2023 Air Quality Annual Status Report (ASR)

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

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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 29,000 to 43,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

This Annual Status Report (ASR) represents the first year of typical transport levels after the pandemic caused widespread reductions in traffic levels, resulting in anomalously low nitrogen dioxide (NO_2) concentrations. The general trend across the borough suggests that NO_2 concentrations are continuing to recover to pre-pandemic levels, with some hotspot areas continuing to persist. Air pollution therefore remains a significant environmental and public health concern and further work is required to slow and reverse the current trends.

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

The wellbeing of those living in Slough is 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

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[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, January 2023

[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

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 reduced due to the pandemic. The programme was due to recommence in 2021, however in July 2021, the Council issued a Section 114 Notice, which resulted in significant reductions in officer capacity and resource to deliver projects, with members of the Environment team seconded to support other service areas during 2021 and 2022. To address this, new service plans are in development with the intention to recruit additional posts to the Environment team, to allow the programme to recommence. The Council's AQAP development recommenced in 2023, with current timelines indicating that the consultation will be released in Autumn of 2023. It should be noted however that the new AQAP builds upon the existing LES which should be considered Slough's most recent strategy to tackle poor air quality, which was last updated in December 2020.

Despite the challenges faced by the Council, work is continuing on the implementation of carbon reduction measures such as the Sustainable Warmth home insulation scheme, and progress on the Access Fund programme by the Sustainable Transport Team has continued, both of which have a positive impact on 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 is continuing to rebuild its operations following the financial situation, which provides opportunities to integrate environmentally supportive recovery measures and aims, including an aim to revoke all of

Slough's Air Quality Management Areas (AQMAs) by 2030. An update to the Council's recovery strategy is currently in progress.

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 (particularly heavy goods vehicle (HGV) transport), 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 associated with data centres, as well as transboundary pollutants (i.e. pollutants outside Slough) also contribute to the background pollution levels, and will continue to do so. The Council has declared a 'smoke controlled area' across Slough's wards, and have acknowledged that further initiatives 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 planned over the next 5-10 years, including:

- Operation of the M4 Smart Motorway (from December 2022) – this is designed to allow up to 15,000 additional vehicle movements a day during its operation (peaking by 2030) (Impacts: M4 AQMA, Tuns Lane AQMA, Town Centre AQMA and Brands Hill AQMA). It was published in April 2023 however that new smart motorways will be removed from government road-building plans in recognition of the lack of public confidence and cost pressures. As such, there is a possibility that the M4 smart motorway scheme will be removed in future.
- 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 9,000 residential properties, 150,000m^2 of new office space, and commercial and retail uses as proposed within the Slough Spatial Strategy 2020 (Town Centre/Tuns Lane AQMAs) (2016 – 2036).

- Slough Northern Expansion – 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 third 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 third 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 indicated that road transport remains the greatest contributor to poor air quality in Slough. The specific sources were modelled in a source apportionment exercise, which indicated 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 update to Slough's AQAP recommenced in 2023. As the modelling work was undertaken during the pandemic, a number of assumptions were made on vehicle fleet compositions and therefore as part of the AQAP development, the baseline and future

year modelling will be revisited to ensure that it is an accurate reflection of air quality within Slough.

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.
- 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 and passive diffusion tube network is given below.

Continuous Monitoring

During 2022, the Council continuously monitored air quality at six locations. Six monitoring stations monitor NO_2 concentrations, and four monitoring stations monitor particulate (PM_{10}) concentrations using established reference methods (TEOM or BAM).

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. As the station was operational late in the year, 2022 represents the first year of full data capture.

The Langley monitoring station began operating in December 2022, therefore the data shall be reported in next year's ASR (ASR 2024). Currently this station is only monitoring NO_2 however a PM monitor is planned to be installed in the next few years pending funding availability.

Pippins Colnbrook monitoring station (SLH 3) 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 was abandoned and the operation of Pippins Colnbrook monitoring station ceased in March 2022. There may be opportunities to recommence monitoring in the future once funding is secured, to monitor the impact of major infrastructure projects such as the Heathrow Expansion on background air quality.

In addition, 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 on the following website Slough Air - AEAT.

Passive (Diffusion Tube) Monitoring

Slough Borough Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 72 sites (102 diffusion tubes) during 2022. Changes to the network from 2021 to 2022 are as follows:

- Removal of the following diffusion tubes: Sussex Place (SLO 6), Tweed Road (SLO 9), Torridge Road (SLO 11), Farnham Road (SLO 30), and Wellington Street Stratfield (SLO 33). 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 May 2022.
- Pippins (SLO 14, SLO 15 and SLO 16) – the continuous monitoring station at Pippins Colnbrook ceased operations in March 2022, therefore the co-located diffusion tubes were decommissioned soon after in May 2022.

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

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). In June 2019, there were 1988 residential properties located within our AQMAs. In 2022, GIS data suggests that there are now 1961 residential

properties within our AQMAs. This reduction may have resulted from change of use (for example, Class C residential to Class E retail use) and improved data quality.

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 2022, there were 542 residential properties within AQMA 1.

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. A new residential development (Rogans) opposite the A4 gyratory is now occupied and is expected to double the number of residential properties exposed in this location. In 2022, there were 85 residential properties within AQMA 2.

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 2022, there were 362 residential properties 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 2022, there were 743 residential properties within AQMA 4.

AQMA 3 Extension: The Council declared the new extended AQMA 3 on 10th May 2018 and formally submitted this to Defra. In 2022, there were 229 residential properties within AQMA 3 Extension.

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 2022

This report covers the air quality results obtained during 2022 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. In the following discussion, any

increase in NO_2 is indicated by a '+' symbol proceeding the value, and any decrease in NO_2 is indicated by a '-' symbol proceeding the value.

National Trends – Nitrogen Dioxide (NO_2)

- Across the UK, urban background NO_2 pollution has reduced both in the long-term and in recent years. Between 2006 and 2019 inclusive, the annual mean NO_2 concentration at urban background sites reduced by an average of -0.9µg/m^3 each year and fell by -4.5µg/m^3 (23%) in 2020 due to a reduction in traffic as a result of the pandemic. Concentrations recovered slightly in 2021 by 5% and decreased by 1% from 2021 to 2022.
- Similarly, roadside sites had seen an average reduction of NO_2 concentrations by -1.8µg/m^3 each year between 2006 and 2019. The pandemic brought a 26% reduction (-8.21µg/m^3) in 2020, which recovered by 8% in 2021 by +1.8µg/m^3. On average, the annual mean concentration of roadside NO_2 has decreased by 5% (-1.2µg/m^3) from 2021 to 2022, whilst remaining 24% lower than concentrations in 2019. 2022 also saw the fewest hours of 'Moderate' air pollution due to NO_2 per site since the beginning of the time series (1997).
- In regards to weekday variations, the Monday-to-Friday mean concentration at roadside sites was 25.2µg/m^3, which was 28% greater than the mean concentration at the weekend of 19.7µg/m^3. This is primarily due to the influence of commuter traffic during the week and is a greater difference when compared to 2021 (26%)[5].

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

- Urban background PM_{10} pollution has reduced in the long-term despite a period of relative stability between 2015 to 2019, until a notable decrease in 2020 by -1.8µg/m^3 (12%) to 13.2µg/m^3. There was further decrease (2%) to 13.0µg/m^3 in 2021, the lowest value in the time series. From there, concentrations have risen by 8% to 13.9µg/m^3 in 2022.
- Similarly to PM_{10}, urban background $PM_{2.5}$ pollution has shown stability between 2015 and 2019, with a notable decrease from 2019 to 2020 from 9.9µg/m^3 to 7.9µg/m^3 (20%). This has recovered slightly in 2022 to 8.3µg/m^3 (5%).

[5] National Statistics on Nitrogen Dioxide (GOV.UK)

- Both roadside PM_{10} and $PM_{2.5}$ pollution has reduced in the long-term. Similarly to urban background sites, roadside PM_{10} concentrations have remained relatively stable over the last 8 years, with an 8% reduction in 2020 to 16.3µg/m^3, dropping by a further 2.7% in 2021 to 15.9µg/m^3. Concentrations in 2022 however have increased by 6% to 16.9µg/m^3. $PM_{2.5}$ has seen a similar trend with the lowest concentrations observed in 2020 at 8.1µg/m^3, increasing slightly to 8.7µg/m^3 by 2022.
- Comparing PM_{10} by site location, concentrations are greater at roadside sites than urban background sites. This is likely to be due to proximity to road transport sources such as brake, tyre and road wear, in addition to resuspension caused by vehicle movements.
- Across the UK, $PM_{2.5}$ locations tend to be highest in urban environments, particularly in the southern and eastern areas of the UK. This is likely due to population density, weather conditions and a greater exposure to pollution sources from mainland Europe. In 2022, the top 5 sites in urban environments (4 roadside and 1 background) with the greatest annual mean concentration of $PM_{2.5}$ were located in the South or East (including London).
- Overall, roadside and urban background monitoring sites have recorded a decreasing trend in hours of 'Moderate' or higher $PM_{2.5}$ air pollution since 2011.

Slough Air Quality Trends

The headlines of the 2022 Slough monitoring results, compared with 2021 data and progress over the last five years (Table A.4.1 and Table B.1) are that:

- AQMA 1: On average, NO_2 concentrations have worsened across AQMA 1 by +2.1µg/m^3 from 2021 to 2022. The biggest increase is observed at Grampian Way (SLO 8) by +4.7µg/m^3, followed by Tweed Road (SLO 9) by +3.4µg/m^3, however both remain far below the AQO at 27.8µg/m^3 and 24.6µg/m^3, respectively. The Highways England receptors (SLO 69 – SLO 95) have increased by +2.2µg/m^3 on average. Over the last five years, average NO_2 concentrations within AQMA 1 have dropped by -10.2µg/m^3 (31%). The biggest improvement is observed at Paxton Avenue (SLO 25) which has reduced by -13.6µg/m^3 (41%) to 19.6µg/m^3 since 2018, whereas the site with the smallest improvement is Grampian Way (SLO 8) by -7.0µg/m^3 (20%), measuring 27.8µg/m^3 in 2022.
- AQMA 2: NO_2 concentrations have increased by +1.0µg/m^3 from 2021 to 2022. In previous years, Brands Hill (A) (SLO 18) had seen the highest concentrations of NO_2

recorded within this AQMA, however from 2021 to 2022, this location showed the greatest improvement in concentrations by -4.9µg/m^3, measuring 31.6µg/m^3 in 2022. In contrast, the greatest worsening of NO_2 is observed at Brands Hill triplicate site (SLO 63, 64, and SLO 65), by +4.6µg/m^3, falling within 10% of the AQO at 36.8µg/m^3. AQMA 2 has experienced the greatest drop in average NO_2 concentrations since 2018 out of all the AQMAs, at -13.0µg/m^3 (31%). The biggest improvement is seen at Brands Hill (A) (SLO 18) by -21.6µg/m^3 (41%), whereas the smallest improvement is seen at Brands Hill triplicate site (SLO 63, SLO 64 and SLO 65) at -6.5µg/m^3 (15%), relative to 2018 concentrations.

- AQMA 3: Overall, concentrations of NO_2 have increased from 2021 to 2022 by +0.7µg/m^3 across AQMA 3, greatest at Tuns Lane (SLO 50) by +2.2µg/m^3 and lowest at Farnham Road (SLO 30) by -0.5µg/m^3. Both sites are below 10% of the AQO at 32.9µg/m^3 and 23.4µg/m^3, respectively. SLO 30 however has been annualised so should be treated with caution.
  Relative to 2018, AQMA 3 has seen an average reduction in NO_2 of -8.6µg/m^3, with Tuns Lane (B) (SLO 50) showing the greatest improvement in concentrations at -12.9µg/m^3 (28%), representing the third year of falling below 10% of the AQO at 32.9µg/m^3 in 2022, and the highest average year on year improvement at 7%. The smallest improvement is observed at Farnham Road (SLO 30) by -5.6µg/m^3, however this site is far below the AQO in 2022.
- AQMA 3 Extension: NO_2 concentrations at AQMA 3 Extension have seen a slight worsening by +0.6µg/m^3 on average from 2021 to 2022. This correlates with the nearby traffic count data which suggests that traffic flows have only increased by 3.7% from 2021 to 2022. Concentrations in 2022 at Windmill Bath Road (SLO 43) and Windmill triplicate (SLO 57, SLO 58 and SLO 59) remain far below the AQO at 25.6µg/m^3 and 28.8µg/m^3, respectively. Relative to 2018, concentrations at the Windmill triplicate (SLO 57, SLO 58 and SLO 59) have reduced by -12.8µg/m^3. Although NO_2 concentrations have increased since 2020, the rate has been slow (average 2%).
  AQMA 4: The average increase in NO_2 is +2.5µg/m^3 in AQMA 3 from 2021 to 2022, with the highest increase seen at Yew Tree Road (SLO 29) by +5.3µg/m^3, resulting in an exceedance of the AQO at 44.2µg/m^3, however once distance corrected, concentrations reduce to 36.6µg/m^3. Since 2018, concentrations have improved across all sites (average -8.1µg/m^3, 22%), the greatest being at Blair Road (SLO 37,

-12.8µg/m^3). The Wellington Street triplicate (SLO 60, SLO 61 and SLO 62) has improved the least by -4.4µg/m^3 (12.8%), however NO_2 concentrations measured over the last five years have remained below 10% of the AQO.

- Potential Langley AQMA: The 2022 results indicate that although NO_2 concentrations at all sites within the Langley area have worsened or show no improvement by -1.8µg/m^3 on average, the highest NO_2 concentration in 2022 is 30.3µg/m^3, observed at High Street Langley (A) (SLO 53), far below the AQO. As concentrations have remained low despite no traffic restrictions being in place, it is unlikely that Langley will be declared an AQMA in future.

Annual mean monitoring results indicate that concentrations have not yet recovered after the widespread reductions resulting from the pandemic in 2020. Overall, Windmill (SLH 12) has seen the greatest reduction in NO_2 concentrations from 2018 to 2022 (-13.3µg/m^3) and the greatest year on year improvement on average (-3.3µg/m^3). In contrast, Pippins Colnbrook (SLH 3) has the lowest year on year improvement on average at -0.2µg/m^3. 2022 has seen an overall worsening of NO_2 by +1.0µg/m^3 relative to 2021 data, with some sites increasing in NO_2 (+3.4µg/m^3 at Pippins Colnbrook (SLH 3)), whilst others have seen a reduction in NO_2 (-0.5µg/m^3 at Spackmans Way (SLH 13)). The 1 hour mean objective was not exceeded during 2022.

In regards to particulate matter (PM_{10}), the five year trend had shown a gradual decline prior to 2022, however 2022 saw an increase in PM_{10} at five of our six monitoring sites by +1.9µg/m^3 on average, the greatest being an increase of +5.7µg/m^3 observed at Lakeside 2 (SLH 9). Brands Hill (SLH 11) was the only site that saw an improvement in PM_{10} from 2021 to 2022 by -1.3µg/m^3 and all sites have remained far below the AQO over the five year period. Similarly $PM_{2.5}$ concentrations have worsened from 2021 to 2022 by +2.1µg/m^3, with 2022 showing the highest concentration recorded over the last five years at Lakeside 2. When calculating $PM_{2.5}$ from PM_{10} data, the results show that all calculated $PM_{2.5}$ results are below the annual objective, however two of the four sites active in 2022 show an exceedance of the interim 2028 target level of 12µg/m^3 at Brands Hill (SLH 11) and Windmill (SLH 12) at 16.7µg/m^3 and 13.4µg/m^3, respectively. Although the trend at Brands Hill shows improvement from 2018 to 2022, falling by -3.4µg/m^3 over the time series, it is clear that further intervention is required to bring this concentration down to 12µg/m^3 by the target date of 2028.

Outside of AQMAs, NO_2 concentrations have increased from 2021 to 2022 by +1.4µg/m^3, greatest at Ledgers Road (b) (SLO 121) by +4.5µg/m^3 to 35.7µg/m^3, and lowest at Salt Hill

Park footpath (SLO 3 Relocated) by -1.5µg/m^3 to 16.5µg/m^3. Relative to 2018, non-AQMA sites have seen a -9.6µg/m^3 improvement in NO_2, most notable at Lakeside Road (SLO 12, -16.3µg/m^3), with an average year on year improvement of -4.1µg/m^3.

Industrial sites outside of AQMAs within the Colnbrook and Poyle area (SLO 7, SLO 12 and SLO 17) have seen the largest reduction in NO_2 by -13.1µg/m^3 (33%) since 2018, the largest observed at Lakeside Road (SLO 12) from 40.7µg/m^3 to 24.4µg/m^3. Roadside and kerbside sites outside of AQMAs have seen a NO_2 reduction of -9.0µg/m^3 since 2018, whereas suburban and urban sites have seen the lowest reduction in NO_2 at -6.0µg/m^3. No monitoring sites outside of AQMAs have fallen within 10% of the AQO since 2020.

Diffusion tube monitoring of the A4 bus lane scheme shows eight diffusion tube sites which have increased in NO_2 concentrations from 2021 to 2022, whereas four sites show a decrease. The results are comparable to concentrations on similar roads, however Ledgers Road (b) (SLO 121) has relatively high concentrations in 2022 compared with other bus lane monitoring locations, at 35.7µg/m^3, close to being within 10% of the AQO. Intervention may be needed at this location to ensure that air quality does not continue to worsen.

As the results from 2022 show a worsening of NO_2 concentrations and this year represents the first year of unrestricted traffic flows, it would be premature to suggest that any of Slough's AQMAs should be revoked. AQMA 2 and AQMA 4 in particular have areas where NO_2 concentrations fall within 10% or exceed the AQO, therefore further work is required to reduce these concentrations to compliant levels. In contrast, AQMA 1, AQMA 3 and AQMA 3 Extension may be closer to revocation, as previous years' data shows that no sites have fallen within 10% of the AQO since 2020, however as the trend is disrupted by two years influenced by the pandemic, it is recommended at least two additional years of data are collected before an adequate conclusion can be drawn on the revocation of Slough's AQMAs.

Actions to Improve Air Quality

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

The Environmental Improvement Plan[6] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[7] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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. Notably, 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-term 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
  - 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

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

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

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, significant intervention and funding within Slough to meet these targets.

The Council reported to Defra in 2022 on 48 measures that are aimed at directly or indirectly improving air quality in Slough. The number of measures reported within this ASR stands at 46. A number of these measures are still ongoing, some have yet to start or are on hold due to the Council's financial position, 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 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.

During the last reporting year, a number of transport schemes were initiated or implemented, which aimed to increase capacity at junctions and improve public transport links. This aims to result in reduced congestion, which has a positive effect on air quality in the borough. A number of measures within Table 2.2 however have seen little progress due to strains on officer resource and capacity resulting from the Section 114 notice (issued in July 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, alongside development of Slough's AQAP. Additional resource will also allow the initiatives within the Climate Change Strategy to be progressed and continue implementation of the Access Fund programme, both of which will have a positive impact on air quality.

A barrier to air quality improvements is public education and awareness of air quality issues. As such, it is imperative that a focus on air quality campaigns is reintroduced. A new Deputy Director of Public Health joined Slough Borough Council in June 2023, which will enable collaborative working and knowledge sharing across environmental disciplines and public health. The Carbon and Sustainability Team will work collaboratively with Public Health and the Council's Communications team to agree a consistent approach to air quality campaigns such as Clean Air Day, for implementation in 2024. This shall be reported in more detail within the next ASR.

In addition, Public Health have established a Tobacco Control Plan, which can have positive impacts on indoor air quality. Although indoor air quality is not a focus within ASRs, it is noted within the Chief Medical Officer report[8] that indoor air quality will become proportionally a greater issue as outdoor air quality continues to improve. It is expected therefore that interventions which focus on indoor air quality as well as outdoor air quality will be needed in future.

Conclusions and Priorities

The pandemic brought about widespread positive air quality impacts in Slough and across the nation. This trend continued into 2021 at the majority of monitoring sites, whereas 2022 has seen increases in NO_2 concentrations on average, with some areas showing partial recovery to pre-pandemic concentrations, particularly at Yew Tree Road (SLO 29) which is now in exceedance of the AQO for NO_2.

As such, it is not recommended that any AQMAs are revoked at this stage. Within the last ASR it was recommended that a full review of the status and boundaries of Slough's AQMAs was completed within this ASR, however as the results from 2022 show a worsening of NO_2 concentrations and this year represents the first year of unrestricted traffic flows, it would be premature to suggest that any of Slough's AQMAs should be revoked. It is expected that at least two additional years of data is collected before a clear conclusion can be drawn.

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

[8] Chief Medical Officer's Annual Report 2022 (publishing.service.gov.uk)

- 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 car clubs are operating to enable residents to have a low emission vehicle option.
- The main challenges are non-conforming Euro VI 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 marked 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, and agree a consistent approach to campaigns such as Clean Air Day.
- 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[9], which have copies of the AQAPs and maps of the AQMAs.

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[10].

[9] Air quality (Slough Borough Council)

[10] Airtext

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[11].

A new AQAP is in development and a public consultation is expected to launch in Autumn 2023. This will provide an opportunity for members of the public to raise their views on the measures that Slough Borough Council intend to introduce to help tackle air quality issues in Slough.

Local Responsibilities and Commitment

This ASR was prepared by the Carbon and Sustainability Team of Slough Borough Council with the support and agreement of the following officers and departments:

Transport Department:

- Associate Director of Operations
- Network Lead for Parking, Highways & Streetworks
- Project Manager Major Infrastructure Projects
- Public Transport Officer

Public Health:

- Deputy Director of Public Health

This ASR has been approved by:

Savio DeCruz – Associate Director of Operations

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

Kelly Evans – Deputy Director of Public Health

[11] 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 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by 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 Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

A summary of AQMAs declared by 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 and the highest concentration recorded once corrected to relevant exposure. 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 Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Slough AQMA 1	Declared 23/06/2005	NO_2 Annual Mean	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	30.5	5	Annex C of the Local Transport Plan - 2006	Slough Local Transport Plan
Slough AQMA 2	Declared 23/06/2005	NO_2 Annual Mean	An area encompassing the A4 London Road east of junction 5 of the M4 motorway as far as Sutton Lane	NO	62	32.2	3	Annex C of the Local Transport Plan - 2006	Slough Local Transport Plan
Slough AQMA 3	Declared 24/01/2011	NO_2 Annual Mean	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	28.9	3	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 Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Slough AQMA 4	Declared 24/01/2011	NO_2 Annual Mean	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	36.6	3	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 Extension 3	Declared 10/05/2018	NO_2 Annual Mean	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	27.8	3	Slough Low Emission Strategy (2018)	Slough Local Emission Strategy 2018 - 2025

☒ **Slough Borough Council confirm the information on UK-Air regarding their AQMAs 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 was widely positive, and acknowledged the difficulties Slough Borough Council are facing financially and the resultant impact that has had on the AQAP and project progress. Key comments are outlined below:

- *The Council has included discussion and review of its AQMAs and monitoring strategy and also the additional monitors (both automatic and non-automatic) put in place to provide data. This demonstrates the Councils proactive and dedicated approach to improving air quality across the area.*
- *The Council provide a detailed analysis of air pollution concentration trends, which are presented and discussed clearly and extensively. A comparison with air quality objectives is also provided, which is welcomed and encouraged.*
- *The Council is in the process of updating and consolidating the AQAPs for the existing AQMAs in the Borough. However, funding and capacity issues have hindered progress. The Council state that, once funding and support has been secured, projects can recommence and progress, such as the development of the AQAP, and initiatives within the Climate Change Strategy. This is very much encouraged, and the Council should provide updates on progress in the next ASR.*

Progress and Challenges in 2022

Slough Borough Council has taken forward a number of direct measures during the current reporting year of 2022 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 0.2. 46 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 2022 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 0.2.

More detail on these measures can be found in their respective Action Plans and within the Low Emission Strategy (2018-2025).

Key completed measures are:

- Langley High Street – widening from Langley College to Elmhurst Road
- Brands Hill widening and junction upgrade / redesign – A4 to By-pass
- Station Forecourt (north side) – new public realm and access arrangements
- Partially complete William St North junction upgrade

- Partially complete A4/Wellington St junction upgrade for right turning vehicles
- Eight traffic signal junction improvements across the borough
- Continuation of the E-Scooters

The above measures aim to increase capacity at road junctions and provide improved public transport links, which both are likely to result in improvements to air quality.

Slough Borough Council worked to implement these measures in partnership with the following stakeholders during 2022:

- Department for Transport (DfT)
- National Highways
- Heathrow Airport
- Network Rail
- Slough Urban Renewal

The principal challenges and barriers to implementation that Slough Borough Council is facing relate to the Council's financial position, which has caused delay to projects across the Council.

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. This has continued into 2022/23 and it is expected that it will take a few more years to achieve a balanced budget alongside required annual savings targets. As a consequence, officer resource and capacity has significantly reduced, with two environmental officers seconded to different roles, causing a delay to projects shown in Table 2.2 during 2022. However, in 2023 it has been acknowledged at Director level that progress needs to be made within the Environmental team to implement the LES programme and progress with the AQAP development. Slough Borough Council are soon to commence a senior management level restructure with seconded officers due to return to their substantive posts by Autumn 2023.

The Corporate Recovery Plan was initially developed in March 2022, which included an ambition to revoke all of Slough AQMAs by 2030. Due to Slough Borough Council's recent new political administration and subsequent change of senior leadership, the Corporate Recovery Plan is being revisited in Summer 2023 and it is expected to include a focus on improving air quality and carbon emissions in the borough. Since the Council's Carbon Officer departed in January 2022, progress on implementing the Council's Climate Change Strategy and Carbon Management Plan have been slow. The Council's Air Quality Officer

is currently undertaking carbon literacy and management training to support the Council's carbon agenda and allow for improved cross discipline working.

As well as internal recognition, the lack of officer resource for air quality projects has also been acknowledged by the Office for Zero Emission Vehicles (OZEV) who have allocated Slough Borough Council funding from the Low Emission Vehicle Infrastructure (LEVI) Capital Fund and the Capability Fund specifically to cover officer resource to deliver electric vehicle projects. With this funding, Slough Borough Council are intending to recruit two new officers who will assist in the delivery of these projects. This includes:

- Development of the Slough Electric Vehicle Programme, including the installation of on-street charging and introducing local charging hubs with both fast and rapid chargers
- Progression of the borough-wide electric vehicle car club
- Progression of the OZEV funded rapid charger scheme
- Delivery of the Defra funded taxi demo project

A small portion of the initial LEVI Capability Fund allocation has been put aside for a Berkshire Wide Electric Vehicle Charging Strategy in collaboration with five of the six Berkshire local authorities.

Slough Borough Council expect that significant progress on LES projects over the course of the next reporting year will be achieved, alongside the development and implementation of Slough's AQAP, once additional resources have been secured. These projects remain the key priorities for the coming year.

In addition, a new Deputy Director of Public Health joined Slough Borough Council in June 2023, which will allow the Council to refocus on public education and awareness campaigns and programmes through collaboration and cross departmental working. In 2023, the Carbon and Sustainability Team will work collaboratively with Public Health and the Council's Communications team to agree a consistent approach to air quality campaigns such as Clean Air Day, for implementation in 2024. This shall be reported in more detail within the next ASR. Although not a focus within this ASR, it is expected that indoor air quality will become of greater importance as outdoor air quality improves. As such, it is likely that joint interventions between Environmental teams and Public Health will increase in future.

Slough Borough Council anticipates that the measures stated above and in Table 0.2 will achieve compliance within all AQMAs, however it is expected that the restarting of the LES

programme implementation and the development of Slough's AQAP will bring about compliance within a shorter timescale.

For 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.

The road layout within AQMA 2 was redesigned and implemented in 2022/23. Although there are high volumes of HGVs using the Brands Hill gyratory and expected increases in traffic as a result of major infrastructure projects in the area, initial results in Slough's most affected areas are looking positive. Further years of data will be needed to determine whether the recent road layout amendments will have prolonged air quality benefits.

Whilst the measures stated above and 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 3, AQMA 3 Extension and AQMA 4. These areas require further transport related interventions to result in long term compliance with the NO_2 AQO. It is evident that the pandemic had a positive impact on air pollution due to reduced traffic flows, which if sustained, would likely have resulted in widespread compliance. As such, measures which reduce private car use are most likely to be effective.

