2023 Air Quality Annual Status Report (ASR)

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

Date: June 2023

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Executive Summary: Air Quality in Our Area

Air Quality in Surrey Heath Borough Council (SHBC)

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].

The borough of Surrey Heath is located in the southeast of England to the southwest of London. The main air quality issues are associated with the emission of pollutants from road traffic, in particular the M3 motorway. The main pollutant of concern is nitrogen dioxide (NO_2), for which air quality objective values are listed in Appendix E.

Over previous years the concentrations of NO_2 measured along the M3 corridor, between the Frimley flyover and just north of the Ravenswood roundabout (A325), led to the conclusion that exceedances of the annual mean objective for NO_2 were likely in this area and in 2002 an Air Quality Management Area (AQMA) was declared[5]. The following year a more detailed assessment concluded that the AQMA should be extended in both directions along the M3[6]. Since then, SHBC has continued monitoring within the borough

[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

[5] Surrey Heath Borough Council, Round One Review and Assessment Stage III, 2002

[6] Surrey Heath Borough Council, Round One Review and Assessment Stage IV, 2004

and the AQMA has been retained. Details of the current AQMA can be found in Section 2 and at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=267.

SHBC monitors NO_2 and PM_{10} concentrations at various locations throughout the borough. At present, no monitoring of $PM_{2.5}$ is carried out, as no areas of concern with respect to $PM_{2.5}$ concentrations have been identified. Automatic monitoring of NO_2 and PM_{10} is carried out at one mobile automatic monitoring station situated in Castle Road, Camberley, approximately 20 metres north of the M3. In addition, the Council monitors NO_2 concentrations using diffusion tubes across a network which has recently been expanded to 53 locations, including one triplicate site co-located with the automatic monitoring station, to monitor other potential locations that may have elevated concentrations of NO_2 in the borough.

The data capture for the automatic monitoring station in 2022 was 93.8% for NO_2 concentrations and 82.4% for PM_{10} concentrations.

The 2022 annual mean NO_2 concentration for the continuous monitoring location was 28 $\mu g/m^3$, which meets the annual mean NO_2 objective. The 2022 result is lower than concentrations recorded in the previous three years (see Table A.3).

In 2022, the annual mean NO_2 concentrations were below 40 $\mu g/m^3$ at all of the 53 diffusion tube monitoring locations. This correlates with the 2020 and 2021 results, when no exceedances were recorded in the monitoring network. This includes diffusion tube sites SH16 and SH33 which were identified as areas of concern due to exceedances of the annual mean NO_2 objective in recent years. The improvements to traffic flow on the M3 are likely to have been a major contributing factor in keeping NO_2 concentrations below the annual mean objective at these sites.

The 2022 monitoring results for PM_{10} from the automatic monitoring station indicate that monitored concentrations remain well within the relevant air quality objectives. The 2022 results are broadly consistent with those of the last 5 years, indicating that exceedances of the PM_{10} air quality objectives are very unlikely. In turn it is inferred that $PM_{2.5}$ concentrations in the borough are likely to be well below the limit of 20 $\mu g/m^3$, based on the empirical relationship published in LAQM.TG22[7].

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[7] Defra & Devolved Administrations (2022) Local Air Quality Management Technical Guidance 2022

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[8] 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[9] provides more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[10] 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.

To fulfil local authorities' responsibility towards the long-term and interim $PM_{2.5}$ targets, SHBC submitted an application for Defra's Local Authority Air Quality Grant in September 2022, to purchase a portable $PM_{2.5}$ & PM_{10} monitor and develop web contents to raise air quality awareness and share air quality data. SHBC also participated in a consortium Defra AQ Grant application led by Hertfordshire County Council, Surrey County Council, Buckinghamshire County Council and many other local authorities to develop educational materials and raise awareness on domestic burning and clean fuel, which is a considerable source of $PM_{2.5}$ in the UK.

In 2022 SHBC further expanded the NO_2 diffusion tube monitoring network to include two additional sites in Mytchett. Thus, SHBC is monitoring NO_2 concentrations using diffusion tubes from 53 locations, including one triplicate site co-located with the automatic reference monitoring station off M3, to establish NO_2 concentrations across the borough and identify potential locations that may have elevated NO_2 concentration.

SHBC continued to support the A331 project, which is led by Rushmoor Borough Council under the direction of Defra's Joint Air Quality Unit. Following the introduction of speed

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

[9] Defra. Air quality strategy: framework for local authority delivery, April 2023

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

restriction from 70 mph to 50 mph, monitored NO_2 concentration along this section of A331 has been demonstrating compliance to the AQ objective level. Further work will be carried out under Defra's guidance with regard to decommissioning.

In 2022 SHBC secured £151K funding through UK Government grants, to part fund the installation of 46 Electric Vehicle charging points in public spaces and upon Council owned land. This project will be delivered over the course of 2023. Alongside this, the Council scoped out further EV charging possibilities around the borough.

Where possible SHBC has undertaken activities to promote the reduction in traffic pollution levels including working with transport companies to provide real time bus information, installation of cycle racks in schools and at Frimley Park Hospital, secured funding to schools for equipment such as hi-vis vests to encourage active travel.

Following the declaration of the AQMA in 2002, an Air Quality Action Plan (AQAP) was required. The AQAP was adopted in 2005 and set out the measures SHBC intended to implement to address air quality issues in the borough and to meet the air quality objectives. Also included in the AQAP were considerations and options for National Highways (formerly Highways Agency and latterly Highways England) to consider. It is acknowledged that the existing AQAP is a number of years old, and an updated action plan may be required should the AQMA be retained in future years. If concentrations within the AQMA continue to be compliant with the relevant objectives, the AQMA must be revoked after five consecutive years of compliance, as stated in LAQM.TG22, and the Council will be required to develop a Local Air Quality Strategy instead of an AQAP. SHBC are therefore currently awaiting five years of consecutive compliance for NO_2, in light of COVID-19 uncertainties and as per paragraph 3.57 of LAQM.TG22, to determine the next course of action with respect to the AQAP and Strategy.

In the 2007 Action Plan Progress Report[11], it was highlighted that 46 of the 51 proposed actions had been completed, including 25 that were completed on time. Four of the twelve options for National Highways were rejected and not pursued. Additionally, National Highways stated that they were unlikely to fund any major projects to address air quality. Since then, in subsequent progress reports[11], the Council have been unable to secure any specific remedial measures within the AQMA by National Highways, who in 2008 confirmed to the Council that they did not consider the AQMA a high priority within the

[11] Surrey Heath Borough Council, Action Plan Progress Reports, (years 2007,2008,2009,2010)

national programme. In 2014, National Highways, commenced work on upgrading the M3 Motorway between junctions 2 and 4 to a Smart Motorway. The upgrade was completed during 2017 and was anticipated to improve air quality at locations near to the M3, as it appears has proven to be the case.

The primary source of emissions, i.e., the M3 Motorway, is out of the control of the Council. Therefore, SHBC do not foresee any local measures that can be carried out to reduce traffic emission levels on the M3 but remain supportive of speed restriction measures between Junction 2 and 4a[12]. That said, under the 2021 Environment Act, National Highways has been designated an Air Quality Partner, should future improvements be required.

A modelling report commissioned by the Surrey Air Alliance (SAA) was published in November 2019. The report detailed the influence of road traffic on pollutant concentrations, with major trunk routes such as the M3 motorway and A roads such as the A30, A322 and A325 being clearly demarked with higher concentrations above the national air strategy quality objective along the road corridors and at major junctions.

Whilst concentrations are currently compliant with the declared objectives, as road traffic levels have been affected by the pandemic and associated lockdowns, and a shift towards hybrid working patterns, SHBC will remain vigilant of any increases in concentrations in future.

[12] Surrey Heath Borough Council, Air Quality Progress Report, 2014

Conclusions and Priorities

Overall, whilst the 2022 NO_2 monitoring results indicate a slight increase in annual mean NO_2 concentrations at most monitoring sites across the borough in comparison to the previous year, these have remained compliant with the annual mean objective. Therefore, on the basis of the latest monitoring results, the AQMA is to be assessed for an amendment to remove the 24-hour mean PM_{10} declaration when supported by further evidence, and for a full revocation when two further years of compliance for annual mean NO_2 have been achieved. SHBC will also continue with the current monitoring with the expanded network introduced in 2022.

Monitored NO_2 concentrations during 2022 suggest that traffic emissions from the M3 continue to be the greatest challenge, and this is outside the control of the Council. However, the concentrations at various locations in the vicinity of the Smart Motorway have shown a decrease in NO_2 at some sites in the reporting year. The Council will continue to look closely at the monitoring data along the M3 to ascertain whether the air quality objectives are being achieved at locations of relevant exposure such that the AQMA can be revoked in future years.

The principal challenges and barriers to implementation that SHBC anticipates facing are that the pollutants that residents are exposed to often come from pollution generated not only within the borough but also from 'background' levels transported in from outside the area. For oxides of nitrogen, up to 25% of concentrations recorded at locations away from main roads can be from these background sources[13]. The main source of NO_2 produced within the borough is from road traffic exhausts, but these sources, being the motorway and major trunk roads, are ones over which the Council has little control.

Should the application for Defra's Air Quality Grant be successful, SHBC will procure a portable $PM_{2.5}$ / PM_{10} monitor with suitable certification, to obtain indicative readings at selected locations within the Borough. Monitoring will be carried out in area with most significant air quality concern (within AQMA, off M3), in urban area with high population density and high exposure, and at selected schools (with vulnerable receptors).

[13] CERC (2019), Detailed air quality modelling and source apportionment. Available at: https://www.waverley.gov.uk/Portals/0/Documents/services/environmental-concerns/pollution-control/air%20quality/Detailed_air_quality_modelling_report_for_Surrey_from_CERC___August_2019.pdf?ver=N6m7p2cykQG1VcKdkOYhVg%3D%3D

One of the priorities for 2023 is to develop air quality web contents to communicate local air quality information, and to provide advice on effective protective and preventive measures individuals can adopt to reduce exposure and improve local air quality.

SHBC continues to contribute to the A331 project. Under the direction of Defra's Joint Air Quality Unit, SHBC will work with project lead Rushmoor Borough Council and other project partners to determine and implement the decommission measures.

SHBC continues to support Surrey County Council to deliver a Local Cycling and Walking Infrastructure Plan (LCWIP) for the area. The outcome of this work will be a high-level analysis of the cycling and walking needs for the Borough which will help guide transport projects to ensure that key travel routes have infrastructure of the required level to entice people into more active travel, thus cutting car use, and improve local air quality.

With secured funding from UK Government grants, SHBC will continue the partnership with an energy supplier to install Electric Vehicle charging points in public spaces and upon Council owned land. This project will be finalised in 2023.

Local Engagement and How to get Involved

The general public can take simple measures to help improve air quality, the main ones being, where possible, making short trips and journeys on foot or by bike instead of by car, or using public transport. Car sharing with colleagues, or with other parents on the school run, are some other examples of ways to reduce traffic congestion, for example. Other measures are listed below:

- Purchasing low-emission electric and/or hybrid vehicles, with government funding and grants available;
- Upgrading boilers to newest and most efficient gas condensing boilers with lowest NO_x (and carbon) emissions or to Air Source Heat Pumps; and
- Renewable energy generation via solar photovoltaics or wind turbine installation (although individual effect on air quality is minor and non-local).

