2021 & 2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: September 2022

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Executive Summary: Air Quality in Our Area

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

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

Air pollution can arise from many sources, including transport, industry and commercial and domestic heating, in particular solid fuel burning. Pollutant levels are assessed against national air quality objectives (detailed in Appendix E) and where the objectives are not met, Air Quality Management Areas (AQMAs) must be declared and an Action Plan put in place to improve the air quality.

Air Quality in South Gloucestershire

South Gloucestershire lies to the north and east of the city of Bristol with the River Severn forming the western boundary and the Cotswold escarpment to the eastern edge. The area is a diverse mix of urban and rural areas, including major residential, industrial and commercial developments. The major junction of the M4 and M5 motorways (the Almondsbury Interchange) is within South Gloucestershire.

The population estimate for South Gloucestershire from the 2021 Census is 290,400[5] which is a 10.5% increase since the 2011 census (262,800). The majority of people live in

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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, July 2021

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

[5] Census 2021 | BETA - South Gloucestershire Council (southglos.gov.uk)

the urban areas on the north and east fringes of Bristol and in the towns of Yate and Thornbury, while the remainder live in the villages and more rural areas of South Gloucestershire. The total population is projected to increase to 354,300 in 2043[6]. With the population projected to continue rising, managing future development and providing vital transport infrastructure is a key challenge.

The main air pollutant of concern locally is nitrogen dioxide (NO_2), which mostly arises from road traffic (34%, rising to 80% near roadsides)[7]. Particulate matter is also a pollutant of concern. Sources of particulate matter (PM_{10} and $PM_{2.5}$ which are described by the particle size) include domestic wood and coal burning (38%), industrial combustion (16%) and road transport (12%)[8].

Air Quality Management Areas

There are two AQMAs currently declared in South Gloucestershire in relation to exceedances, or likely exceedances, of the annual mean objective for nitrogen dioxide (40 µg/m^3):

- Staple Hill – in the centre around the Broad Street/ High Street/ Soundwell Road/ Victoria Street crossroads and the High Street/ Acacia Road/ Pendennis Road crossroads.
- Kingswood – Warmley – from the Bristol/ South Gloucestershire boundary in Kingswood along the A420 to the junction with Goldney Avenue in Warmley.

Full details of the current AQMAs are included in Table 2.1 of this report and maps are available in Appendix D. Further information on the AQMAs is available on the Council website at www.southglos.gov.uk/airquality and on the Defra website at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=238.

The former Cribbs Causeway AQMA adjacent to the M5 Junction 17 roundabout was formally revoked in July 2020 as nitrogen dioxide concentrations within the AQMA have

[6] Source: ONS 2020 Sub-national population projections (2018-based) https://www.southglos.gov.uk/council-and-democracy/census/population-and-demographics/

[7] Defra Clean Air Strategy 2019 Clean Air Strategy 2019 (publishing.service.gov.uk)

[8] Defra Clean Air Strategy 2019 Clean Air Strategy 2019 (publishing.service.gov.uk)

consistently been below the annual mean objective since 2010. Further information is provided in Section 2.1 of the report.

Trends in monitored concentrations

Until the Covid-19 pandemic in 2020, the air quality in South Gloucestershire had been gradually improving over the previous decade, with overall declining trends in nitrogen dioxide and particulate matter (PM_{10}) concentrations. Pollutant levels had mostly been compliant with the national objectives, apart from in some locations where the air quality did not meet, or was close to, the annual mean objective for nitrogen dioxide (40 µg/m^3), largely in the AQMAs.

The impact of the Covid-19 pandemic restrictions on people's movements and travel patterns in 2020 had an effect on monitored pollutant concentrations, which continued to a slightly lesser degree in 2021, in addition to other factors such as meteorological conditions and changing vehicle fleet composition which influence pollutant levels year to year under normal circumstances.

South Gloucestershire Council monitored NO_2 and PM_{10} in 2020 and 2021 at its automatic site in Yate and from August 2021, NO_2, PM_{10}, $PM_{2.5}$ and Ozone (O_3) monitoring began at a new automatic site in Stoke Gifford on the A4174 Ring Road near Coldharbour Lane and the University of West England (UWE). There was also extensive monitoring of nitrogen dioxide at 96 non-automatic (passive) diffusion tube monitoring sites in 2020 and at 98 sites in 2021. The details of the monitoring sites are provided in Appendix A.

The key outcomes from the monitoring reported in this Annual Status Report are:

- In 2020, annual mean NO_2 concentrations decreased by an average of 22% across the diffusion tube monitoring sites in South Gloucestershire due to the impacts of the Covid-19 pandemic travel restrictions from March 2020.
- In 2021, annual mean NO_2 concentrations increased by an average of 5% from 2020 across the LAQM diffusion tube monitoring sites as the pandemic travel restrictions eased but were still on average 17% lower than 2019 annual mean concentrations.
- In the Kingswood – Warmley AQMA, annual mean NO_2 concentrations decreased by an average of 22% from 2019 to 2020, followed by an average 4% increase from 2020 to 2021 as the pandemic restrictions eased. There were no exceedances of the annual mean NO_2 objective or any "borderline" sites (within 10% of the annual mean objective i.e. greater than 36 µg/m^3) in this AQMA.

- At the single previously exceeding site in 2019 (and 2018) in South Gloucestershire within the Kingswood – Warmley AQMA (Site 146 Kingswood - Hill Street), the annual mean NO_2 concentration decreased by 15% from 2019 (42.3 µg/m^3) to 2020 (35.9 µg/m^3). This decreased further at this site in 2021 to 34.1 µg/m^3 (a 19 % decrease from 2019). This demonstrates that the decreases and increases in concentrations were not uniform across the district as the situation changed during the pandemic.
- In the Staple Hill AQMA, the annual mean NO_2 concentrations decreased by an average of 23% from 2019 to 2020 due to the impacts of the pandemic restrictions. There was then an average 6% increase in annual mean concentrations from 2020 to 2021 as the restrictions eased. There were no exceedances of the annual mean NO_2 objective or any “borderline” sites in this AQMA.
- Aside from the significant decreases in concentrations in 2020 and slight increases at the majority of AQMA sites in 2021, prior to these Covid impacted years, there has been an overall gradual downward trend in nitrogen dioxide concentrations in the Kingswood – Warmley and Staple Hill AQMAs over the past decade.
- There were no exceedances of the NO_2 annual mean objective in 2020 or 2021 outside of the AQMAs where there is relevant exposure (i.e. public exposure for the averaging period of the objective, so in this case, a calendar year). In 2021, there was one marginally “borderline” site outside of the AQMAs at a new site in Patchway on the A38 Gloucester Road close to Hayes Way (site 188).
- At the Yate automatic monitoring site, the NO_2 concentrations were well below the annual mean and 1-hour objective in 2020 and 2021. In 2020, the annual mean was 14 µg/m^3 which is a 26% decrease from the 2019 annual mean of 19 µg/m^3. This is on a par with the average 25% reductions in NO2 concentrations seen across the national automatic urban and rural monitoring network (AURN). The annual mean concentration increased slightly in 2021 to 15 µg/m^3 when travel restrictions were less stringent. Overall, annual mean NO_2 concentrations at Yate have been slowly declining over the past decade when the monitored concentration was 27 µg/m^3 in 2011.
- The PM_{10} concentrations measured in 2020 and 2021 at the Yate automatic site were well below the annual mean objective (40 µg/m^3) and 24-hour mean objective (50 µg/m^3 not to be exceeded more than 35 times a year). In 2020, the annual mean was 11 µg/m^3, and in 2021, 12 µg/m^3, compared to 13 µg/m^3 in 2019. The lower annual means are likely to have resulted from the impacts of the Covid-19 pandemic

restrictions as concentrations rose again slightly in 2021 when travel restrictions were less stringent, although PM_{10} concentrations were less affected than NO_2 levels by the pandemic restrictions. Overall, annual mean PM_{10} concentrations at Yate have been slowly declining over the last decade from 18 µg/m^3 in 2011.

- At the new automatic monitoring site in Stoke Gifford on the A4174 Ring Road near Coldharbour Lane, the NO_2, PM_{10}, $PM_{2.5}$ and Ozone (O_3) concentrations were below the relevant objectives or standards in 2021. The results were "annualised" (adjusted from short to long-term) as monitoring began on 24 August 2021.

The monitoring results and trends in the data are discussed fully in Section 3.2 of the report and trend graphs are available in Appendix A.

The monitoring data from the South Gloucestershire automatic sites is also available to view on the Air Quality in the United Kingdom (ukairquality.net) website.

How the Council works to manage local air quality

South Gloucestershire Council is a unitary authority and Planning, Transport and Environmental Health are all within the Directorate for Place enabling close working between these teams. There is also a close working relationship with the Public Health Team in the Directorate for People, and their work on the built environment recognises the importance of aligning spatial planning and transport work with its associated impacts on air quality and health.

The development of a council-wide approach to air quality has brought services which have an interest and/or impact on air quality, including Public Health, Environmental Health, Transport Policy, Environmental Policy, Spatial Planning, Development Control, Street Care and Highways and Strategic Communications, together into a Board. The Clean Air and Climate Change Board is co-chaired by the Director for Place and the Director of Public Health and also covers the Council's work on Climate Change. This ensures there is a joined-up approach across the two work areas, which are closely interlinked with often the same sources and interventions and secures alignment with the Council's existing Climate Change Strategy[9].

Public Health led on the development of a South Gloucestershire Clean Air Strategy, which was approved by the Council in July 2020. Subsequently, a new Clean Air Action

[9] https://www.southglos.gov.uk//documents/Climate-Change-Strategy-201823-Final-sgc-signed-v1.pdf

Plan (CAAP) has also been developed to implement the visions and priorities contained within South Gloucestershire's Clean Air Strategy and to fulfil the Council's statutory local air quality management duties to update the 2012 Air Quality Action Plan for the Kingswood and Staple Hill AQMAs.

It is anticipated that public consultation will be undertaken on the draft Clean Air Action Plan in Autumn 2022 and the South Gloucestershire Clean Air Strategy will be published alongside the draft CAAP. The consultation will seek the views of the public and businesses who may be affected by the actions and incorporate their views where appropriate, to help shape the final Clean Air Action Plan. Information will be available on the Council's consultation website in due course at Homepage - South Gloucestershire Online Consultations (southglos.gov.uk). Further information is provided in Section 2.2.

South Gloucestershire works closely with other neighbouring authorities in the West of England (Bath and North East Somerset, Bristol City and North Somerset Councils), and also with the West of England Combined Authority (WECA), to develop, implement and refine schemes with cross-boundary characteristics and particularly with regard to regional strategic work areas such as transport, e.g. the Joint Local Transport Plan (JLTP4[10]) and the Travel West[11] brand which acknowledges commuters do not think in terms of Council boundaries.

Actions to Improve Air Quality

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

The 2019 Clean Air Strategy[12] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[13] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely

[10] https://travelwest.info/projects/joint-local-transport-plan

[11] https://travelwest.info/

[12] Defra. Clean Air Strategy, 2019

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

important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

The key completed measures to improve air quality are:

- Under the second round of the Clean Bus Technology Fund, First Bus and CT Plus have retrofitted nearly 150 buses with emissions-reducing technology.
- A £4.79m Office for Low Emission Vehicles (OLEV) funding grant was awarded to the four West of England local authorities and First Bus in August 2017. This funding has enabled the delivery of 98 bio-methane buses and two re-fuelling stations in the area. The new buses will contribute to reducing air pollution levels across the West of England area, including in the Staple Hill AQMA.
- Entire fleet of Council pool cars switched to electric in 2017, with OLEV funding secured to switch 20% of other fleet vehicles to electric in 2021.
- Access funding secured to 2021, to enable the continuation of school, business and community travel planning measures to promote sustainable travel choices.
- Across South Gloucestershire, as part of the Council response to Covid-19, new walking and cycling measures have been implemented through the DfT Active Travel Fund to enable social distancing and encourage more journeys by active modes. This includes some schemes in and near to the AQMAs and schemes such as school streets (the closure of roads near schools during drop off/pick up times), the trial pedestrianisation of Thornbury High Street and new cycle routes in Yate (Station Road) and Filton (Southmead Road). Further details are provided in Appendix F.

Full details of progress in implementing the existing Air Quality Action Plan for Kingswood and Staple Hill are contained in Section 2.2 of this report.

Other actions progressed in South Gloucestershire and on a wider West of England regional basis aimed at reducing traffic congestion and improving air quality include:

- Kingswood Town Centre Regeneration[14] - a project investigating the redevelopment potential of Kingswood High Street, including the possibility of re-routing traffic in Kingswood town centre.

[14] https://www.southglos.gov.uk/business/regeneration/love-high-streets-kingswood/

- Metrobus - an express bus service which aims to relieve congestion, reduce pollution, improve journey times and access to key employment, education and leisure destinations[15]. There are currently three metrobus routes in operation and proposed additional Metrobus routes are set out in the Joint Local Transport Plan 4.
- Cribbs Patchway Metrobus Extension[16] - an extension of the Metrobus network between Bristol Parkway railway station and The Mall at Cribbs Causeway. Construction is due to be completed in early 2023.
- MetroWest[17] – improved rail services and infrastructure being delivered in two phases by the West of England councils, working in partnership with Network Rail and Great Western Railway. Plans for a new rail station at Charfield[18] in Phase 2 are being developed with WECA funding.
- Cribbs Patchway New Neighbourhood Cycle Links – a £3.125m package of walking and cycling schemes has been delivered ahead of the completion of the first phase of the development to encourage more people to choose a sustainable travel mode from the outset.
- GoUltraLowWest[19] - completion of a £7m project funded by Office for Low Emission Vehicles (OLEV) to accelerate the purchase of electric vehicles and provision of charge points across Bristol, South Gloucestershire, North Somerset and Bath & North East Somerset.
- A38 and Bradley Stoke Way improvements – development of a scheme along the Thornbury to Bradley Stoke Way corridor to improve conditions for people walking, cycling, and travelling by bus to encourage mode shift. Funding has been secured to advance the scheme to detailed design and it is envisaged to be open by 2025.
- A432 Yate to Ring Road A4174 Corridor – development of a scheme along this corridor to improve conditions for people walking, cycling, and travelling by bus and

[15] https://travelwest.info/metrobus

[16] https://beta.southglos.gov.uk/cribbs-patchway-metrobus-extension/

[17] https://travelwest.info/projects/metrowest

[18] https://beta.southglos.gov.uk/charfield-train-station

[19] https://travelwest.info/drive/electric-vehicles/go-ultra-low-west

encourage mode shift. Funding anticipated to be secured to advance the scheme to detailed design.

- South Gloucestershire Electric Vehicle (EV) Charging Strategy – development of and recent consultation[20] on a draft EV charging strategy[21] which aims to support the transition to EVs.

Further information on these wider actions is provided in Section 2.2 of this report.

South Gloucestershire Council also continues to engage with Bristol City Council and Bath and North East Somerset Council on their Clean Air Plans, through meetings organised by the West of England Combined Authority (WECA). Further information about the Bristol Clean Air Plan is available on the Clean Air for Bristol website[22] and for the Bath Clean Air Plan, on the Bath Breathes website[23].

The Bath Clean Air Zone (CAZ) launched on 15 March 2021 and the Bristol CAZ is planned to start on 28 November 2022[24]. The Government's Vehicle Checker tool[25] can be used to check whether there is (or will be) a charge to drive any particular vehicle in either CAZ Check your vehicle (GOV.UK).

Conclusions and Priorities

The Covid-19 pandemic restrictions impacted monitored pollutant concentrations during 2020, and 2021, albeit to slightly lesser degree. Monitored NO_2 concentrations were particularly impacted with annual mean NO_2 concentrations across the diffusion tube monitoring network down by 22% compared to 2019, and in 2021 annual mean NO_2 concentrations were still on average 17% lower than in 2019. A 26% decrease in annual mean NO_2 concentrations in 2020 compared to 2019 was also observed at the Yate automatic monitoring site, and in 2021, there was still a 21% decrease in concentrations from 2019.

[20] https://consultations.southglos.gov.uk/EVChargingStrategy/consultationHome

[21] South Gloucestershire Electric Vehicle Charging Draft Strategy.pdf (southglos.gov.uk)

[22] https://www.cleanairforbristol.org/

[23] http://www.bathnes.gov.uk/bath-breathes-2021

[24] https://www.bristol.gov.uk/residents/streets-travel/bristols-caz

[25] https://www.gov.uk/clean-air-zones

Prior to this, air quality in South Gloucestershire had been gradually improving with long-term overall declining trends in nitrogen dioxide and particulate matter (PM_{10}) concentrations. Pollutant levels had mostly been compliant with the national objectives, apart from in some locations where the air quality did not meet, or was close to, the annual mean objective for nitrogen dioxide (40 µg/m^3), largely in the AQMAs.

However, in 2020 and 2021, there were no exceedences of pollutant objectives identified at any local air quality monitoring site, including in the AQMAs, and only one site in 2021 that was marginally "borderline" (once adjusted to reflect relevant exposure), albeit outside of the AQMAs in Patchway on the A38 Gloucester Road close to Hayes Way.

While there were no exceedences, or borderline sites within the AQMAs in 2020, revocation of the AQMAs based on compliance being achieved in 2020 is not considered appropriate, as advised in the Defra Covid-19: Supplementary Guidance for LAQM Reporting in 2021[26]. This is because 2020 monitoring data is not representative of long-term trends in pollutant concentrations, and it is uncertain whether the air quality objectives would continue to be met in future years. This is also likely to be applicable to the 2021 data.

It is important to note that while pollutant levels complied with the relevant objectives at the local air quality management (LAQM) monitoring sites, evidence shows that there are health impacts from air pollution at levels below the current national objectives, so it is important to further reduce people's exposure to air pollution across the whole district[27].

South Gloucestershire Council's priorities for the coming year are to:

- Produce the final Clean Air Action Plan following public consultation and seek formal approval of the CAAP to enable implementation of the actions to begin to improve air quality within the AQMAs and across South Gloucestershire as a whole.
- Continue to monitor and assess the effectiveness of the JAQU directed scheme on the A4174 at Hambrook in achieving compliance with the annual mean NO_2 limit value, as traffic conditions return to more "normal" levels.

[26] Covid-19-Supplementary-Guidance-for-Local-Air-Quality-Management-Reporting-in-2021-v1.pdf (defra.gov.uk)

[27] Air Quality - A guide for directors of public health (defra.gov.uk)

The main challenges and barriers to implementation that South Gloucestershire Council anticipates facing are:

- Significant continued pressure on local government funding, exacerbated by the Covid-19 pandemic and the energy crisis, which could impact on delivering air quality improvements, including funding for the actual Clean Air Action Plan measures themselves.
- The uncertainties arising from the Covid-19 pandemic has impacted travel patterns and traffic volumes. Many organisations offer their office staff the ability to work from home for all or part of their contracted hours, reducing demand levels on the network. However, the acceleration in the popularity of home delivery services has increased the number of delivery vehicles on the road.
- Public transport usage continues to be well below pre-Covid-19 pandemic levels, which is impacting on the commercial viability of some bus routes with operators responding by reducing or withdrawing services. This makes it harder for travellers to choose sustainable modes of transport over the private car.
- With the increased uptake of electric powered vehicles being constrained by cost of living and supply chain issues, the knock-on impacts on fleet composition and future trends in pollutant concentrations is difficult to predict.

Local Engagement and How to get Involved

What you can do to reduce air pollution

There are many ways that everyone can help contribute towards improving air quality in South Gloucestershire. By making informed personal choices, particularly around how we travel and heat our homes, we can all reduce our personal contribution to air pollution and help improve air quality and improve our own health in the process.

To reduce pollution when travelling:

- Swap some trips in the car for walking, cycling or taking a bus or train, where possible, as this not only reduces air pollution but also, if walking and cycling, improves your health and wellbeing.
- Consider sharing lifts which will save you money on fuel as well as reducing the number of cars on the road.

- Travel outside peak hours and/or work from home, if possible, to save time spent in traffic and use less fuel, reducing emissions while saving time and money.
- If you are thinking of changing your vehicle, try switching to a less polluting type of vehicle and opt for the cleanest vehicle you feasibly can. As a general rule, electric vehicles have the lowest emissions, and then in order of increasing emissions; petrol hybrids, gas or petrol vehicles, diesel hybrids and lastly, diesels have the highest emissions. Emissions can vary depending on make and model and some perform better than others when the emissions in real world driving conditions are compared to the required Euro standards for vehicles. To check the emissions of your vehicle or a vehicle you are considering purchasing, there is an online vehicle checker[28] on the Mayor of London/ London Assembly website.
- Visit the Travel West[29] and Better by Bike[30] websites for live information on public transport, traffic reports, routes and journey planning for walkers and cyclists, electric vehicle charge points and other information that simplifies travel choices.

To help reduce pollution from domestic heating:

- If a property does not already have a solid fuel burner, e.g. a stove or fireplace, the best option is not to install one, as even the cleanest wood burning appliance emits significantly more particulate matter pollution than a gas oil or gas appliance.
- Should you still plan to install a stove, then the lowest emission stoves currently on the market are those that are 'Eco-design Ready'. These meet the EU standards that were introduced in 2022 for all new stoves sales in the UK.
- If you already own a stove or fireplace and choose to use it, make sure you follow the "Open fires and wood-burning stoves" advice leaflet[31] by using the right fuel on an efficient and well-maintained appliance. Some of South Gloucestershire is

[28] https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/cleaning-londons-vehicles

[29] https://travelwest.info/

[30] https://betterbybike.info/

[31] Open fires wood burning stoves - guide-A4-update-12Oct (defra.gov.uk)

covered by a Smoke Control Area[32] which allows only approved appliances and fuels to be used.

In May 2021, the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020[33] came into force. These regulations have been introduced to reduce particulate emissions from the residential burning of wood and other solid fuels and will phase out the use of bituminous coal and the burning of unseasoned wood in domestic heating appliances.

- Consider a boiler upgrade to the newest and most efficient gas condensing boiler with lowest NO_x (and carbon) emissions, especially if the boiler is more than 10 years old. In many cases, the long-term savings made with a more efficient boiler will cover the outlay.
- Consider installing “clean” renewable energy generation, for example via solar photovoltaics or air source heat pumps.

There are choices that we can all make to reduce air pollution. Relatively small changes all add up, and if everyone contributes, it can make a big difference overall.

Further information is available on our website www.southglos.gov.uk/airquality.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Team of South Gloucestershire Council with the support and agreement of officers from the following teams:

Transport and Environmental Policy

Public Health

This ASR has been approved by:

Executive Director of Place (Nigel Riglar), Acting Service Director – Place Operations (Customer and Regulatory) (Gerard Madden) and Environmental Protection Team Leader (Allison Jay).