Table 0.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	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. In 2022, all businesses were offered a business grant to promote active travel. 2 businesses expressed an interest and of the two, one business accepted the grant of £2500. All businesses receive quarterly newsletters. 10 businesses offered bespoke travel planning maps to encourage active travel.
2	Access Fund Smarter Travel for Slough Schools Programme	Promoting Travel Alternatives	School Travel Plans	2017	2021	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. 21 schools were 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 One school achieved Bronze level in 2022. In 2023, we now have 1 silver school and two bronze. We expect to have another 5 schools to have Bronze by July 2023.
3	Access Fund Smarter Travel for Slough residents Programme	Promoting Travel Alternatives	Other	2017	2021	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. We plan to engage with communities through our events. Events in 2022: community engagement through bike markings across the borough; promoting active travel with Chalvey residents; and supporting communities on low income.
4	Marketing and Promotion of Sustainable travel options in Slough	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2017	2021	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. 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	Ongoing	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. The scheme also included junction improvement works at the TVU junctions and additional works to be undertaken at the Mill Street junction.
6	Access Fund: Personalise Travel Planning	Promoting Travel Alternatives	Personalised Travel Planning	2017	2021	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 and Behavioural change / modal shift remain a Council priority.	Introduced April 2017. Funding share of £2m. Further £500k awarded by DfT until 2021. Currently no further funding by DfT, but work continuing where 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. In 2022, there was no further progress made. We are currently developing a package for businesses.
7	Home Working	Promoting Travel Alternatives	Encourage / Facilitate home-working	2019	Ongoing	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

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															ongoing basis in 2022 with no formalised requirements regarding frequency of office working.
8	Promotion of cycling	Promoting Travel Alternatives	Promotion of cycling	2017	Ongoing	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. The A4 scheme drawings being presented to Cabinet in July 2023. Before monitoring data has been collected to understand existing cycling numbers and journey time.
9	Promotion of walking	Promoting Travel Alternatives	Promotion of walking	2017	Ongoing	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. Cycling scheme to be introduced on Burnham Station Road.
10	Freight Partnerships	Freight and Delivery Management	Freight Partnerships for town centre deliveries	2021	Ongoing	SBC	SBC	NO	Not funded	£10k - 50k	Planning	AQMA2 & AQMA 4	Reduction in emissions of freight deliveries		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. No progress has been made in 2022.
11	Slough Cycle Hire Scheme	Transport Planning and Infrastructure	Public cycle hire scheme	2013	Ongoing	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 was originally due to be introduced later in 2022. An ITT is to be advertised to procure a combined e-scooter and e-bike offering. Procurement activities to be undertaken to procure e-scooter and e-bikes supplier July/August 2023.
12	Pedestrian Wayfinding System	Transport Planning and Infrastructure	Other	2017	2018	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. Slough was awarded the Levelling Up grant to deliver the Destination Farnham Road. The scheme will include an urban realm, cycling and walking facilities and wayfinding totems.
13	Local safety and accessibility schemes to schools and businesses	Transport Planning and Infrastructure	Cycle network	2017	Ongoing	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, cycle counts and wayfinding totems at Farnham Road, BC team take up of scheme, introduction of new cycle hire. A combined bike hire and e-scooter procurement is underway. Farnham Road Public Realm improvement bid was successful.
14	Bus route improvements	Transport Planning and Infrastructure	Bus route improvements	2010	2022	SBC	SBC, DfT, Bus Operators	NO	Not Funded	£100k	Implementation	Borough Wide	Bus patronage	Ongoing	Ongoing, first introduced 2001. The main focus has been on the Slough response to the National Bus Strategy. SBC has

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															developed a Bus Service Improvement Plan (BSIP) in partnership with the local bus operators, in an Enhanced Partnership (EP) arrangement. The BSIP includes extensive reviews of and proposals for all aspects of improved bus service, including route planning and funding sources for scheme proposals, with the submitted BSIP including an implementation funding request to DfT. However, all BSIP / EP measures are subject to feasibility, funding and consultation outcomes. No funding was received from DfT in 2022 for implementation of the BSIP. Furthermore, a small number of existing, supported services were at risk due to Council financial situation. In April 2023 most of the existing supported services at risk were retained / enhanced with funding from Heathrow, Buckinghamshire Council and bus operators, and funds of up to approx. £500k were received from DfT during 2022 and 2023 which will be spent (as planned by the EP) on bus service improvements identified in the BSIP
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. Langley station access scheme now complete, also LEP funded. Stoke Road Regeneration including enhancements to northern forecourt of Slough railway station were due to be completed by September 2022 (enhancements to northern forecourt of Slough railway station were delayed. 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. Slough Bus Station was badly damaged in a fire in October 2022 and (as at June 2023) remains closed for repairs, with reopening date not yet known; buses currently using on-street stops around the town centre
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 concentrations	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 became 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. Western section of MRT (Stewarts) continues in operation. Eastern section of MRT (various operators and routes) already in use informally and frequencies continuing to return to those in place pre-pandemic, with funding from Heathrow. Phase 2 for the P&R was withdrawn and was to become a decarbonisation hub, however the decarbonisation hub was not approved by the LEP and the Park and Ride grant was returned to the LEP.
17	Reduction of speed limits, 20mph zones	Traffic Management	Reduction of speed limits, 20mph zones	2010	Ongoing	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

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															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. Consultation for the proposed A4 30mph scheme was completed. Additional road safety mitigation measures are to be introduced as part of the Safer Roads scheme. These measures will support the implementation of the 30mph speed limit.
18	Parking Enforcement on highway	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2018	Ongoing	SBC	SBC, DfT	NO	Partially funded	£50k - £100k	Implementation	Borough Wide	Congestion	No data available	Ongoing. Parking contract commenced with Saba, June 2018. Bus lane enforcement in place since 2019. Enforcement currently in place for the EATF experimental bus lane scheme which was made permanent in February 2022.
19	Emissions based parking charges	Traffic Management	Emission based parking or permit charges	2021	Ongoing	SBC	SBC	NO	Funded	£10k - 50k	Planning	Borough Wide	Number of spaces		Ongoing. Will be investigating scope 2024. Additional spaces to be secured over 2018-2025
20	EV Parking Provision – New Developments	Policy Guidance and Development Control	Low Emission Strategy	2018	Ongoing	SBC	SBC	NO	Not Funded		Implementation	Borough Wide	Number of new EV Parking spaces		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 (significant net increase in trip rates	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance (Low Emission Strategy)	2018	Ongoing	SBC	SBC	NO	Not funded		Implementation	All AQMAs	Negligible Air Quality Impacts (following mitigation and offsetting)		Ongoing, first introduced in 2018. Included in the Planners Developers Guide
22	Securing developer air quality contributions for low emission infrastructure and EV car clubs	Policy Guidance and Development Control	Low Emission Strategy	2018	Ongoing	SBC, Developers	S.106	NO	Not funded		Implementation	All AQMAs	Financial Contributions amount (£s)		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	2023	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	Ongoing	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/OZEV/Capital funding
25	Taxi emission incentives	Promoting Low Emission Transport	Taxi emission incentives – free charging and licensing for early adopters	2018	2024	SBC	SBC, S.106, OLEV	NO	Funded	£10k - 50k	Implementation	AQMA 4, and Borough Wide	Number of Taxi Rapid Chargers		Funding for 7 Rapid Chargers awarded but not yet been actioned due to capacity issues. This is ongoing in 2022 however funding to support officers was announced in 2023
26	Taxi Licensing	Promoting Low Emission Transport	Taxi Licensing conditions	2018	2025	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

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
27	Council Electric Pool Car and Bike Scheme	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2018	Ongoing	SBC	SBC	NO	Not Funded		Implementation	Borough Wide	Number of electric business miles travelled. Reduction in CO_2 (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. The fleet of Council Electric Bikes were stolen with one left which can be used by staff.
28	Council – ULEV staff company salary sacrifice car scheme	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2018	Ongoing	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 VI 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)	2020	Ongoing	SBC	SBC	NO	Not Funded	£500k - £1 million	Planning	AQMA 2, AQMA3 and AQMA 4 to be modelled	Successful feasibility study		On hold due to Council financial situation.
31	SBC Car & lift sharing schemes	Alternatives to private vehicle use	Car and Lift Sharing Schemes	2019	Ongoing	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		S106 funding being secured. Capital money secured, but not yet implemented. Funding to support officers to deliver the scheme was announced in 2023.
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	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.
35	Air Quality Communication Plan	Public Information	Via all Media	2021	2022	SBC	SBC	NO	Not funded		Planning	Borough Wide	Number of re-tweets		Using Defra six principles of communication. Communication plan as part of CAP on hold due to Council financial situation.
36	New Air Quality Action Plan	Public Information	via leaflets and social media	2021	2022	SBC	SBC	NO	Funded	£100k - £500k	Planning	Borough Wide	Leaflets		Action plan significantly delayed due to Council financial situation. Expected to be developed in 2023.
37	Clean Air Campaigns	Public Information	Signed up	2020	-	SBC, GAP	SBC	NO	Not funded		Planning	Borough Wide	Various media sources		On hold due to Council financial situation.
38	AirText Service	Public Information	Via the Internet and text (smart phones	2017	2021	SBC	SBC	NO	Funded	< £10k	Aborted	Borough Wide	Number of subscribers		Public Awareness Campaign. Due to insufficient funding, the services were aborted in June 2021. This may recommence if funding becomes available.
39	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,	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.

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
							Slough Urban Renewal								
40	A4 Bus Lane experimental scheme	Transport Planning and Infrastructure	Bus route improvements	2020	2021	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 countered the encouragement for PT uptake. The scheme was approved by Cabinet and made permanent in February 2022. Bus frequencies along the bus lane continuing to return to those in place pre-pandemic or better, with funding from Heathrow.
41	eScooter trial	Alternatives to private vehicle use	Other	2020	TBA	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. The contract with neuron our e-scooter provide ceased, therefore the trial is on hold whilst we procure for a new provider together with e-bikes. Procurement exercise to be undertaken July /August to seek suppliers to provide e-scooter and e-bikes.
42	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 Road roundabout	Volume of cyclists (plus any available modal shift metric)		£10.9m funding awarded by the DfT. Preliminary drawings have been developed for the scheme and will be presented to the July 2023 Cabinet meeting. Expected to be delivered by end of 2025
43	Strategic Transport Infrastructure Plan (STIP)	Transport Planning and Infrastructure	Other	2020	ongoing	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		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. No updates have been developed for the STIP in 2022
44	Local Transport Plan revision	Transport Planning	Other	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. There is no update to report in 2022
45	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		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. This has not developed further in 2022.
46	School Street	Promoting Travel Alternatives	Reduction of car use at schools	2020	2020	SBC	SBC	NO	Funded	£10k - 50k	Implementation	Boroughwide	No of School Streets		2 school streets were implemented in 2020. One withdrawn and the other has been made permanent. A further 3 school streets were planned for Sept/Oct 2022. One School Street is in operation. We are consulting with the community in the view for it to be made permanent. No further school streets are planned until moving traffic offences powers have been granted.

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (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 2021 within Slough Borough Council is 6.3% (0.5% improvement from 2020). 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[12]. 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).

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 2021 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. The trend shows a reduction in mortality from 2018 onwards, and the gap between Slough and England rates is reducing each year (1.8% in 2018 to 0.8% in 2021).

[12] Interactive Map - air quality (DEFRA)

With the new modelling methodology, the mortality rates are much higher than previously modelled, for example, in 2018, mortality rates were at 8.9% using the new modelling methodology but 6.5% using the previous methodology.

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

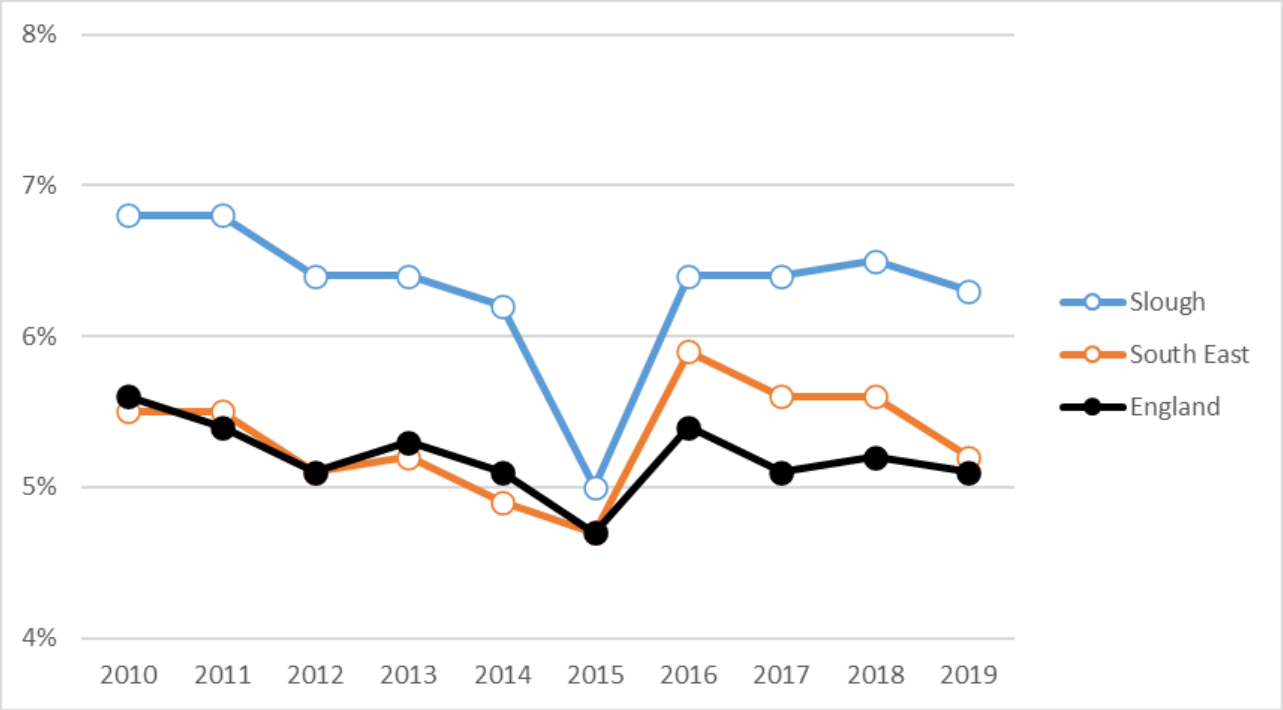


Figure 2.2 - Fraction of Mortality Attributable to Particulate Air Pollution for Slough (2018-2021, New Methodology)

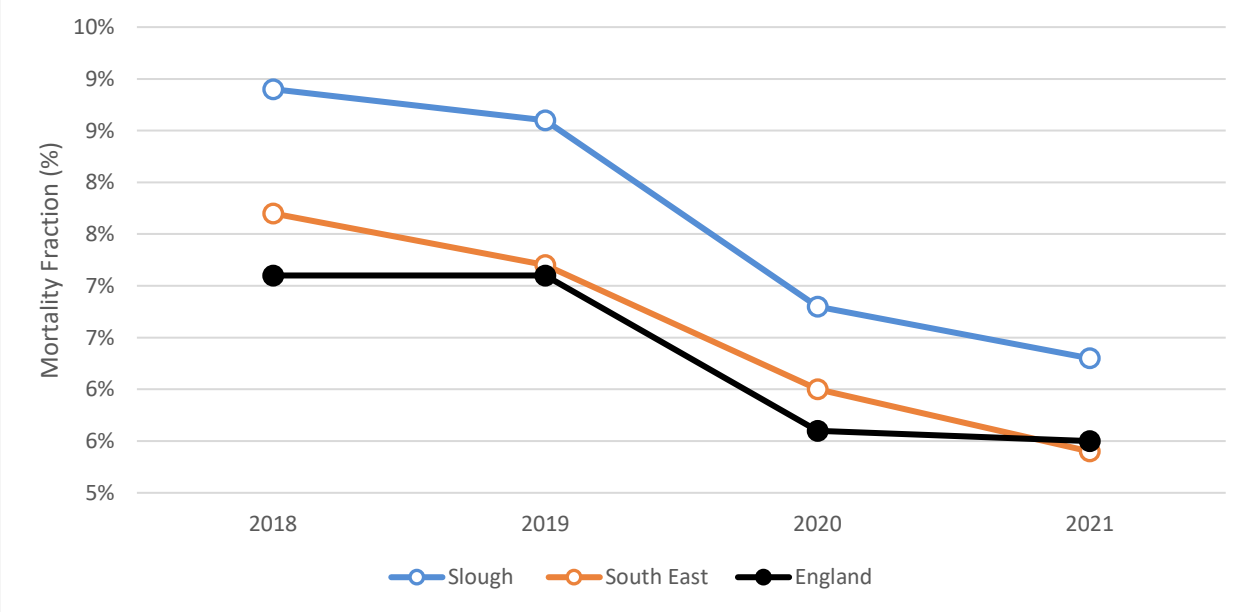


Figure 2.3 below shows Slough mortality rates due to particulate pollution compared with other nearby districts and unitary authorities. These areas all show a similar trend and concentrations to Slough. Data for the City of London has been added as a comparison, which has the highest proportion of mortality attributed to particulate matter pollution in England.

Figure 2.3 - Fraction of Mortality Attributable to Particulate Air Pollution for Slough and Nearby Districts / UAs (2018-2021, New Methodology)

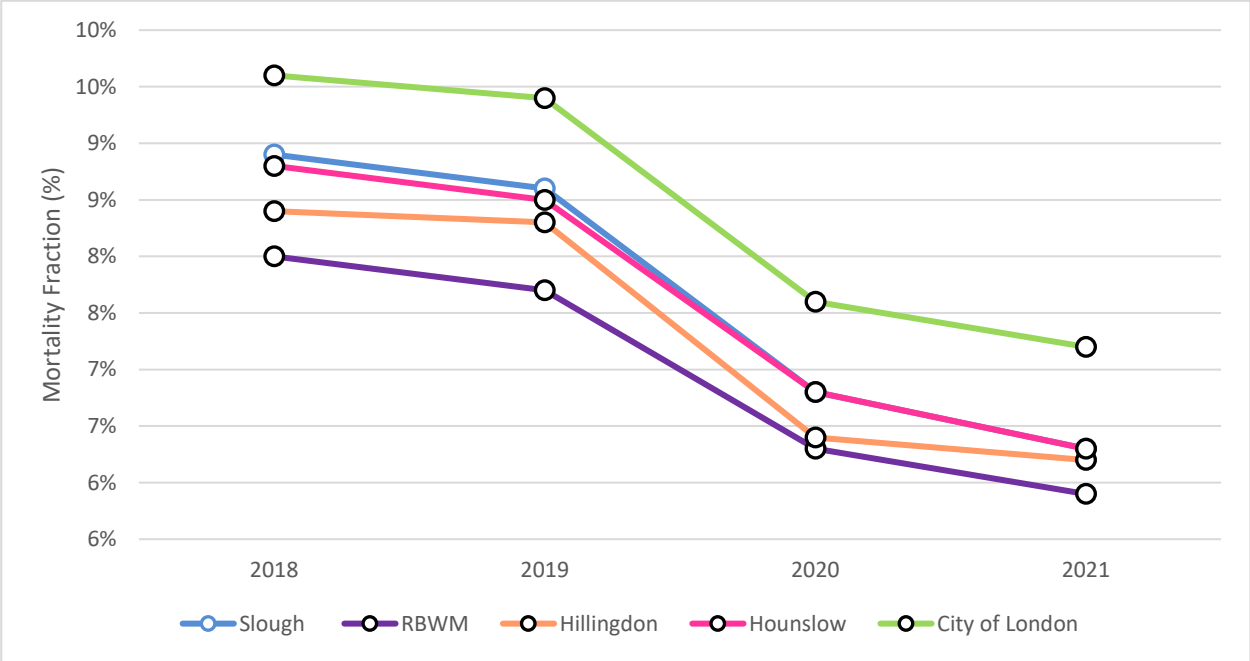
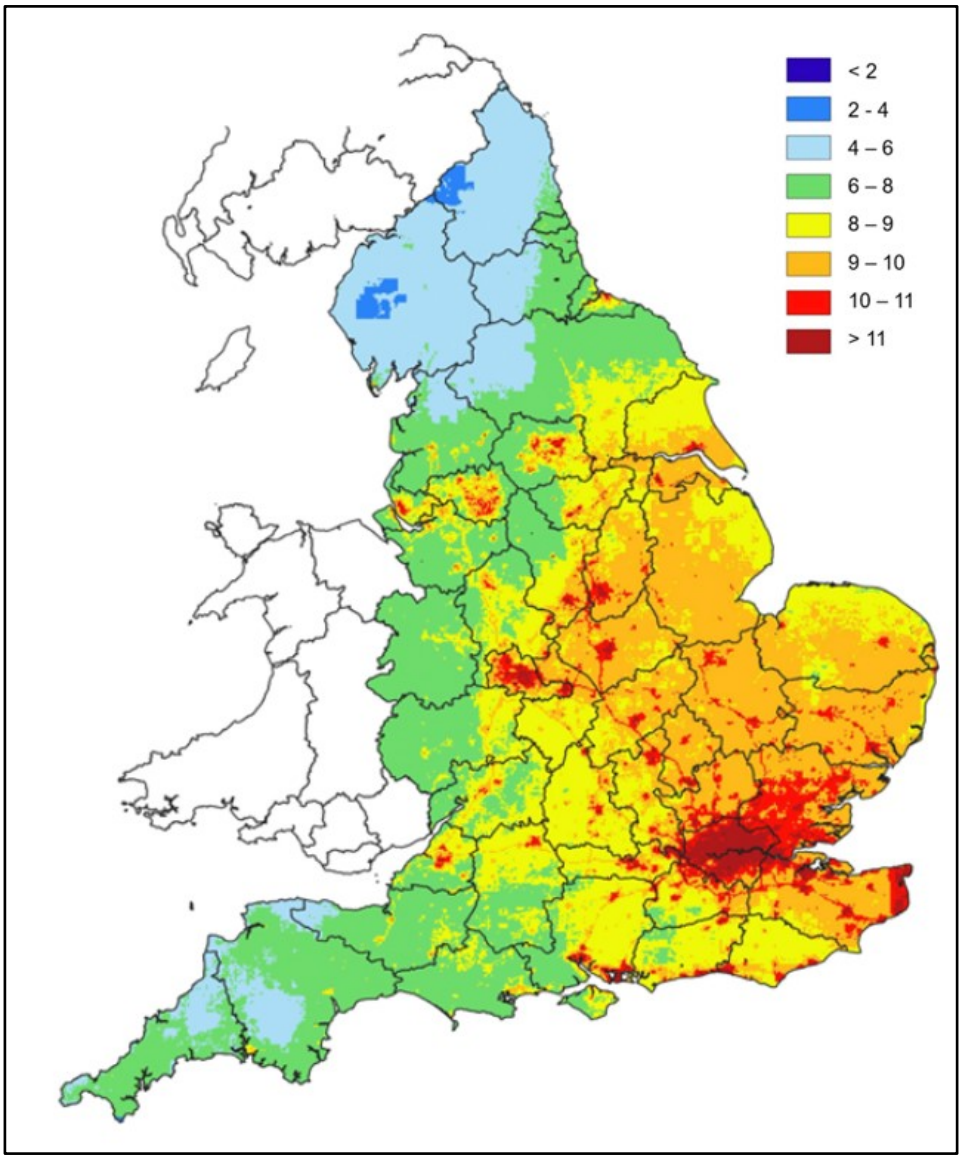


Figure 2.4 shows a map of $PM_{2.5}$ in 2018 which indicates the distribution of $PM_{2.5}$ across England. The South East region primarily has lower $PM_{2.5}$ concentrations, with Slough showing higher concentrations, nearby London. This would result in an overall low average for the South East, therefore it is not surprising that Slough exceeds this. The comparison shown in Figure 2.3 is therefore considered to be more appropriate due to Slough's proximity to London, the density of the urban landscape and the proportion of industrial activity within the borough (SEGRO Trading Estate and proximity to Heathrow Airport).

Figure 2.4 - Map of modelled $PM_{2.5}$ concentrations across England in 2018, produced by Imperial College London (µg/m^3).

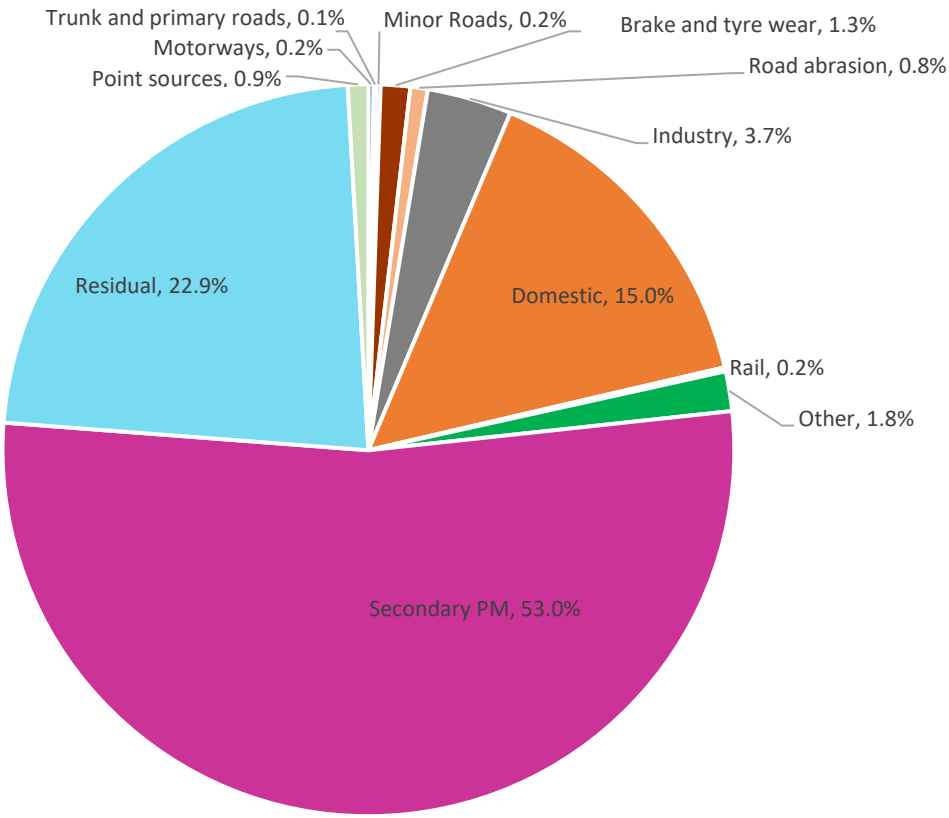


Background Data

Provisional air quality modelling data undertaken as part of the emerging AQAP (baseline year 2017), indicated that across Slough concentrations of $PM_{2.5}$ ranged from 12.4µg/m^3 to 17.1µg/m^3, with over 80% of $PM_{2.5}$ concentrations attributable to background sources.

This modelling is due to be updated in Autumn 2023 whilst baseline modelling assumptions are revisited to continue with the AQAP update. In light of this, a review of $PM_{2.5}$ concentrations within Slough in 2022 has been completed using Defra background mapping projections (see Figure 2.5 below).

Figure 2.5 – Proportion of $PM_{2.5}$ Emission Sources in Slough During 2022



The concentrations modelled for the 2022 projection indicate that concentrations in Slough range from 10.1µg/m^3 to 12.5µg/m^3, averaging at 11.1µg/m^3. Similarly to the modelled concentrations from 2021, the largest sources remain to be secondary particulate matter (53%), residual particulate matter (23%), domestic (15%) and industrial sources (4%). Secondary particulate matter arises from power plants and industrial processes, including oil refining. 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.

The Environment Act was passed into UK law in November 2021, approximately three years after a bill was first proposed to govern environmental matters after the UK's departure from the EU. Within the Act, the government has set two new legally binding $PM_{2.5}$ targets, each with an interim target:

- 10µg/m^3 annual mean concentration $PM_{2.5}$ nationwide by 2040, with an interim target of 12µg/m^3 by January 2028.
- 35% reduction in average population exposure by 2040, with an interim target of a 22% reduction by January 2028, both compared to a 2018 baseline.

The background modelling projections produced by Defra suggest that on average across Slough, the $PM_{2.5}$ 2028 interim target level of 12µg/m^3 has been met at each year of the time series. The grid square that consistently has the highest modelled concentrations of $PM_{2.5}$ is in the Langley area, with a high proportion attributable to industrial sources relative to other grid squares. This suggests that there is a high $PM_{2.5}$ generating activity occurring within the industrial estate in Langley that should be investigated further.

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.

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.

15% of Slough's background $PM_{2.5}$ originates from domestic sources therefore it is expected that the enforcement actions described above could 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.

A review of Slough's monitored data and calculated $PM_{2.5}$ concentrations from PM_{10} data is presented within Section 3.2.3, which shows higher calculated concentrations than presented within Defra's background modelling projections. This may be due to monitor proximity to primary emissions such as road traffic vehicles (especially those with diesel engines); wood burning; cooking; dust from roads and construction, and agricultural operations.

Actions to Reduce $PM_{2.5}$

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. This is due to be updated and is likely to include air quality improvements as a key aim.
- 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).
- Defra intend to extend their $PM_{2.5}$ monitoring network and current plans suggest that there will be a $PM_{2.5}$ monitor within AQMA 3 or AQMA 3 Extension (Tuns Lane / Bath Road).

- 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 2022 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 2018 and 2022 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 six sites during 2022, 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 have operated an Energy from Waste (EfW) plant 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 changes to Slough Borough Council's continuous monitoring network implemented during 2022 and early 2023 are as follows:

- Decommissioning of Slough Colnbrook (Pippins) SLH 3 (non-AQMA, completed March 2022)
- Commissioning and operation of Station Road, Langley (non-AQMA, began operating January 2023).

As reported in ASR 2022, 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, this ambition was not able to be fulfilled and is unlikely to materialise in the near future. However, it is understood that Defra are expanding the AURN $PM_{2.5}$ network over the next 2 years and current plans suggest that a $PM_{2.5}$ monitor will be based in Slough, within AQMA 3, which shall provide reliable $PM_{2.5}$ roadside concentrations data. Further details shall be reported in ASR 2024 should these plans progress.

The new proposed monitoring station on Station Road, Langley, was commissioned in late 2022, with data reported from January 2023 onwards, therefore analysis of this data will be presented within ASR 2024.

Table A.1 in Appendix A shows the details of the automatic monitoring sites. Please note, details of discontinued sites are included in this table for reference when observing historic trends.

Note, 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 72 sites (102 diffusion tubes) during 2022. Table A.2 in Appendix A presents the details of the non-automatic sites.

During 2022, no new diffusion tube sites were introduced, however eight sites were decommissioned due to 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 were no longer required for co-location purposes:

- Sussex Place (SLO 6), Tweed Road (SLO 9), Torridge Road (SLO 11), Farnham Road (SLO 30), Wellington Street - Stratfield (SLO 33) – results recorded over the last five years indicate that these sites have been consistently lower than 10% below the AQO

(<36µg/m^3). Despite the pandemic having an impact on concentrations during 2020 and 2021, comparing concentrations from 2018 to 2022 shows an average reduction of 6.3µg/m^3 across these sites, and therefore it is likely that the pandemic has only exacerbated the existing trend.

- Pippins (SLO 14, SLO 15 and SLO 16) – the continuous monitoring station at Pippins Colnbrook ceased operations in March 2022, therefore the co-located diffusion tubes were decommissioned soon after in May 2022.

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 2022, these tubes were collected on a 4 or 5 weekly basis and analysed at a UKAS accredited laboratory (SOCOTEC). 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 discontinued diffusion tube locations described above had to be annualised, alongside two sites which suffered from frequent thefts (Poyle Road - SLO 96 and Elliman Avenue (a) - SLO 114).

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. In the following discussion, any increase in NO_2 is indicated by a '+' symbol proceeding the value, and any decrease in NO_2 is indicated by a '-' symbol proceeding the value.

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

Table A. 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. The 2018 national background modelled concentrations (adjusted to the monitoring year 2022 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. Please note, some distances have been adjusted from the previous year due to inaccuracies in measurement reporting and changes to road layouts, particularly in the Brands Hill area (affecting SLO 10, SLO 39, SLO 32, SLO 18 and SLO 63, SLO 64 and SLO 65).

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

3.2.1.1 Comparison between 2021 and 2022 Diffusion Tube Concentrations

All monitoring data presented in this section has been corrected for bias. Corresponding trend graphs are presented in Appendix A (Figure A.1 – Figure A.10).

The data collected in 2022 represents the first full year of concentrations that are not directly influenced by the pandemic, which had caused widespread traffic reductions and therefore anomalously low NO_2 concentrations in both the previous two reporting years. It was discussed within the previous ASRs whether this data should be excluded from the 5 year trend analysis because of this. Although the majority of passive monitoring locations show increased concentrations of NO_2 from 2021 to 2022, the increase has been relatively low (average +1.7µg/m^3 (7%)) and all sites show an improvement in comparison to 2019 data (average -9.8µg/m^3 (27%) where data is available). Comparatively, some sites have shown improvement from 2021 to 2022 both inside and outside of Slough's AQMAs.

The greatest improvements in NO_2 from 2021 to 2022 by site and AQMA are presented below. 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. It is noted that there are no improvements in the passive monitoring data within AQMA 1, AQMA 3 Extension or AQMA 4 when compared to 2021.

AQMA 2:

- Brands Hill (A) (SLO 18) = -4.9µg/m^3
- Brands Hill (B) (SLO 32) = -1.6µg/m^3

AQMA 3:

- **Farnham Road (SLO 30) = -0.5µg/m^3**

Non-AQMA:

- **Elliman Avenue (a) (SLO 114) = -0.7µg/m^3**
- Shaggy Calf Lane (a) (SLO 116) = -0.7µg/m^3
- Chalvey Road East (b) (SLO 119) = -0.2µg/m^3
- Cippenham Lane (b) (SLO 123) = -0.7µg/m^3

All but two of the remaining 65 passive monitoring sites have shown a worsening of NO_2 from 2021 to 2022 (the two that have shown very little change have increased by <0.01µg/m^3). The highest increases in NO_2 within each AQMA are presented below:

AQMA 1: Grampian Way (SLO 8) = +4.7µg/m^3
AQMA 2: Brands Hill triplicate (SLO 63, SLO 64 and SLO 65) = +4.6µg/m^3
AQMA 3: Tuns Lane (B) (SLO 50) = +2.2µg/m^3
AQMA 3 Extension: Windmill triplicate (SLO 57, SLO 58 and SLO 59) = +0.6µg/m^3
AQMA 4: Yew Tree Road (SLO 29) = +5.3µg/m^3
Non-AQMA: Ledgers Road (SLO 121) = +4.5µg/m^3

2022 saw the first exceedance of the AQO since 2019, at Yew Tree Road (SLO 29) and only one site was within 10% of the AQO at the Brands Hill triplicate site (SLO 63, SLO 64 and SLO 65). Once distance corrected however, all sites are below 10% of the AQO.

A summary of NO_2 concentrations from 2021 to 2022 across each AQMA and sites outside of AQMAs is presented below:

- On average, NO_2 concentrations have worsened across AQMA 1 by +2.1µg/m^3 (10%) from 2021 to 2022. The biggest increase is observed at Grampian Way (SLO 8) at +4.7µg/m^3, followed by Tweed Road (SLO 9) at +3.4µg/m^3, however both remain far below the AQO at 27.8µg/m^3 and 24.6µg/m^3, respectively. The Highways England

receptors (SLO 69 – SLO 95) have increased by +2.2µg/m^3 on average. This is discussed in more detail within Appendix C. Other sites within AQMA 1 have seen a relatively low worsening of NO_2, including Spackmans Way (SLO 24) and Paxton Avenue (SLO 25) by +0.5µg/m^3 and +0.6µg/m^3 but remain below the AQO at 21.4µg/m^3 and 19.6µg/m^3, respectively. A worsening of air quality at these sites was expected as traffic levels were not impacted by any pandemic related restrictions in 2022, however the impact is not equal across all sites and is lower than expected at some sites.

