 would likely be considered anomalous and be excluded from the five year trend analysis. This section therefore compares data from 2020 to 2021, to determine whether the positive impact caused by the pandemic on air quality has continued into 2021, and indicate whether the data from 2020 should be retained in trend analysis.

Comparing results from 2020 to 2021, where data is available, 57 sites (70.4%) of Slough's diffusion tube monitoring network showed an improvement in NO_2 concentrations. Monitoring which commenced in 2021 with no monitoring data for previous years' is not included in this comparison. Diffusion tubes which have been annualised have been highlighted in bold – these should be treated with caution as annualised data is not as reliable as monitored data.

The greatest improvements in air quality (>1.5μg/m^3 reduction in NO_2 concentrations) by site and AQMA are presented below. The concentration specified is the improvement from 2020 to 2021, with the maximum improvement observed at Lakeside Road (SLO 12) by 4.3μg/m^3.

As in 2020, there are no diffusion tube sites that are above the AQO for NO_2, however there are two sites that are within 10% of the AQO (Yew Tree Road – SLO 29, and Brands Hill (A) – SLO 18), however once distance corrected, these sites fall below 10% of the AQO. It is noted that there are no improvements in the passive monitoring network within AQMA 3 or AQMA 3 Extension.

AQMA 1:

- Paxton Avenue Highways England Receptor 1 (SLO 66, SLO 67, SLO 68) = -1.8μg/m^3
- Spackmans Way Highways England Receptor 2-9 (SLO 69 – SLO 92) = -1.5μg/m^3 – -3.6μg/m^3
- Winvale Highways England Receptor 10 (SLO 93, SLO 94, SLO 95) = -3.5μg/m^3
- Winvale (SLO 22) = -3.3μg/m^3
- Grampian Way (SLO 8) = -3.2μg/m^3
- Spackmans Way (SLO 24) = -1.8μg/m^3
- Tweed Road (B) (SLO 9) = -1.7μg/m^3

AQMA 2:

- Brands Hill (A) (SLO 18) = -2.0μg/m^3

AQMA 4:

- Wellington Street – Stratfield (SLO 33) = -3.1μg/m^3
- Cornwall House, Bath Rd (SLO 46) = -3.0μg/m^3
- Wellesley Road (SLO 38) = -2.6μg/m^3
- Princes Street (SLO 5) = -2.4μg/m^3

- Blair Road – Victoria Court (SLO 37) = -1.8µg/m^3

Non-AQMA:

- Lakeside Road (SLO 12) = 4.3µg/m^3
- Sutton Lane (SLO 56) = -2.9µg/m^3
- **Francis Way - Cippenham (SLO 105) = -2.8µg/m^3**
- **Hatton Avenue - Penn Wood (SLO 110) = -2.9µg/m^3**
- **Castle Street (SLO 48) = -2.1µg/m^3**
- **Cumberland Avenue (SLO 111) = -1.9µg/m^3**
- **Hatton Avenue (SLO 109) = -1.9µg/m^3**

The remaining 23 sites (29.6%) show either a deterioration of air quality or no change from 2020 to 2021. The greatest increase is observed at Yew Tree Road (Ux Rd) (B) (SLO 29) by 5.1µg/m^3. The sites recording a worsening of air quality >1.0µg/m^3 have been presented below. Sites which have shown a worsening of <1.0µg/m^3 have not been presented as the change is not considered significant.

AQMA 2:

- Brands Hill (SLO 63, SLO 64, SLO 65) = +3.2µg/m^3

AQMA 4:

- Yew Tree Road (Uxbridge Rd) SLO 29 = +5.1µg/m^3
- Yew Tree Rd (Ux Rd) (B) SLO 26 = +2.6µg/m^3
- Wellington Street SLO 60, SLO 61, SLO 62 = +2.0µg/m^3

Non-AQMA:

- Windsor Road (SLO 49) - 2.2µg/m^3
- **The Hawthorns – Pippins (SLO 98) - 1.0µg/m^3**

Prior to 2020, each AQMA had monitoring locations which showed varying NO_2 concentrations, a portion of which were consistently above the NO_2 AQO. 2020 saw unusually low traffic volumes resulting in low concentrations across the borough. It was discussed in ASR 2021 that further data for future years was required to determine whether this data should be excluded from the five year trend analyses, or whether the impact of the pandemic would have lasting affects. This concept is discussed further below in the context of each AQMA:

- AQMA 1 has seen the greatest improvement of NO_2 concentrations on average (2.0µg/m^3 reduction) from 2020 to 2021. Data from the Highways England M4 receptors suggests that air quality has improved by up to 3.6µg/m^3. This is an unexpected result, as traffic was reduced throughout 2020 due to the pandemic and traffic volumes were predicted to recover during 2021, however the data suggests that the positive effects of the pandemic on traffic levels has been sustained during 2021.

- The average improvement within AQMA 2 is significantly lower than AQMA, at 0.2µg/m^3. This average arises as a result of some sites recording a deterioration of air quality (Brands Hill triplate SLO 63, SLO 64 SLO 65 worsening by 3.2µg/m^3) and others showing an improvement (Brands Hill (A) SlO 18 improving by 2.0µg/m^3), despite being 200m apart from each other on the same stretch of road. There are improvement works ongoing in the Brands Hill area currently, which has resulted in instances of queueing traffic adjacent to the continuous monitoring site, which may be the cause of this discrepancy.
- Various sites showing positive and negative changes in NO_2 concentrations has resulted in an overall worsening of NO_2 by 0.2µg/m^3 within AQMA 3. The largest increase in NO_2 is observed on Farnham Road (SLO 30), however data capture was very low at this site (42.2%) and was annualised, so the data may be unrealiable.
- AQMA 3 Extension has experienced an overall worsening of NO_2 by 0.5µg/m^3, however there is limited diffusion tube data to support this conclusion.
- Within AQMA 4, the average improvement of NO_2 is 0.2µg/m^3. Similarly to AQMA 2, some sites have experienced a significant increase in NO_2 (+5.1µg/m^3 at Yew Tree Road, SLO 29) while others have experienced a decrease (-3.1µg/m^3 at Wellington Street, SLO 33), resulting in an overall slight improvement.

Lockdowns introduced to reduce public exposure to Covid-19 were ongoing throughout 2020 and continued until March 2021. It could be possible that the subsequent reduction in traffic during the winter months when concentrations are typically highest, has resulted in a lower overall NO_2 annual average for 2021. This is supported by Slough's local transport data shown in Figure C.4, where traffic flows are reduced in the early months of the year in 2021 when compared with 2020, although it should be noted that this is based on traffic counters along the A4 and may not represent traffic flow trends across the borough. This suggests that measures which target vehicle use during the winter months may be the most effective in reducing high annual NO_2 concentrations. This may also be the reason why concentrations have dropped further at sites neighbouring the M4, alongside continued progress of the Smart Motorway scheme. The pandemic has also resulted in a greater number of staff adopting a hybrid working arrangement where homeworking has increased, likely to result in fewer vehicle trips during the peak rush hour periods. In addition, humid or wet weather can result in lower NO_2 concentrations, which may have been a contributing factor during 2021.

3.2.2.2 Diffusion Tube Trend Analysis 2017 – 2021

Table A.4.1 presented in Appendix A describes the year by year change in concentration at each diffusion tube site where five years of data exists, inclusive of data from 2020 and 2021. The average change from one year to the next has been calculated, which has been averaged across all sites for each AQMA. Overall, improvement of NO_2 concentrations have been experienced across all of Slough's AQMAs, with the highest rate observed in 2020, as expected. Relative to 2017 data, there has been an improvement of 14.2µg/m^3 (36%) across all AQMAs on average.

A summary of the rate of improvement and overall improvements in 2021 relative to 2017 concentrations by AQMA is provided below (corresponding to Figures A.3-A7):

- Over the last five years, AQMA 1 has shown the fastest rate of improvement at 13% on average from 2017 to 2021. Relative to 2017 data, AQMA 1 has experienced the greatest improvement in NO_2 concentrations by 16.9µg/m^3, equivalent to 45.3%. The fastest rate of improvement on average is observed at Winvale (SLO 22) at 5.5µg/m^3 (16%).
- The rate of improvement on average over the last five years within AQMA 2 is by 3.4µg/m^3 (9%), greatest at Rogans (Colnbrook bypass) (SLO 28), primarily due to the large drop in NO_2 (13% relative to 2020) which has been sustained during 2021. Overall, NO_2 concentrations have improved by 33.8% relative to 2017 data.
- AQMA 3 has seen a slower rate of improvement, averaging at 2.9µg/m^3 over five years. Overall, NO_2 concentrations have improved by 31.2% relative to 2017 data.
- The two monitoring sites in AQMA 3 Extension have an improvement rate of 2.5µg/m^3 per year on average over the last five years, with a 34.5% improvement in 2021 relative to 2017.
- AQMA 4 has the most diffusion tube sites, which all show an average improvement rate above 1.0µg/m^3 on average over the last five years. Relative to 2017, 2021 data shows NO_2 concentrations have improved by 34.9% across the AQMA overall. The biggest improvement is observed at Cornwall House, Bath Road (SLO 46), by 43.2% relative to 2017 concentrations.

Overall, air quality is improving across Slough's AQMAs. The highest average rate of improvement has been observed at sites within AQMA 1, which may be driven by changes to the M4. The Winvale site specifically (SLO 22) is within 30m of the M4 which has recently had a large barrier installed along the length for the purposes of reducing noise and air quality exposure from the M4. This would have an obvious impact on pollution dispersion which may explain the improvement experienced at this location. A similar improvement trend is evident in all of the M4 receptor monitoring locations.

Relative to concentrations in 2017, the majority of monitoring sites have seen an improvement in NO_2 concentrations above 10µg/m^3, with the exception of the Yew Tree Road site (SLO 29) which continues to have concentrations within 10% of the AQO in 2021. Brands Hill (A) (SLO 18) is also within 10% of the AQO at 36.6µg/m^3, despite also seeing a 33.8% reduction in NO_2 relative to 2017. These results suggest that more work is required to reduce concentrations in these locations.

3.2.2.3 Non-AQMA Sites – Roadside, Industrial, Urban, Suburban, And Urban Background

Slough Borough Council monitor at 53 sites outside of AQMAs. This is often to monitor the impact of local pollution sources to determine whether further action is required. This section splits these sites into the following location categories: Roadside and Kerbside sites; Suburban and Urban Background; and Rail and Industrial sites. Monitoring for specific transport schemes including the M4 Smart Motorway scheme and the A4 Bus Lane scheme have been discussed separately within Appendix C.

Outside of AQMAs, NO_2 concentrations have improved from 2020 to 2021 by 0.9µg/m^3 on average, and have improved on average by 12.2µg/m^3 relative to 2017 data (see Figure A.8-A.10). Specifically by location category:

- Roadside and kerbside sites have been continually improving over the last five years, with a significant drop in 2020 where all concentrations reduced far below the AQO. 77.8% of Slough's kerbside and roadside sites have seen an further improvement from 2020 to 2021. The greatest improvement is observed at Sutton Lane (SLO 56), with a 3.0µg/m^3 reduction in NO_2. Windsor Road (SLO 49) in contrast has seen a worsening of air quality from 2020 to 2021 by 2.2ug/m2, however, in reference to 2017 data, concentrations have reduced in this location by 20.5µg/m^3, indicating an overall improvement.
- Only four sites within Slough's network have five years of data in Suburban and Urban Background locations, shown in Figure A.9. Suburban and Urban Background sites show a downward trend in NO_2 concentrations from 2017 to 2021, with a less

pronounced drop in 2020 and for the majority of sites, and continuation of this trend is shown in 2021.

- Industrial and Rail sites have seen a greater variation in concentration over the last five years compared to other sites, specifically within Colnbrook and Poyle (Lakeside Road – SLO 12, and Horton Road – SLO 17). Both sites saw an increase in concentrations in 2018 before beginning a downward trend. Horton Road has seen an increase in NO_2 by 0.8µg/m^3 from 2020 to 2021, expected due to the recovery of industry after the pandemic. In contrast, Lakeside Road has seen an improvement in NO_2 by 4.3µg/m^3 from 2020 to 2021. Relative to 2017, each site has seen an improvement of >10µg/m^3, with the exception of Horton Road, which has seen very minimal change (0.1µg/m^3 reduction). Further initiatives are clearly required to focus on improvements in this area.

3.2.3 Continuous Monitoring NO_2 Results

3.2.3.1 Annual Mean NO_2 Monitoring Results

All continuous monitoring data has been properly ratified. In contrast to the passive monitoring network, the majority of continuous monitoring sites show a worsening of air quality from 2020 to 2021 (see Figure A.1 and Figure A.2). The greatest increase in NO_2 is observed at Brands Hill, by 4.8µg/m^3, which correlates with the increase seen at the co-located diffusion tubes (SLO 63, SLO 64 and SLO 65). Wellington Street, Windmill and Pippins monitoring stations have all seen increases in NO_2 by 2.7µg/m^3, 2.0µg/m^3 and 1.6µg/m^3, respectively. Relative to 2017 however, all sites have shown improvement in NO_2 concentrations, with Windmill having the greatest improvement by 12.6µg/m^3.

3.2.3.2 1-Hour Mean NO_2 Monitoring Results

The NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) has historically not been exceeded across Slough's automatic monitoring sites, with the exception of Windmill Bath Road (SLH 12) which has shown one exceedance of 200µg/m^3 in 2021. This is still considerably below the objective level and is therefore not of concern.

3.2.4 Conclusion:

In regards to AQMA declaration and revokation, each AQMA has at least one area that has suffered from high NO_2 concentrations within the last five years. For an AQMA to be revoked, sustained compliance for a minimum of five years is required. This may be achievable for AQMA 1 and AQMA 3 Extension in the near future as all monitoring sites have been compliant with the AQO since 2018. All remaining AQMAs have had monitoring sites above the AQO in 2019 suggesting it is too early to revoke these AQMAs.

As the last two reporting years have been impacted by the pandemic, it is not yet clear whether the positive effects will be sustained in the long term, therefore making any adjustments to the AQMA boundaries is not recommended until a full year of data is obtained with no impact from the pandemic (i.e 2022). It is expected therefore that a full review of Slough's AQMAs and their bounadries is completed as part of ASR 2023.

3.2.5 Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results and Figure A.11 compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 and Figure A.12 within Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

All monitoring data presented has been properly ratified.

Slough monitor PM_{10} within AQMA 1 (Spackmans Way), AQMA 2 (Brands Hill), AQMA 3 Extension (Windmill) and outside of the AQMAs at the EfW site. The five year trend shown in Figure A.11 shows that PM_{10} concentrations have been gradually declining over the monitoring period, with no sites exceeding the AQO over the last five years. Due to the health effects associated with particulate matter, Slough Borough Council strive to reduce concentrations as low as possible, however in some locations, progress is slow.

Unlike the NO_2 results, the impact of the pandemic on PM_{10} concentrations was more varied, with an increase in PM_{10} concentrations observed at two monitoring stations in 2020 (Pippins and Lakeside 2). In contrast, concentrations have decreased across all monitoring sites from 2020 to 2021, with the biggest decrease observed at Colnbrook (Lakeside, Tan House Farm). Windmill monitoring station has seen the smallest change in PM_{10} from 2020 to 2021, by 0.2µg/m^3, but overall has seen the biggest improvement out of all PM_{10} monitoring sites from 2017 to 2021 (5.7µg/m^3 reduction).

Relative to the revised WHO 2021 AQGs, three monitoring sites record concentrations above the new guidelines, including Pippins, Brands Hill and Wellington Street. The recently introduced monitoring station on Spackmans Way is currently recording below the revised guideline value, however as this data was anuualised, data is required for future years to determine an accurate value. Despite being below the AQO, concentrations at

Brands Hill and Windmill are much higher than the WHO 2021 AQGs, therefore further initiatives are required to reduce concentrations.

In regards to the 24 hour mean, 2017 to 2018 saw varying results, with some locations showing a reduction and two sites showing a large increase in concentrations. Since 2018, a reduction of the number of times the AQO has been exceeded has been observed at Brands Hill only. Windmill shows an initial increase which has reduced since 2019. From 2020 to 2021, all sites show a decrease.

When considering the WHO 2021 AQGs (reduction from 50µg/m^3 to 45µg/m^3), comparison has been made using Sloughs highest reporting monitoring station (Brands Hill). Reducing the limit to 45µg/m^3 results in 22 exceedences, suggesting that Slough Borough Council are compliant with the WHO 2021 AQG in the context of the PM_{10} 24 hour mean.

There are not expected to be any changes to the PM_{10} monitoring network within the next reporting year.

3.2.6 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A and Figure A.13 presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

All data has been properly ratified.

$PM_{2.5}$ is the pollutant which has the biggest impact on public health and on which the Public Health Outcomes Framework (PHOF) indicator is based. $PM_{2.5}$ is monitored at one location in Slough (Osiris at Lakeside 2 EfW – SLO 9) (a number of Slough operated Osiris units were discontinued after 2019). Figure A.13 indicates that the monitoring site has showed no improvement from 2020 to 2021, however it is noted that data capture was low during 2021 and therefore may show an unreliable result.

To provide further insight into likely $PM_{2.5}$ concentrations across Slough, an exercise has been completed to estimate $PM_{2.5}$ from PM_{10} monitoring data.

TG(16) states that when a site meansures both PM_{10} and $PM_{2.5}$, a locally derived ratio can be calculated and applied to PM_{10} data to obtain an estimate of $PM_{2.5}$. Where no appropriate local sites measuring both PM_{10} and $PM_{2.5}$ is available, a national derived correction ratio of 0.7 can be used, which was calculated as the average of all ratios of $PM_{2.5}$/ PM_{10} found for years 2010 to 2014.

Table A.8.1 shows the estimated $PM_{2.5}$ concentrations based on the PM_{10} data, applied to the last five years of data, presented visually in Figure A.14. As the data is a factor reduction from PM_{10} data, the trend mirrors that of Figure A.11. The graph is useful when comparing to AQOs and guideline levels, which are different from PM_{10}. The WHO 2021 AQG for $PM_{2.5}$ exposure is 5µg/m^3 – none of the estimated values meet this level.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
SLH 4	Salt Hill (Slough-town-centre, A4)	Urban Background	496599	180156	NOx, NO_2 and PM_{10}	NO	Chemiluminescence TEOM	>30m	12.5m	4m
SLH 3	Slough-Colnbrook-(Pippins)	Suburban	503542	176827	NOx, NO_2, PM_{10}, $PM_{2.5}$ & PM_1	NO	Chemiluminescence TEOM	7m	1.3m	4m
SLH 6	Slough-Colnbrook-(Pippins)	Suburban	503542	176827	NOx, NO_2, PM_{10}, $PM_{2.5}$ & PM_1	NO	Osiris	7m	1.3m	4m
SLH 7	Slough-Chalvey, M4	Other	496562	179109	NOx and NO_2	YES - AQMA 1	Chemiluminescence	53m	74m	1.5m
SLH 5	Slough-Colnbrook (Lakeside, Tan House Farm)	Industrial	503551	177258	PM_{10}, $PM_{2.5}$ & PM_1	NO	Osiris	>200m	>50m	10m
SLH 8	Slough-Lakeside-2 (run by Lakeside Energy from Waste Ltd)	Industrial	503569	177385	NOx, NO_2 and PM_{10}	NO	Chemiluminescence BAM (PM_{10})	>200m	10m	4m
SLH 9	Slough-Lakeside-2 (run by Lakeside Energy from Waste Ltd)	Industrial	503569	177385	NOx, NO_2 and PM_{10}	NO	Co-located Osiris (PM_{10}, $PM_{2.5}$ and PM1)	>200m	10m	4m
SLH 10	Slough Town Centre Wellington Street	Roadside	498413	179804	NOx and NO_2	YES - AQMA 4	Chemiluminescence	8m	5m	1.5m
SLH 11	Brands Hill London Road	Roadside	501643	177753	NOx, NO_2 and PM_{10}	YES - AQMA 2	Chemiluminescence and BAM	12.5m	4m	1.5m
SLH 12	Slough Windmill Bath Road	Roadside	496528	180171	NOx, NO_2 and PM_{10}	YES - AQMA 3 Extension	Chemiluminescence and BAM	12m	7.5m	1.5m

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)
SLH 13	Spackmans Way	Other	496447	179117	NOx, NO_2 and PM_{10}	YES - AQMA 1	Chemiluminescence and BAM	9.5m	2.9m	1.5m

Notes:

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

(2) N/A if not applicable

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
SLO 1 Relocated	Salt Hill Park tennis courts	Urban Background	496904	180187	NO_2	No	134.7	86.3	No	2.5
SLO 2 Relocated	Salt Hill Park footbridge	Urban Background	496785	180336	NO_2	No	65.7	88.2	No	2.5
SLO 3 Relocated	Salt Hill Park footpath	Urban Background	496665	180236	NO_2	No	48.6	65.2	No	2.0
SLO 4 Relocated	Lansdowne Avenue - new location	Roadside	497185	180050	NO_2	Yes - AQMA 4	0.0	11.0	No	2.0
SLO 5	Princes Street	Roadside	498541	179815	NO_2	Yes - AQMA 4	12.0	22.0	No	2.0
SLO 6	Sussex Place	Roadside	498784	179560	NO_2	No	4.5	9.6	No	2.0
SLO 7	Colnbrook By-pass	Industrial	503196	177349	NO_2	No	200.0	5.0	No	2.0
SLO 8	Grampian Way	Other	501382	178101	NO_2	Yes - AQMA 1	20.0	35.0	No	2.0
SLO 9	Tweed Road (B) Moved 2012	Other	501501	177879	NO_2	Yes - AQMA 1	12.9	22.0	No	2.0
SLO 10	London Road (A)	Roadside	501733	177725	NO_2	Yes - AQMA 2	12.5	4.0	No	2.0
SLO 11	Torridge Road	Suburban	501637	177999	NO_2	Yes - AQMA 1	30.0	65.0	No	3.0
SLO 12	Lakeside Road	Industrial	503877	177459	NO_2	No	200.0	>100	No	2.0
SLO 13	Elbow Meadows	Suburban	503856	176538	NO_2	No	37.0	50.0	No	2.0
SLO 14, SLO 15, SLO 16	Pippins *	Suburban	503542	176827	NO_2	No	7.0	>50	Yes	2.5
SLO 17	Horton Road (Caravan Park)	Suburban	503136	175654	NO_2	No	28.5	15.0	No	2.0
SLO 18	Brands Hill (A)	Roadside	501798	177659	NO_2	Yes - AQMA 2	10.5	6.0	No	2.5
SLO 19	Ditton Road	Roadside	500851	177890	NO_2	No	21.0	1.8	No	2.0
SLO 20	Hencroft Street	Urban Background	497925	179450	NO_2	No	5.0	>100	No	2.0
SLO 21	Windsor Road	Roadside	497457	179566	NO_2	No	10.5	2.5	No	2.5
SLO 22	Winvale	Other	497488	179090	NO_2	Yes - AQMA 1	20.0	31.0	No	2.0
SLO 23	Tuns Lane	Urban Background	496416	180126	NO_2	Yes - AQMA 3	18.0	17.5	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)
SLO 24	Spackmans Way	Other	496272	179187	NO_2	Yes - AQMA 1	53.0	60.5	No	2.5
SLO 25	Paxton Avenue	Other	496050	179258	NO_2	Yes - AQMA 1	34.5	27.0	No	2.0
SLO 26	Yew Tree Rd (Ux Rd) (B)	Roadside	498473	179706	NO_2	Yes- AQMA 4	0.0	9.5	No	2.0
SLO 27	India Road	Other	498681	179972	NO_2	No	0.0	13.0	No	2.0
SLO 28	Rogans (Colnbrook by pass)	Roadside	501941	177633	NO_2	Yes - AQMA 2	8.5	4.5	No	2.5
SLO 29	Yew Tree Road (Uxbridge Rd)	Kerbside	498483	179707	NO_2	Yes - AQMA 4	6.0	1.5	No	2.0
SLO 30	Farnham Road (2)	Roadside	496397	180341	NO_2	Yes - AQMA 3	17.5	12.0	No	2.0
SLO 31	Essex Avenue	Suburban	496200	181900	NO_2	No	3.0	1.4	No	2.0
SLO 32	Brands Hill (B)	Roadside	501853	177620	NO_2	Yes - AQMA 2	0.0	9.0	No	2.0
SLO 33	Wellington Street - Stratfield	Roadside	498168	179907	NO_2	Yes - AQMA 4	8.0	12.0	No	2.5
SLO 34, SLO 35, SLO 36	Chalvey (CAS) *	Other	496562	179109	NO_2	Yes - AQMA 1	> 50	74.0	Yes	1.5
SLO 34 Relocated, SLO 35 Relocated, SLO 36 Relocated	Spackmans Way	Other	496447	179117	NO_2	Yes - AQMA 1	9.5	2.9	Yes	1.5
SLO 37	Blair Road- Victoria Court	Roadside	497105	180081	NO_2	Yes - AQMA 4	11.0	11.0	No	2.0
SLO 38	Wellesley Road	Roadside	498071	179949	NO_2	Yes - AQMA 4	13.0	11.5	No	2.5
SLO 39	London Rd (B)	Roadside	501734	177733	NO_2	Yes - AQMA 2	0.0	11.5	No	2.5
SLO 40	Wexham Road	Roadside	498394	179849	NO_2	Yes - AQMA 4	11.5	11.0	No	2.0
SLO 41	Sandringham Court	Other	493960	181355	NO_2	No	0.0	10.5	No	2.5
SLO 42	Walpole Rd	Other	493493	181378	NO_2	No	0.0	16.0	No	2.5
SLO 43	Windmill (Bath Rd)	Roadside	496533	180175	NO_2	Yes - AQMA 3 Extension	0.0	12.0	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
SLO 44	Goodman Park (Ux Rd)	Roadside	498961	180113	NO_2	No	10.0	9.7	No	2.5
SLO 45	London Rd (C)	Roadside	501658	177781	NO_2	Yes - AQMA 2	0.0	14.0	No	2.0
SLO 46	Cornwall House, Bath Rd	Roadside	497467	179971	NO_2	Yes - AQMA 4	11.0	5.0	No	2.0
SLO 47	Princes House, Bath Road	Roadside	497326	180003	NO_2	Yes - AQMA 4	0.0	4.5	No	2.0
SLO 48	Castle Street	Roadside	497960	179243	NO_2	No	15.5	14.0	No	2.0
SLO 49	Windsor Road (B)	Kerbside	497397	179471	NO_2	No	6.0	1.5	No	2.0
SLO 50	Tuns Lane (B)	Kerbside	496377	179929	NO_2	Yes - AQMA 3	13.0	4.0	No	2.0
SLO 51	Langley Road	Roadside	501014	179316	NO_2	No	10.0	2.5	No	2.5
SLO 52	Station Road	Roadside	501161	179538	NO_2	No	10.0	3.5	No	2.5
SLO 53	High Street Langley (A)	Roadside	501208	178799	NO_2	No	5.5	2.0	No	2.5
SLO 54	High Street Langley (B)	Roadside	501256	179067	NO_2	No	6.0	4.0	No	2.5
SLO 55	Parlaunt Road	Roadside	501891	178954	NO_2	No	8.0	2.5	No	2.5
SLO 56	Sutton lane	Roadside	502241	178679	NO_2	No	7.5	4.0	No	2.5
SLO 57, SLO 58, SLO 59	Windmill	Kerbside	469528	180171	NO_2	Yes - AQMA 3 Extension	12.0	7.5	Yes	1.5
SLO 60, SLO 61, SLO 62	Wellington Street	Kerbside	498413	179804	NO_2	Yes - AQMA 4	8.0	5.0	Yes	1.5
SLO 63, SLO 64, SLO 65	Brands Hill	Kerbside	501643	177753	NO_2	Yes - AQMA 2	12.5	4.0	Yes	1.5
SLO 66, SLO 67, SLO 68	Paxton Avenue HE Receptor 1	Other	496146	179259	NO_2	Yes - AQMA 1	22.1	20.4	No	2.0
SLO 69, SLO 70, SLO 71	Spackmans Way HE Receptor 2	Other	496223	179217	NO_2	Yes - AQMA 1	0.0	34.1	No	1.5