Information on real time measurements within the AQMA and historical reports and data on air quality may be accessed through the Council website https://www.surreyheath.gov.uk/environment/pollution/air-quality/air-quality-management-surrey-heath or http://www.ukairquality.net/.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Surrey Heath Borough Council with the support and agreement of the following officers and departments:

This ASR has been approved by:

Ann Zhang (Environmental Health)

On behalf of the Surrey County Council Director of Public Health, the Public Health team work closely with Surrey Air Alliance including District and Borough Council partners responsible for submitting Annual Statement Reports (ASR) on air quality within their area; to develop initiatives, air quality action plans, and implement actions to improve air quality across the county of Surrey. A copy of this ASR has been provided to Surrey Public Health.

If you have any comments on this ASR please send them to Ann Zhang at:

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1 Local Air Quality Management

This report provides an overview of air quality in SHBC 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 Surrey Heath 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

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 SHBC can be found in Table 2.1. The table presents a description of the Surrey Heath AQMAs AQMA that is currently designated within SHBC. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of the AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO_2 annual mean;
- PM_{10} 24-hour mean;

The concentrations of PM_{10} and NO_2 are strongly influenced by road traffic along this section of M3. Road traffic level has seen gradual increase since 2021, In 2022 there appears to be a considerable increase in the annual mean concentration of PM10, from 14.0 $\mu g/m^3$ for 2021 to 19.8 $\mu g/m^3$ for 2022. The NO_2 concentration has been compliant for three consecutive years. However, of these three years, road traffic was severely disrupted during 2020 and 2021 due to the pandemic, lockdowns, and working from home arrangements. Currently it is not clear whether road traffic level is going to increase further, which would lead to higher emissions. While SHBC is committed to revising and, or revoking existing AQMA, this decision shall be supported by sufficient evidence.

At the current time, SHBC shall continue the current monitoring regime (see Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance).

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by 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
Surrey Heath AQMA	01/04/2002	NO_2 Annual Mean	The strip of land from Frimley Road Camberley to Ravenswood Roundabout Camberley which embraces the M3 Motorway and the houses on both side of the motorway which border the highway	YES	43µg/m^3	No Exceedance	3 years	Surrey Heath Borough Council, Air Quality Action Plan, Progress Report 2007	Surrey Heath Borough Council, Air Quality Action Plan
Surrey Heath AQMA	01/04/2002	PM_{10} 24-Hour Mean	The strip of land from Frimley Road Camberley to Ravenswood Roundabout Camberley which embraces the M3 Motorway and the houses on both side of the motorway which border the highway	YES	20 times	0 times	>5 Years		

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

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

Progress and Impact of Measures to address Air Quality in Surrey Heath Borough Council.

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

1. All relevant objectives, both for NO_2 and PM_{10}, were complied with at all monitoring locations within 2021.
2. The locally derived bias adjustment factor continues to be high, which shows it is representative of the monitoring location. Data showing a comparison of previous local and national bias factors, and discussion around the choice to apply the local factor, has been included and is welcomed.
3. Sufficient detail is included on the QA/QC procedures for both the automatic analyser and the NO_2 diffusion tubes.
4. The continual collaborative approach that Surrey Heath Borough Council are taking, both with National Highways and through the Surrey Air Alliance, is welcomed.
5. A decision has been made to keep the current AQMA designation, in terms of annual mean NO_2 concentrations, in force. This is supplemented by commentary around compliance data through 2020 and 2021 likely having been affected by COVID-19 and subsequent restrictions.
6. It is also understood from the 2022 ASR that, in terms of the 24-hour mean PM_{10} AQMA designation, a decision has been made since completion of the 2021 ASR to delay revocation so that this can cover both pollutants simultaneously. This is accepted and if further years of compliance are achieved, full AQMA revocation should be considered.
7. The current Air Quality Action Plan (AQAP) was adopted in 2005 (and reviewed in 2007) and updates on the remaining five measures from the AQAP have been detailed within the 2022 ASR. It is understood that the primary influence on concentrations within the AQMA is a National Highways managed road, therefore the influence of the council is limited in terms of the measures that can be implemented; however, the Environment Act requires that Action Plans be periodically reviewed. While no time limit is explicitly set within the Act, ideally this is expected to occur no later than every five years, therefore it is recommended that the Council follow this guidance.
8. It is welcomed that the council continue to engage with National Highways in terms of the schemes that they are implementing in relation to the M3 motorway. In

addition, the council continue to liaise with neighbouring councils through the Surrey Air Alliance, with contributions being made to a toolkit of measures that may be implemented, in addition to the AQAP measures, as appropriate.

9. Discussion surrounding the commentary provided in the appraisal report of the 2021 ASR is provided. This is encouraged to continue in future reporting years.
10. The report includes detailed discussion of the measures the council are taking to address $PM_{2.5}$. Links are provided and discussed in regard to the Public Health Outcomes Framework and fraction of mortality attributable to $PM_{2.5}$ emissions. Comparisons to the regional and national average as well as a trend analysis over time is included. This is welcomed and is encouraged to be included in all future reports.

With regards to the appraisal, the relevant comments have been taken on board, though no material changes were required.

SHBC 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 2.2, along with the type of measure and the progress SHBC have made during the reporting year of 2022. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

Table 2.2 – 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
6	Liaison with Highways England	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, incl. Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2006	Completed in 2010 but activity is on-going as part of day to day work. A331 work will be complete by 2024, but this will not affect levels in the AQMA	SHBC / HE / SCC	SHBC / HE / SCC. Funding Status: Business as usual SHBC	No	Funded		Completed in 2010 but activity is on-going as part of day to day work. A331 work will be complete by 2024, but this will not affect levels in the AQMA	-15% on 2010 figures	40µg/m^3 at continuous monitoring station	Is currently compliant but work on-going. Level of NO_2 in 2010 was 28 compared to 38 in 2019. This 15% reduction target will not therefore be achieved, and the source is out of the Borough Councils control. Further work will be carried out under Defra's guidance with regard to decommissioning.	SMART M3 fully opened in Dec 2017. Dialogue with HE ongoing regarding AQ plans and modelling for the SMART M3. Implementation of part A331 lowered speed limit during 2021
7	AQMA extension and liaison with HE	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, incl. Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2006	M3 smart motorway work completed 2018, assessment of impacts on-going. Three-year normal operations period needed to decide on rescinding AQMA not before 2025	SHBC / HE / SCC	Funding Status: Business as usual SHBC	No	Funded		M3 smart motorway work completed 2018, assessment of impacts on-going. Three-year normal operations period needed to decide on rescinding AQMA not before 2025	No effect in AQMA		M3 smart motorway work completed 2018, assessment of impacts on-going	Smart motorway work completed 2018. To assess effect on levels over 3 years to 2021 to determine future actions. Covid interrupted 3-year programme, so will continue with 3 year monitoring of normal operations which will expire not before 2025.
8	Support for national schemes	Promoting Travel Alternatives	Promote use of rail and inland waterways	2008	Estimated 2023.	SHBC / HE / SCC	SHBC / HE / SCC. Funding Status: Business as usual SHBC		Funded		Estimated 2022.	No effect to end of 2022		On-going. No evidence to end of 2022 that air quality guidelines exceeded by M3 traffic at relevant receptors. Covid since has skewed figures for NO_2.	Considering effect of SMART M3 and possible variable speed controls As of 2022 SHBC has worked with transport companies to provide real time bus information, installation of cycle racks in schools and secured funding to schools for equipment such as hi-vis vests to encourage active travel.
14	AQ Strategy	Policy Guidance and Development Control	Other policy	2010	Estimated 2023.	SHBC / HE / SCC	SHBC / HE / SCC	No	-		Estimated 2022.	Little or no effect in AQMA		Not achieved	Low priority, likely to be affected by Environment Act requirements in 2022 and remains outstanding
46	Grant application for energy saving project	Promoting Low Emission Transport	Other measure for low emission fuels for stationary and mobile sources. Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2008	Completed but is part of on-going air quality work.	SHBC / HE / SCC	SHBC / HE / SCC Funding status. SHBC unable to apply for AQ grants due to A331 work. Grants applied for by SCC for EV point installations is ongoing as part of	No	Funded		Completed but is part of on-going air quality work.	Little or no effect in AQMA		Grant applications continue at County Level but without success in attaining	In 2022 SHBC secured a £151K funding through UK Government grants, to part fund the installation of 46 Electric Vehicle charging points. The Council scoped out further EV charging possibilities around the Borough.

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
							Surrey Air Alliance.								

$PM_{2.5}$ – 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.

SHBC is addressing $PM_{2.5}$ through a countywide dispersion modelling study which was commissioned by SAA and carried out by CERC. Source apportionment was carried out to calculate the relative contributions of each source group (road sources, by vehicle type and non-exhaust component for PM; large industrial sources; other emissions sources; and background) to pollutant emissions and concentrations. The report, published in November 2019, identified the influence of road traffic on pollutant levels, with major trunk routes such as the M3 motorway and A-roads such as the A30, A322 and A325 being clearly demarked with higher levels above the national air quality objective along the road corridors and at major junctions. For particulate matter, background concentrations from outside Surrey were found to be the most significant contributors to PM_{10} and $PM_{2.5}$, and thus any local measures introduced would have a minimal effect on overall levels.

SHBC submitted an application for Defra's Local Authority Air Quality Grant in September 2022, to purchase a portable $PM_{2.5}$ & PM_{10} monitor and for the development of web contents to raise air quality awareness and share air quality data.

In addition to this, SHBC are continuing to enforce legislation that can have an impact on air quality such as reducing pollution from construction/trade/business sites and responding to complaints about domestic bonfires and smoke. More information can be found our website: - https://www.surreyheath.gov.uk/environment/pollution

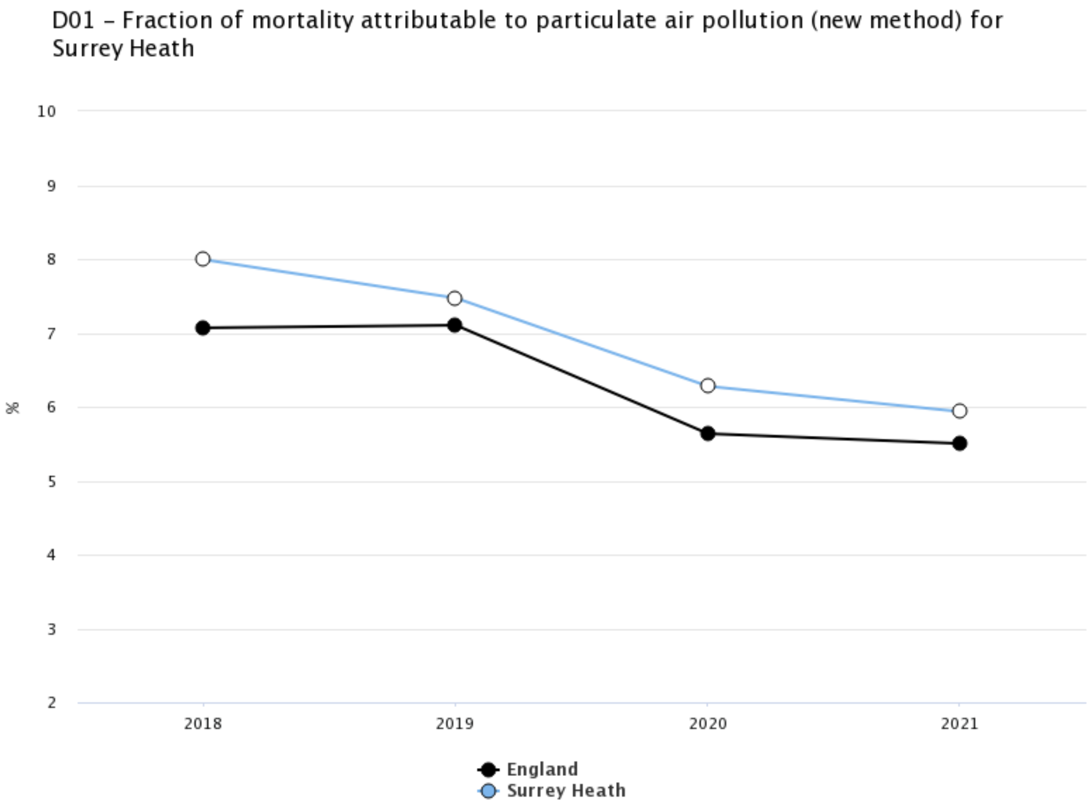
To put the local concentrations of $PM_{2.5}$ in context within the borough, SHBC makes use of Defra background mapping and modelling. The background annual average $PM_{2.5}$ concentrations in Surrey Heath for 2021 ranged from 9.1 µg/m^3 to 12.8 µg/m^3; these are estimated to have dropped to 8.8 µg/m^3 to 12.8 µg/m^3 in 2022. These concentrations are well below the limit of 20 µg/m^3 but have yet to reach the 2040 target of 10 µg/m^3. Monitored PM_{10} concentrations within the borough are well below the relevant air quality objectives (Table A.6 and Table A.7), and it would be expected that $PM_{2.5}$ concentrations are correspondingly low based on the empirical relationship published in LAQM.TG22.