[32] https://www.southglos.gov.uk/environment-and-planning/pollution/pollution-control-clean-air-act-approval/smoke-control-areas/

[33] The Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020 (legislation.gov.uk)

This ASR has been signed off by the Director of Public Health (Sarah Weld).

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

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Environmental Protection
PO Box 1954
Bristol
BS37 0DD

Telephone: 01454 868001

Email: environmental.protection@southglos.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in South Gloucestershire during the years 2021 and 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This combined Annual Status Report (ASR) for 2021 and 2022 shows the strategies employed by South Gloucestershire Council to improve air quality and any progress that has been made since the 2020 ASR.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1 in Appendix E.

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 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

In 2010, three AQMAs were declared in the centres of both Kingswood and Staple Hill and at Cribbs Causeway adjacent to the M5 Junction 17 roundabout. The Kingswood and Staple Hill AQMAs were extended in 2012 following further assessment and the Council produced an Action Plan in 2012, focusing mainly on transport measures.

In December 2015, the Kingswood - Warmley AQMA was declared, extending the 2012 Kingswood AQMA along the A420 corridor east to Warmley. This followed a detailed assessment in 2014 which had identified new locations on this corridor where the nitrogen dioxide annual mean objective was being exceeded.

Work has significantly progressed in developing a new Air Quality Action Plan, which is known as the Clean Air Action Plan (CAAP), to replace the 2012 Air Quality Action Plan for Kingswood and Staple Hill. The CAAP has been produced to implement the visions and priorities contained within South Gloucestershire's Clean Air Strategy and to fulfil the Council's statutory local air quality management duties to update the action plan for the AQMAs. The CAAP includes a broad range of actions to improve air quality both within the Kingswood – Warmley and Staple Hill AQMAs and across South Gloucestershire as a whole. Further information is provided in Section 2.2.

It is anticipated that public consultation will be undertaken on the draft CAAP in Autumn 2022 and the South Gloucestershire Clean Air Strategy will be published alongside the draft CAAP. Information will be available on the Council's consultation website in due course at Homepage - South Gloucestershire Online Consultations (southglos.gov.uk).

Since the declaration of the Cribbs Causeway AQMA in 2010, the nitrogen dioxide concentrations at the façade of the single residential property within the AQMA have been below the annual mean objective (40 µg/m^3) and also the precautionary "borderline" level (36 µg/m^3).

Following Defra's recommendation to revoke the AQMA and a subsequent consultation[34] in 2019, the Cribbs Causeway AQMA was revoked by a legal order on 22 July 2020. This report confirms the nitrogen dioxide concentrations in 2020 and 2021 remained below the objective within the former AQMA, demonstrating ongoing compliance, not least because of the reduced traffic levels due to the Covid-19 pandemic restrictions. Monitoring will continue at this location to assess the impact of the new developments in the vicinity.

A summary and description of the two AQMAs currently declared by South Gloucestershire Council can be found in Table 2.1.The air quality objective pertinent to the current AQMA designations is as follows:

- NO_2 annual mean

The levels of exceedance at the declaration of the AQMAs in 2010 and in 2020 and 2021 are also compared in Table 2.1, however the monitoring undertaken within the AQMAs has changed during this timeframe to reflect extensions to the AQMAs and to better represent relevant exposure. Consequently, the monitoring locations in 2020 and 2021 are not necessarily directly comparable to those in 2010 and comparison between the exceedance levels may not provide a true reflection of trends in NO_2 levels over that timeframe. Also, the reduced traffic levels as a result of the pandemic restrictions in 2020 and 2021 significantly impacted NO_2 concentrations to the extent that any remaining exceedences and "borderline" concentrations i.e. within 10% of the objective (>36 µg/m^3) in the AQMAs disappeared.

The trends in annual mean nitrogen dioxide concentrations in the Kingswood –Warmley and Staple Hill AQMAs are shown in Appendix A and discussed in Section 3.2.1.

Further information on the declared or revoked AQMAs, including maps, are available on the Council website at www.southglos.gov.uk/airquality and on the Defra website at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=238.

Alternatively, Appendix D provides maps of the current AQMAs and the revoked Cribbs Causeway AQMA and also maps of the air quality monitoring locations in relation to the AQMAs.

[34] Proposed Revocation of the Cribbs Causeway Air Quality Management Area - South Gloucestershire Online Consultations (southglos.gov.uk)

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA 2 Kingswood – Warmley	Declared 14 April 2010 Amended 25 May 2012 Amended 16 December 2015	NO2 Annual Mean	The area incorporates A420 road from South Gloucestershire /Bristol City Council boundary in Kingswood extending eastwards to junction of Goldney Avenue in Warmley; to the south along Hanham Road (up to and including The Folly); and to the south-east along Tower Road North to the junction of Crown Gardens; and includes any properties that lie within the outlined boundary.	NO	45.0 µg/m^3 Site 68 at façade in Kingswood AQMA as declared in 2010. NB: no ground floor exposure	34.1 µg/m^3 (2021) 35.9 µg/m^3 (2020) Site 146 at façade in Kingswood – Warmley AQMA 26.7 µg/m^3 (2021) 27.8 µg/m^3 (2020) Site 68 at façade for comparison in former Kingswood AQMA. NB: no ground floor exposure	Air Quality Action Plan for Kingswood and Staple Hill 2012 (Consultation on a new draft Action Plan is anticipated in Autumn 2022)	Visit the 2012 Air Quality Action Plan for Kingswood and Staple Hill

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA 3 Staple Hill	Declared 14 April 2010 Amended 25 May 2012	NO2 Annual Mean	The area incorporates the Broad Street (A4175), High Street (B4465), Victoria Street and Soundwell Road (A4017) crossroads; along Broad Street to the junction with York Road; High Street (up to and including no's 40 and 49); Soundwell Road (up to and including no's 16a and 47); Victoria Street to the junction of Clarence Road; and includes any properties that lie within the outlined boundary.	NO	47.9 µg/m^3 (Site 73 in Staple Hill AQMA as declared in 2010. NB: not distance adjusted, no ground floor exposure)	31.2 µg/m^3 (2021) 28.7 µg/m^3 (2020) (Site 165 at façade in Staple Hill AQMA. NB: no ground floor exposure) (Site 73 for comparison no longer operational from 2020)	Air Quality Action Plan for Kingswood and Staple Hill 2012 (Consultation on a new draft Action Plan is anticipated in Autumn 2022)	Visit the 2012 Air Quality Action Plan for Kingswood and Staple Hill

☒ **South Gloucestershire Council confirm the information on UK-Air regarding their AQMAs is up to date.**

☒ **South Gloucestershire Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in South Gloucestershire

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

(The Council's responses are shown in brackets where appropriate)

The report is well structured and provides much of the information specified in the Guidance. The report is accepted but the following comments are designed to assist with future reporting.

1. *Trends are presented and discussed, and a robust comparison to air quality objectives is provided.*
2. *The Council has taken the decision to add two new diffusion tube sites to their monitoring network in locations considered to be potential hotspots. This decision is supported.*
3. *The Council has provided a list of measures to tackle $PM_{2.5}$ emissions with detailed comments. The Council has reported on Public Health Outcome Framework Indicator D01 in the report which shows approximately 5.2% of deaths attributable to $PM_{2.5}$ within the Council. This figure was based on the 2018 data, it is recommended to report on 2019 data which is now available in next year's report.* (Noted and based on latest data for 2020 for this report)
4. *The Council has plans to renew and update the AQAP based on the extension of the Warmley AQMA. The AQAP was published in 2012 and is past the 5 years review period. Any update on AQAP should be reported in next year's report.* (An update is provided in Section 2.2 of this report)
5. *Distance correction has been carried out for all locations away from relevant exposure for the 2019 monitoring data. However, it should be noted that distance correction is not required for all sites, only sites that have exceeded the AQO limit. Consideration may also be given to sites within 10% of the AQO limit. Please refer to Section 7.78 of LAQM-TG16 for more details.* (Only concentrations above 36 µg/m^3 have been adjusted for this report and at sites where relevant exposure is closer to the road than the monitor)

6. *A consolidated report for monitoring year 2020 and 2021 may be submitted with results for both years discussed in the same report.* (This combined report has been produced accordingly)
7. *Latest template for report can be obtained from Defra's website* *https://laqm.defra.gov.uk/air-quality/annual-reporting/annual-status-report-templates-england-exc-london/.* (The latest 2022 ASR template with Appendix F: Impact of Covid-19 upon LAQM added from 2021 ASR template, has been used for this report in accordance with LAQM Helpdesk advice).

South Gloucestershire Council has taken forward a number of direct measures during the reporting years of 2020 and 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

41 measures are included within Table 2.2, with the type of measure and the progress South Gloucestershire Council have made during the reporting years of 2020 and 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in the 2012 Air Quality Action Plan for Kingswood and Staple Hill[35] and in related plans and strategies, such as the West of England Joint Local Transport Plan 4 (JLTP4) 2020– 2036[36], which is supported by various strategies on public transport, smarter travel choices, cycling and walking and aims to address strategic transport planning in the region. One of the five key objectives within the JLTP4 is to "Take action against climate change and address poor air quality" thereby placing a greater emphasis on air quality and climate change in strategic transport planning through to 2036.

Key completed measures are:

- Under the second round of the Clean Bus Technology Fund, First Bus and CT Plus have retrofitted nearly 150 buses with emissions-reducing technology.
- A £4.79m Office for Low Emission Vehicles (OLEV) funding grant was awarded to the four West of England local authorities and First Bus in August 2017. This funding has enabled the delivery of 98 bio-methane buses and 2 re-fuelling stations

[35] http://www.southglos.gov.uk/documents/cos120094.pdf

[36] https://travelwest.info/projects/joint-local-transport-plan

in the area. The new buses will contribute to reducing air pollution levels across the West of England area, including in the Staple Hill AQMA.

- Entire fleet of Council pool cars switched to electric in 2017, with OLEV funding secured to switch 20% of other fleet vehicles to electric in 2021.
- Access funding secured to 2021, to enable the continuation of school, business and community travel planning measures to promote sustainable travel choices.
- Lighting installed along the Bristol/Bath railway cycle path during 2014/15 and 2015/16. These works will significantly improve conditions for cyclists along this major cycling corridor which also serves the Staple Hill AQMA.
- Local Pinch Point Funding has enabled improvements to the M5 motorway junctions 16 and 17, in order to manage the impact of anticipated development and reduce congestion. Works were completed during 2015/16 and have contributed to reduced nitrogen dioxide concentrations within the former Cribbs Causeway AQMA and should help maintain concentrations below the air quality objective.
- Across South Gloucestershire, as part of the Council response to Covid-19, new walking and cycling measures have been implemented through the DfT Active Travel Fund to enable social distancing and encourage more journeys by active modes. This includes some schemes in and near to the AQMAs and also schemes such as school streets (the closure of roads near schools during drop off/pick up times), the trial pedestrianisation of Thornbury High Street and new cycle routes in Yate (Station Road) and Filton (Southmead Road). Further details are provided in Appendix F.

Other actions progressed in South Gloucestershire and on a wider West of England regional basis aimed at reducing traffic congestion and improving air quality include:

- Kingswood Town Centre Regeneration[37] - WECA funding from the “Love our High Streets” programme enabled investigation into the redevelopment potential of Kingswood High Street, including the possibility of re-routing traffic in Kingswood town centre. A masterplan was developed and consulted on during 2021 and work

[37] https://www.southglos.gov.uk/business/regeneration/love-high-streets-kingswood/

is progressing to refine the options. This work has the potential to improve air quality issues in Kingswood town centre.

- Metrobus - an express bus service, which started operating in 2018, aiming to speed up journey times, relieve congestion, reduce pollution, and give people improved access to key employment, education and leisure destinations[38]. There are currently three metrobus routes in operation; two of which run between South Gloucestershire and Bristol (M1 and M3 services). Proposed additional Metrobus routes are set out within the new JLTP4.
- Cribbs Patchway Metrobus Extension[39] - this extension of the Metrobus network in South Gloucestershire will provide an alternative, fast and direct route between Bristol Parkway railway station and The Mall at Cribbs Causeway. It will benefit communities in Stoke Gifford, Patchway and the forthcoming Cribbs Patchway New Neighbourhood on the former Filton Airfield site. Construction is due to be completed in early 2023.
- MetroWest[40] – improved rail services and infrastructure being delivered in two phases by the West of England councils, working in partnership with Network Rail and Great Western Railway. Phase 1 proposes to re-open the Portishead rail line and to enhance local passenger train services on the Bath to Bristol lines and on the Severn Beach/Avonmouth line, with a planned extension of this line to Bath and Westbury. Phase 2 proposes to re-open the Henbury Line to an hourly spur passenger service and increase train services between Bristol Temple Meads and to Gloucester via Yate to a half-hourly service and includes plans for new rail stations at Henbury, North Filton, Ashley Down and Charfield. Plans for the new rail station at Charfield[41] are being developed with WECA funding.
- Cribbs Patchway New Neighbourhood Cycle Links – a £3.125m package of walking and cycling schemes has been delivered. The aim of this project is to provide walking and cycling infrastructure links to the Cribbs Patchway New Neighbourhood

[38] https://travelwest.info/metrobus

[39] https://beta.southglos.gov.uk/cribbs-patchway-metrobus-extension/

[40] https://travelwest.info/projects/metrowest

[41] https://beta.southglos.gov.uk/charfield-train-station

development site ahead of the completion of the first phase of the development, to encourage more people to choose a sustainable travel mode from the outset.

- GoUltraLowWest[42] - a £7m project grant funded by Office for Low Emission Vehicles (OLEV) to accelerate the purchase of electric vehicles across Bristol, South Gloucestershire, North Somerset and Bath & North East Somerset. All works have now been completed and funding utilised. Key achievements include:
    - Launched a highly successful flagship rapid charging hub at the Bristol and Bath Science Park
    - Supported the conversion of 33 electric vehicles within our own fleet
    - Provided business grants to enable the installation of 73 workplace charging points which have supported over 12,000 staff
    - Worked with North Somerset Council to offer over 140 West of England residents the opportunity to 'try before you buy' through demonstrator electric vehicles
    - Implemented marketing and communications plans to promote EVs and raise awareness of our local network of Revive charging points
    - Installed 46 Revive EV public charging bays
- A38 and Bradley Stoke Way improvements – SGC are developing a scheme along the Thornbury to Bradley Stoke Way corridor aimed at improving conditions for people walking, cycling, and travelling by bus. The aim is to encourage mode shift, reduce carbon emissions and consequently improve air quality. Measures include the provision of sections of bus lane and LTN1/20 standard cycling infrastructure[43]. Funding has been secured to advance the scheme to detailed design and it is envisaged to be open by 2025.
- A432 Yate to Ring Road A4174 Corridor - SGC are developing a scheme along this corridor aimed at improving conditions for people walking, cycling, and travelling by bus and encourage mode shift. Measures included provision of sections of bus lane and LTN1/20 standard cycling infrastructure. It is anticipated that funding will be

[42] https://travelwest.info/drive/electric-vehicles/go-ultra-low-west

[43] https://www.gov.uk/government/publications/cycle-infrastructure-design-ltn-120

secured from WECA to advance the scheme to detailed design; it is envisaged to be open by 2025.

- South Gloucestershire Electric Vehicle (EV) Charging Strategy – SGC is consulting[44] on its first draft EV charging strategy[45] until 3 October 2022. If adopted, the strategy aims to support residents transitioning to EVs through a variety of measures, including the expansion of public charging infrastructure provision through the implementation of our 'Community Hubs' schemes; supporting the creation of e-mobility hubs, including the introduction of electric car clubs; exploring opportunities to encourage the provision of EV charging at workplaces and requiring new developments to adequately cater for EVs.

South Gloucestershire Council will also continue to engage with Bristol City Council and Bath and North East Somerset Council on their Clean Air Plans, through meetings organised by the West of England Combined Authority (WECA). Further information about the Bristol Clean Air Plan is available on the Clean Air for Bristol website[46] and for the Bath Clean Air Plan, on the Bath Breathes website[47].

The Bath Clean Air Zone (CAZ) launched on 15 March 2021 and is a class C CAZ charging high-emission buses, coaches, taxis, private hire vehicles, heavy goods vehicles, vans and minibuses to travel through the zone but not private cars and motorbikes. The Bristol CAZ is planned to start on 28 November 2022[48] and, as a Class D CAZ, will charge for private cars in addition to the vehicles listed above for the Class C CAZ. The Government's Vehicle Checker tool[49] can be used to check whether there is (or will be) a charge to drive any particular vehicle in either CAZ Check your vehicle (GOV.UK).

A4174 Hambrook Air Quality Action Update

Following the Government's UK Air Quality Plan[50] for nitrogen dioxide published in July 2017, South Gloucestershire Council was mandated by the Government in February 2018

[44] https://consultations.southglos.gov.uk/EVChargingStrategy/consultationHome

[45] South Gloucestershire Electric Vehicle Charging Draft Strategy.pdf (southglos.gov.uk)

[46] https://www.cleanairforbristol.org/

[47] http://www.bathnes.gov.uk/bath-breathes-2021

[48] https://www.bristol.gov.uk/residents/streets-travel/bristols-caz

[49] https://www.gov.uk/clean-air-zones

[50] https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017

to undertake a Targeted Feasibility Study. The study was required to identify actions that could be taken to reduce roadside nitrogen dioxide levels on the A4174 Ring Road between the A4017 Bromley Heath and M32 Junction 1 roundabouts to meet the annual mean NO_2 concentration limit (40 µg/m^3) as set out in the Air Quality Standards Regulations 2010[51]), in the shortest time possible.

The study concluded that it would be possible to bring forward compliance on this section of the A4174 if certain traffic management measures were put in place at the Hambrook junction. The outcome of the study was approved by the Joint Air Quality Unit (JAQU); a joint unit formed between Defra and the Department for Transport (DfT). The feasibility studies of all 33 mandated authorities in the "third wave" of Government air quality action were used to develop the supplement[52] to the 2017 UK Air Quality Plan and were also published separately by Defra[53].

The Council was subsequently legally directed through a further Ministerial Direction to implement the identified measures with full funding provided by JAQU. The following measures, also shown in Figure 2.1 –, were implemented at the A4174 Hambrook junction on a trial basis through an Experimental Traffic Order (ETO) in August 2019:

- Removal of the right turn facility onto the B4058 from the westbound carriageway of the A4174 ring road
- Removal of the straight on movement for the B4058 northbound from Frenchay
- Removal of the right turn facility from the B4058 from Frenchay onto the A4174
- Removal of the westbound bus lane on the A4174 through the junction to the M32 traffic signals

An ETO allows a trial for a period up to 18 months so that the effectiveness of the measures can be considered before a decision is taken on whether to implement them permanently. Orders are subject to a statutory process which allows the public to comment formally and provide feedback. The consultation ran until 11 February 2020 on the Council website[54].

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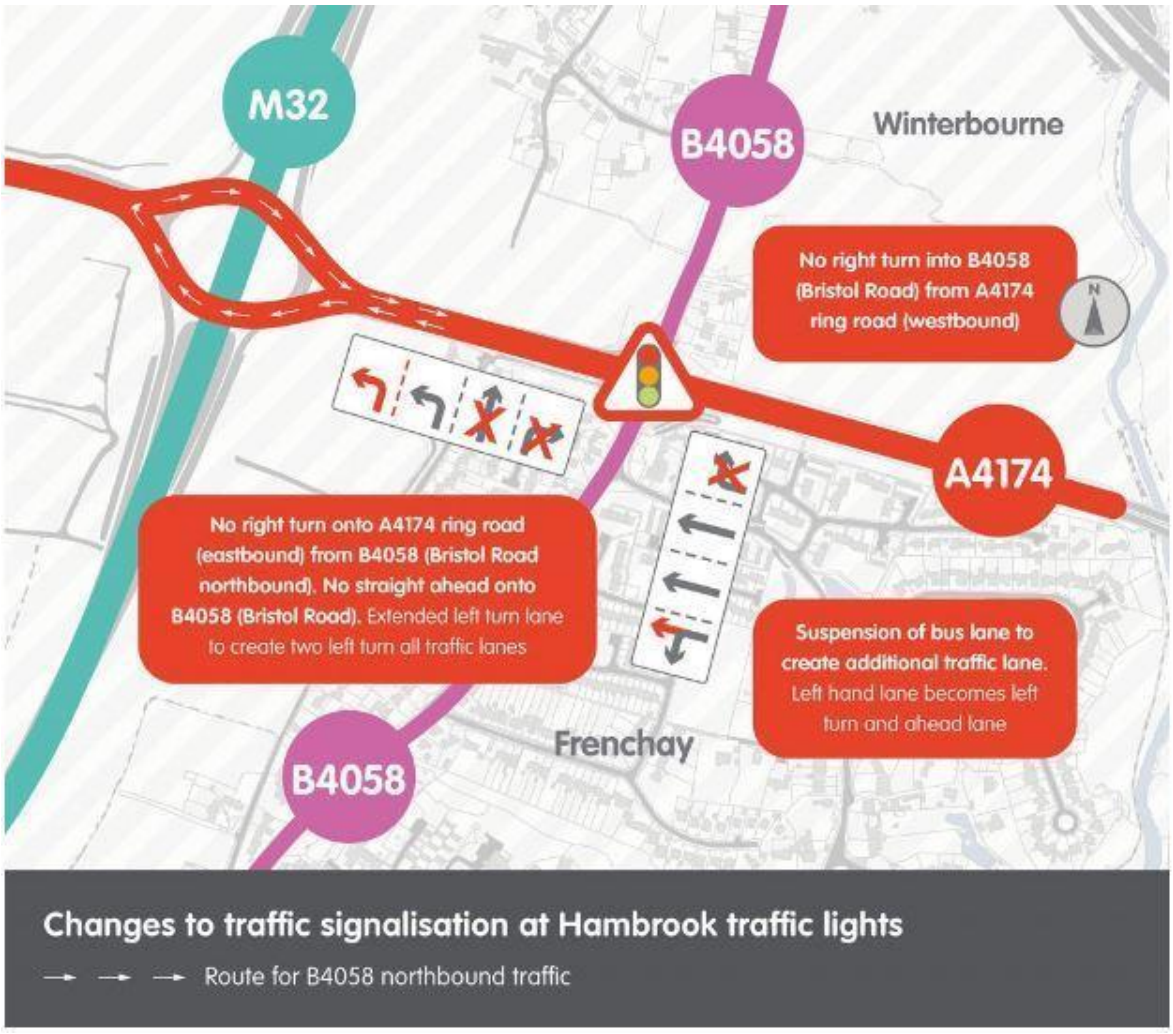
[51] https://uk-air.defra.gov.uk/air-pollution/uk-eu-policy-context

[52] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/746100/air-quality-no2-plan-supplement.pdf

[53] https://uk-air.defra.gov.uk/library/no2ten/2018-la-tfs-documents

[54] https://consultations.southglos.gov.uk/consult.ti/PT.6296_Hambrook_E.T.O/consultationHome

Figure 2.1 – Traffic measures at A4174 Hambrook junction



Additional monitoring was set up at the roadside for the purposes of the trial to monitor the impact of the traffic restrictions at the junction. This is because the NO_2 annual mean limit value applies where there is public access (with some exceptions), so includes pedestrian and cycle paths. However, the national (UK) air quality objectives, which form the basis of the Local Air Quality Management framework, take “relevant exposure” into consideration with the objectives applying where the public are regularly present for the averaging period of the objective; so relevant exposure for the national annual mean NO_2 objective generally relates to long-term exposure, such as at the façades of residential properties and care homes but also schools and hospitals.