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)
SLO 72, SLO 73, SLO 74	Spackmans Way HE Receptor 3	Other	496225	179213	NO_2	Yes - AQMA 1	0.0	34.9	No	1.5
SLO 75, SLO 76, SLO 77	Spackmans Way HE Receptor 4	Other	496227	179207	NO_2	Yes - AQMA 1	0.0	34.7	No	1.5
SLO 78, SLO 79, SLO 80	Spackmans Way HE Receptor 5	Other	496229	179204	NO_2	Yes - AQMA 1	0.0	34.3	No	1.5
SLO 81, SLO 82, SLO 83	Spackmans Way HE Receptor 6	Other	496232	179199	NO_2	Yes - AQMA 1	0.0	34.1	No	1.5
SLO 84, SLO 85, SLO 86	Spackmans Way HE Receptor 7	Other	496234	179195	NO_2	Yes - AQMA 1	0.0	33.9	No	1.5
SLO 87, SLO 88, SLO 89	Spackmans Way HE Receptor 8	Other	496236	179191	NO_2	Yes - AQMA 1	0.0	33.7	No	1.5
SLO 90, SLO 91, SLO 92	Spackmans Way HE Receptor 9	Other	496238	179186	NO_2	Yes - AQMA 1	0.0	33.8	No	1.5
SLO 93, SLO 94, SLO 95	Winvale HE Receptor 10	Other	497433	179092	NO_2	Yes - AQMA 1	17.2	25.3	No	2.0
SLO 96	Poyle Rd	Roadside	503272	176597	NO_2	No	0.0	7.0	No	1.5
SLO 97	Albert Street/Upton Court Park Road	Roadside	497725	179360	NO_2	No	12.8	2.9	No	1.5
SLO 98	The Hawthorns - Pippins (2)	Suburban	503527	176823	NO_2	No	14.6	1.2	No	2.5
SLO 99	The Hawthorns - Pippins (3)	Suburban	503510	176806	NO_2	No	8.9	2.2	No	2.5
SLO 100	The Hawthorns - Pippins (4)	Suburban	503613	176912	NO_2	No	2.0	28.4	No	1.5
SLO 101	Bower Way - Cippenham (5)	Kerbside	494101	180708	NO_2	No	2.0	1.0	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)
SLO 102	Erica Close - Cippenham (6)	Urban Background	494199	180637	NO_2	No	7.2	0.7	No	2.5
SLO 103	St Andrews Way - Cippenham (7)	Kerbside	493784	180662	NO_2	No	3.8	0.6	No	2.5
SLO 104	Dennis Way - Cippenham (8)	Suburban	493812	180572	NO_2	No	5.1	1.9	No	2.5
SLO 105	Francis Way - Cippenham (9)	Urban Background	493592	180737	NO_2	No	19.1	1.3	No	2.5
SLO 106	Monksfield Way - Claycots (10)	Kerbside	495488	182538	NO_2	No	35.1	0.7	No	2.5
SLO 107	Monksfield Way - Claycots (11)	Roadside	495457	182550	NO_2	No	6.1	2.0	No	2.0
SLO 108	Brighton Spur - Claycots (12)	Urban Background	495668	182430	NO_2	No	6.2	0.7	No	2.5
SLO 109	Hatton Avenue - Penn Wood (13)	Suburban	496526	182276	NO_2	No	5.1	1.1	No	2.5
SLO 110	Hatton Avenue - Penn Wood (14)	Suburban	496529	182243	NO_2	No	5.9	0.7	No	2.5
SLO 111	Cumberland Av. Footpath - Penn Wood (15)	Urban Background	496489	182270	NO_2	No	61.5	4.0	No	2.5
SLO 112	Oatlands Drive (a)	Roadside	497070	181108	NO_2	No	10.7	2.2	No	1.5
SLO 113	Oatlands Drive (b)	Roadside	497079	181088	NO_2	No	10.5	2.5	No	1.5
SLO 114	Elliman Avenue (a)	Roadside	497677	180876	NO_2	No	6.1	1.8	No	1.5
SLO 115	Elliman Avenue (b)	Roadside	497671	180866	NO_2	No	4.9	2.1	No	1.5
SLO 116	Shaggy Calf Lane (a)	Roadside	498103	180842	NO_2	No	12.8	1.7	No	1.5
SLO 117	Shaggy Calf Lane (b)	Roadside	498112	180857	NO_2	No	11.6	1.8	No	1.5
SLO 118	Chalvey Road East (a)	Kerbside	497097	179521	NO_2	No	4.1	0.6	No	1.5
SLO 119	Chalvey Road East (b)	Roadside	497104	179511	NO_2	No	2.1	1.4	No	1.5
SLO 120	Ledgers Road (a)	Kerbside	497013	179870	NO_2	No	1.4	0.4	No	1.5

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)
SLO 121	Ledgers Road (b)	Kerbside	497004	179874	NO_2	No	3.8	1.1	No	1.5
SLO 122	Cippenham Lane (a)	Kerbside	496167	179975	NO_2	No	8.8	0.9	No	1.5
SLO 123	Cippenham Lane (b)	Roadside	496184	179950	NO_2	No	7.8	8.3	No	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.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 2021 (%) (2)	2017	2018	2019	2020	2021
SLH 3	503542	176827	Suburban	99.7	99.7	25	22	26.1	16.2	17.8
SLH 4	496599	180156	Urban Background	-	-	33	31	26.4	-	-
SLH 7	496562	179109	Other	99.0	81.2	35	32	32.7	21.3	20
SLH 8	503569	77385	Industrial	99.7	99.7	26	26	27.6	19.1	18.1
SLH 10	498413	179804	Roadside	98.6	98.6	36.6	36	34.7	24.6	27.3
SLH 11	501643	177753	Roadside	98.1	98.1	37.5	**42**	39.2	27.3	32.1
SLH 12	496528	180171	Roadside	99.1	99.1	**41.5**	**42**	39.2	26.9	28.9
SLH 13	496447	179117	Other	97.5	25.1	-	-	-	-	23.2

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

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

Notes:

The annual mean concentrations are presented as μg/m³.

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

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

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

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

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

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SLO 1 Relocated	496904	180187	Urban Background	100	100.0	-	-	-	19.7	18.5
SLO 2 Relocated	496785	180336	Urban Background	93.7	93.7	-	-	-	15.4	14.5
SLO 3 Relocated	496665	180236	Urban Background	84.7	84.7	-	-	-	17.6	18.0
SLO 4 Relocated	497185	180050	Roadside	82.7	82.7	-	-	-	19.4	20.2
SLO 5	498541	179815	Roadside	100	100.0	**40.7**	34.4	33.6	27.6	25.2
SLO 6	498784	179560	Roadside	100	100.0	32.1	29.0	27.8	21.2	21.2
SLO 7	503196	177349	Industrial	100	100.0	38.7	35.0	32.8	23.8	23.5
SLO 8	501382	178101	Other	100	100.0	**40.4**	34.8	35.0	26.3	23.0
SLO 9	501501	177879	Other	100	100.0	35.3	32.6	31.8	22.9	21.2
SLO 10	501733	177725	Roadside	100	100.0	**45.3**	**44.4**	**41.1**	28.8	29.7
SLO 11	501637	177999	Suburban	100	100.0	32.7	30.0	28.7	20.5	19.7
SLO 12	503877	177459	Industrial	100	100.0	38.6	**40.7**	39.5	26.6	22.3
SLO 13	503856	176538	Suburban	100	100.0	30.5	31.2	28.9	20.9	19.6
SLO 14, SLO 15, SLO 16	503542	176827	Suburban	100	100.0	25.3	25.3	23.8	18.3	17.5
SLO 17	503136	175654	Suburban	100	100.0	25.6	**41.5**	33.3	24.9	25.7
SLO 18	501798	177659	Roadside	100	100.0	**55.2**	**53.2**	**49.4**	38.5	36.5
SLO 19	500851	177890	Roadside	100	100.0	34.6	33.2	33.7	22.7	22.1
SLO 20	497925	179450	Urban Background	100	48.2	27.0	23.7	24.2	16.8	17.0
SLO 21	497457	179566	Roadside	100	100.0	**40.9**	35.0	34.6	24.0	24.1
SLO 22	497488	179090	Other	100	100.0	**41.8**	33.8	32.7	23.1	19.8
SLO 23	496416	180126	Urban Background	100	100.0	33.6	29.5	30.8	22.0	21.9
SLO 24	496272	179187	Other	100	100.0	37.9	32.7	33.0	22.6	20.9
SLO 25	496050	179258	Other	100	100.0	36.5	33.2	31.8	20.3	19.0
SLO 26	498473	179706	Roadside	100	100.0	**48.1**	31.5	35.2	26.7	29.3
SLO 27	498681	179972	Other	100	48.2	31.3	26.9	26.5	19.8	16.9
SLO 28	501941	177633	Roadside	100	100.0	**45.3**	**44.0**	38.5	25.5	25.6
SLO 29	498483	179707	Kerbside	100	100.0	**42.9**	**52.7**	**48.5**	33.8	39.0
SLO 30	496397	180341	Roadside	42.2	42.2	32.6	29.0	32.0	23.2	23.9
SLO 31	496200	181900	Suburban	100	48.2	28.7	27.0	27.0	21.9	20.9

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SLO 32	501853	177620	Roadside	100	100.0	36.3	36.2	32.8	23.9	23.7
SLO 33	498168	179907	Roadside	100	100.0	33.9	28.7	30.1	23.1	20.0
SLO 34, SLO 35, SLO 36	496562	179109	Other	80	40.5	35.5	30.6	30.6	18.4	18.4
SLO 34 Relocated, SLO 35 Relocated, SLO 36 Relocated	496447	179117	Other	100	51.8	-	-	-	-	22.5
SLO 37	497105	180081	Roadside	100	100.0	**45.3**	39.9	37.8	28.2	26.3
SLO 38	498071	179949	Roadside	100	100.0	37.4	32.3	33.0	25.0	22.4
SLO 39	501734	177733	Roadside	100	100.0	33.1	31.6	30.1	21.8	20.6
SLO 40	498394	179849	Roadside	100	100.0	**42.3**	38.6	37.9	29.7	29.6
SLO 41	493960	181355	Other	100	48.2	25.9	21.9	19.4	13.6	12.7
SLO 42	493493	181378	Other	60	24.9	23.1	21.2	18.6	12.8	13.2
SLO 43	496533	180175	Roadside	100	100.0	37.2	34.0	33.1	25.0	25.0
SLO 44	498961	180113	Roadside	100	100.0	36.4	31.9	29.8	24.7	23.6
SLO 45	501658	177781	Roadside	100	48.2	31.4	28.6	28.1	19.8	18.9
SLO 46	497467	179971	Roadside	100	100.0	**46.2**	**40.1**	39.0	29.3	26.3
SLO 47	497326	180003	Roadside	90.1	90.1	36.9	35.2	31.0	22.5	22.7
SLO 48	497960	179243	Roadside	100	48.2	29.4	28.1	29.0	22.2	20.1
SLO 49	497397	179471	Kerbside	93.7	93.7	**48.7**	**40.0**	39.5	26.0	28.2
SLO 50	496377	179929	Kerbside	100	100.0	**45.3**	**45.8**	**42.8**	30.6	30.7
SLO 51	501014	179316	Roadside	100	100.0	37.8	36.0	35.0	24.8	24.9
SLO 52	501161	179538	Roadside	100	100.0	36.4	33.2	33.3	23.7	22.4
SLO 53	501208	178799	Roadside	100	100.0	**42.1**	37.9	39.9	27.9	27.1
SLO 54	501256	179067	Roadside	100	100.0	35.4	32.8	32.6	24.6	23.3
SLO 55	501891	178954	Roadside	90.9	90.7	31.4	30.4	29.5	21.3	20.1
SLO 56	502241	178679	Roadside	100	100.0	37.8	37.6	35.7	26.3	23.3
SLO 57, SLO 58, SLO 59	469528	180171	Kerbside	100	100.0	**44.2**	**41.5**	38.9	27.3	28.2
SLO 60, SLO 61, SLO 62	498413	179804	Kerbside	100	100.0	37.3	33.9	33.6	24.9	26.8

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SLO 63, SLO 64, SLO 65	501643	177753	Kerbside	90.7	90.7	36.9	**43.3**	**41.2**	29.1	32.2
SLO 66, SLO 67, SLO 68	496146	179259	Other	100	100.0	-	-	34.6	22.6	20.8
SLO 69, SLO 70, SLO 71	496223	179217	Other	100	100.0	-	-	32.7	23.1	21.6
SLO 72, SLO 73, SLO 74	496225	179213	Other	100	100.0	-	-	32.0	24.7	21.1
SLO 75, SLO 76, SLO 77	496227	179207	Other	100	100.0	-	-	29.3	22.6	20.3
SLO 78, SLO 79, SLO 80	496229	179204	Other	100	100.0	-	-	31.5	24.1	22.2
SLO 81, SLO 82, SLO 83	496232	179199	Other	100	100.0	-	-	-	24.1	21.1
SLO 84, SLO 85, SLO 86	496234	179195	Other	100	100.0	-	-	32.9	23.3	22.0
SLO 87, SLO 88, SLO 89	496236	179191	Other	100	100.0	-	-	33.2	23.1	21.8
SLO 90, SLO 91, SLO 92	496238	179186	Other	100	100.0	-	-	28.7	23.1	21.5
SLO 93, SLO 94, SLO 95	497433	179092	Other	100	100.0	-	-	33.5	23.8	20.3
SLO 96	503272	176597	Roadside	100	100.0	-	-	28.4	20.5	20.1
SLO 97	497725	179360	Roadside	91.8	91.8	-	-	-	28.2	27.1
SLO 98	503527	176823	Suburban	100	48.2	-	-	-	17.1	18.1
SLO 99	503510	176806	Suburban	100	48.2	-	-	-	18.0	18.1
SLO 100	503613	176912	Suburban	100	48.2	-	-	-	16.7	15.4

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 2021 (%) (2)	2017	2018	2019	2020	2021
SLO 101	494101	180708	Kerbside	100	48.2	-	-	-	20.4	20.0
SLO 102	494199	180637	Urban Background	100	48.2	-	-	-	14.4	13.9
SLO 103	493784	180662	Kerbside	100	48.2	-	-	-	18.8	17.7
SLO 104	493812	180572	Suburban	100	48.2	-	-	-	17.7	16.4
SLO 105	493592	180737	Urban Background	100	48.2	-	-	-	16.4	13.7
SLO 106	495488	182538	Kerbside	100	48.2	-	-	-	17.1	16.1
SLO 107	495457	182550	Roadside	100	48.2	-	-	-	17.8	17.2
SLO 108	495668	182430	Urban Background	100	48.2	-	-	-	14.3	13.2
SLO 109	496526	182276	Suburban	100	48.2	-	-	-	14.7	12.8
SLO 110	496529	182243	Suburban	100	48.2	-	-	-	19.3	16.4
SLO 111	496489	182270	Urban Background	80	41.9	-	-	-	14.8	12.8
SLO 112	497070	181108	Roadside	75.6	75.6	-	-	-	-	24.5
SLO 113	497079	181088	Roadside	100	100.0	-	-	-	-	23.3
SLO 114	497677	180876	Roadside	67.4	67.4	-	-	-	-	28.0
SLO 115	497671	180866	Roadside	100	100.0	-	-	-	-	25.7
SLO 116	498103	180842	Roadside	100	100.0	-	-	-	-	24.5
SLO 117	498112	180857	Roadside	92.6	92.6	-	-	-	-	21.5
SLO 118	497097	179521	Kerbside	51.8	51.8	-	-	-	-	25.4
SLO 119	497104	179511	Roadside	100	100.0	-	-	-	-	26.1
SLO 120	497013	179870	Kerbside	74	74.0	-	-	-	-	23.5
SLO 121	497004	179874	Kerbside	57.5	57.5	-	-	-	-	31.2
SLO 122	496167	179975	Kerbside	100	100.0	-	-	-	-	25.0
SLO 123	496184	179950	Roadside	92.6	92.6	-	-	-	-	21.5

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

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

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

Notes:

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

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

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

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

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

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

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

Table A.4.1 – Concentration Change from 2017 to 2021 (µg/m³)

Site	Site ID	AQMA	Annual Mean NO_2 2017	Annual Mean NO_2 2018	Annual Mean NO_2 2019	Annual Mean NO_2 2020	Annual Mean NO_2 2021	5 Year Change in NO_2 2021-2017	5 Year Change in NO_2 (%)	Year on Year Change in NO_2 17-18	Year on Year Change in NO_2 18-19	Year on Year Change in NO_2 19-20	Year on Year Change in NO_2 20-21	Year on Year Change in NO_2 Average	Year on Year Change in NO_2 (%) 17-18	Year on Year Change in NO_2 (%) 18-19	Year on Year Change in NO_2 (%) 19-20	Year on Year Change in NO_2 (%) 20-21	Year on Year Change in NO_2 (%) Average
Grampian Way	8	1	40.4	34.8	35.0	26.3	23.0	-17.4	-43.0	-5.6	0.2	-8.7	-3.3	-4.3	-14%	1%	-25%	-12%	-13%
Tweed Road (B)	9	1	35.3	32.6	31.8	22.9	21.2	-14.1	-39.9	-2.7	-0.8	-8.9	-1.7	-3.5	-8%	-2%	-28%	-7%	-11%
Torridge Road	11	1	32.7	30.0	28.7	20.5	19.7	-13.0	-39.9	-2.7	-1.3	-8.2	-0.8	-3.3	-8%	-4%	-29%	-4%	-11%
Winvale	22	1	41.8	33.8	32.7	23.1	19.8	-22.0	-52.6	-8.0	-1.1	-9.6	-3.3	-5.5	-19%	-3%	-29%	-14%	-16%
Spackmans Way	24	1	37.9	32.7	33.0	22.6	20.9	-17.0	-45.0	-5.2	0.3	-10.4	-1.7	-4.3	-14%	1%	-32%	-8%	-13%
Paxton Avenue	25	1	36.5	33.2	31.8	20.3	19.0	-17.5	-48.0	-3.3	-1.4	-11.5	-1.3	-4.4	-9%	-4%	-36%	-7%	-14%
Chalvey Triplicate	34, 35, 36	1	35.8	31.1	30.8	18.4	18.4	-17.5	-48.7	-4.8	-0.3	-12.4	0.0	-4.4	-13%	-1%	-40%	0%	-14%
Average								**-16.9**	**-45.3**					**-4.2**					**-13%**
London Road (A)	10	2	45.3	44.4	41.1	28.8	29.7	-15.6	-34.4	-0.9	-3.3	-12.3	0.9	-3.9	-2%	-7%	-30%	3%	-9%
Brands Hill (A)	18	2	55.2	53.2	49.4	38.5	36.5	-18.7	-33.8	-2.0	-3.8	-10.9	-2.0	-4.7	-4%	-7%	-22%	-5%	-9%
Rogans (Colnbrook by-pass)	28	2	45.3	44.0	38.5	25.5	25.6	-19.7	-43.5	-1.3	-5.5	-13.0	0.1	-4.9	-3%	-13%	-34%	0%	-12%
Brands Hill (B)	32	2	36.3	36.2	32.8	23.9	23.7	-12.6	-34.6	-0.1	-3.4	-8.9	-0.2	-3.1	0%	-9%	-27%	-1%	-9%
London Road (B)	39	2	33.1	31.6	30.1	21.8	20.6	-12.4	-37.6	-1.5	-1.5	-8.3	-1.2	-3.1	-4%	-5%	-28%	-5%	-11%
London Road (C)	45	2	31.4	28.6	28.1	19.8	18.9	-12.5	-39.7	-2.8	-0.5	-8.3	-0.9	-3.1	-9%	-2%	-29%	-5%	-11%
Brands Hill Triplicate	63, 64, 65	2	36.9	43.3	41.2	29.1	32.2	-4.7	-12.7	6.4	-2.1	-12.1	3.2	-1.2	17%	-5%	-29%	11%	-2%
Average								**-13.7**	**-33.8**					**-3.4**					**-9%**
Tuns Lane	23	3	33.6	29.5	30.8	22.0	21.9	-11.6	-34.6	-4.1	1.3	-8.8	0.0	-2.9	-12%	4%	-29%	0%	-9%
Farnham Road	30	3	32.6	29.0	32.0	23.2	23.9	-8.7	-26.7	-3.6	3.0	-8.8	0.7	-2.2	-11%	10%	-27%	3%	-6%
Tuns Lane (B)	50	3	45.3	45.8	42.8	30.6	30.7	-14.6	-32.2	0.5	-3.0	-12.2	0.1	-3.7	1%	-7%	-28%	0%	-8%
Average								**-11.6**	**-31.2**					**-2.9**					**-8%**
Windmill (Bath Road)	43	Ext 3	37.2	34.0	33.1	25.0	25.0	-12.2	-32.7	-4.1	1.3	-8.8	0.0	-2.9	-9%	-3%	-25%	0%	-9%
Windmill Triplicate	57, 58, 59	Ext 3	44.3	41.6	38.4	27.3	28.2	-16.1	-36.4	-3.6	3.0	-8.8	0.7	-2.2	-6%	-8%	-29%	3%	-10%
Average								**-14.1**	**-34.5**					**-2.5**					**-9%**
Princes Street	5	4	40.7	34.4	33.6	27.6	25.2	-15.5	-38.1	-6.3	-0.8	-6.0	-2.4	-3.9	-15.5%	-2.3%	-17.9%	-8.6%	-11.1%
Yew Tree Rd (Ux Rd) (B)	26	4	48.1	31.5	35.2	26.7	29.3	-18.8	-39.1	-16.6	3.7	-8.5	2.6	-4.7	-34.5%	11.7%	-24.3%	9.9%	-9.3%
Yew Tree Road	29	4	42.9	52.7	48.5	33.8	39.0	-3.9	-9.2	9.8	-4.2	-14.7	5.1	-1.0	22.8%	-8.0%	-30.2%	15.1%	0.0%
Wellington Street - Stratfield	33	4	33.9	28.7	30.1	23.1	20.0	-13.9	-41.0	-5.2	1.4	-7.0	-3.1	-3.5	-15.3%	4.9%	-23.2%	-13.5%	-11.8%
Blair Road - Victoria Court	37	4	45.3	39.9	37.8	28.2	26.3	-19.0	-41.9	-5.4	-2.1	-9.6	-1.8	-4.7	-11.9%	-5.3%	-25.5%	-6.5%	-12.3%
Wellesley Road	38	4	37.3	32.3	33.0	25.0	22.4	-14.9	-39.9	-5.0	0.7	-8.0	-2.6	-3.7	-13.3%	2.2%	-24.2%	-10.5%	-11.5%
Wexham Road	40	4	42.2	38.6	37.9	29.7	29.6	-12.6	-29.8	-3.6	-0.7	-8.2	-0.1	-3.1	-8.6%	-1.8%	-21.5%	-0.3%	-8.1%
Cornwall House, Bath Road	46	4	46.2	40.1	39.0	29.3	26.3	-19.9	-43.2	-6.1	-1.1	-9.7	-3.0	-5.0	-13.2%	-2.7%	-24.9%	-10.4%	-12.8%
Princess House, Bath Road	47	4	36.9	35.2	31.0	22.5	22.7	-14.2	-38.4	-1.7	-4.2	-8.5	0.2	-3.5	-4.5%	-11.9%	-27.4%	0.8%	-10.7%
Wellington Street Triplicate	60, 61, 62	4	37.3	33.9	33.6	24.9	26.8	-10.5	-28.2	-3.4	-0.3	-8.7	1.9	-2.6	-9.1%	-0.9%	-25.9%	7.6%	-7.1%
Average								**-14.3**	**-34.9**					**-3.6**					**-9%**