The Public Health Outcomes Framework (PHOF) has published statistics on the health effects of exposure of the public to fine particulate pollution[14]. SHBC notes PHOF indicator DO1 – Fraction of mortality attributable to particulate ($PM_{2.5}$) air pollution in 2021 (latest available) gives a value of 5.9% which is slightly above the average for both the South East region (5.4%) and England (5.5%).

The estimated fraction of mortality attributable to particulate ($PM_{2.5}$) air pollution between 2018 and 2021 is shown in Figure 2.1 for Surrey Heath and across England. The $PM_{2.5}$ fractions for Surrey Heath exhibited a slight drop between 2020 and 2021 but are slight highly than the average $PM_{2.5}$ fractions across England.

[14] Public Health Outcomes Framework. D01 – Fraction of mortality attributable to particular air pollution. Available At: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/1/gid/1000043/pat/6/ati/401/are/E07000214/iid/30101/age/230/sex/4/cid/4/tbm/1/page-options/ovw-do-0_car-do-0. Accessed April 2023.

Figure 2-1: Public Health Outcomes Framework, Fine Particulate Matter ($PM_{2.5}$)



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

This section sets out the monitoring undertaken during 2022 by SHBC 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, inclusive, to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

SHBC undertook automatic (continuous) monitoring at one site located in Castle Road, Camberley during 2022. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The monitoring station is located within the Surrey Heath AQMA. Data from the automatic monitoring site can be obtained from http://www.ukairquality.net/.

Maps showing the location of the monitoring site 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

SHBC undertook non-automatic (i.e. passive) monitoring of NO_2 at 53 sites (including one triplicate site, with total of 55 diffusion tubes) during 2022. Two additional monitoring sites were introduced in 2022. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

Individual Pollutants

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

3.1.3 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2022 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 mentions distance corrected values. It is not considered necessary to undertake this adjustment where concentrations are already below 36 µg/m^3, as per LAQM.TG22 guidance, thus no distance correction has been applied to any of the monitored sites.

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

The Castle Road, Camberley automatic monitoring station is located within the existing AQMA. The 2022 monitoring results indicate that neither the annual mean nor the 1-hour mean NO_2 objectives were exceeded at this location. The annual mean NO_2 concentration in 2022 was 28 µg/m^3, which is lower than the annual mean NO_2 concentrations recorded between 2018 and 2021. There were no occasions where the hourly mean NO_2 was greater than objective value of 200 µg/m^3, and the site was therefore well within the 18 hours permitted per year to achieve the hourly objective.

In general, there was a slight increase in NO_2 concentrations across the borough for the diffusion tube monitoring sites, and there were no exceedances of the annual mean NO_2 objective at any location. The highest concentration recorded in the borough during 2022 was at SH40 (Frimley Park Hospital; 34.7 µg/m^3), which is below the annual mean NO_2 objective.

Annual mean NO_2 concentrations at two NO_2 diffusion monitoring locations, SH16 (Wood Road) and SH33 (Wood Road Garages), recorded concentrations above the annual mean NO_2 objective during 2018 and 2019. These locations are located outside of the AQMA near to the M3, and have since maintained themselves at levels below the annual objective.

Of the new sites introduced in 2022, none of the concentrations monitored were close to the annual mean NO_2 objective.

As none of the diffusion tube sites recorded annual mean NO_2 concentrations greater than 60 µg/m^3, it is unlikely that the 1-hour mean NO_2 objective was exceeded at any of these locations in 2022, which is consistent with previous years' results.

The overall increase in NO_2 concentrations from the previous reporting year is likely due to the increase in traffic flow post COVID-19, however as concentrations still maintain themselves below the AQS objectives the borough is still on track towards the revocation of the AQMA in the near future, with two further years' compliance. The Council will remain vigillant as traffic levels may continue to increase post COVID-19 which could negatively impact NO_2 concentrations.

3.1.4 Particulate Matter (PM_{10})

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

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

During 2022, the data capture recorded at the Castle Road, Camberley monitoring station was 82.4%. This is below the annual data capture target of 85% and consequently the PM_{10} 90th percentile is also reported in Table A.7 as per LAQM.TG22 guidance. The relatively low data capture can be attributed to supply issues with the BAM tape, as well as power outages at the station in July. The 2022 PM_{10} monitoring results are consistent with the results in previous years, with no exceedances of the annual mean or daily mean PM_{10} objectives.

The annual mean PM_{10} concentration for 2022 was 19.8 µg/m^3, which is below the annual mean PM_{10} objective (40 µg/m^3). This represents an increase in concentration from 2021 (14.0 µg/m^3) possibly due to the rebound in road traffic post pandemic. On the basis of the recent years' monitoring results, it can be concluded that annual mean PM_{10} concentrations in SHBC would not be expected to increase much further from recent years' observed results without significant new sources being introduced.

The daily mean PM_{10} objective value of 50 µg/m^3 was not exceeded during the year; consequently, the daily mean objective (35 permitted days) was achieved. This result is consistent with previous years.

In conclusion, although recent years' PM_{10} monitoring results indicate that the annual mean and daily mean PM_{10} objectives are unlikely to be exceeded, 2020 and 2021 data were affected by the pandemic and lockdowns. Due to the significant increase of PM_{10} annual mean concentration in 2021, SHBC will continue to monitor PM10 at Castle Road Camberley. This monitoring programme will be reviewed and amended when supported by further evidence.

3.1.5 Particulate Matter ($PM_{2.5}$)

No $PM_{2.5}$ monitoring is carried out by SHBC.

3.1.6 Sulphur Dioxide (SO_2)

No SO_2 monitoring is carried out by SHBC.

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)
CM1	Castle Road, Camberley	Roadside	488647	159807	NO_2; PM_{10}	YES (Surrey Heath AQMA)	Chemiluminescent; BAM	20	17	2.5

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.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)
SH1	A30 Bagshot	Roadside	491010	163344	NO_2	NO	8.0	6.0	No	0.2
SH2	Windle Valley Daycare Centre	Roadside	491065	163337	NO_2	NO	n/a	4.0	No	1.8
SH3	Snows Ride School Windlesham	Urban Background	492810	164408	NO_2	NO	n/a	-	No	1.8
SH4	Shaftesbury Road Bisley	Urban Background	494654	159444	NO_2	NO	31.0	-	No	1.8
SH5	Chestnut Avenue	Roadside	489460	160586	NO_2	NO	n/a	15.0	No	1.8
SH6	Church Lane Bisley	Roadside	494974	159611	NO_2	NO	15.0	2.0	No	1.8
SH7	M3 Brickhill roadside	Other	496191	164418	NO_2	NO	78.0	30.0	No	1.8
SH8	M3 Brickhill 150m back	Urban Background	496170	164472	NO_2	NO	39.0	-	No	1.8
SH9	A30 Jolly Farmer	Roadside	489617	161874	NO_2	NO	n/a	15.0	No	1.8
SH10	A30 Homebase	Urban Centre	485796	160074	NO_2	NO	n/a	16.0	No	1.8
SH11	Watchetts School Camberley	Urban Centre	486937	159011	NO_2	NO	n/a	18.0	No	1.8
SH12	High Street Camberley	Roadside	487490	160788	NO_2	NO	3.0	1.0	No	1.8
SH13	Le Marchant Road	Urban Centre	488727	159591	NO_2	NO	n/a	25.0	No	1.8
SH14	Badgers Copse	Urban Centre	488603	159675	NO_2	YES - Surrey Heath AQMA	4.0	14.0	No	1.8
SH16	Wood Road	Urban Centre	486834	158336	NO_2	NO	18.0	23.0	No	1.8
SH17	Portsmouth Road at Ravenswood M3/A325	Other	489297	160440	NO_2	NO	n/a	21.0	No	1.8
SH20	Deepcut Bridge Road	Roadside	490396	157290	NO_2	NO	2.0	2.0	No	1.8
SH21	Benner Lane	Urban Background	495156	161078	NO_2	NO	15.0	4.0	No	1.8

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [(1)]	Distance to kerb of nearest road (m) [(2)]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
SH23	Red Road/Maultway	Suburban	490698	160351	NO_2	NO	n/a	12.0	No	1.8
SH24	High Street, Chobham	Roadside	497347	161697	NO_2	NO	2.0	2.0	No	1.8
SH15, SH22, SH25	AQM	Roadside	488647	159807	NO_2	YES - Surrey Heath AQMA	17.0	17.0	No	2.5
SH26	College Ride, Camberley	Urban Background	487762	161393	NO_2	NO	7.0	5.0	No	1.8
SH27	361 Gford Road, Bisley	Roadside	495553	158854	NO_2	YES - Surrey Heath AQMA	6.0	8.0	No	1.8
SH28	Queens Road, Bisley	Roadside	495343	159031	NO_2	NO	10.0	7.0	No	1.8
SH29	Heath Park Windlesham	Suburban	494228	163480	NO_2	NO	102.0	36.0	No	1.0
SH30	Matalan, Frimley Road	Urban Centre	487318	158515	NO_2	NO	n/a	23.0	No	1.8
SH31	Old Pond Close	Urban Centre	487022	158419	NO_2	NO	6.0	19.0	No	1.8
SH32	Two Hoots, Old Pond Close	Urban Centre	486979	158393	NO_2	NO	4.0	21.0	No	1.0
SH33	Wood Road Garages	Urban Centre	486843	158319	NO_2	NO	n/a	25.0	No	1.8
SH34	Brackendale Road	Urban Centre	488052	159239	NO_2	YES - Surrey Heath AQMA	n/a	36.0	No	1.8
SH35	Prior End	Urban Centre	489189	160209	NO_2	YES - Surrey Heath AQMA	n/a	41.0	No	1.8
SH36	Youlden Drive	Urban Centre	489350	160389	NO_2	YES - Surrey Heath AQMA	20.0	18.0	No	1.8
SH37	Crawley Drive	Roadside	489082	160265	NO_2	YES - Surrey Heath AQMA	20.0	5.0	No	1.8
SH38	Swift Lane	Urban Centre	491702	163139	NO_2	NO	n/a	16.0	No	1.8
SH39	Frimley Green Road	Roadside	488724	156857	NO_2	NO	n/a	6.0	No	1.8