The Council has been monitoring nitrogen dioxide levels where people live near this junction for some years in line with LAQM requirements. These results show that the levels are below the national air quality objectives where people live. This is mainly because the houses are set back from the road and pollutant concentrations quickly drop off with increasing distance from the roadside.

Unfortunately, we have not been able to assess the effectiveness of the scheme during the trial period because of the impact of the Covid-19 pandemic restrictions on traffic levels, which were much reduced during 2020, and are therefore not representative of "normal" traffic conditions. These impacts continued into 2021 so traffic levels are potentially still not representative of normal conditions. Consequently, the Council has not been released from the Ministerial Direction to reduce roadside nitrogen dioxide levels at this location and have been instructed by the Government's Joint Air Quality Unit to continue monitoring as we continue to return to more normal traffic conditions.

Further information about the scheme and consultation on the scheme's possible future format will be published in due course on the Council's website at: https://beta.southglos.gov.uk/hambrook-lights-changes-to-traffic-movements.

Air Quality and Public Health Progress

Work continued to progress the alignment of the air quality agenda and public health outcomes during 2020 and 2021 despite the work pressures caused by the Covid-19 pandemic.

The Joint Strategic Needs Assessment (JSNA) is being renewed in 2022 and continues to recognise the wider determinants of health. It also highlights the links between access to green space, active travel and sustainable transport and the mutual benefits of these for both mental and physical health.

The South Gloucestershire Joint Health and Wellbeing Strategy 2021 - 2025[55] was updated and approved by the Health and Wellbeing Board in 2021. The strategy is a refresh of the previous (2017 – 2021) Strategy and maintains a focus on the four previous priority areas for collective action, renamed the "strategic objectives". One of these is to "Maximise the potential of our built and natural environment to enable healthy lifestyles and prevent disease".

The development of the Joint Health and Wellbeing Strategy involved increased community engagement and insights following the Covid-19 pandemic and recognises that tackling the wider determinants of health and inequalities are key factors in improving health outcomes.

[55] Joint Health and Wellbeing Strategy 2021-25 | BETA - South Gloucestershire Council (southglos.gov.uk)

The Strategy contains the practical actions that all Health and Wellbeing Board member organisations should follow, including:

- Show that their work, including estate and land holdings contribute to reducing pollution.
- Support and maximise use of active travel options and community transport services.

Progress to achieve the strategic objectives will be monitored and evidence supporting the actions will be reviewed in turn at quarterly Health and Wellbeing Board meetings.

The continued commitment of resource from the Public Health team into built environment and air quality work, recognises the importance of this work in terms of public health. The Public Health team previously entered into a partnership with the University of the West of England to provide placements for public health registrars specialising in health and the built environment and continues to support this, however, there has been no application for this placement since 2020.

A succession of public health registrars have led on clean air work, including the development of a South Gloucestershire Clean Air Strategy, which was approved by the Council in July 2020. Subsequently, a jointly funded Senior Air Quality Project Officer post was established to produce a new Clean Air Action Plan, developed within LAQM statutory requirements but also encompassing some wider ambition across South Gloucestershire in relation to clean air. This work has been ongoing during 2021 – 2022. Unfortunately, the post is now vacant and so resource from the wider Environmental Health and Public Health teams is being utilised to progress the action plan and strategy through public consultation.

The consultation, which is anticipated to be undertaken in Autumn 2022, will seek the views of the public and businesses who may be affected by the actions and incorporate their views where appropriate, to help shape the final Clean Air Action Plan. The actions will seek to support the priorities set out in the Council Plan 2020 -2024[56] and build on the co-benefits realised as a result of Covid-19 restrictions, such as the Emergency Active Travel Schemes that were implemented in 2020 (see Appendix F for further details).

[56] https://beta.southglos.gov.uk/publications/council-plan-2020-2024/

The Clean Air and Climate Change Board continues to oversee both the strategy and action plan. The Clean Air and Climate Change Board continues to be co-chaired by the Executive Director of Place (formerly Director of Environment and Community Services) and the Director of Public Health and also covers the Council's work on Climate Change. This ensures a joined-up approach across the two work areas, which are closely interlinked with often the same sources and interventions and secures alignment with the Council's existing Climate Change Strategy[57].

Officers within the Public Health team retain links to a wider West of England group to ensure that public health issues, including air quality, continue to be considered during the development of strategic plans by the West of England Combined Authority. Any future regional strategy will be underpinned by the emerging South Gloucestershire Council Local Plan[58] which will provide further opportunity to recommend policies to improve air quality.

South Gloucestershire Council continues to work in close partnership with its neighbouring local authorities and the West of England Combined Authority to develop, implement and refine schemes with cross-boundary characteristics. The Council also continues to work closely with JAQU regarding the Hambrook Air Quality Scheme.

South Gloucestershire Council's priorities for the coming year are to:

- Produce the final Clean Air Action Plan following public consultation and seek formal approval of the CAAP to enable implementation of the actions to begin to improve air quality within the AQMAs and across South Gloucestershire as a whole.
- Continue to monitor and assess the effectiveness of the JAQU directed scheme on the A4174 at Hambrook in achieving compliance with the annual mean NO_2 limit value, as traffic conditions return to "normal".

The principal challenges and barriers to implementation that South Gloucestershire Council anticipates facing are:

- Significant continued pressure on local government funding, exacerbated by the Covid-19 pandemic and the energy crisis, which could impact on delivering air

[57] https://www.southglos.gov.uk//documents/Climate-Change-Strategy-201823-Final-sgc-signed-v1.pdf

[58] https://beta.southglos.gov.uk/new-local-plan/

quality improvements, including funding for the actual Clean Air Action Plan measures themselves.

- The uncertainties arising from the Covid-19 pandemic has impacted travel patterns and traffic volumes. Many organisations offer their office staff the ability to work from home for all or part of their contracted hours, reducing demand levels on the network. However, the acceleration in the popularity of home delivery services has increased the number of delivery vehicles on the road.
- Public transport usage continues to be well below pre-Covid-19 pandemic levels, which is impacting on the commercial viability of some bus routes with operators responding by reducing or withdrawing services. This makes it harder for travellers to choose sustainable modes of transport over the private car.
- With the increased uptake of electric powered vehicles being constrained by cost of living and supply chain issues, the knock-on impacts on fleet composition and future trends in pollutant concentrations is difficult to predict.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, South Gloucestershire Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of the Kingswood - Warmley and Staple Hill AQMAs. However, the proposed new Clean Air Quality Action Plan should significantly help, if the resource and funding is made available to deliver the new proposed actions.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
KS1	Travel Plan for Kingswood Civic Centre	Promoting Travel Alternatives	Workplace Travel Planning	2012		South Gloucestershire Council	Local Transport Capital Programme (LTCP)	NO	Funded	£10k - 50k	Completed	No specific target emissions reduction.	• Reduction in solo occupancy vehicles • Increased cycling levels • Increased walking levels	Action complete. Implementation of travel plan is continuous process.	
KS2	Parking review (Kingswood)	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2015/16	2015/16	South Gloucestershire Council	LTCP	NO	Funded	£10k - 50k	Completed	None, impact considered too small to be measurable.	• Road safety benefits • Reduced congestion	Initial parking review implemented in 2015/16 Following 2nd review three additional waiting restriction schemes delivered. An electric vehicle charging point with 2 vehicle capacity has been installed at Cecil Road car park in Kingswood.	
KS3	Ensure air quality is a priority in development of transport schemes (Kingswood)	Transport Planning and Infrastructure	Other	2013/14	2013	South Gloucestershire Council	LTCP	NO	Funded		Completed	No specific target emissions reduction.	Number of actions taken forward within Capital Programme	The prioritisation framework for the Local Transport Capital Programme (LTCP) was reviewed in 2013, and now includes an assessment of the contribution to meeting LTP carbon emissions/air quality goals.	
KS4	Bus partnership (Kingswood) Working with operators to address AQ issues	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2013		South Gloucestershire Council in partnership with bus operators and neighbouring local authorities	OLEV Grant	NO	Funded	£1 million - £10 million	Completed	No specific target emissions reduction.	Number of buses replaced for lower emission vehicles	The £4.79m OLEV funding for bio-methane buses has enabled the delivery of 98 buses and 2 re-fuelling stations in the area. The latest round of Clean Bus Technology Fund (CBTF) enabled 149 buses to be retrofitted with cleaner engines.	
KS5	Review of Council Fleet to ensure lowest emission vehicles (Kingswood)	Vehicle Fleet Efficiency	Other	2016		South Gloucestershire Council	OLEV Grant	NO	Partially Funded	£100k - £500k	Implementation	No specific target emissions reduction.	Reduction in vehicle emissions	The Council has continued to introduce low or zero emission vehicles into its Fleet. All replacement vehicles introduced into the fleet meet or better the latest emission standards. The Council has also been successful in reducing its overall Fleet size. We have	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														conducted base line assessments of CO2 emissions across the fleet to assist in targeting future emissions reductions. The Council has also introduced further charging infrastructure to allow the introduction of more electric or hybrid vehicles.	
KS6	Promotion of more efficient use of taxi ranks and bus stops (Kingswood).	Vehicle Fleet Efficiency	Driver training and ECO driving aids	2013		South Gloucestershire Council in liaison with taxi operators and bus operators	Local Transport Capital Programme (LTCP)	NO	Funded	£10k - 50k	Completed	No specific target emissions reduction.	Number of bus/taxi operators signed up to programme	Bus lay-by and taxi bay on Regent Street altered to improve traffic flow in June 2013. First Bus regularly review vehicle timing points to remove excessive idling times. The Council continues to work with local bus and taxi operators to encourage the transition of fleets to low emission vehicles.	
KS7	Ensure adequate landscaping is considered within new planning applications and urban designs (Kingswood)	Policy Guidance and Development Control	Other policy	2013	2013	South Gloucestershire Council	Council Funds	NO	Funded	£10k - 50k	Completed	No specific target emissions reduction.	Number of new trees planted. NB: Data relating to the indicator for this measure is not currently available.	Policies CS2 and CS9 within the Councils adopted Core Strategy set out how Green Infrastructure and the natural environment is to be planned, delivered and managed within proposed development. Planting schemes using Council own funds have been completed.	
KS8	Promotion of VOSA Smoky Vehicle Hotline (Kingswood)	Public Information	Via the Internet	2013	2013	South Gloucestershire Council	n/a	NO	Funded	< £10k	Completed	No specific target emissions reduction.	Number of vehicles reported to VOSA (data not currently available).	Information added to the Council's website on the Exhaust emissions testing and Improving air quality webpages.	
KM1	School travel planning (Kingswood)	Promoting Travel Alternatives	School Travel Plans	2013		South Gloucestershire Council in conjunction with local schools	DfT Grant Funding	NO	Funded	£500k - £1 million	Implementation	No specific target emissions reduction.	'Hands up' surveys within participating schools indicate mode share for pupils arriving at school.	A series of interventions undertaken annually with LSTF, STTY and Access West funding since 2013 to promote sustainable travel in schools. The Road Safety Team works with schools to promote active travel across the region, including a school street scheme at Kings Oak Academy.	Further progress subject to funding availability.
KM2	Travel planning for Kingswood Town Centre (Kingswood)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2013		South Gloucestershire Council in conjunction with Kingswood	DfT Grant Funding	NO	Funded	£500k - £1 million	Implementation	No specific target emissions reduction.	Measured by increased: • Cycling levels • Bus	Measures to encourage sustainable travel were previously delivered through LSTF and STTY projects and	Further progress subject to funding availability.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
						Business Association DfT Grant Funding							patronage • Walking levels	continue with Access West. In March 2020, the DfT confirmed funding to March 2021 (Access West Y4) to continue to work with Businesses, Schools and Communities to promote and support sustainable and active travel choices. Capability Fund has followed Access West Y4 and started mobilising Q3 2021 – due to complete at the end of Q2 2022. Again, this builds on the previous work completed by Access West.	
KM3	Review bus terminals and timing points (Kingswood)	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2014/15	2014/15	South Gloucestershire Council in conjunction with bus operators	Undertaken by operators	NO	Funded	< £10k	Implementation	No specific target emissions reduction.	Reduction in number of buses idling at bus stops	Review of bus network to reduce number of services terminating in AQMA. Bus stop infrastructure and parking review schemes to improve traffic flow.	
KM4	Smarter Choices promotions/ roadshows (Kingswood)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2014		South Gloucestershire Council	DfT Grant Funding	NO	Funded	£500k - £1 million	Implementation	No specific target emissions reduction.	Measured by increased: • Cycling levels • Bus patronage • Walking levels Also measure by number of proactive events	The Access West project (finished March 2020) built on work delivered through LSTF and STTY, working with Businesses, Schools and Communities across South Gloucestershire to promote and support sustainable and active travel modes. Access West Yr 4 ran through 2020. Large elements of the project had to be adapted quickly in response to Covid-19 restrictions and the impact on travel and engagement work. The Project continued to run the Wheels to Work Project and the Kingswood One Stop Shop was one of the key partners. The Communities Team also continued work by Southern Brooks in uploading the Discover Guide for Kingswood to the Around Your Way microsite for promoting the local area and encouraging active	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														travel modes. The Capability Fund followed Access West Y4 and started mobilising Q3 2021 (due to complete end of Q2 2022). This continued the work of Access West providing support to encourage sustainable and active travel modes across SGC.	
KM5	Cycling infrastructure (Kingswood)	Transport Planning and Infrastructure	Cycle network	2015		South Gloucestershire Council	LTCP and DfT Grant Funding	NO	Partially Funded	£1 million - £10 million	Planning	No specific target emissions reduction.	Increases in numbers of cyclists.	Priority routes in the area have been identified through the Local Cycling and Walking Infrastructure Plan (LCWIP) adopted by WECA in 2020.	Further progress subject to funding availability.
KL1	ECO Stars Fleet Recognition Scheme (Kingswood)	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	n/a		South Gloucestershire Council	Unknown at Present	NO	Not Funded		Planning	No specific target emissions reduction.	Membership numbers.	Not currently feasible to implement due to resource availability. Progression of this action is unlikely but will be reviewed as part of AQAP review.	Resource availability currently prevents implementation
KL2	Car club (Kingswood)	Alternatives to private vehicle use	Car Clubs	n/a		South Gloucestershire Council	Unknown at Present	NO	Not Funded	£50k - £100k	Planning	No specific target emissions reduction	Car club membership	Discussions held in the past with car club operators failed to firm commitment. May be considered as part of the on-going regeneration of the Kingswood shopping area.	
KL3	Restrict traffic turning movements onto A420 (Kingswood)	Traffic Management	UTC, Congestion management, traffic reduction	n/a		South Gloucestershire Council	LTCP	NO	Partially Funded		Aborted	No specific target emissions reduction	Reduction in volume of traffic travelling towards and along A420	Traffic modelling was undertaken to test options commissioned to assess impact of LTCP and developer proposals upon air quality, however no measures were identified that improved the flow of traffic.	
KL4	Review traffic signal numbers and operations (Kingswood)	Traffic Management	UTC, Congestion management, traffic reduction	2014		South Gloucestershire Council	LTCP	NO	Partially Funded		Planning	No specific target emissions reduction.	Improved traffic speeds and reduced congestion	MOVA signalling system has been installed at 3 junctions in the AQMA to improve traffic flow. A review of mid-block pedestrian signals within the AQMA was undertaken in 2014 and recommended the removal of 1 or 2 pedestrian crossings from Kingswood High Street. The on-going regeneration of Kingswood will make	Implementation dependant on securing funding.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														substantial changes to traffic flow and access arrangements.	
KL5	Review of delivery bays (Kingswood)	Freight and Delivery Management	Delivery and Service plans	2016/17	2016/17	South Gloucestershire Council	LTCP	NO	Funded	£50k - £100k	Completed	No specific target emissions reduction	• Number of reported issues with delivery bays • Reduced congestion	Entry and exit kerbing into delivery bays on the High Street have been adjusted to allow easier access and reduce delays and traffic queues. A signing review of delivery bays was completed in 2016/17.	
KL6	Controlled deliveries/ collections (Kingswood)	Freight and Delivery Management	Freight Consolidation Centre	n/a		South Gloucestershire Council	Unknown at Present	NO	Not Funded		Planning	No specific target emissions reduction	Number of delivery & collection agreements made with businesses	This action will be reviewed as part of work to update the action plan, and will either be included within the new plan, or closed if considered no longer appropriate.	
KL7	Reclassify strategic routes and signing strategy (Kingswood)	Traffic Management	Other	n/a		South Gloucestershire Council	Unknown at Present	NO	Not Funded		Planning	No specific target emissions reduction	Reduction in traffic volumes on and travelling towards A420	This action will be reviewed as part of work to update the action plan, and will either be included within the new plan, or closed if considered no longer appropriate.	
KL8	Taxi ranks (Kingswood)	Promoting Low Emission Transport	Taxi emission incentives	n/a		South Gloucestershire Council in conjunction with taxi operators	Unknown at Present	NO	Not Funded		Planning	No specific target emissions reduction	Production of review report	This action will be reviewed as part of work to update the action plan, and will either be included within the new plan, or closed if considered no longer appropriate.	
CR39/ 2013	Improved pedestrian crossing facilities at High St/ Alma Rd	Promoting Travel Alternatives	Promotion of walking	2015/16	2015/16	South Gloucestershire Council	LTCP	NO	Funded	£100k - £500k	Completed	No specific target emissions reduction	Implement infrastructure improvements to promote walking	Scheme added to the Council's Local Transport Capital Programme using the scheme prioritisation framework (see Action KS3). Following design and public consultation the scheme was implemented in 2015/16.	
SS1	Ensure air quality is a priority in development of transport schemes (Staple Hill)	Transport Planning and Infrastructure	Other	2013	2013	South Gloucestershire Council	LTCP	NO	Funded	< £10k	Completed	No specific target emissions reduction	Number of actions taken forward within Capital Programme	The prioritisation framework for the Local Transport Capital Programme (LTCP) was reviewed in 2013, and now includes an assessment of the contribution to meeting LTP carbon emissions/air quality goals.	

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SS2	Bus partnership (Staple Hill) Working with operators to address AQ issues	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2013		South Gloucestershire Council in partnership with bus operators	OLEV Grant	NO	Funded	£1 million - £10 million	Completed	No specific target emissions reduction	Number of buses replaced for lower emission vehicles.	The £4.79m OLEV funding for bio-methane buses has enabled the delivery of 98 buses and 2 re-fuelling stations in the area. The latest round of Clean Bus Technology Fund (CBTF) has enabled 149 buses to be retrofitted with cleaner engines.	
SS3	Review of Council Fleet to ensure lowest emission vehicles (Staple Hill)	Vehicle Fleet Efficiency	Other	2016		South Gloucestershire Council	OLEV Grant	NO	Partially Funded	£100k - £500k	Implementation	No specific target emissions reduction. .	Reduction in vehicle emissions	The Council has continued to introduce low or zero emission vehicles into its Fleet. All replacement vehicles introduced into the fleet meet or better the latest emission standards. The Council has also been successful in reducing its overall Fleet size. We have conducted base line assessments of CO2 emissions across the fleet to assist in targeting future emissions reductions. The Council has also introduced further charging infrastructure to allow the introduction of more electric or hybrid vehicles.	
SS4	Promotion of more efficient use of taxi ranks and bus stops (Staple Hill)	Vehicle Fleet Efficiency	Driver training and ECO driving aids	2015		South Gloucestershire Council in liaison with taxi operators and bus operators	LTCP	NO	Funded	< £10k	Implementation	No specific target emissions reduction	Number of bus/taxi operators signed up to programme	The parking review as part of SM4 is complete. First Bus regularly review vehicle timing points to remove excessive idling times. The Council continues to work with local bus and taxi operators to encourage the transition of fleets to low emission vehicles.	
SS5	Ensure adequate landscaping is considered within new planning applications and urban designs (Staple Hill)	Policy Guidance and Development Control	Other policy	2013	2013	South Gloucestershire Council	Council Funds	NO	Funded	£10k - 50k	Completed	No specific target emissions reduction.	Number of new trees planted. NB: Data relating to the indicator for this measure is not currently available.	Policies CS2 and CS9 within the Councils adopted Core Strategy set out how Green Infrastructure and the natural environment is to be planned, delivered and managed within proposed development. Planting schemes using Council own funds have been completed.	