Figure A.1 – Trends in Annual Mean NO_2 Concentrations from 2017 to 2021

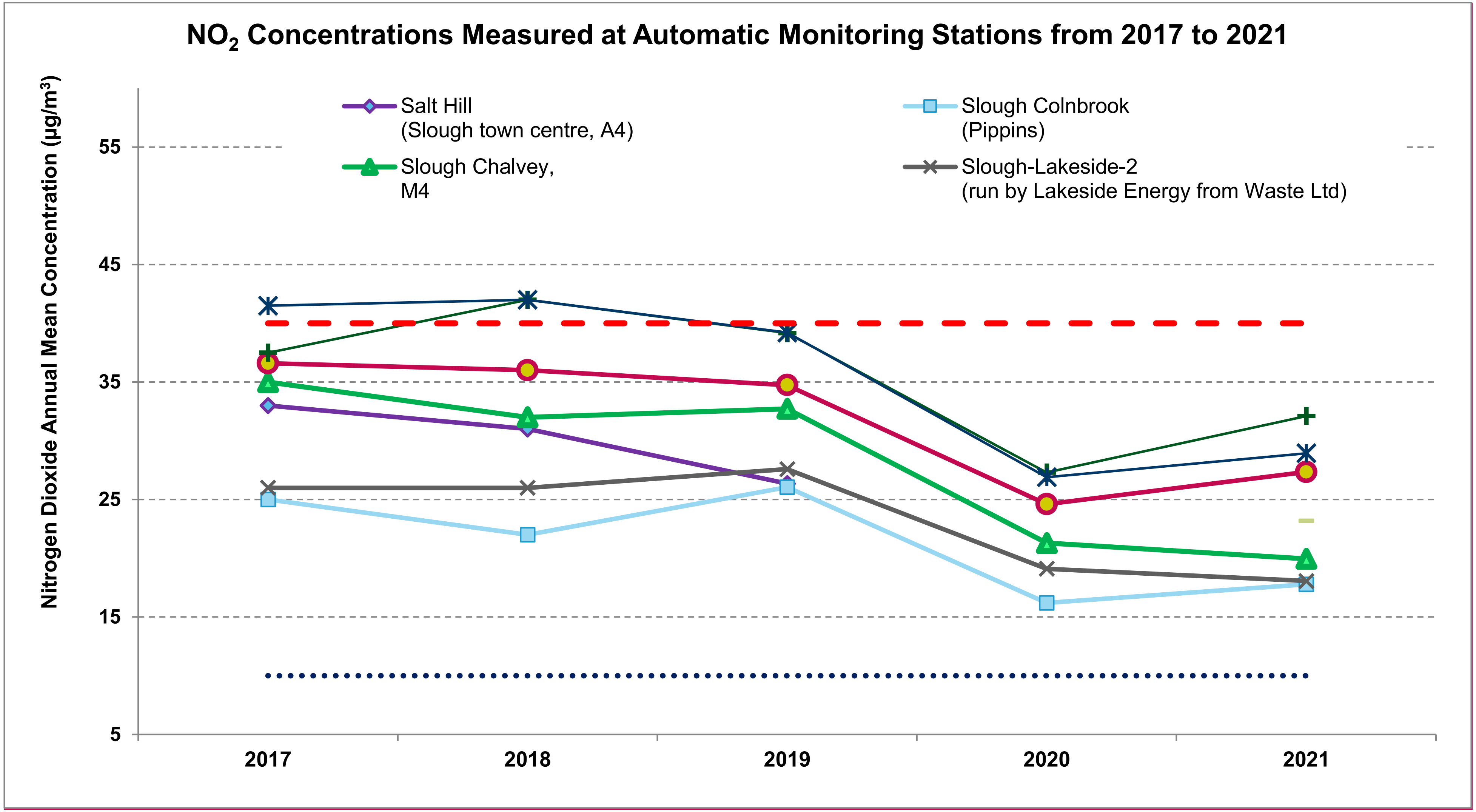


Figure A.2 – Trends in Annual Mean NO_2 Concentrations, Grouped by Location

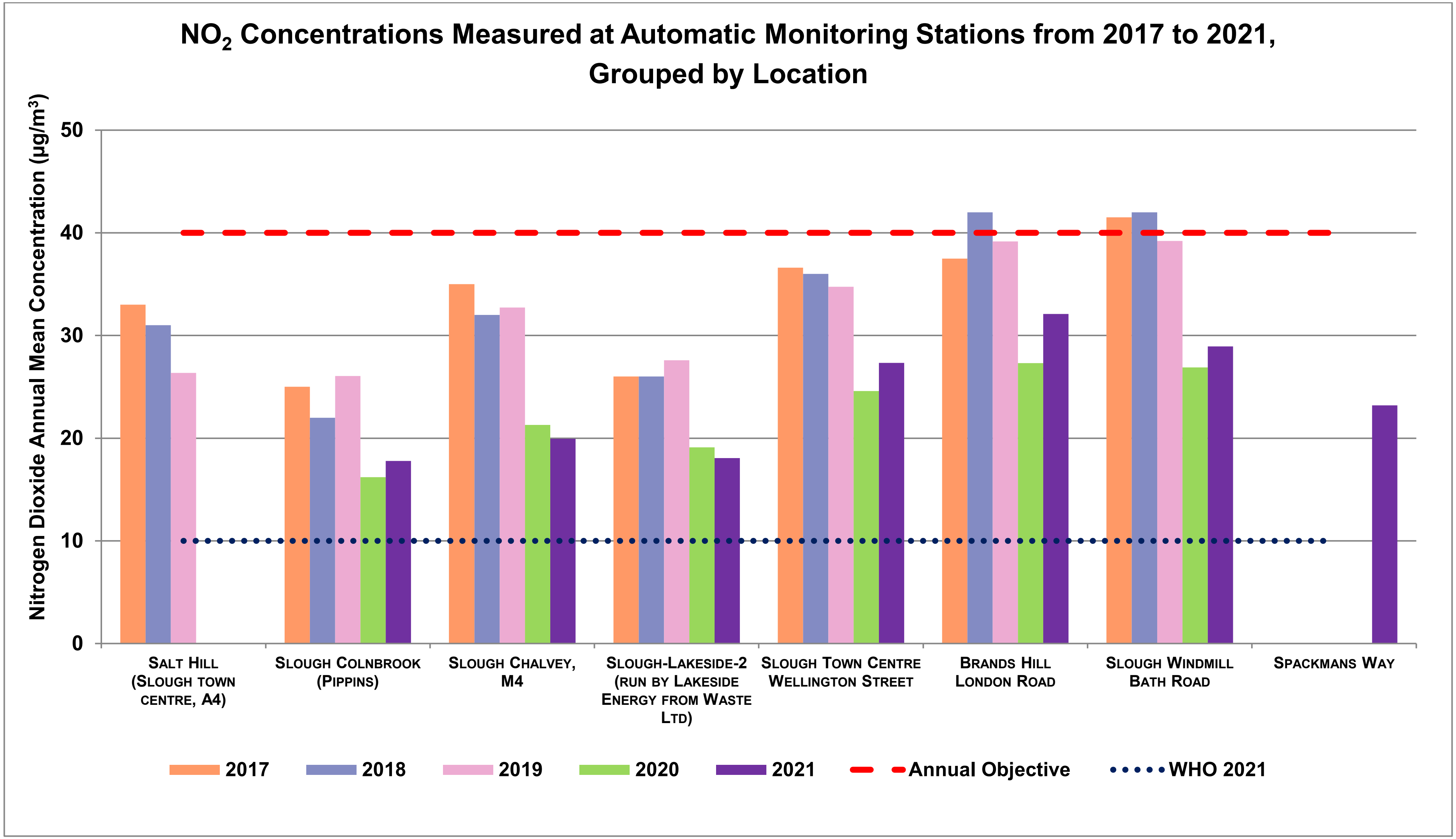


Figure A.3 – Trends in Annual Mean NO_2 Concentrations at AQMA 1

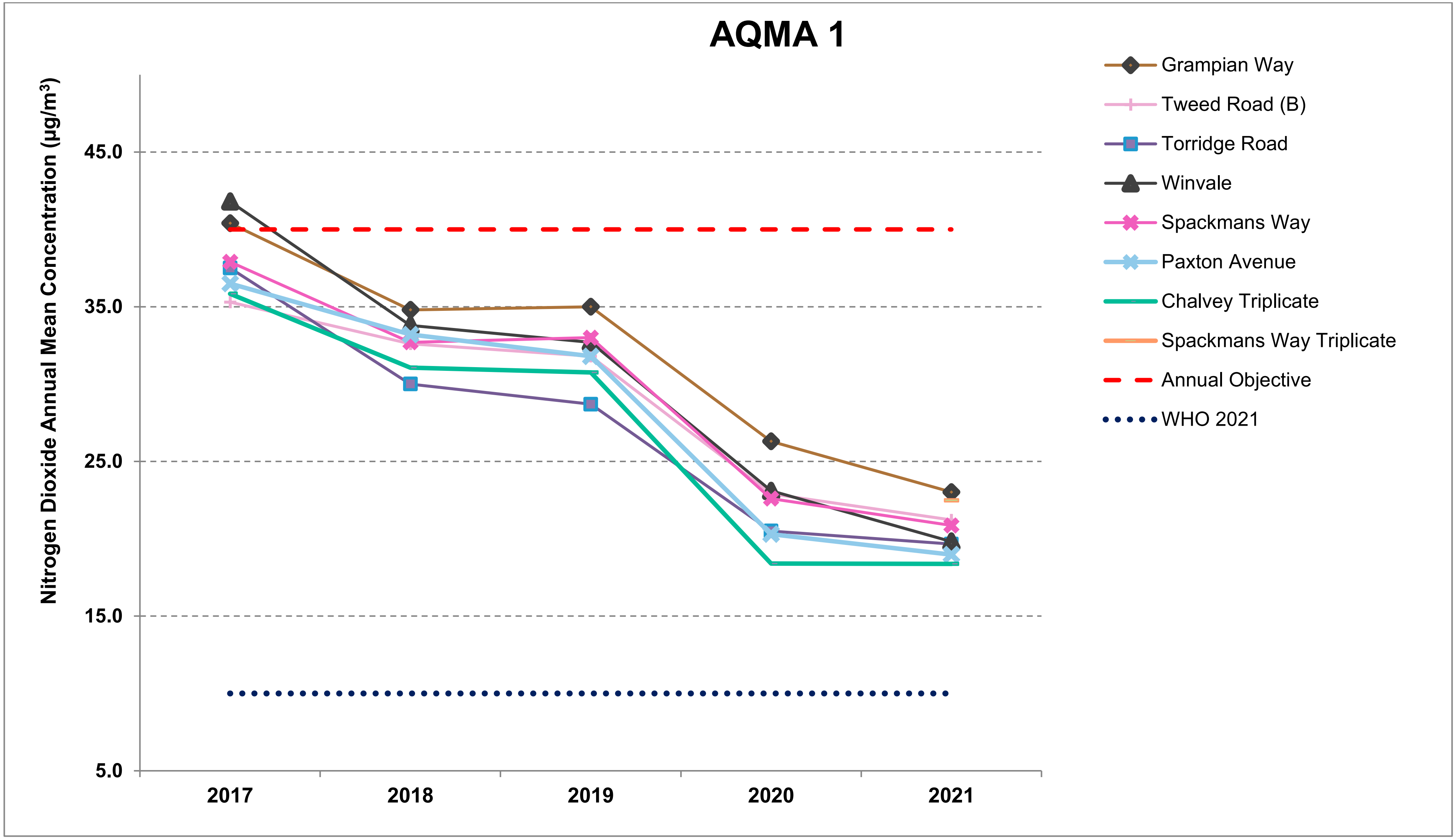


Figure A.4 - Trends in Annual Mean NO_2 Concentrations at AQMA 2

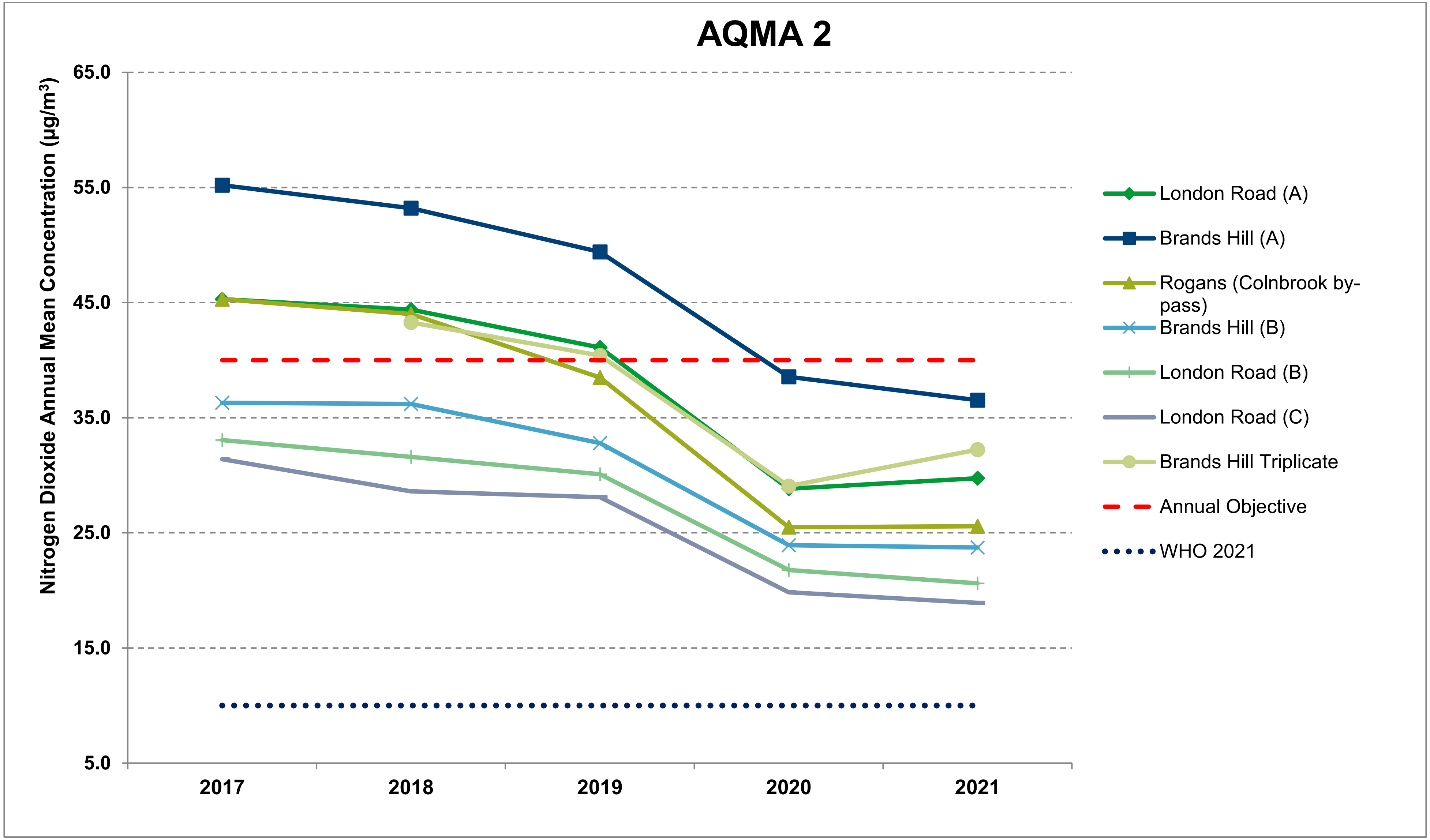


Figure A.5 - Trends in Annual Mean NO_2 Concentrations at AQMA 3 and AQMA 3 Extension

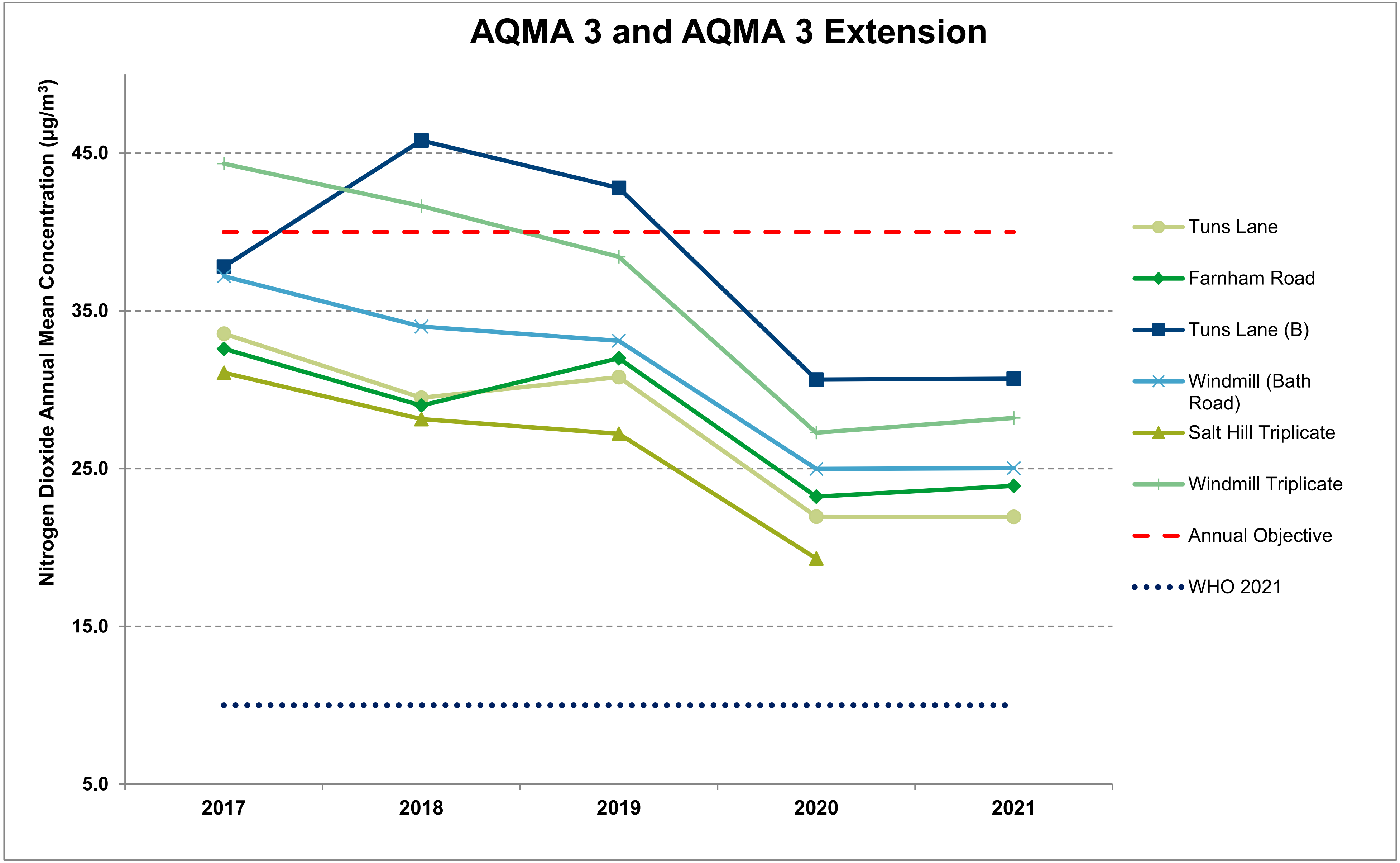


Figure A.6 – Trends in Annual Mean NO_2 Concentrations at AQMA 4

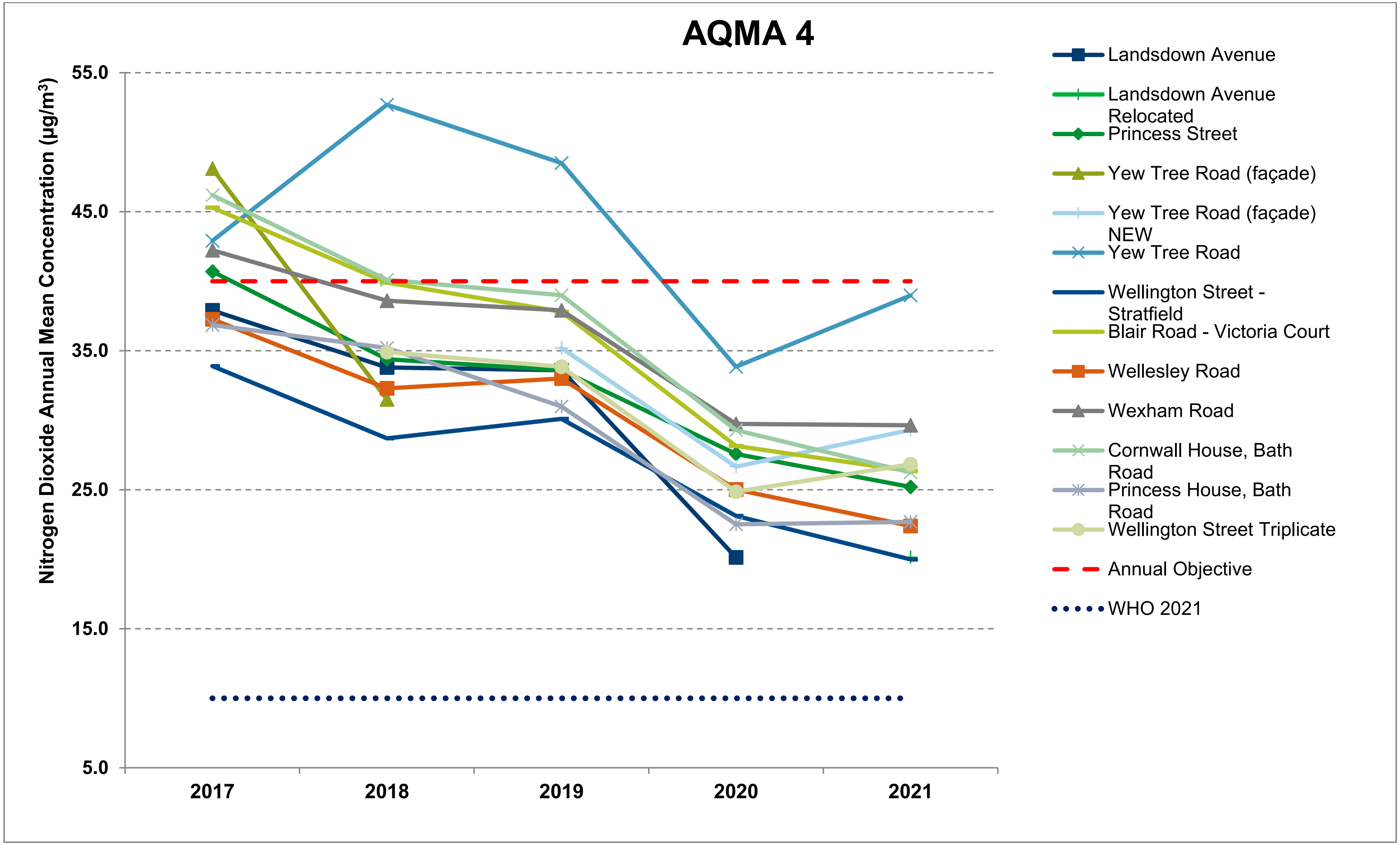


Figure A.7 – Trends in Annual Mean NO_2 Concentrations in Langley

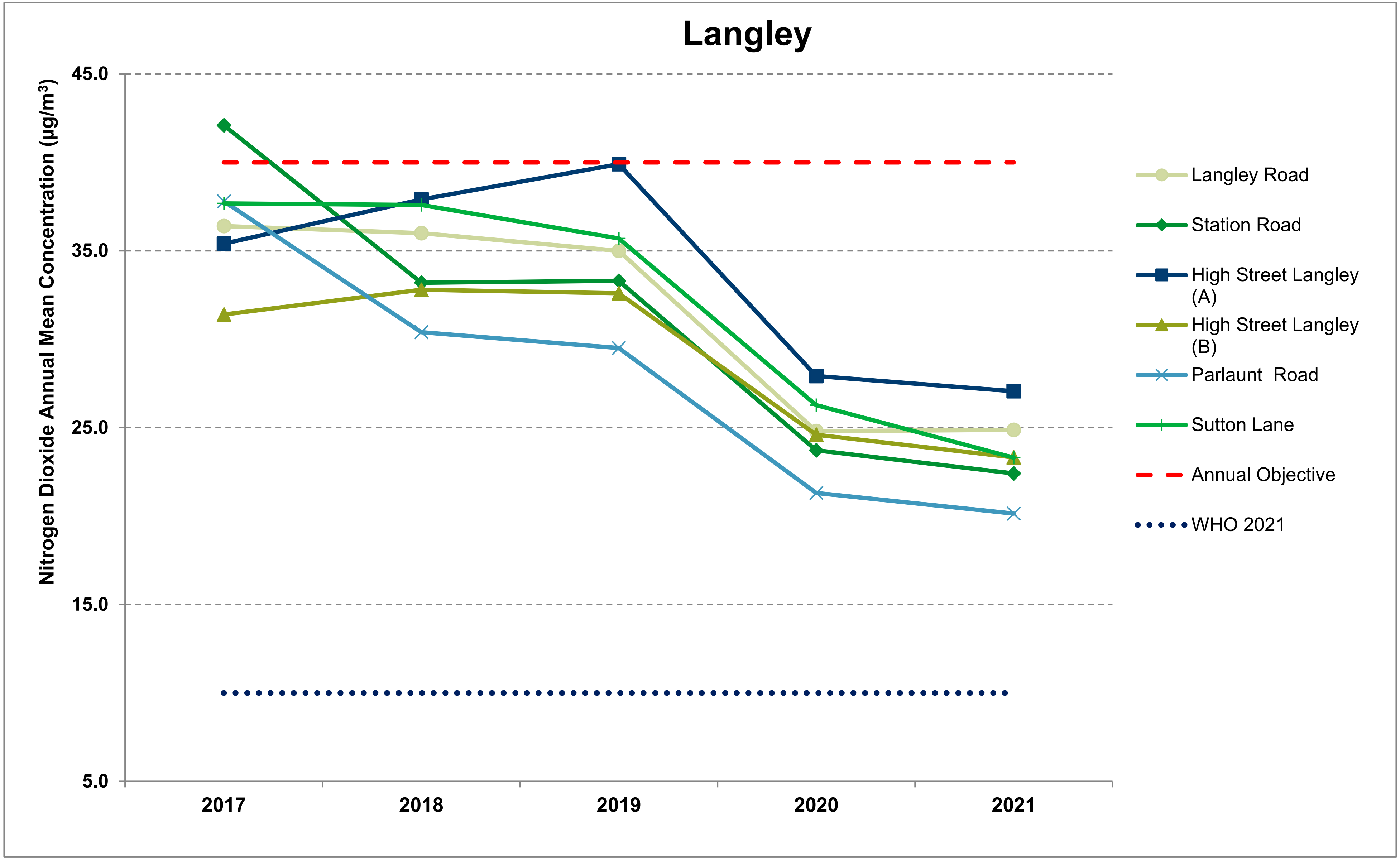


Figure A.8 – Trends in Annual Mean NO_2 Concentrations at Roadside and Kerbside Sites