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
SH40	Frimley Park Hospital	Roadside	487845	158520	NO_2	NO	n/a	1.0	No	1.8
SH41	Watchetts Drive	Kerbside	487196	158885	NO_2	NO	15.0	1.0	No	1.8
SH42	Tomlinscote Way	Roadside	489062	158770	NO_2	NO	17.0	2.0	No	1.8
SH43	Upper Chobham Road	Roadside	489242	159042	NO_2	NO	19.0	2.0	No	1.8
SH44	Frimley Park Hospital Denly	Kerbside	487943	158549	NO_2	NO	26.0	2.0	No	1.8
SH45	Grove School	Roadside	488011	158513	NO_2	NO	128.0	13.0	No	1.8
SH46	Bagshot Green	Roadside	491398	162885	NO_2	NO	7.0	1.0	No	1.8
SH47	Badger Drive	Roadside	492111	162110	NO_2	NO	17.0	10.0	No	1.8
SH48	Hawkswood Avenue	Kerbside	488602	158448	NO_2	NO	11.0	2.0	No	1.8
SH49	High Street Bagshot	Roadside	491017	163181	NO_2	NO	n/a	5.0	No	1.8
SH50	Guildford Road Bagshot	Roadside	491303	163313	NO_2	NO	n/a	3.0	No	1.8
SH51	School Lane Bagshot	Roadside	491033	162945	NO_2	NO	10.0	2.0	No	1.8
SH52	Freemantle Road	Roadside	491564	163565	NO_2	NO	5.0	2.0	No	1.8
SH53	Crawley Ridge	Kerbside	489009	161166	NO_2	NO	3.0	2.0	No	1.8
SH54	Frimley High Street	Roadside	487485	157828	NO_2	NO	n/a	5.0	No	1.8
SH55	Heatherside School	Kerbside	490495	159630	NO_2	NO	8.0	3.0	No	1.8
SH56	Sherrard Way	Roadside	488421	155510	NO_2	NO	6.0	2.0	No	1.8
SH57	156 Mytchett Road	Roadside	488955	154901	NO_2	NO	0.0	10.0	No	1.8

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 ($\mu g/m^3$)

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
CM1	488647	159807	Roadside	93.7	93.7	**40.0**	38.0	32.0	30.0	28.0

☒ **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 $\mu g/m^3$.

Exceedances of the NO_2 annual mean objective of $40\mu g/m^3$ 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 ($\mu g/m^3$)

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
SH1	491010	163344	Roadside	100.0	100.0	23.0	20.2	16.4	18.7	27.7
SH2	491065	163337	Roadside	90.4	90.4	25.5	22.7	18.6	20.4	25.7
SH3	492810	164408	Urban Background	100.0	100.0	21.0	18.8	15.1	18.1	20.3
SH4	494654	159444	Urban Background	100.0	100.0	18.3	15.3	11.9	15.0	18.0
SH5	489460	160586	Roadside	100.0	100.0	33.5	32.5	27.6	27.1	27.0
SH6	494974	159611	Roadside	100.0	100.0	29.3	29.0	22.7	23.0	21.7
SH7	496191	164418	Other	92.3	92.3	**42.8**	39.5	34.2	32.4	30.4
SH8	496170	164472	Urban Background	100.0	100.0	28.5	25.1	19.2	20.2	23.9
SH9	489617	161874	Roadside	92.3	92.3	23.7	26.5	19.2	19.2	22.6
SH10	485796	160074	Urban Centre	100.0	100.0	32.6	29.5	29.3	30.8	30.4
SH11	486937	159011	Urban Centre	100.0	100.0	30.0	30.7	25.0	28.3	27.7
SH12	487490	160788	Roadside	92.3	92.3	30.7	29.5	24.6	25.0	26.7
SH13	488727	159591	Urban Centre	100.0	100.0	27.7	28.1	22.3	22.4	23.4
SH14	488603	159675	Urban Centre	100.0	100.0	35.2	30.9	25.0	29.5	27.1
SH16	486834	158336	Urban Centre	100.0	100.0	**43.3**	**43.6**	35.4	34.2	34.4
SH17	489297	160440	Other	92.3	92.3	24.0	28.1	25.2	27.2	24.3
SH20	490396	157290	Roadside	92.3	92.3	27.6	23.5	20.9	20.5	21.3
SH21	495156	161078	Urban Background	82.7	82.7	21.9	21.8	17.5	19.8	20.5
SH23	490698	160351	Suburban	100.0	100.0	26.3	25.3	21.8	22.4	24.4
SH24	497347	161697	Roadside	100.0	100.0	33.6	31.6	28.8	29.6	28.7
SH15, SH22, SH25	488647	159807	Roadside	100.0	100.0	38.0	37.0	31.2	28.7	28.4
SH26	487762	161393	Urban Background	92.3	92.3	26.9	20.4	21.7	19.9	22.6
SH27	495553	158854	Roadside	100.0	100.0	27.0	24.9	18.1	22.1	22.1
SH28	495343	159031	Roadside	92.3	92.3	29.9	26.9	22.4	24.1	24.2
SH29	494228	163480	Suburban	100.0	100.0	28.2	30.8	25.0	24.9	25.0
SH30	487318	158515	Urban Centre	100.0	100.0	39.5	35.3	31.6	35.7	31.4
SH31	487022	158419	Urban Centre	100.0	100.0	34.3	34.8	27.5	30.6	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
SH32	486979	158393	Urban Centre	100.0	100.0	32.5	29.8	28.3	27.3	27.1
SH33	486843	158319	Urban Centre	100.0	100.0	**43.8**	**40.2**	31.7	32.9	31.4
SH34	488052	159239	Urban Centre	92.3	92.3	31.2	32.5	23.4	24.0	23.4
SH35	489189	160209	Urban Centre	100.0	100.0	31.5	28.0	22.7	25.3	24.7
SH36	489350	160389	Urban Centre	100.0	100.0	30.6	30.0	23.3	29.5	24.4
SH37	489082	160265	Roadside	100.0	100.0	37.6	33.4	26.0	28.4	30.1
SH38	491702	163139	Urban Centre	100.0	100.0	34.5	32.0	25.4	27.3	27.4
SH39	488724	156857	Roadside	100.0	100.0	-	-	21.5	23.6	23.3
SH40	487845	158520	Roadside	100.0	100.0	-	-	30.0	32.6	34.7
SH41	487196	158885	Kerbside	100.0	100.0	-	-	22.8	23.8	24.3
SH42	489062	158770	Roadside	90.4	90.4	-	-	16.2	17.7	19.3
SH43	489242	159042	Roadside	100.0	100.0	-	-	22.2	23.1	22.1
SH44	487943	158549	Kerbside	100.0	100.0	-	-	28.8	31.4	32.0
SH45	488011	158513	Roadside	100.0	100.0	-	-	32.5	32.2	29.3
SH46	491398	162885	Roadside	57.7	57.7	-	-	18.8	19.0	22.5
SH47	492111	162110	Roadside	90.4	90.4	-	-	14.8	19.4	20.4
SH48	488602	158448	Kerbside	100.0	100.0	-	-	18.9	20.6	23.4
SH49	491017	163181	Roadside	92.3	92.3	-	-	27.6	26.7	27.7
SH50	491303	163313	Roadside	100.0	100.0	-	-	27.6	27.4	26.7
SH51	491033	162945	Roadside	92.3	92.3	-	-	16.6	18.4	22.2
SH52	491564	163565	Roadside	100.0	100.0	-	-	22.8	22.2	24.2
SH53	489009	161166	Kerbside	100.0	100.0	-	-	18.0	19.4	22.2
SH54	487485	157828	Roadside	100.0	100.0	-	-	26.6	29.8	29.5
SH55	490495	159630	Kerbside	90.4	90.4	-	-	19.2	19.9	23.5
SH56	488421	155510	Roadside	100.0	42.3	-	-	-	-	21.3
SH57	488955	154901	Roadside	100.0	42.3	-	-	-	-	25.6

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

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

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

Notes:

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

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

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

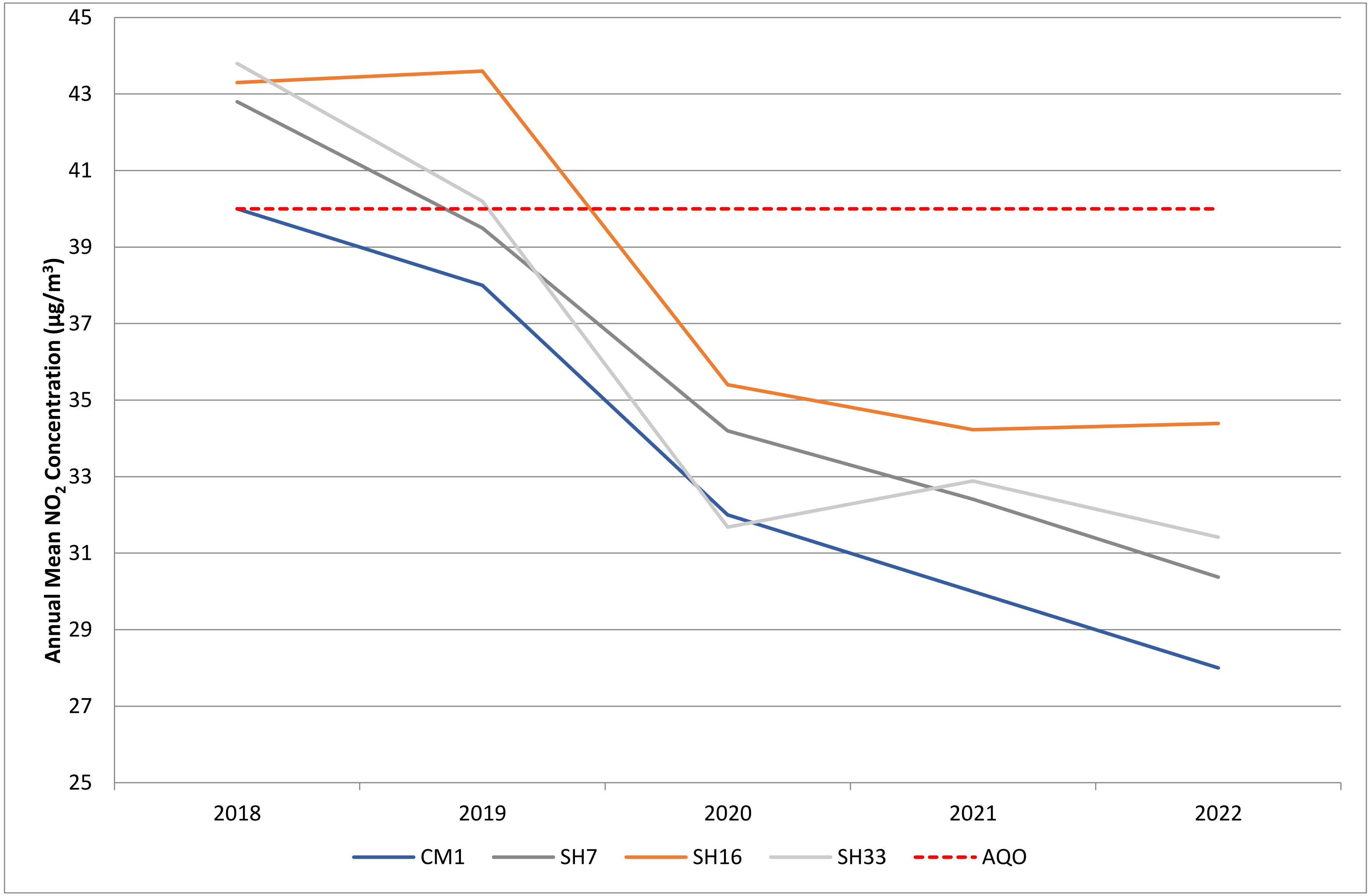
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