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SS6	Promotion of VOSA Smoky Vehicle Hotline (Staple Hill)	Public Information	Via the Internet	2013	2013	South Gloucestershire Council	n/a	NO	Funded	< £10k	Completed	No specific target emissions reduction.	Number of vehicles reported to VOSA (data not currently available).	Information added to the Council's website on the Exhaust emissions testing and Improving air quality webpages.	
SM1	School travel planning (Staple Hill)	Promoting Travel Alternatives	School Travel Plans	2013		South Gloucestershire Council in conjunction with local schools	DfT Grant funding	NO	Funded	£500k - £1 million	Implementation	No specific target emissions reduction.	'Hands up' surveys within participating schools indicate mode share for pupils arriving at school.	A series of interventions undertaken annually with LSTF, STTY and Access West funding since 2013 to promote sustainable travel in schools.	Further progress subject to funding availability.
SM2	Travel planning for Staple Hill Town Centre	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2014		South Gloucestershire Council in conjunction with Staple Hill Chamber of Trade	DfT Grant funding	NO	Funded	£500k - £1 million	Implementation	No specific target emissions reduction.	Measured by increased: • Cycling levels • Bus patronage • Walking levels	Measures to encourage sustainable travel were previously delivered through LSTF and STTY projects and continue with Access West. In March 2020, the DfT confirmed funding to March 2021 to continue to work with Businesses, Schools and Communities to promote and support sustainable and active travel choices.	Further progress subject to funding availability.
SM3	Relocation of bus stops on Soundwell Road (Staple Hill)	Traffic Management	UTC, Congestion management, traffic reduction	n/a		South Gloucestershire Council	LTCP	NO	Partially Funded		Aborted	No specific target emissions reduction.	Measured by relocation of bus stop	Bus stop locations reviewed when the shelters were replaced, but due to site constraints a better location could not be found. Action closed, as the bus stops are unable to be re-located.	
SM4	Parking Review (Staple Hill)	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2014/15	2014/15	South Gloucestershire Council	LTCP	NO	Funded	£50k - £100k	Completed	Impact of action considered too small to be measurable.	Measured by: • Road safety benefits • Reduced congestion	A new electric vehicle charging point with 2 vehicle capacity has been installed at Haynes Lane car park in Staple Hill. A review of parking restrictions within Staple Hill was undertaken. The resulting scheme was delivered as part of the 2014/15 local transport capital programme. Any subsequent issues have been addressed in a further review which is also now complete.	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
SM5	Smarter Choices promotions /roadshows (Staple Hill)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2014		South Gloucestershire Council	DfT Grant Funding	NO	Funded	£500k - £1 million	Completed	No specific target emissions reduction.	Measured by increased: • Cycling levels • Bus patronage • Walking levels Also measure by number of proactive events	The Access West project (finished March 2020) built on work delivered through LSTF and STTY, working with Businesses, Schools and Communities across South Gloucestershire to promote and support sustainable and active travel modes. Access West Yr 4 ran through 2020. Large elements of the project had to be adapted quickly in response to Covid-19 restrictions and the impact on travel and engagement work. The Capability Fund followed Access West Y4 and started mobilising Q3 2021 (due to complete end of Q2 2022). This continued the work of Access West providing support to encourage sustainable and active travel modes across SGC.	
SM6	Cycling infrastructure (Staple Hill)	Transport Planning and Infrastructure	Cycle network	2014-16		South Gloucestershire Council	DfT Grant funding	NO	Partially Funded	£1 million - £10 million	Implementation	No specific target emissions reduction.	Increases in numbers of cyclists.	Two grant funded cycle route lighting schemes were implemented nearby between 2014 and 2016. More recently priority routes in the area have been identified through the Local Cycling and Walking Infrastructure Plan (LCWIP) adopted by WECA in 2020.	Further progress subject to funding availability.
SL1	ECO Stars Fleet Recognition Scheme (Staple Hill)	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	n/a		South Gloucestershire Council	Unknown at Present	NO	Not Funded		Planning	No specific target emissions reduction.	Membership numbers.	Not currently feasible to implement due to resource availability. Progression of this action is unlikely for the foreseeable future but will be reviewed as part of AQMA extension review.	Resource availability currently prevents implementation
SL2	Car club (Staple Hill)	Alternatives to private vehicle use	Car Clubs	n/a	2023	South Gloucestershire Council	Unknown at Present	NO	Not Funded	£50k - £100k	Planning	No specific target emissions reduction	Car club membership	Progress was delayed due to the Covid19 pandemic. Discussions with operator have now resumed with service level agreements being negotiated. Expectation that site will launch by summer 2023.	

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
SL3	Review traffic signal numbers and operations (Staple Hill)	Traffic Management	UTC, Congestion management, traffic reduction	2012-13	2013/14	South Gloucestershire Council	Defra Grant funding/ LTCP	YES	Funded		Completed	No specific target emissions reduction.	Improved traffic speeds and reduced congestion	Traffic signals reviewed and amended at the junction of A4175 Broad Street/A4017 Victoria Street in 2012. Upgrading of the traffic signals at the Pendennis Road and Acacia Road junction was completed in 2013, using DEFRA grant.	
SL4	Review of delivery bays (Staple Hill)	Freight and Delivery Management	Delivery and Service plans	2013/14	2013/14	South Gloucestershire Council	LTCP	NO	Funded		Completed	No specific target emissions reduction	Measured by • Number of reported issues with delivery bays • Reduced congestion	This action was programmed as part of the Local Transport capital programme. The parking review completed in 2013/14 under SM4 including the review of delivery bays.	
SL5	Restrict traffic turning movements at A4017 junction (Staple Hill)	Traffic Management	UTC, Congestion management, traffic reduction	n/a		South Gloucestershire Council	Unknown at Present	NO	Not Funded		Planning	No specific target emissions reduction	Measured by reduction in traffic volumes at A4017 junction	This action will be reviewed as part of work to update the action plan, and will either be included within the new plan, or closed if considered no longer appropriate	
SL6	Controlled deliveries/ collections (Staple Hill)	Freight and Delivery Management	Freight Consolidation Centre	n/a		South Gloucestershire Council	Unknown at Present	NO	Not Funded		Planning	No specific target emissions reduction	Measured by number of delivery & collection agreements made with businesses	This action will be reviewed as part of work to update the action plan, and will either be included within the new plan, or closed if considered no longer appropriate	
SL7	Reclassify strategic routes and signing strategy (Staple Hill)	Traffic Management	Other	n/a		South Gloucestershire Council	Unknown at Present	NO	Not Funded		Planning	No specific target emissions reduction	Measured by reduction in traffic volumes on and travelling towards A4017.	This action will be reviewed as part of work to update the action plan, and will either be included within the new plan, or closed if considered no longer appropriate	

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

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

The inclusion of indicators related to $PM_{2.5}$ in the Public Health Outcomes Framework (PHOF) highlights the significance of this pollutant and its health impacts.

The detail of one of these indicators (formerly known as D01) changed in May 2022. It was previously described as:

> *Fraction of all cause adult mortality attributable to anthropogenic (originating from human activity) particulate air pollution (measured as fine particulate matter $PM_{2.5}$).*

This has now been amended to:

> *Fraction of all cause adult mortality attributable to particulate air pollution (concentrations of total $PM_{2.5}$) (new method)*

The previous indicator was based on estimates of mortality burden from modelled annual average concentrations of fine particulate matter ($PM_{2.5}$) originating from human activities in each local authority area.

The indicator has been amended based on recommendations made by the Committee on the Medical Effects of Air Pollutants (COMEAP). Total concentrations of $PM_{2.5}$, referred to as fine particulate matter, are now used as the basis for this indicator. Modelled concentrations of the anthropogenic component of PM2.5 (human-made only) are no longer used because of the uncertainty associated with the assignment to anthropogenic and non-anthropogenic sources, and because non-anthropogenic sources make only a small contribution to total concentrations.

The new indicator can be viewed as the mortality burden associated with long-term exposure to particulate air pollution at current levels, expressed as the percentage of annual deaths from all causes in those aged 30 and over.

The PHOF Indicator; Fraction of mortality attributable to particulate air pollution (new method) 2020[59] for South Gloucestershire compared to the neighbouring West of England local authorities, the South West and England values are shown in Table 2.3.

Table 2.3 – PHOF Indicator - Fraction of mortality attributable to particulate air pollution (new method) 2020

Area	Value (%)
England	5.6
South West Region	5.2
South Gloucestershire	5.9
Bristol	6.1
North Somerset	5.1
Bath and North East Somerset	5.4

Furthermore, the total concentration of $PM_{2.5}$ has been added as an additional PHOF indicator:

Air Pollution: fine particulate matter (new method – concentrations of total $PM_{2.5}$)

The new PHOF indicator; Concentrations of total $PM_{2.5}$ (2020)[60] for South Gloucestershire, neighbouring local authorities, the South West and England are shown in Table 2.4.

Both indicators are reported in the Public Health Outcomes Framework with the caveat that the data covers the 2020 Covid-19 pandemic period and should therefore be interpreted with caution, especially in relation to the attributable fraction to mortality.

[59] Public health profiles - OHID (phe.org.uk)

[60] Public health profiles - OHID (phe.org.uk)

Table 2.4 – PHOF Indicator - Concentrations of total $PM_{2.5}$ (2020)

Area	Value (micrograms/m^3)
England	7.5
South West Region	7.0
South Gloucestershire	7.9
Bristol	8.2
North Somerset	6.8
Bath and North East Somerset	7.2

Public Health Intelligence Portal

In 2022, the Public Health Team in South Gloucestershire Council developed a Public Health Intelligence Portal[61] which is a one-stop shop for data and intelligence on the population of South Gloucestershire. The portal forms part of the South Gloucestershire Health and Wellbeing Board's Joint Strategic Needs Assessment (JSNA). Its purpose is to use data and intelligence to provide a current and comprehensive overview of the health and wellbeing of the South Gloucestershire population, framed in the context of health inequalities and local strategies. The portal utilises data from the Public Health Outcomes Framework, including the data on fine particulate matter detailed above. This ensures that this data is drawn to the attention of those using the portal and also provides a context in which the data can be used, to support a range of work both across and outside the council.

South Gloucestershire Council is also taking the following measures to address $PM_{2.5}$:

- The progress made in implementing measures in the existing Air Quality Action Plan, as detailed in Section 2.2, will contribute to reducing emissions and concentrations of $PM_{2.5}$ as while the measures are primarily aimed at reducing nitrogen dioxide, road

[61] Population Health Intelligence Portal | BETA - South Gloucestershire Council (southglos.gov.uk)

traffic is also a source of particulate matter so the implementation of measures will have co-benefits.

- Alongside measures to tackle nitrogen dioxide in the new Clean Air Action Plan, reducing emissions and concentrations of $PM_{2.5}$ has been considered. The Council understands the potential co-benefits of action plan measures on multiple pollutants of concern and has followed appropriate guidance in developing the new CAAP to include measures that are likely to be beneficial in reducing $PM_{2.5}$ levels (in addition to other pollutants).
- The wider regional transport initiatives, such as Metrobus[62] and the Cribbs Patchway Metrobus Extension[63], will contribute to reducing emissions and concentrations of $PM_{2.5}$. In addition to reduced exhaust emissions, by making traffic flows smoother, these schemes will reduce non-exhaust emissions from brake and tyre wear.
- Dust Management Plans (DMPs), which are usually incorporated into Construction Environmental Management Plans (CEMPs), are routinely conditioned on major development planning permissions to control and minimise the risk of construction dust impacts, and therefore $PM_{2.5}$ emissions, on nearby receptors.
- Regular inspections of industrial processes permitted by the Council where combustion and non-combustion processes could lead to anthropogenic emissions of $PM_{2.5}$.
- Some of South Gloucestershire is covered by a Smoke Control Area[64] which allows only approved fuels and appliances to be used. Further extension of the smoke control area is being considered as a possible area for action under the local South Gloucestershire Clean Air Strategy and the proposed Clean Air Action Plan to better control particulate (and NOx) emissions from open fires and wood-burning stoves. The Council's Environmental Health team has produced an information sheet on Solid Fuel Appliances Smoke Control[65] and will investigate smoke complaints. Non-compliance with smoke control legislation can result in a fine of up to £1000.

[62] https://travelwest.info/metrobus

[63] https://beta.southglos.gov.uk/cribbs-patchway-metrobus-extension/

[64] Smoke control areas | South Gloucestershire Council (southglos.gov.uk)

[65] http://www.southglos.gov.uk/documents/Solid-Fuel-Appliances.pdf

- The Council will also continue to promote initiatives such as the "Ready to burn" scheme. Understanding the right fuels and the right way to use them is explained in the "Open fires and wood-burning stoves" guidance leaflet[66] issued by Defra. The measures outlined for reducing emissions include:
    - Choosing the right stove
    - Considering burning less
    - Buying 'Ready to Burn' fuel
    - Season freshly chopped wood before use
    - Do not burn treated waste wood (e.g. old furniture) or household rubbish
    - Regularly service and maintain your stove (annually)
    - Get your chimney swept regularly (up to twice a year)

In May 2021, the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020[67] came into force. These regulations have been introduced to reduce particulate emissions from the residential burning of wood and other solid fuels in domestic heating appliances. The sale of bagged traditional bituminous house coal will be phased out[68] and the burning of unseasoned "wet" wood limited through tighter controls on the supply, distribution and sale of wood, as burning wet wood can result in at least twice the amount of smoke emissions produced than when seasoned or dry wood is burned.

While the responsibility for meeting the $PM_{2.5}$ targets sits with national government; local authorities have a role to play in delivering reductions in $PM_{2.5}$. Although there is no $PM_{2.5}$ regulatory standard for local authorities, the pre-existing UK legal limit of 20 $\mu g/m^3$ and the exposure reduction target of 15% reduction in concentrations at urban background locations between 2010 and 2020, act as a guide.

In terms of the situation regarding $PM_{2.5}$ concentrations locally, as advised in previous annual status reports, three "AQ Mesh" monitoring units were installed in 2018 at sites within the Kingswood-Warmley and Staple Hill AQMAs and also adjacent to the A4174 at

[66] Open fires wood burning stoves - guide-A4-update-12Oct (defra.gov.uk)

[67] The Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020 (legislation.gov.uk)

[68] Selling coal for domestic use in England - GOV.UK (www.gov.uk)

Hambrook. These are small outdoor air quality monitors, which are configured to deliver localised, real-time indicative readings of a variety of pollutants, including $PM_{2.5}$.

The setting of the units in 'worst-case' locations was intended to provide a level of indicative monitoring data for $PM_{2.5}$. Unfortunately, there were issues with the reliability of the instrument sensors that could not be satisfactorily resolved and resulted in incomplete datasets. For this reason, the data obtained was not considered sufficiently robust to report under the LAQM framework and the AQ Mesh monitoring ceased in early 2021 due to the above issues.

However, $PM_{2.5}$ monitoring has since started in August 2021 at the new automatic monitoring site in Stoke Gifford on the A4174 Ring Road near Coldharbour Lane and the University of the West of England (UWE). This site, which also monitors NO_2, PM_{10} and Ozone (O_3), was set up as part of the Council's "Umbrella" Network for the air quality use case, to provide reference standard pollutant measurements for comparison with data from a network of low-cost indicative sensors located along the A4174 Ring Road from the Bristol and Bath Science Park at Lyde Green to the UWE Frenchay campus. Further information regarding the Umbrella Network is available on the Council website at UMBRELLA network | BETA - South Gloucestershire Council (southglos.gov.uk).

The $PM_{2.5}$ monitoring results from the new automatic monitoring site are provided in Table A.8 in Appendix A and are discussed in Section 3.2.3. but in summary, the annualised $PM_{2.5}$ mean for 2021 was 7.4 µg/m^3 which is below the pre-existing 20 µg/m^3 limit.

To provide an indication of the long-term trends, the local $PM_{2.5}$ concentrations have also been estimated from the PM_{10} concentrations measured at the Yate automatic monitoring site using the method specified in Technical Guidance LAQM TG16 Box 7.7. The estimated $PM_{2.5}$ values are compared to the monitored $PM_{2.5}$ concentrations at the nearest AURN monitoring station Bristol St Pauls and the results provided in Table A.11 in Appendix A.

The estimated local $PM_{2.5}$ concentrations of 6.3 µg/m^3 in 2021 and 7.7 µg/m^3 in 2020 are below the pre-existing national limit of 20 µg/m^3 and a greater % reduction (55%) than the 15% target for reduction in concentrations can be seen in the concentrations between 2010 and 2021, although the data trends should be interpreted with some caution because of the impact of the Covid-19 pandemic restrictions on pollutant levels.

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

This section sets out the monitoring undertaken within 2020 and 2021 by South Gloucestershire Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 (Appendix A) to allow monitoring trends to be identified and discussed.

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. National monitoring results are available on the Defra UK-AIR (Air Information Resource) website[69].

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

South Gloucestershire Council undertook automatic (continuous) monitoring at one site in Yate during 2020 and 2021 (NO_2 and PM_{10}) and at one additional new site in Stoke Gifford on the A4174 Ring Road near Coldharbour Lane and the University of West England (UWE) from August 2021 (NO_2, PM_{10}, $PM_{2.5}$ and Ozone (O_3)). Table A.1 in Appendix A shows the details of the automatic monitoring sites. The Air Quality in the United Kingdom (ukairquality.net) website presents the automatic monitoring results for South Gloucestershire Council.

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.

[69] https://uk-air.defra.gov.uk/

3.1.2 Non-Automatic Monitoring Sites

South Gloucestershire Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 96 sites during 2020 and at 98 sites during 2021. Table A.2 in Appendix A presents the details of the non-automatic sites.

Triplicate monitoring (using three diffusion tubes) was undertaken at three of the monitoring locations during 2020 and 2021 to ensure robust monitoring datasets:

- Yate, Station Road, where the tubes are co-located with the automatic monitoring station (sites 4A, B and C).
- At the façade of the single property in the now revoked Cribbs Causeway AQMA, Hollywood Cottage (sites 87A, B and C).
- In Soundwell at the façade of 264 Soundwell Road located adjacent to the busy junction of Soundwell Road, Siston Way and Downend Road, where concentrations have previously been borderline with the annual mean objective (sites 147A, B and C).

Also, during 2020, two new triplicate monitoring sites were co-located at the two AQ Mesh monitoring sites in the AQMAs with the intention of comparing the triplicate diffusion tube data with the AQ Mesh monitoring data:

- In the Staple Hill AQMA at the junction of High Street with Pendennis Road (site 185A, B and C).
- In the Kingswood - Warmley AQMA at the junction of Warmley High Street with Tower Road North (site 186A, B and C).

However, the AQ Mesh monitors were removed in early 2021 due to the unreliability of the instrument sensors, which resulted in insufficiently robust datasets to undertake comparison of the monitoring datasets, so these two triplicate sites also ceased early 2021. Both sites 185 and 186 remained in situ as single tube sites from January 2021.

In 2021, two new sites were set up in:

- Thornbury – Rock Street (site 187). This site was deployed to monitor any potential impacts from re-routed traffic around the town centre following changes to traffic access on the High Street. The Thornbury High Street scheme, which was initially introduced as an Emergency Travel Scheme during the Covid-19 pandemic, has evolved and is ongoing to develop a high street that is fit for the future.

- Patchway – A38 Gloucester Road near the junction of Hayes Way (site 188). This site was deployed to monitor the impacts of the redevelopment of the former Filton Airfield which is a major part of the Cribbs Patchway New Neighbourhood.

The following eight diffusion tube sites ceased operation early in 2020:

- Site 60 Downend - North Street Kustom Floors & Furniture because monitored concentrations have been consistently below the annual mean objective and there is no relevant exposure at ground floor. Also the site has been replaced with newer site 172 from 2017 at a potential worse case location that better represents relevant exposure.
- Site 73 Staple Hill - 11 Soundwell Rd Starlight because it has been replaced with newer site 165 from 2017 at façade in the narrow street canyon section closer to the Broad Street/High Street/Soundwell Road/Victoria Street junction than site 73. Also, while there is no ground floor relevant exposure at site 165, there is first floor exposure and also ground floor exposure at the adjoining property, compared to only first floor exposure set back from site 73.
- Site 75 Staple Hill - 118 High Street Lloyd Bottoms/ R K Fashion because it has been replaced with newer site 164 from 2017 at façade so is more representative of where there is likely to be relevant exposure, although there is no relevant exposure at ground floor level in relation to either site as the premises are commercial/retail premises, there is first floor relevant exposure at site 164, compared to first floor of an adjoining property set back from site 75.
- Site 78 Staple Hill - 9-11 Victoria Street because it has been replaced with newer site 161 from 2017 located at the façade of residential property so represents relevant exposure, whereas site 78 was on a telegraph pole closer to the road.
- Site 79 Staple Hill - 27-29 Victoria Street because it has been replaced with newer site 162 from 2017 located at the façade of residential property so represents relevant exposure, whereas site 79 was on a telegraph pole closer to the road.
- Site 102 Staple Hill - 58 High Street CBS Consultants because it has been replaced with newer site 160 from 2017 adjacent to the façade of residential property so better represents relevant exposure at ground floor in a worse-case location near the High Street/ Pendennis Road/ Acacia Road junction as there is no ground floor relevant exposure at site 102.

- Site 116 Warmley - 14 High St (former Webbs) because there is another site 139 at the façade of the same residential property rather than on a lamp post adjacent to the façade as was the case with Site 116.
- Site 130 Cribbs Causeway – 2 Mayfield Cottages façade because the monitored concentrations have been consistently well below the annual mean objective.

The above list includes five sites in the Staple Hill AQMA following a review of the monitoring in this AQMA in 2017 when additional monitoring was set up at façade to better represent relevant exposure. The existing monitoring sites were retained until the end of 2019 for comparison of the results, which were reviewed in the previous 2020 Air Quality Annual Status Report in Appendix D[70].

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

3.2 Individual Pollutants

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

NB: The results of the Ozone monitoring at the new Stoke Gifford A4174 Ring Road automatic monitoring site are reported separately in Appendix G as the Ozone objective is not included in the local air quality management regime due to the transboundary nature of this pollutant.

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 from the automatic and non-automatic (diffusion tube) sites respectively 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

[70] https://www.southglos.gov.uk//documents/2020-South-Glos-Council-Air-Quality-Annual-Status-Report.pdf

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).

Automatic Monitoring Data

The Yate automatic monitoring results show the NO_2 concentrations are well below the annual mean objective in 2020 and 2021 and all other reported years (Table A.3, Appendix A). In 2020, the annual mean was 14 µg/m^3 which is a 26% decrease from the 2019 annual mean of 19 µg/m^3. This is on a par with the average 25% reductions in NO_2 concentrations seen across the national automatic urban and rural monitoring network (AURN). The significant decrease is most likely due to the impacts of the Covid-19 pandemic restrictions on travel. The annual mean concentration increased slightly in 2021 to 15 µg/m^3 when travel restrictions were less stringent. The trend data presented in Figure A.1 (Appendix A) shows an overall continuing decline in annual mean nitrogen dioxide concentrations since 2011 when the monitored annual mean concentration was 27 µg/m^3.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. The maximum 1-hour mean in 2020 was 90 µg/m^3 and in 2021, 82 µg/m^3 so the 1-hour mean objective was not exceeded in either year. The site has been below the hourly mean objective in all reported years.

At the new site in Stoke Gifford on the A4174 Ring Road near Coldharbour Lane and UWE from August 2021, the annualised NO_2 mean for 2021 was 21.4 µg/m^3 and the maximum 1-hour mean was 109 µg/m^3 so there were no exceedances of the annual mean or 1-hour mean objectives. The results are also included in Table A.3 and Table A.5 and shown in Figure A.1 in Appendix A.

Non-Automatic (Diffusion Tube) Monitoring Data

The NO_2 annual mean concentrations from the diffusion tube monitoring sites are provided in Table A.2 (Appendix A). The data reported in Table A.4 has been bias adjusted and annualised.

The full 2020 and 2021 datasets of monthly mean values are provided in Appendix B. Note that the 2020 concentration data presented in Table B.1 and 2021 data in Table B.2 includes distance corrected values, only where relevant.

Discussion of 2020 and 2021 Diffusion Tube Monitoring Results

Exceeding Sites

In 2020 and 2021, there were no exceedences of the annual mean objective at the LAQM diffusion tube monitoring sites in South Gloucestershire, including in the AQMAs. This is most likely due to the impact of the Covid-19 pandemic restrictions on travel during 2020, which continued into 2021, although to a lesser degree. In comparison, there was an exceedance measured at one monitoring site in South Gloucestershire in both 2019 and 2018. Before this, there were three exceedances in 2017 and eleven in 2016.