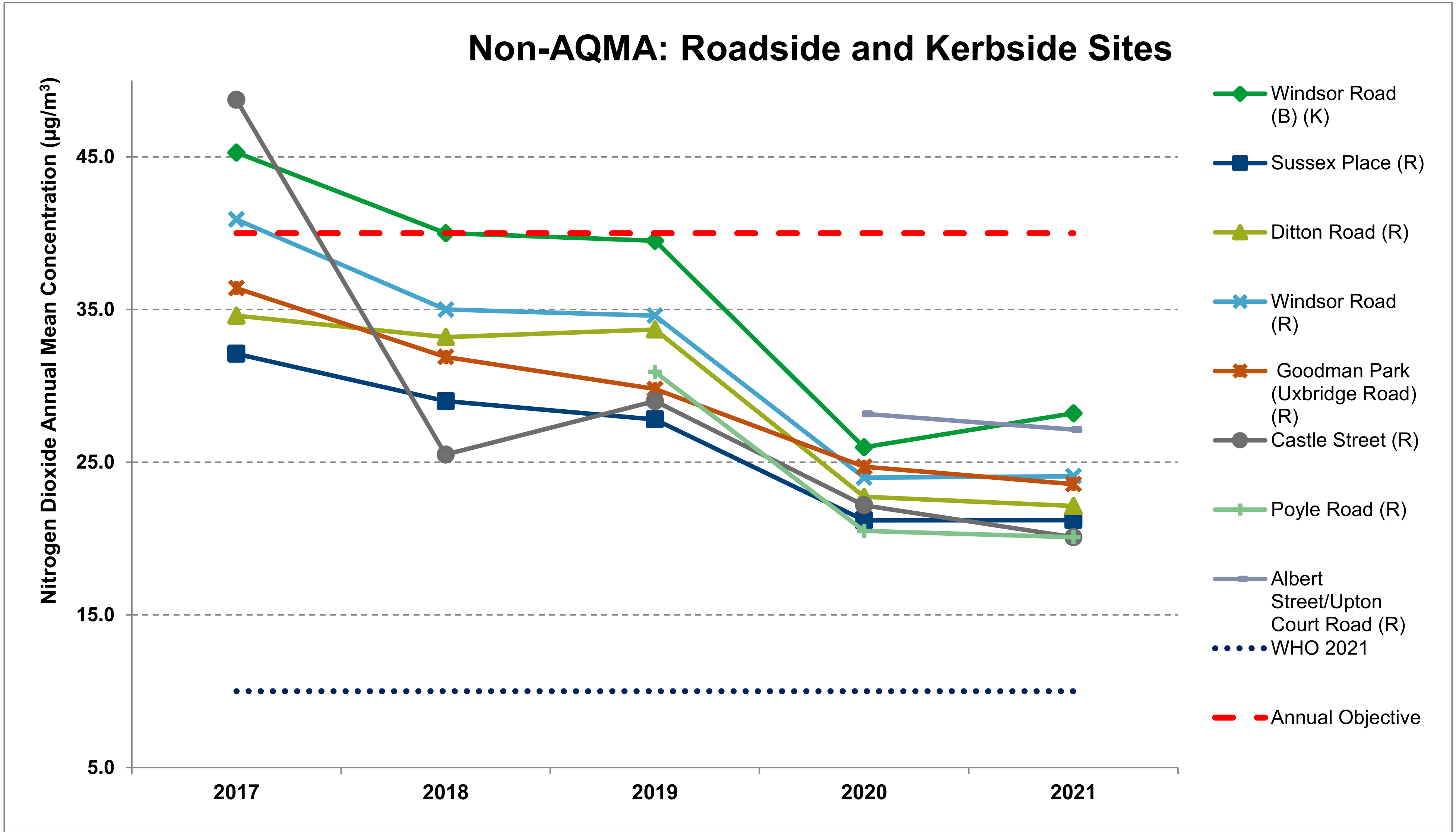


Figure A.9 – Trends in Annual Mean NO_2 Concentrations at Suburban and Urban Background Sites

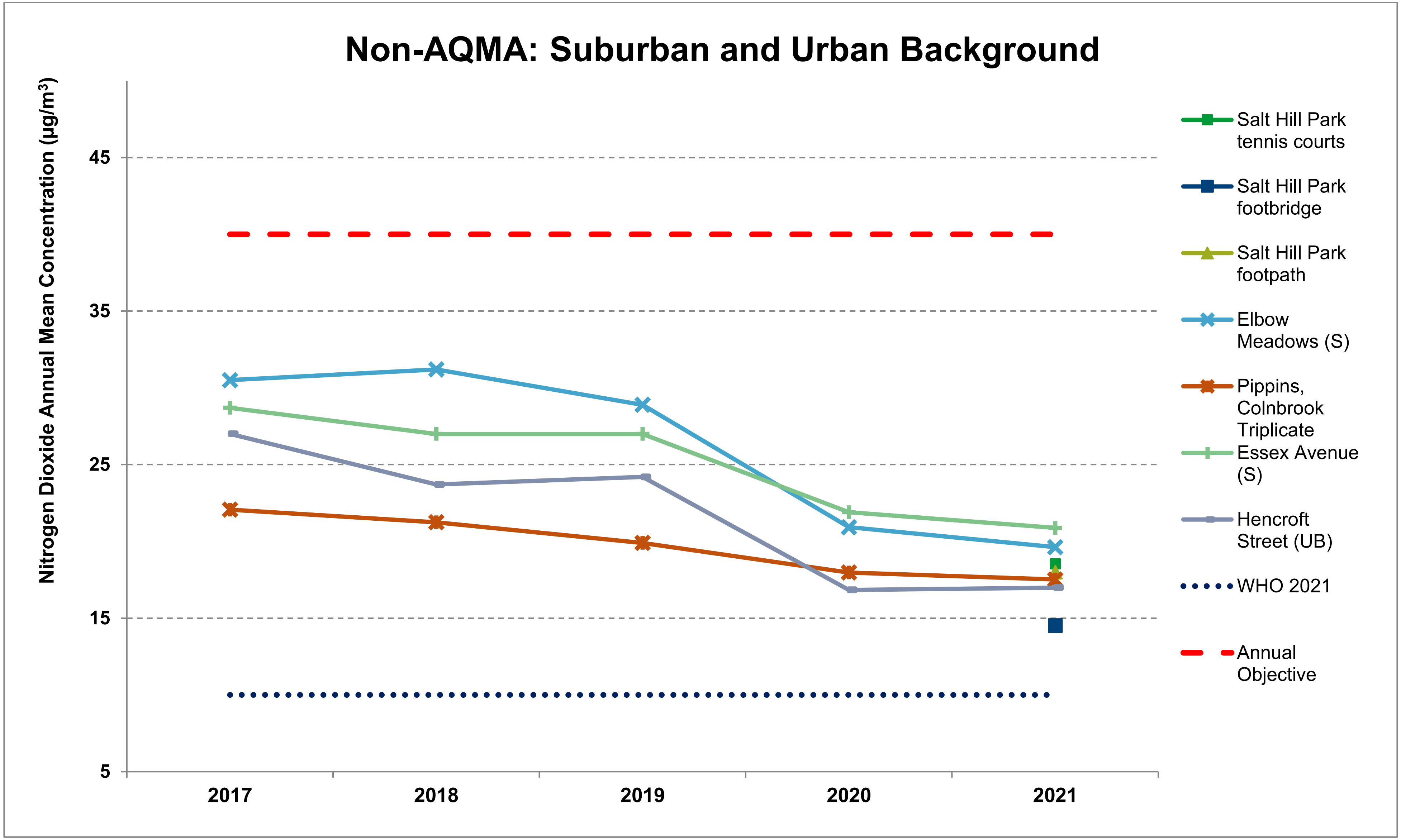


Figure A.10 – Trends in Annual Mean NO_2 Concentrations at Rail and Industrial Sites

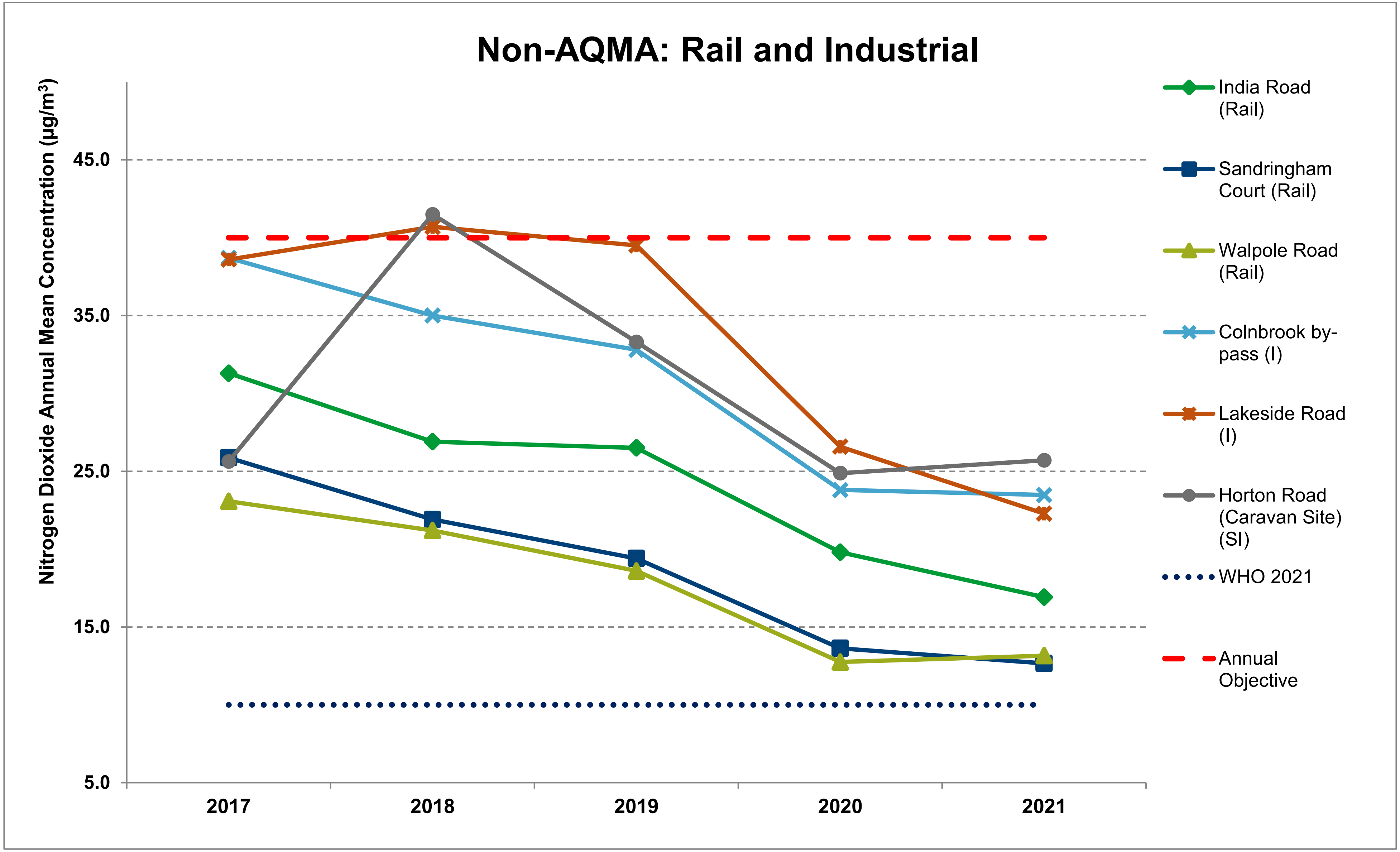


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SLH 3	503542	176827	Suburban	99.7	99.7	0	0	0	0	0
SLH 4	496599	180156	Urban Background	-	-	0	0	**0 (88)**	-	-
SLH 7	496562	179109	Other	99	81.2	0	0	0	0	**0 (78.6)**
SLH 8	503569	77385	Industrial	99.7	99.7	0	0	0	0	0
SLH 10	498413	179804	Roadside	98.6	98.6	**0 (114)**	0	0	0	0
SLH 11	501643	177753	Roadside	98.1	98.1	**0 (121)**	0	0	0	0
SLH 12	496528	180171	Roadside	99.1	99.1	**0 (117)**	0	0	0	1
SLH 13	496447	179117	Other	97.5	25.1	-	-	-	-	**0 (72.9)**

Notes:

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

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

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

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SLH 3	503542	176827	Suburban	97.7	97.7	16	18	16.4	17	15.2
SLH 4	496599	180156	Urban Background	-	-	18	16.9	18.3	-	-
SLH 5	503551	177258	Industrial	-	-	14	14.4	12	-	-
SLH 6	503542	176827	Urban Background	-	-	16	10.3	15	-	-
SLH 8	503569	77385	Industrial	99.5	99.5	14	13.7	15	14	12.4
SLH 9	503569	77385	Urban Background	81.2	81.2	17	14.8	14	16.7	12.6
SLH 11	501643	177753	Roadside	95.0	95.0	27.9	28.8	28	25.4	24.4
SLH 12	496528	180171	Roadside	98.0	98.0	24.4	23.9	23.4	18.9	18.7
SLH 13	496447	179117	Other	97.0	25.0	-	-	-	-	13.3

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

Notes:

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

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

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

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

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

Figure A.11 – Trends in Annual Mean PM_{10} Concentrations

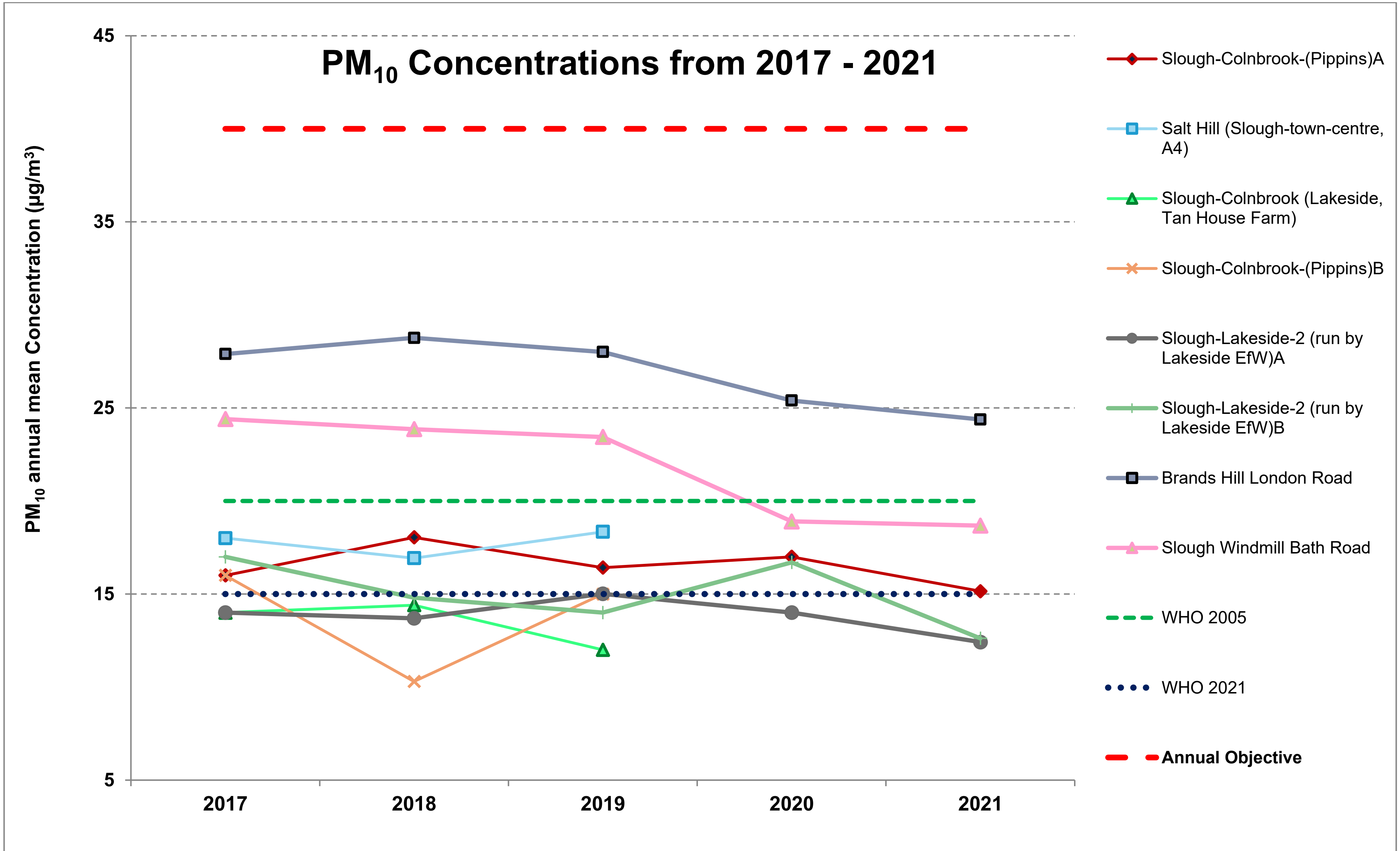


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SLH 3	503542	176827	Suburban	97.7	97.7	5	1	3	0	0
SLH 4	496599	180156	Urban Background	-	-	3	1	**3 (32)**	**-**	**-**
SLH 5	503551	177258	Industrial	-	-	1	1	0 (19)	-	-
SLH 6	503542	176827	Urban Background	-	-	5	0	0 (24)	-	-
SLH 8	503569	77385	Industrial	99.5	99.5	3	1	3	0	0
SLH 9	503569	77385	Urban Background	81.2	81.2	9	1	0 (24)	4	2 (23.2)
SLH 11	501643	177753	Roadside	95	95	5 (36)	25	23	19	14
SLH 12	496528	180171	Roadside	98	98	5 (36)	11	15	7	4
SLH 13	496447	179117	Other	97	25	-	-	-	-	0 (21.3)

Notes:

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

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

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

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

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

Figure A.12 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m³

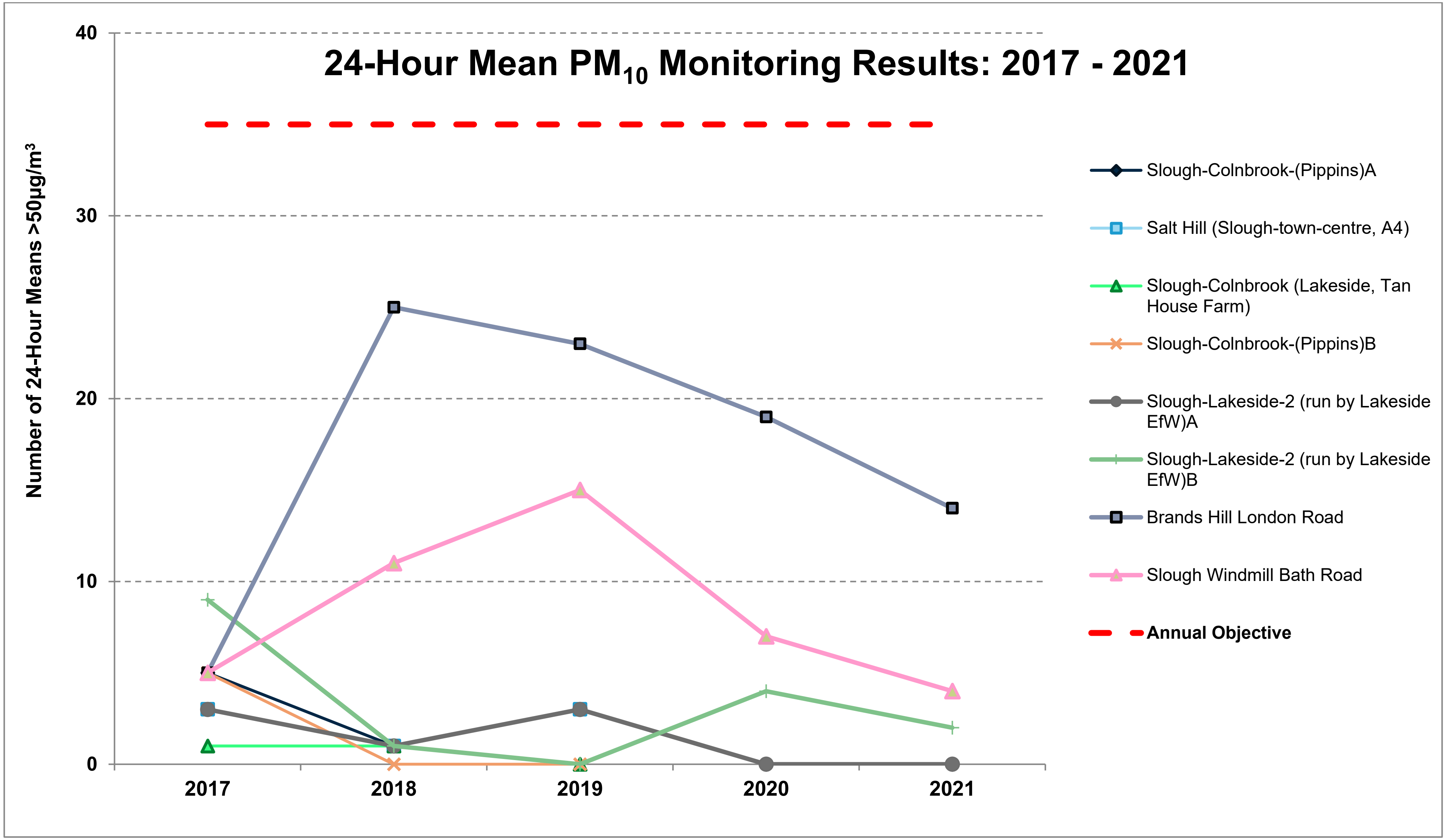


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SLH 5	503551	177258	Industrial	-	-	6	6.2	6	-	-
SLH 6	503542	176827	Suburban	-	-	7	6.1	7	-	-
SLH 9	503569	77385	Industrial	76.8%	76.8%	7	6.9	7	5.5	5.5

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

Notes:

The annual mean concentrations are presented as µg/m³.

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

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

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

Table A.8.1 – Annual Mean $PM_{2.5}$ from PM_{10} Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	2017	2018	2019	2020	2021
SLH 3	503542	176827	Suburban	11.2	12.6	11.5	11.9	10.6
SLH 4	496599	180156	Urban Background	12.6	11.8	12.8		
SLH 5	503551	177258	Industrial	9.8	10.1	8.4		
SLH 6	503542	176827	Urban Background	11.2	7.2	10.5		
SLH 8	503569	77385	Industrial	9.8	9.6	10.5	9.8	8.7
SLH 9	503569	77385	Urban Background	11.9	10.4	9.8	11.7	8.8
SLH 11	501643	177753	Roadside	19.5	20.1	19.6	17.8	17.1
SLH 12	496528	180171	Roadside	17.1	16.7	16.4	13.2	13.1
SLH 13	496447	179117	Other					9.3

Figure A.13 – Trends in Annual Mean $PM_{2.5}$ Concentrations

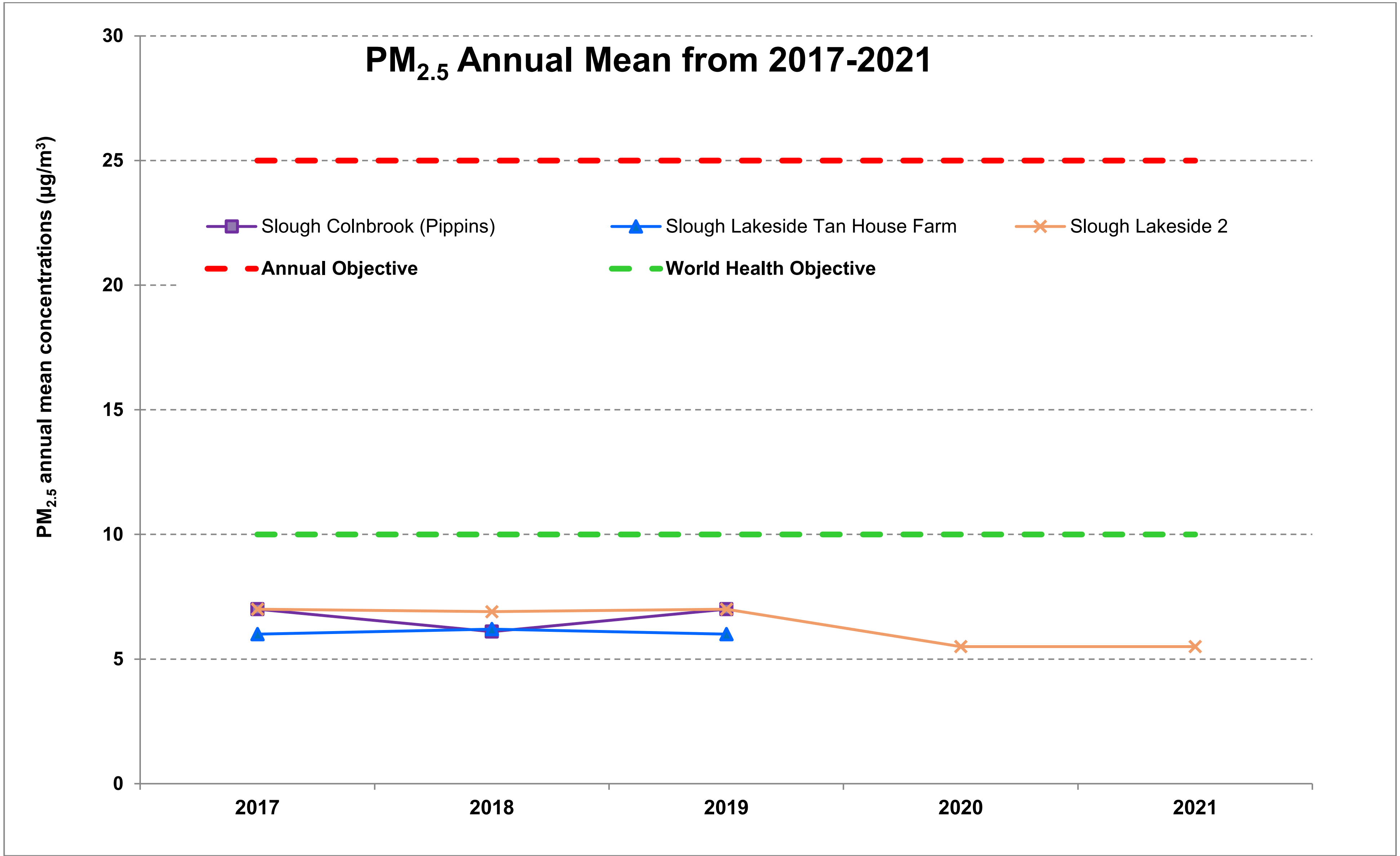
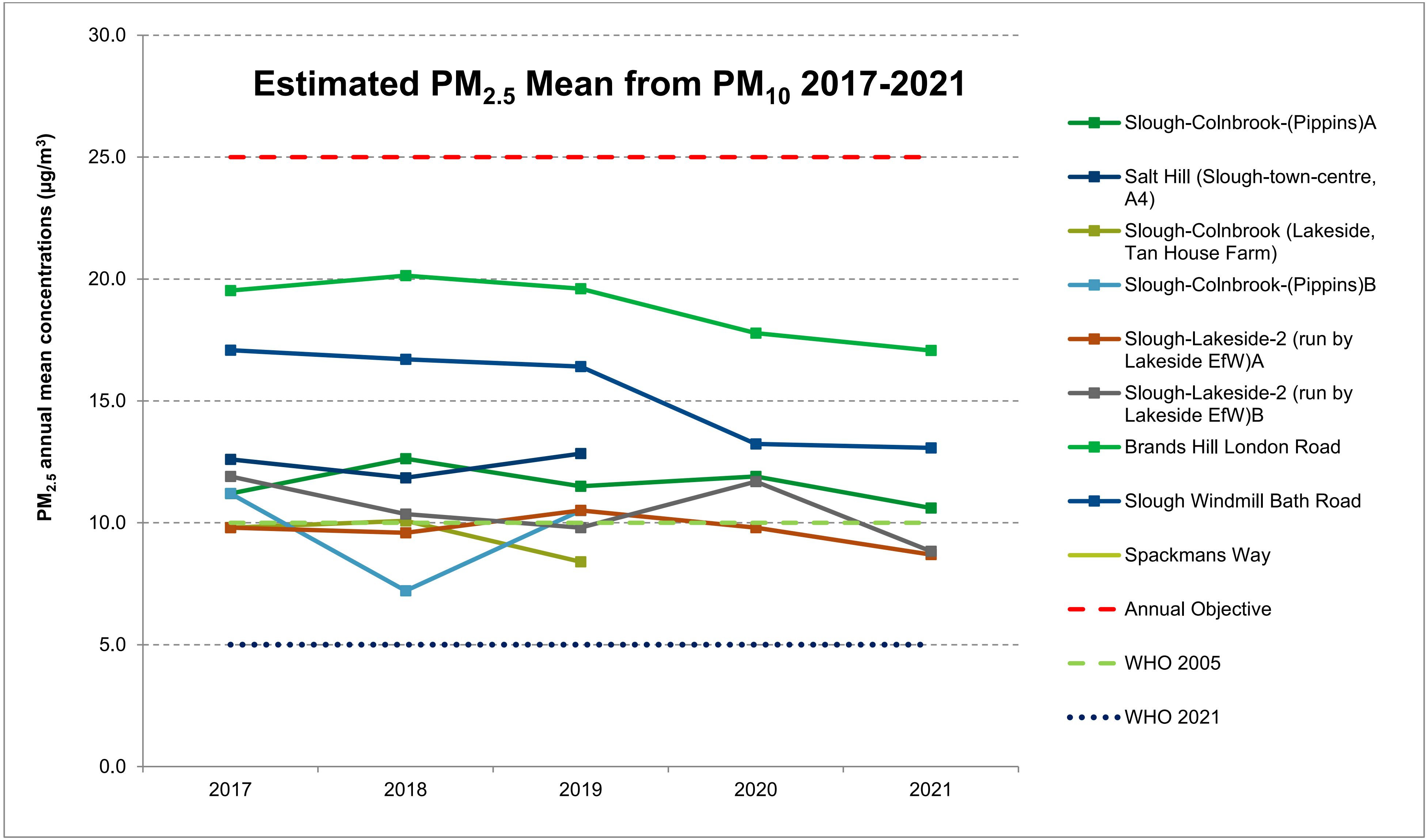