- AQMA 2 has seen a mixed result from 2021 to 2022, with an average worsening of NO_2 by +1.0µg/m^3. In previous years, Brands Hill (A) (SLO 18) had seen the highest concentrations of NO_2 recorded within this AQMA, however from 2021 to 2022, this location showed the greatest improvement in concentrations by -4.9µg/m^3 to measure at 31.6µg/m^3 in 2022, followed by Brands Hill (B) (SLO 32) by -1.6µg/m^3 to 22.2µg/m^3. In contrast, the greatest worsening of NO_2 is observed at Brands Hill triplicate site (SLO 63, 64, and SLO 65), by +4.6µg/m^3, falling within 10% of the AQO at 36.8µg/m^3. The road layout at Brands Hill has recently been reconfigured, which has resulted in both SLO 18 and SLO 32 being exposed to much lower traffic flows than seen in previous years due to both a prolonged construction period which has slowed traffic and may have resulted in drivers avoiding the area, and an increase in the distance between the receptor and roadside (see Appendix C which discusses traffic flows along the A4). As a result, traffic flows have reduced by approximately 40% in this area and it is expected that lower concentrations will be sustained in future, however this will be evaluated in more detail in ASR 2024.
- Overall, concentrations of NO_2 have increased from 2021 to 2022 by +0.7µg/m^3 across AQMA 3. Tuns Lane (SLO 50) has seen a worsening of NO_2 by +2.2µg/m^3, whereas Farnham Road (SLO 30) has seen an improvement of NO_2 by -0.5µg/m^3. Both sites are below 10% of the AQO at 32.9µg/m^3 and 23.4µg/m^3, respectively. SLO 30 however has been annualised so should be treated with caution.
- NO_2 concentrations at AQMA 3 Extension have seen a slight worsening by +0.6µg/m^3 on average. This correlates with the nearby traffic count data which suggests that traffic flows have only increased by 3.7% from 2021 to 2022 (discussed in Appendix C). Concentrations in 2022 at Windmill Bath Road (SLO 43) and Windmill triplicate (SLO 57, SLO 58 and SLO 59) however remain far below the AQO at 25.6µg/m^3 and 28.8µg/m^3, respectively.

- Within AQMA 4, the average increase in NO_2 is +2.5µg/m^3, with the highest increase seen at Yew Tree Road (SLO 29) by +5.3µg/m^3 resulting in an exceedance of the AQO at 44.2µg/m^3. The lowest increase is observed at Wellesley Road (SLO 38) by +0.1µg/m^3 to 22.4µg/m^3, however this site had both January and February results missing which may have resulted in under reported NO_2 concentrations. The results from Yew Tree Road make it clear that there is a congestion issue here that needs to be addressed.
- Outside of Slough's AQMAs, there has been an average increase in NO_2 by +1.4µg/m^3 (6%) from 2021 to 2022. The highest increase is observed at Ledgers Road (b) (SLO 121) by +4.5µg/m^3 to 35.7µg/m^3. This is discussed in more detail within Appendix C. In contrast, Salt Hill Park footpath (SLO 3 Relocated) shows the greatest improvement in NO_2 by -1.5µg/m^3 to 16.5µg/m^3 from 2021 to 2022.

3.2.1.2 Diffusion Tube Trend Analysis within AQMAs 2018 – 2022

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. The average change from one year to the next has been calculated and across all sites for each AQMA. Overall, improvement of NO_2 concentrations have been experienced across all of Slough's AQMAs over the last five years, with the highest rate observed in 2020, as expected due to the pandemic. Relative to 2018 data, there has been an improvement of -10.0µg/m^3 (27%) across all AQMAs on average, with an average rate of improvement year on year by -2.5µg/m^3 (7%). This is a slower annual improvement compared to last years' ASR (-3.6µg/m^3, 10%), due to the NO_2 increase observed in 2022.

A summary of the rate of improvement and overall improvements in 2022 relative to 2018 concentrations by AQMA is provided below (corresponding to Figure A.3 – Figure A.6). As above, this considers trends over a 5 year period, where data is available.

- Over the last five years, average NO_2 concentrations within AQMA 1 have dropped by -10.2µg/m^3 (31%). The biggest improvement is observed at Paxton Avenue (SLO 25) which has reduced by -13.6µg/m^3 (41%) to 19.6µg/m^3 since 2018, whereas the site with the smallest improvement is Grampian Way (SLO 8) by -7.0µg/m^3 (20%), measuring 27.8µg/m^3 in 2022. As expected, the year on year trend shows a large drop in 2020 as a result of the pandemic, with a slight recovery of NO_2 concentrations by 2022, most apparent at Grampian Way which increased from 23.0 µg/m^3 in 2021 to 27.8µg/m^3 in 2022.

- AQMA 2 has experienced the greatest drop in average NO_2 concentrations since 2018 out of all the AQMAs, at -13.0µg/m^3 (31%). The biggest improvement is seen at Brands Hill (A) (SLO 18) by -21.6µg/m^3 (41%), measuring 31.6µg/m^3 in 2022, whereas the smallest improvement is seen at Brands Hill triplicate site (SLO 63, SLO 64 and SLO 65) at -6.5µg/m^3 (15%) and falls within 10% of the AQO at 36.8µg/m^3 in 2022. SLO 18 also sees the highest year on year rate of improvement at 12% on average.
- A smaller reduction in average NO_2 is observed at AQMA 3 (-8.6µg/m^3) relative to 2018 concentrations, with Tuns Lane (B) (SLO 50) showing the greatest improvement in concentrations at -12.9µg/m^3 (28%), representing the third year of falling below 10% of the AQO at 32.9µg/m^3 in 2022, and the highest average year on year improvement at 7%. The smallest improvement is observed at Farnham Road (SLO 30) by -5.6µg/m^3, however this site is far below the AQO in 2022 at 23.4µg/m^3.
- AQMA 3 Extension shows a similar improvement in NO_2 concentrations since 2018, with the greatest reduction observed at the Windmill triplicate (SLO 57, SLO 58 and SLO 59) by -12.8µg/m^3, measuring at 28.8µg/m^3 in 2022. Although NO_2 concentrations have increased since 2020, the rate has been slow (average 2%).
- Since 2018, concentrations have improved across all sites within AQMA 4 (average -8.1µg/m^3, 22%), the greatest being at Blair Road (SLO 37) with a -12.8µg/m^3 decrease in NO_2 (32%). The Wellington Street triplicate (SLO 60, SLO 61 and SLO 62) has improved the least by -4.4µg/m^3 (12.8%), however NO_2 concentrations measured over the last five years have remained below 10% of the AQO. This site has also seen the slowest year on year rate of improvement by -1.1µg/m^3 on average, alongside Wellington Street Stratfield (SLO 33).

Overall, air quality has improved over the last five years across all of Slough's AQMAs. The greatest improvement is observed at Brands Hill (AQMA 2), primarily driven by a large improvement of NO_2 concentrations by -21.6µg/m^3 at Brands Hill (A) (SLO 18) since 2018. This AQMA however has one site (Brands Hill triplicate – SLO 63, SLO 64 and SLO 65) that falls within 10% of the AQO in 2022 at 36.8µg/m^3.

In contrast, the Town Centre (AQMA 4) has shown the least improvement across monitoring sites on average (-8.1µg/m^3) and also the lowest year on year improvement on average (5%), primarily skewed by the Yew Tree Road (SLO 29) site which is the only site in 2022 where the monitored result exceeds the AQO at 44.2µg/m^3.

3.2.1.3 Diffusion Tube Trend Analysis 2018 – 2022: Non-AQMA Sites (Roadside, Kerbside, Suburban, Urban Background, Industrial and Rail)

In 2022, Slough Borough Council monitored at 33 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.

Table A.4.1 (row 33-44) shows concentrations at sites outside of AQMAs where five years of data exists. On average, NO_2 concentrations have improved by -9.6µg/m^3 since 2018. The biggest improvement is observed at Lakeside Road (SLO 12) by -16.3µg/m^3, whilst the smallest improvement is observed at Pippins Colnbrook triplicate (SLO 14, SLO 15 and SLO 16) by -2.7µg/m^3. It should be noted however that only three months of data were collected at this site in 2022 and the data was therefore annualised, therefore this data should be treated with caution. All sites have remained below the AQO since 2020.

The year on year change in NO_2 shows an overall improvement by -2.4µg/m^3 (7%) on average across all sites. Lakeside Road (SLO 12) has the highest rate of improvement at -4.1µg/m^3 per year on average (11%), whereas Pippins Colnbrook (SLO 14, SLO 15 and SLO 16) has seen the smallest year on year improvement on average at -0.7µg/m^3 (3%).

It should be noted however that this is a background site and the change in concentration is very similar to the changes observed in Defra's background concentration projections (approximately -1.0µg/m^3 reduction each year).

Figure A.8 – Figure A.10 show trends for all sites outside of AQMAs. Specifically by location category:

- Overall, NO_2 concentrations are improving year by year by -2.2µg/m^3 on average at roadside and kerbside sites (6%), and all sites are below 30µg/m^3 in 2022. Relative to 2018, these sites have seen an average improvement in NO_2 concentrations by -9.0µg/m^3 over the last five years, with the greatest improvement observed at Windsor Road (B) (SLO 49) which has seen a drop of -11.8µg/m^3 since 2018, measuring at 28.2µg/m^3 in 2022. Roadside and kerbside sites have all shown a worsening or no improvement of NO_2 concentrations from 2021 to 2022, averaging at +1.5µg/m^3. The greatest increase is observed at Poyle Road (SLO 96) by +3.0µg/m^3 however this site

remains far below the AQO at 23.1µg/m^3, whereas Goodman Park (Uxbridge Road) (SLO 44) remains unchanged from 2021 to 2022 at 23.6µg/m^3.

- The two suburban and urban background sites that have five years of data indicate that NO_2 has improved by -6.0µg/m^3 since 2018, with an average year on year improvement of -1.5µg/m^3, with all sites below 10% of the AQO since 2018. From 2021 to 2022, these sites have worsened by +0.7µg/m^3 on average, with the greatest increase in NO_2 observed at Elbow Meadows (SLO 13) by +2.3µg/m^3 measuring at 21.9µg/m^3 in 2022. In contrast, concentrations at Salt Hill Park footpath (SLO 3) have seen an improvement in NO_2 concentrations by -1.5µg/m^3, measuring at 16.5µg/m^3 in 2022.
- Industrial sites within the Colnbrook and Poyle area have seen an average improvement in NO_2 of -13.1µg/m^3 (33%) since 2018, with the biggest decrease observed at Lakeside Road (SLO 12) from 40.7µg/m^3 to 24.4µg/m^3 (-16.3µg/m^3 reduction). This site has also seen the highest average year on year improvement at -4.1µg/m^3, with all sites improving by 8% each year on average. From 2021 to 2022 however, NO_2 concentrations increase by 2.2µg/m^3 on average.
- Monitoring at rail sites ceased in 2021, however data from previous years indicates that concentrations have not exceeded 10% below the AQO since monitoring began in 2013 and concentrations in 2021 were a maximum of 16.9µg/m^3 at India Road (SLO 27). As such, these sites were discontinued during 2021 due to the low concentrations.

3.2.1.4 Diffusion Tube Trend Analysis 2018 – 2022: Langley Sites

It was discussed within previous ASRs that the Langley area may be declared an AQMA due to concentrations above the AQO for NO_2 in 2016 and 2017 (maximum 48.6µg/m^3 and 42.1µg/m^3, respectively), and close to the AQO for NO_2 in 2019 at High Street Langley (A) (SLO 53). The pandemic brought widespread reductions of NO_2 in 2020, with the biggest decrease in the area observed at High Street Langley (A) (SLO 53) by -12.0µg/m^3, bringing the concentration down to 27.9µg/m^3. Within ASR 2022, all but one site within Langley showed an improvement in NO_2 concentrations from 2020 to 2021, with a -1.3µg/m^3 reduction on average.

ASR 2023 presents the first full year of data that is not influenced by traffic restrictions resulting from the pandemic. As such, this data has been used to conclude whether Langley should be declared an AQMA, supported by the graph within Figure A.7.

The 2022 results indicate that although NO_2 concentrations at all sites within the Langley area have worsened or show no improvement by on average -1.8µg/m^3, the highest NO_2

concentration in 2022 is 30.3µg/m^3, observed at High Street Langley (A) (SLO 53), far below the AQO. As concentrations have remained low despite no traffic restrictions being in place, it is unlikely that Langley will be declared an AQMA. It should be noted that the Langley Road Widening scheme from Langley College to Elmhurst Road was completed during 2022, which aimed to increase capacity at junctions and therefore reduce congestion, therefore this may be a contributing factor towards low air quality concentrations. As such, future ASRs will not review Langley sites separately from other non-AQMA sites unless a significant increase in NO_2 or concentrations close to the AQO are observed in subsequent years.

3.2.1.5 Continuous Monitoring NO_2 Results – Annual Mean

All continuous NO_2 monitoring data has been properly ratified and is illustrated in Figure A.1 and Figure A.2.

Overall, long term continuous NO_2 trends show a downward trend, however this has not been linear. 2020 saw a significant reduction of concentrations, which has not returned to pre-pandemic levels. When considering concentrations at the beginning of the time series, Windmill (SLH 12) has seen the greatest reduction in NO_2 concentrations from 42.0µg/m^3 in 2018, to 28.7µg/m^3 in 2022 (32% reduction) and has seen the greatest year on year improvement on average (3.3µg/m^3). In contrast, Pippins Colnbrook (SLH 3) has the lowest year on year improvement on average at -0.2µg/m^3, however concentrations have been very low since monitoring began. This is expected given the monitor's background location.

Similarly to the passive monitoring results discussed above, the majority of continuous monitoring results show a worsening of NO_2 from 2021 to 2022 by +1.0µg/m^3 on average, the largest being +3.4µg/m^3 at Pippins Colnbrook (SLH 3), however concentrations have remained low at 21.1µg/m^3. Windmill (SLH 12) and Spackmans Way (SLH 13) however show an improvement of NO_2 from 2021 to 2022 by -0.2µg/m^3 and -0.5µg/m^3, respectively. The highest concentration was observed at Brands Hill (SLH 11) however this is below 10% of the AQO at 32.6µg/m^3.

3.2.1.6 Continuous Monitoring NO_2 Results – 1-Hour Mean

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 had shown one exceedance of 200µg/m^3

in 2021. 2022 continues this historic trend by having no exceedances of the 1-hour mean objective and is therefore not of concern.

3.2.1.7 Conclusion:

In summary, NO_2 diffusion tube concentrations in 2022 have overall worsened on average by +1.7µg/m^3, whilst continuous monitoring data has shown a worsening of +1.0µg/m^3 relative to 2021 data. The largest increase in NO_2 is observed at Yew Tree Road within AQMA 4 (SLO 29, +5.3µg/m^3) and is the only monitoring site with a concentration above the AQO at 44.2µg/m^3. Despite this, there are areas that have seen an overall improvement in NO_2, most notably Brands Hill (A) (SLO 18) which has reduced by -4.9µg/m^3).

On average, the recovery of concentrations has been smaller than expected, particularly as 2022 had no government imposed transport restrictions. This suggests that some positive effects of the pandemic may be more prolonged than anticipated, possibly due to a greater uptake of active travel modes after implementation of government funded schemes as part of the Emergency Active Travel Fund (EATF) and a higher proportion of home working, alongside the expected improvements in vehicle emissions and increases in electric vehicle use.

As the results from 2022 show a worsening of NO_2 concentrations and this year represents the first year of unrestricted traffic flows, it would be premature to suggest that any of Slough's AQMAs should be revoked. AQMA 2 and AQMA 4 in particular have areas where NO_2 concentrations fall within 10% or exceed the AQO, therefore further work is required to reduce these concentrations to compliant levels. In contrast, AQMA 1, AQMA 3 and AQMA 3 Extension may be closer to revocation, as previous years' data shows that no sites have fallen within 10% of the AQO since 2020, however as the trend is disrupted by two years influenced by the pandemic, it is recommended at least two additional years of data are collected before an adequate conclusion can be drawn on the revocation of Slough's AQMAs. No changes to the monitoring network are proposed at this stage.

3.2.2 Particulate Matter (PM_{10})

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

40µg/m^3.

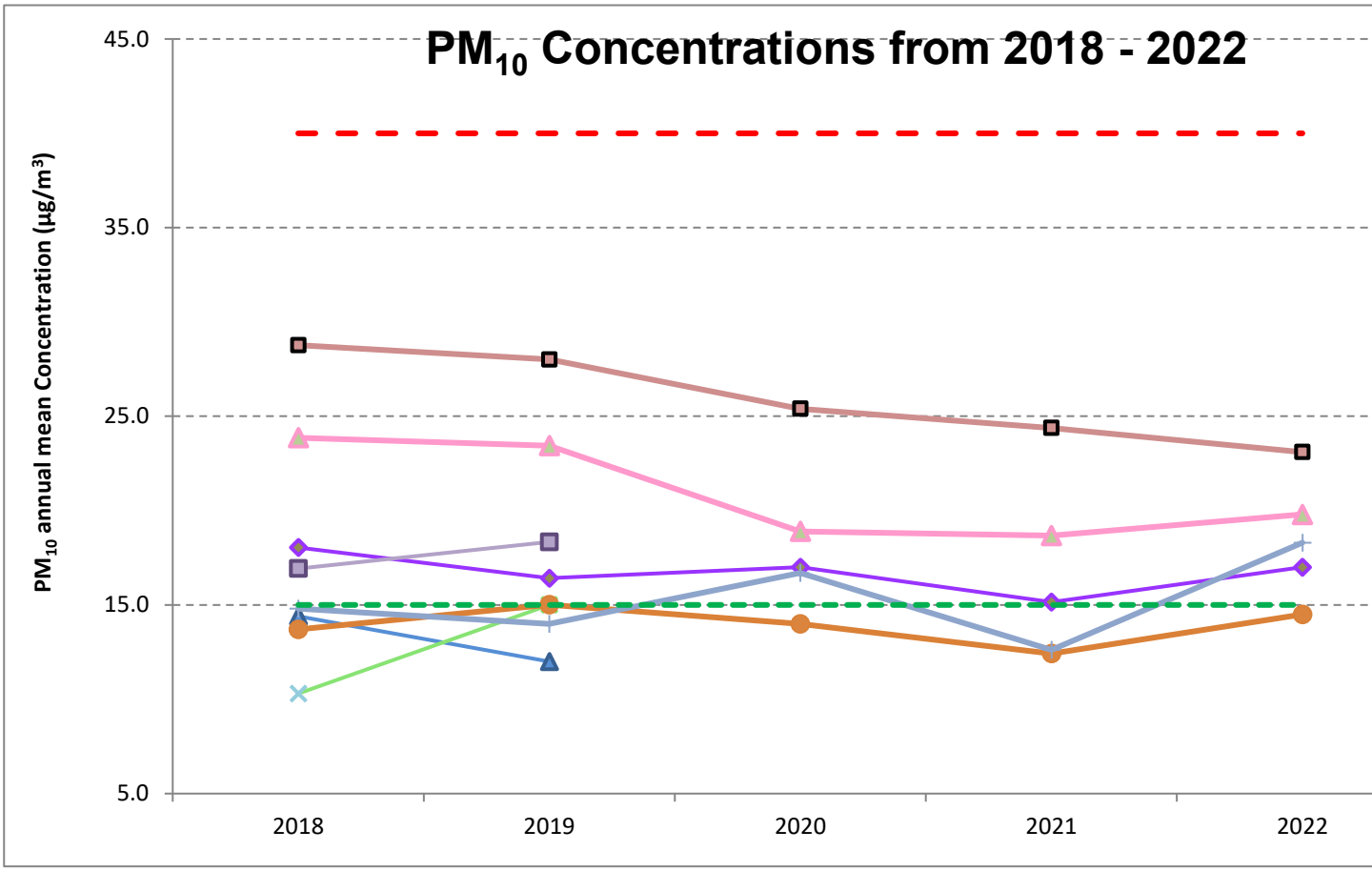


Table A. in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

All continuous PM_{10} and $PM_{2.5}$ monitoring data has been properly ratified and is illustrated in Figure A.11 – Figure A.14.

In 2022, Slough monitored PM_{10} within AQMA 1 (Spackmans Way), AQMA 2 (Brands Hill), AQMA 3 Extension (Windmill), and outside of the AQMAs at the EfW site and at Pippins Colnbrook (only until March 2022). Due to the health effects associated with particulate matter, Slough Borough Council strives to reduce concentrations as much as possible, however in some locations, progress is slow. The greatest year on year improvement from 2018 to 2022 on average is -1.4µg/m^3 (5%) observed at Brands Hill (SLH 11) whilst Lakeside 2 (SLH 9) has seen a greater fluctation with an overall worsening of PM_{10} by +0.9µg/m^3 (9%) on average across the time series.

Prior to 2022, the five year trend had shown a gradual decline over the monitoring period, however 2022 saw an increase in PM_{10} at five of our six monitoring sites by +1.9µg/m^3 on average, the greatest being an increase of +5.7µg/m^3 observed at Lakeside 2 (SLH 9). This site however is monitored using an Osiris which is indicative only, therefore this data may be more unreliable relative to MCERTS accredited monitors. Comparing to the co-located BAM (SLH 8), the data shows an increase but at a lower value of +2.1µg/m^3.

Brands Hill (SLH 11) was the only site that saw an improvement in PM_{10} from 2021 to 2022 by -1.3µg/m^3, however all sites have remained far below the AQO over the five year period. In reference to the WHO 2021 levels, all but one site (Lakeside 2, SLH 8) exceeded the air quality guideline level of 15µg/m^3, therefore it is evident that further initiatives are required to reduce concentrations.

In regards to the 24 hour mean, the trend from 2018 to 2022 shows a gradual decrease in the number of exceedances per year at Pippins Colnbrook (SLH 3), and Brands Hill (SLH 11), whereas Windmill (SLH 12), Lakeside 2 (SLH 9) and Spackmans Way (SLH 13) have seen an increase from 2021 to 2022.

When considering the WHO 2021 AQGs for PM_{10} (45µg/m^3), comparison has been made using Sloughs highest reporting monitoring station (Brands Hill, SLO 11). Reducing the limit to 45µg/m^3 results in 20 exceedences, which is two fewer exceedances than those recorded in 2021. This indicates 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.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A. in Appendix A 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 concentrations of $PM_{2.5}$ have worsened from 2021 to 2022 by +2.1µg/m^3, with 2022 showing the highest concentration recorded over the last five years.

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

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 $PM_{2.5}$. Prior to 2021, a national derived correction ratio of 0.7 (i.e. PM_{10} concentration x 0.7) could be used to calculate $PM_{2.5}$ from PM_{10} concentrations where no appropriate local sites measuring both PM_{10} and $PM_{2.5}$ was available, which is based on the average of all ratios of $PM_{2.5}$/ PM_{10} found for years 2010 to 2014. Post 2021, two separate factors were calculated on an annual basis for Background and Roadside sites by analysing hourly data for all AURN sites which measure both PM_{10} and $PM_{2.5}$ concentrations for years 2010 to current day. PMCoarse is calculated by subtracting the PM_{10} concentration by the $PM_{2.5}$ concentration for the hours when both size fractions are measured. The calculated average PMCoarse split is then used to estimate $PM_{2.5}$ concentrations by subtracting the PM_{10} concentration by the calculated average PMCoarse split. In 2022, the national factor for background and roadside sites was 5.5 and 6.4, respectively.

Figure A.14 shows the estimated $PM_{2.5}$ concentrations based on the PM_{10} data. Data from 2018 to 2020 has been corrected based on TG16 guidance (multiplying by 0.7) whereas the data from 2021 and 2022 has been corrected based on TG22 guidance (subtracting the nationally derived factors for background and roadside sites, where appropriate). It should be noted that in ASR 2022, a factor of 0.7 was also applied to 2021 so this method will provide a different value for the 2021 correction.

The data shows that all calculated $PM_{2.5}$ results are below the annual objective, however two of the four sites active in 2022 show an exceedance of the interim 2028 target level of 12µg/m^3 at Brands Hill (SLH 11) and Windmill (SLH 12) at 16.7µg/m^3 and 13.4µg/m^3, respectively. Although the trend at Brands Hill shows improvement from 2018 to 2022, falling by 3.4µg/m^3 over the time series, it is clear that further intervention is required to bring this concentration down to 12µg/m^3 by the target date of 2028. Despite falling below the interim target, both Pippins Colnbrook (SLH 3) and Spackmans Way (SLH 13) show an increase of $PM_{2.5}$ concentrations by 1.2µg/m^3 and 1.3µg/m^3, respectively. All sites are above the WHO 2021 AQG level whereas only Spackmans Way (SLH 13) falls below the WHO 2005 AQG 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 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 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 5	Slough-Colnbrook (Lakeside, Tan House Farm)	Industrial	503551	177258	PM_{10}, $PM_{2.5}$ & PM_1	NO	Osiris	>200m	>50m	10m
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 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 PM_1)	>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

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 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
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	N/A	N/A	No	2.5
SLO 2 Relocated	Salt Hill Park footbridge	Urban Background	496785	180336	NO_2	No	N/A	N/A	No	2.5
SLO 3 Relocated	Salt Hill Park footpath	Urban Background	496665	180236	NO_2	No	N/A	N/A	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	Princess Street	Roadside	498541	179815	NO_2	Yes - AQMA 4	N/A	N/A	No	2.0
SLO 6	Sussex Place	Roadside	498784	179560	NO_2	No	-5.1	9.6	No	2.0
SLO 7	Colnbrook By-pass	Industrial	503196	177349	NO_2	No	33.0	5.0	No	2.0
SLO 8	Grampian Way	Other	501382	178101	NO_2	Yes - AQMA 1	-15.0	35.0	No	2.0
SLO 9	Tweed Road (B) Moved 2012	Other	501501	177879	NO_2	Yes - AQMA 1	-10.2	23.1	No	2.0
SLO 10	London Road (A)	Roadside	501733	177725	NO_2	Yes - AQMA 2	7.1	3.5	No	2.0
SLO 11	Torridge Road	Suburban	501637	177999	NO_2	Yes - AQMA 1	N/A	N/A	No	3.0
SLO 12	Lakeside Road	Industrial	503877	177459	NO_2	No	100.0	0.5	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 13	Elbow Meadows	Suburban	503856	176538	NO_2	No	15.0	45.0	No	2.0
SLO 14, SLO 15, SLO 16	Pippins *	Suburban	503542	176827	NO_2	No	5.4	43.3	Yes	2.5
SLO 17	Horton Road (Caravan Park)	Suburban	503136	175654	NO_2	No	28.0	0.5	No	2.0
SLO 18	Brands Hill (A)	Roadside	501798	177659	NO_2	Yes - AQMA 2	3.0	4.8	No	2.5
SLO 19	Ditton Road	Roadside	500851	177890	NO_2	No	19.2	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	8.0	2.5	No	2.5
SLO 22	Winvale	Other	497488	179090	NO_2	Yes - AQMA 1	N/A	N/A	No	2.0
SLO 23	Tuns Lane	Urban Background	496416	180126	NO_2	Yes - AQMA 3	1.8	18.0	No	2.5
SLO 24	Spackmans Way	Other	496272	179187	NO_2	Yes - AQMA 1	N/A	N/A	No	2.5
SLO 25	Paxton Avenue	Other	496050	179258	NO_2	Yes - AQMA 1	6.8	27.7	No	2.0
SLO 26	Yew Tree Rd (Ux Rd) (B)	Roadside	498473	179706	NO_2	Yes- AQMA 4	0.0	6.5	No	2.0
SLO 27	India Road	Other	498681	179972	NO_2	No	0.0	13.0	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 28	Rogans (Colnbrook by pass)	Roadside	501941	177633	NO_2	Yes - AQMA 2	-0.4	1.3	No	2.5
SLO 29	Yew Tree Road (Uxbridge Rd)	Kerbside	498483	179707	NO_2	Yes - AQMA 4	4.5	1.5	No	2.0
SLO 30	Farnham Road (2)	Roadside	496397	180341	NO_2	Yes - AQMA 3	-2.6	10.8	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	10.0	No	2.0
SLO 33	Wellington Street - Stratfield	Roadside	498168	179907	NO_2	Yes - AQMA 4	-5.4	14.7	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	6.9	33.1	Yes	1.5
SLO 37	Blair Road-Victoria Court	Roadside	497105	180081	NO_2	Yes - AQMA 4	-1.7	10.8	No	2.0
SLO 38	Wellesley Road	Roadside	498071	179949	NO_2	Yes - AQMA 4	7.2	11.5	No	2.5
SLO 39	London Rd (B)	Roadside	501734	177733	NO_2	Yes - AQMA 2	0.0	10.5	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 40	Wexham Road	Roadside	498394	179849	NO_2	Yes - AQMA 4	2.8	2.5	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
SLO 44	Goodman Park (Ux Rd)	Roadside	498961	180113	NO_2	No	2.0	8.5	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	4.8	5.0	No	2.0
SLO 47	Princes House, Bath Road	Roadside	497326	180003	NO_2	Yes - AQMA 4	0.0	4.4	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	4.5	1.5	No	2.0
SLO 50	Tuns Lane (B)	Kerbside	496377	179929	NO_2	Yes - AQMA 3	9.0	3.0	No	2.0
SLO 51	Langley Road	Roadside	501014	179316	NO_2	No	5.3	2.0	No	2.5
SLO 52	Station Road	Roadside	501161	179538	NO_2	No	6.5	3.5	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 53	High Street Langley (A)	Roadside	501208	178799	NO_2	No	4.6	1.6	No	2.5
SLO 54	High Street Langley (B)	Roadside	501256	179067	NO_2	No	1.5	5.2	No	2.5
SLO 55	Parlaunt Road	Roadside	501891	178954	NO_2	No	4.7	4.8	No	2.5
SLO 56	Sutton lane	Roadside	502241	178679	NO_2	No	3.5	4.0	No	2.5
SLO 57, SLO 58, SLO 59	Windmill	Kerbside	469528	180171	NO_2	Yes - AQMA 3 Extension	2.9	7.5	Yes	1.5
SLO 60, SLO 61, SLO 62	Wellington Street	Kerbside	498413	179804	NO_2	Yes - AQMA 4	1.7	5.2	Yes	1.5
SLO 63, SLO 64, SLO 65	Brands Hill	Kerbside	501643	177753	NO_2	Yes - AQMA 2	8.4	5.8	Yes	1.5
SLO 66, SLO 67, SLO 68	Paxton Avenue HE Receptor 1	Other	496146	179259	NO_2	Yes - AQMA 1	2.5	19.6	No	2.0
SLO 69, SLO 70, SLO 71	Spackmans Way HE Receptor 2	Other	496223	179217	NO_2	Yes - AQMA 1	0.0	32.5	No	1.5
SLO 72, SLO 73, SLO 74	Spackmans Way HE Receptor 3	Other	496225	179213	NO_2	Yes - AQMA 1	0.0	34.2	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

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 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	N/A	N/A	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	13.2	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

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 101	Bower Way - Cippenham (5)	Kerbside	494101	180708	NO_2	No	2.0	1.0	No	2.5
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	10.8	2.4	No	1.5
SLO 113	Oatlands Drive (b)	Roadside	497079	181088	NO_2	No	10.5	2.8	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 114	Elliman Avenue (a)	Roadside	497677	180876	NO_2	No	6.3	1.8	No	1.5
SLO 115	Elliman Avenue (b)	Roadside	497671	180866	NO_2	No	5.0	1.8	No	1.5
SLO 116	Shaggy Calf Lane (a)	Roadside	498103	180842	NO_2	No	12.9	2.3	No	1.5
SLO 117	Shaggy Calf Lane (b)	Roadside	498112	180857	NO_2	No	11.8	1.8	No	1.5
SLO 118	Chalvey Road East (a)	Kerbside	497097	179521	NO_2	No	4.6	0.6	No	1.5
SLO 119	Chalvey Road East (b)	Roadside	497104	179511	NO_2	No	2.1	3.3	No	1.5
SLO 120	Ledgers Road (a)	Kerbside	497013	179870	NO_2	No	1.2	0.4	No	1.5
SLO 121	Ledgers Road (b)	Kerbside	497004	179874	NO_2	No	3.4	1.1	No	1.5
SLO 122	Cippenham Lane (a)	Kerbside	496167	179975	NO_2	No	7.8	0.9	No	1.5
SLO 123	Cippenham Lane (b)	Roadside	496184	179950	NO_2	No	8.0	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/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 2022 (%) (2)	2018	2019	2020	2021	2022
SLH 3	503542	176827	Suburban	100.0	20.4	22	26.1	16.2	17.8	21.1
SLH 4	496599	180156	Urban Background	-	-	31	26.4	-	-	-
SLH 7	496562	179109	Other	-	-	32	32.7	21.3	20.0	-
SLH 8	503569	77385	Industrial	99.6	99.6	26	27.6	19.1	18.1	19.9
SLH 10	498413	179804	Roadside	97.7	97.7	36	34.7	24.6	27.3	28.3
SLH 11	501643	177753	Roadside	99.6	99.6	**42**	39.2	27.3	32.1	32.6
SLH 12	496528	180171	Roadside	99.9	99.9	**42**	39.2	26.9	28.9	28.7
SLH 13	496447	179117	Other	99.9	99.9	-	-	-	23.2	22.7

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

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

Notes:

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

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

All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Table A.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 2022 (%) [2]	2018	2019	2020	2021	2022
SLO 1 Relocated	496904	180187	Urban Background	92.9	92.9	-	-	19.7	18.5	19.4
SLO 2 Relocated	496785	180336	Urban Background	100	100.0	-	-	15.4	14.5	15.5
SLO 3 Relocated	496665	180236	Urban Background	92	92.0	-	-	17.6	18.0	16.5
SLO 4 Relocated	497185	180050	Roadside	92.3	92.3	-	-	19.4	20.2	21.3
SLO 5	498541	179815	Roadside	92	92.0	34.4	33.6	27.6	25.2	28.3
SLO 6	498784	179560	Roadside	100	42.3	29.0	27.8	21.2	21.2	23.8
SLO 7	503196	177349	Industrial	90.1	90.1	35.0	32.8	23.8	23.5	25.3
SLO 8	501382	178101	Other	100	100.0	34.8	35.0	26.3	23.0	27.8
SLO 9	501501	177879	Other	100	42.3	32.6	31.8	22.9	21.2	24.6
SLO 10	501733	177725	Roadside	100	100.0	**44.4**	**41.1**	28.8	29.7	32.5
SLO 11	501637	177999	Suburban	100	42.3	30.0	28.7	20.5	19.7	21.7
SLO 12	503877	177459	Industrial	85.2	85.2	**40.7**	39.5	26.6	22.3	24.4

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 2022 (%) [2]	2018	2019	2020	2021	2022
SLO 13	503856	176538	Suburban	100	100.0	31.2	28.9	20.9	19.6	21.9
SLO 14, SLO 15, SLO 16	503542	176827	Suburban	100	42.3	25.3	23.8	18.3	17.5	18.5
SLO 17	503136	175654	Suburban	100	100.0	**41.5**	33.3	24.9	25.7	28.3
SLO 18	501798	177659	Roadside	100	100.0	**53.2**	**49.4**	38.5	36.5	31.6
SLO 19	500851	177890	Roadside	100	100.0	33.2	33.7	22.7	22.1	23.5
SLO 20	497925	179450	Urban Background			23.7	24.2	16.8	17.0	-
SLO 21	497457	179566	Roadside	100	100.0	35.0	34.6	24.0	24.1	25.2
SLO 22	497488	179090	Other	100	100.0	33.8	32.7	23.1	19.8	21.0
SLO 23	496416	180126	Urban Background	100	100.0	29.5	30.8	22.0	21.9	22.2
SLO 24	496272	179187	Other	100	100.0	32.7	33.0	22.6	20.9	21.4
SLO 25	496050	179258	Other	90.1	90.1	33.2	31.8	20.3	19.0	19.6
SLO 26	498473	179706	Roadside	75.3	75.3	31.5	35.2	26.7	29.3	29.7
SLO 27	498681	179972	Other			26.9	26.5	19.8	16.9	-

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 2022 (%) [2]	2018	2019	2020	2021	2022
SLO 28	501941	177633	Roadside	100	100.0	**44.0**	38.5	25.5	25.6	28.8
SLO 29	498483	179707	Kerbside	100	100.0	**52.7**	**48.5**	33.8	39.0	**44.2**
SLO 30	496397	180341	Roadside	80	34.6	29.0	32.0	23.2	23.9	23.4
SLO 31	496200	181900	Suburban			27.0	27.0	21.9	20.9	-
SLO 32	501853	177620	Roadside	100	100.0	36.2	32.8	23.9	23.7	22.2
SLO 33	498168	179907	Roadside	100	42.3	28.7	30.1	23.1	20.0	24.2
SLO 34, SLO 35, SLO 36	496562	179109	Other			30.6	30.6	18.4	18.4	-
SLO 34 Relocated, SLO 35 Relocated, SLO 36 Relocated	496447	179117	Other	100	100.0	-	-	-	22.5	23.5
SLO 37	497105	180081	Roadside	100	100.0	39.9	37.8	28.2	26.3	27.1
SLO 38	498071	179949	Roadside	84.9	84.9	32.3	33.0	25.0	22.4	22.4
SLO 39	501734	177733	Roadside	92.3	92.3	31.6	30.1	21.8	20.6	22.9
SLO 40	498394	179849	Roadside	100	100.0	38.6	37.9	29.7	29.6	32.6

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
SLO 41	493960	181355	Other			21.9	19.4	13.6	12.7	-
SLO 42	493493	181378	Other			21.2	18.6	12.8	13.2	-
SLO 43	496533	180175	Roadside	100	100.0	34.0	33.1	25.0	25.0	25.6
SLO 44	498961	180113	Roadside	90	89.6	31.9	29.8	24.7	23.6	23.6
SLO 45	501658	177781	Roadside			28.6	28.1	19.8	18.9	-
SLO 46	497467	179971	Roadside	92.3	92.3	**40.1**	39.0	29.3	26.3	29.8
SLO 47	497326	180003	Roadside	92.3	92.3	35.2	31.0	22.5	22.7	24.5
SLO 48	497960	179243	Roadside			28.1	29.0	22.2	20.1	-
SLO 49	497397	179471	Kerbside	92.3	92.3	**40.0**	39.5	26.0	28.2	28.2
SLO 50	496377	179929	Kerbside	100	100.0	**45.8**	**42.8**	30.6	30.7	32.9
SLO 51	501014	179316	Roadside	100	100.0	36.0	35.0	24.8	24.9	26.7
SLO 52	501161	179538	Roadside	100	100.0	33.2	33.3	23.7	22.4	24.8
SLO 53	501208	178799	Roadside	100	100.0	37.9	39.9	27.9	27.1	30.3

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 2022 (%) [2]	2018	2019	2020	2021	2022
SLO 54	501256	179067	Roadside	92	92.0	32.8	32.6	24.6	23.3	25.3
SLO 55	501891	178954	Roadside	92.3	92.3	30.4	29.5	21.3	20.1	21.0
SLO 56	502241	178679	Roadside	100	100.0	37.6	35.7	26.3	23.3	24.1
SLO 57, SLO 58, SLO 59	469528	180171	Kerbside	89.6	89.6	**41.5**	38.9	27.3	28.2	28.8
SLO 60, SLO 61, SLO 62	498413	179804	Kerbside	100	100.0	33.9	33.6	24.9	26.8	29.5
SLO 63, SLO 64, SLO 65	501643	177753	Kerbside	100	100.0	**43.3**	**41.2**	29.1	32.2	36.8
SLO 66, SLO 67, SLO 68	496146	179259	Other	100	100.0	-	34.6	22.6	20.8	23.5
SLO 69, SLO 70, SLO 71	496223	179217	Other	100	100.0	-	32.7	23.1	21.6	23.6
SLO 72, SLO 73, SLO 74	496225	179213	Other	100	100.0	-	32.0	24.7	21.1	23.9
SLO 75, SLO 76, SLO 77	496227	179207	Other	92.9	92.9	-	29.3	22.6	20.3	22.6
SLO 78, SLO 79, SLO 80	496229	179204	Other	100	100.0	-	31.5	24.1	22.2	24.0

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 2022 (%) [2]	2018	2019	2020	2021	2022
SLO 81, SLO 82, SLO 83	496232	179199	Other	100	100.0	-	-	24.1	21.1	24.0
SLO 84, SLO 85, SLO 86	496234	179195	Other	100	100.0	-	32.9	23.3	22.0	24.6
SLO 87, SLO 88, SLO 89	496236	179191	Other	92.3	92.3	-	33.2	23.1	21.8	23.5
SLO 90, SLO 91, SLO 92	496238	179186	Other	92	92.0	-	28.7	23.1	21.5	23.8
SLO 93, SLO 94, SLO 95	497433	179092	Other	100	100.0	-	33.5	23.8	20.3	21.2
SLO 96	503272	176597	Roadside	64.6	64.6	-	28.4	20.5	20.1	23.1
SLO 97	497725	179360	Roadside	100	100.0	-	-	28.2	27.1	29.2
SLO 98	503527	176823	Suburban			-	-	17.1	18.1	-
SLO 99	503510	176806	Suburban			-	-	18.0	18.1	-
SLO 100	503613	176912	Suburban			-	-	16.7	15.4	-
SLO 101	494101	180708	Kerbside			-	-	20.4	20.0	-
SLO 102	494199	180637	Urban Background			-	-	14.4	13.9	-

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 2022 (%) [2]	2018	2019	2020	2021	2022
SLO 103	493784	180662	Kerbside			-	-	18.8	17.7	-
SLO 104	493812	180572	Suburban			-	-	17.7	16.4	-
SLO 105	493592	180737	Urban Background			-	-	16.4	13.7	-
SLO 106	495488	182538	Kerbside			-	-	17.1	16.1	-
SLO 107	495457	182550	Roadside			-	-	17.8	17.2	-
SLO 108	495668	182430	Urban Background			-	-	14.3	13.2	-
SLO 109	496526	182276	Suburban			-	-	14.7	12.8	-
SLO 110	496529	182243	Suburban			-	-	19.3	16.4	-
SLO 111	496489	182270	Urban Background			-	-	14.8	12.8	-
SLO 112	497070	181108	Roadside	90.1	90.1	-	-	-	24.5	26.8
SLO 113	497079	181088	Roadside	100	100.0	-	-	-	23.3	25.2
SLO 114	497677	180876	Roadside	57.7	57.7	-	-	-	28.0	27.3
SLO 115	497671	180866	Roadside	100	100.0	-	-	-	25.7	28.0

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 2022 (%) [2]	2018	2019	2020	2021	2022
SLO 116	498103	180842	Roadside	84.9	84.9	-	-	-	24.5	23.8
SLO 117	498112	180857	Roadside	100	100.0	-	-	-	21.5	24.5
SLO 118	497097	179521	Kerbside	92.3	92.3	-	-	-	25.4	26.4
SLO 119	497104	179511	Roadside	73.1	73.1	-	-	-	26.1	25.8
SLO 120	497013	179870	Kerbside	92.3	92.3	-	-	-	23.5	25.1
SLO 121	497004	179874	Kerbside	85.2	85.2	-	-	-	31.2	35.7
SLO 122	496167	179975	Kerbside	100	100.0	-	-	-	25.0	28.0
SLO 123	496184	179950	Roadside	92.3	92.3	-	-	-	21.5	20.8

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

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

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

Notes:

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

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

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

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

Table A.4.1 – Concentration Change from 2018 to 2022 (µg/m³)

Site	Site ID	AQMA/ Non-AQMA	Annual Mean NO_2 2018	Annual Mean NO_2 2019	Annual Mean NO_2 2020	Annual Mean NO_2 2021	Annual Mean NO_2 2022	5 Year Change in NO_2 2018-2022	5 Year Change in NO_2 (%)	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 21-22	Year on Year Change in NO_2 Average	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 (%) 21-22	Year on Year Change in NO_2 (%) Average
Grampian Way	8	1	34.8	35.0	26.3	23.0	27.8	-7.0	-20.2	0.2	-8.7	-3.3	4.7	-1.8	1%	-25%	-12%	21%	-4%
Tweed Road (B)	9	1	32.6	31.8	22.9	21.2	24.6	-8.0	-24.4	-0.8	-8.9	-1.7	3.4	-2.0	-2%	-28%	-7%	16%	-5%
Torridge Road	11	1	30.0	28.7	20.5	19.7	21.7	-8.3	-27.7	-1.3	-8.2	-0.8	2.0	-2.1	-4%	-29%	-4%	10%	-7%
Winvale	22	1	33.8	32.7	23.1	19.8	21.0	-12.8	-38.0	-1.1	-9.6	-3.3	1.1	-3.2	-3%	-29%	-14%	6%	-10%
Spackmans Way	24	1	32.7	33.0	22.6	20.9	21.4	-11.3	-34.5	0.3	-10.4	-1.7	0.5	-2.8	1%	-32%	-8%	3%	-9%
Paxton Avenue	25	1	33.2	31.8	20.3	19.0	19.6	-13.6	-41.0	-1.4	-11.5	-1.3	0.6	-3.4	-4%	-36%	-7%	3%	-11%
Average								**-10.2**	**-31.0%**					**-2.5**					**-8%**
London Road (A)	10	2	44.4	41.1	28.8	29.7	32.5	-11.9	-26.9	-3.3	-12.3	0.9	2.7	-3.0	-7%	-30%	3%	9%	-6%
Brands Hill (A)	18	2	53.2	49.4	38.5	36.5	31.6	-21.6	-40.6	-3.8	-10.9	-2.0	-4.9	-5.4	-7%	-22%	-5%	-14%	-12%
Rogans (Colnbrook bypass)	28	2	44.0	38.5	25.5	25.6	28.8	-15.2	-34.6	-5.5	-13.0	0.1	3.2	-3.8	-13%	-34%	0%	12%	-8%
Brands Hill (B)	32	2	36.2	32.8	23.9	23.7	22.2	-14.0	-38.8	-3.4	-8.9	-0.2	-1.6	-3.5	-9%	-27%	-1%	-7%	-11%
London Road (B)	39	2	31.6	30.1	21.8	20.6	22.9	-8.7	-27.5	-1.5	-8.3	-1.2	2.3	-2.2	-5%	-28%	-5%	11%	-7%
Brands Hill Triplicate	63, 64, 65	2	43.3	41.2	29.1	32.2	36.8	-6.5	-15.0	-2.1	-12.1	3.2	4.6	-1.6	-5%	-29%	11%	14%	-2%
Average								**-13.0**	**-30.6%**					**-3.3**					**-8%**
Tuns Lane	23	3	29.5	30.8	22.0	21.9	22.2	-7.3	-24.6	1.3	-8.8	0.0	0.3	-1.8	4%	-29%	0%	1%	-6%
Farnham Road	30	3	29.0	32.0	23.2	23.9	23.4	-5.6	-19.4	3.0	-8.8	0.7	-0.5	-1.4	10%	-27%	3%	-2%	-4%
Tuns Lane (B)	50	3	45.8	42.8	30.6	30.7	32.9	-12.9	-28.1	-3.0	-12.2	0.1	2.2	-3.2	-7%	-28%	0%	7%	-7%
Average								**-8.6**	**-24.0%**					**-2.1**					**-6%**
Windmill (Bath Road)	43	Ext 3	34.0	33.1	25.0	25.0	25.6	-8.4	-24.8	-0.9	-8.1	0.0	0.5	-2.1	-3%	-25%	0%	2%	-6%
Windmill Triplicate	57, 58, 59	Ext 3	41.6	38.4	27.3	28.2	28.8	-12.8	-30.8	-3.2	-11.2	0.9	0.6	-3.2	-8%	-29%	3%	2%	-8%
Average								**-10.6**	**-27.8%**					**-2.7**					**-7%**
Princes Street	5	4	34.4	33.6	27.6	25.2	28.3	-6.1	-17.8	-0.8	-6.0	-2.4	3.1	-1.5	-2%	-18%	-9%	12%	-4%
Yew Tree Road	29	4	52.7	48.5	33.8	39.0	44.2	-8.5	-16.1	-4.2	-14.7	5.1	5.3	-2.1	-8%	-30%	15%	13%	-2%
Wellington Street - Stratfield	33	4	28.7	30.1	23.1	20.0	24.2	-4.5	-15.6	1.4	-7.0	-3.1	4.2	-1.1	5%	-23%	-14%	21%	-3%
Blair Road - Victoria Court	37	4	39.9	37.8	28.2	26.3	27.1	-12.8	-32.0	-2.1	-9.6	-1.8	0.8	-3.2	-5%	-26%	-6%	3%	-9%
Wellesley Road	38	4	32.3	33.0	25.0	22.4	22.4	-9.9	-30.5	0.7	-8.0	-2.6	0.1	-2.5	2%	-24%	-10%	0%	-8%
Wexham Road	40	4	38.6	37.9	29.7	29.6	32.6	-6.0	-15.6	-0.7	-8.2	-0.1	2.9	-1.5	-2%	-22%	0%	10%	-3%
Cornwall House, Bath Road	46	4	40.1	39.0	29.3	26.3	29.8	-10.3	-25.7	-1.1	-9.7	-3.0	3.6	-2.6	-3%	-25%	-10%	14%	-6%
Princess House, Bath Road	47	4	35.2	31.0	22.5	22.7	24.5	-10.7	-30.5	-4.2	-8.5	0.2	1.8	-2.7	-12%	-27%	1%	8%	-8%
Wellington Street Triplicate	60, 61, 62	4	33.9	33.6	24.9	26.8	29.5	-4.4	-12.8	-0.3	-8.7	1.9	2.7	-1.1	-1%	-26%	8%	10%	-2%
Average								**-8.1**	**-21.8%**					**-2.0**					**-5%**
Colnbrook by-pass	7	I	35.0	32.8	23.8	23.5	25.3	-9.7	-27.6	-2.2	-9.0	-0.3	1.9	-2.4	-6%	-27%	-1%	8%	-7%
Lakeside Road	12	I	40.7	39.5	26.6	22.3	24.4	-16.3	-40.0	-1.2	-12.9	-4.3	2.2	-4.1	-3%	-33%	-16%	10%	-11%
Horton Road (Caravan Site)	17	I	41.5	33.3	24.9	25.7	28.3	-13.2	-31.9	-8.2	-8.4	0.8	2.5	-3.3	-20%	-25%	3%	10%	-8%
Sussex Place	6	R	29.0	27.8	21.2	21.2	23.8	-5.2	-18.0	-1.2	-6.6	0.0	2.6	-1.3	-4%	-24%	0%	12%	-4%
Ditton Road	19	R	33.2	33.7	22.7	22.1	23.5	-9.7	-29.2	0.5	-11.0	-0.6	1.4	-2.4	2%	-33%	-3%	6%	-7%
Windsor Road	21	R	35.0	34.6	24.0	24.1	25.2	-9.8	-27.9	-0.4	-10.6	0.1	1.2	-2.4	-1%	-31%	0%	5%	-7%
Goodman Park	44	R	31.9	29.8	24.7	23.6	23.6	-8.3	-26.1	-2.1	-5.1	-1.1	0.0	-2.1	-7%	-17%	-5%	0%	-7%
Windsor Road (B)	49	K	40.0	39.5	26.0	28.2	28.2	-11.8	-29.5	-0.5	-13.5	2.2	0.0	-2.9	-1%	-34%	9%	0%	-7%
Elbow Meadows	13	S	31.2	28.9	20.9	19.6	21.9	-9.3	-29.9	-2.3	-8.0	-1.3	2.3	-2.3	-7%	-28%	-6%	12%	-7%
Pippins Triplicate	14, 15, 16	S	21.2	19.9	18.0	17.5	18.5	-2.7	-12.9	-1.3	-1.9	-0.5	1.0	-0.7	-6%	-10%	-3%	6%	-3%
Average								**-9.6**	**-27.3%**					**-2.4**					**-7%**

Non-AQMA sites = Industrial (I), Roadside (R), Kerbside (K), and Suburban (S).

Figure A.1 – Trends in Annual Mean Automatic NO_2 Concentrations from 2018 to 2022

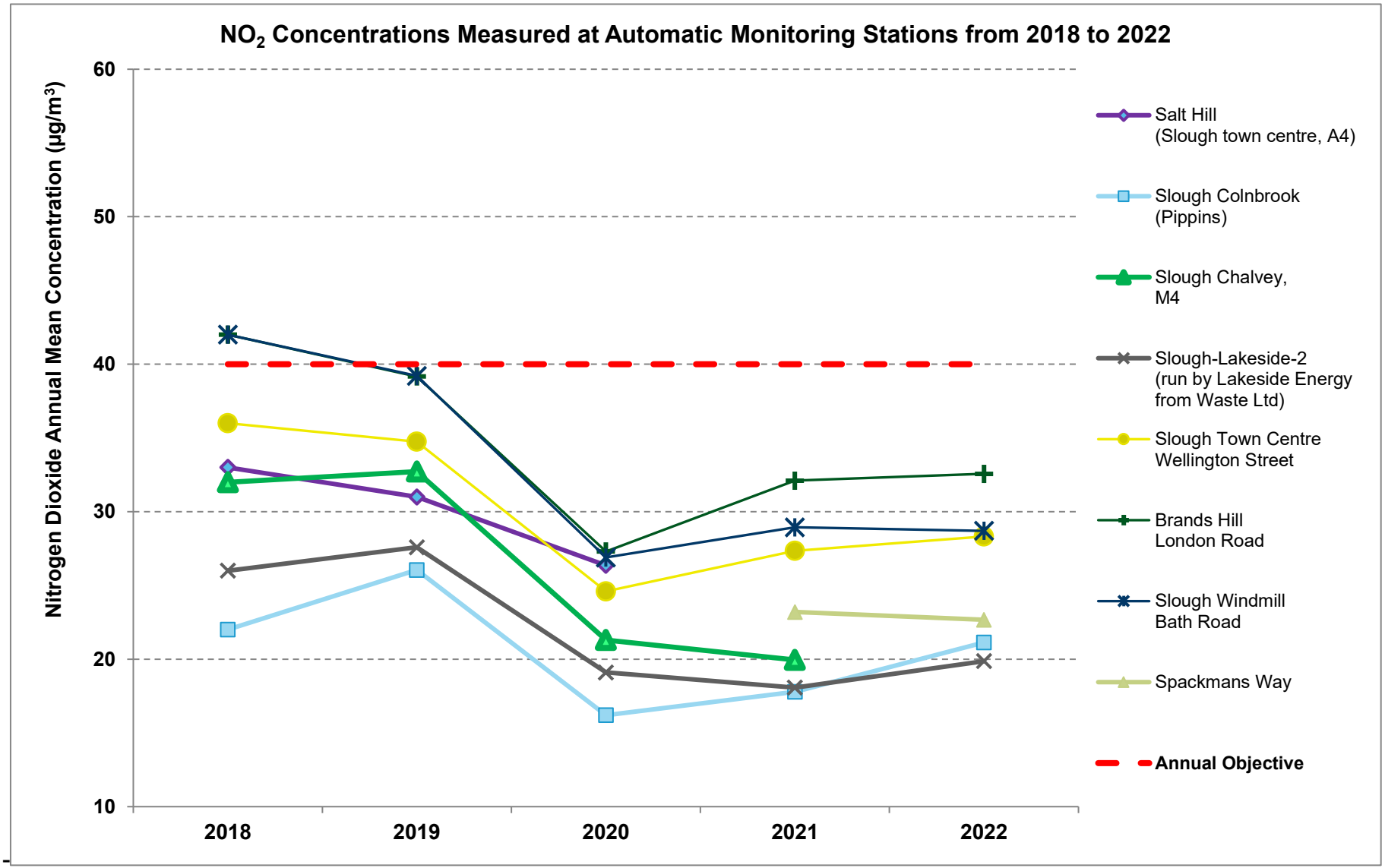


Figure A.2 – Trends in Annual Mean Continuous NO_2 Concentrations, Grouped by Location

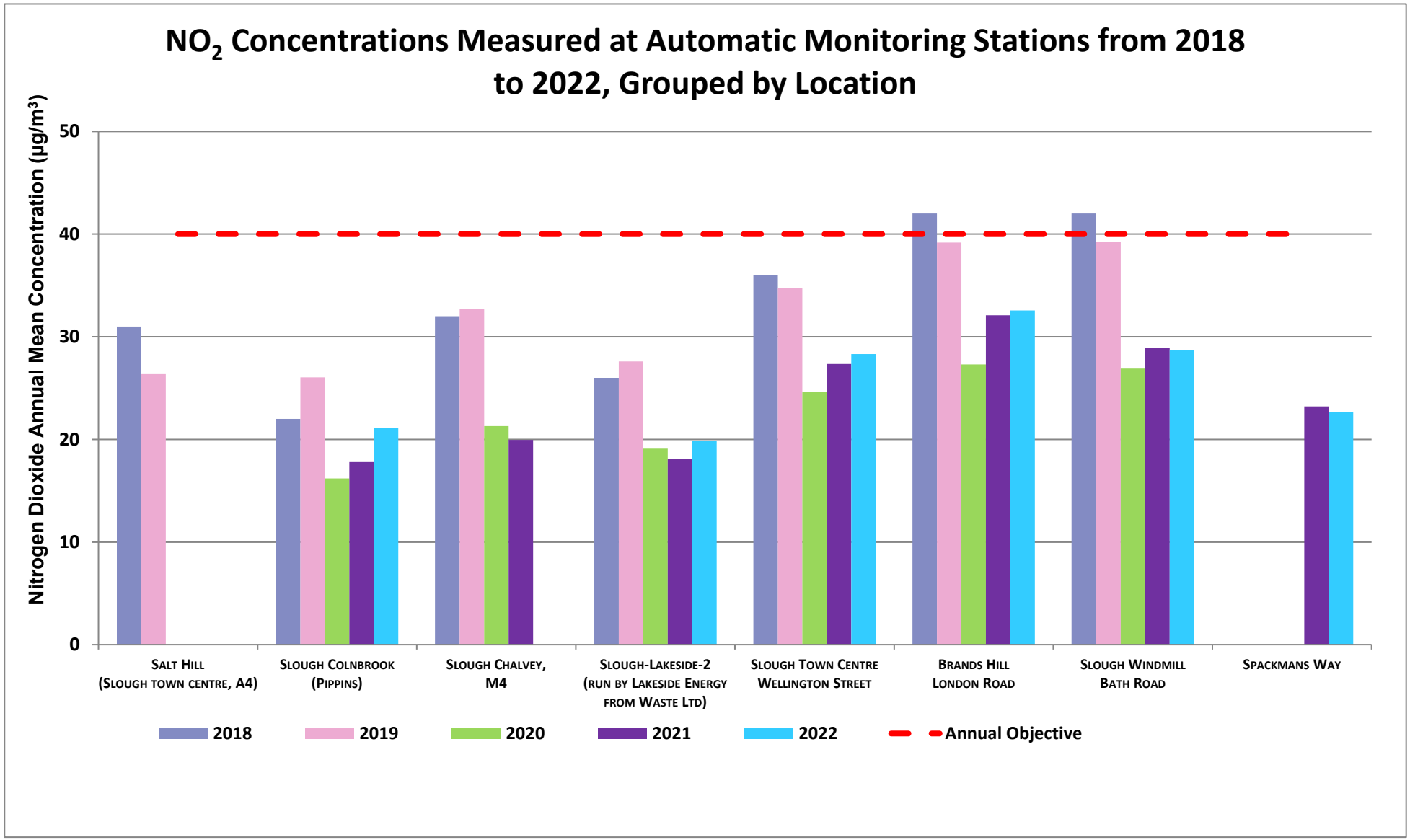


Figure A.3 – Trends in Annual Mean Diffusion Tube NO_2 Concentrations at AQMA 1

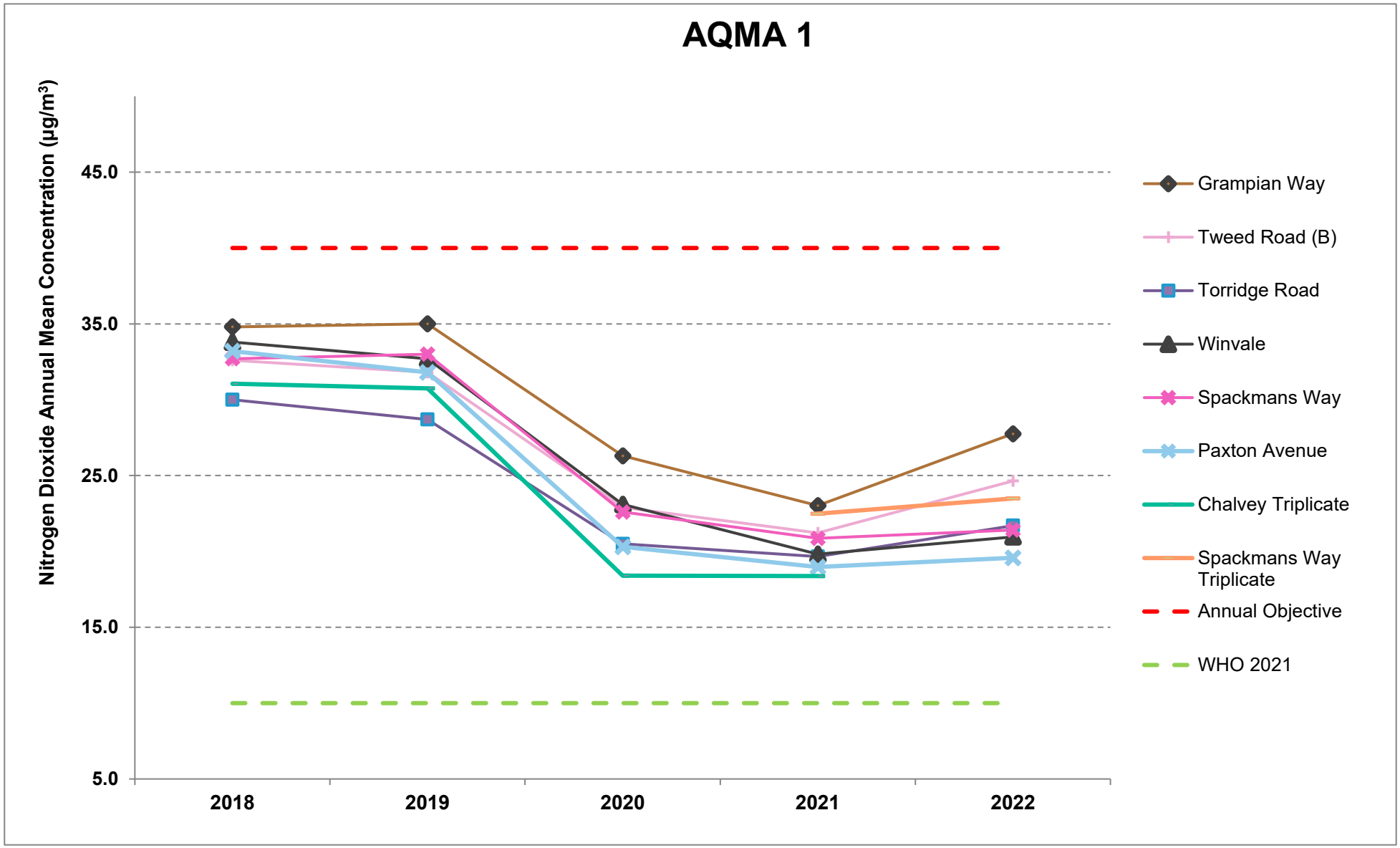


Figure A.4 – Trends in Annual Mean Diffusion Tube NO_2 Concentrations at AQMA 2

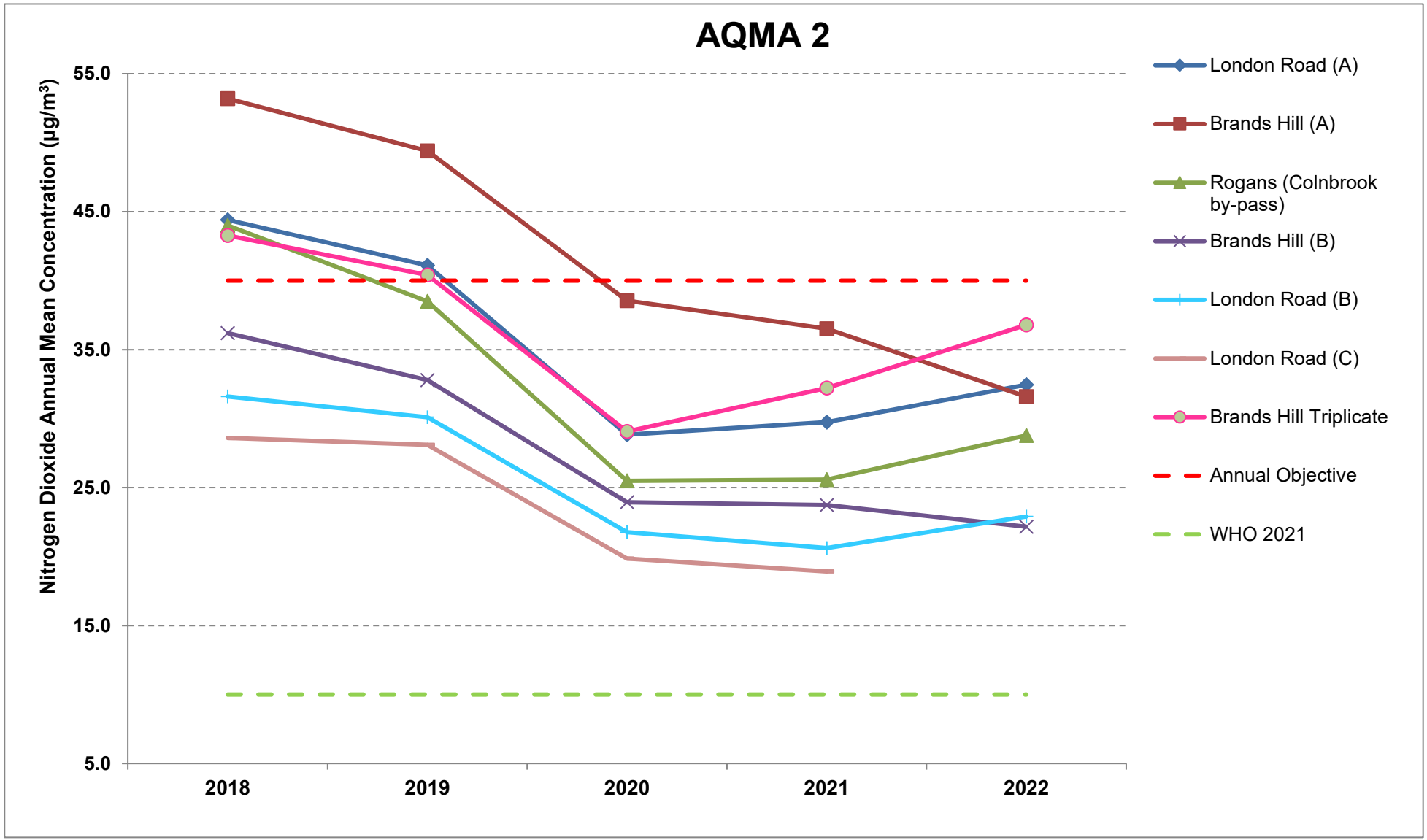


Figure A.5 – Trends in Annual Mean Diffusion Tube NO_2 Concentrations at AQMA 3 and AQMA 3 Extension