The single exceeding site in 2019 and 2018 was in the Kingswood – Warmley AQMA at site 146 Kingswood - 34 Hill Street. This site is at façade with relevant residential exposure. To compare, previously there were two exceeding sites in 2017 and five in 2016 in this AQMA.

In the Staple Hill AQMA, there were no exceeding sites in 2019 or 2018, with the last exceedance monitored at one site in 2017, although there were five in 2016 in this AQMA.

There were no exceedances outside of the AQMAs where there is relevant exposure, including in the former Cribbs Causeway AQMA, with monitored concentrations well below the annual mean objective in 2020 (19.3 µg/m^3) and 2021 (20.7 µg/m^3) at the façade of the single residential property, particularly so in these years due to the Covid-19 pandemic restrictions reducing traffic and consequently NO_2 levels. There has been sustained compliance with the objective where there is relevant exposure for more than ten years (2010 -2021 inclusive) which continues to justify the formal revocation of the AQMA in July 2020.

No annual means greater than 60 µg/m^3 were recorded at any of the diffusion tube monitoring sites, so exceedances of the 1-hour mean objective are considered unlikely.

Borderline Exceedances

There was one site approaching the objective (i.e. within 10% of the objective at 36 µg/m^3 or above) in 2021 and no borderline sites in 2020. This compares to a total of eight sites that were approaching the objective in 2019; two of which were in the Kingswood – Warmley AQMA (sites 68 and 95), five were in the Staple Hill AQMA (sites 61, 62, 73, 75 and 165) and one was outside of the AQMAs (site 147B - part of a triplicate site) located in Soundwell.

The borderline site in 2021 (site 188) was a new site in that year and is outside of the AQMAs. It is a roadside monitoring site adjacent to the A38 Gloucester Road in Patchway close to the junction with Hayes Way which serves as a link to new development within the Cribbs Patchway new neighbourhood and retail and leisure facilities at Cribbs Causeway. As the site is not located at façade, the result has been distance adjusted using the Diffusion Tube Data Processing Tool[71]. Distance adjustment of the result (38.8 µg/m^3) to the nearest relevant exposure reduces the annual mean concentration to 36.3 µg/m^3, so the site remains marginally above the borderline level of 36 µg/m^3. Further information is provided in Appendix C and the distance adjustment calculation is shown Table C.4. This site will continue to be closely observed, especially as traffic returns to more normal conditions and planning and/or transport developments that may affect future nitrogen dioxide concentrations at this site will be carefully considered.

Trends in Annual Mean Nitrogen Dioxide Concentrations

In 2020, annual mean nitrogen dioxide concentrations decreased by an average of 22% across all the diffusion tube monitoring sites in South Gloucestershire due to the impacts of the Covid-19 pandemic travel restrictions from March 2020. This is on a par with the 26% decrease seen at the Yate automatic monitoring site already discussed.

The largest decrease of 39% was seen at diffusion tube monitoring site 11 in Thornbury High Street, which in this location was also due to the implementation of an Emergency Active Travel Scheme to reduce traffic on the High Street to make it safer for public access during the pandemic. The annual mean NO_2 concentration at site 11 fell from 24.2 µg/m^3 in 2019 to 14.7 µg/m^3 in 2020. The smallest decrease of 13% was at site 142 in Warmley adjacent to the A4174 Ring Road, falling from an annual mean of 26.7 µg/m^3 in 2019 to 23.2 µg/m^3 in 2020.

At the single previously exceeding site in 2019 in the Kingswood – Warmley AQMA (Site 146 Kingswood – 34 Hill Street), the annual mean concentration decreased by 15% from 42.3 µg/m^3 in 2019 to 35.9 µg/m^3 in 2020. The concentration decreased slightly further at this site in 2021 to 34.1 µg/m^3 (a 19 % decrease from 2019). This demonstrates that the decreases and increases in concentrations were not uniform across the district as the situation changed during the pandemic. Overall, the annual mean concentrations at the monitoring sites in the Kingswood – Warmley AQMA decreased by an average of 22%

[71] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/diffusion-tube-data-processing-tool/

from 2019 to 2020, followed by an average 4% increase from 2020 to 2021 as the pandemic restrictions eased. In the Kingswood section of the AQMA, the average % decrease in concentrations from 2019 to 2020 was 25%, compared to an average decrease of 19% in the Warmley section of the AQMA. In 2021, the average % increase in concentrations in the Kingswood section was 2%, compared to 7% in the Warmley section of the AQMA.

Until 2020 and 2021, site 146 had consistently exceeded the annual mean objective since 2014, with it remaining as the single exceeding LAQM site in South Gloucestershire in 2018 and 2019. The pre-pandemic exceedances were likely to be due to the property façade being very close to the road (approximately 1.6m from the kerb) and that the property is on an uphill section of the A420 main road, so vehicles are having to work harder to travel up the hill and producing more emissions. The site will continue to be kept under review as travel behaviours change and traffic returns to more normal conditions.

In the Staple Hill AQMA, the annual mean concentrations decreased by an average of 23% from 2019 to 2020 due to the impacts of the pandemic restrictions. There was then an average 6% increase in annual mean concentrations from 2020 to 2021 as the restrictions eased.

Following a review of the monitoring sites in the Staple Hill AQMA in 2017, additional monitoring was set up at façade to better represent relevant exposure and the existing monitoring sites were retained until the end of 2019 for comparison. This allowed robust assessment of whether concentrations were below the objective where there is relevant exposure and therefore, whether the AQMA was still required. However, in 2019, there were two borderline sites (62 and 165) in the Staple Hill AQMA and Defra advised that AQMAs should remain in place until several years of data below 10% of the objective (36 µg/m^3) is collected to support revocation.

While there were no exceedences or borderline sites within 10% of the objective within the AQMAs in 2020, revocation of the AQMAs based on compliance being achieved in 2020 is not considered appropriate, as advised in the Defra Covid-19: Supplementary Guidance for LAQM Reporting in 2021[72]. This is because 2020 data is not representative of long-term trends in pollutant concentrations, and it is uncertain whether the air quality

[72] Covid-19-Supplementary-Guidance-for-Local-Air-Quality-Management-Reporting-in-2021-v1.pdf (defra.gov.uk)

objectives would continue to be met in future years. This is also likely to be applicable to 2021 monitoring data.

The trends in annual mean nitrogen dioxide concentrations measured at the diffusion tube monitoring sites in the Kingswood - Warmley and Staple Hill Air Quality Management Areas are shown in graphs in Appendix A. For ease of reference, the diffusion tube monitoring results within the Kingswood – Warmley and Staple Hill AQMAs can be found in Table A.9 and Table A.10 respectively.

Aside from the significant decreases in concentrations in 2020 and slight increases at the majority of AQMA sites in 2021, prior to these Covid impacted years, an overall gradual downward trend can be seen in nitrogen dioxide concentrations in the Kingswood – Warmley and Staple Hill AQMAs over the past decade.

While it is expected NO_2 concentrations will increase as traffic returns to more normal conditions, it is difficult to predict future trends in concentrations with many current factors affecting travel behaviour, including; altered working patterns with continued working from home and less travel to and from workplaces; reduced number of passengers using public transport such as buses and trains; consequent reductions in bus and train services; disruption to the manufacture and supply of new vehicles and knock-on impacts in the second-hand vehicle market, impacting on turn-over and improvement in the vehicle fleet; increased fuel prices; and the general cost of living crisis.

3.1.4 Particulate Matter (PM_{10})

The PM_{10} monitoring data from the Yate automatic site has been adjusted to gravimetric equivalent with the BAM data corrected for slope (see Appendix C).

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

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

The PM_{10} concentrations measured at the Yate automatic site are well below the annual mean and 24-hour mean objectives in 2020 and 2021 and all other reported years. In 2020, the annual mean was 11 µg/m^3, and in 2021, 12 µg/m^3, compared to 13 µg/m^3 in 2019. The lower annual means are likely to have resulted from the impacts of the Covid-19

pandemic restrictions as concentrations rose again slightly in 2021 when travel restrictions were less stringent.

The long-term trend data presented in Figure A.2 (Appendix A) shows that overall, the annual mean PM_{10} concentrations at Yate have been slowly declining over the last decade from 18 µg/m^3 in 2011. The maximum 24-hour mean in 2020 was 33 µg/m^3 and in 2021, 42 µg/m^3 so the 24-hour mean objective was not exceeded in either year.

At the new automatic site in Stoke Gifford on the A4174 Ring Road near Coldharbour Lane and the University of West England (UWE) from August 2021, the annualised PM_{10} mean for 2021 was 15.5 µg/m^3 and maximum 24-hour mean was 40 µg/m^3 so there were no exceedances of the annual mean or 24-hour mean objectives. The results are included in Table A.6 and Table A.7 and shown in Figure A.2 in Appendix A.

3.1.5 Particulate Matter ($PM_{2.5}$)

South Gloucestershire Council started monitoring $PM_{2.5}$ from 24 August 2021 at the new automatic monitoring site in Stoke Gifford on the A4174 Ring Road near Coldharbour Lane and the University of the West of England. The $PM_{2.5}$ measurements are made using a smart heated BAM 1020 and do not require correction.

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for 2021 from the new automatic monitoring site.

The annualised $PM_{2.5}$ mean for 2021 was 7.4 µg/m^3 which is below the pre-existing UK limit of 20 µg/m^3. While this is not set as an LAQM standard because the responsibility for meeting $PM_{2.5}$ targets sits with national government; local authorities have a role to play in delivering reductions in $PM_{2.5}$ as previously discussed in Section 2.3.

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)
SG1	Yate Station Road	Roadside	370418	182525	NO_2 PM_{10}	NO	Chemiluminescent Gravimetric (BAM)	N/A	6	NO_2 1.6 PM_{10} 1.8
SG2(3)	Stoke Gifford A4174 Coldharbour Lane	Roadside	362384	178562	NO_2 PM_{10} $PM_{2.5}$ O_3	NO	Chemiluminescent Gravimetric (BAM 1020 Smart Heated) Gravimetric (BAM 1020 Smart Heated) Absorption	N/A	10.2	NO_2 2.7 PM_{10} 2.9 $PM_{2.5}$ 2.9 O_3 2.7

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

(3) Site SG2 operational from 24 August 2021

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)
1	Yate - 88 Station Road The Candle	Roadside	370692	182499	NO2	No	4.6	2.5	No	2.7
4A, 4B, 4C	Yate - Station Road Co-Location	Roadside	370418	182525	NO2	No		6.0	Yes	2.4
10	Filton - 152 Gloucester Road North Pizza Bello façade	Roadside	360266	179136	NO2	No	0.0	3.5	No	2.3
11	Thornbury - 48 High Street Uniq Family Wealth	Roadside	363654	189893	NO2	No	2.8	0.6	No	2.5
12	Stoke Gifford - Church Road rear of Aviva	Roadside	362161	179570	NO2	No		1.0	No	2.6
13	Filton - MOD roundabout	Roadside	361523	178732	NO2	No		1.0	No	2.3
21	Downend - Boscombe Crescent St Augustines Church	Urban Background	365673	177475	NO2	No		1.5	No	2.5
27	Kingswood - 90 Regent Street Nat West façade	Roadside	364866	173835	NO2	Yes (Kingswood - Warmley)	0.0	2.0	No	2.8
29	Staple Hill - 123 High Street Backhouse Bet	Roadside	364822	175932	NO2	Yes (Staple Hill)	2.0	1.0	No	2.7
34	Bradley Stoke - 109 Ormonds Close (M4 East of Almondsbury Interchange)	Roadside	362395	182544	NO2	No	11.0	24.8 (M4 33)	No	2.5
35	Bradley Stoke - Woodlands Lane (M4 East of Almondsbury Interchange)	Roadside	362118	183031	NO2	No	9.8	3.3 (M4 22.5)	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)
36	Hambrook - Whiteshill Fairwater (M4 East of M32)	Roadside	364544	178855	NO2	No	-17.5	30.0 (M4)	No	2.2
37	Almondsbury - Old Aust Road (M4 West of Almondsbury Interchange)	Roadside	361147	184846	NO2	No		7 (M4)	No	2.3
38	Severn Beach - Ableton Lane Severn Beach Primary School façade	Urban Background	354282	184653	NO2	No	0.0	49.0	No	2.3
44	Stoke Gifford - Hatchet Road	Roadside	362061	180025	NO2	No	14.0	4.0	No	2.8
46	Winterbourne - High Street opp Winterbourne Academy	Roadside	364852	180758	NO2	No	16.5	1.3	No	2.6
53	Hambrook - Bristol Road rear of 17 Fenbrook Close	Roadside	363907	178389	NO2	No	16.0	6.5	No	1.9
54	Longwell Green - A431/Aldermoor Way	Roadside	365256	171656	NO2	No		1.5	No	2.7
57	Coalpit Heath - 225 Badminton Road GT Plumbing & Heating	Roadside	367742	181160	NO2	No	12.0	2.0	No	2.5
61	Staple Hill - 1 Broad Street William Hill	Roadside	364926	175926	NO2	Yes (Staple Hill)	1.0	2.3	No	2.5
62	Staple Hill - 2 Broad Street 501 Bar façade	Roadside	364909	175908	NO2	Yes (Staple Hill)	0.0	1.5	No	2.4
63	Patchway - 28 Park Leaze	Roadside	359487	182479	NO2	No	8.0	1.5	No	2.5
67	Kingswood - 40 Regent Street Hays Travel façade	Roadside	364671	173877	NO2	Yes (Kingswood - Warmley)	0.0	2.5	No	2.8

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)
68	Kingswood - 26-32 Regent Street Store Twenty One façade	Roadside	364631	173886	NO2	Yes (Kingswood - Warmley)	0.0	2.5	No	2.6
69	Kingswood - 12 Regent Street Dominos Pizza façade	Roadside	364597	173892	NO2	Yes (Kingswood - Warmley)	0.0	2.5	No	2.6
70	Kingswood - Two Mile Hill Road Job Centre Plus façade	Roadside	364533	173896	NO2	Yes (Kingswood - Warmley)	0.0	2.5	No	2.5
71	Staple Hill - 11 The Square Bunch Florist	Roadside	365075	175918	NO2	Yes (Staple Hill)	0.5	6.5	No	2.7
72	Staple Hill - 25 Broad Street Westbury Inks	Roadside	364990	175920	NO2	Yes (Staple Hill)	6.5	1.5	No	2.7
74	Staple Hill - 29-31 Soundwell Rd opp Page Comm Assoc	Roadside	364885	175772	NO2	Yes (Staple Hill)	4.0	0.4	No	2.7
76	Staple Hill - 84-86 High Street Staple Hill Oak Pub façade	Roadside	364722	175926	NO2	Yes (Staple Hill)	0.0	2.0	No	2.7
83	Chipping Sodbury - 51A Broad Street façade	Roadside	372791	182241	NO2	No	0.0	4.7	No	2.2
87A, 87B, 87C	Cribbs Causeway - Blackhorse Hill Hollywood Cottage facade	Roadside	357739	181334	NO2	No	0.0	13.0	No	1.7
92	Kingswood - Regent Street Entertainment & Sports Club	Roadside	364968	173836	NO2	Yes (Kingswood - Warmley)	0.0	2.0	No	2.7
93	Kingswood - Hanham Road Exchange Flats	Roadside	364979	173801	NO2	Yes (Kingswood - Warmley)	0.0	2.0	No	2.4
95	Kingswood - 45 High Street Adam Lee	Roadside	365078	173846	NO2	Yes (Kingswood - Warmley)	0.0	2.7	No	3.3

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
96	Kingswood - 71 High Street SGYH Youth Housing	Roadside	365164	173832	NO2	Yes (Kingswood - Warmley)	5.5	2.3	No	2.7
98	Kingswood - High Street Sainsbury's Local	Roadside	365463	173785	NO2	Yes (Kingswood - Warmley)		2.5	No	2.6
101	Staple Hill - High Street Beech House	Roadside	364546	175951	NO2	No	9.0	1.5	No	2.9
105	Staple Hill - 2 North Street	Roadside	364932	176147	NO2	Yes (Staple Hill)	2.5	2.0	No	2.9
106	Stoke Gifford - 73 Hambrook Lane façade	Roadside	363112	179547	NO2	No	0.0	10.0	No	1.9
113	Patchway - 5 Falcon Close façade	Roadside	359112	181909	NO2	No	0.0	7.5 (M5 45)	No	1.9
114	Pilning - 23 Keens Grove façade	Roadside	355263	185351	NO2	No	0.0	7.0	No	2.3
115	Pilning - 2 Wick Road façade	Roadside	355212	185360	NO2	No	0.0	8.5	No	2.3
117	Filton Northville - 29 Gloucester Rd Nth Rowe Vets	Roadside	359874	178259	NO2	No	2.5	2.9	No	2.5
119	Filton 137 Gloucester Rd Nth	Roadside	360263	179250	NO2	No	0.5	3.6	No	2.5
122	Filton - 549 Filton Avenue	Roadside	360566	178229	NO2	No	4.5	4.0	No	2.1
124	Filton - 702a Filton Ave Way Ahead	Roadside	360918	178905	NO2	No	6.6	1.9	No	2.3
125	Filton - 71 Station Rd	Roadside	360891	179005	NO2	No	5.4	0.5 (A4174 9.3)	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)
128[3]	Kingswood - 109 Downend Road	Roadside	364587	174431	NO2	No	1.6	1.4	No	2.4
129	Cribbs Causeway – 1 Holly Cottages façade	Roadside	357508	181059	NO2	No	0.0	18 (M5 44)	No	2.1
132	Hanham - 66 High St Sassy Hair Studio	Roadside	364178	172337	NO2	No	0.6	2.7	No	2.5
133	Hambrook - 123 Old Gloucester Road façade	Roadside	363736	178507	NO2	No	0.0	10.4 (A4174)	No	1.9
134	Hambrook - Bristol Rd Old Bakery façade	Roadside	364048	178719	NO2	No	0.0	2.2	No	1.9
135	Frenchay - Harford Drive Dyrham Flats	Roadside	364029	178413	NO2	No	12.7	24.5 (A4174)	No	2.5
136	Little Stoke - 26 Gypsy Patch Lane	Roadside	361242	180544	NO2	No	0.0	12.0	No	3.0
137	Warmley - 35 High Street lp at façade	Roadside	366984	173563	NO2	Yes (Kingswood - Warmley)	0.0	1.9	No	2.6
138	Warmley 18 High Street façade	Roadside	366941	173558	NO2	Yes (Kingswood - Warmley)	0.0	2.0	No	2.8
139	Warmley 14 High Street (former Webbs) façade	Roadside	366890	173560	NO2	Yes (Kingswood - Warmley)	0.0	2.3	No	2.1
141	Warmley - 41 Deanery Road façade	Roadside	366705	173581	NO2	Yes (Kingswood - Warmley)	0.0	7.7	No	2.7
142	Warmley - 33 Deanery Road Warmley Court façade	Roadside	366613	173597	NO2	Yes (Kingswood - Warmley)	0.0	8.9 (A4174 18.2)	No	2.1

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
143	Warmley - 1 High Street Ideal Pharmacy façade	Roadside	366815	173574	NO2	Yes (Kingswood - Warmley)	0.0	5.0	No	2.6
144	Warmley - 8 Tower Road North	Roadside	366913	173523	NO2	No	0.0	4.3	No	2.7
145	Warmley - 1 London Road/Cycle Path	Roadside	367107	173531	NO2	Yes (Kingswood - Warmley)	-1.2	5.0	No	2.3
146	Kingswood - 34 Hill St façade	Roadside	365910	173680	NO2	Yes (Kingswood - Warmley)	0.0	1.6	No	2.2
147A, 147B, 147C[3]	Soundwell - 264 Soundwell Rd façade	Roadside	364586	174496	NO2	No	0.0	2.6	No	2.3
148	Filton - 109 Gloucester Road North facade	Roadside	360077	178900	NO2	No	0.0	10.2	No	1.9
149	Filton - 707 Southmead Road facade	Roadside	360050	179021	NO2	No	0.0	9.8	No	1.8
150[3]	Soundwell - 296 Soundwell Road façade	Roadside	364528	174425	NO2	No	0.0	4.3	No	1.7
151	Hambrook - Bristol Road Old Bakery FP Signpost	Roadside	364049	178726	NO2	No	0.0	1.2	No	2.3
152	Bradley Stoke - 188 Oaktree Crescent lp49	Roadside	360945	182831	NO2	No	0.3	9.0	No	2.8
153	Bradley Stoke - 141 Wheatfield Drive façade	Roadside	361842	182417	NO2	No	0.0	8.2	No	2.1
154	Bradley Stoke - 166 Ellan Hay Road façade	Roadside	363242	180724	NO2	No	0.0	9.7	No	1.8
155	Stoke Gifford - 3 Earl Close façade	Roadside	363324	179854	NO2	No	0.0	26.5 (SGTL)	No	2.2

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)
156	Stoke Gifford - Lancelot Road	Roadside	362400	177624	NO2	No	21.2	1.8	No	2.4
157	Hambrook - Bristol Road Poplars House façade	Roadside	363999	178505	NO2	No	14.5	20.2 (A4174 25.1)	No	1.9
158	Downend - 5 Wick Wick Close façade	Roadside	366157	178557	NO2	No	0.0	20.2 (A4174)	No	2.1
159	Wickwar - 21 High Street façade	Roadside	372395	188581	NO2	No	0.0	2.5	No	2.3
160	Staple Hill - 62 High Street	Roadside	364655	175931	NO2	Yes (Staple Hill)	0.4	1.6	No	2.9
161	Staple Hill - 13 Victoria Street façade	Roadside	364906	176022	NO2	Yes (Staple Hill)	0.0	4.4	No	2.0
162	Staple Hill - 28 Victoria Street façade	Roadside	364925	176062	NO2	Yes (Staple Hill)	0.0	4.8	No	1.9
163	Staple Hill - 2 Victoria Street façade	Roadside	364918	175979	NO2	Yes (Staple Hill)	0.0	4.8	No	1.9
164	Staple Hill - 102 High Street Jay Jays Hair façade	Roadside	364811	175919	NO2	Yes (Staple Hill)	0.0	3.5	No	2.2
165	Staple Hill - 3 Soundwell Rd Chinese Kitchen facade	Roadside	364906	175864	NO2	Yes (Staple Hill)	0.0	1.5	No	2.6
166	Kingswood - 12 Cecil Road	Roadside	364770	173695	NO2	No	2.1	1.5	No	2.7
167	Kingswood - 7 Downend Road	Roadside	364652	173957	NO2	No	2.9	2.3	No	2.4
168	Kingswood - 133 High Street façade	Roadside	365366	173805	NO2	Yes (Kingswood - Warmley)	0.0	3.1	No	2.4

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
169	Warmley - 20 Deanery Road Warmley Community Centre façade	Roadside	366714	173560	NO2	Yes (Kingswood - Warmley)	0.0	4.2	No	2.5
170	Patchway - 204 Gloucester Road front façade	Roadside	360606	181675	NO2	No	0.0	10.5	No	2.3
171	Soundwell - 225 Soundwell Rd façade	Roadside	364664	174672	NO2	No	0.0	2.6	No	2.7
172	Downend - 31 Badminton Road Brownes façade	Roadside	365153	176812	NO2	No	0.0	5.4	No	2.2
173	Mangotsfield - 10 Cossham Street façade	Roadside	366459	176139	NO2	No	0.0	2.4	No	2.3
174	Charfield - 25 Wotton Road façade	Roadside	372011	192189	NO2	No	0.0	4.7	No	2.4
180	Wick - 70 High Street The Old Post Office façade	Roadside	370605	172681	NO2	No	0.0	1.6	No	2.3
181	Warmley - 16 London Road façade	Roadside	367298	173452	NO2	Yes (Kingswood - Warmley)	0.0	1.7	No	2.1
185[4]	Staple Hill - High Street Pendennis Park Flats AQ Mesh site	Roadside	364634	175946	NO2	Yes (Staple Hill)	1.4	4.0	No	2.4
186[4]	Warmley - High Street/ Tower Rd Nth Junction AQ Mesh site	Roadside	366902	173559	NO2	Yes (Kingswood - Warmley)	0.0	2.5	No	3.0
187[5]	Thornbury - Rock Street Grace Lodge	Roadside	363785	189856	NO2	No	2.5	1.4	No	2.5
188[5]	Patchway- 43 Gloucester Road nr Hayes Way	Roadside	360450	181066	NO2	No	2.3	3.6	No	2.8

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.