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

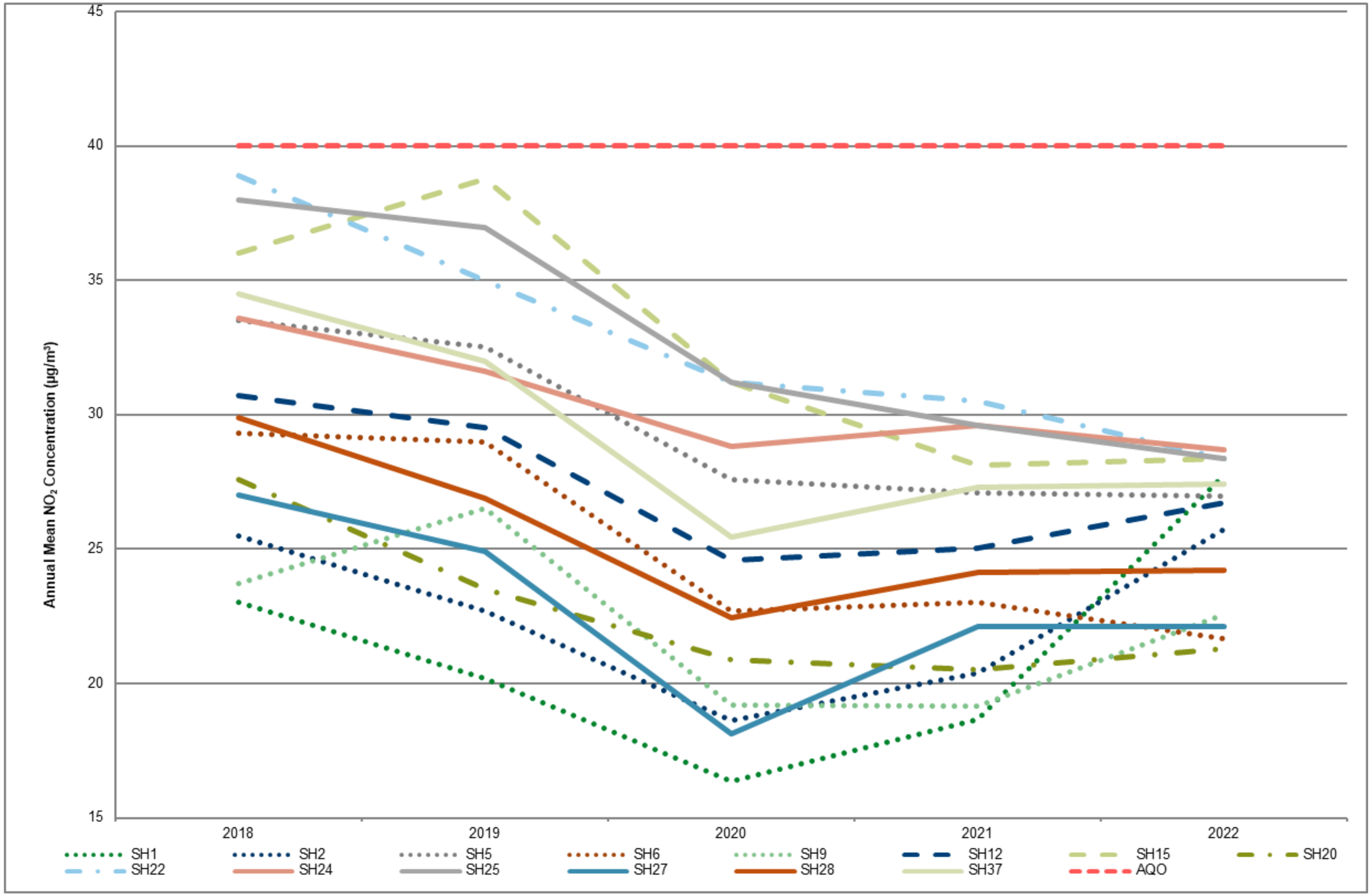
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations at Previously Exceeding Sites



Note: Monitoring locations shown in Figure A.1 are locations that have recorded at least one exceedance of the annual mean NO_2 objective (40 µg/m^3) between 2018 and 2022, inclusive.

Figure A.2 – Trends in Annual Mean NO_2 Concentrations – Historic Kerbside and Roadside Locations



Note: Sites have SH56 and SH57 have been excluded due to insufficient data required to show a trend.

Figure A.3 – Trends in Annual Mean NO_2 Concentrations – Kerbside and Roadside Locations introduced in 2020

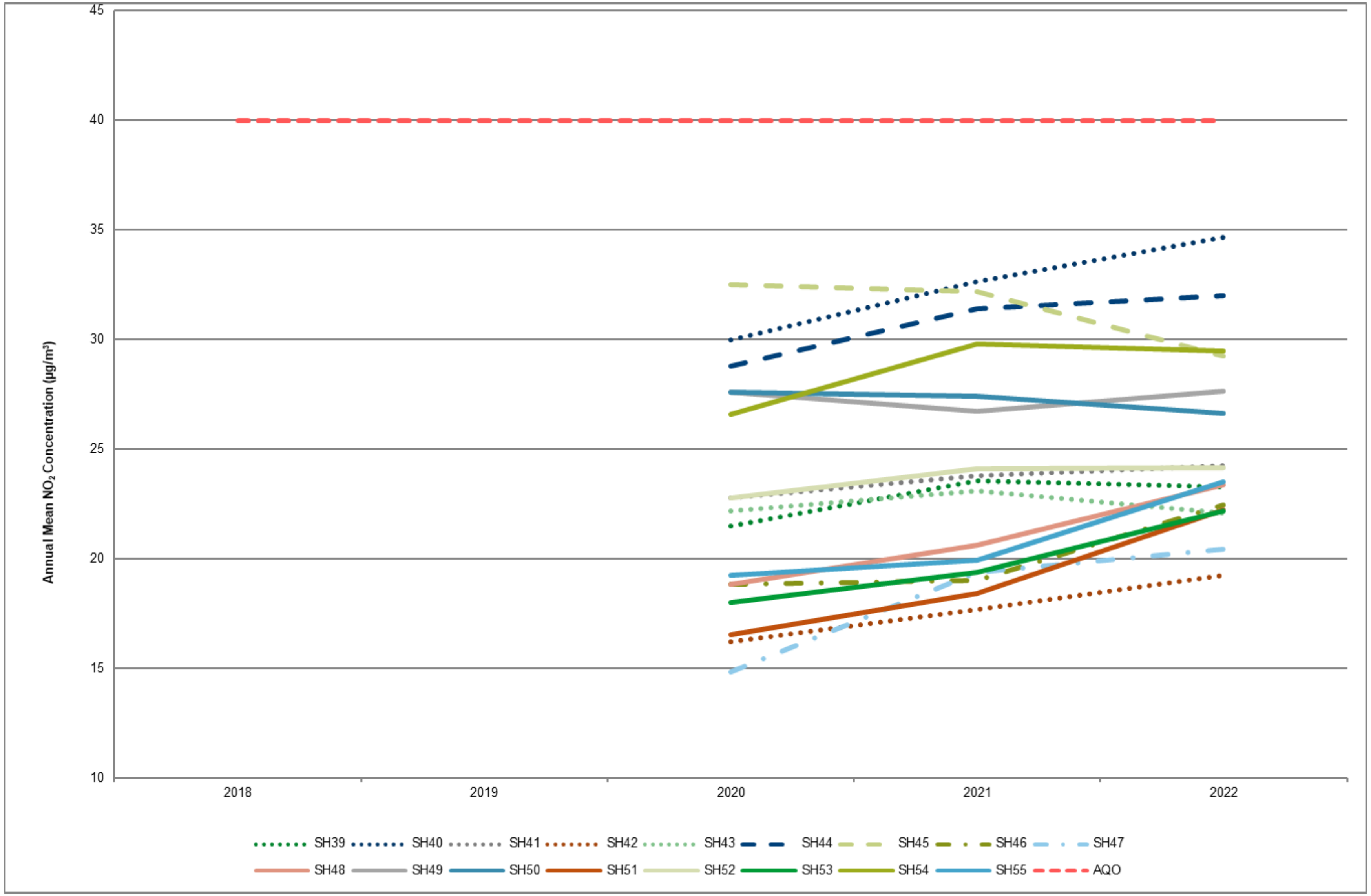


Figure A.4 – Trends in Annual Mean NO_2 Concentrations – Urban Background and Suburban Locations

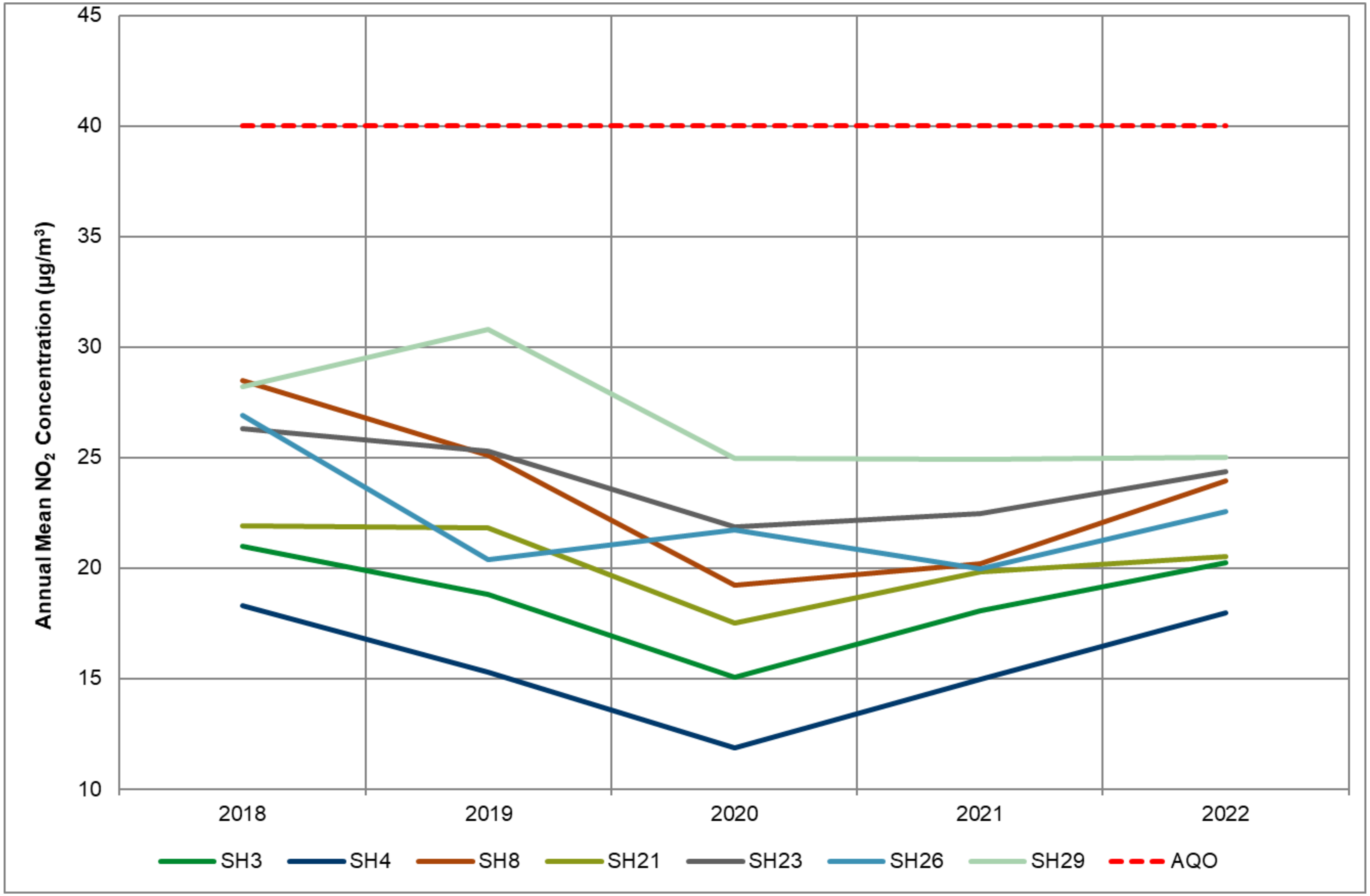


Figure A.5 – Trends in Annual Mean NO_2 Concentrations – Urban Centre and Other Locations