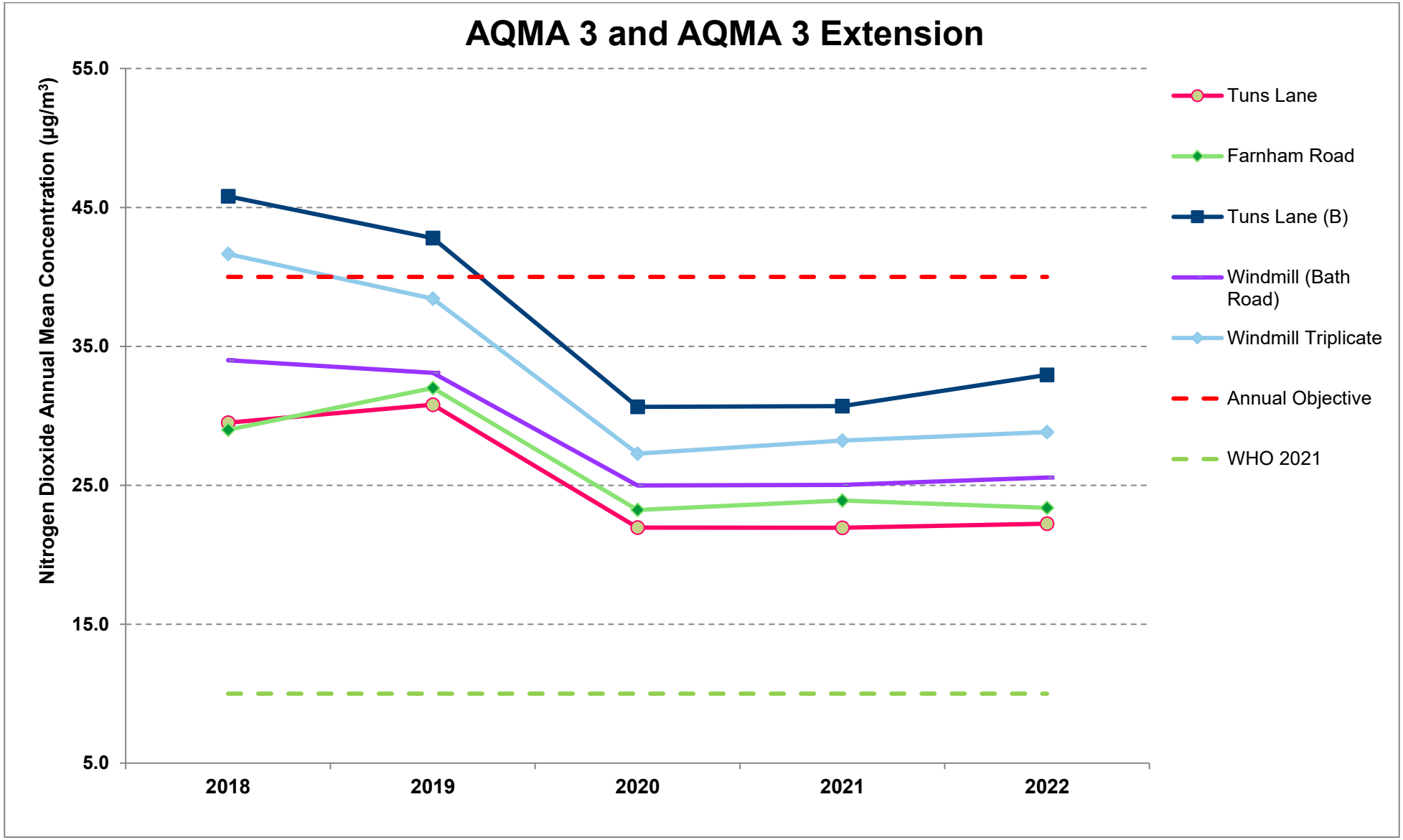


Figure A.6 – Trends in Annual Mean Diffusion Tube NO_2 Concentrations at AQMA 4

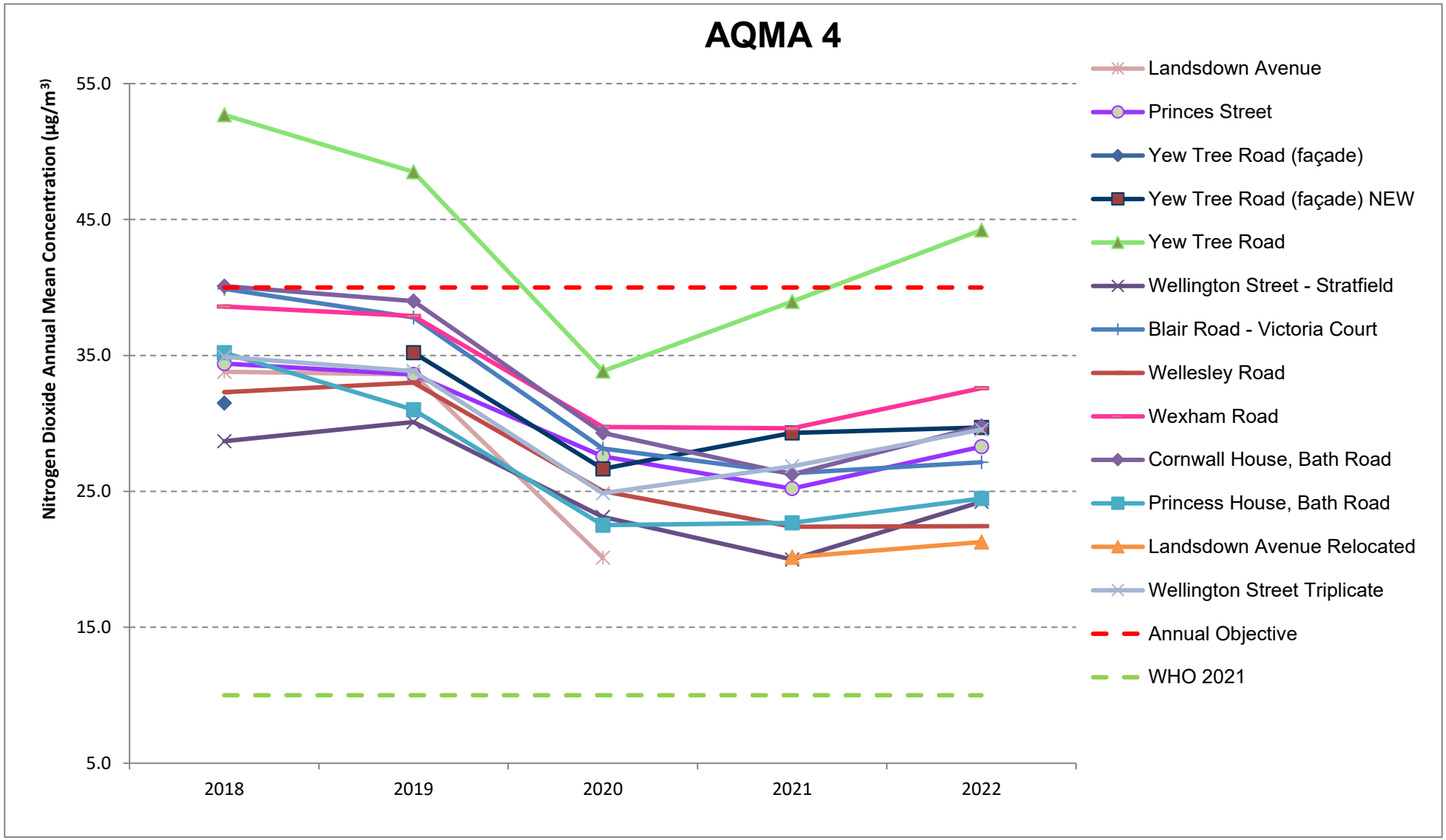


Figure A.7 – Trends in Annual Mean Diffusion Tube NO_2 Concentrations at Langley

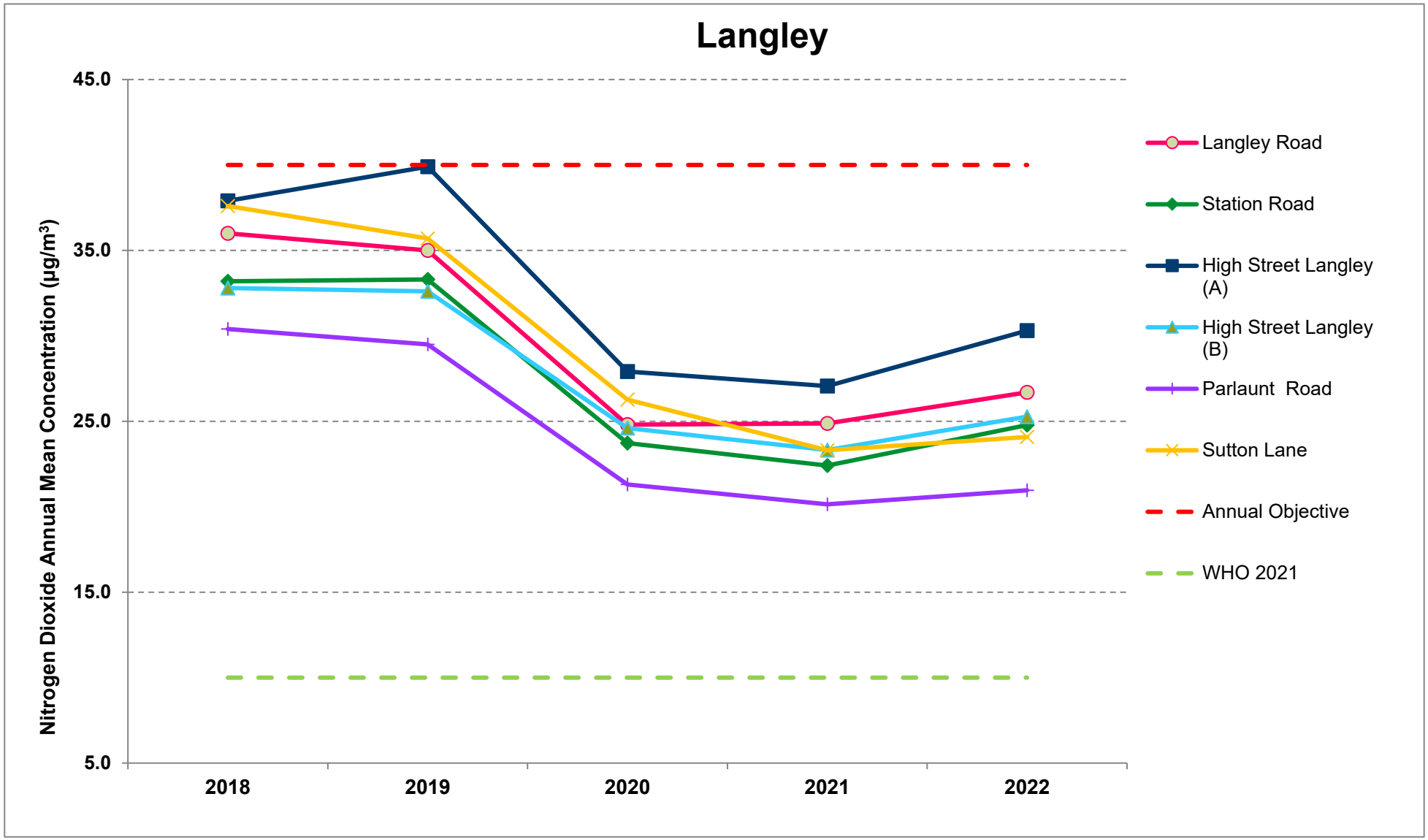


Figure A.8 – Trends in Annual Mean Diffusion Tube NO_2 Concentrations at Non AQMA: Roadside and Kerbside Sites

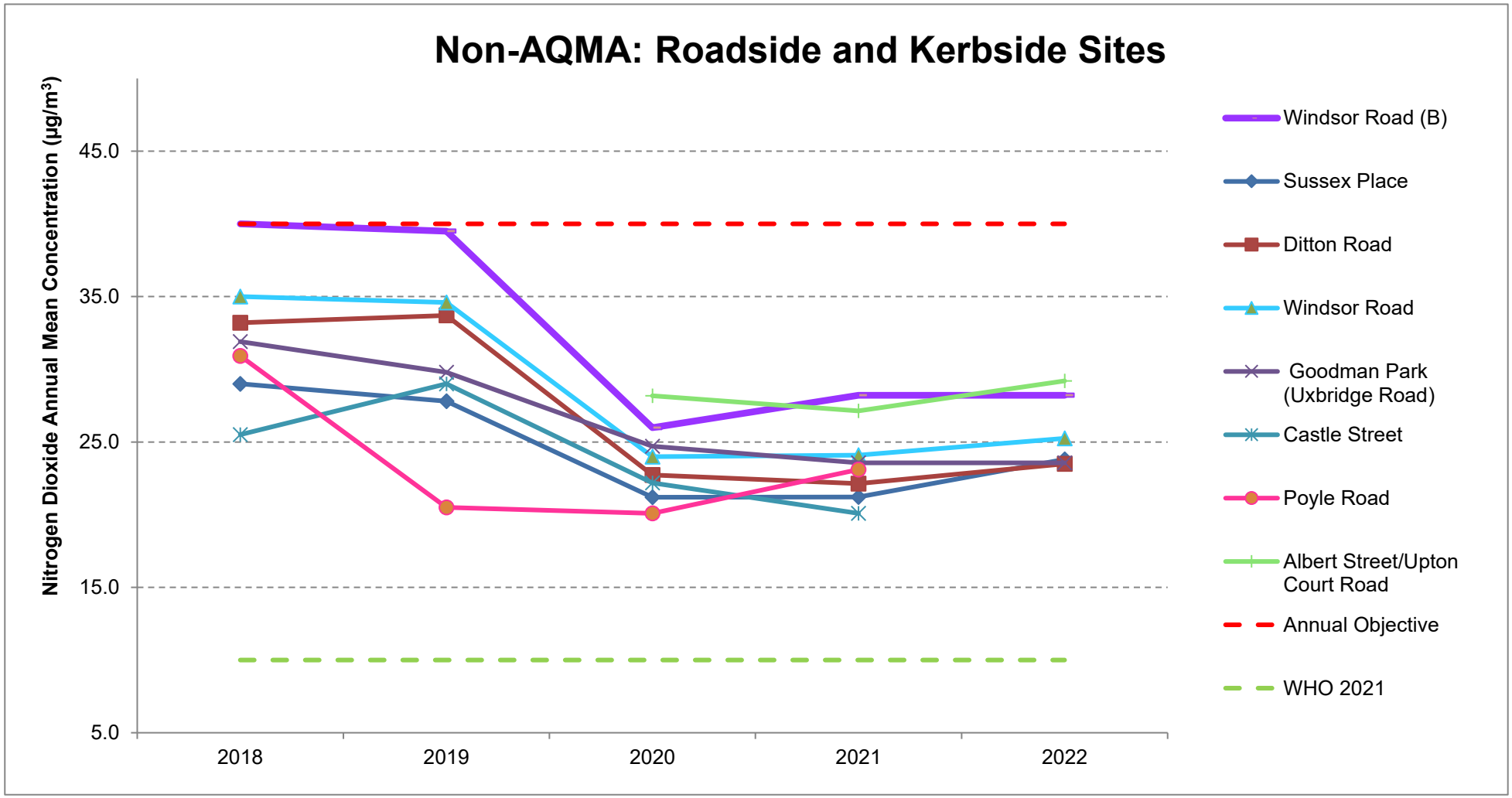


Figure A.9 – Trends in Annual Mean Diffusion Tube NO_2 Concentrations at Non AQMA: Suburban and Urban Background Sites

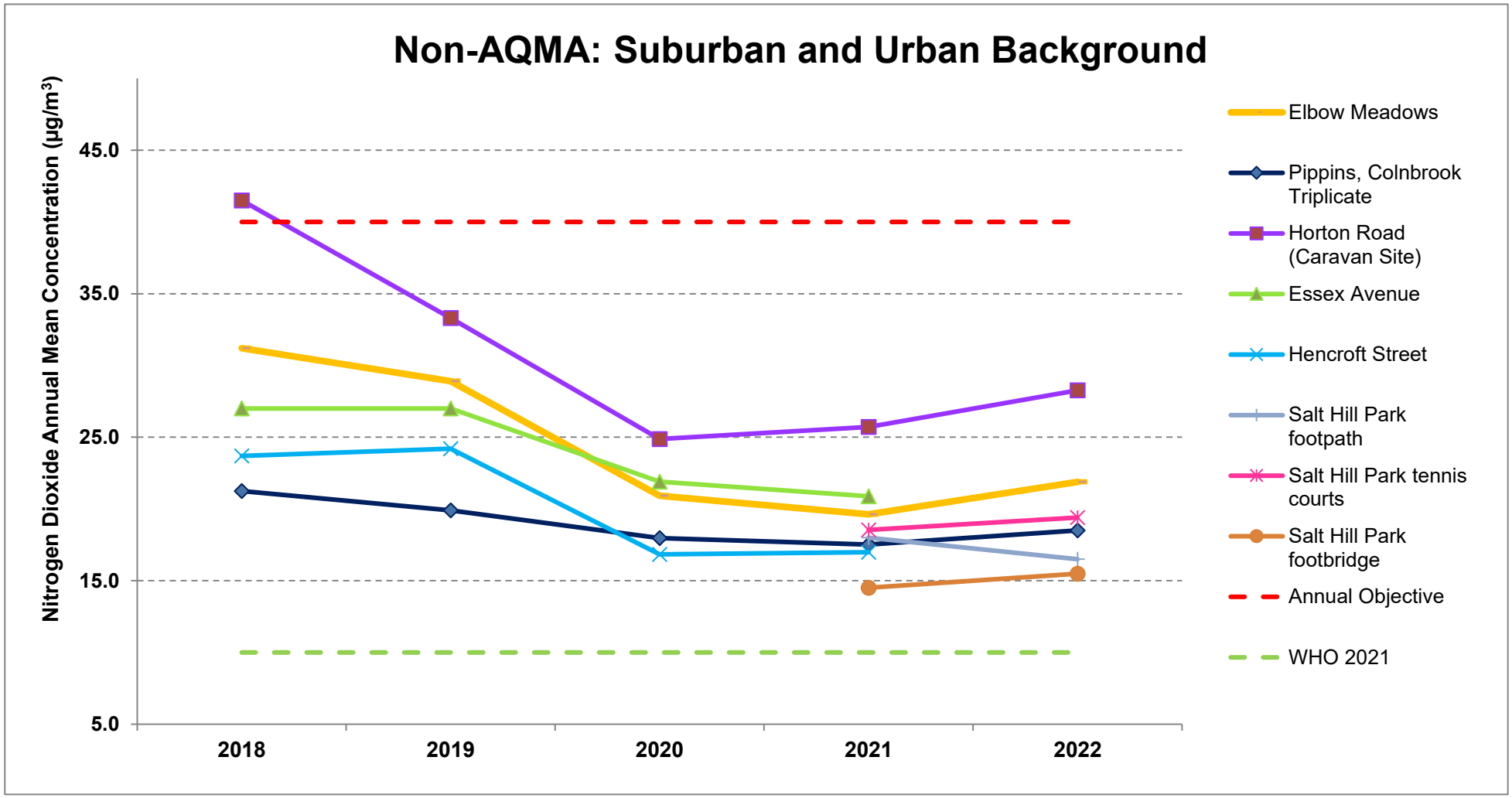


Figure A.10 – Trends in Annual Mean Diffusion Tube NO_2 Concentrations at Non AQMA: Rail and Industrial Sites

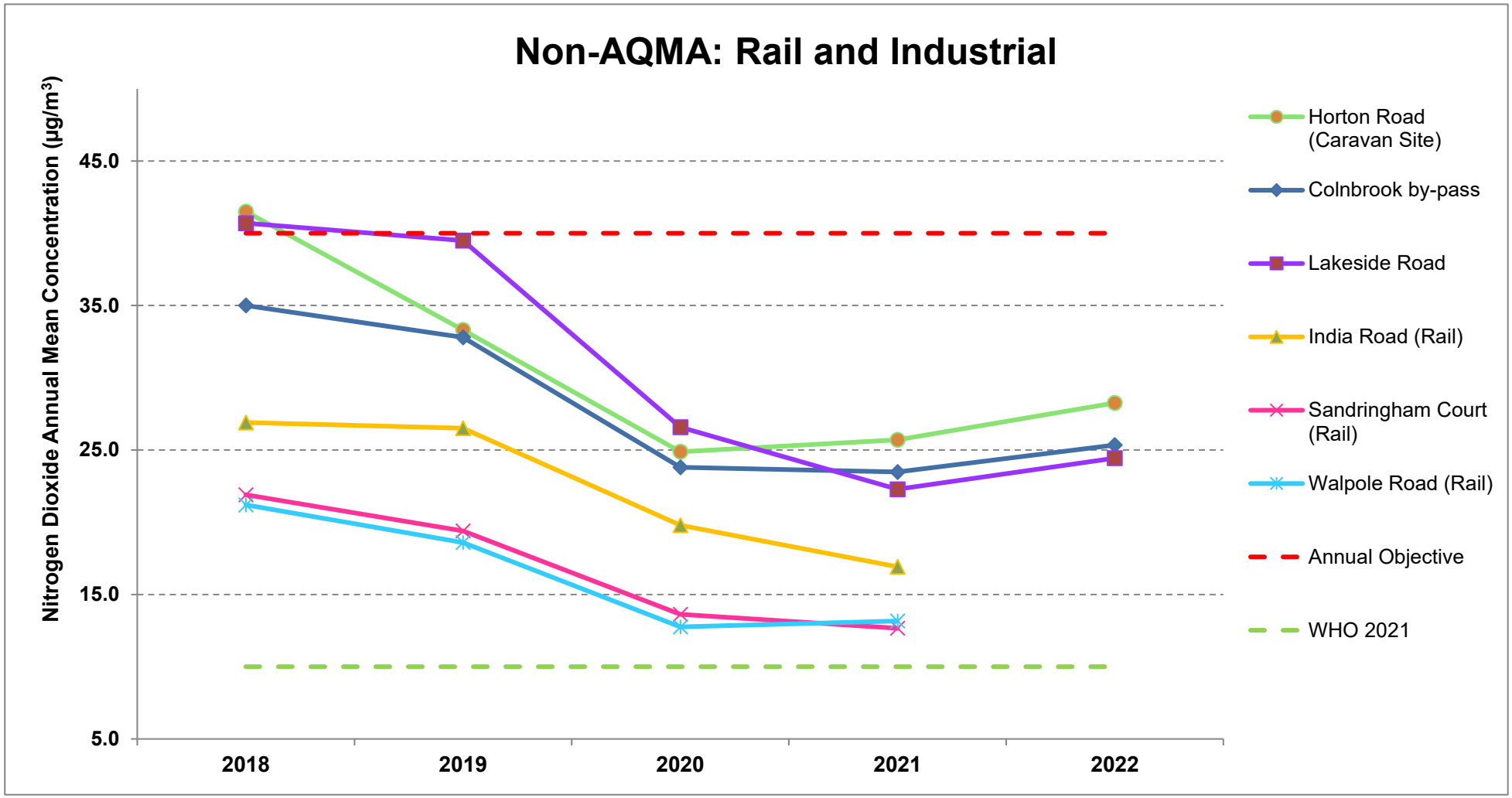


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
SLH 3	503542	176827	Suburban	100.0	20.4	0	0	0	0	0 (74.0)
SLH 4	496599	180156	Urban Background	-	-	0	0 (88)	-	-	-
SLH 7	496562	179109	Other	-	-	0	0	0	0 (78.6)	-
SLH 8	503569	77385	Industrial	99.6	99.6	0	0	0	0	0
SLH 10	498413	179804	Roadside	97.7	97.7	0	0	0	0	0
SLH 11	501643	177753	Roadside	99.6	99.6	0	0	0	0	0
SLH 12	496528	180171	Roadside	99.9	99.9	0	0	0	1	0
SLH 13	496447	179117	Other	99.9	99.9	-	-	-	0 (72.9)	0

Notes:

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

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

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

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

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

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 2022 (%) (2)	2018	2019	2020	2021	2022
SLH 3	503542	176827	Suburban	99.9	20.4	18	16.4	17	15.2	17.0
SLH 4	496599	180156	Urban Background	-	-	16.9	18.3	-	-	-
SLH 5	503551	177258	Industrial	-	-	14.4	12	-	-	-
SLH 6	503542	176827	Urban Background	-	-	10.3	15	-	-	-
SLH 8	503569	77385	Industrial	89.7	89.7	13.7	15	14	12.4	14.5
SLH 9	503569	77385	Urban Background	89.5	89.5	14.8	14	16.7	12.6	18.3
SLH 11	501643	177753	Roadside	99.5	99.5	28.8	28	25.4	24.4	23.1
SLH 12	496528	180171	Roadside	98.8	98.8	23.9	23.4	18.9	18.7	19.8
SLH 13	496447	179117	Other	97.4	97.4	-	-	-	13.3	15.2

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

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.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

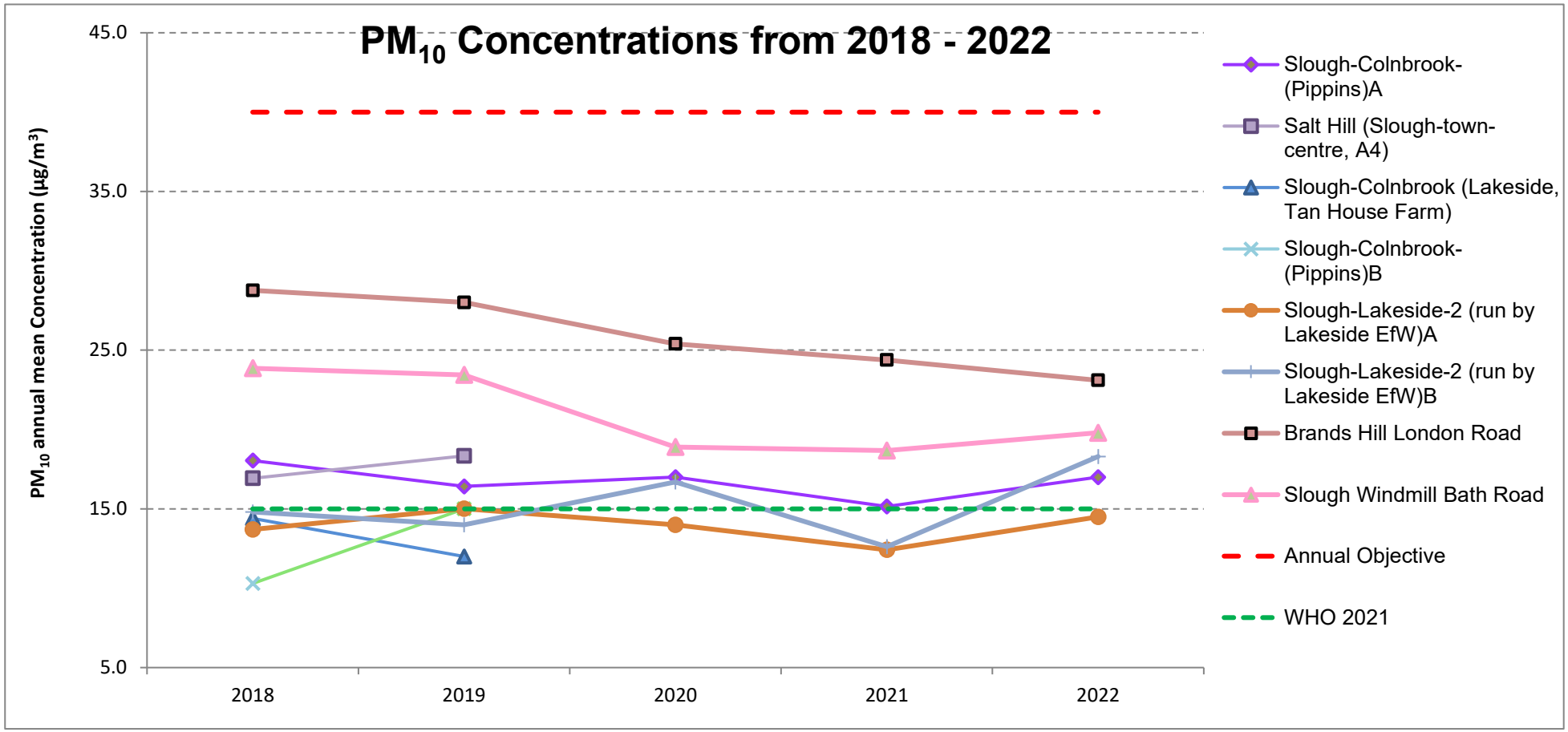


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
SLH 3	503542	176827	Suburban	99.9	20.4	1	3	0	0	0 (27.9)
SLH 4	496599	180156	Urban Background	-	-	1	3 (32)	-	-	-
SLH 5	503551	177258	Industrial	-	-	1	0 (19)	-	-	-
SLH 6	503542	176827	Urban Background	-	-	0	0 (24)	-	-	-
SLH 8	503569	77385	Industrial	89.7	89.7	1	3	0	0	1
SLH 9	503569	77385	Urban Background	89.5	89.5	1	0 (24)	4	2 (23.2)	7
SLH 11	501643	177753	Roadside	99.5	99.5	25	23	19	14	14
SLH 12	496528	180171	Roadside	98.8	98.8	11	15	7	4	5
SLH 13	496447	179117	Other	97.4	97.4	-	-	-	0 (21.3)	1

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

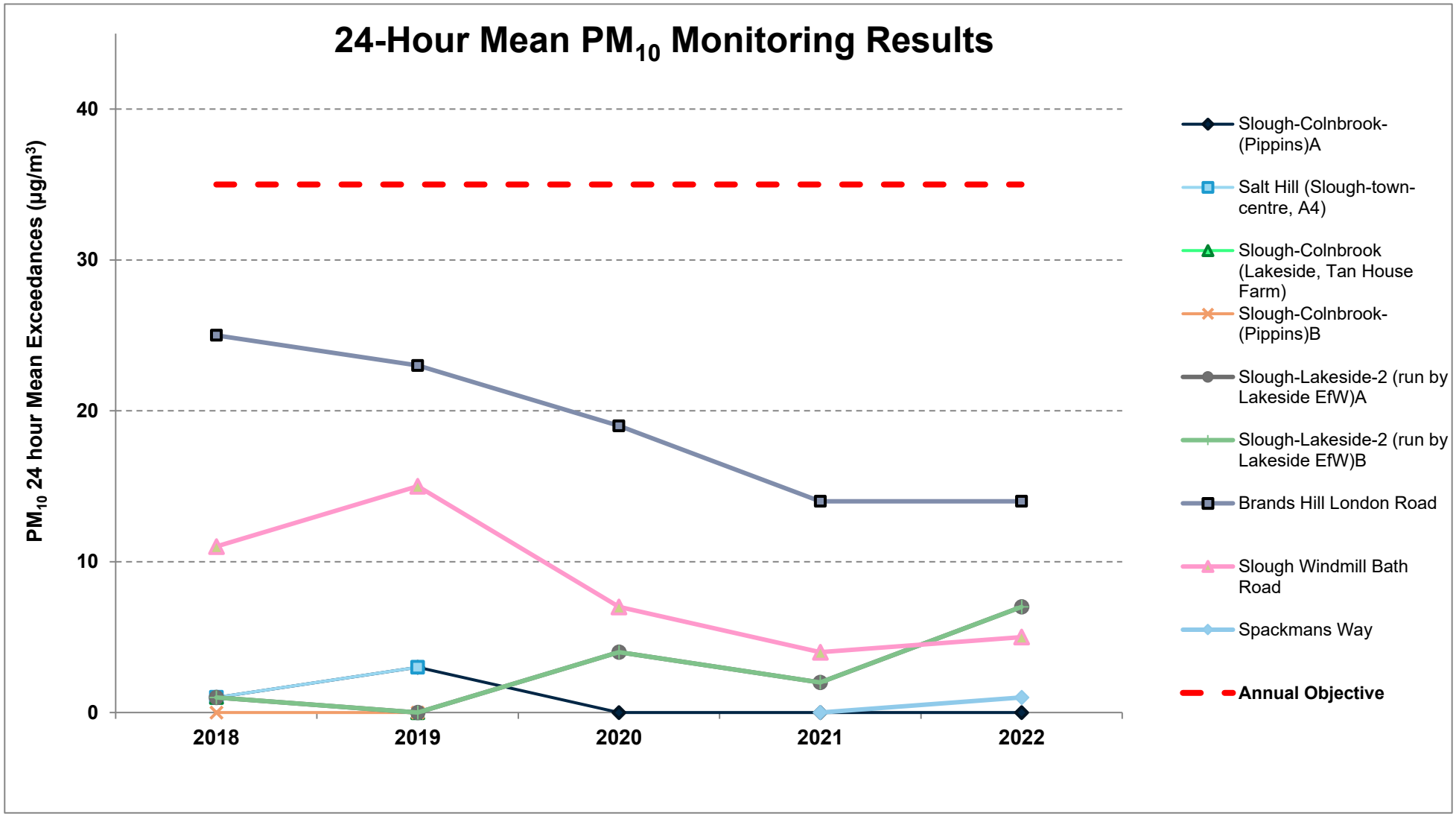


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
SLH 5	503551	177258	Industrial	-	-	6.2	6	-	-	-
SLH 6	503542	176827	Suburban	-	-	6.1	7	-	-	-
SLH 9	503569	77385	Industrial	89.6	89.6	6.9	7	5.5	5.5	7.6