(3) Co-ordinates for sites 128, 147A,B,C and 150 are in South Gloucestershire – these sites are adjacent to SGC/Bristol CC boundary.

(4) Sites 185 & 186 operated as triplicate sites in 2020 (185A,B,C & 186A,B,C) then as singles sites in 2021.

(5) Sites 187 and 188 operational from 2021.

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 2020 (%) (2)	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SG1 Yate Station Road	370418	182525	Roadside	99.2	99.2	98.5	98.5	23	20	19	14	15
SG2 Stoke Gifford A4174 Coldharbour Lane	362384	178562	Roadside	-	-	99.5	35.4	-	-	-	-	21.4

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

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

Notes:

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

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

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

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

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

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

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

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
1	Yate - 88 Station Road The Candle	370692	182499	Roadside	100.0	100.0	29.6	27.4	28.2	22.7	23.9
4A, 4B, 4C	Yate - Station Road Co-Location	370418	182525	Roadside	100.0	100.0	22.7	20.2	20.3	15.9	16.8
10	Filton - 152 Gloucester Road North Pizza Bello façade	360266	179136	Roadside	100.0	100.0	34.7	34.7	35.9	30.0	28.0
11	Thornbury - 48 High Street Uniq Family Wealth	363654	189893	Roadside	80.8	80.8	25.6	24.7	24.2	14.7	13.3
12	Stoke Gifford - Church Road rear of Aviva	362161	179570	Roadside	90.4	90.4	28.4	27.7	25.1	19.3	19.9
13	Filton - MOD roundabout	361523	178732	Roadside	100.0	100.0	30.1	31.7	30.5	25.2	27.4
21	Downend - Boscombe Crescent St Augustines Church	365673	177475	Urban Background	100.0	100.0	16.4	14.9	14.5	11.6	12.4
27	Kingswood - 90 Regent Street Nat West façade	364866	173835	Roadside	92.3	92.3	29.8	27.0	27.3	19.7	20.7
29	Staple Hill - 123 High Street Backhouse Bet	364822	175932	Roadside	100.0	100.0	30.9	28.1	28.0	20.8	23.4
34	Bradley Stoke - 109 Ormonds Close (M4 East of Almondsbury Interchange)	362395	182544	Roadside	100.0	100.0	26.9	26.1	24.0	19.2	20.2
35	Bradley Stoke - Woodlands Lane (M4 East of Almondsbury Interchange)	362118	183031	Roadside	100.0	100.0	26.1	26.5	25.8	21.0	22.0
36	Hambrook - Whiteshill Fairwater (M4 East of M32)	364544	178855	Roadside	100.0	100.0	18.8	18.8	16.2	13.6	12.9

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
37	Almondsbury - Old Aust Road (M4 West of Almondsbury Interchange)	361147	184846	Roadside	90.4	90.4	25.2	30.7	27.1	21.8	24.7
38	Severn Beach - Ableton Lane Severn Beach Primary School façade	354282	184653	Urban Background	100.0	100.0	13.8	13.6	12.3	9.8	10.8
44	Stoke Gifford - Hatchet Road	362061	180025	Roadside	82.7	82.7	30.1	30.6	30.4	24.1	21.6
46	Winterbourne - High Street opp Winterbourne Academy	364852	180758	Roadside	100.0	100.0	28.8	25.1	25.7	18.9	20.8
53	Hambrook - Bristol Road rear of 17 Fenbrook Close	363907	178389	Roadside	100.0	100.0	27.9	27.7	26.2	19.7	21.8
54	Longwell Green - A431/Aldermoor Way	365256	171656	Roadside	100.0	100.0	31.9	30.2	28.4	22.7	23.6
57	Coalpit Heath - 225 Badminton Road GT Plumbing & Heating	367742	181160	Roadside	100.0	100.0	24.7	23.6	23.6	19.9	20.5
61	Staple Hill - 1 Broad Street William Hill	364926	175926	Roadside	100.0	100.0	39.2	37.8	36.6	29.3	30.9
62	Staple Hill - 2 Broad Street 501 Bar façade	364909	175908	Roadside	100.0	100.0	34.6	33.6	36.3	26.8	28.6
63	Patchway - 28 Park Leaze	359487	182479	Roadside	100.0	100.0	24.8	22.2	19.0	15.2	16.3
67	Kingswood - 40 Regent Street Hays Travel façade	364671	173877	Roadside	100.0	100.0	37.9	34.0	35.6	25.8	25.8
68	Kingswood - 26-32 Regent Street Store Twenty One façade	364631	173886	Roadside	100.0	100.0	39.7	36.2	36.5	27.8	26.7
69	Kingswood - 12 Regent Street Dominos Pizza façade	364597	173892	Roadside	100.0	100.0	33.2	33.9	35.0	25.1	24.4

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
70	Kingswood - Two Mile Hill Road Job Centre Plus façade	364533	173896	Roadside	100.0	100.0	30.8	30.1	29.6	21.4	22.7
71	Staple Hill - 11 The Square Bunch Florist	365075	175918	Roadside	100.0	100.0	24.6	21.5	22.7	16.7	17.3
72	Staple Hill - 25 Broad Street Westbury Inks	364990	175920	Roadside	100.0	100.0	31.1	28.1	28.1	22.5	24.5
74	Staple Hill - 29-31 Soundwell Rd opp Page Comm Assoc	364885	175772	Roadside	100.0	100.0	27.1	27.0	25.6	18.9	20.8
76	Staple Hill - 84-86 High Street Staple Hill Oak Pub façade	364722	175926	Roadside	100.0	100.0	32.9	29.3	31.2	24.0	24.1
83	Chipping Sodbury - 51A Broad Street façade	372791	182241	Roadside	100.0	100.0	22.8	21.9	21.7	15.7	16.8
87A, 87B, 87C	Cribbs Causeway - Blackhorse Hill Hollywood Cottage facade	357739	181334	Roadside	100.0	100.0	27.0	25.2	25.3	19.3	20.7
92	Kingswood - Regent Street Entertainment & Sports Club	364968	173836	Roadside	84.6	84.6	33.2	30.5	30.4	22.7	22.9
93	Kingswood - Hanham Road Exchange Flats	364979	173801	Roadside	100.0	100.0	26.7	26.6	24.4	19.1	21.0
95	Kingswood - 45 High Street Adam Lee	365078	173846	Roadside	92.3	92.3	36.6	37.8	37.0	25.7	25.0
96	Kingswood - 71 High Street SGYH Youth Housing	365164	173832	Roadside	92.3	92.3	35.0	31.3	30.3	23.1	24.3
98	Kingswood - High Street Sainsbury's Local	365463	173785	Roadside	100.0	100.0	34.8	32.2	32.2	24.4	24.8
101	Staple Hill - High Street Beech House	364546	175951	Roadside	82.7	82.7	25.4	23.3	22.6	18.7	18.5

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
105	Staple Hill - 2 North Street	364932	176147	Roadside	100.0	100.0	27.0	25.0	26.0	19.5	20.6
106	Stoke Gifford - 73 Hambrook Lane façade	363112	179547	Roadside	100.0	100.0	20.5	18.7	18.2	14.5	14.2
113	Patchway - 5 Falcon Close façade	359112	181909	Roadside	100.0	100.0	30.3	27.2	24.7	19.6	21.3
114	Pilning - 23 Keens Grove façade	355263	185351	Roadside	100.0	100.0	23.4	24.5	22.1	18.7	20.6
115	Pilning - 2 Wick Road façade	355212	185360	Roadside	100.0	100.0	24.2	23.0	22.9	19.6	21.1
117	Filton Northville - 29 Gloucester Rd Nth Rowe Vets	359874	178259	Roadside	92.3	92.3	30.5	29.7	29.2	24.0	25.5
119	Filton 137 Gloucester Rd Nth	360263	179250	Roadside	100.0	100.0	30.2	30.1	29.1	23.3	24.0
122	Filton - 549 Filton Avenue	360566	178229	Roadside	100.0	100.0	29.4	29.0	28.0	21.9	22.3
124	Filton - 702a Filton Ave Way Ahead	360918	178905	Roadside	100.0	100.0	29.7	32.0	30.7	23.4	24.7
125	Filton - 71 Station Rd	360891	179005	Roadside	92.3	92.3	29.1	26.8	27.3	20.7	22.0
128	Kingswood - 109 Downend Road	364587	174431	Roadside	100.0	100.0	31.7	30.0	28.1	23.9	23.2
129	Cribbs Causeway – 1 Holly Cottages façade	357508	181059	Roadside	100.0	100.0	29.2	28.6	23.9	19.6	21.3
132	Hanham - 66 High St Sassy Hair Studio	364178	172337	Roadside	100.0	100.0	29.0	28.8	23.8	17.0	20.0

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
133	Hambrook - 123 Old Gloucester Road façade	363736	178507	Roadside	100.0	100.0	25.6	25.9	25.5	21.4	22.5
134	Hambrook - Bristol Rd Old Bakery façade	364048	178719	Roadside	100.0	100.0	32.7	28.3	29.5	22.8	23.2
135	Frenchay - Harford Drive Dyrham Flats	364029	178413	Roadside	100.0	100.0	27.4	24.0	23.8	19.1	20.7
136	Little Stoke - 26 Gypsy Patch Lane	361242	180544	Roadside	100.0	100.0	22.5	21.4	20.8	16.3	15.7
137	Warmley - 35 High Street lp at façade	366984	173563	Roadside	100.0	100.0	39.0	37.2	34.5	26.1	29.4
138	Warmley 18 High Street façade	366941	173558	Roadside	100.0	100.0	36.3	33.7	31.9	26.0	27.1
139	Warmley 14 High Street (former Webbs) façade	366890	173560	Roadside	100.0	100.0	**41.4**	37.2	34.4	29.1	32.1
141	Warmley - 41 Deanery Road façade	366705	173581	Roadside	100.0	100.0	31.8	29.0	27.7	22.6	23.2
142	Warmley - 33 Deanery Road Warmley Court façade	366613	173597	Roadside	100.0	100.0	29.0	26.8	26.7	23.2	21.3
143	Warmley - 1 High Street Ideal Pharmacy façade	366815	173574	Roadside	100.0	100.0	25.1	23.1	22.5	17.1	19.0
144	Warmley - 8 Tower Road North	366913	173523	Roadside	100.0	100.0	25.3	22.9	21.6	18.2	21.9
145	Warmley - 1 London Road/Cycle Path	367107	173531	Roadside	100.0	100.0	26.8	23.6	21.1	16.6	18.5
146	Kingswood - 34 Hill St façade	365910	173680	Roadside	100.0	100.0	**46.3**	**40.8**	**42.3**	35.9	34.1
147A, 147B, 147C	Soundwell - 264 Soundwell Rd façade	364586	174496	Roadside	100.0	100.0	38.1	35.3	35.3	28.5	31.3

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
148	Filton - 109 Gloucester Road North facade	360077	178900	Roadside	100.0	100.0	24.2	23.9	22.1	17.9	19.6
149	Filton - 707 Southmead Road facade	360050	179021	Roadside	100.0	100.0	26.9	27.8	25.1	21.0	22.8
150	Soundwell - 296 Soundwell Road façade	364528	174425	Roadside	100.0	100.0	26.1	26.3	24.1	18.2	20.0
151	Hambrook - Bristol Road Old Bakery FP Signpost	364049	178726	Roadside	100.0	100.0	35.5	29.8	29.2	23.2	23.4
152	Bradley Stoke - 188 Oaktree Crescent lp49	360945	182831	Roadside	100.0	100.0	30.5	27.4	26.9	21.8	22.5
153	Bradley Stoke - 141 Wheatfield Drive façade	361842	182417	Roadside	100.0	100.0	19.5	18.2	17.5	13.8	14.0
154	Bradley Stoke - 166 Ellan Hay Road façade	363242	180724	Roadside	100.0	100.0	22.5	20.4	20.3	17.2	17.1
155	Stoke Gifford - 3 Earl Close façade	363324	179854	Roadside	100.0	100.0	19.5	19.2	18.0	13.8	14.5
156	Stoke Gifford - Lancelot Road	362400	177624	Roadside	100.0	100.0	21.8	21.1	21.6	16.3	17.9
157	Hambrook - Bristol Road Poplars House façade	363999	178505	Roadside	100.0	100.0	25.3	23.0	26.5	21.4	21.1
158	Downend - 5 Wick Wick Close façade	366157	178557	Roadside	100.0	100.0	24.8	24.6	23.4	17.3	19.4
159	Wickwar - 21 High Street façade	372395	188581	Roadside	100.0	100.0	27.2	26.7	25.8	19.8	22.6
160	Staple Hill - 62 High Street	364655	175931	Roadside	100.0	100.0	30.9	29.3	30.0	23.7	24.1
161	Staple Hill - 13 Victoria Street façade	364906	176022	Roadside	100.0	100.0	29.8	26.8	29.1	23.1	24.1

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
162	Staple Hill - 28 Victoria Street façade	364925	176062	Roadside	100.0	100.0	25.7	25.5	25.4	20.5	22.0
163	Staple Hill - 2 Victoria Street façade	364918	175979	Roadside	100.0	100.0	26.9	26.4	26.9	21.0	23.1
164	Staple Hill - 102 High Street Jay Jays Hair façade	364811	175919	Roadside	100.0	100.0	28.3	28.2	28.2	22.1	23.0
165	Staple Hill - 3 Soundwell Rd Chinese Kitchen facade	364906	175864	Roadside	100.0	100.0	36.3	38.6	39.2	28.7	31.2
166	Kingswood - 12 Cecil Road	364770	173695	Roadside	100.0	100.0	27.9	28.8	27.5	21.1	22.3
167	Kingswood - 7 Downend Road	364652	173957	Roadside	90.4	90.4	32.5	30.4	29.5	22.8	24.3
168	Kingswood - 133 High Street façade	365366	173805	Roadside	100.0	100.0	29.4	28.1	25.6	19.7	21.6
169	Warmley - 20 Deanery Road Warmley Community Centre façade	366714	173560	Roadside	100.0	100.0	36.9	29.0	28.3	24.1	24.3
170	Patchway - 204 Gloucester Road front façade	360606	181675	Roadside	100.0	100.0	24.3	24.1	22.7	18.6	20.2
171	Soundwell - 225 Soundwell Rd façade	364664	174672	Roadside	100.0	100.0	32.1	29.5	30.3	24.3	26.8
172	Downend - 31 Badminton Road Brownes façade	365153	176812	Roadside	100.0	100.0	35.2	30.6	30.8	25.3	25.2
173	Mangotsfield - 10 Cossham Street façade	366459	176139	Roadside	100.0	100.0	27.0	24.8	25.0	19.3	20.7
174	Charfield - 25 Wotton Road façade	372011	192189	Roadside	100.0	100.0		18.0	17.0	13.0	14.5
180	Wick - 70 High Street The Old Post Office façade	370605	172681	Roadside	92.3	92.3			26.8	20.1	22.6

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
181	Warmley - 16 London Road façade	367298	173452	Roadside	92.3	92.3			23.7	19.5	20.8
185(3)	Staple Hill - High Street Pendennis Park Flats AQ Mesh site	364634	175946	Roadside	100.0	100.0				22.7	23.3
186(3)	Warmley - High Street/ Tower Rd Nth Junction AQ Mesh site	366902	173559	Roadside	100.0	100.0				22.9	26.4
187(4)	Thornbury - Rock Street Grace Lodge	363785	189856	Roadside	92.3	92.3					20.0
188(4)	Patchway- 43 Gloucester Road nr Hayes Way	360450	181066	Roadside	84.6	84.6					38.8

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

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

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

Notes:

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

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

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

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

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

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

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

(3) Sites 185 & 186 operated as triplicate sites in 2020, then as single sites in 2021. Triplicate average annual means are reported for 2020.

(4) Sites 187 and 188 operational from 2021.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations at Automatic Monitoring Sites

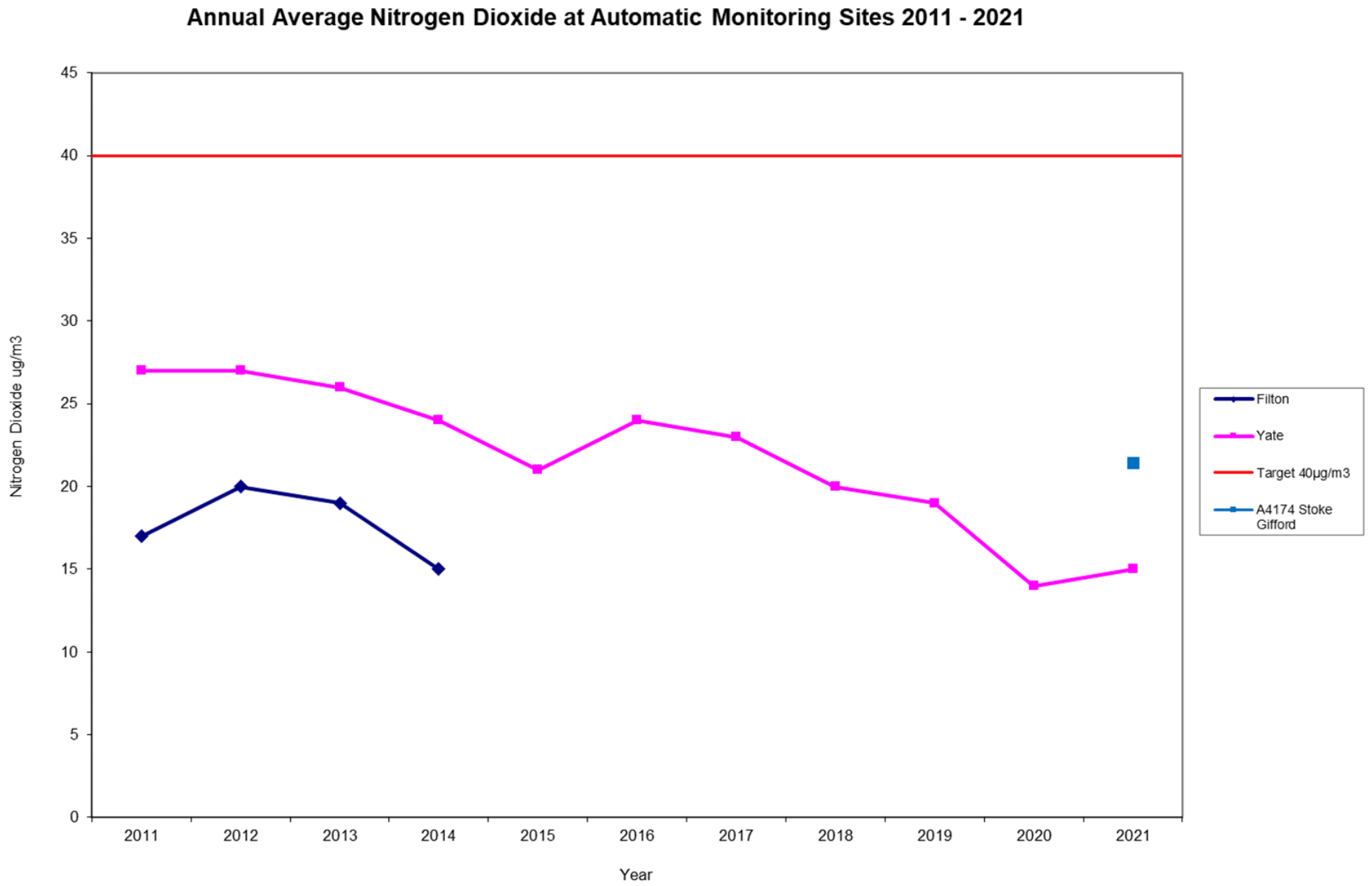


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	Valid Data Capture for Monitoring Period (%) (1	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SG1 Yate Station Road	370418	182525	Roadside	99.2	99.2	98.5	98.5	0	0	0	0	0
SG2 Stoke Gifford A4174 Coldharbour Lane	362384	178562	Roadside	-	-	99.5	35.4	-	-	-	-	0 (90)

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 2020 (%) (2)	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SG1 Yate Station Road	370418	182525	Roadside	96.5	96.5	93.3	93.3	14	13	13	11	12
SG2 Stoke Gifford A4174 Coldharbour Lane	362384	178562	Roadside	-	-	99.6	35.5	-	-	-	-	15.5

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

Notes:

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

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

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

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

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

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations at Automatic Monitoring Sites

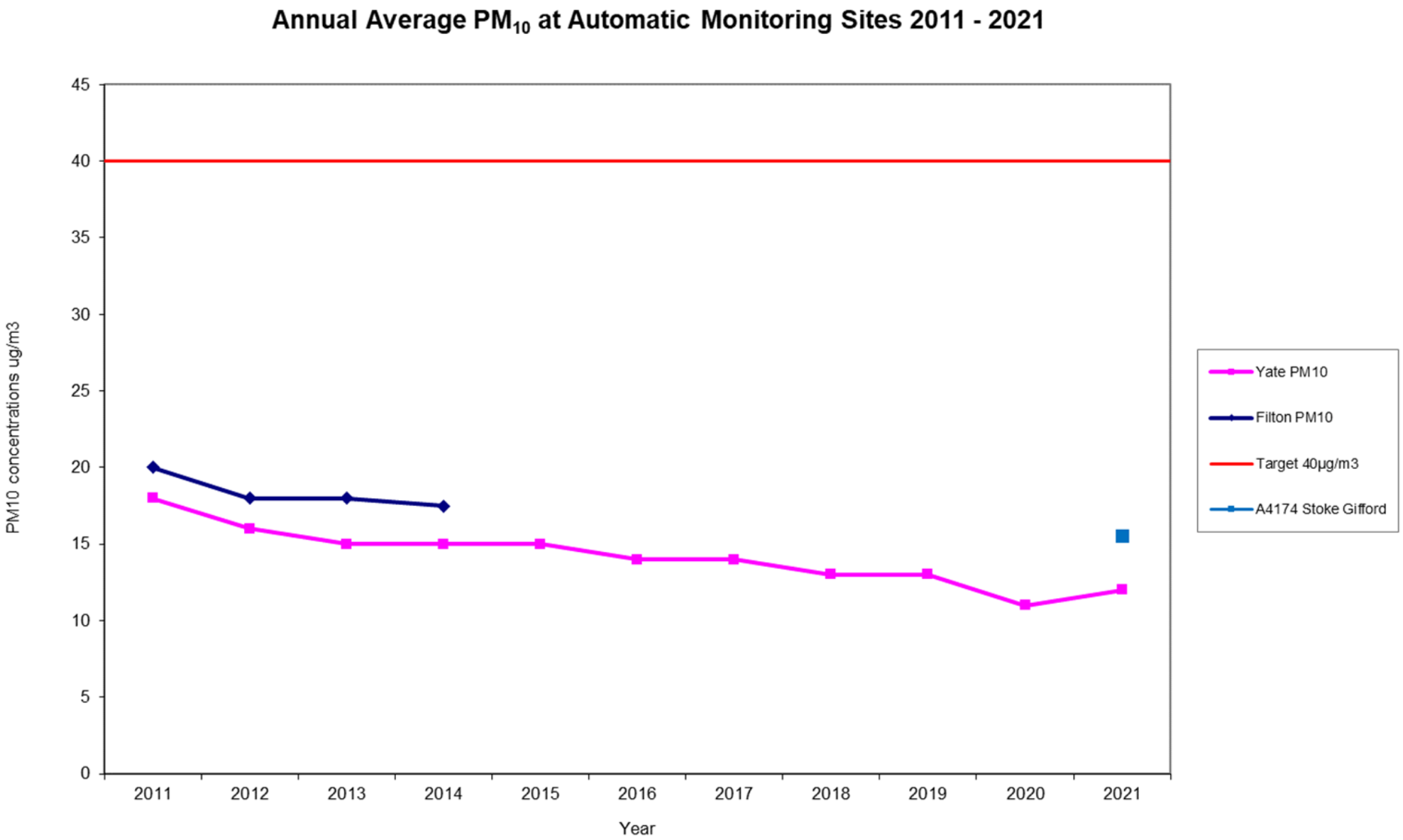


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SG1 Yate Station Road	370418	182525	Roadside	96.5	96.5	93.3	93.3	0	0	0	0	0
SG2 Stoke Gifford A4174 Coldharbour Lane	362384	178562	Roadside	-	-	99.6	35.5	-	-	-	-	0 (27)

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%).