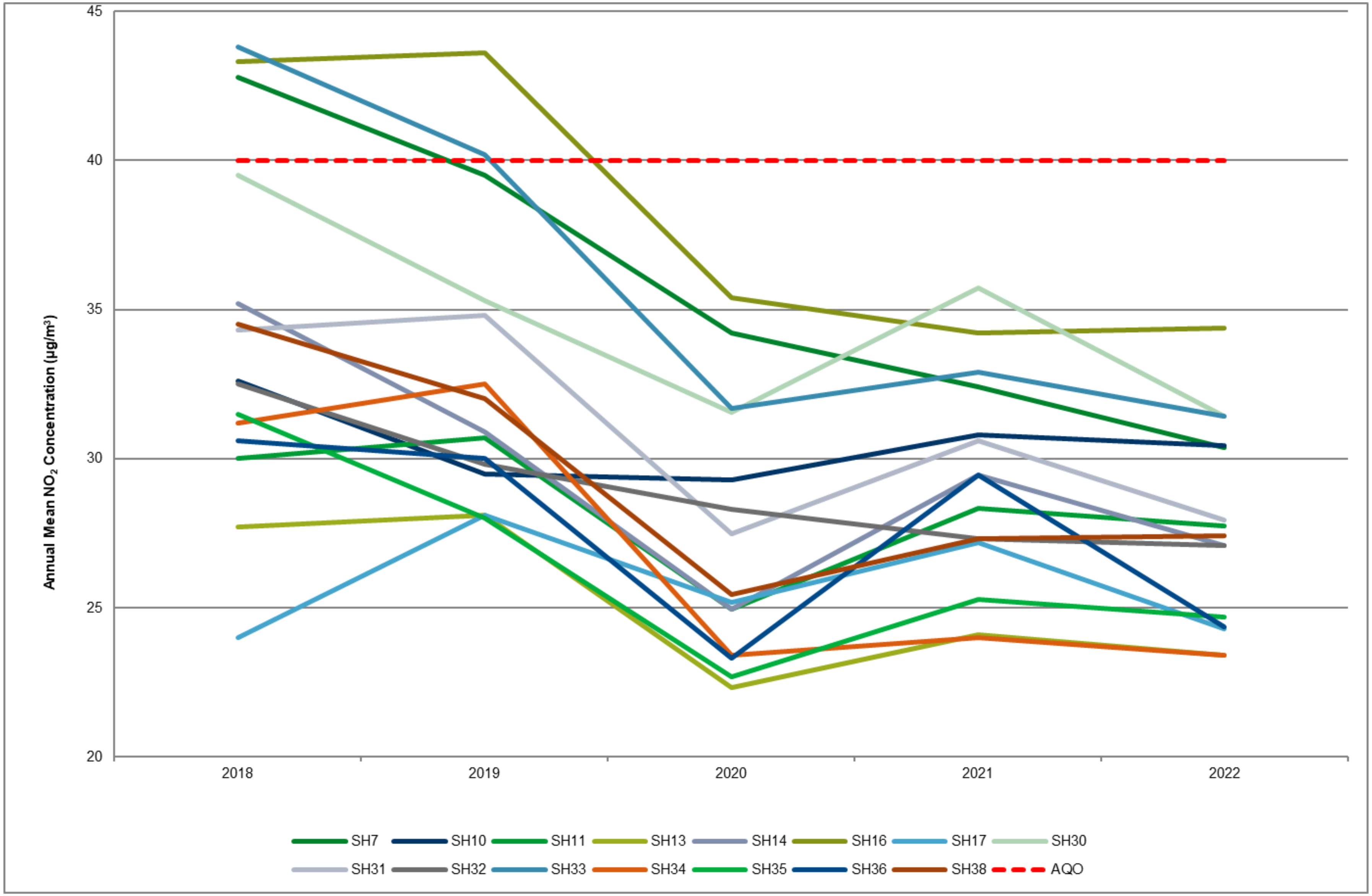


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
CM1	488647	159807	Roadside	93.7	93.7	0	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m³ have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m³ 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
CM1	488647	159807	Roadside	82.4	82.4	16.0	16.0	16.0	14.0	19.8

☐ **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.6 – 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
CM1	488647	159807	Roadside	82.4	82.4	0 (23)	0 (25)	0 (26)	0 (23)	0 (33)

Notes:

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

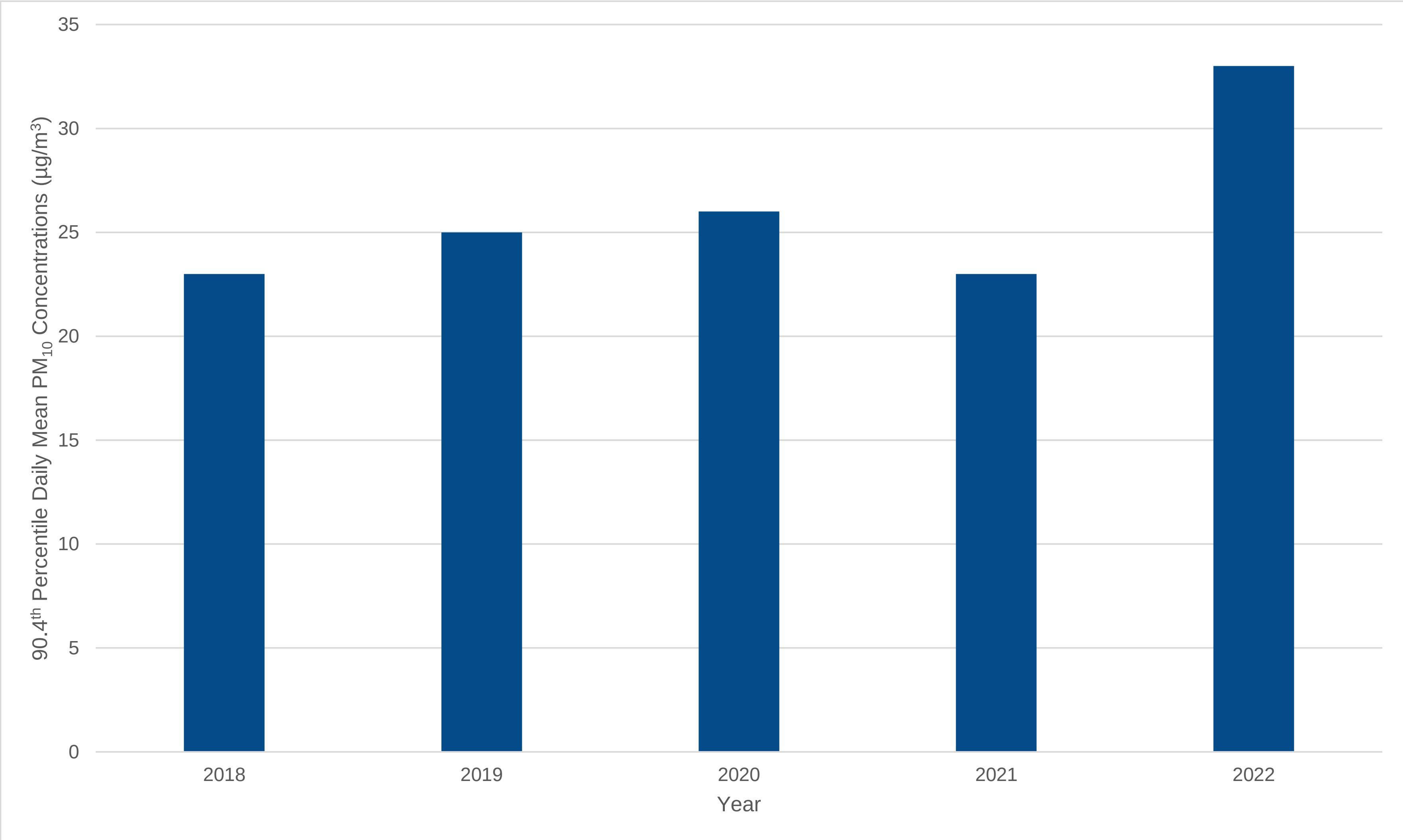
Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means should be calculated. To allow comparison across years, the 90.4th percentile of 24-hour means is provided in brackets for all years.

(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.7 – Trends in Number of 90.4th Percentile Daily Mean PM_{10} Results