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

Notes:

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

All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

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

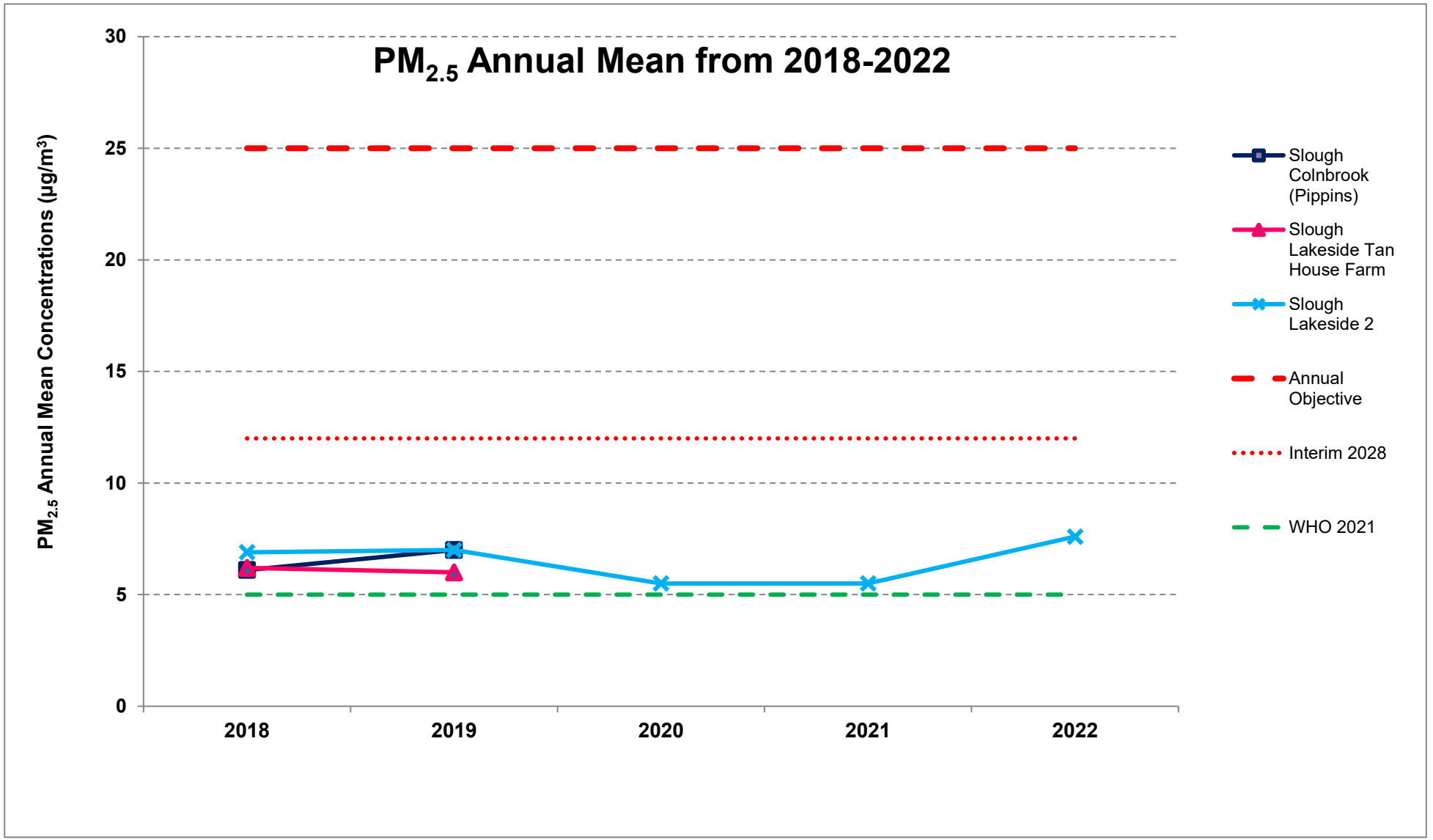
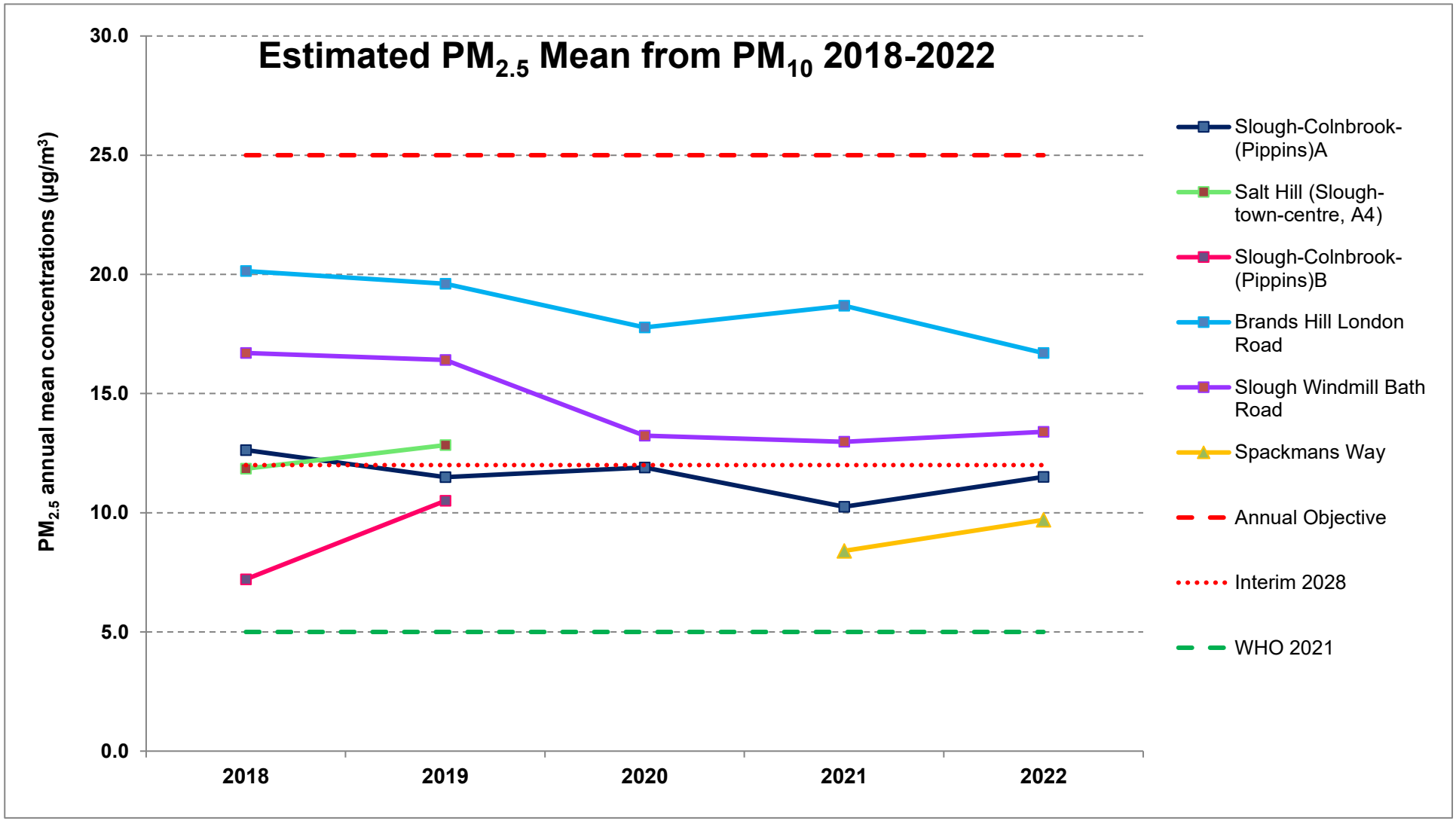


Figure A.14 – Trends in Annual Mean $PM_{2.5}$ Concentrations, Estimated from PM_{10}



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.78)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SLO 1 Relocated	496904	180187	39.6	25.2	29.6	20.2	17.4		17.5	18.5	20.3	27.4	23.9	32.3	24.7	19.4		
SLO 2 Relocated	496785	180336	30.3	18.0	29.0	17.2	13.4	12.5	14.4	14.4	19.6	18.8	24.9	24.3	19.7	15.5		
SLO 3 Relocated	496665	180236	24.6	22.0	29.0	16.1	15.6	14.1	14.2	15.5		24.1	27.4	28.6	21.0	16.5		
SLO 4 Relocated	497185	180050	42.3		36.2	24.8	22.4	20.2	21.3	21.0	23.2	28.1	25.6	33.0	27.1	21.3		
SLO 5	498541	179815	48.1	34.8	43.3	27.3	29.5	31.3		27.1	31.3	41.8	40.5	41.4	36.0	28.3		
SLO 6	498784	179560	45.7	30.2	35.6	22.5	21.7								31.1	23.8	25.1	
SLO 7	503196	177349	48.1	36.6	47.8	27.0	24.4	23.2	24.3	25.9	31.5		33.5	32.9	32.3	25.3		
SLO 8	501382	178101	47.4	41.9	42.1	26.8	29.9	29.1	28.7	28.3	31.2	37.6	39.5	41.8	35.4	27.8	30.5	
SLO 9	501501	177879	42.4	26.2	42.1	26.8	23.8								32.3	24.6	26.0	
SLO 10	501733	177725	56.3	37.5	59.7	42.1	35.4	35.9	39.9	44.2	47.6	39.1	20.7	37.7	41.3	32.5		
SLO 11	501637	177999	37.6	21.5	37.6	26.2	19.1								28.4	21.7		
SLO 12	503877	177459		24.8	42.6	28.6	25.2	26.9	27.7	29.7	33.0	36.3		36.5	31.1	24.4		
SLO 13	503856	176538	33.3	20.9	42.4	28.9	20.3	19.4	26.3	29.5	28.2	28.0	28.2	29.2	27.9	21.9		
SLO 14	503542	176827	26.3	16.3	39.9	19.1	15.5								-	-		Triplicate Site with SLO 14, SLO 15 and SLO 16 - Annual data provided for SLO 16 only
SLO 15	503542	176827	28.9		40.4	22.5	14.8								-	-		Triplicate Site with SLO 14, SLO 15 and SLO 16 - Annual data provided for SLO 16 only
SLO 16	503542	176827	27.1		42.6	20.7	16.6								24.2	18.5		Triplicate Site with SLO 14, SLO 15 and SLO 16 - Annual data provided for SLO 16 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 (0.78)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SLO 17	503136	175654	48.4	25.7	48.6	36.6	25.9	26.6	36.6	42.7	39.4	31.8	33.0	36.7	36.0	28.3		
SLO 18	501798	177659	52.1	32.6	49.0	44.6	41.7	47.0	41.1	38.3	41.4	32.1	31.7	31.3	40.2	31.6		
SLO 19	500851	177890	32.8	25.8	43.8	27.1	22.3	24.8	25.2	29.6	31.0	32.2	31.1	33.6	29.9	23.5		
SLO 20	497925	179450														-		
SLO 21	497457	179566	45.8	31.4	40.2	31.4	24.5	27.6	26.5	27.7	31.7	35.8	25.3	38.1	32.2	25.2		
SLO 22	497488	179090	42.0	32.8	31.9	17.1	22.5	20.2	18.8	20.7	25.7	28.6	29.7	30.4	26.7	21.0		
SLO 23	496416	180126	42.4	23.6	40.2	29.2	21.7	21.5	25.0	26.6	30.3	29.0	17.1	33.4	28.3	22.2		
SLO 24	496272	179187	35.0	25.5	37.0	22.4	20.5	22.9	20.8	24.6	25.9	29.8	32.6	30.2	27.3	21.4		
SLO 25	496050	179258	31.7	23.6	41.6	21.9	18.7	20.1	22.3	23.6	25.6		12.5	32.7	24.9	19.6		
SLO 26	498473	179706	51.8			41.7	34.0	34.1	35.6	37.4	37.4		32.5	36.1	37.8	29.7		
SLO 27	498681	179972														-		
SLO 28	501941	177633	41.8	34.4	42.6	35.5	30.2	33.0	32.7	36.2	40.3	39.2	36.1	38.0	36.7	28.8	29.4	
SLO 29	498483	179707	70.3	53.9	66.2	55.7	51.6	50.1	56.2	59.6	57.8	50.8	49.4	54.6	56.4	**44.2**	36.6	
SLO 30	496397	180341	38.7		39.8	25.4	23.8								31.9	23.4	23.7	
SLO 31	496200	181900														-		
SLO 32	501853	177620	36.4	21.5	37.6	32.8	24.0	24.7	29.1	30.5	30.7	22.9	19.1	29.5	28.2	22.2		
SLO 33	498168	179907	48.5	29.7	36.6	23.2	20.6								31.7	24.2	25.3	
SLO 34, SLO 35, SLO 36	496562	179109														-		
SLO 34 Relocated	496447	179117	44.5	33.7	37.0	24.7	23.7	23.9	23.6	25.7	25.7	31.6	28.6	35.9	-	-		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	46.0	33.8	34.2	24.1	23.3	23.8	24.5	25.7	26.8	31.6	35.3	24.2	-	-		Triplicate Site with SLO 34 Relocated, SLO 35 Relocated and SLO 36

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 (0.78)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
																		Relocated - Annual data provided for SLO 36 Relocated only
SLO 36 Relocated	496447	179117	39.9	33.3	36.4	24.7	24.8	24.3	23.9	24.5	27.2	32.8	36.2	37.4	29.9	23.5		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	48.1	35.8	45.1	31.1	28.2	29.4	29.5	28.9	31.1	37.9	36.3	33.5	34.6	27.1	27.6	
SLO 38	498071	179949			35.3	24.9	24.1	23.3	24.4	25.8	28.1	33.3	35.3	31.5	28.6	22.4		
SLO 39	501734	177733	43.2		41.8	25.6	24.0	22.3	23.6	27.0	28.3	27.0	28.0	30.1	29.2	22.9		
SLO 40	498394	179849	55.6	34.5	53.6	37.3	34.2	34.7	33.7	39.0	42.2	44.3	42.4	46.7	41.5	32.6		
SLO 41	493960	181355														-		
SLO 42	493493	181378														-		
SLO 43	496533	180175	45.3	28.6	40.3	31.9	27.2	25.1	28.1	30.7	32.7	32.1	35.0	33.8	32.6	25.6		
SLO 44	498961	180113	34.2	43.0	35.0		23.1	23.5	21.9	23.5	26.0	31.1	34.1	34.9	30.0	23.6		
SLO 45	501658	177781														-		
SLO 46	497467	179971	42.5	39.6	47.4	35.8	27.4	32.6	31.3		39.1	39.5	45.0	37.6	38.0	29.8		
SLO 47	497326	180003	47.8		38.8	28.8	24.7	21.2	26.7	26.6	32.5	29.2	32.6	34.1	31.2	24.5		
SLO 48	497960	179243														-		
SLO 49	497397	179471	50.1		44.3	34.5	32.0	28.5	32.2	33.5	37.8	29.2	32.4	40.9	35.9	28.2		
SLO 50	496377	179929	56.2	35.9	57.5	37.9	32.9	32.2	35.6	40.9	46.3	43.1	40.3	44.8	42.0	32.9		
SLO 51	501014	179316	46.1	33.7	38.9	27.8	27.7	26.7	29.6	32.6	37.5	34.6	32.8	40.2	34.0	26.7		
SLO 52	501161	179538	43.7	29.2	42.2	27.0	22.0	23.3	25.3	28.8	30.1	34.6	37.3	35.4	31.6	24.8		
SLO 53	501208	178799	52.3	37.0	49.8	32.6	30.4	31.5	32.7	35.1	40.0	39.5	39.0	43.4	38.6	30.3		
SLO 54	501256	179067	39.6	24.8	45.5	26.6	24.9	27.3		27.9	33.5	37.8	33.0	33.2	32.2	25.3		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.78)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SLO 55	501891	178954	42.7		35.8	24.3	19.9	22.3	21.3	21.9	25.9	26.8	20.4	32.4	26.7	21.0		
SLO 56	502241	178679	32.4	30.0	46.5	21.2	23.0	25.3	24.1	28.9	29.5	29.9	34.6	42.7	30.7	24.1		
SLO 57	469528	180171	52.8	32.7	36.8		34.3	28.0	35.3	37.7	37.5	35.5	33.9	34.4	-	-		Triplicate Site with SLO 57, SLO 58 and SLO 59 - Annual data provided for SLO 59 only
SLO 58	469528	180171	50.9	33.0	39.4			30.3	34.7	37.5	39.3	37.3	28.2	38.2	-	-		Triplicate Site with SLO 57, SLO 58 and SLO 59 - Annual data provided for SLO 59 only
SLO 59	469528	180171	47.2	35.9	43.3		34.9	29.7	34.0	38.6	40.9	36.5	35.5	33.4	36.7	28.8		Triplicate Site with SLO 57, SLO 58 and SLO 59 - Annual data provided for SLO 59 only
SLO 60	498413	179804	49.9	30.0	48.6	35.1	29.4	28.9	31.3	36.9	39.9	37.1	40.5	36.7	-	-		Triplicate Site with SLO 60, SLO 61 and SLO 62 - Annual data provided for SLO 62 only
SLO 61	498413	179804	53.5	29.9	37.3	37.0	28.9	29.1	33.9	37.9	40.5	37.6	32.0	43.4	-	-		Triplicate Site with SLO 60, SLO 61 and SLO 62 - Annual data provided for SLO 62 only
SLO 62	498413	179804	49.1	31.7	53.7	39.0	29.6	28.0	34.6	38.6	41.6	38.3	41.1	44.4	37.6	29.5		Triplicate Site with SLO 60, SLO 61 and SLO 62 - Annual data provided for SLO 62 only
SLO 63	501643	177753	60.3	40.1	70.3	43.3	35.3	38.9	44.6	46.4	46.0	45.6	40.0	41.8	-	-		Triplicate Site with SLO 63, SLO 64 and SLO 65 - Annual data provided for SLO 65 only
SLO 64	501643	177753	63.6	40.7	71.4	44.6	33.4	38.8	44.4	47.6	52.5	45.6	41.4	43.4	-	-		Triplicate Site with SLO 63, SLO 64 and SLO 65 - Annual data provided for SLO 65 only
SLO 65	501643	177753	61.5	42.1	74.3	45.1	36.0	35.5	46.0	41.2	51.1	46.6	45.5	42.2	46.9	36.8	32.2	Triplicate Site with SLO 63, SLO 64 and SLO 65 - Annual data provided for SLO 65 only
SLO 66	496146	179259	34.3	26.5	34.8	23.9	21.7	26.9	26.2	28.4	30.1	35.3	33.8	30.3	-	-		Triplicate Site with SLO 66, SLO 67 and SLO 68 - Annual data provided for SLO 68 only
SLO 67	496146	179259	35.4	24.7	42.2	26.3	23.5	26.2	25.6	28.6	29.6	35.3	28.5	35.4	-	-		Triplicate Site with SLO 66, SLO 67 and SLO 68 - Annual data provided for SLO 68 only
SLO 68	496146	179259	34.8	26.2	45.9	26.7	23.0	25.8	19.2	26.8	30.6	34.8	34.4	34.9	29.9	23.5		Triplicate Site with SLO 66, SLO 67 and SLO 68 - Annual data provided for SLO 68 only
SLO 69	496223	179217	40.9	30.3	35.7	27.5	29.5	26.8	27.5	27.7	29.5	34.6	36.3	37.3	-	-		Triplicate Site with SLO 69, SLO 70 and SLO 71 -

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 (0.78)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
																		Annual data provided for SLO 71 only
SLO 70	496223	179217	32.3	26.7	33.8	25.4	26.5	27.8	27.5	25.0	30.1	32.9	31.5	28.9	-	-		Triplicate Site with SLO 69, SLO 70 and SLO 71 - Annual data provided for SLO 71 only
SLO 71	496223	179217	38.8		32.4	22.8	28.2	26.8	26.9	25.3	30.3	31.6	23.5	34.6	30.0	23.6		Triplicate Site with SLO 69, SLO 70 and SLO 71 - Annual data provided for SLO 71 only
SLO 72	496225	179213	32.2	30.4	34.0	24.6	27.6	27.6	26.7	24.6	30.0	33.2	34.6	35.0	-	-		Triplicate Site with SLO 72, SLO 73 and SLO 74 - Annual data provided for SLO 74 only
SLO 73	496225	179213	42.5	24.7	32.3	24.4	27.1	28.6	27.8	26.8	29.8	32.2	37.9	34.4	-	-		Triplicate Site with SLO 72, SLO 73 and SLO 74 - Annual data provided for SLO 74 only
SLO 74	496225	179213	41.1		35.5	26.4	27.7	27.9	26.1	25.0	29.8	30.9	31.2	35.8	30.4	23.9		Triplicate Site with SLO 72, SLO 73 and SLO 74 - Annual data provided for SLO 74 only
SLO 75	496227	179207	37.2			24.8	28.3	26.6	25.9	25.3	28.4	32.4	31.7	31.9	-	-		Triplicate Site with SLO 75, SLO 76 and SLO 77 - Annual data provided for SLO 77 only
SLO 76	496227	179207	41.0			23.9	26.1	25.9	26.0	24.8	27.7	31.5	32.2	33.3	-	-		Triplicate Site with SLO 75, SLO 76 and SLO 77 - Annual data provided for SLO 77 only
SLO 77	496227	179207	39.9	27.2		22.7	25.9	25.1	25.4	24.3	27.5	30.5	29.3	31.9	28.8	22.6		Triplicate Site with SLO 75, SLO 76 and SLO 77 - Annual data provided for SLO 77 only
SLO 78	496229	179204	43.2		31.5	23.4	27.1	26.2	28.0	27.0	30.7	31.0	39.2	37.2	-	-		Triplicate Site with SLO 78, SLO 79 and SLO 80 - Annual data provided for SLO 80 only
SLO 79	496229	179204	43.2	29.9	31.9	21.3	28.0	27.6	28.9	27.5	28.6	35.1	32.2	34.9	-	-		Triplicate Site with SLO 78, SLO 79 and SLO 80 - Annual data provided for SLO 80 only
SLO 80	496229	179204	42.5	26.1	30.7	24.2	28.2	28.2	27.5	27.4	31.1	34.0	25.1	34.3	30.6	24.0		Triplicate Site with SLO 78, SLO 79 and SLO 80 - Annual data provided for SLO 80 only
SLO 81	496232	179199	41.6		35.1	21.5	27.5	28.4	27.8	25.6	30.4	33.4	32.0	33.3	-	-		Triplicate Site with SLO 81, SLO 82 and SLO 83 - Annual data provided for SLO 83 only
SLO 82	496232	179199	41.7	26.6	32.6	25.4	28.5	27.2	27.2	26.5	30.3	32.8	33.8	33.6	-	-		Triplicate Site with SLO 81, SLO 82 and SLO 83 - Annual data provided for SLO 83 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 (0.78)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SLO 83	496232	179199	42.4	28.3	36.0	24.9	27.5	27.3	27.2	25.7	30.4	34.2	33.0	34.1	30.6	24.0		Triplicate Site with SLO 81, SLO 82 and SLO 83 - Annual data provided for SLO 83 only
SLO 84	496234	179195	39.2	31.0	36.2	25.1	25.1	28.1	26.5	26.5	31.2		32.7	39.4	-	-		Triplicate Site with SLO 84, SLO 85 and SLO 86 - Annual data provided for SLO 86 only
SLO 85	496234	179195	42.8		34.9	26.5	29.0	27.1	27.5	26.4	30.1		33.9	30.7	-	-		Triplicate Site with SLO 84, SLO 85 and SLO 86 - Annual data provided for SLO 86 only
SLO 86	496234	179195	43.9		29.7	25.0	28.6	28.5	26.4	25.7	31.6	34.9	36.3	34.3	31.3	24.6		Triplicate Site with SLO 84, SLO 85 and SLO 86 - Annual data provided for SLO 86 only
SLO 87	496236	179191	40.8		30.8	21.8	27.9	27.4	27.2	25.2	26.3	33.7	36.1	31.7	-	-		Triplicate Site with SLO 87, SLO 88 and SLO 89 - Annual data provided for SLO 89 only
SLO 88	496236	179191	38.4		32.7	19.0	26.9	26.4	27.2	26.0	29.0		35.4	30.2	-	-		Triplicate Site with SLO 87, SLO 88 and SLO 89 - Annual data provided for SLO 89 only
SLO 89	496236	179191	39.3		31.8	25.6	27.5	26.4	27.1	24.7	28.4	31.9	35.0	35.9	29.9	23.5		Triplicate Site with SLO 87, SLO 88 and SLO 89 - Annual data provided for SLO 89 only
SLO 90	496238	179186	44.2	29.9	31.6	24.9	27.6	26.1	28.1	24.4		34.8	32.2	25.1	-	-		Triplicate Site with SLO 90, SLO 91 and SLO 92 - Annual data provided for SLO 92 only
SLO 91	496238	179186	42.9		28.7	25.0	29.0	26.5	27.5	23.9		34.6	32.4	31.3	-	-		Triplicate Site with SLO 90, SLO 91 and SLO 92 - Annual data provided for SLO 92 only
SLO 92	496238	179186	45.3		32.2	25.9	27.8	27.4	27.0	26.1		33.6	32.8	30.6	30.3	23.8		Triplicate Site with SLO 90, SLO 91 and SLO 92 - Annual data provided for SLO 92 only
SLO 93	497433	179092	40.2	27.4	33.0	20.3	22.0	21.4	22.3	23.1		27.7	28.4	33.6	-	-		Triplicate Site with SLO 93, SLO 94 and SLO 95 - Annual data provided for SLO 95 only
SLO 94	497433	179092	37.5	28.1	32.3	22.5	21.4	22.6	21.6	23.1	27.1	28.3	29.4	32.7	-	-		Triplicate Site with SLO 93, SLO 94 and SLO 95 - Annual data provided for SLO 95 only
SLO 95	497433	179092	40.4	27.4	31.5	21.6	20.9	21.5	21.1	21.1	24.1	28.2	26.3	35.9	27.0	21.2		Triplicate Site with SLO 93, SLO 94 and SLO 95 - Annual data provided for SLO 95 only
SLO 96	503272	176597	37.0	21.5	40.4		23.9	23.9		29.6	30.8	29.7			29.6	23.1		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.78)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SLO 97	497725	179360	52.7	29.1	48.4	35.2	29.5	28.5	31.0	36.7	37.3	39.2	36.8	42.0	37.2	29.2		

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

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

☒ **Local bias adjustment factor used.**

☐ **National bias adjustment factor used.**

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

☒ **Slough Borough Council confirm that all 2022 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 2022

Slough Borough Council has not identified any new major sources relating to air quality within the reporting year of 2022. 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.
- New road configurations including the Langley road widening scheme and the Brands Hill gyratory and bus lane scheme, which would have disrupted traffic flows during construction and operation.
- Full operation of the M4 Smart Motorways Scheme, which includes a new boundary fence which may influence dispersion and therefore reduce NO_2 concentrations at receptor monitoring locations.

C.2 Additional Air Quality Works Undertaken by Slough Borough Council During 2022

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 Emergency Active Travel Fund (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. The bus lane operates in peak times only and can be used by exempt vehicles including motorcycles, taxis, private hire vehicles and zero emission vehicles. The bus lane was made permanent in December 2021 after approval was granted by Cabinet.

At the request of Councillors, diffusion tubes were located on six roads surrounding the A4 to monitor potential traffic and congestion increase as a result of the scheme (SLO 112 – SLO 123) in 2021. There is no baseline monitoring at these locations prior to operation of

the bus lane. The data collected to date is presented in Figure C.3. All sites fall below the AQO for NO_2 but exceed the WHO 2021 AQGs. Eight diffusion tube sites show an increase in NO_2 concentrations from 2021 to 2022, whereas four sites show a decrease. The highest concentrations are observed at Ledgers Road (b) at 35.7µg/m^3, close to being within 10% of the AQO. Intervention may be needed at this location to ensure that air quality does not continue to worsen.

Despite the remaining locations having low values, concentrations will continue to be monitored for a minimum of five years for the purpose of monitoring the impact of the A4 cycle way scheme implementation.

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 2020 to 2022 (2019 has not been included due to monitoring starting too late in the year to be annualised). 2022 represents the first full year of complete data that has not been affected by the pandemic. Figure C.1 shows the three year trend at the three key receptor areas and Figure C.2 shows concentrations at each identified receptor. The graphs indicate that concentrations fell furthest in 2021, despite the pandemic starting in early 2020. From 2021 to 2022, concentrations have worsened at all sites by 2.2µg/m^3 on average, with the greatest increase observed at HE Receptor 6 (Spackmans Way, SLO 81, SLO 82 and SLO 83) by 2.9µg/m^3 and the smallest increase at HE Receptor 10 (Winvale, SLO 93, SLO 94 and SLO 95) by 0.9µg/m^3. Despite the increase in NO_2, concentrations remain far below the AQO in 2022, reaching a maximum of 24.6µg/m^3 at HE Receptor 7 (Spackmans Way, SLO 84, SLOL 85 and SLO 86).

C.3 Factors Influencing Air Quality During 2022

C.3.1 Traffic Flows

The Council operate a number of traffic counters along the A4, to monitor the number of vehicles which use this road. This provides invaluable data to correlate with air quality trends and can be used to assist in identifying the causes of air quality improvements or deterioration.

Figure C.4 shows traffic count data (monthly average daily traffic flows) from 2019 to 2022. The impact of the pandemic on traffic levels is evident in 2020 when the first lockdown was introduced, which is seen again in early 2021 but to a lesser extent. The traffic flows began to recover after this event, however the data suggests that traffic flows are still

lower than those recorded in 2019, therefore it may be possible that the pandemic has resulted in a prolonged reduction in vehicle use.

The data from the traffic counter on London Road shows a significant reduction in traffic flows, beyond that which was experienced during the pandemic in 2020. In the first six months of 2022, traffic flows were 25,256 on average, which is slightly lower than the annual average from 2019 (29,495). In the last six months of 2022 however, this level steeply drops to an average traffic flow of 14,808, with the lowest average traffic flow observed in December at 12,140. This is lower than the traffic reductions seen during the pandemic, with the lowest traffic flow observed in April 2022 at 12,892. This may explain the reason as to why concentrations in the Brands Hill area have been lower than expected in 2022. These traffic flow reductions are likely to have resulted from the road layout changes, causing lower traffic flows than seen in previous years due to both a prolonged construction period which has slowed traffic and may have resulted in drivers avoiding the area, and an increase in the distance between the receptor and roadside.

Due to the Council's financial position, some traffic counters are suffering from a reduced maintenance regime and therefore this data may not be available in future. If funding is sourced, it will be a priority to maintain these counters to provide traffic count data.