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
SG2 Stoke Gifford A4174 Coldharbour Lane	362384	178562	Roadside	99.6	35.5	-	-	-	-	7.4

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

Notes:

The annual mean concentrations are presented as $\mu g/m^3$.

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

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

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

Table A.9 – Kingswood - Warmley AQMA Annual Mean NO_2 Non-Automatic Monitoring Results (µg/m^3)

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
27	Kingswood - 90 Regent Street Nat West façade	364866	173835	Roadside	92.3	92.3	29.8	27.0	27.3	19.7	20.7
67	Kingswood - 40 Regent Street Hays Travel façade	364671	173877	Roadside	100.0	100.0	37.9	34.0	35.6	25.8	25.8
68	Kingswood - 26-32 Regent Street Store Twenty One façade	364631	173886	Roadside	100.0	100.0	39.7	36.2	36.5	27.8	26.7
69	Kingswood - 12 Regent Street Dominos Pizza façade	364597	173892	Roadside	100.0	100.0	33.2	33.9	35.0	25.1	24.4
70	Kingswood - Two Mile Hill Road Job Centre Plus façade	364533	173896	Roadside	100.0	100.0	30.8	30.1	29.6	21.4	22.7
92	Kingswood - Regent Street Entertainment & Sports Club	364968	173836	Roadside	84.6	84.6	33.2	30.5	30.4	22.7	22.9
93	Kingswood - Hanham Road Exchange Flats	364979	173801	Roadside	100.0	100.0	26.7	26.6	24.4	19.1	21.0
95	Kingswood - 45 High Street Adam Lee	365078	173846	Roadside	92.3	92.3	36.6	37.8	37.0	25.7	25.0
96	Kingswood - 71 High Street SGYH Youth Housing	365164	173832	Roadside	92.3	92.3	35.0	31.3	30.3	23.1	24.3
98	Kingswood - High Street Sainsbury's Local	365463	173785	Roadside	100.0	100.0	34.8	32.2	32.2	24.4	24.8

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
137	Warmley - 35 High Street lp at façade	366984	173563	Roadside	100.0	100.0	39.0	37.2	34.5	26.1	29.4
138	Warmley 18 High Street façade	366941	173558	Roadside	100.0	100.0	36.3	33.7	31.9	26.0	27.1
139	Warmley 14 High Street (former Webbs) façade	366890	173560	Roadside	100.0	100.0	**41.4** [a]	*37.2*	34.4	29.1	32.1
141	Warmley - 41 Deanery Road façade	366705	173581	Roadside	100.0	100.0	31.8	29.0	27.7	22.6	23.2
142	Warmley - 33 Deanery Road Warmley Court façade	366613	173597	Roadside	100.0	100.0	29.0	26.8	26.7	23.2	21.3
143	Warmley - 1 High Street Ideal Pharmacy façade	366815	173574	Roadside	100.0	100.0	25.1	23.1	22.5	17.1	19.0
145	Warmley - 1 London Road/Cycle Path	367107	173531	Roadside	100.0	100.0	26.8	23.6	21.1	16.6	18.5
146	Kingswood - 34 Hill St façade	365910	173680	Roadside	100.0	100.0	**46.3**	**40.8**	**42.3**	35.9	34.1
168	Kingswood - 133 High Street façade	365366	173805	Roadside	100.0	100.0	29.4[a]	28.1	25.6	19.7	21.6
169	Warmley - 20 Deanery Road Warmley Community Centre façade	366714	173560	Roadside	100.0	100.0	36.9[a]	29.0	28.3	24.1	24.3

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
181	Warmley - 16 London Road façade	367298	173452	Roadside	92.3	92.3	N/O	N/O	23.7	19.5	20.8
186(3)	Warmley - High Street/ Tower Rd Nth Junction AQ Mesh site	366902	173559	Roadside	100.0	100.0	N/O	N/O	N/O	22.9	26.4

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

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

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

Notes:

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

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

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

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details. (ª denotes annualised results for previous years 2017 – 2019).

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%).

(3) Site 186 annual mean for triplicate tubes (186 A,B,C) in 2020 and single tube in 2021

N/O Site not operational

Figure A.3 – Trends in Annual Mean NO_2 Concentrations in Kingswood Section of Kingswood - Warmley AQMA

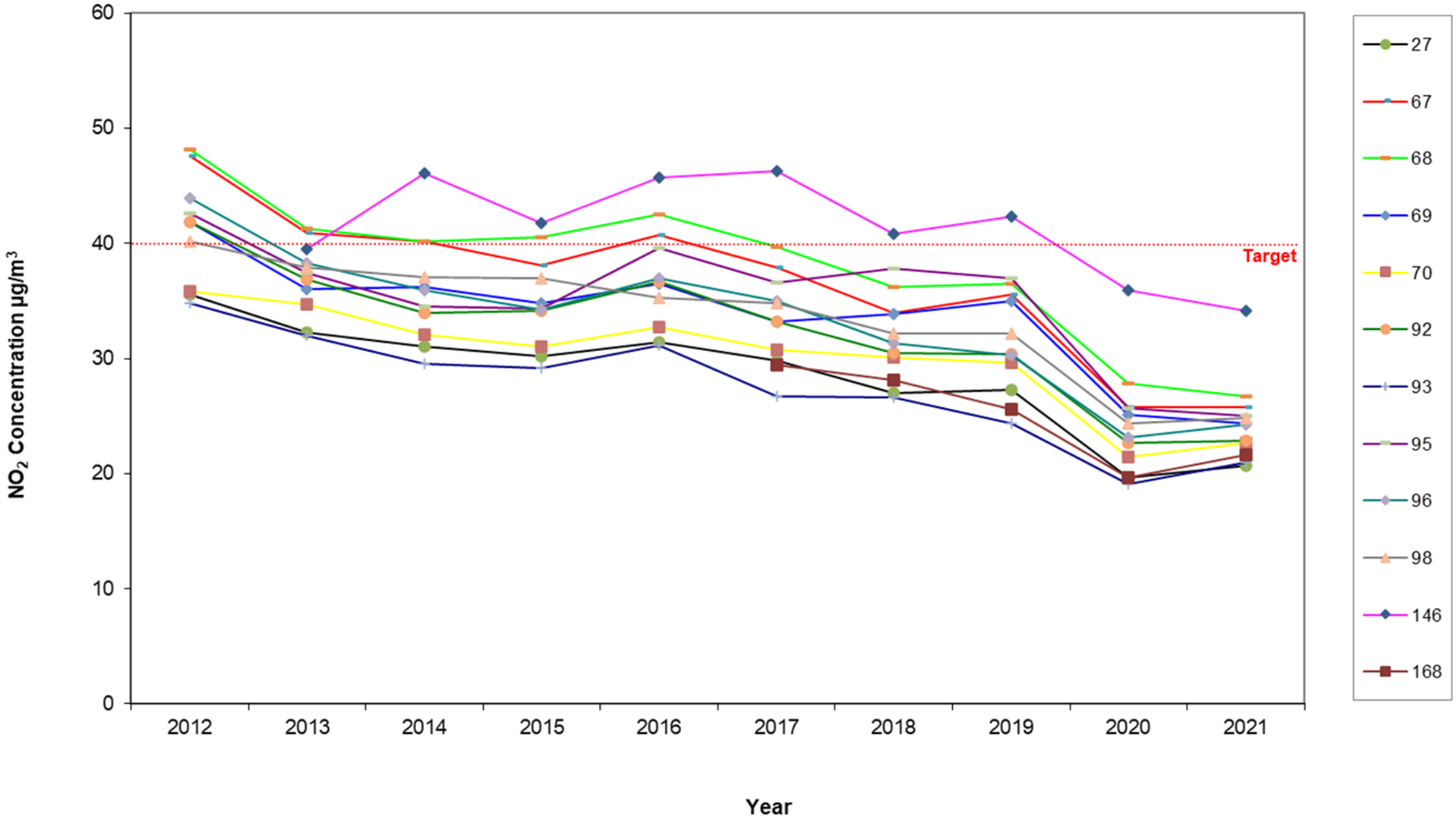


Figure A.4 – Trends in Annual Mean NO_2 Concentrations in Warmley Section of Kingswood - Warmley AQMA

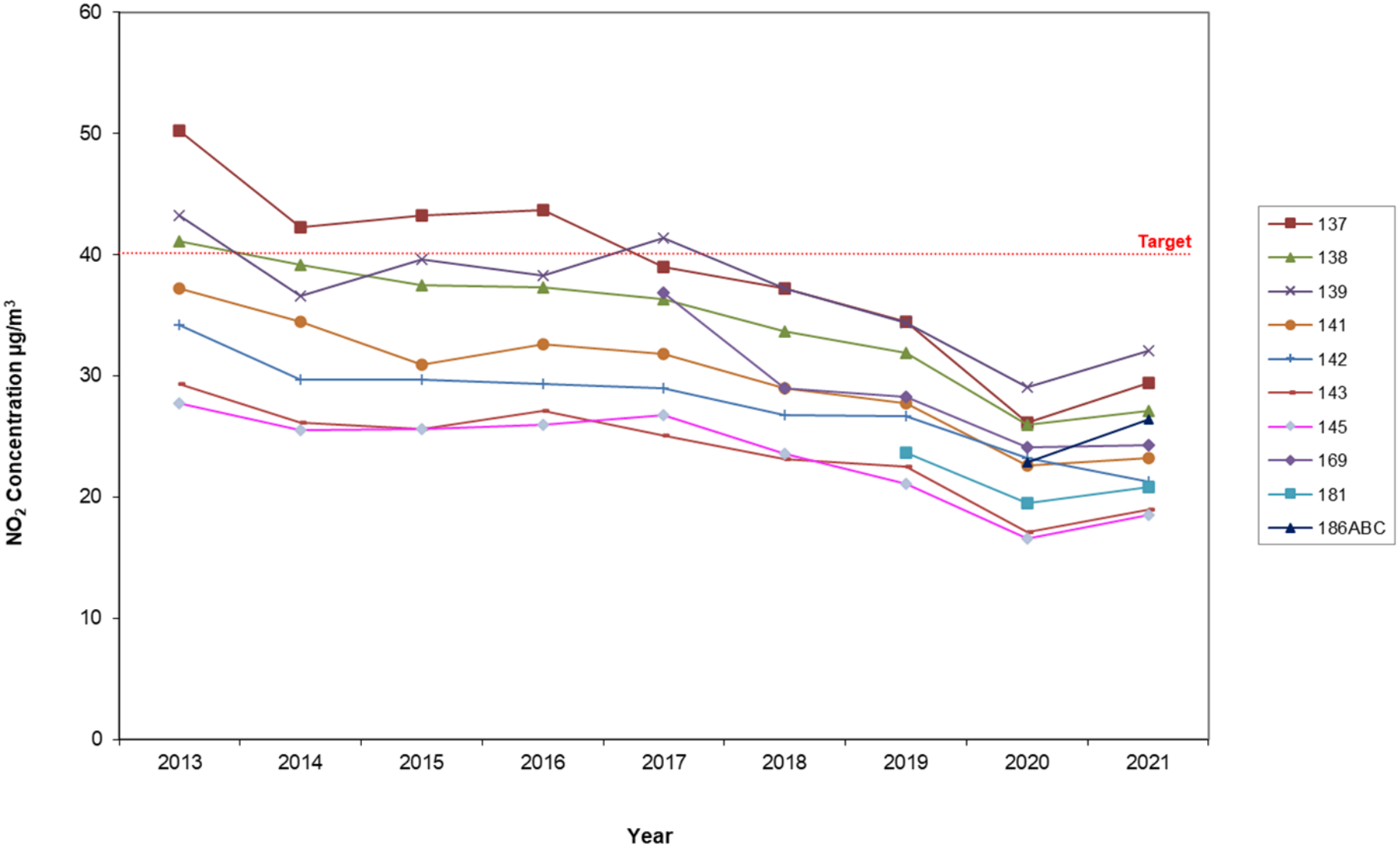


Table A.10 – Staple Hill AQMA Annual Mean NO_2 Non-Automatic Monitoring Results (µg/m^3)

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
29	Staple Hill - 123 High Street Backhouse Bet	364822	175932	Roadside	100.0	100.0	30.9	28.1	28.0	20.8	23.4
61	Staple Hill - 1 Broad Street William Hill	364926	175926	Roadside	100.0	100.0	39.2	37.8	36.6	29.3	30.9
62	Staple Hill - 2 Broad Street 501 Bar façade	364909	175908	Roadside	100.0	100.0	34.6	33.6	36.3	26.8	28.6
71	Staple Hill - 11 The Square Bunch Florist	365075	175918	Roadside	100.0	100.0	24.6	21.5	22.7	16.7	17.3
72	Staple Hill - 25 Broad Street Westbury Inks	364990	175920	Roadside	100.0	100.0	31.1	28.1	28.1	22.5	24.5
74	Staple Hill - 29-31 Soundwell Rd opp Page Comm Assoc	364885	175772	Roadside	100.0	100.0	27.1	27.0	25.6	18.9	20.8
76	Staple Hill - 84-86 High Street Staple Hill Oak Pub façade	364722	175926	Roadside	100.0	100.0	32.9	29.3	31.2	24.0	24.1
105	Staple Hill - 2 North Street	364932	176147	Roadside	100.0	100.0	27.0	25.0	26.0	19.5	20.6
160	Staple Hill - 62 High Street	364655	175931	Roadside	100.0	100.0	30.9	29.3	30.0	23.7	24.1
161	Staple Hill - 13 Victoria Street façade	364906	176022	Roadside	100.0	100.0	29.8	26.8	29.1	23.1	24.1

Diffusion Tube ID	Site Name	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
162	Staple Hill - 28 Victoria Street façade	364925	176062	Roadside	100.0	100.0	25.7	25.5	25.4	20.5	22.0
163	Staple Hill - 2 Victoria Street façade	364918	175979	Roadside	100.0	100.0	26.9	26.4	26.9	21.0	23.1
164	Staple Hill - 102 High Street Jay Jays Hair façade	364811	175919	Roadside	100.0	100.0	28.3	28.2	28.2	22.1	23.0
165	Staple Hill - 3 Soundwell Rd Chinese Kitchen facade	364906	175864	Roadside	100.0	100.0	36.3	38.6	39.2	28.7	31.2
185[3]	Staple Hill - High Street Pendennis Park Flats AQ Mesh site	364634	175946	Roadside	100.0	100.0	N/O	N/O	N/O	22.7	23.3

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

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

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

Notes:

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

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

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

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

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

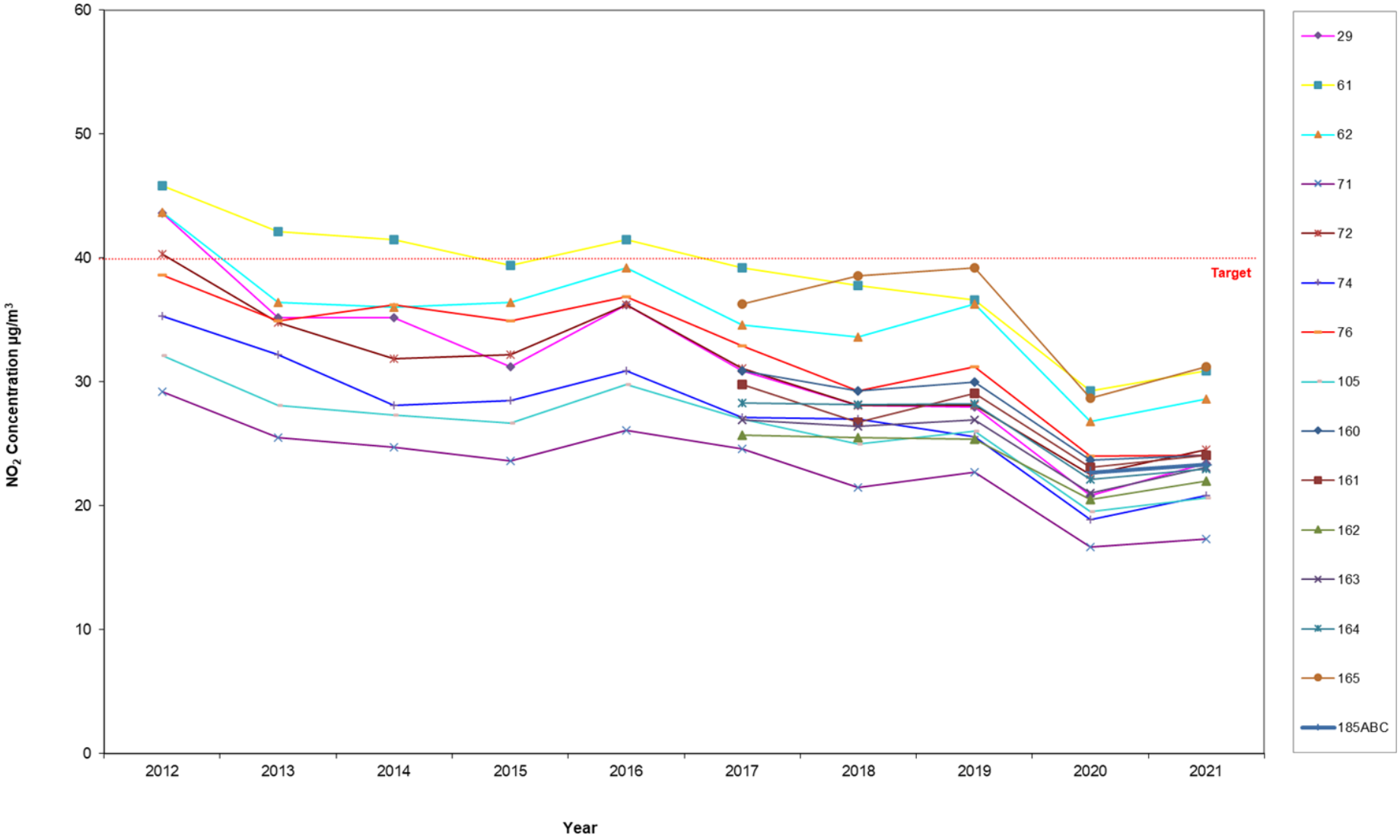
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

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

(3) Site 185 annual mean for triplicate tubes (185ABC) in 2020 and single tube in 2021.