Figure A.14 – $PM_{2.5}$ Estimated from PM_{10} Results from 2017 to 2021



Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m³)

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
SLO 1 Relocated	496904	180187	28.8		24.0	18.7	20.2	15.7	17.8	15.2	20.5	23.1	27.3	27.5	22.3	18.5		
SLO 2 Relocated	496785	180336	22.2			17.5	13.4	11.5	13.6	11.7	17.3	19.5	21.2	20.9	17.5	14.5		
SLO 3 Relocated	496665	180236	27.6		22.2	17.8	18.0		15.2		18.1	21.2	24.8	25.0	21.7	18.0		
SLO 4 Relocated	497185	180050	26.2		24.3			19.1	21.0	18.3	23.5	27.2	30.7	25.8	24.3	20.2		
SLO 5	498541	179815	35.1		32.9	26.3	25.6	23.7	28.2	23.0	35.1	41.0	37.9	21.7	30.4	25.2		
SLO 6	498784	179560	28.3		27.5	24.1	21.3	19.3	23.5	18.5	23.2	31.3	33.5	27.5	25.5	21.2		
SLO 7	503196	177349	33.2		21.7	27.9	24.9	21.9	25.5	20.1	30.4	32.7	31.6	32.8	28.3	23.5		
SLO 8	501382	178101	31.8		28.7	26.6	24.2	17.4	26.9	22.8	29.3	34.2	26.9	30.6	27.7	23.0		
SLO 9	501501	177879	28.4		28.7	24.0	23.3	20.2	21.8	17.4	25.3	28.7	31.2	29.3	25.6	21.2		
SLO 10	501733	177725	40.4		37.0	37.9	29.1	32.6	36.5	27.2	37.3	35.8	39.9	34.0	35.8	29.7		
SLO 11	501637	177999	29.9		23.7	26.5	20.4	18.5	19.3	14.8	22.9	24.0	27.3	25.3	23.7	19.7		
SLO 12	503877	177459	32.9		28.1	21.7	24.3	24.1	24.6	19.9	30.0	29.8	25.5	28.2	26.8	22.3		
SLO 13	503856	176538	26.8		22.8	29.0	22.0	20.9	21.8	18.6	18.1	24.9	26.1	24.5	23.6	19.6		
SLO 14	503542	176827	26.8		20.2	21.4	16.7	14.0	18.9	13.0	25.4	23.9	23.2	23.9	-	-		Triplicate Site with SLO 14, SLO 15 and SLO 16 - Annual data provided for SLO 16 only
SLO 15	503542	176827	23.8		20.3	20.8	18.2	14.9	18.7	13.5	21.1	22.8	22.4	25.9	-	-		Triplicate Site with SLO 14, SLO 15 and SLO 16 - Annual data provided for SLO 16 only
SLO 16	503542	176827	25.9		19.8	22.0	17.7	14.7	18.8	14.1	23.5	22.6	22.2	25.1	21.1	17.5		Triplicate Site with SLO 14, SLO 15 and SLO 16 - Annual data provided for SLO 16 only
SLO 17	503136	175654	33.3		30.8	39.2	31.1	30.9	29.5	20.1	28.0	30.1	35.0	29.1	31.0	25.7		
SLO 18	501798	177659	47.7		40.3	46.1	42.1	47.9	48.8	41.1	47.0	39.8	42.5	35.8	44.0	36.5	31.6	
SLO 19	500851	177890	29.9		27.2	29.4	21.6	23.1	25.8	20.6	27.4	27.9	28.4	26.9	26.7	22.1		
SLO 20	497925	179450	24.3		19.8	19.7	16.7	15.9							20.3	17.0		
SLO 21	497457	179566	31.0		29.0	29.1	23.9	22.9	28.1	24.7	32.4	31.5	32.0	30.7	29.0	24.1		
SLO 22	497488	179090	26.3		26.9	23.4	18.6	18.5	20.2	17.2	22.4	27.1	31.2	28.0	23.9	19.8		
SLO 23	496416	180126	28.4		27.2	30.1	23.8	24.2	25.0	20.3	24.4	26.1	30.2	27.8	26.4	21.9		
SLO 24	496272	179187	28.7		27.0	23.9	21.6	20.2	22.4	19.1	24.1	29.6	29.5	26.6	25.1	20.9		
SLO 25	496050	179258	24.8		24.9	22.2	23.5	15.6	20.8	15.4	22.9	27.3	24.8	26.6	22.9	19.0		
SLO 26	498473	179706	33.0		35.2	41.1	31.4	38.1	36.1	32.0	34.5	34.6	38.8	34.7	35.3	29.3		
SLO 27	498681	179972	25.1		23.5	14.2	19.3	15.0							20.2	16.9		
SLO 28	501941	177633	32.5		31.6	30.9	24.8	28.5	26.0	25.0	33.6	33.9	37.6	32.3	30.8	25.6		
SLO 29	498483	179707	44.2		51.6	53.5	49.0	53.2	48.1	44.7	45.7	51.5	58.5	23.8	47.0	39.0	32.2	
SLO 30	496397	180341				25.0		22.1		20.7	29.1		31.8		25.8	23.9		
SLO 31	496200	181900	27.2		26.7	24.9	21.8	21.4							24.9	20.9		
SLO 32	501853	177620	30.4		28.5	36.4	23.5	30.7	27.8	24.9	30.5	26.7	28.7	23.0	28.6	23.7		
SLO 33	498168	179907	26.9		27.1	24.2	21.9	17.1	18.8	17.5	23.5	28.7	30.9	25.6	24.1	20.0		
SLO 34	496562	179109	25.9		21.7	21.3	23.1								-	-		Triplicate Site with SLO 34, SLO 35 and SLO 36 - Annual data provided for SLO 36 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
SLO 35	496562	179109	26.3		23.8	20.4	22.6								-	-		Triplicate Site with SLO 34, SLO 35 and SLO 36 - Annual data provided for SLO 36 only
SLO 36	496562	179109	24.4		23.4	20.8	23.0								23.5	18.4		Triplicate Site with SLO 34, SLO 35 and SLO 36 - Annual data provided for SLO 36 only
SLO 34 Relocated	496447	179117							21.7	20.2	25.7	31.0	32.2	30.5	-	-		Triplicate Site with SLO 34 Relocated, SLO 35 Relocated and SLO 36 Relocated - Annual data provided for SLO 36 Relocated only
SLO 35 Relocated	496447	179117							23.8	20.2	28.2	31.5	30.9	31.6	-	-		Triplicate Site with SLO 34 Relocated, SLO 35 Relocated and SLO 36 Relocated - Annual data provided for SLO 36 Relocated only
SLO 36 Relocated	496447	179117							23.6	19.2	27.1	29.6	31.7	31.3	27.3	22.5		Triplicate Site with SLO 34 Relocated, SLO 35 Relocated and SLO 36 Relocated - Annual data provided for SLO 36 Relocated only
SLO 37	497105	180081	34.0		34.0	29.4	31.2	28.0	28.1	25.2	31.3	34.9	34.5	36.2	31.7	26.3		
SLO 38	498071	179949	29.4		29.0	25.2	24.7	20.0	24.3	19.3	25.3	30.6	33.2	32.6	27.0	22.4		
SLO 39	501734	177733	28.1		23.9	26.3	23.7	20.5	23.3	17.7	24.3	26.5	29.7	24.8	24.8	20.6		
SLO 40	498394	179849	34.2		34.7	33.8	35.4	33.3	34.4	28.7	37.1	41.1	42.2	38.8	35.7	29.6		
SLO 41	493960	181355	18.6		15.3	14.0	13.0	10.8							15.1	12.7		
SLO 42	493493	181378				14.7	13.3	11.0							13.1	13.2		
SLO 43	496533	180175	32.1		30.9	30.9	27.8	29.9	26.8	26.1	28.0	31.2	36.7	29.6	30.2	25.0		
SLO 44	498961	180113	30.6		32.2	27.0	24.0	24.0	23.7	23.0	27.7	33.2	33.1	31.7	28.4	23.6		
SLO 45	501658	177781	24.8		23.6	22.6	20.8	18.5							22.6	18.9		
SLO 46	497467	179971	34.2		33.4	33.0	33.6	27.1	29.7	26.5	19.1	38.1	36.0	35.4	31.6	26.3		
SLO 47	497326	180003	28.6		29.9		26.1	26.4	24.3	19.6	29.7	30.7	29.6	27.5	27.3	22.7		
SLO 48	497960	179243	26.8		25.4	23.3	22.3	18.8							24.0	20.1		
SLO 49	497397	179471	34.1			34.2	30.9	33.1	31.3	32.1	36.4	34.8	42.0	31.1	34.0	28.2		
SLO 50	496377	179929	35.1		36.9	36.2	37.1	37.2	35.2	31.0	39.3	39.8	40.2	40.1	37.0	30.7		
SLO 51	501014	179316	30.2		26.9	32.6	28.7	27.7	27.8	19.9	29.9	32.8	36.6	33.9	30.0	24.9		
SLO 52	501161	179538	29.5		28.7	30.2	24.8	23.7	24.5	19.2	26.7	29.0	29.6	27.4	27.0	22.4		
SLO 53	501208	178799	34.9		39.0	30.8	33.1	30.2	32.6	28.2	34.8	39.2	35.0	21.5	32.6	27.1		
SLO 54	501256	179067	28.9		31.6	23.2	22.4	23.2	26.6	21.6	30.9	34.4	34.2	31.2	28.1	23.3		
SLO 55	501891	178954	26.9		21.7	25.6	19.0	19.9		19.6	25.0	26.7	30.0	23.7	24.3	20.1		
SLO 56	502241	178679	31.4		28.6	25.5	26.9	22.3	26.9	20.3	27.5	30.9	32.3	32.0	28.1	23.3		
SLO 57	469528	180171	33.1			33.8	29.8	36.6	30.0	29.1	33.9	34.6	43.8	36.8	-	-		Triplicate Site with SLO 57, SLO 58 and SLO 59 - Annual data provided for SLO 59 only
SLO 58	469528	180171	32.2		33.2	34.4	31.7	34.5	31.3	29.7	33.7	32.9	39.2	36.8	-	-		Triplicate Site with SLO 57, SLO 58 and SLO 59 - Annual data provided for SLO 59 only
SLO 59	469528	180171	32.8		34.4	34.9	31.8	33.8	30.4	29.8	34.4	37.4	45.3	35.1	34.0	28.2		Triplicate Site with SLO 57, SLO 58 and SLO 59 - Annual data provided for SLO 59 only

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SLO 60	498413	179804	32.6		31.1	34.9	25.7	29.6	30.2	24.0	28.9	35.9	39.9	32.8	-	-		Triplicate Site with SLO 60, SLO 61 and SLO 62 - Annual data provided for SLO 62 only
SLO 61	498413	179804	32.3		31.5	33.0	31.0	30.4	30.8	23.6	33.7	36.7	36.2	34.1	-	-		Triplicate Site with SLO 60, SLO 61 and SLO 62 - Annual data provided for SLO 62 only
SLO 62	498413	179804	31.9		30.3	35.5	29.0	32.0	31.6	25.5	34.5	35.4	38.6	38.6	32.3	26.8		Triplicate Site with SLO 60, SLO 61 and SLO 62 - Annual data provided for SLO 62 only
SLO 63	501643	177753	29.5		37.2	39.1	37.7	38.2		33.6	47.7	44.4	46.3	40.1	-	-		Triplicate Site with SLO 63, SLO 64 and SLO 65 - Annual data provided for SLO 65 only
SLO 64	501643	177753	29.0		34.6	36.2	37.4	40.7		34.0	38.9	51.1	46.6	39.3	-	-		Triplicate Site with SLO 63, SLO 64 and SLO 65 - Annual data provided for SLO 65 only
SLO 65	501643	177753	30.0		37.0	37.4	36.8	40.9		36.3	50.4	53.8	46.0	40.2	38.8	32.2		Triplicate Site with SLO 63, SLO 64 and SLO 65 - Annual data provided for SLO 65 only
SLO 66	496146	179259	28.0		24.8	23.3	26.6	20.0	25.4	18.6	29.2	29.6	25.2	27.5	-	-		Triplicate Site with SLO 66, SLO 67 and SLO 68 - Annual data provided for SLO 68 only
SLO 67	496146	179259			25.4	24.7	26.4	19.3	25.7	19.2	27.3	27.4	24.6	17.7	-	-		Triplicate Site with SLO 66, SLO 67 and SLO 68 - Annual data provided for SLO 68 only
SLO 68	496146	179259			24.8		27.9	19.3	22.8	18.3	24.8	29.2	27.3	25.8	25.0	20.8		Triplicate Site with SLO 66, SLO 67 and SLO 68 - Annual data provided for SLO 68 only
SLO 69	496223	179217	26.7		30.2	22.2	28.1	23.1	23.6	21.7	25.2	29.5	34.3	27.3	-	-		Triplicate Site with SLO 69, SLO 70 and SLO 71 - Annual data provided for SLO 71 only
SLO 70	496223	179217	26.2		29.6	22.0	26.7	21.1	21.7	21.4	26.2	29.8	33.8	28.1	-	-		Triplicate Site with SLO 69, SLO 70 and SLO 71 - Annual data provided for SLO 71 only
SLO 71	496223	179217	26.3		29.6	23.5	23.6	21.8	23.0	21.9	26.9	30.4	30.4	26.8	26.0	21.6		Triplicate Site with SLO 69, SLO 70 and SLO 71 - Annual data provided for SLO 71 only
SLO 72	496225	179213	22.2		28.4	23.5	25.0	21.5	22.7	20.6	20.5	29.9	33.0	28.6	-	-		Triplicate Site with SLO 72, SLO 73 and SLO 74 - Annual data provided for SLO 74 only
SLO 73	496225	179213	24.8		29.9	23.9	29.9	22.6	22.7	21.9	24.1	28.5	34.8	28.6	-	-		Triplicate Site with SLO 72, SLO 73 and SLO 74 - Annual data provided for SLO 74 only
SLO 74	496225	179213	26.2		28.7	23.9	25.6	23.1	21.7	20.4	24.2	29.1	29.8	24.3	25.4	21.1		Triplicate Site with SLO 72, SLO 73 and SLO 74 - Annual data provided for SLO 74 only
SLO 75	496227	179207	23.2		26.9	20.8	25.4	21.9	23.3	21.0	23.2	28.9	32.3	27.0	-	-		Triplicate Site with SLO 75, SLO 76 and SLO 77 - Annual data provided for SLO 77 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
SLO 76	496227	179207	25.5		25.8	20.7	23.9	21.4	22.4	19.8	23.7	28.4	32.8	27.9	-	-		Triplicate Site with SLO 75, SLO 76 and SLO 77 - Annual data provided for SLO 77 only
SLO 77	496227	179207	24.3		27.3	22.7	23.3	19.7	19.9	19.9	25.7	28.3	31.1	23.8	24.5	20.3		Triplicate Site with SLO 75, SLO 76 and SLO 77 - Annual data provided for SLO 77 only
SLO 78	496229	179204	26.0		28.9	24.6	28.0	24.0	23.4	21.7	27.6	32.5	32.7	30.2	-	-		Triplicate Site with SLO 78, SLO 79 and SLO 80 - Annual data provided for SLO 80 only
SLO 79	496229	179204	28.0		30.1	25.0	22.9	23.8	23.4	21.4	27.3	29.2	31.7	28.8	-	-		Triplicate Site with SLO 78, SLO 79 and SLO 80 - Annual data provided for SLO 80 only
SLO 80	496229	179204	25.5		27.1	25.2	25.5	23.7		21.4	27.3	30.1	33.2	29.8	26.7	22.2		Triplicate Site with SLO 78, SLO 79 and SLO 80 - Annual data provided for SLO 80 only
SLO 81	496232	179199	25.5		26.2	23.8	23.9	21.3	20.7	20.5	25.8	29.5	33.1	28.7	-	-		Triplicate Site with SLO 81, SLO 82 and SLO 83 - Annual data provided for SLO 83 only
SLO 82	496232	179199	24.8		26.7	20.0	24.7	21.5	23.0	20.4	26.1	28.4	37.3	27.0	-	-		Triplicate Site with SLO 81, SLO 82 and SLO 83 - Annual data provided for SLO 83 only
SLO 83	496232	179199	26.1		26.0	22.5	24.0	22.1	23.6	20.1	25.0	29.9	33.2	27.7	25.4	21.1		Triplicate Site with SLO 81, SLO 82 and SLO 83 - Annual data provided for SLO 83 only
SLO 84	496234	179195	30.6		29.6	24.3	26.2	21.4	22.4	21.2	25.6	31.4	33.6	29.9	-	-		Triplicate Site with SLO 84, SLO 85 and SLO 86 - Annual data provided for SLO 86 only
SLO 85	496234	179195	26.1		30.6	24.1		22.7	22.7	21.5	26.4	30.1	35.1	27.7	-	-		Triplicate Site with SLO 84, SLO 85 and SLO 86 - Annual data provided for SLO 86 only
SLO 86	496234	179195	26.7		29.7	23.7	26.1	20.9	22.4	21.5	25.9	28.1	31.3	27.9	26.5	22.0		Triplicate Site with SLO 84, SLO 85 and SLO 86 - Annual data provided for SLO 86 only
SLO 87	496236	179191	30.6		29.5	23.0	22.9	20.3	21.8	22.2	25.7	31.5	34.1	28.6	-	-		Triplicate Site with SLO 87, SLO 88 and SLO 89 - Annual data provided for SLO 89 only
SLO 88	496236	179191	29.6		29.3	22.8	24.7	21.8	22.7	20.4	26.2	28.8	31.0	27.9	-	-		Triplicate Site with SLO 87, SLO 88 and SLO 89 - Annual data provided for SLO 89 only
SLO 89	496236	179191	29.9		28.1	24.2	24.4	21.1	23.3	20.3	25.4	29.2	31.4	26.1	26.3	21.8		Triplicate Site with SLO 87, SLO 88 and SLO 89 - Annual data provided for SLO 89 only
SLO 90	496238	179186			27.5	23.2	23.7	21.6	22.8	19.9	24.1	30.5	30.5	26.1	-	-		Triplicate Site with SLO 90, SLO 91 and SLO 92 - Annual data provided for SLO 92 only
SLO 91	496238	179186	28.1		27.9	22.9	25.0	22.6	24.4	20.4	26.1	28.3	30.5	26.8	-	-		Triplicate Site with SLO 90, SLO 91 and SLO 92 - Annual data provided for SLO 92 only

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SLO 92	496238	179186			28.3		23.8	22.1	23.7	21.4	26.5	31.2	33.3	27.9	25.9	21.5		Triplicate Site with SLO 90, SLO 91 and SLO 92 - Annual data provided for SLO 92 only
SLO 93	497433	179092	31.2		27.0	21.2	22.2	19.1	21.6	18.0	23.2	27.1	29.9	28.7	-	-		Triplicate Site with SLO 93, SLO 94 and SLO 95 - Annual data provided for SLO 95 only
SLO 94	497433	179092	28.7		23.2	22.2	20.7	16.1	19.4	17.4	23.8	27.2	29.3	26.3	-	-		Triplicate Site with SLO 93, SLO 94 and SLO 95 - Annual data provided for SLO 95 only
SLO 95	497433	179092	33.5		25.9	22.6	20.2	19.1	20.4	16.8	22.7	25.1	29.7	26.9	24.5	20.3		Triplicate Site with SLO 93, SLO 94 and SLO 95 - Annual data provided for SLO 95 only
SLO 96	503272	176597	24.8		23.2	24.9	23.1	21.5	24.4	17.1	25.2	27.3	26.2	26.5	24.2	20.1		
SLO 97	497725	179360	34.3		32.4	36.4	29.2	32.1	32.7	25.7	30.8		34.4	35.3	32.7	27.1		
SLO 98	503527	176823	27.0		20.6	21.8	17.8	13.5							21.6	18.1		
SLO 99	503510	176806	28.4		21.9	19.6	15.0	15.5							21.6	18.1		
SLO 100	503613	176912	21.0		18.2	19.3	15.7	13.7							18.3	15.4		
SLO 101	494101	180708	25.2		24.0	26.5	20.0	20.8							23.8	20.0		
SLO 102	494199	180637	20.8		16.7	16.2	13.0	10.9							16.6	13.9		
SLO 103	493784	180662	26.2		22.6	18.7	16.9	15.6							21.1	17.7		
SLO 104	493812	180572	23.4		19.7	17.6	19.1	14.2							19.6	16.4		
SLO 105	493592	180737	15.2		18.5	19.5	16.0	13.2							16.3	13.7		
SLO 106	495488	182538	23.7		19.1	17.4	17.3	13.1							19.2	16.1		
SLO 107	495457	182550	25.2		19.6	19.4	17.2	15.5							20.5	17.2		
SLO 108	495668	182430	21.2		15.4	12.5	13.9	10.2							15.8	13.2		
SLO 109	496526	182276	19.4		16.3	13.4	13.2	10.1							15.3	12.8		
SLO 110	496529	182243	22.9		23.0	16.4	18.1	15.0							19.6	16.4		
SLO 111	496489	182270	20.6			12.4	13.2	9.3							15.3	12.8		
SLO 112	497070	181108	32.1		28.5	29.7	29.2		30.3			32.9	36.1	33.2	31.6	24.5		
SLO 113	497079	181088	30.8		25.8	27.5	25.0	23.4	25.1	21.4	29.9	30.7	34.3	30.3	28.0	23.3		
SLO 114	497677	180876	36.8					28.9	30.7	27.4		34.8	38.0	37.6	34.0	28.0		
SLO 115	497671	180866	35.0		26.9	25.0	29.7	25.4	29.2	22.1	32.1	36.0	37.0	36.2	31.0	25.7		
SLO 116	498103	180842	31.7		30.3	26.3	27.1	22.1	26.2	22.5	30.5	34.3	37.8	32.9	29.5	24.5		
SLO 117	498112	180857	27.2		26.2	20.6		21.4	24.5	18.8	27.6	30.0	32.2	28.9	25.9	21.5		
SLO 118	497097	179521							27.4	21.6	31.3	32.5	34.9	36.2	30.8	25.4		
SLO 119	497104	179511	34.5		34.4	27.5	32.4	25.9	27.5	23.7	30.1	35.0	38.5	33.7	31.4	26.1		
SLO 120	497013	179870	32.4		28.2	27.0	27.8	25.2				32.2	34.7	29.7	30.0	23.5		
SLO 121	497004	179874	35.5				36.4		35.0	33.4		43.9	44.6		37.7	31.2		
SLO 122	496167	179975	34.4		33.6	29.1	22.5	25.5	27.2	20.9	25.3	33.6	37.2	36.1	30.1	25.0		
SLO 123	496184	179950	30.9		25.8	24.5		20.0	21.6	15.9	26.4	26.9	30.5	30.4	25.9	21.5		

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

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

☒ **National bias adjustment factor used.**

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

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

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.
NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.
See Appendix C for details on bias adjustment and annualisation.

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

C.1 New or Changed Sources Identified Within Slough Borough Council During 2021

Slough Borough Council has not identified any new major sources relating to air quality within the reporting year of 2021. There have however been changes that have affected the road traffic vehicle volumes which may have impacted the results. This includes:

- Increasing capacity on the road network resulting from new developments. Although not all fully operational, it is expected that the construction phase contributes to baseline creep.
- Ongoing works on the M4 Smart Motorways Scheme, with construction of a new boundary fence may influence dispersion and therefore reduce NO_2 concentrations at receptor monitoring locations.
- Lockdown measures introduced in 2020 to reduce health impacts caused by the pandemic continued into 2021, until early March. As the winter period is when NO_2 concentrations are typically highest, it is expected that this reduction in traffic contributed to the low concentrations observed in Slough over 2021.