C.3.2 Weather Patterns

The weather has a large impact on air quality in terms of pollution dispersion, transportation and generation of secondary pollution. This section provides a summary on weather patterns experienced during 2022, which can help to understand the causes of pollution levels in Slough.

2022 was the warmest year on record for the UK in a series from 1884 for maximum and mean temperatures (extreme heatwaves in the summer months included temperatures in excess of 40 °C being recorded in the UK for the first time), with all individual months warmer than average with the exception of December. It was a sunnier than average year for most areas, especially eastern England, with only some northern and western fringes recording less sunshine than average. These conditions can create high levels of ground level ozone (O_3) which is produced via photo-chemical reactions between precursor pollutants in the lower levels of the atmosphere (troposphere), including nitrogen dioxide (NO_2), volatile organic compounds (NMVOCs), methane (CH_4) and carbon (CO), which helps to explain why NO_2 concentrations are much lower in the summer when compared to winter months. Chemical reactions between precursors such as nitrogen oxides (NO_x),

sulphur dioxides (SO_2), and ammonia (NH3) also produce secondary particulate matter. A peak of $PM_{2.5}$ is typical in early spring, as elevated concentrations of nitrates are transported from agricultural operations across continental Europe.

Rainfall was mostly below average for the year, with the months from January to August, and December, all being generally drier than average. The autumn months were wetter than average, although this was not enough to fully offset the deficit from the previous eight months. Wetter weather can reduce NO_2 concentrations through a 'washout' effect.

Notable extreme events of 2022 included a sequence of particularly stormy weather during February, including storm Eunice on 18 February when two red warnings for wind were issued and during which a new England gust speed record was set with a gust of 122 mph recorded at Needles (Isle of Wight). The impact this has on air pollution is clearly visible in the data, where concentrations of NO_2 were much lower in February at all monitoring stations than typical. Prevailing wind direction also has an influence on the level of transboundary pollution.

There was a prolonged cold spell during the first half of December, one of the most significant cold spells to affect the UK since December 2010. This can indirectly produce higher concentrations of particulate matter as contributions from anthropogenic sources such as residential combustion of wood, coal in stoves and open fires increase. Emissions from this source are typically located closer to urban background sites than roadside sides, which may explain the slight convergence between concentrations recorded at urban background and roadside sites throughout the winter months in national monitoring data.

Figure C.1 – Highways England Receptor NO_2 Concentrations, Averaged by Location

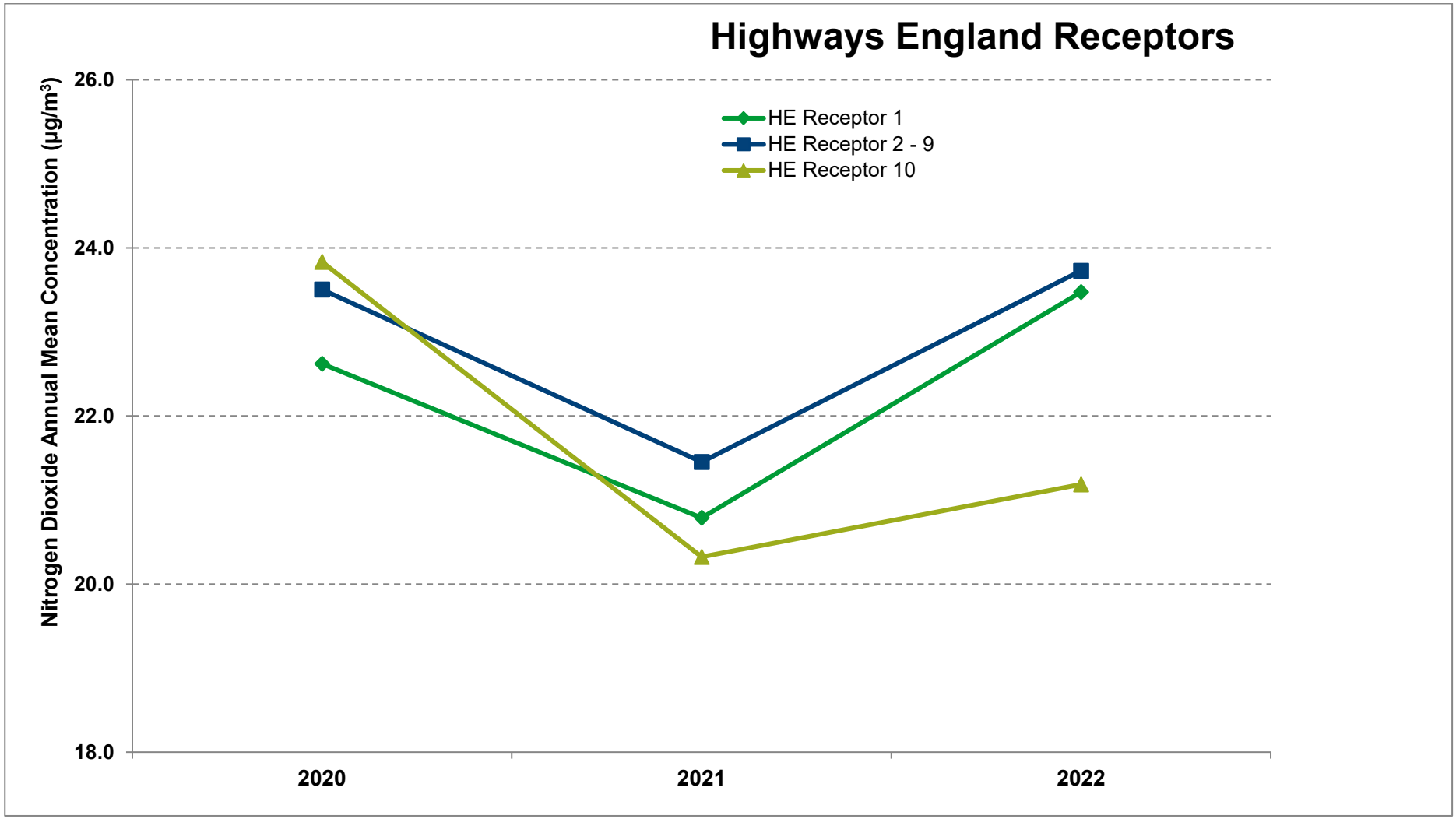


Figure C.2 – Highways England Receptor NO_2 Concentrations, by Individual Receptor

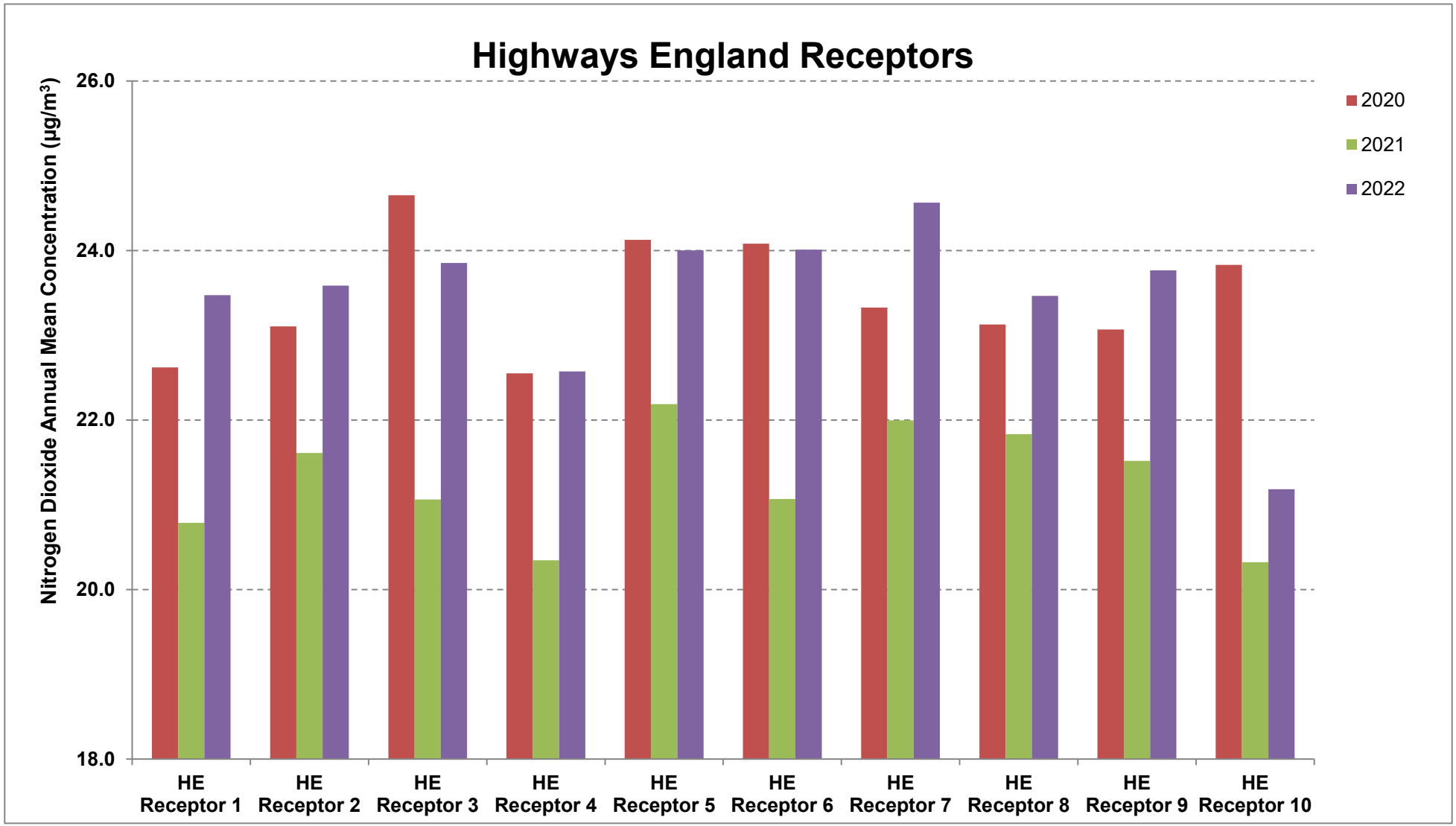


Figure C.3 – Bus Lane Monitoring

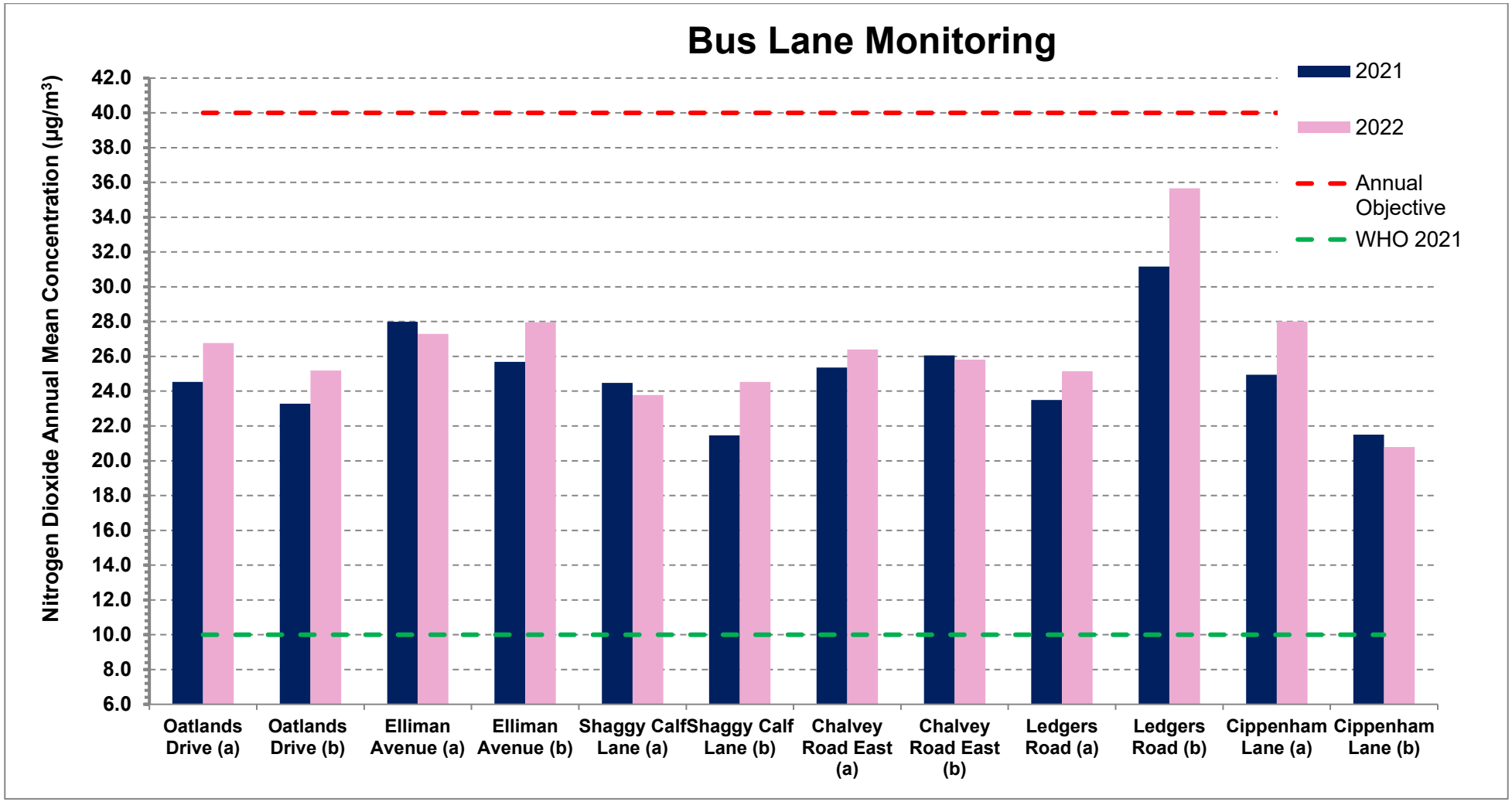
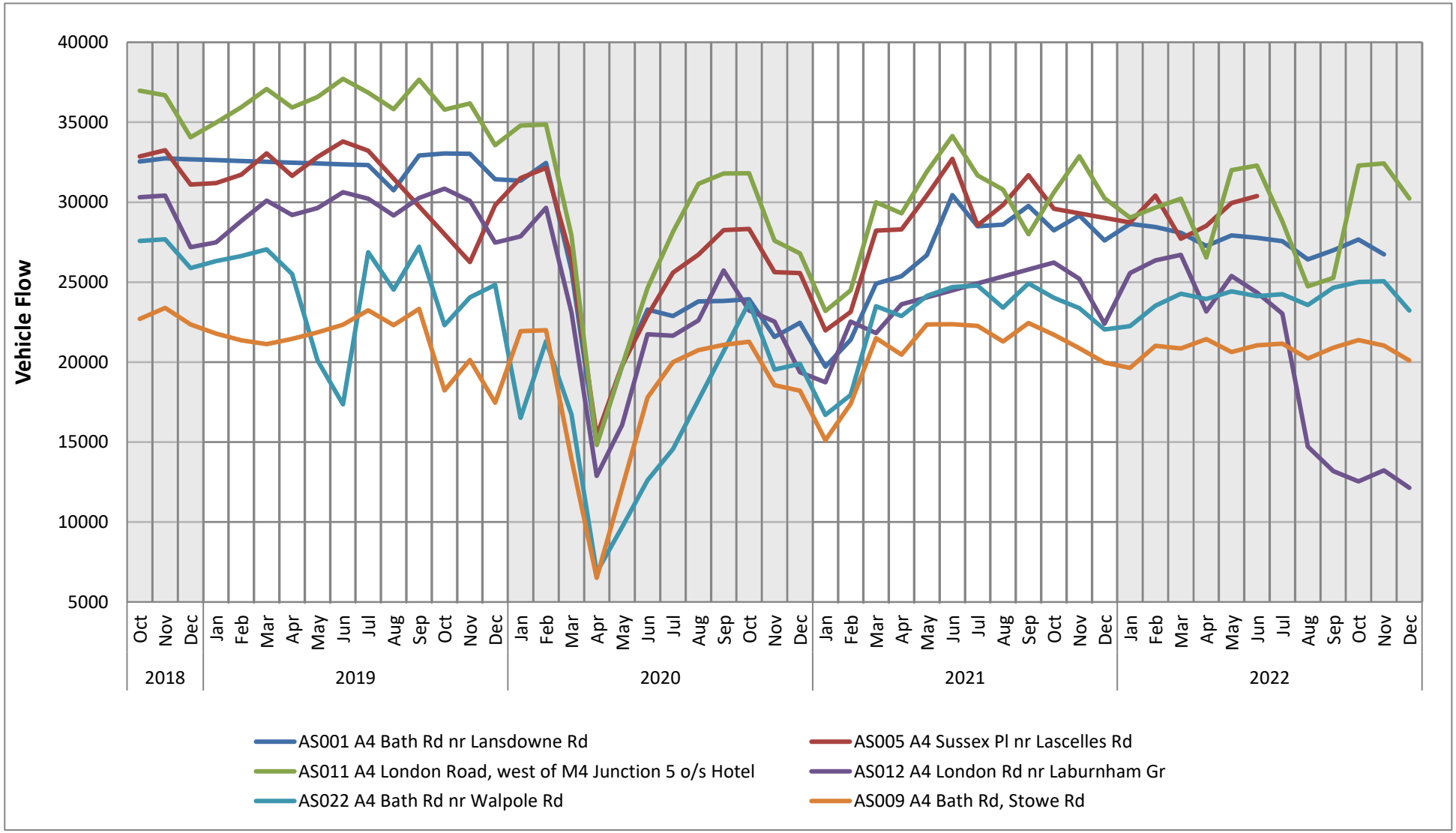

Bus Lane Monitoring
Nitrogen Dioxide Annual Mean Concentration (µg/m³)
42.0
40.0
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
2021
2022
Annual Objective
WHO 2021
Oatlands Drive (a)
Oatlands Drive (b)
Elliman Avenue (a)
Elliman Avenue (b)
Shaggy Calf Lane (a)
Shaggy Calf Lane (b)
Chalvey Road East (a)
Chalvey Road East (b)
Ledgers Road (a)
Ledgers Road (b)
Cippenham Lane (a)
Cippenham Lane (b)

Figure C.4 – Monthly Average Daily Traffic Flows along the A4 Between Huntercombe Roundabout and M4 Junction 5



C.4 QA/QC of Diffusion Tube Monitoring

During 2022, Slough Borough Council used services provided by SOCOTEC for the supply and analysis of diffusion tubes, who was the sole supplier during 2022. The existing contract was implemented in January 2022 and is valid until December 2024. Prior to 2022, services were provided by Gradko International Ltd.

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).

Diffusion tube manufacture and analysis at SOCOTEC carries UKAS accreditation to the international standard BS EN ISO/IEC 17025 and their Environmental Management System is accredited to ISO14001:2015.

The two main analytical techniques for the determination of nitrite are ion chromatography and colorimetry. SOCOTEC conduct diffusion tube analysis using colorimetric techniques, which is considered industry standard. The instrument is calibrated daily, with the correlation coefficient (r value) checked against acceptable criteria. All calibration and QC standards are made from ISO Guide 34 certified standards and made against defined acceptance tolerances.

To supplement quality control procedures, SOCOTEC 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 diffusion tube laboratories are released. Results of the most recent eight 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 2022 Diffusion Tube Monitoring Calendar (+- 2 days).

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 $\leq \pm 2$ 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 Scientific Services	NR [4]	NR [4]	100 %	100 %	100 %	75 %	75 %	50 %	75 %
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]

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
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

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

C.4.1 Diffusion Tube Annualisation

Annualisation is required for any site with data capture less than 75% but greater than 25%. In 2022, 10 diffusion tube sites were annualised by producing an annualisation factor using three nearby, long-term, continuous monitoring sites which are part of the national network (London Hillingdon (HIL), Hillingdon Sipson (SIPS) and Oxford St Ebbes (OX8)). A sites chosen are Urban Background sites, have a data capture above 85%, and lie within a radius of <50 miles.

Annualisation was undertaken for the following diffusion tube sites, also presented in Appendix C.4:

- Sites which were removed due to prolonged compliance (below 10% of the AQO) for five years: SLO 6, SLO 9, SLO 11, SLO 30 and SLO 33
- Sites which had a low data capture due to frequent thefts: SLO 96 and SLO 114.
- Sites which were removed as they were no longer required for co-location purposes: SLO 14, SLO 15 and SLO 16.

No continuous monitoring sites required annualisation in 2022.

Table C.3 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor London Hillingdon (HIL)	Annualisation Factor Hillingdon Sipson (SIPS)	Annualisation Factor Oxford St Ebbes (OX8)	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
SLO 6	0.9742	0.9902	0.9560	0.9734	31.1	30.3
SLO 9	0.9742	0.9902	0.9560	0.9734	32.3	31.4
SLO 11	0.9742	0.9902	0.9560	0.9734	28.4	27.6
SLO 14	0.9742	0.9902	0.9560	0.9734	-	-
SLO 15	0.9742	0.9902	0.9560	0.9734	-	-
SLO 16	0.9742	0.9902	0.9560	0.9734	24.2	23.6
SLO 30	0.9555	0.9460	0.8971	0.9329	31.9	29.8
SLO 33	0.9742	0.9902	0.9560	0.9734	31.7	30.9
SLO 96	0.9911	0.9782	1.0134	0.9942	29.6	29.4
SLO 114	1.1058	1.1032	1.0987	1.1026	31.5	34.8

+

C.4.2 Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from 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 local bias adjustment factor of 0.78 to the 2022 monitoring data. A summary of bias adjustment factors used by Slough Borough Council over the past five years is presented in Table C..

Table C.4 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	Local	-	0.78
2021	National	06/22	0.83
2020	Local	-	0.86
2019	Local	-	0.93
2018	Local	-	0.78

Slough Borough Council undertook co-location of diffusion tubes with a continuous analyser at six sites during 2022. The sites and their bias factors are presented below and shown in Table C.5:

Wellington Street (SLH 10) – Bias Factor B: 32%
Brands Hill (SLH 11) – Bias Factor B: 42%
Windmill (SLH 12) – Bias Factor B: 28%
Spackmans Way (SLH 13) – Bias Factor B: 33%
Pippins Colnbrook (SLH 3) – Bias Factor B: 10%
Average Bias Factor B = 29%. Factor inverse = 1/1.29 = 0.78.

Pippins was only operational from January to March 2022. As such, the data available for co-location is very limited. Excluding the Pippins bias adjustment factor, the resultant bias

adjustment factor is 0.75, marginally below the national bias. As including Pippins results in a higher bias adjustment factor and therefore higher diffusion tube concentrations, this bias adjustment factor (0.78) was used to adjust the diffusion tube concentrations, to support a conservative approach.

Table C.5 – 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
Periods used to calculate bias	12	12	11	11	1
Bias Factor A	0.76 (0.71 - 0.81)	0.71 (0.67 - 0.75)	0.78 (0.71 - 0.87)	0.75 (0.7 - 0.8)	
Bias Factor B	32% (24% - 40%)	42% (34% - 49%)	28% (15% - 41%)	33% (25% - 42%)	
Diffusion Tube Mean (µg/m^3)	37.6	46.9	36.7	29.7	
Mean CV (Precision)	5.8%	3.8%	4.9%	3.7%	
Automatic Mean (µg/m^3)	28.5	33.1	28.7	22.3	
Data Capture	96%	99%	99%	100%	
Adjusted Tube Mean (µg/m^3)	29 (27 - 30)	33 (31 - 35)	29 (26 - 32)	22 (21 - 24)	

Notes:

A combined local bias adjustment factor of 0.78 has been used to bias adjust the 2022 diffusion tube results.

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 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.

Fall off with distance was automatically populated using the diffusion tube processing tool for sites where the monitor was further than the road than the receptor, or where concentrations were within 10% of the AQO. Only one diffusion tube exceeded the AQO for NO_2 at Yew Tree Road (SLO 29 (44.2µg/m^3)) and only one site was within 10% of the AQO at the Brands Hill triplicate (SLO 63, SLO 64 and SLO 65 (36.8µg/m^3)). Once distance corrected, the resultant concentrations are 36.6µg/m^3 and 32.2µg/m^3, respectively.

Table C.6 – NO_2 Fall off With Distance Calculations (concentrations presented in $\mu g/m^3$)

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 6	9.6	4.5	23.8	19.0	25.1	
SLO 8	35.0	20.0	27.8	20.8	30.5	*Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution.*
SLO 9	23.1	12.9	24.6	20.3	26.0	*Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution.*
SLO 28	1.3	0.9	28.8	20.3	29.4	
SLO 29	1.5	6.0	44.2	19	*36.6*	*Predicted concentration at Receptor within 10% the AQS objective.*
SLO 30	10.8	8.2	23.4	19.9	23.7	*Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution.*
SLO 33	14.7	9.3	24.2	19.0	25.3	*Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution.*
SLO 37	10.8	9.1	27.1	20.5	27.6	*Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution.*
SLO 63, SLO 64, SLO 65	5.8	14.2	36.8	20.3	32.2	

C.5 QA/QC of Automatic Monitoring

Prior to 2022, Slough Borough Council's automatic sites were managed to the same procedures and standards as AURN sites by Ricardo Energy and Environment. However, due to the Council's financial situation, the calibration regime conducted by Ricardo's Local Site Operators (LSOs) was reduced from bi-weekly to monthly, to reduce costs.

The six-monthly auditing procedure, whereby 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 takes place, remains unchanged from previous years.

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.5.1 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. As Pippins was the last monitoring station that contained a TEOM and was discontinued in 2022, this adjustment will no longer be necessary.

C.5.2 Automatic Monitoring Annualisation

All automatic monitoring locations within Slough Borough Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

C.5.3 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 2022.