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (1.30)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SH1	491010	163344	39.0	20.0	15.0	13.0	35.0	13.0	16.0	35.0	18.0	20.0	10.0	22.0	21.3	27.7		
SH2	491065	163337	20.0	26.0	15.0	14.0	ns	20.0	13.0	14.0	24.0	19.0	ns	33.0	19.8	25.7		
SH3	492810	164408	16.0	24.0	12.0	13.0	10.0	16.0	9.0	13.0	25.0	22.0	9.0	18.0	15.6	20.3		
SH4	494654	159444	12.0	16.0	14.0	13.0	8.0	16.0	7.0	13.0	19.0	10.0	22.0	16.0	13.8	18.0		
SH5	489460	160586	20.0	29.0	21.0	16.0	14.0	18.0	20.0	24.0	23.0	20.0	20.0	24.0	20.8	27.0		
SH6	494974	159611	21.0	13.0	20.0	14.0	14.0	10.0	11.0	22.0	21.0	20.0	13.0	21.0	16.7	21.7		
SH7	496191	164418	27.0	26.0	26.0	18.0	20.0	15.0	24.0	25.0	20.0	33.0	ns	23.0	23.4	30.4		
SH8	496170	164472	18.0	28.0	17.0	13.0	12.0	33.0	11.0	15.0	28.0	16.0	12.0	18.0	18.4	23.9		
SH9	489617	161874	19.0	22.0	19.0	14.0	15.0	10.0	15.0	ns	13.0	19.0	23.0	22.0	17.4	22.6		
SH10	485796	160074	31.0	23.0	23.0	17.0	16.0	19.0	22.0	20.0	28.0	26.0	25.0	31.0	23.4	30.4		
SH11	486937	159011	28.0	33.0	22.0	16.0	12.0	20.0	16.0	22.0	24.0	24.0	13.0	26.0	21.3	27.7		
SH12	487490	160788	23.0	22.0	ns	16.0	14.0	15.0	22.0	19.0	20.0	31.0	18.0	26.0	20.5	26.7		
SH13	488727	159591	22.0	28.0	17.0	14.0	15.0	19.0	13.0	18.0	19.0	15.0	21.0	15.0	18.0	23.4		
SH14	488603	159675	24.0	22.0	17.0	17.0	20.0	17.0	20.0	21.0	21.0	24.0	22.0	25.0	20.8	27.1		
SH15	488647	159807	22.0	24.0	ns	18.0	24.0	10.0	18.0	25.0	20.0	28.0	26.0	24.0	-	-		Triplicate Site with SH15, SH22 and SH25 - Annual data provided for SH25 only
SH16	486834	158336	26.0	26.0	24.0	18.0	27.0	20.0	24.0	30.0	27.0	41.0	ns	28.0	26.5	34.4		
SH17	489297	160440	25.0	22.0	15.0	16.0	13.0	ns	20.0	22.0	16.0	20.0	ns	18.0	18.7	24.3		
SH20	490396	157290	19.0	26.0	17.0	13.0	11.0	17.0	11.0	14.0	ns	13.0	21.0	18.0	16.4	21.3		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (1.30)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SH21	495156	161078	13.0	16.0	17.0	13.0	ns	ns	10.0	20.0	13.0	15.0	22.0	19.0	15.8	20.5		
SH22	488647	159807	21.0	20.0	21.0	20.0	23.0	ns	22.0	23.0	21.0	29.0	25.0	25.0	-	-		Triplicate Site with SH15, SH22 and SH25 - Annual data provided for SH25 only
SH23	490698	160351	22.0	22.0	19.0	14.0	14.0	25.0	13.0	21.0	17.0	18.0	18.0	22.0	18.8	24.4		
SH24	497347	161697	26.0	23.0	25.0	20.0	23.0	16.0	25.0	31.0	18.0	21.0	18.0	19.0	22.1	28.7		
SH25	488647	159807	21.0	21.0	25.0	17.0	22.0	11.0	21.0	22.0	21.0	30.0	ns	27.0	21.8	28.4		Triplicate Site with SH15, SH22 and SH25 - Annual data provided for SH25 only
SH26	487762	161393	20.0	20.0	ns	14.0	13.0	13.0	14.0	15.0	15.0	21.0	22.0	24.0	17.4	22.6		
SH27	495553	158854	21.0	23.0	15.0	12.0	13.0	13.0	11.0	17.0	22.0	15.0	21.0	21.0	17.0	22.1		
SH28	495343	159031	19.0	23.0	23.0	17.0	15.0	12.0	ns	21.0	15.0	18.0	23.0	19.0	18.6	24.2		
SH29	494228	163480	20.0	30.0	17.0	24.0	15.0	24.0	14.0	16.0	12.0	21.0	19.0	19.0	19.3	25.0		
SH30	487318	158515	29.0	22.0	24.0	19.0	24.0	26.0	21.0	25.0	34.0	21.0	17.0	28.0	24.2	31.4		
SH31	487022	158419	19.0	17.0	25.0	18.0	21.0	22.0	25.0	29.0	23.0	19.0	13.0	27.0	21.5	28.0		
SH32	486979	158393	18.0	29.0	19.0	17.0	19.0	15.0	25.0	23.0	19.0	19.0	23.0	24.0	20.8	27.1		
SH33	486843	158319	24.0	24.0	20.0	20.0	22.0	19.0	23.0	30.0	27.0	36.0	19.0	26.0	24.2	31.4		
SH34	488052	159239	22.0	ns	14.0	14.0	15.0	19.0	18.0	20.0	17.0	22.0	16.0	21.0	18.0	23.4		
SH35	489189	160209	23.0	29.0	16.0	14.0	16.0	21.0	15.0	19.0	19.0	18.0	16.0	22.0	19.0	24.7		
SH36	489350	160389	22.0	20.0	21.0	16.0	15.0	18.0	17.0	18.0	19.0	19.0	20.0	20.0	18.8	24.4		
SH37	489082	160265	25.0	31.0	20.0	19.0	18.0	26.0	23.0	25.0	22.0	20.0	23.0	26.0	23.2	30.1		
SH38	491702	163139	23.0	21.0	25.0	18.0	17.0	12.0	24.0	24.0	21.0	27.0	18.0	23.0	21.1	27.4		
SH39	488724	156857	22.0	25.0	17.0	12.0	12.0	20.0	15.0	17.0	17.0	17.0	19.0	22.0	17.9	23.3		
SH40	487845	158520	31.0	37.0	28.0	30.0	21.0	23.0	21.0	23.0	25.0	32.0	21.0	28.0	26.7	34.7		
SH41	487196	158885	21.0	28.0	17.0	12.0	14.0	17.0	15.0	17.0	17.0	24.0	21.0	21.0	18.7	24.3		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (1.30)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
SH42	489062	158770	19.0	24.0	11.0	ns	12.0	9.0	10.0	12.0	14.0	14.0	19.0	19.0	14.8	19.3		
SH43	489242	159042	16.0	21.0	13.0	14.0	21.0	10.0	16.0	13.0	17.0	21.0	21.0	21.0	17.0	22.1		
SH44	487943	158549	27.0	ns	31.0	17.0	23.0	25.0	23.0	26.0	23.0	25.0	23.0	28.0	24.6	32.0		
SH45	488011	158513	30.0	28.0	21.0	18.0	10.0	20.0	27.0	25.0	20.0	25.0	22.0	24.0	22.5	29.3		
SH46	491398	162885	ns	23.0	9.0	ns	ns	ns	ns	13.0	23.0	21.0	20.0	20.0	18.4	22.5		
SH47	492111	162110	17.0	23.0	10.0	12.0	9.0	26.0	12.0	14.0	12.0	ns	19.0	19.0	15.7	20.4		
SH48	488602	158448	20.0	30.0	16.0	11.0	14.0	22.0	12.0	20.0	19.0	18.0	16.0	18.0	18.0	23.4		
SH49	491017	163181	24.0	29.0	ns	17.0	18.0	21.0	18.0	20.0	18.0	25.0	20.0	24.0	21.3	27.7		
SH50	491303	163313	26.0	28.0	19.0	18.0	9.0	13.0	19.0	23.0	17.0	29.0	20.0	25.0	20.5	26.7		
SH51	491033	162945	18.0	24.0	17.0	12.0	14.0	14.0	11.0	21.0	13.0	24.0	ns	20.0	17.1	22.2		
SH52	491564	163565	20.0	26.0	19.0	19.0	9.0	22.0	14.0	19.0	16.0	23.0	15.0	21.0	18.6	24.2		
SH53	489009	161166	16.0	23.0	24.0	12.0	17.0	21.0	10.0	14.0	14.0	16.0	17.0	21.0	17.1	22.2		
SH54	487485	157828	24.0	31.0	19.0	15.0	12.0	18.0	23.0	24.0	31.0	26.0	21.0	28.0	22.7	29.5		
SH55	490495	159630	21.0	21.0	17.0	ns	23.0	18.0	12.0	15.0	14.0	17.0	20.0	21.0	18.1	23.5		
SH56	488421	155510								15.0	18.0	15.0	22.0	15.0	17.0	21.3		
SH57	488955	154901								18.0	12.0	27.0	22.0	23.0	20.4	25.6		

☒ **All spurious / erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1 (February: SH44; March: SH15; June: SH22; November: SH2, SH16, SH17, SH24;)**

☒ **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.**

☒ **Surrey Heath 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 **<u>bold and underlined</u>**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within SHBC During 2022

SHBC has not identified any new sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by SHBC During 2022

SHBC has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

SHBC's NO_2 diffusion tubes are supplied and analysed by Lambeth Scientific Services Ltd, a National Measurement Accreditation Service (NAMAS) approved laboratory, using the 50% triethanolamine TEA in Acetone method. This method conforms to the guidelines set out in Defra's 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance' document.

Lambeth Scientific Services Ltd participates in the AIR NO_2 PT scheme[15]. This scheme forms an integral part of the UK NO_2 Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). In AIR NO_2 PT rounds AR050, AR046 and AR045 Lambeth Scientific Services achieved 75% satisfactory scores. In AIR NO_2 PT rounds AR049 and AR039 Lambeth Scientific Services achieved 50% satisfactory scores.

[15] LGC (2022) Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (May 2020 – June 2022) Available at: https://laqm.defra.gov.uk/wp-content/uploads/2022/07/LAQM-NO2-Performance-data_Up-to-June-2022_V2.1.pdf

Diffusion Tube Annualisation

Annualisation is required for any site with data capture less than 75% but greater than 25%. Annualisation was required at 3 sites, SH46, SH56 and SH57. Site SH46 had a data capture of 57.7%, sites SH56 and SH57 had a 100% data capture but were installed part-way through the year and only provided data for 42.3% of the calendar year. Annualisation requires the use of continuous monitors with a data capture of 85% or greater, the AURN Reading New Town monitor was also considered but had insufficient data capture to be used for annualisation.

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

Diffusion Tube ID	Annualisation Factor London Hillingdon	Annualisation Factor Chilbolton Observatory	Annualisation Factor Oxford St Ebbs	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m^3)	Annualised Data Simple Annual Mean (µg/m^3)
SH46	0.9216	0.9480	0.9437	0.9378	18.4	17.3
SH56	0.9475	0.9859	0.9577	0.9637	17.0	16.4
SH57	0.9475	0.9859	0.9577	0.9637	20.4	19.7

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.

Local Bias Adjustment Factors

As a triplicate diffusion tube array is co-located alongside the automatic NO_2 monitoring site in Castle Road, Camberley, the local bias adjustment factor has been calculated as per Figure C.1[16]. The data quality is flagged as poor when the coefficient of variation of triplicate

[16] Defra, LAQM, Local bias adjustment factor spreadsheet, https://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html, accessed May 2023

tubes in any period is greater than 20%. Three months were identified as having poor precision, with one tube from the triplicate clearly being an outlier:

- SH15 (March 2022);
- SH22 (June 2022); and
- SH25 (November 2022).

In these cases, the outliers have been removed to ensure good overall precision.

A local bias adjustment factor is generally preferred over a national bias adjustment factor, as local influences that may affect diffusion tube results, such as meteorological conditions, are usually better captured by a local factor.

It is possible to use either a local bias adjustment factor calculated using all periods, whether or not data capture or precision is adequate, or a local factor derived only from periods with adequate data capture and precision. A local factor of 1.30 was determined using all available periods with good precision for 2022.

Figure C.1 - Local Bias Adjustment Factor Spreadsheet

Period	NO_2 Period Mean (µg/m^3)			Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of Mean	Data Quality Check
	Tube 1	Tube 2	Tube 3					
1	22.0	21.0	21.0	21.3	0.6	3%	1.4	Good
2	24.0	20.0	21.0	21.7	2.1	10%	5.2	Good
3		21.0	25.0	23.0	2.8	12%	25.4	Good
4	18.0	20.0	17.0	18.3	1.5	8%	3.8	Good
5	24.0	23.0	22.0	23.0	1.0	4%	2.5	Good
6	10.0		11.0	10.5	0.7	7%	6.4	Good
7	18.0	22.0	21.0	20.3	2.1	10%	5.2	Good
8	25.0	23.0	22.0	23.3	1.5	7%	3.8	Good
9	20.0	21.0	21.0	20.7	0.6	3%	1.4	Good
10	28.0	29.0	30.0	29.0	1.0	3%	2.5	Good
11	26.0	25.0		25.5	0.7	3%	6.4	Good
12	24.0	25.0	27.0	25.3	1.5	6%	3.8	Good
								Good Overall Precision

Period	Period Mean	Data Capture (%)	Data Quality Check
1	30.8	100.0%	**Good**
2	28.3	99.9%	**Good**
3	32.9	99.1%	**Good**
4	27.1	98.1%	**Good**
5	26.0	99.9%	**Good**
6	31.4	83.5%	**Good**
7	24.2	42.6%	**Poor Data Capture**
8	24.6	99.9%	**Good**
9	23.6	97.9%	**Good**
10	28.5	99.3%	**Good**
11	30.3	99.6%	**Good**
12	31.4	90.1%	**Good**
			Good Overall Data Capture

National Bias Adjustment Factors

Diffusion tubes for SHBC are supplied and analysed by Lambeth Scientific Services. The preparation method used is 50% triethanolamine (TEA) / acetone.

A list of the national bias adjustment factors for 2018 to 2022 are summarised in Table C.2 below, and the calculation for 2022 using the LAQM national bias adjustment spreadsheet[17] is shown in Figure C.2.