C.2 Additional Air Quality Works Undertaken by Slough Borough Council During 2021

C.2.1 Sensor Study

In 2019, the Council were awarded funding towards a project to monitor NO_2 concentrations outside of four local primary schools, including Cippenham, Claycots, Pippins and Penn Wood Primary Schools, using 5 Vaisala AQT 410 and 10 AQT 420 sensors, each with a co-located diffusion tube. One sensor was also co-located with a continuous analyser (Colnbrook Pippins SLH 3). The project's initial focus was on monitoring NO_2 emissions originating from idling vehicles and congestion over 8-12 months, however, the pandemic resulted in disruption to the project as schools were required to deliver remote education to most pupils except for children of key workers and vulnerable children, therefore activity on school boundaries was greatly reduced. As a result, the project plan was adapted to report on the differences in pollutant concentrations before and after lockdown restrictions were introduced. Monitoring results from the co-located diffusion tubes (SLO 98 – SLO 111) are presented in Figure C.2. Monitoring commenced in June 2020 and due to the pandemic, the monitoring period was extended to February 2021, therefore the results of the study are presented in this ASR. Much of this data was annualised and has now ceased, however the graph demonstrates that a drop in concentrations has been observed across 86% of the sensor co-location sites. Despite this drop, concentrations are still far higher than the WHO 2021 AQGs. As the majority of the monitoring locations are background sites with very little vehicle acitivity, this raises questions about the feasibility of meeting such stringent standards.

In the previous ASR, without the influence of high traffic volumes, the co-located diffusion tube concentrations tracked each other well, with concentrations peaking in November 2020. The trend became more varied after December 2020 as traffic volumes began to recover, however all diffusion tube sites saw a gradual decline in NO_2 after this point.

The key conclusions of the study are as follows:

- QA/QC: Application of the QA/QC regime identified that the measurements of NO, O_3 and $PM_{2.5}$ from the Vaisala AQT 410 and AQT 420 were unreliable. For NO and O_3, this may be due to the underlying Vaisala algorithms and temperature and relative humidity sensor performance (>50% developed problems). This also affected $PM_{2.5}$ measurements, as well as insect activity.
- Co-Location: A Vaisala AQT420 was co-located with the automatic monitoring station in Colnbrook, Pippins. NO_2 and PM_{10} performed well (R2 of 0.72 and 0.6), as did NO (R2 at 0.71) until monitoring low NO concentrations, where values were much overestimated. Results from the colocation study at the reference site (London Harlington) suggested that regular co-location studies or by using network inter-comparisons is needed to scale the data accurately, because the response of the sensors is likely to change with time. Co-location was also completed with diffusion tubes at each monitoring location, used to correct the sensors to improve their accuracy. This could be improved by adding triplicate tubes but this would impact cost.
- Benefits: Advantages of the sensor network was the ability to have high resolution data for analysing trends and identifying potential sources and the ability to measure multiple pollutants. If the performance of the additional pollutants (NO, O_3 and $PM_{2.5}$) could be improved upon by the sensor system provider, this would add to the versatility of the Vaisala system.
- Application: Having high resolution data enabled an investigation into the variation of NO_2 and PM_{10} during the monitoring period as a result of lockdown events to be

completed. The study found that emissions remained relatively unchanged at the four schools between 01/07/2020 and 31/03/2021. This is likely due to the ongoing restrictions in place due to the Covid-19 pandemic. Even though the restrictions were fluid throughout the monitoring campaign, business as usual never became established.

- Cost benefit: The cost benefit analysis found that diffusion tubes are useful to screen large areas whereas sensors were most useful in investigating areas of concern where high resolution data was needed.
- Outcome: The study has successfully demonstrated the integration of Vaisala air quality sensors systems into the SSE Enterprise Mayflower Smart Lighting network and Smart Cities infrastructure. This infrastructure provides the opportunity to deploy large numbers of air quality sensors, only limited by the number of lamp posts within the Smart Lighting network. The network fulfils both the power and the communications requirements for the air quality sensor systems. There is potential to build hyperlocal networks using this methodology and infrastructure. Combining high resolution pollution data with high density networks has the potential to improve the QA/QC, analysis, and local authorities understanding of air quality in their council areas.

C.2.2 Bus Lane Monitoring

The bus lane scheme started as an experimental scheme, first introduced in August 2020 between Huntercombe Roundabout and Sussex Place. The scheme was partially funded by the EATF, with additional funding provided by Slough Borough Council. The aim of the bus lane was to encourage the public to travel actively and sustainably, support social distancing measures for cyclists and pedestrians and to prepare for the borough's recovery. After the initial consultation from August to December 2020, changes were made to the bus lane restrictions including the operation of the bus lane in peak times only (previously 24/7) and allowing more vehicles to use the bus lane, including motorcycles, taxis, private hire vehicles and zero emission vehicles (previously bus and cycles only). The bus lane was made permanent in December 2021 after approval was granted by Cabinet.

At request of local councillors, diffusion tubes were located on six roads surrounding the A4 to monitor potential traffic and congestion increase as a result of the temporary A4 bus lane (SLO 112 – SLO 123). As the bus lane scheme commenced at the end of 2020 (alongside diffusion tube monitoring), only one full year of data has been collected to date, shown in Figure C.3. Relative to objective levels, all sites are compliant with the national

AQO for NO_2, however all sites exceed the WHO 2021 AQGs. The highest concentration is observed at Ledgers Road (SLO 121 (b)), however this site only had 57.5% data capture, therefore further data is required for future years to determine whether or not this location suffers high NO_2 concentrations.

Leading on from the bus lane development, the Council has been successful in receiving £10.4m towards the implementation of the A4 cycle way scheme. The scheme is planned to run from the Huntercombe roundabout to Uxbridge Road roundabout of the A4. It is expected that the diffusion tube monitoring implemented to monitor the impact of the scheme will continue at these locations to determine whether the new scheme has a positive influence on air quality within the town centre.

C.2.3 Highways England Sites

Figure C.1 shows results of the diffusion tube monitoring at receptors closest to the M4 Smart Motorways scheme from initiation (2019) to 2021. The graph indicates that, as observed at many other diffusion tube sites, concentrations initially dropped in 2020 and have continued to decline in 2021. It could be argued that 2019 data is likely to represent typical concentrations, however it should be noted that monitoring commenced in October and were annualised therefore results may not be reliable. The two following years represent impact from the pandemic, therefore there is not currently a full year of ‘typical’ air quality concentrations at these new receptor monitoring locations. A conclusion can be drawn from the results once data from 2022 is reported in ASR 2023.

Figure C.1 – Highways England Receptor NO_2 Results

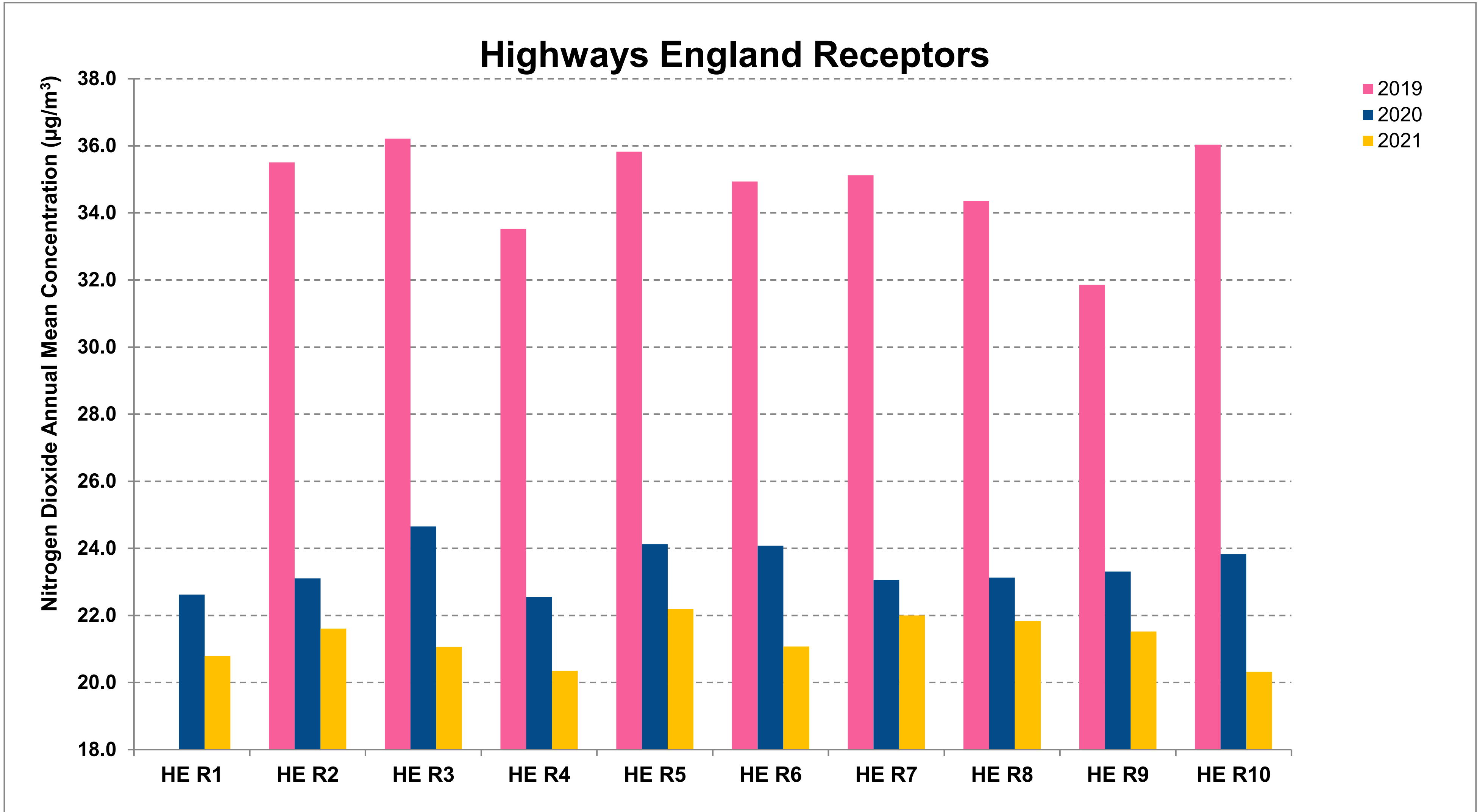


Figure C.2 – Sensor Study NO_2 Results by Year

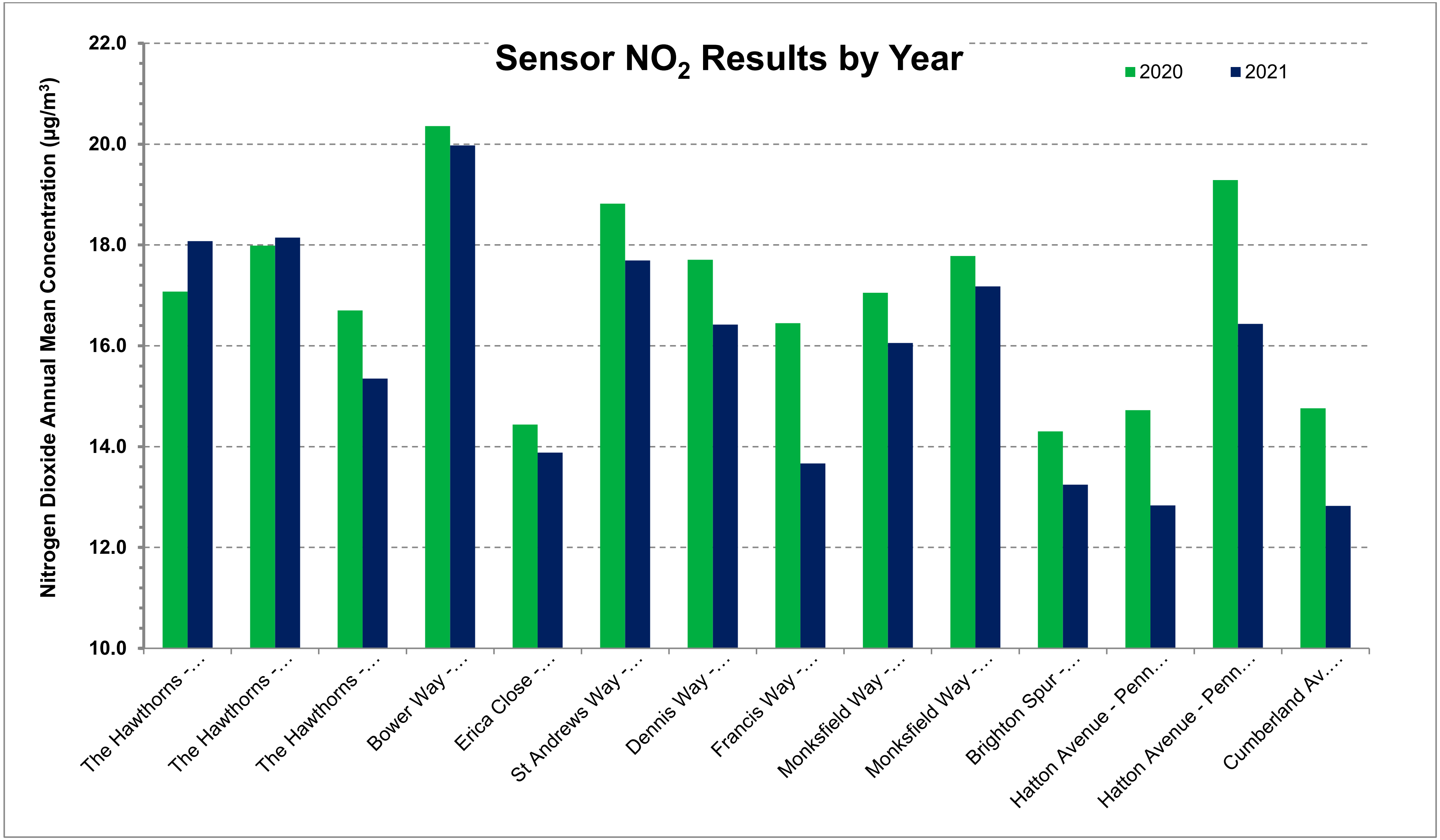


Figure C.3 – Bus Lane Monitoring NO_2 Results for 2021

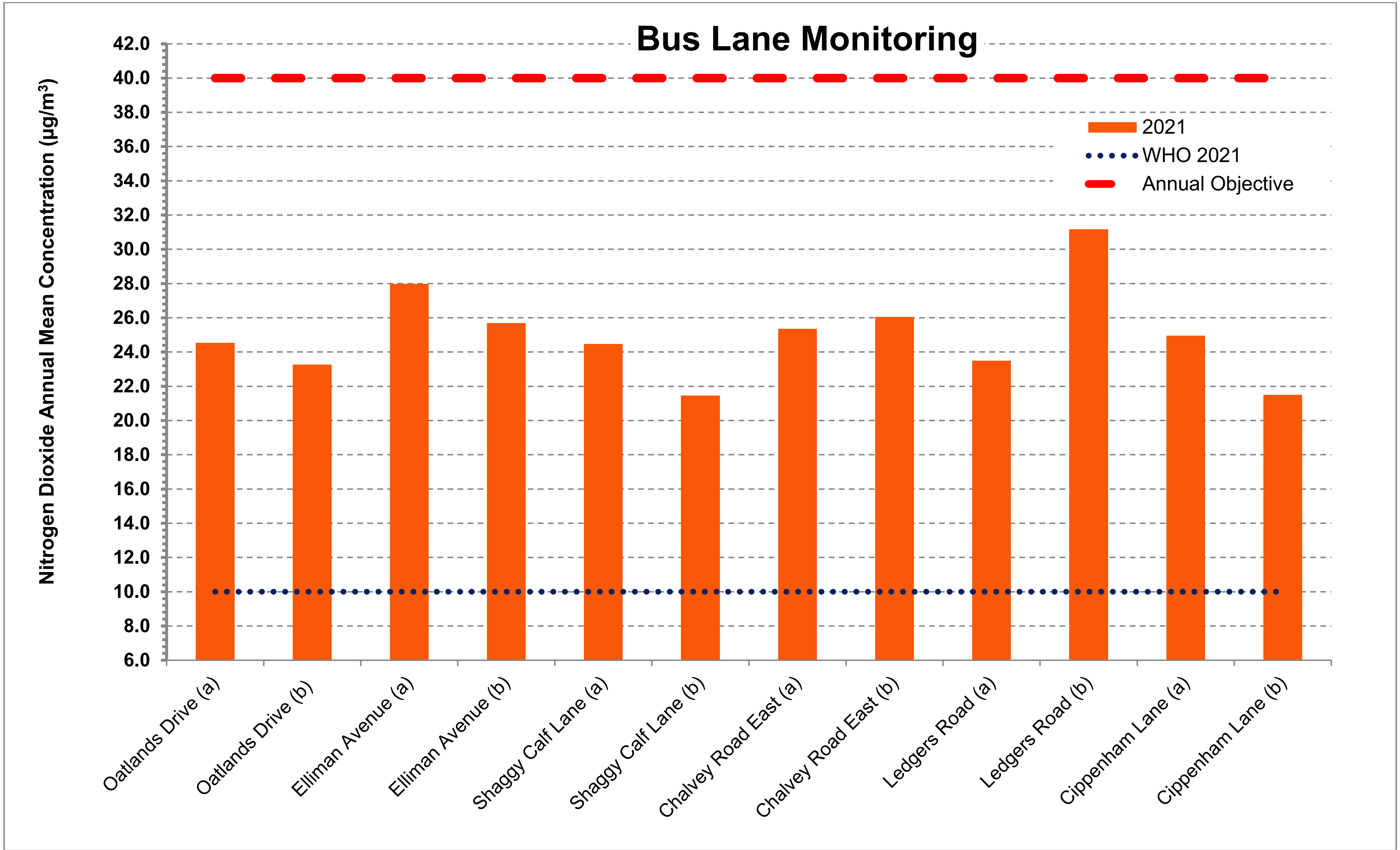
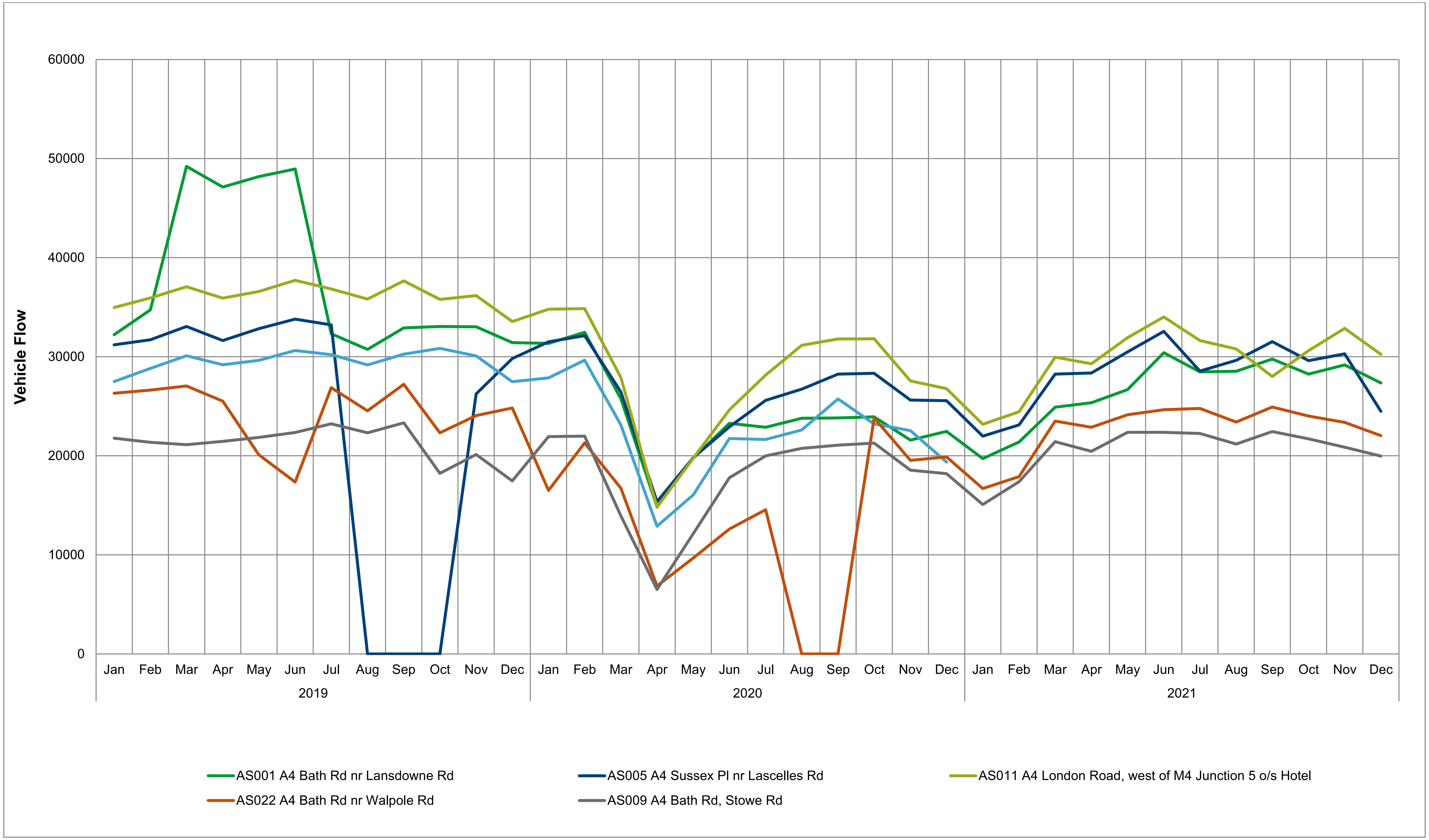


Figure C.4 – Transport Data from 2019 to 2021



C.3 QA/QC of Diffusion Tube Monitoring

During 2021, Slough Borough Council used services supplied by Gradko International Ltd (“Gradko”) for the supply and analysis of diffusion tubes, who was the sole supplier during 2021. This contract was valid from 2019 to 2021, with SOCOTEC providing services to Slough Borough Council prior to 2019.

The preparation of the tubes was 50% Triethanolamine (TEA) in Acetone and the preparation procedures adhered to the guidance detailed within ‘Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users’, Issue 1a Feb.2008 (issued by AEA Energy and Environment). Gradko has been UKAS accreditation since 2001 for ISO/IEC 17025.

Analysis is conducted using the accredited spectrophotometer method which closely follows the processes outlined in the Defra guidance. Calibration is carried out monthly using NIST certified nitrite standards and the calibration graph is checked by running standards before each batch of samples to be analysed

To supplement quality control procedures, Gradko participate in the UKAS accredited proficiency testing scheme AIR-PT run by LGC (accredited) and supported by the Health and Safety Laboratory. This testing scheme is undertaken by analysing four spiked diffusion tubes on a quarterly basis to assess the analytical performance of those laboratories.

Annually, the AIR-PT and annual inter-field comparison results for Gradko are released. Results of the most recent 8 rounds of proficiency testing under the AIR-PT scheme for laboratories which provide 50% TEA/Acetone diffusion tubes are provided in Table C.1. The table gives the percentage of samples where results returned by the laboratory were considered satisfactory – i.e. 1 out of 4 = 25%, and 4 out of 4 = 100%. The guidance directs that a single round is a snap-shot in time, and thus it is more informative to consider performance over a number of rounds. It is further stated that over a rolling five round AIR-PT window, 95% of results (i.e. 19 out of 20 samples) should be considered to be satisfactory.

Diffusion tube monitoring has been completed in adherence with the 2021 Diffusion Tube Monitoring Calendar, with the exception of January to March 2021, where the exposure period spanned two months due to the lockdown implemented at the beginning of the year. These results have been time weighted adjusted in the Diffusion Tube Data Processing Tool.

Gradko scored poorly in rounds AR040 (September – October 2020) and AR042 (January – February 2021) but have had scored 100% in subsequent tests. SOCOTEC in comparison have scored well every quarter with the exception of AR045 (July – August 2021) where a score of 87.5% was achieved. In contrast, Lambeth Scientific Services have consistently scored below 100% since AR043 (May – June 2021).

When considering the five year rolling average (Table C.2), SOCOTEC is the only supplier who consistently has >95% of laboratory results ≤ ± 2. Due to poor scores in two PT rounds, Gradko's rolling average is low until AR049 where a 100% score is achieved. Edinburgh Scientific Services, by comparison, are consistently below 95%, suggesting that there are significant sources of error within their analytical procedure.

The AIR PT scores were taken into consideration when assessing bids for the new diffusion tube contract (2022-2024), which was subsequently awarded to SOCOTEC.

Table C.1 – Results of Laboratories Which Participated in the Latest AIR-PT Rounds

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of ≤ ± 2 as defined above.

AIR PT Round	AIR PT AR037	AIR PT AR039	AIR PT AR040	AIR PT AR042	AIR PT AR043	AIR PT AR045	AIR PT AR046	AIR PT AR049	AIR PT AR050
Round conducted in the period	May – June 2020	July – August 2020	September – October 2020	January – February 2021	May – June 2021	July – August 2021	September – October 2021	January – February 2022	May – June 2022
Aberdeen Scientific Services	NR [4]	NR [4]	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Cardiff Scientific Services	NR [4]	NR [4]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	NR [4]	NR [4]	100 %	25 %	100 %	100 %	75 %	NR [2]	50 %
SOCOTEC	NR [4]	NR [4]	100 % [1]	100 % [1]	100 % [1]	87.5 % [1]	100 % [1]	100 % [1]	100 % [1]
Exova (formerly Clyde Analytical)	NR [4]	NR [4]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	NR [4]	NR [4]	100 %	50 %	100 %	100 %	NR [2]	100 %	100 %
Gradko International	NR [4]	NR [4]	75 %	25 %	100 %	100 %	100 %	100 %	100 % [1]
Kent Scientific Services	NR [4]	NR [4]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	NR [4]	NR [4]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Lambeth	NR [4]	NR [4]	100 %	100 %	100 %	75 %	75 %	50 %	75 %

AIR PT Round	AIR PT AR037	AIR PT AR039	AIR PT AR040	AIR PT AR042	AIR PT AR043	AIR PT AR045	AIR PT AR046	AIR PT AR049	AIR PT AR050
Scientific Services									
Milton Keynes Council	NR [4]	NR [4]	25 %	0 %	50 %	100 %	100 %	75 %	100 %
Northampton Borough Council	NR [4]	NR [4]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Somerset Scientific Services	NR [4]	NR [4]	100 %	100 %	100 %	100 %	100 %	75 %	100 %
South Yorkshire Air Quality Samplers	NR [4]	NR [4]	100 %	100 %	75 %	100 %	100 %	NR [2]	NR [2]
Staffordshire County Council	NR [4]	NR [4]	50 %	100 %	100 %	100 %	100 %	100 %	100 %
Tayside Scientific Services (formerly Dundee CC)	NR [4]	NR [4]	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]	NR [2]
West Yorkshire Analytical Services	NR [4]	NR [4]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]

[1] Participant subscribed to two sets of test results (2 x 4 test samples) in each AIR PT round.
[2] NR, No results reported.
[3] Cardiff Scientific Services, Exova (formerly Clyde Analytical), Kent Scientific Services, Kirklees MBC, Northampton Borough Council and West Yorkshire Analytical Services; no longer carry out NO2 diffusion tube monitoring and therefore did not submit results.
[4] Round was cancelled due to pandemic.