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

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

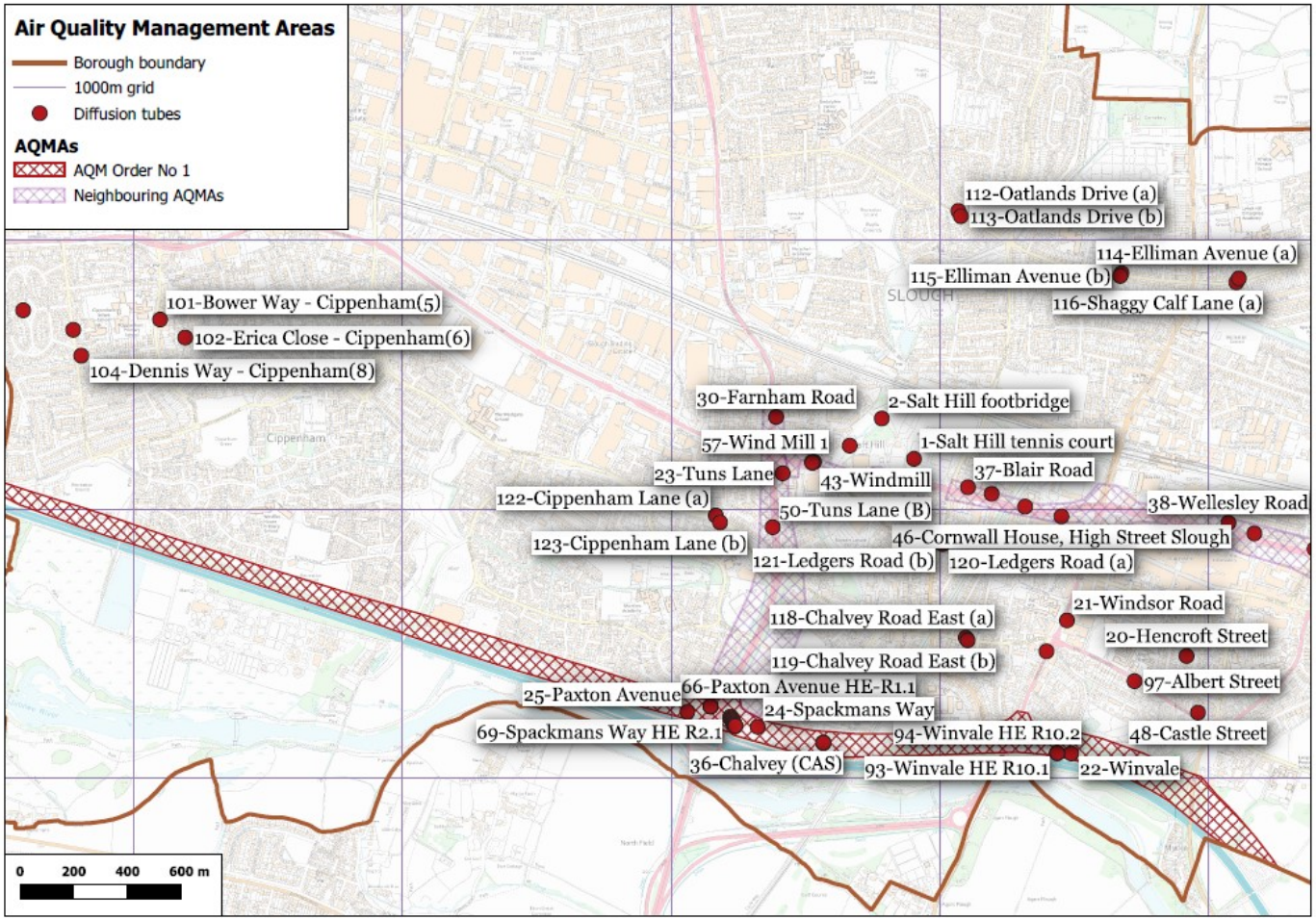


Figure D.2 – Map of Non-Automatic Monitoring Sites in AQMA 1b

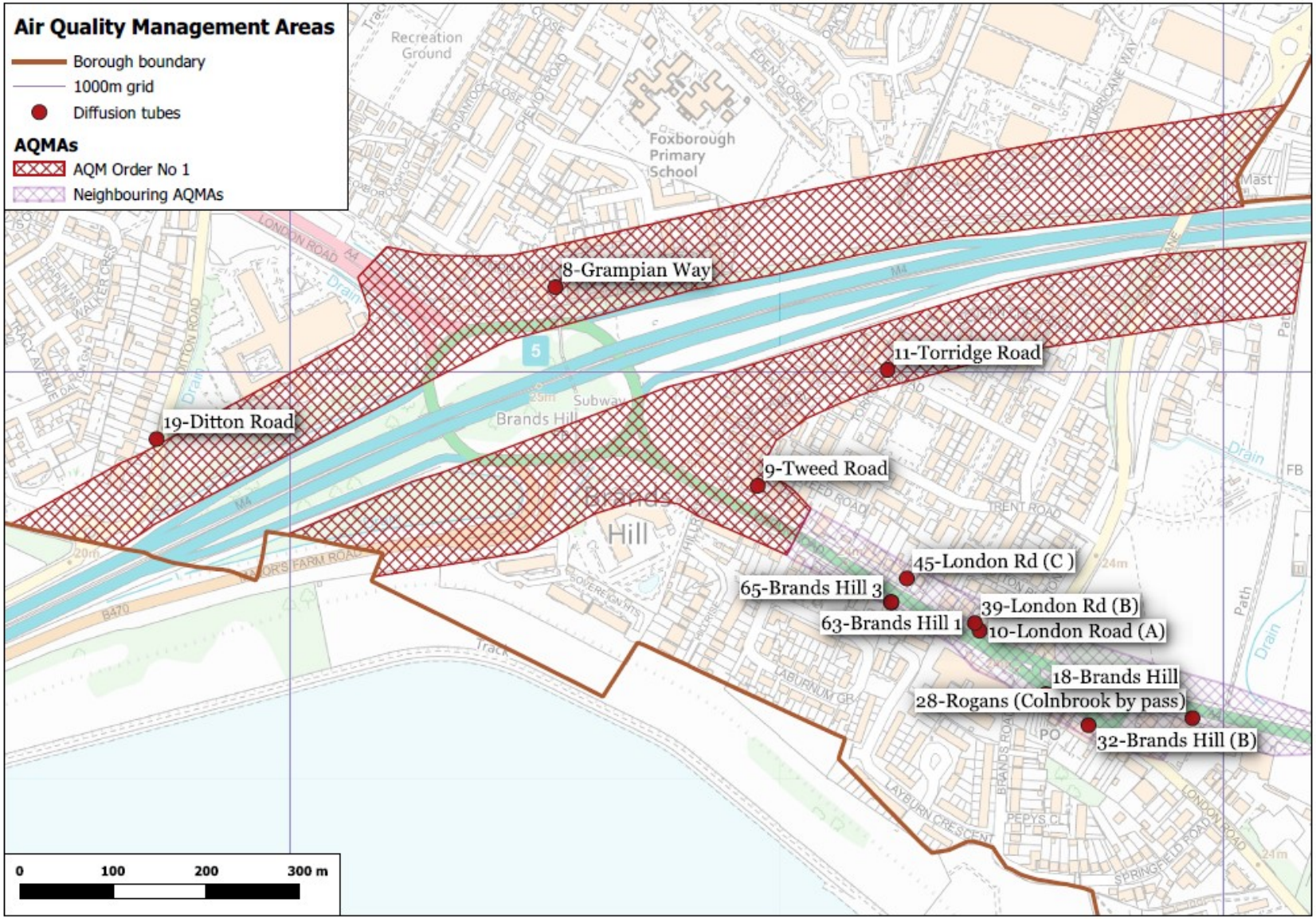


Figure D.3 – Map of Non-Automatic Monitoring Sites in AQMA 2

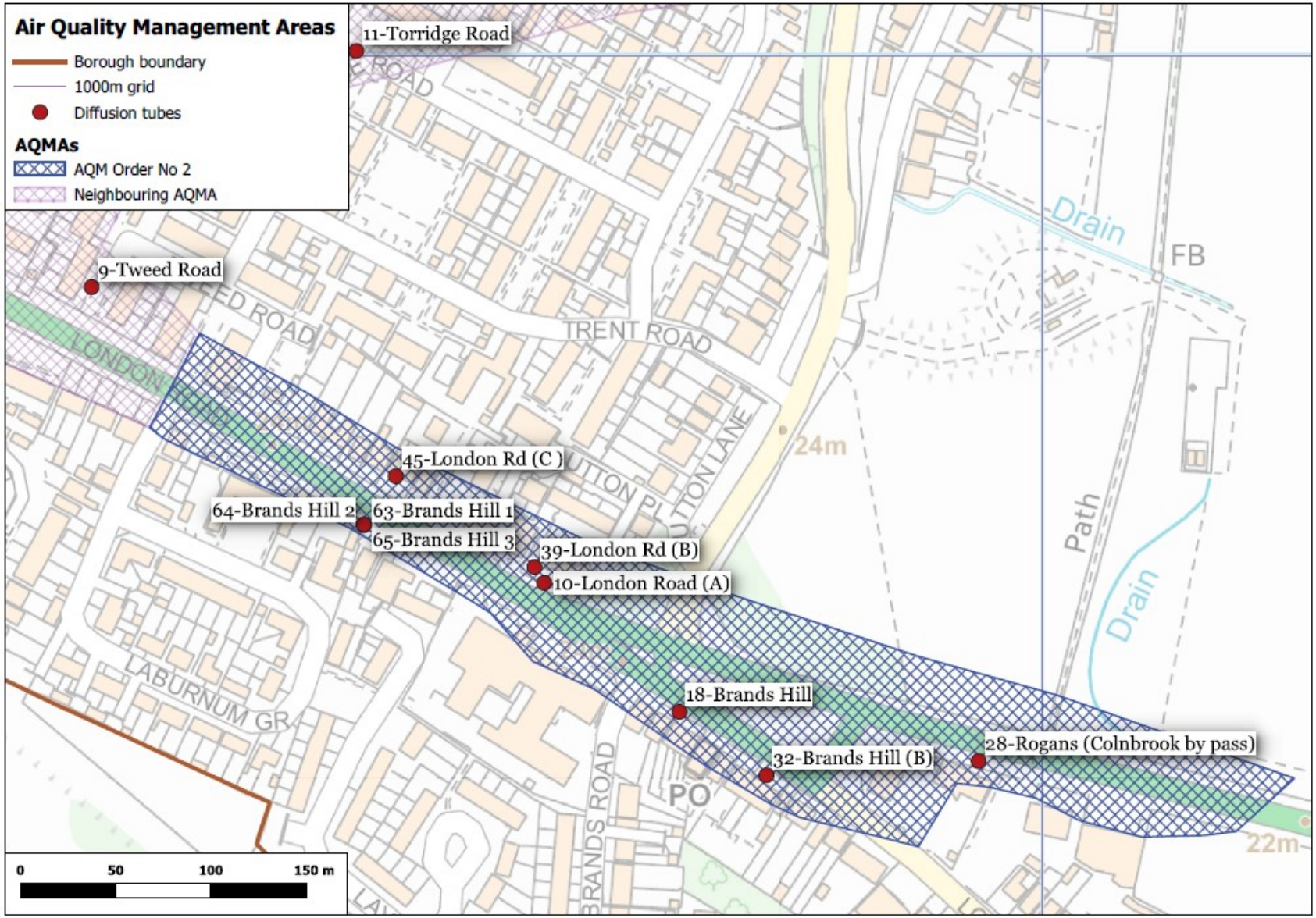


Figure D.4 – Map of Non-Automatic Monitoring Sites in AQMA 3

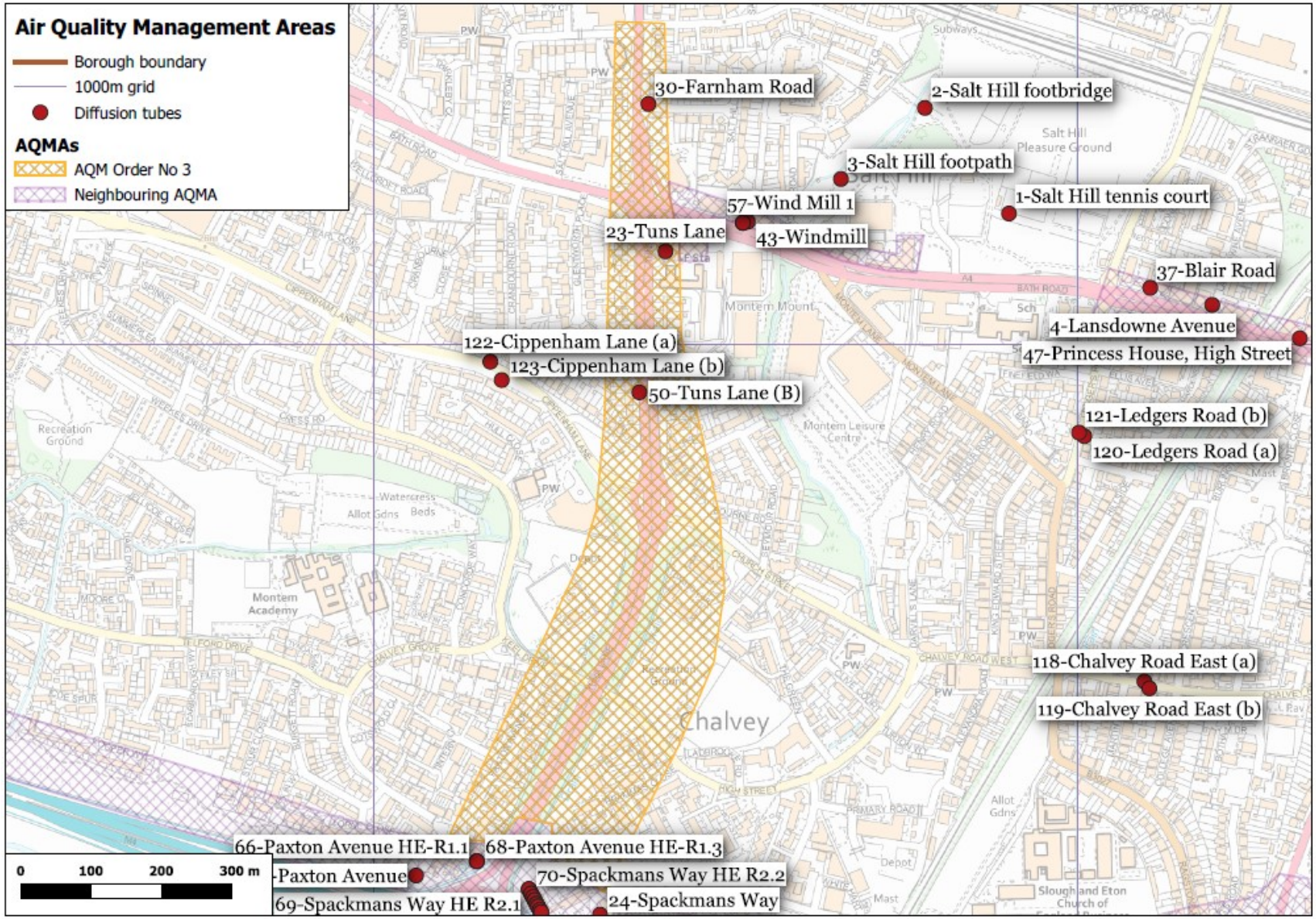


Figure D.5 – Map of Non-Automatic Monitoring Sites in AQMA 3 Extension

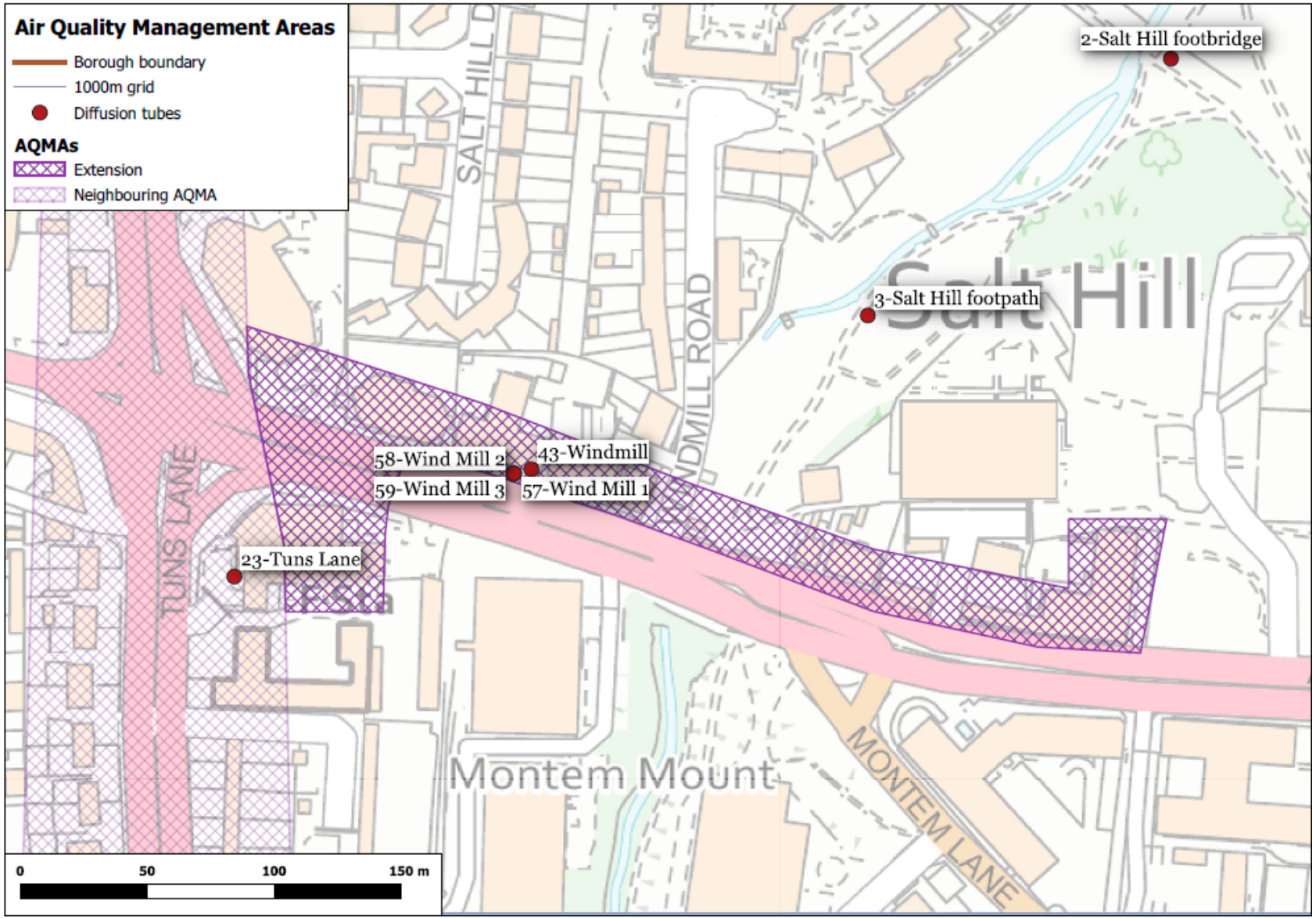


Figure D.6 – Map of Non-Automatic Monitoring Sites in AQMA 4

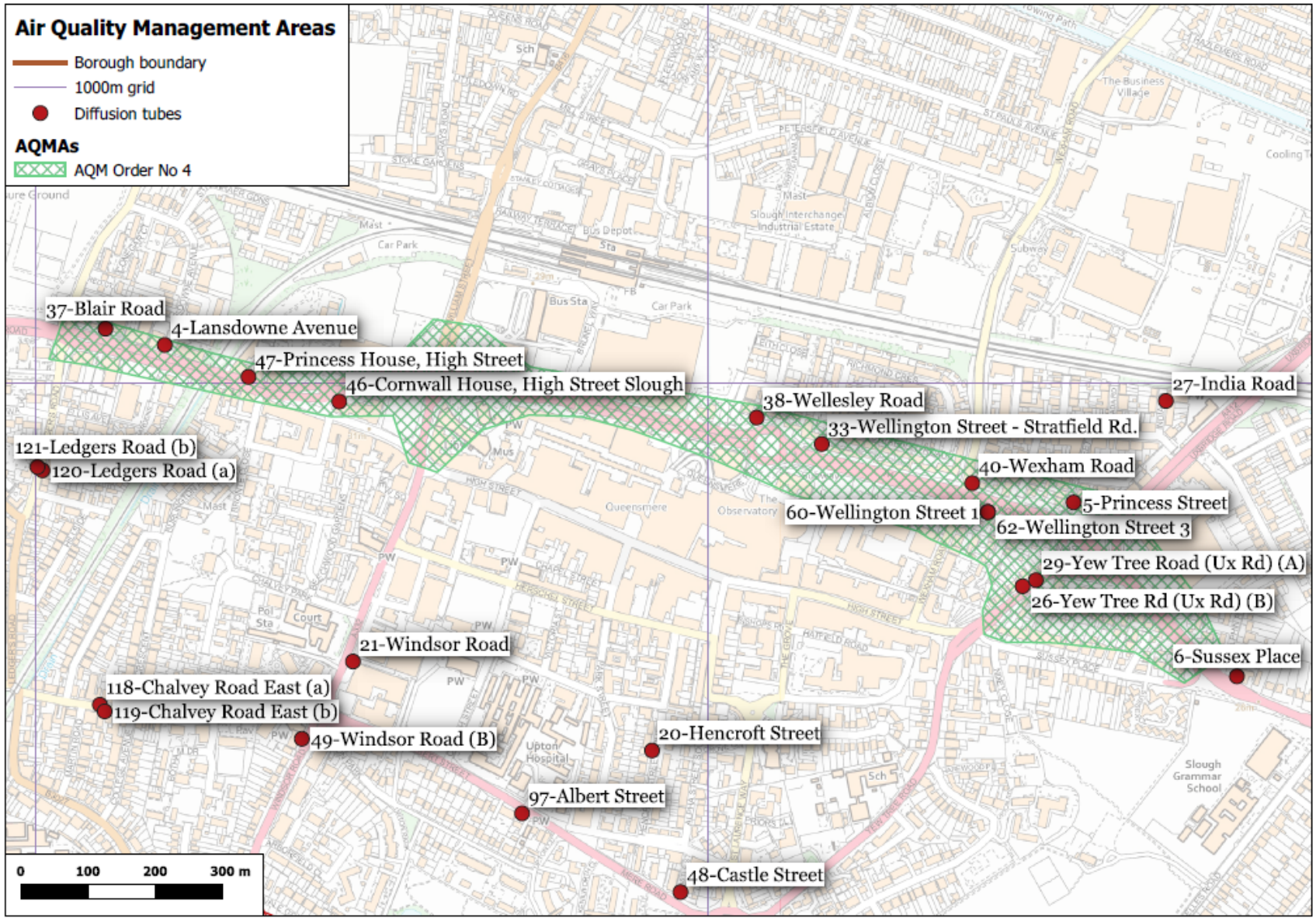


Figure D.7– Map of All Non-Automatic Monitoring Sites

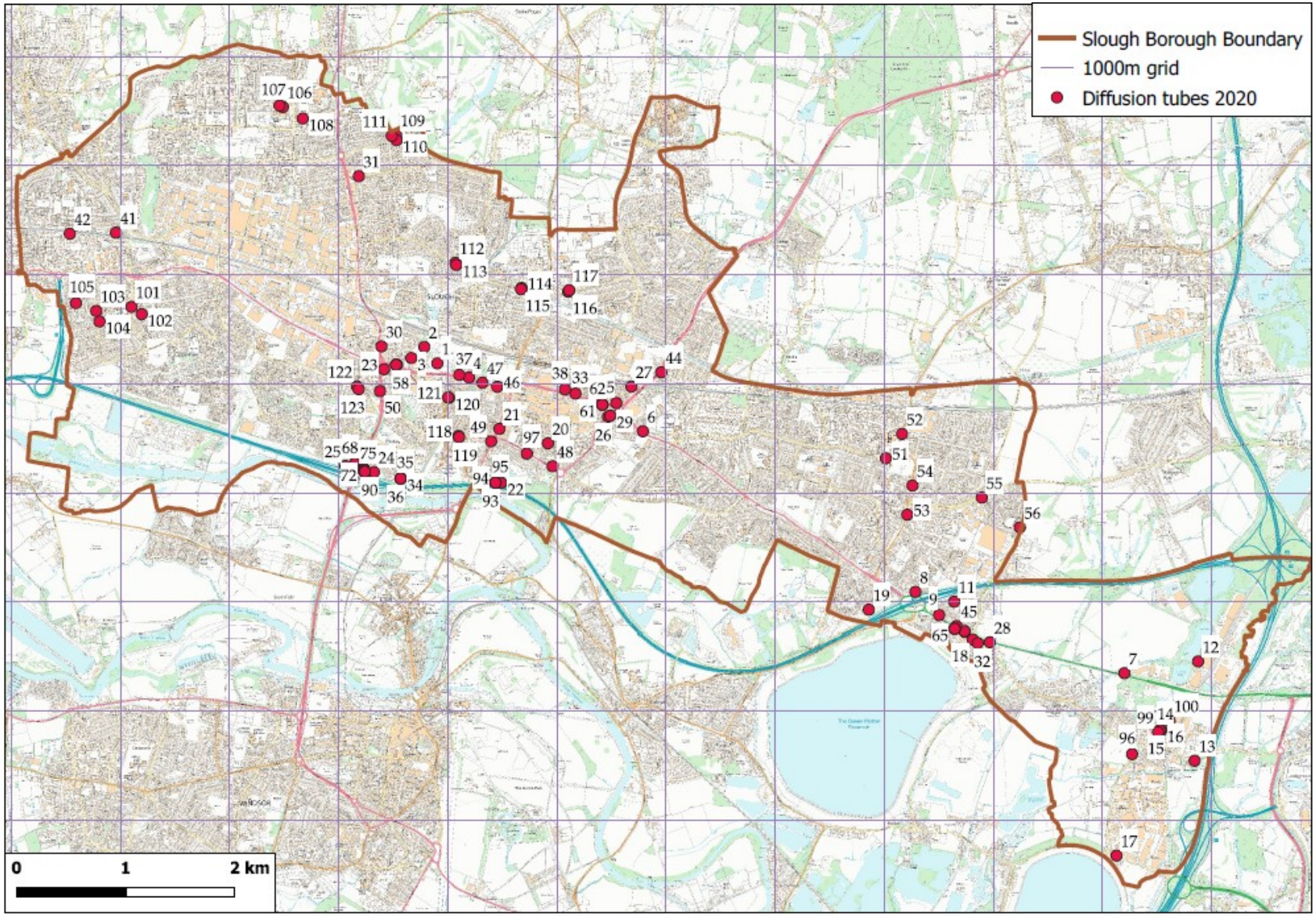
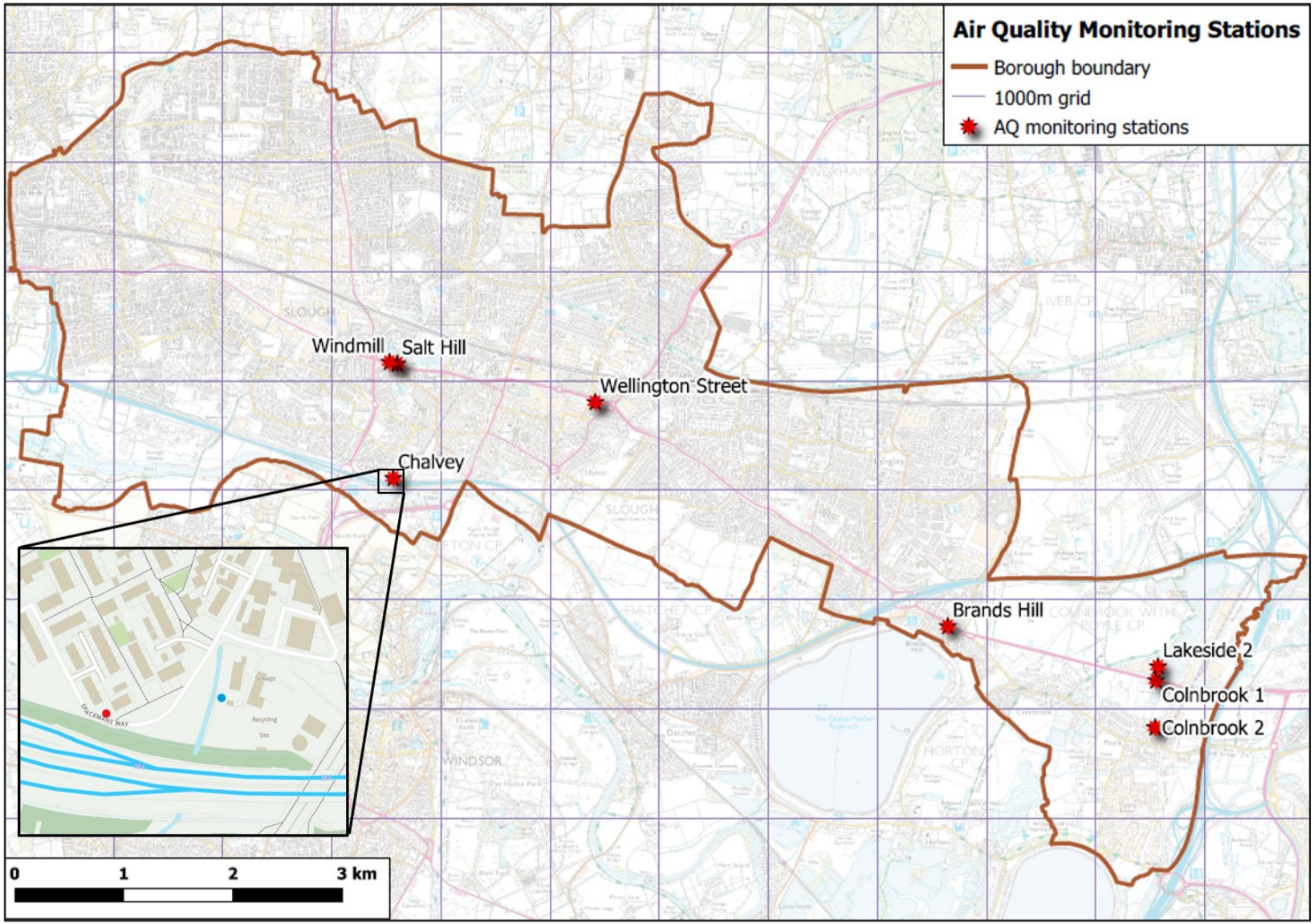


Figure D.8 – Map of All Automatic Continuous Monitors in Slough



Square insert: red marker shows new site at Spackmans Way (SLH 13); blue marker shows old site at Chalvey (SLH 7).

Figure D.9 – Map of All AQMAs in Slough

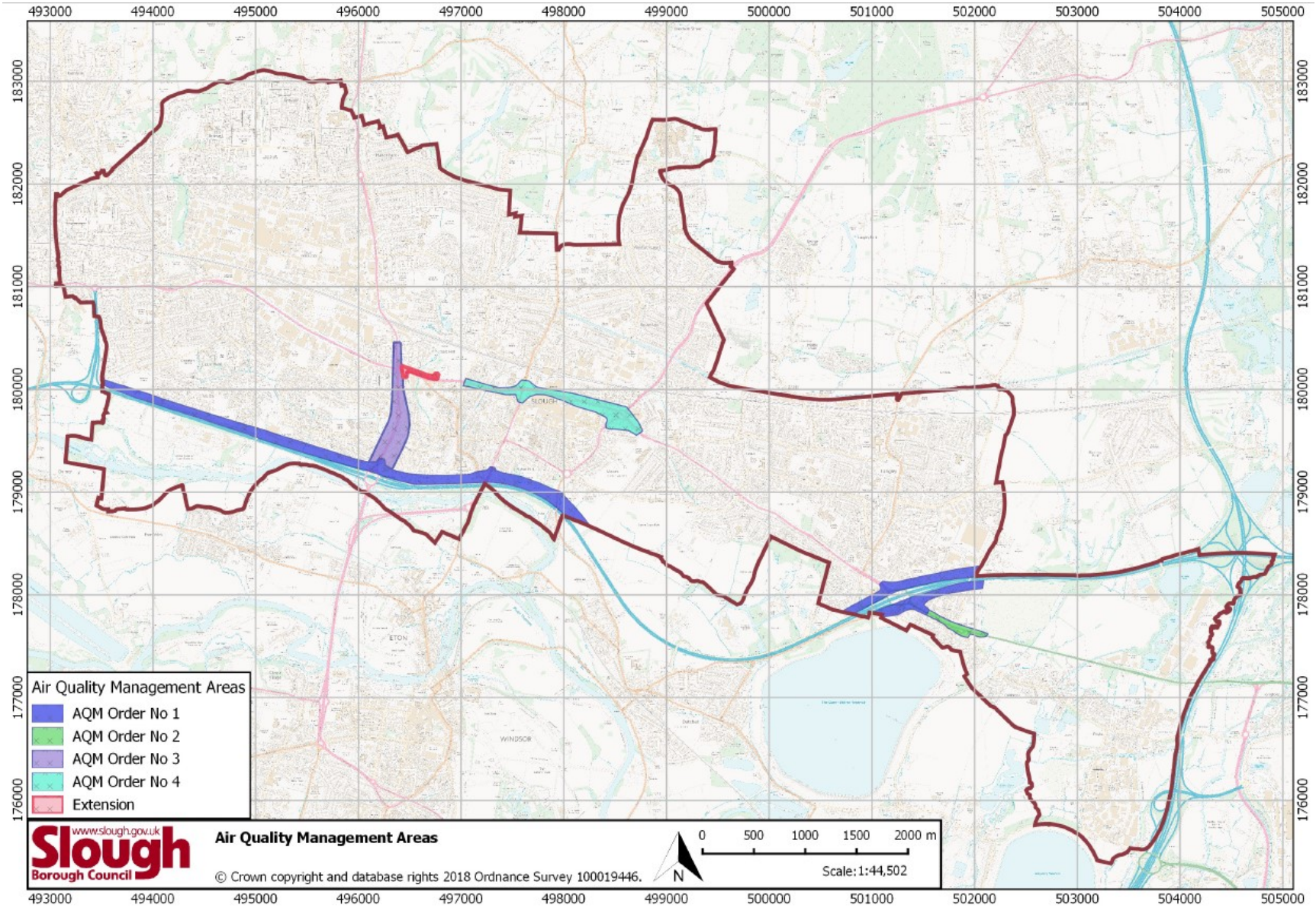
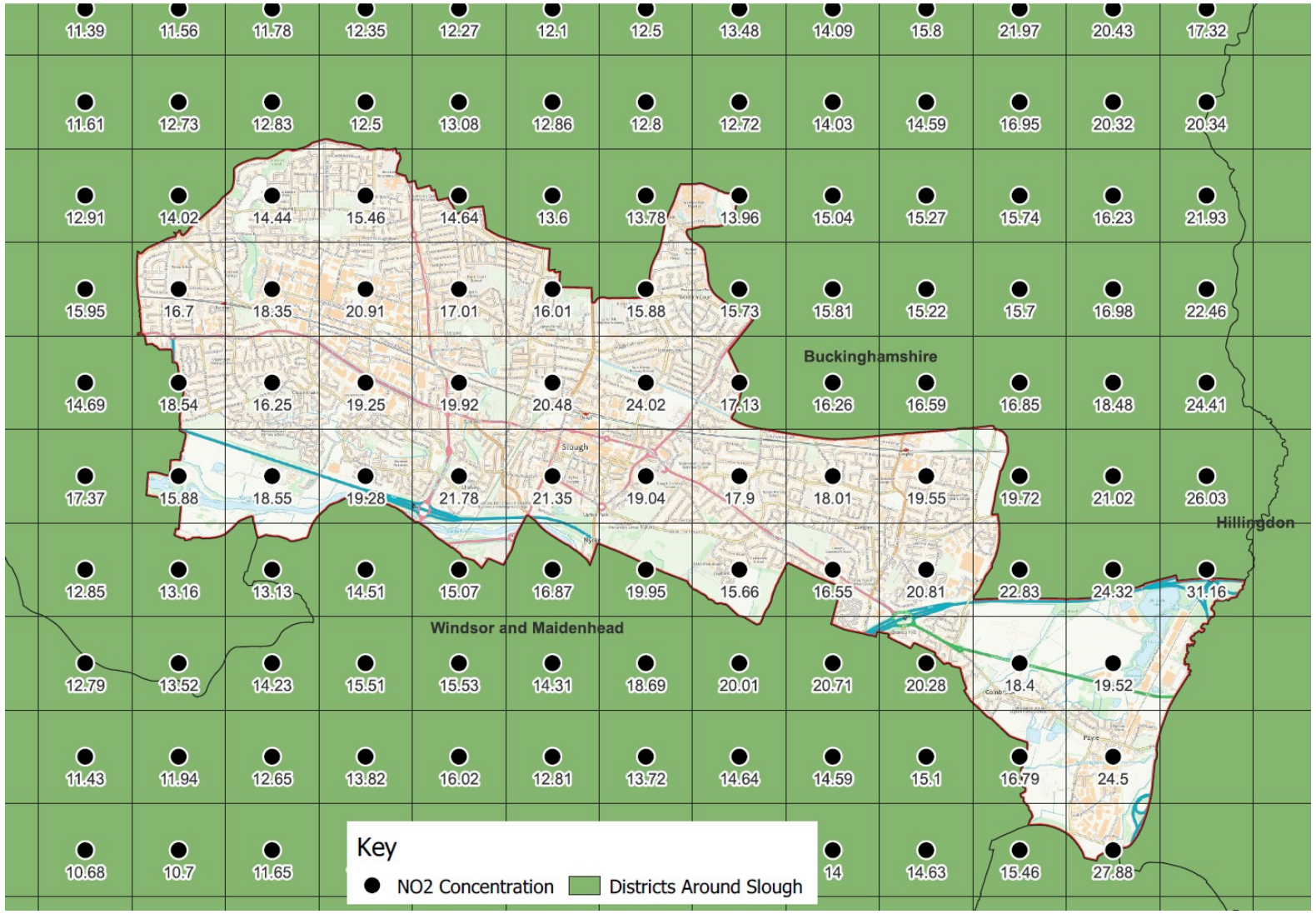


Figure D.10 – Map of Defra Background NO_2 Concentrations



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[13]

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
CAZ	Clean Air Zone
CAP	Clean Air Plan
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EATF	Emergency Active Travel Fund
EfW	Energy from Waste
EU	European Union
EV	Electric Vehicle
FDMS	Filter Dynamics Measurement System
HGV	Heavy Goods Vehicle
LAQM	Local Air Quality Management
LES	Low Emission Strategy (2018-2025)
LEVI	Low Emission Vehicle Infrastructure
NH_3	Ammonia
NMVOC	Non-Methane Volatile Organic Compound
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NRMM	Non-Road Mobile Machinery
OZEV	Office for Zero Emission Vehicles
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

Abbreviation	Description
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
STIP	Strategic Transport Infrastructure Plan

References

- CERC. AirTEXT, June 2023
- Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
- Defra. Air quality appraisal: damage cost guidance, January 2023
- Defra. National statistics for nitrogen dioxide (NO_2), June 2023
- Defra. UK AIR, June 2023
- Department of Health and Social Care. Chief Medical Officer's (CMO) Annual Report 2022: Air Pollution. Available from: Chief Medical Officer's Annual Report 2022 (publishing.service.gov.uk). June 2023.
- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022 Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022 Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017
- Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018
- Slough Borough Council. Air Quality, June 2023
- Slough Borough Council. Air Quality and Public Health, June 2023