Table C.2 - National Diffusion Tube Bias Adjustment Factors

Year	Preparation Method	Number of Studies	National Bias Factor
2018	50% TEA / Acetone	7	1.03
2019	50% TEA / Acetone	1	0.85
2020	50% TEA / Acetone	5	0.96
2021	50% TEA / Acetone	5	0.97
2022	50% TEA / Acetone	4	0.95

Figure C.2 - National Diffusion Tube Bias Adjustment Factor Spreadsheet

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/23

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2023

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List. If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m3)	Automatic Monitor Mean Conc. (Cm) (µg/m3)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Lambeth Scientific Services	50% TEA in acetone	2022	KS	Marylebone Road Intercomparison	12	53	42	25.4%	G	0.80
Lambeth Scientific Services	50% TEA in acetone	2022	R	Surrey Heath Borough Council	11	22	29	-24.0%	G	1.32
Lambeth Scientific Services	50% TEA in acetone	2022	UB	Spelthorne Borough Council	12	23	20	16.3%	G	0.86
Lambeth Scientific Services	50% TEA in acetone	2022	UB	Spelthorne Borough Council	10	26	24	8.7%	P	0.92
Lambeth Scientific Services	50% TEA in acetone	2022		Overall Factor[3] (4 studies)				Use		0.95

SHBC have applied the local bias adjustment factor of 1.30 to the 2022 monitoring data for the following reasons.

Firstly, the local bias factor is likely to be more representative of the local area. Secondly, the local bias adjustment factor is larger than the nationally derived factor and therefore

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[17] Defra, LAQM, National bias adjustment factor spreadsheet. https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html accessed May 2023

allows for more a conservative assessment of NO_2 concentrations (worst-case concentrations).

It is recognised that 1.30 is a high factor compared to other preparation methods, which indicates a large discrepancy between the annual mean NO_2 concentration recorded by the continuous monitoring station at Castle Road, Camberley and that recorded by co-located diffusion tubes. Consequently, a degree of caution should be taken when interpreting the results from the diffusion tube network, as they are likely to be pessimistic (i.e. over-estimated) given the large bias-adjustment factor applied.

The local bias adjustment factor, while outside the normal range expected, allows for worst-case NO_2 concentrations to be assessed. The location of the continuous monitor and co-located tubes is considered likely to be affected by the dense vegetation nearby.

The local factor, whilst high, also compares well with the factors historically applied, aiding historical comparison. A summary of bias adjustment factors used SHBC over the past five years is presented in Table C.3 as requested in previous appraisals.

Table C.3 – Bias Adjustment Factor

Year	Factor chosen Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	Local	-	1.30
2021	Local	-	1.36
2020	Local	-	1.44
2019	Local	-	1.25
2018	Local	-	1.43

NO_2 Fall-off with Distance from the Road

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

No NO_2 monitoring locations within the borough required distance correction during 2022, since none were within 10% of the objective (>36 µg/m^3).

QA/QC of Automatic Monitoring

During 2022, the Castle Road site was locally operated by SHBC. QA/QC procedures involved maintenance of the kit by Wecare4Air and calibration, scaling and Quality Control visits by Air Quality Data Management. All data have been ratified according to Defra LAQM Technical Guidance (TG22) standards. Further details of the validation and ratification process are found appended to this report.

Automatic Monitoring Annualisation

All automatic monitoring locations within SHBC recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data.

Table C.4 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input
Periods used to calculate bias	11
Bias Factor A	1.3 (1.12 - 1.55)
Bias Factor B	-23% (-36% - -11%)
Diffusion Tube Mean (µg/m^3)	22.0
Mean CV (Precision)	6.0%
Automatic Mean (µg/m^3)	28.6
Data Capture	97%
Adjusted Tube Mean (µg/m^3)	29(25 - 34)

Notes:

A single local bias adjustment factor of 1.30 has been used to bias adjust the 2022 diffusion tube results.

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

Figure D.1 – Map of West Surrey Heath Monitoring Site

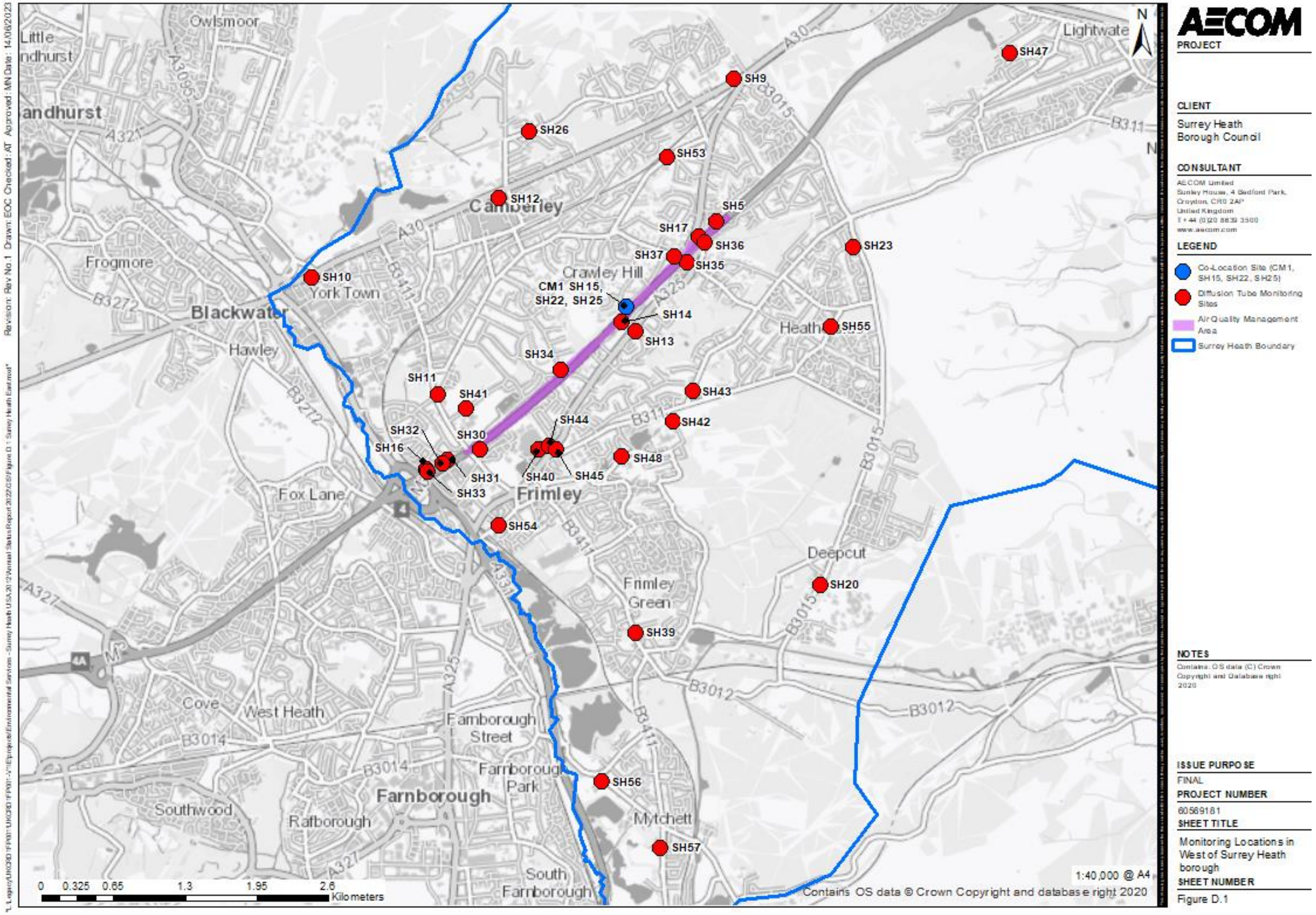
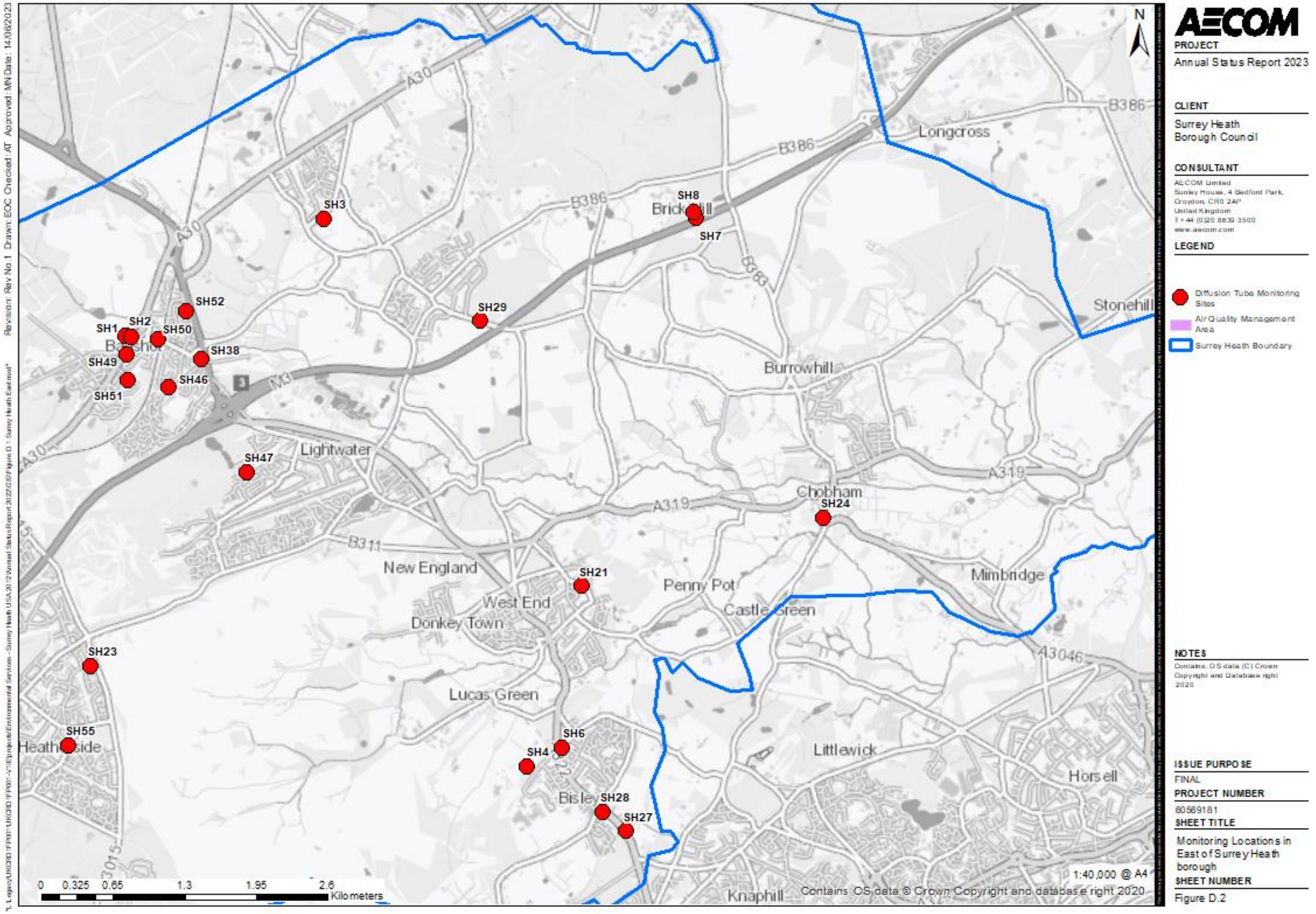


Figure D.2 – Map of East Surrey Heath Monitoring Site



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[18]

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
EV	Electric Vehicle
FDMS	Filter Dynamics Measurement System
HE	Highways England
LAQM	Local Air Quality Management
LCWIP	Local Cycling and Walking Infrastructure Plan
NHS	National Health Service
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
SHBC	Surrey Heath Borough Council
SCC	Surrey County Council
SAA	Surrey Air Alliance
PHOF	Public Health Outcomes Framework

References

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