Table C.2 – Rolling Average AIR-PT Scores for 50% TEA/Acetone Laboratories

Laboratory	AR034	AR036	AR040	AR042	AR043	AR045	AR046	AR049
Gradko International Ltd	90	90	75	75	75	80	85	100
SOCOTEC	97.5	100	100	100	97.5	97.5	97.5	97.5
Edinburgh Scientific Services	68.75	68.75	60	60	75	80	75	81.25
Lambeth Scientific Services	80	90	90	100	95	90	80	75
South Yorkshire Air Quality Samplers	95	95	95	90	95	95	93.75	91.67

AIR-PT AR037 & AR039 - round was cancelled due to the pandemic therefore rolling average from previous period applies

C.3.1 Diffusion Tube Annualisation

Annualisation is required for any site with data capture less than 75% but greater than 25%. Annualisation was completed for 33 diffusion tube sites by producing an annualisation factor using Slough's urban background site (SLH 3, Pippins Colnbrook), and two other sites within a 50 mile radius of the sites to be annualised (London Hillingdon and London Sipsom). This created an average annualisation factor which was applied to diffusion tubes which had a data capture less than 75% but greater than 25%. Annualisation was undertaken for the following diffusion tube sites, also presented in Appendix C.4:

- Sites which were removed from the network mid 2021 after showing sustained compliance over five years: SLO 20, SLO 27, SLO 31, SLO 41, SLO 42, SLO 45, and SLO 48.
- Sites which were co-located with the Vaisala sensors and were removed mid 2021 when the project ended: SLO 98 – SLO 111.
- Sites which had been recently introduced or removed for the purpose of co-locating with a continuous analyser: SLO 34 – SLO 36, and SLO 34 Relocated – SLO 36 Relocated.
- Sites which had low data capture caused by frequent thefts: SLO 30, SLO 112, SLO 114, SLO 118, SLO 120 and SLO 121.

C.3.2 Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/ NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Slough Borough Council have applied a national bias adjustment factor of 0.83 to the 2021 monitoring data. A summary of bias adjustment factors used by Slough Borough Council over the past five years is presented in Table C.33.

Slough Borough Council undertook co-location of diffusion tubes with a continuous analyser at six sites during 2021. The sites and their bias factors are presented below:

Pippins Colnbrook (SLH 3) – Bias Factor B: 18%

Chalvey (SLH 7) – Bias Factor B: 5%

Wellington Street (SLH 10) – Bias Factor B: 20%

Brands Hill (SLH 11) – Bias Factor B: 24%

Windmill (SLH 12) – Bias Factor B: 19%

Spackmans Way (SLH 13) – Bias Factor B: 19%

Average Bias Factor B = 17.5%. Factor inverse = 1/1.175 = 0.851.

As both of the Chalvey based sites (SLH 7 and SLH 13) suffered from low data capture (<90%), the above calculation was completed excluding these co-location studies, which resulted in the following:

Average Bias Factor B (-SLH 7 & SLH 13) = 20.3%. Factor inverse = 1/1.203 = 0.831.

The revised bias adjustment factor which excludes sites with poor data capture results in a bias adjustment factor of 0.831 (full details shown in Table C.6). This is equal to the national bias adjustment factor, therefore either factor could be used in this case. However as the national bias adjustment factor is based on 16 studies, the national bias adjustment factor has been used to adjust the diffusion tube data.

Table C.3 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	06/22	0.83
2020	Local	-	0.86
2019	Local	-	0.93
2018	Local	-	0.78
2017	Local	-	0.80

C.3.3 NO_2 Fall-off with Distance from the Road

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

Two diffusion tube sites required distance correcting as concentrations in 2021 exceeded 36µg/m^3, which were Brands Hill (A) (SLO 18) and Yew Tree Road (SLO 29). The resultant concentrations are 31.6µg/m^3 and 32.2µg/m^3, respectively, therefore there were no receptors exposed to NO_2 concentrations over compliance levels in 2021.

C.4 QA/QC of Automatic Monitoring

Slough Borough Council's automatic sites are part of the National Automatic Monitoring Calibration Club, whereby monitoring data are managed to the same procedures and standards as AURN sites by Ricardo Energy and Environment. Ricardo also provide Local Site Operator (LSO) duties to calibrate monitors every two weeks and are responsible for conducting six monthly independent ISO 17025 UKAS accredited audits of all air quality monitoring stations and six monthly service and maintenance of each air quality monitoring station within four weeks of the UKAS accredited audits.

Both live and historic raw data collected by the monitoring stations is collated on the Air Quality England website. This data is provisional and later ratified. This ratification process occurs quarterly. All data presented in this ASR has been through this ratification process.

C.4.1 PM_{10} and $PM_{2.5}$ Monitoring Adjustment

Daily mean TEOM measurements were adjusted to account for the volatile fraction of particulate matter using data download from the Kings College VCM Portal Website.

C.4.2 Automatic Monitoring Annualisation

As with non-automatic monitoring data, annualisation is required for any continuous monitoring site with data capture less than 75% but greater than 25%. As the new Chalvey site on Spackmans Way (SLH 13) was operational from September 2021 onwards, data capture is poor and therefore required annualising. All other sites have a data capture greater than 75% where annualisation is not required.

Table C.5 has been produced to demonstrate the steps taken in annualising data from Spackmans Way (SLH 13). As annualisation of both PM_{10} and NO_2 was required, sites which monitor both were chosen from the AURN network. The annual mean and period means were calculated from these datasets, which were used to derive annualisation factors for both NO_2 and PM_{10} (0.90 and 1.14, respectively). Once applied to the annual mean data from Spackmans Way, the resultant annualised means for NO_2 and PM_{10} were 23.2µg/m^3 and 13.3µg/m^3, respectively.

C.4.3 NO_2 Fall-off with Distance from the Road

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

No automatic NO_2 monitoring locations within Slough Borough Council required distance correction during 2021.

Table C.4 – Diffusion Tube Annualisation Summary (concentrations presented in µg/m³)

Site ID	Annualisation Factor Slough Colnbrook (SLH 3)	Annualisation Factor London Hillingdon (HIL)	Annualisation Factor Hillingdon Sipson (SIPS)	Annualisation Factor Site 4 (not used)	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
SLO 20	0.9737	1.0162	1.0403	-	1.0101	20.3	20.5	
SLO 27	0.9737	1.0162	1.0403	-	1.0101	20.2	20.4	
SLO 30	1.0796	1.1282	1.1358	-	1.1145	25.8	28.8	
SLO 31	0.9737	1.0162	1.0403	-	1.0101	24.9	25.2	
SLO 34	0.9111	0.9440	0.9700	-	0.9417	-	-	Triplicate Site with SLO 34, SLO 35 and SLO 36 - Annual data provided for SLO 36 only
SLO 35	0.9111	0.9440	0.9700	-	0.9417	-	-	Triplicate Site with SLO 34, SLO 35 and SLO 36 - Annual data provided for SLO 36 only
SLO 36	0.9111	0.9440	0.9700	-	0.9417	23.5	22.1	Triplicate Site with SLO 34, SLO 35 and SLO 36 - Annual data provided for SLO 36 only
SLO 34 Relocated	1.0267	0.9849	0.9654	-	0.9923	-	-	Triplicate Site with SLO 34 Relocated, SLO 35 Relocated and SLO 36 Relocated - Annual data provided for SLO 36 Relocated only
SLO 35 Relocated	1.0267	0.9849	0.9654	-	0.9923	-	-	Triplicate Site with SLO 34 Relocated, SLO 35 Relocated and SLO 36 Relocated - Annual data provided for SLO 36 Relocated only
SLO 36 Relocated	1.0267	0.9849	0.9654	-	0.9923	27.3	27.1	Triplicate Site with SLO 34 Relocated, SLO 35 Relocated and SLO 36 Relocated - Annual data provided for SLO 36 Relocated only
SLO 41	0.9737	1.0162	1.0403	-	1.0101	15.1	15.3	
SLO 42	1.1010	1.2118	1.3093	-	1.2074	13.1	15.9	
SLO 45	0.9737	1.0162	1.0403	-	1.0101	22.6	22.8	
SLO 48	0.9737	1.0162	1.0403	-	1.0101	24.0	24.2	

Site ID	Annualisation Factor Slough Colnbrook (SLH 3)	Annualisation Factor London Hillingdon (HIL)	Annualisation Factor Hillingdon Sipson (SIPS)	Annualisation Factor Site 4 (not used)	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
SLO 98	0.9737	1.0162	1.0403	-	1.0101	21.6	21.8	
SLO 99	0.9737	1.0162	1.0403	-	1.0101	21.6	21.9	
SLO 100	0.9737	1.0162	1.0403	-	1.0101	18.3	18.5	
SLO 101	0.9737	1.0162	1.0403	-	1.0101	23.8	24.1	
SLO 102	0.9737	1.0162	1.0403	-	1.0101	16.6	16.7	
SLO 103	0.9737	1.0162	1.0403	-	1.0101	21.1	21.3	
SLO 104	0.9737	1.0162	1.0403	-	1.0101	19.6	19.8	
SLO 105	0.9737	1.0162	1.0403	-	1.0101	16.3	16.5	
SLO 106	0.9737	1.0162	1.0403	-	1.0101	19.2	19.3	
SLO 107	0.9737	1.0162	1.0403	-	1.0101	20.5	20.7	
SLO 108	0.9737	1.0162	1.0403	-	1.0101	15.8	16.0	
SLO 109	0.9737	1.0162	1.0403	-	1.0101	15.3	15.5	
SLO 110	0.9737	1.0162	1.0403	-	1.0101	19.6	19.8	
SLO 111	0.9601	1.0234	1.0413	-	1.0083	15.3	15.4	
SLO 112	0.9377	0.9370	0.9285	-	0.9344	31.6	29.6	
SLO 114	1.0149	0.9960	0.9652	-	0.9920	34.0	33.7	
SLO 118	1.0267	0.9849	0.9654	-	0.9923	30.8	30.6	
SLO 120	0.9517	0.9516	0.9298	-	0.9444	30.0	28.3	
SLO 121	1.0153	0.9771	0.9931	-	0.9952	37.7	37.6	

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

Continuous Monitoring Sites to Annualise

Site Name	Site Type	Pollutants Monitored	Monitoring Period Start Date andTime	Monitoring Period End Date Time
Spackmans Way (SLH 13)	Urban Traffic	NO_2 & PM_{10}	29/09/2021 01:00:00	31/12/2021 24:00:00

Continuous Monitoring Sites Used for Annualisation

Site Name	Site Type	Pollutants Monitored	Network	Commencement Date	Data Capture 2021	Distance from SLH 13
London Hillingdon (HIL)	Urban background	NO_2	AURN	02/08/1996	100%	6.5mi (10.4km)
Reading New Town (REA1)	Urban background	NO_2 & PM_{10}	AURN	17/03/2003	91%	14.7mi (23.7km)
Oxford St Ebbes (OX8)	Urban background	NO_2 & PM_{10}	AURN	01/01/2008	100%	32.5mi (52.3km)
London N. Kensington (KC1)	Urban background	NO_2 & PM_{10}	AURN	01/04/1996	99%	17.1mi (27.6km)
London Teddington Bushy Park (TED2)	Urban background	PM_{10}	AURN	09/08/2013	99%	12.6mi (20.3km)

Data Summary

Site Name	Annual Mean (Am) NO_2 (µg/m3)	Period Mean (Pm) NO_2 (µg/m3)	Am/Pm NO_2 (µg/m3)	Annual Mean (Am) NO_2 (µg/m3)	Period Mean (Pm) PM_{10} (µg/m3)	Am/Pm PM_{10} (µg/m3)
London Hillingdon (HIL)	25.0	29.5	0.85	-	-	-
Reading New Town (REA1)	19.7	21.4	0.92	14.6	13.2	1.11
Oxford St Ebbes (OX8)	11.4	12.3	0.93	11.1	9.3	1.19
London N. Kensington (KC1)	19.5	21.9	0.89	13.7	12.3	1.11
London Teddington Bushy Park TED2)	-	-	-	12.6	10.8	
Average (annualisation factor)			0.90			1.14

Annualised Continuous Monitoring Site Results

Site Name	Period Mean NO_2 (µg/m^3)	Annualised Mean NO_2 (µg/m^3)	Period Mean PM_{10} (µg/m3)	Annualised Mean PM_{10} (µg/m3)
Spackmans Way (SLH 13)	25.9	**23.2**	11.7	**13.3**

Table C.6 – Local Bias Adjustment Calculation

Adjustment Parameters	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5	Local Bias Adjustment Input 6
Periods used to calculate bias	11	4	3	11	11	10
Bias Factor A	0.81 (0.74 - 0.89)	0.95 (0.84 - 1.1)	0.84 (0.78 - 0.92)	0.85 (0.81 - 0.88)	0.84 (0.78 - 0.9)	0.84 (0.78 - 0.91)
Bias Factor B	24% (12% - 35%)	5% (-9% - 18%)	19% (9% - 29%)	18% (13% - 23%)	20% (11% - 28%)	19% (10% - 29%)
Diffusion Tube Mean (µg/m^3)	24	5	19	18	20	19
Mean CV (Precision)	39.8	23.1	31.2	20.5	32.2	34.1
Automatic Mean (µg/m^3)	4.3%	3.0%	2.4%	3.7%	4.7%	3.2%
Data Capture						
Adjusted Tube Mean (µg/m^3)	32.2	22.0	26.2	17.3	26.9	28.6

Notes:

As explained in Section C.3.2, a national bias adjustment factor of 0.83 has been used to bias adjust the 2021 diffusion tube results. The table above demonstrates that retaining the co-location data from all sites including those with poor data capture results in a combined local bias adjustment factor of 0.85. Removal of data with poor data capture results in a local bias adjustment factor which matches the national bias adjustment factor (0.83).

Table C.7 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
SLO 18	6.0	16.5	36.5	21.2	31.6	
SLO 29	1.5	7.5	39.0	19.7	32.2	

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

Figure D.1 – Map of Non-Automatic Monitoring Sites in AQMA 1a

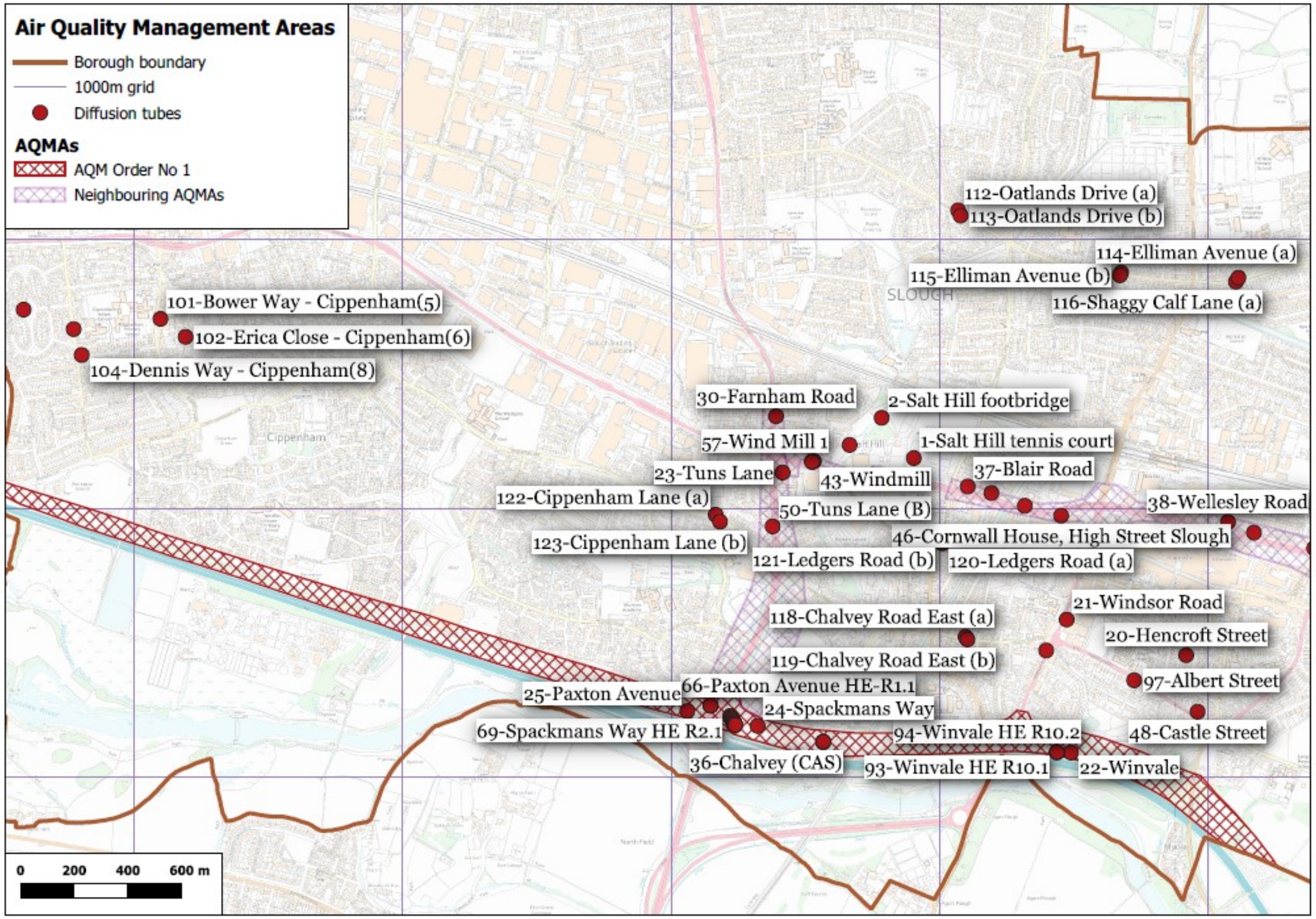


Figure D.2 – Map of Non-Automatic Monitoring Sites in AQMA 1b

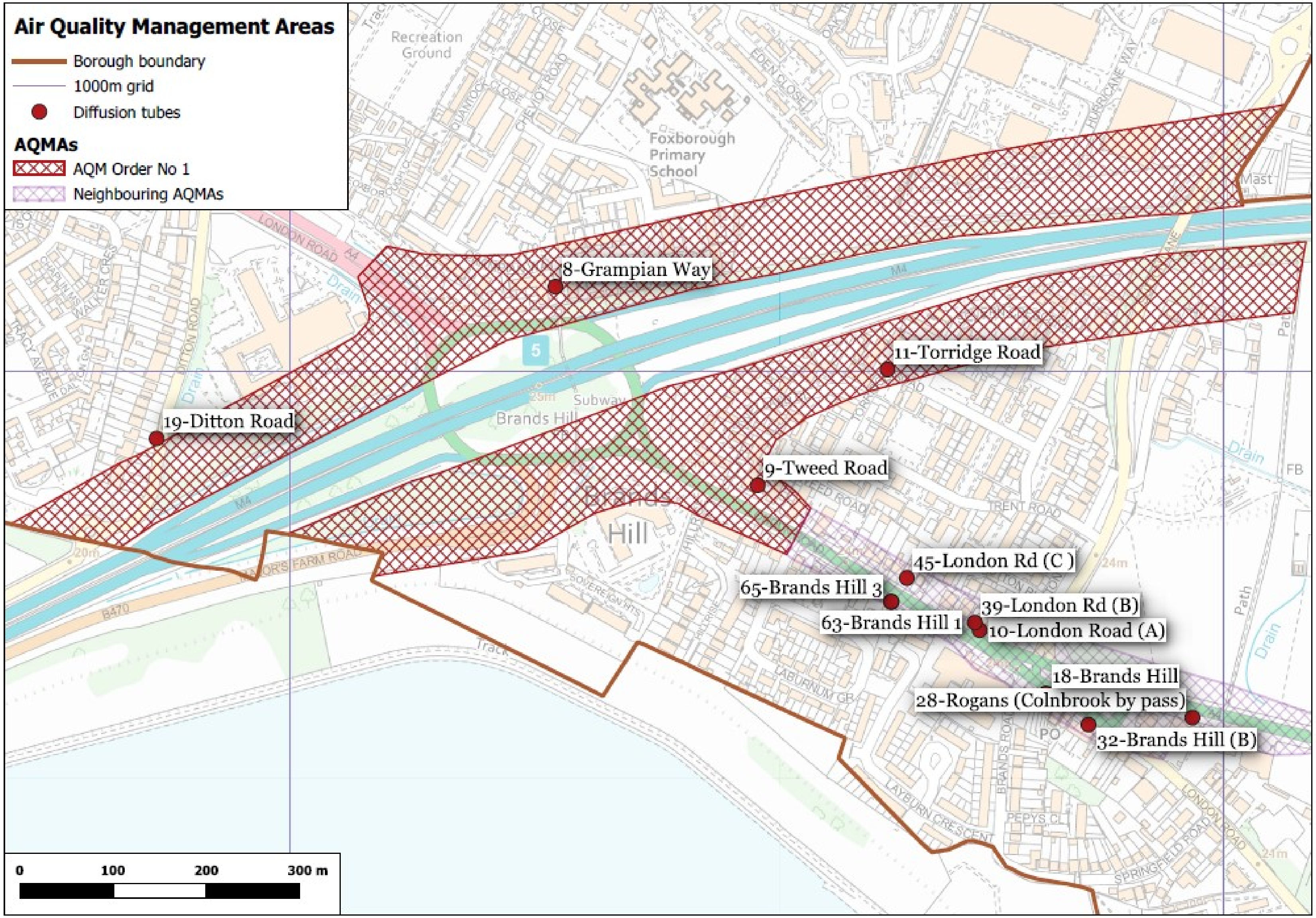


Figure D.3 – Map of Non-Automatic Monitoring Sites in AQMA 2

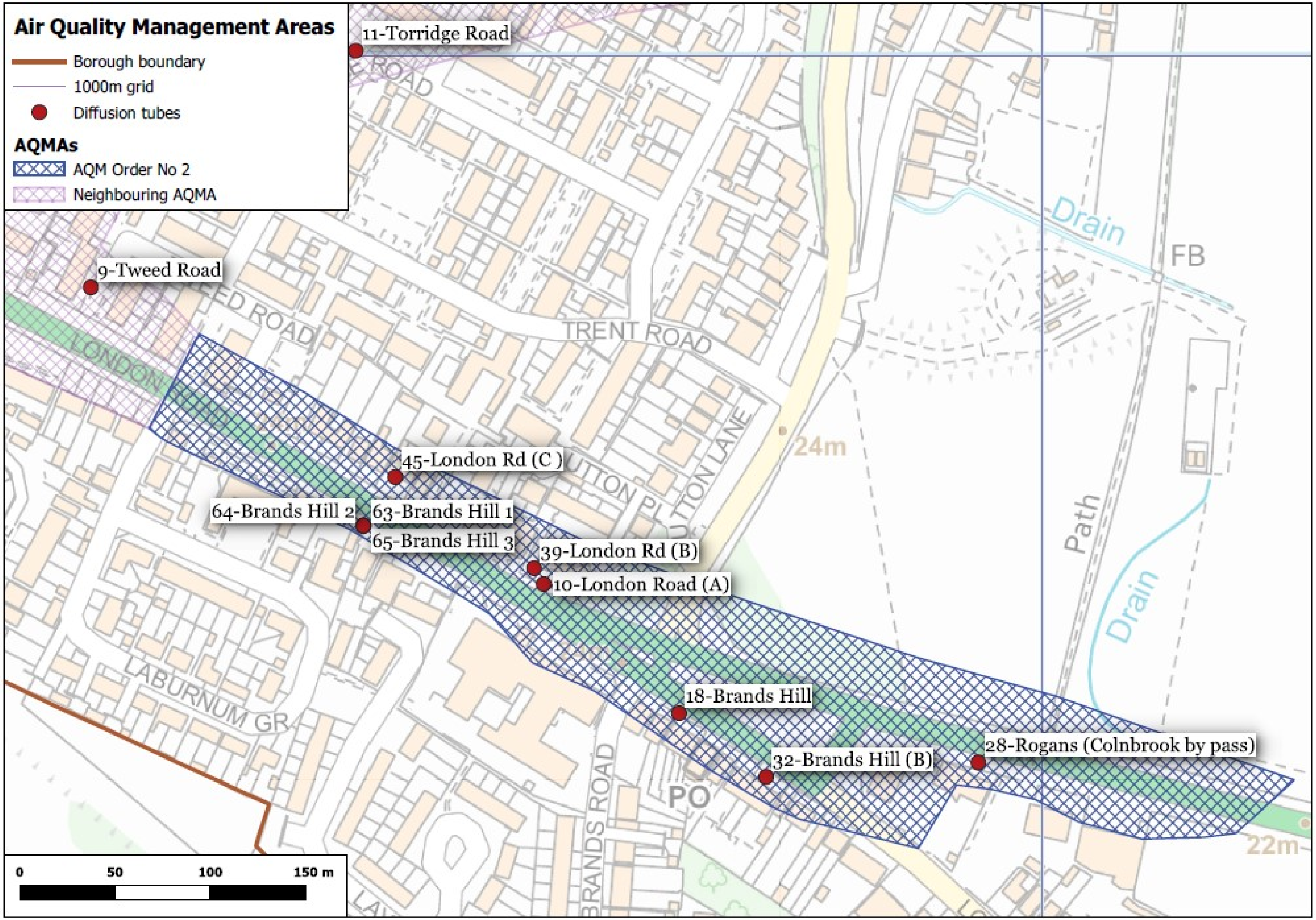


Figure D.4 – Map of Non-Automatic Monitoring Sites in AQMA 3

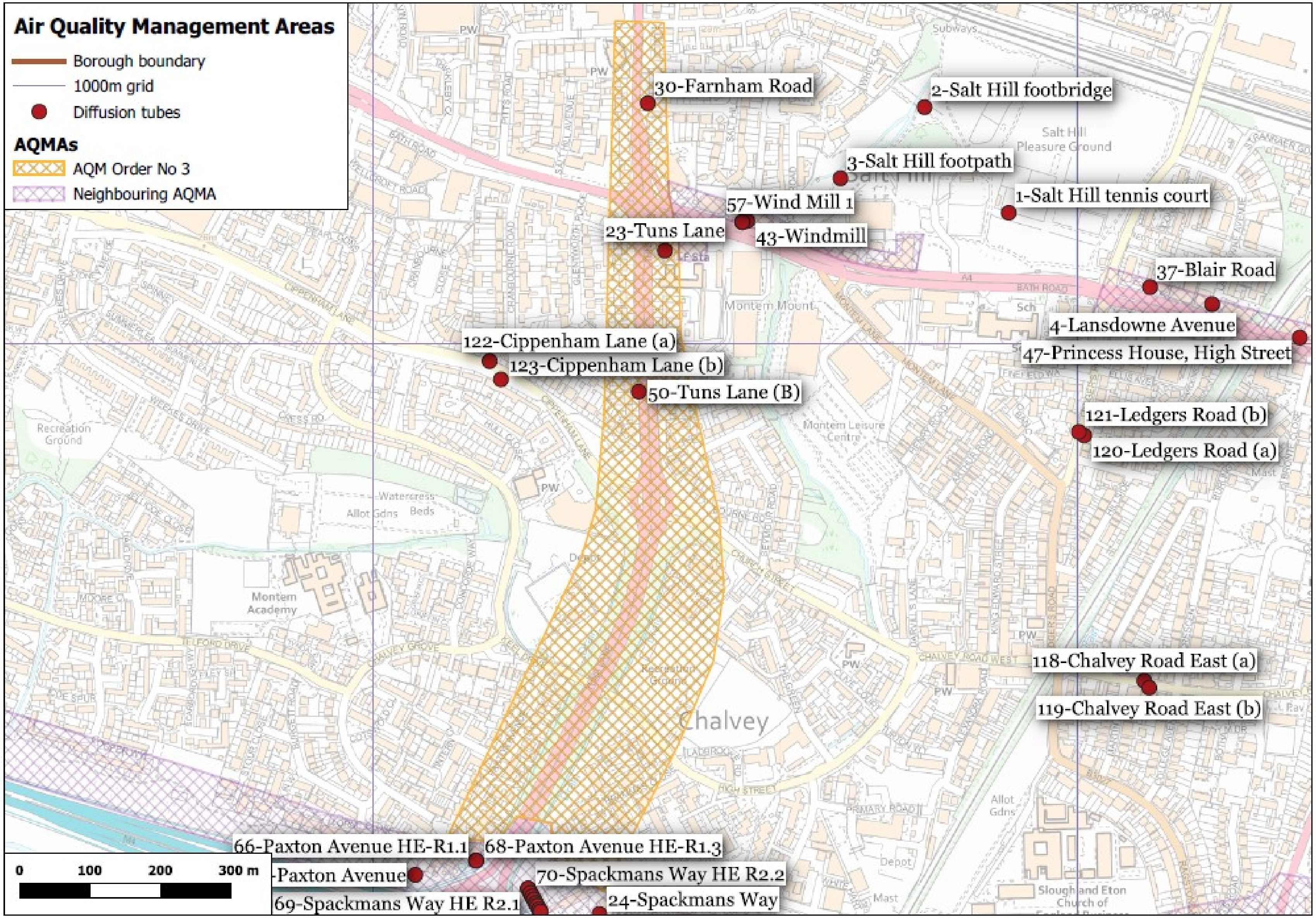


Figure D.5 – Map of Non-Automatic Monitoring Sites in AQMA 3 Extension

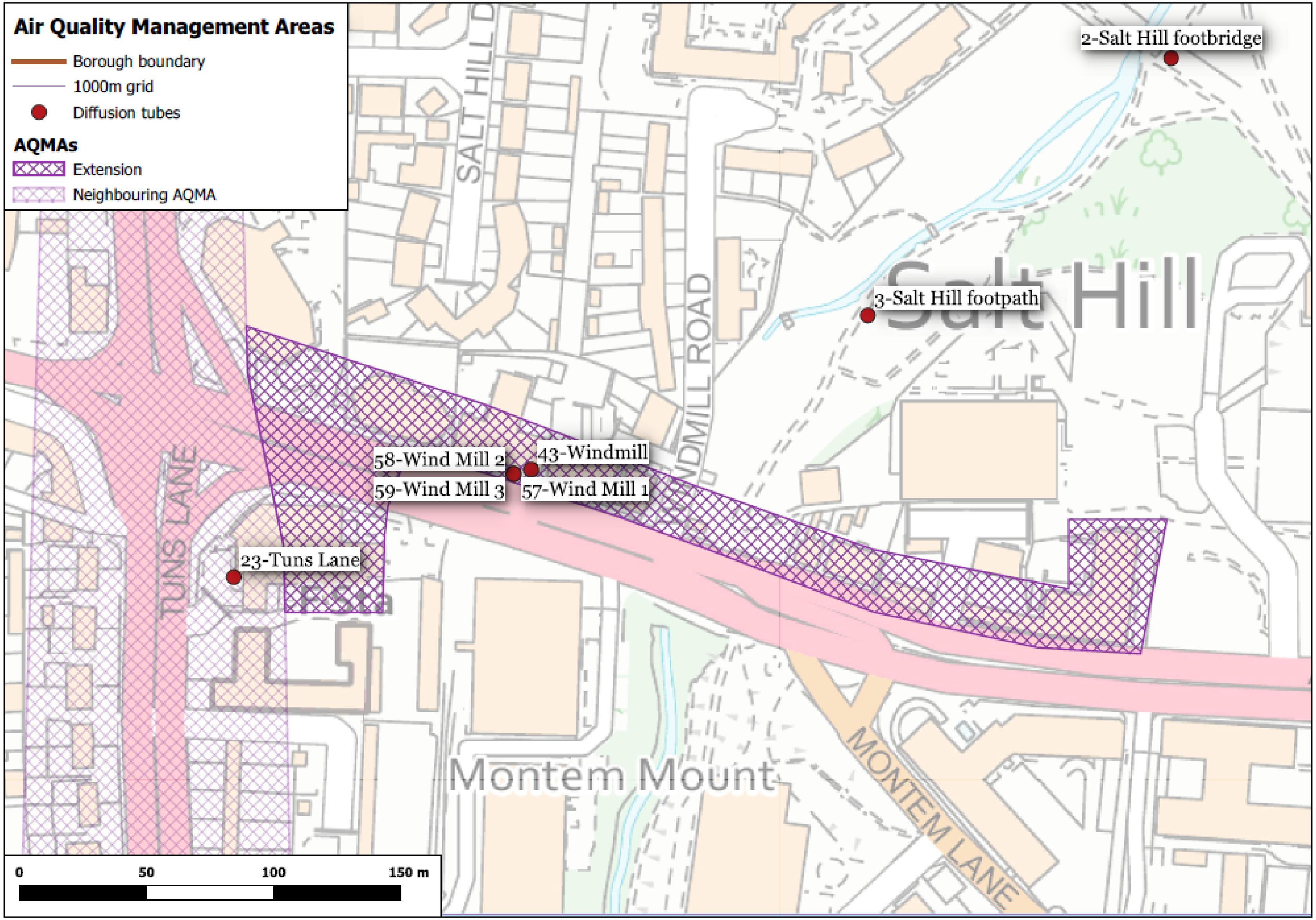


Figure D.6 – Map of Non-Automatic Monitoring Sites in AQMA 4

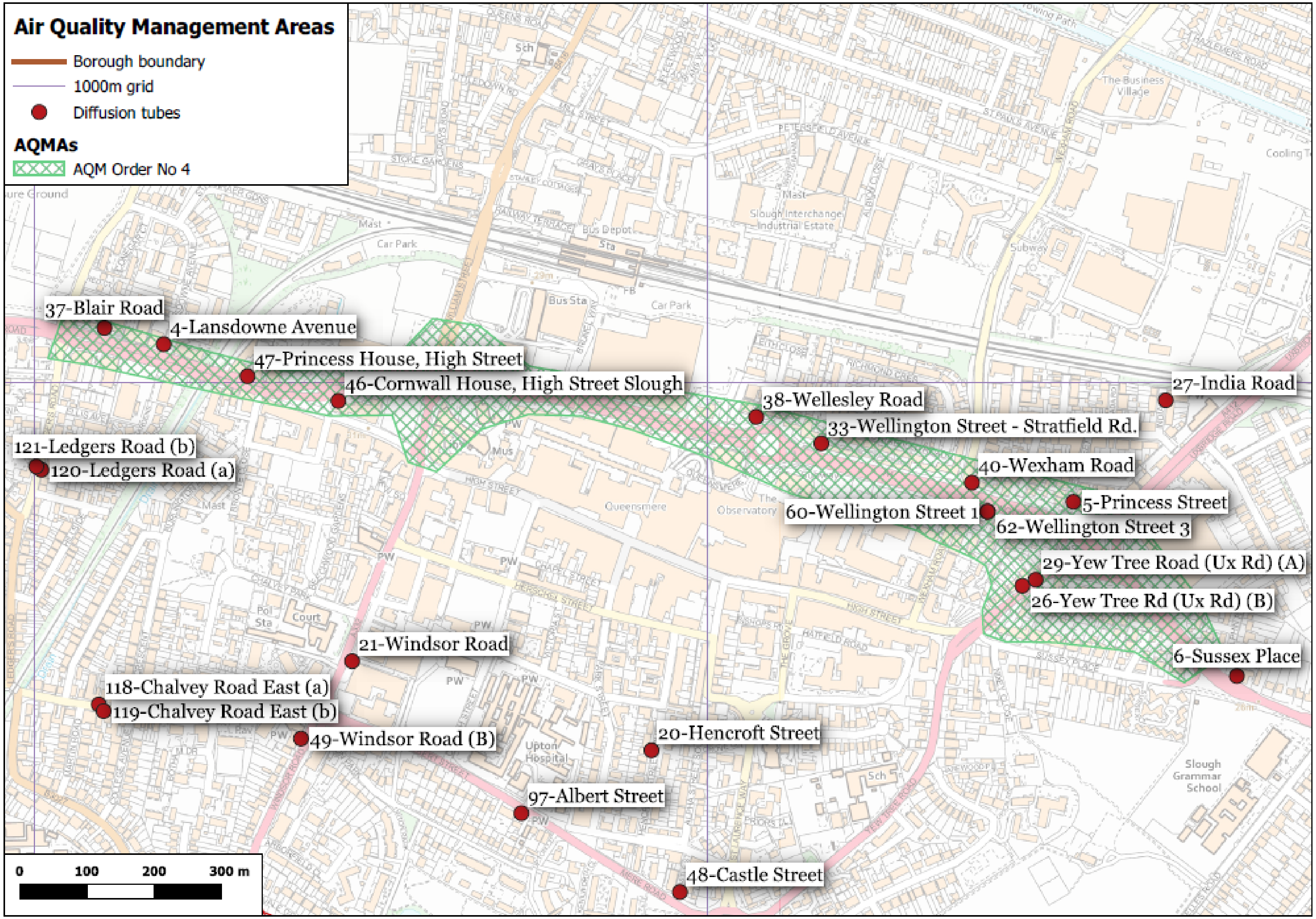


Figure D.7– Map of All Non-Automatic Monitoring Sites

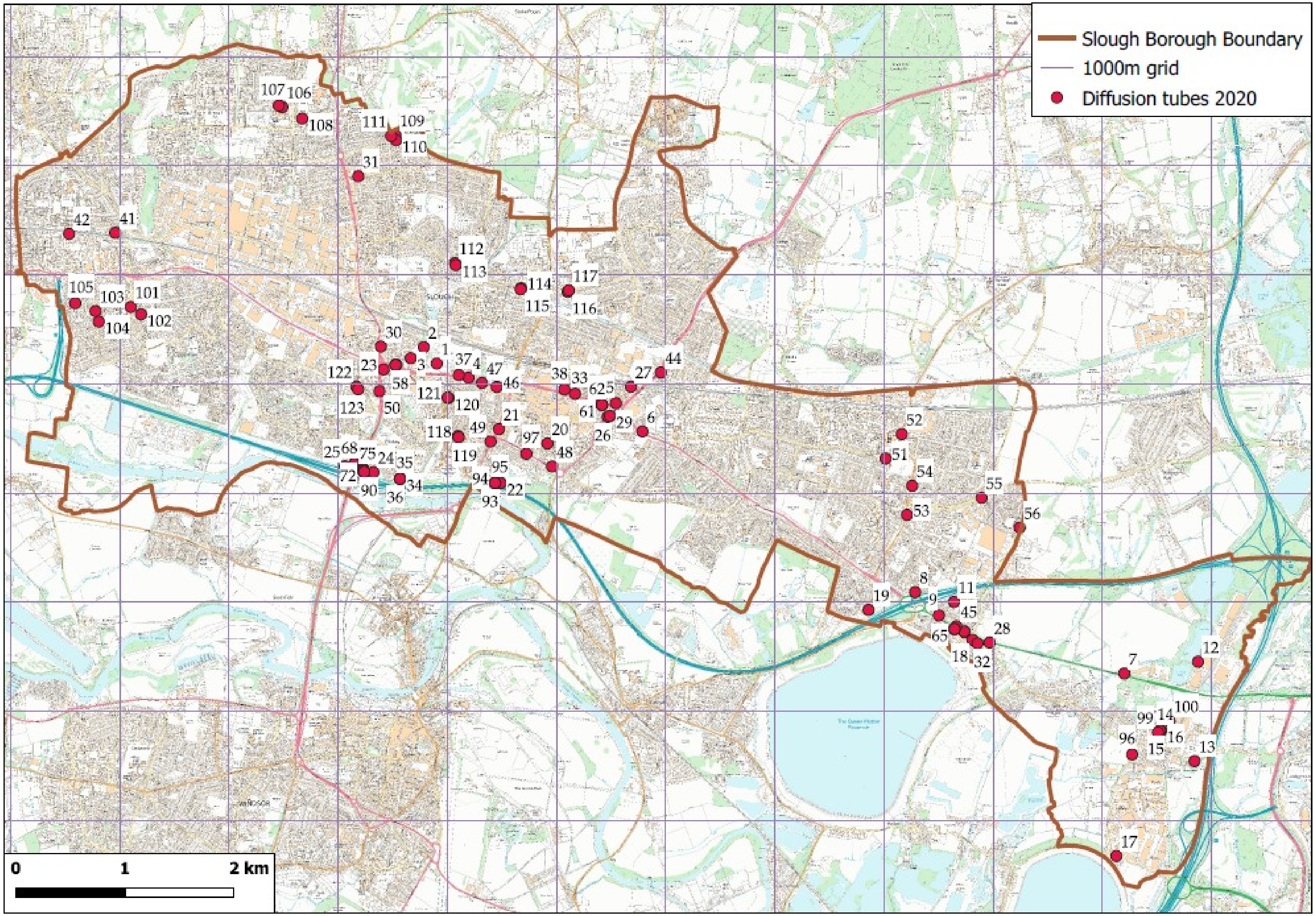


Figure D.8 – Map of All Automatic Continuous Monitors in Slough

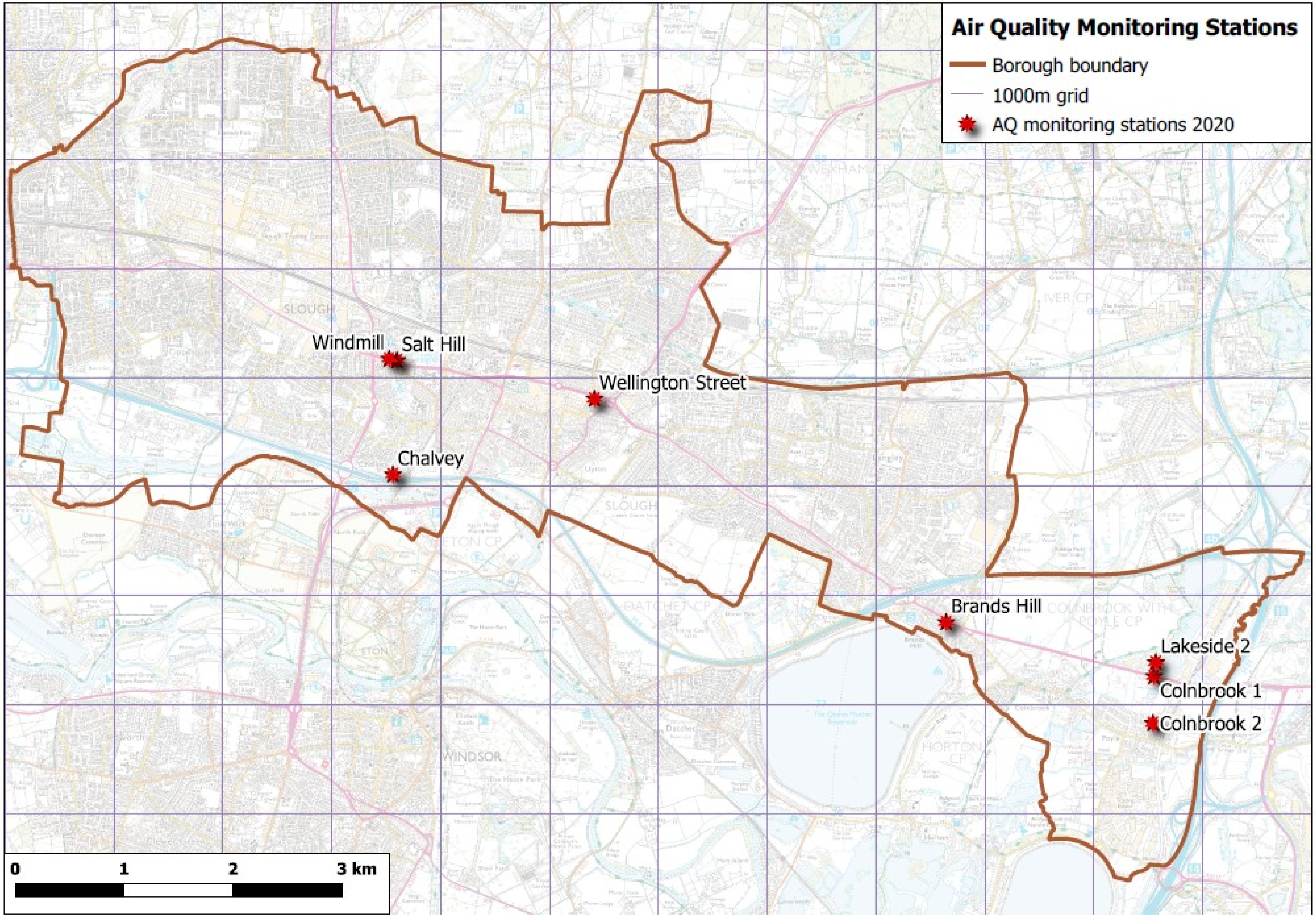


Figure D.9 – Map of All AQMAs in Slough

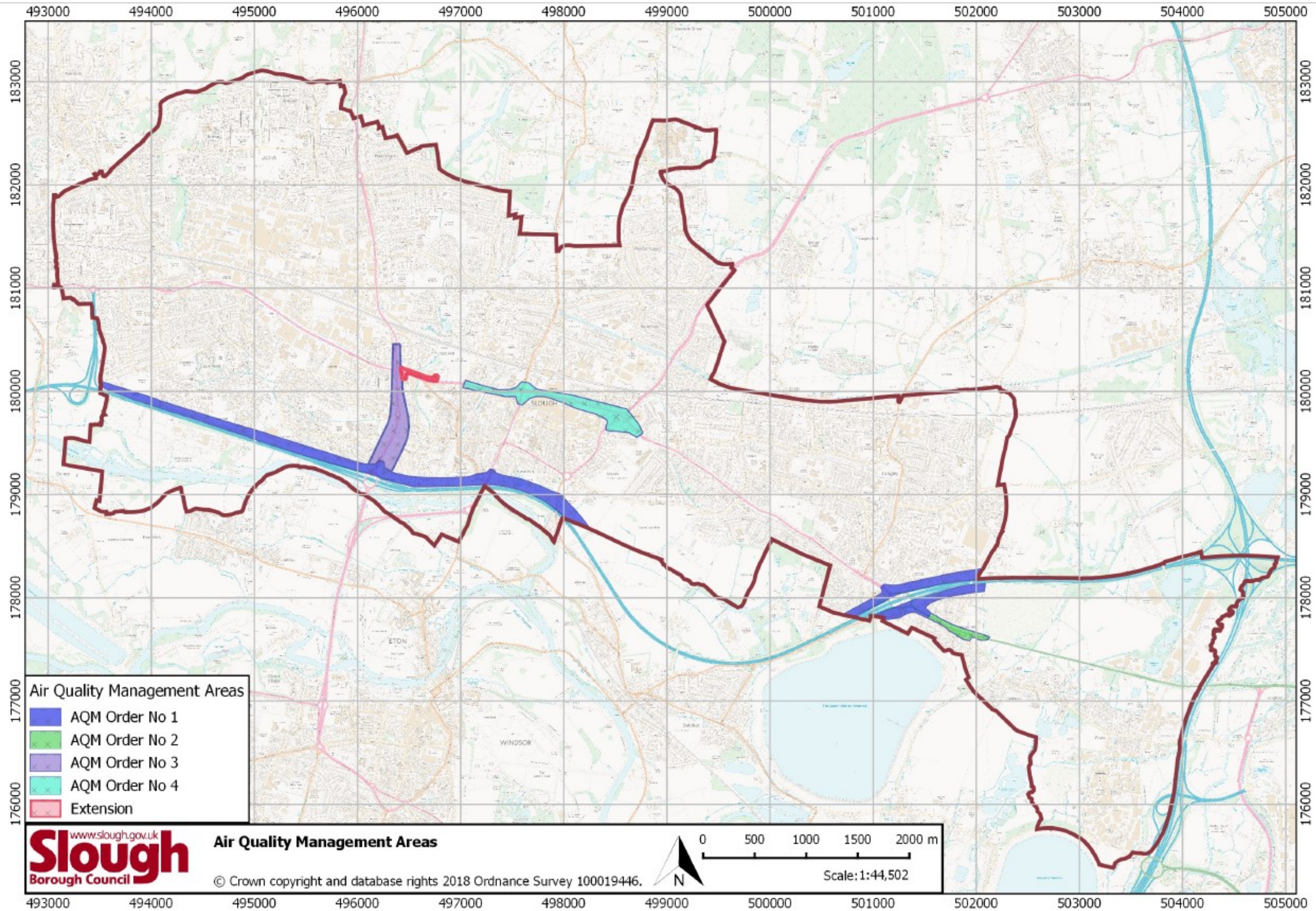
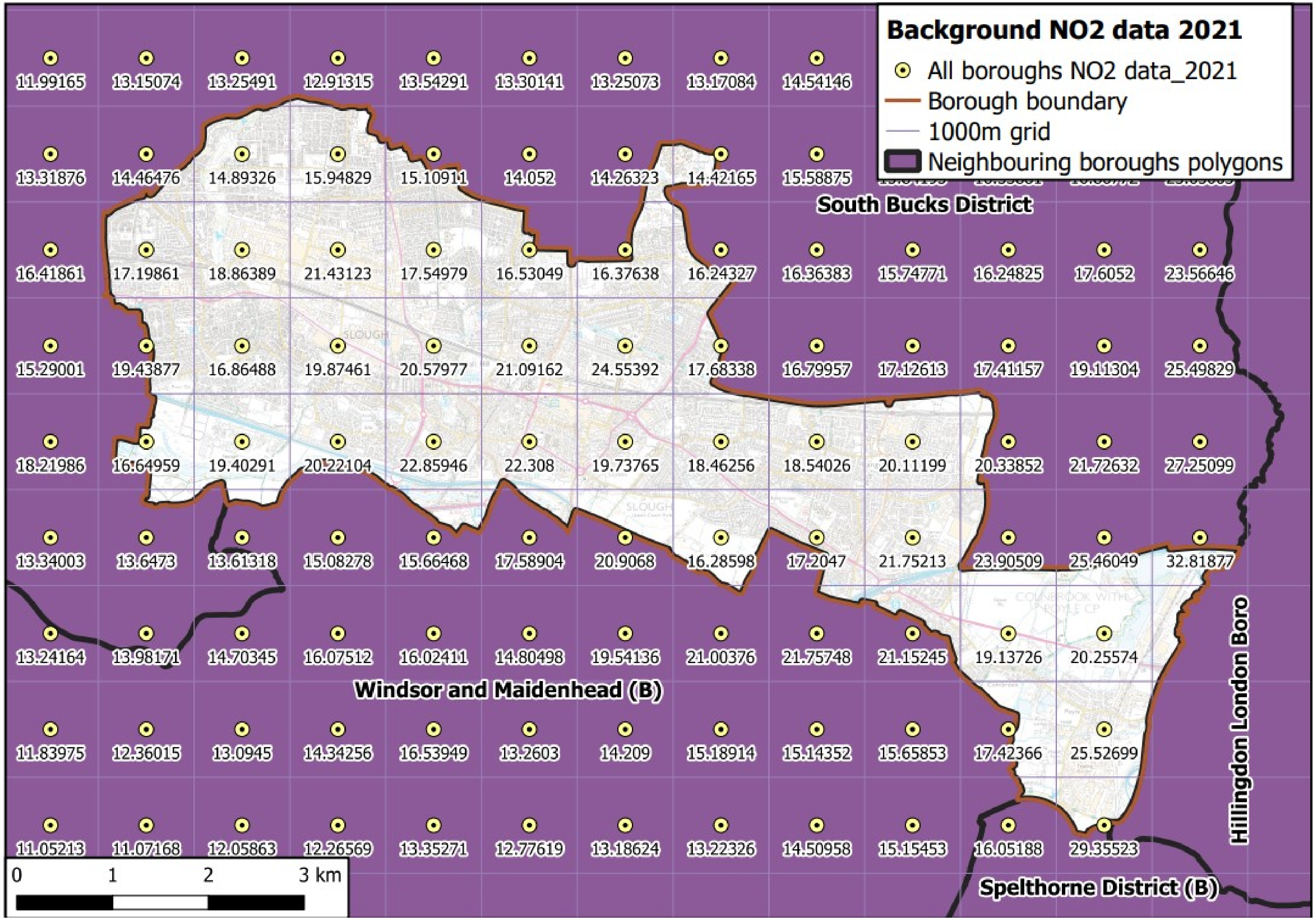


Figure D.10 – Map of Defra Background NO_2 Concentrations



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[12]

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values’
AQG	Air Quality Guidelines, updated by the World Health Organisation in 2021
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
EfW	Energy from Waste
EU	European Union
EV	Electric Vehicle
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
LES	Low Emission Strategy (2018-2025)
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NRMM	Non-Road Mobile Machinery
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
SCA	Smoke Control Area
SO_2	Sulphur Dioxide
STIP	Strategic Transport Infrastructure Plan
TEA	Triethanolamine
WHO	World Health Organisation

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