N/O Site not operational

Figure A.5 – Trends in Annual Mean NO_2 Concentrations in Staple Hill AQMA



Estimated $PM_{2.5}$ Concentrations from Yate PM_{10} Monitoring

Table A.11 – Estimation of $PM_{2.5}$ concentrations and % reductions

Year	Yate PM_{10} Annual Means ($\mu g/m^3$)	Yate Estimated $PM_{2.5}$ Annual Means (1) (2) ($\mu g/m^3$)	Bristol St. Pauls (AURN) Monitored $PM_{2.5}$ Annual Means (3) ($\mu g/m^3$)
2010	20	14	14
2011	18	12.6	15
2012	16	11.2	13
2013	15	10.5	13
2014	15	10.5	13
2015	15	10.5	10
2016	14	9.8	12
2017	14	9.8	10
2018	13	9.1	12
2019	13	9.1	11
2020	11	7.7	10
2021	12	6.3	8
% Reduction 2010 -2021	**40%**	**55%**	**43%**

Notes:

(1) 2010 to 2020 $PM_{2.5}$ concentrations estimated as per LAQM.TG16 Box 7.7 (PM_{10} x 0.7)

(2) 2021 $PM_{2.5}$ concentrations estimated as per LAQM.TG22[73] using 2021 national roadside factor of 5.7 (PM_{10} annual mean concentration – national factor = estimated $PM_{2.5}$ annual mean concentration)

(3) Data obtained from UK-AIR Data Archive Annual and Exceedance Statistics - Defra, UK

[73] Estimating PM2.5 from PM10 Measurements | LAQM (defra.gov.uk)

Appendix B: Full Monthly Diffusion Tube Results for 2020 and 2021

Table B.1 – NO_2 2020 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.85)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1	370692	182499	41.1	32.6	25.8	12.7	19.3	21.3	18.8	24.3	29.7	27.9	34.9	32.7	26.7	22.7	-	
4A	370418	182525	28.2	22.2	18.0	11.2	10.1	13.2	11.7	16.7	21.4	21.6	29.6	26.0	-	-	-	Triplicate Site with 4A, 4B and 4C - Annual data provided for 4C only
4B	370418	182525	30.3	22.3	19.2	10.9	9.9	14.0	13.3	14.8	16.0	22.2	27.1	24.9	-	-	-	Triplicate Site with 4A, 4B and 4C - Annual data provided for 4C only
4C	370418	182525	26.5	21.4	18.0	10.3	9.8		13.1	16.5	19.7	21.6	27.3	23.0	18.8	15.9	-	Triplicate Site with 4A, 4B and 4C - Annual data provided for 4C only
10	360266	179136	45.8	33.0	27.0	21.5	20.9	26.8	19.9	38.1	32.9	70.2	47.9	40.0	35.3	30.0	-	
11	363654	189893	35.1	27.2	21.3	11.3	12.4	10.0	7.9	11.3	13.4	14.4	23.2	19.5	17.3	14.7	-	
12	362161	179570	32.6	25.3	23.1	14.3	13.5	14.4	16.3	21.7	25.9	27.1	29.4	29.5	22.8	19.3	-	
13	361523	178732	43.1	27.6	32.4	25.7	22.0	23.6	16.7	29.0	32.0	32.5	34.3	37.2	29.7	25.2	-	
21	365673	177475	21.9	15.1	14.1	11.0	6.9	8.2	7.0	9.4	14.4	12.6	20.6	22.6	13.7	11.6	-	
27	364866	173835	37.9	27.2	20.6	12.6	13.4	17.5	17.4	22.1	24.2	25.1	31.5	28.6	23.2	19.7	-	
29	364822	175932	29.1	22.5	25.5	18.1	18.9	21.2	16.9	23.2	29.4	25.6	31.0	32.2	24.5	20.8	-	
34	362395	182544	30.0	23.7	24.8	21.3	17.9	17.6	12.5	22.7		23.6	27.5	27.4	22.6	19.2	-	
35	362118	183031	35.8	22.2	26.0	20.4	17.1	20.2	13.8	24.4	27.0	26.3	31.9	31.9	24.8	21.0	-	
36	364544	178855	23.6	18.2	13.7	9.2	8.4	13.3	12.8	14.9	15.9	21.2	19.6	21.0	16.0	13.6	-	
37	361147	184846	29.6	21.6	27.1	15.0	19.8	26.4		30.3	25.3	22.8	36.0	28.5	25.7	21.8	-	
38	354282	184653	16.7	10.0	10.5	9.6	8.5	9.7	6.8	11.3	11.5	12.0	17.3	15.3	11.6	9.8	-	
44	362061	180025	42.5	34.8	28.3	17.9		22.3	19.2	21.6	30.4		34.9	31.5	28.3	24.1	-	
46	364852	180758		22.6	23.1	13.1	12.7	18.4	15.7	21.9	26.0	27.3	37.6	26.7	22.3	18.9	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.85)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
53	363907	178389	33.0	17.0	25.9	21.2	16.5	17.8	12.6	24.5	24.8	23.9	31.8	28.6	23.1	19.7	-	
54	365256	171656	39.6	29.4	25.5	13.3	13.8	24.5	19.9	24.4	29.2	31.6	34.8	34.7	26.7	22.7	-	
57	367742	181160	35.4	25.7	22.7	16.7	14.0	17.4	15.7	21.2	25.7	23.1	31.8	30.9	23.4	19.9	-	
61	364926	175926	45.7	37.1	34.9	27.0	20.9	29.4	24.7	32.9	37.3	38.9	43.6	41.4	34.5	29.3	-	
62	364909	175908	47.4	34.0	31.2	15.8	23.7	30.3	20.2	32.2	32.8	30.4	41.3	39.2	31.6	26.8	-	
63	359487	182479	24.3	22.8	15.7	9.7	9.6	12.3	14.2	17.3	19.2	20.2	26.8	22.3	17.9	15.2	-	
67	364671	173877	51.9	39.6	26.0	15.7	18.3	27.0	23.2	29.5	28.9	30.3	38.7	35.4	30.4	25.8	-	
68	364631	173886	52.5	39.9	29.4	20.5	19.9	25.5	25.1	32.2	31.4	34.5	40.9	40.3	32.7	27.8	-	
69	364597	173892	42.5	36.5	24.0	19.8	18.7	26.9	23.7	28.3	30.1	33.1	36.9	34.1	29.5	25.1	-	
70	364533	173896	38.3	24.1	23.1	15.6	15.7	19.2	15.4	25.0	25.9	26.3	35.3	38.2	25.2	21.4	-	
71	365075	175918	31.3	21.8	18.7	12.7	12.7	13.9	10.6	16.2	21.9	21.1	27.7	27.1	19.6	16.7	-	
72	364990	175920	41.9	31.7	26.2	13.7	12.6	19.4	21.0	24.1	30.9	28.9	32.9	34.8	26.5	22.5	-	
74	364885	175772	35.2	22.8	22.9	15.6	15.2	14.7	11.2	21.2	23.9	22.9	30.2	31.7	22.3	18.9	-	
76	364722	175926	42.4	36.7	27.9	15.1	18.7	21.8	20.1	27.5	31.9	31.5	34.2	31.6	28.3	24.0	-	
83	372791	182241	26.7	17.3	17.9	13.2		12.3	11.0	17.2	20.8	18.7	24.4	23.7	18.5	15.7	-	
87A	357739	181334	29.5	24.6	19.7	15.7	13.7	20.7	10.3	22.2	22.7	23.0	32.8	29.4	-	-	-	Triplicate Site with 87A, 87B and 87C - Annual data provided for 87C only
87B	357739	181334	33.6	29.6	20.5	16.7	14.0	22.2	10.5	23.9	23.7	22.7	32.0	30.1	-	-	-	Triplicate Site with 87A, 87B and 87C - Annual data provided for 87C only
87C	357739	181334	32.8	26.5	21.0	17.0	14.3	20.5	11.1	24.1	22.1	20.8	33.7	31.1	22.8	19.3	-	Triplicate Site with 87A, 87B and 87C - Annual data provided for 87C only
92	364968	173836	44.7	35.0	24.6	14.9	17.2	18.3	22.2	24.4	27.7	29.2	32.3	30.6	26.8	22.7	-	
93	364979	173801	25.9	21.9	23.3	18.9	18.4	15.4	12.3	21.8	24.7	23.6	33.8	29.6	22.5	19.1	-	
95	365078	173846	46.7	34.5	29.4	19.2	19.4	24.3	28.5	27.3	32.0	30.6	36.6	33.8	30.2	25.7	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.85)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
96	365164	173832	42.9	33.1	25.5	16.6	16.8	20.6	21.1	21.8	29.2	28.9	34.6	34.7	27.1	23.1	-	
98	365463	173785	45.2	34.1	25.8	15.9	17.4	24.6	18.4	26.1	29.1	30.8	39.9	37.8	28.7	24.4	-	
101	364546	175951	31.4	23.3	21.0	10.3			13.2			21.0	29.0	41.2	23.8	17.8	-	
105	364932	176147	37.2	25.6	23.3	15.2	10.1	15.7	13.7	20.1	23.4	25.0	34.2	32.3	23.0	19.5	-	
106	363112	179547	25.7	18.3	16.8	11.7	10.6	11.5	9.6	14.4	18.1	20.3	24.0	23.2	17.0	14.5	-	
113	359112	181909	28.1	26.3	23.6	10.4	16.2	18.6	24.4	24.5	28.4	26.0	23.7	26.3	23.0	19.6	-	
114	355263	185351	27.0	22.3	22.2	21.0	14.7	21.0	16.4	20.5			28.8	25.7	22.0	18.7	-	
115	355212	185360	31.9	21.3	20.9	21.8	17.0	21.2	16.4	22.0	23.8	22.4	31.3	27.5	23.1	19.6	-	
117	359874	178259	43.7	32.1	27.5	14.6	17.5	20.2	20.6	26.9	31.0	32.6	37.6	34.6	28.2	24.0	-	
119	360263	179250	41.6	29.9	27.8	16.9	16.3	21.8	16.4	23.5	30.3	31.1	37.9	35.2	27.4	23.3	-	
122	360566	178229	39.0	29.2	28.6	19.1	11.2	17.6	14.1	23.8	25.4	30.7	35.9	35.0	25.8	21.9	-	
124	360918	178905	40.7	25.8	29.3	23.8	20.8	21.8	14.2	25.9	27.8	30.1	36.4	33.8	27.5	23.4	-	
125	360891	179005	39.0	26.1	25.6	16.5	14.9	13.2	13.3	23.4	22.4	30.7	35.3	31.5	24.3	20.7	-	
128	364587	174431	42.2	30.7	27.1	17.0	17.0	19.7	19.5	24.5	30.6	30.0	37.5	41.8	28.1	23.9	-	
129	357508	181059	30.8	22.7	24.8	15.1	15.2	17.0	18.0	22.9	26.6	26.0	29.5	27.4	23.0	19.6	-	
132	364178	172337	29.5	19.7	16.1	13.0	13.5	16.7	14.4	18.9	22.3	20.6	28.2	27.8	20.0	17.0	-	
133	363736	178507	29.1	21.0	25.4	25.8	23.8	23.4	19.2	25.9	29.9	25.7	27.1	25.7	25.2	21.4	-	
134	364048	178719	36.8	26.9	24.8	20.6	18.5	22.8	20.7	28.2	29.8	28.7	32.8	31.3	26.8	22.8	-	
135	364029	178413	29.6	22.4	24.0	20.2	18.7	15.5	14.8	21.5	26.4	23.4	27.5	26.4	22.5	19.1	-	
136	361242	180544	34.5	25.5	18.8	10.8	8.6		10.0	15.7	16.6	20.5	24.8	24.5	19.1	16.3	-	
137	366984	173563	51.2	34.3	31.6	20.0	17.3	24.2	24.2	22.1	30.8	35.4	39.0	37.7	30.7	26.1	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.85)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
138	366941	173558	43.3	38.9	27.8	13.6	18.2	28.0	23.4	31.1	31.3	33.4	40.6	37.1	30.5	26.0	-	
139	366890	173560	50.4	46.0	33.1	16.1	23.0	27.6	32.7	32.8	36.8	39.8	39.9	32.8	34.2	29.1	-	
141	366705	173581	41.8	32.6	25.5	16.0	17.9	21.7	22.1	20.6	25.5	30.7	32.4	31.9	26.5	22.6	-	
142	366613	173597	42.2	31.5	23.8	14.2	14.7	19.6	18.6	24.5	27.8	26.4	41.9	43.1	27.3	23.2	-	
143	366815	173574	29.5	24.6	19.3	13.5	14.5	17.5	13.4	17.9	19.2	16.4	28.0	27.4	20.1	17.1	-	
144	366913	173523	31.7	27.5	20.6	10.4	12.8	16.6	15.5	19.2	23.0	24.7	28.3	27.4	21.5	18.2	-	
145	367107	173531	31.5	23.5	19.1	10.6	9.8	17.1	16.0	19.1	21.4	22.3	20.3	24.2	19.6	16.6	17.1	
146	365910	173680	77.7	57.4	34.2	32.1	25.0	32.3	30.9	38.7	38.6	42.2	52.7	44.8	42.2	35.9	-	
147A	364586	174496	44.0	35.6	29.6	17.1	23.0	27.2	28.7	32.7	37.2	37.2	39.4	40.6	-	-	-	Triplicate Site with 147A, 147B and 147C - Annual data provided for 147C only
147B	364586	174496	45.7	38.5	31.9	15.5	22.5	28.4	29.8	31.6	38.5	35.7	42.7	42.7	-	-	-	Triplicate Site with 147A, 147B and 147C - Annual data provided for 147C only
147C	364586	174496	47.4	37.9	30.5	17.7	22.1	27.1	29.4	36.1	39.3	39.9	42.2	43.4	33.6	28.5	-	Triplicate Site with 147A, 147B and 147C - Annual data provided for 147C only
148	360077	178900	30.5	19.6	23.8	17.8	12.1	16.8	11.9	19.7	21.4	22.0	29.5	27.8	21.1	17.9	-	
149	360050	179021	36.3	23.1	25.9	20.9	16.8	19.3	13.4	22.7	26.5	27.2	34.9	29.3	24.7	21.0	-	
150	364528	174425	23.9	19.9	22.3	14.3	16.1	17.3	12.7	21.6	24.0	24.5	30.1	30.0	21.4	18.2	-	
151	364049	178726	39.2	32.1	26.7	18.2	18.1	19.4	20.9	26.4	30.4	29.0	32.3	34.4	27.3	23.2	-	
152	360945	182831	32.7	24.5	27.3	21.6	18.8	19.2	16.5	24.5	28.1	27.7	32.1	34.0	25.6	21.8	-	
153	361842	182417	25.1	15.5	16.5	11.4	9.6	10.5	8.2	14.8	18.4	17.0	24.4	23.9	16.3	13.8	-	
154	363242	180724	29.7	20.2	17.6	15.3	7.9	13.6	12.7	25.8	21.3	22.9	27.3	27.8	20.2	17.2	-	
155	363324	179854	23.9	18.6	15.7	10.7	7.4	11.1	9.0	12.5	16.4	17.8	26.8	24.4	16.2	13.8	-	
156	362400	177624	31.0	19.9	18.7	12.2	9.9	13.2	9.4	16.0	18.7	23.3	30.9	27.1	19.2	16.3	-	
157	363999	178505	38.8	33.5	25.2	14.8	13.6	19.1	12.8	23.6	27.7	29.6	32.6	30.7	25.2	21.4	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.85)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
158	366157	178557	25.9	19.7	18.3	16.3	16.0	16.4	13.4	21.4	24.9	19.8	26.4	25.3	20.3	17.3	-	
159	372395	188581	34.6	20.3	23.9	16.3	14.6	19.6	11.1	24.1	29.3	23.9	32.5	29.9	23.4	19.8	-	
160	364655	175931	42.8	33.9	24.9	16.1	20.7	22.6	22.3	24.0	30.0	29.5	33.4	33.9	27.8	23.7	-	
161	364906	176022	42.8	33.5	24.5	14.6	14.9	19.4	17.7	25.9	30.3	28.1	35.8	38.9	27.2	23.1	-	
162	364925	176062	35.4	23.8	22.3	17.9	12.6	18.1	13.2	23.8	23.6	26.0	33.5	38.6	24.1	20.5	-	
163	364918	175979	36.9	27.1	23.9	14.5	13.5	18.0	15.9	22.7	26.8	26.0	32.6	38.4	24.7	21.0	-	
164	364811	175919	38.4	29.4	25.1	15.0	16.2	21.8	18.5	24.8	27.3	27.3	32.7	35.7	26.0	22.1	-	
165	364906	175864	50.9	33.8	30.9	18.1	26.4	30.0	17.9	38.4	33.2	32.4	45.0	48.8	33.8	28.7	-	
166	364770	173695	37.5	25.2	24.8	16.3	12.7	19.6	17.1	23.4	27.3	26.5	36.0	32.2	24.9	21.1	-	
167	364652	173957	45.0	30.4	24.1	14.7	15.7	21.0	20.9	24.4	29.8	29.4	35.5	31.1	26.8	22.8	-	
168	365366	173805	36.2	25.0	22.1	15.6	16.4	17.7	14.6	21.5	24.9	24.5	32.4	26.6	23.1	19.7	-	
169	366714	173560	42.5	36.9	27.2	13.0	19.6	23.0	25.8	25.9	31.8	32.0	31.4	31.0	28.4	24.1	-	
170	360606	181675	31.0	20.4	23.8	13.7	16.2	14.3	13.2	22.2	23.6	24.0	30.1	30.1	21.9	18.6	-	
171	364664	174672	42.0	27.9	25.6	17.8	16.7	22.7	19.2	31.2	30.1	27.7	41.2	40.2	28.5	24.3	-	
172	365153	176812	40.4	35.7	29.2	17.2	16.3	24.1	27.1	28.0	36.6	31.5	37.1	33.5	29.7	25.3	-	
173	366459	176139	35.3	25.1		13.7	13.4	17.0	13.8	21.8	24.4	23.3	31.7	30.1	22.7	19.3	-	
174	372011	192189	22.7	16.1	12.9	9.9	9.7	12.2	11.1	12.2	17.6	17.1	23.0	19.0	15.3	13.0	-	
180	370605	172681	33.0	18.4	22.3	18.2	17.9	24.2	15.0	27.7	19.6	25.5	32.0	29.8	23.6	20.1	-	
181	367298	173452	32.0	25.8	24.0	13.3	15.5	17.1	18.5	23.8	22.1	27.5	28.1	27.1	22.9	19.5	-	
185A	364634	175946	40.1	31.4	24.9	19.1	18.4	20.1	18.7	24.2	28.3	26.9	34.0	37.7	-	-	-	Triplicate Site with 185A, 185B and 185C - Annual data provided for 185C only
185B	364634	175946	40.5	28.1	25.3	16.7	18.4	20.2	17.9	24.7	28.1	27.7	35.3	32.3	-	-	-	Triplicate Site with 185A, 185B and 185C - Annual data provided for 185C only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.85)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
185C	364634	175946	41.7	30.4	25.4	16.8	18.6	22.4	18.8	20.9	28.1	28.4	37.0	32.4	26.7	22.7	-	Triplicate Site with 185A, 185B and 185C - Annual data provided for 185C only
186A	366902	173559	43.2	38.0	28.4	14.6	20.1	24.0	25.1	24.5	30.4	30.8	33.6	32.4	-	-	-	Triplicate Site with 186A, 186B and 186C - Annual data provided for 186C only
186B	366902	173559	38.3	34.3	29.0	13.5	18.5	21.4	23.2	25.0	25.3	29.5	32.0	31.8	-	-	-	Triplicate Site with 186A, 186B and 186C - Annual data provided for 186C only
186C	366902	173559	36.9	32.7	25.5	14.5	17.2	21.9	21.7	22.7	25.7	25.1	29.8	30.1	27.0	22.9	-	Triplicate Site with 186A, 186B and 186C - Annual data provided for 186C only

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

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

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

☒ **South Gloucestershire Council confirm that all 2020 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.

Table B.2 – NO_2 2021 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.86)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1	370692	182499	32.8	27.3	29.3	25.1	24.7	25.2	25.7	25.1	27.8	27.3	34.9	28.1	27.8	23.9	-	
4A	370418	182525	24.5	21.4	19.8	16.6	15.4	15.1	14.8	17.3	19.8	19.2	25.8	22.1	-	-	-	Triplicate Site with 4A, 4B and 4C - Annual data provided for 4C only
4B	370418	182525	26.7	21.1	20.1	17.3	16.7	15.5	16.3	15.0	19.3	20.8	29.1	20.8	-	-	-	Triplicate Site with 4A, 4B and 4C - Annual data provided for 4C only
4C	370418	182525	25.9	21.5	20.3	15.5	16.0	14.8	15.2	16.2	19.5	20.4	26.9	21.7	19.6	16.8	-	Triplicate Site with 4A, 4B and 4C - Annual data provided for 4C only
10	360266	179136	33.3	34.1	27.0	31.4	27.7	26.8	30.6	32.9	36.7	35.8	38.5	35.9	32.6	28.0	-	
11	363654	189893	16.8	15.2	22.7		10.4	10.3		12.5	13.5	16.2	17.4	19.6	15.5	13.3	-	
12	362161	179570	26.9	23.9	24.5	22.3	18.3	18.9		24.6	25.5	14.5	30.0	25.1	23.1	19.9	-	
13	361523	178732	31.8	32.3	30.7	30.4	29.5	29.3	29.0	31.1	35.5	29.2	41.2	32.1	31.8	27.4	-	
21	365673	177475	19.0	14.3	16.7	15.4	8.9	8.3	9.7	11.9	12.4	18.1	20.9	17.2	14.4	12.4	-	
27	364866	173835	27.0		24.6	21.3	22.2	20.0	21.8	21.0	24.4	22.0	31.9	27.8	24.0	20.7	-	
29	364822	175932	32.2	24.6	29.1	28.3	22.2	22.7	26.3	23.7	27.7	25.0	37.5	27.1	27.2	23.4	-	
34	362395	182544	38.3	25.3	23.4	23.1	20.9	14.9	18.9	18.9	24.3	20.1	26.8	27.4	23.5	20.2	-	
35	362118	183031	26.8	28.2	23.9	29.7	21.2	20.3	24.7	24.1	28.0	22.1	30.8	27.0	25.6	22.0	-	
36	364544	178855	19.0	16.5	14.1	13.4	14.3	12.1	13.1	12.4	13.4	14.9	19.0	18.3	15.0	12.9	-	
37	361147	184846	22.9	32.2	44.3	30.5	30.4	22.7	24.9	24.1	34.4		21.8	27.8	28.7	24.7	-	
38	354282	184653	17.7	14.9	12.7	11.6	10.5	8.9	10.2	10.6	12.1	12.5	15.9	13.2	12.6	10.8	-	
44	362061	180025	31.8	27.5	28.0	21.9	24.1	21.9	22.8	19.8	26.8	26.1			25.1	21.6	-	
46	364852	180758	31.7	24.4	25.3	21.6	21.7	20.8	18.9	19.8	25.5	25.5	30.3	24.8	24.2	20.8	-	
53	363907	178389	26.2	25.9	27.3	30.8	21.3	20.5	23.9	20.9	28.1	22.4	30.1	26.6	25.3	21.8	-	
54	365256	171656	33.0	29.7	26.1	20.5	24.5	24.0	25.2	26.0	30.2	26.5	35.5	27.5	27.4	23.6	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.86)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
57	367742	181160	33.3	25.7	24.7	23.2	18.9	17.7	19.7	18.1	23.7	25.1	30.1	25.9	23.8	20.5	-	
61	364926	175926	39.3	34.8	39.7	33.6	28.4	32.5	33.6	34.4	36.1	38.0	42.4	38.0	35.9	30.9	-	
62	364909	175908	34.9	33.8	29.3	35.2	30.2	30.5	36.0	29.2	37.1	32.7	39.0	31.4	33.3	28.6	-	
63	359487	182479	27.7	19.0	18.5	15.8	14.8	17.0	16.5	17.2	18.2	18.4	24.2	20.0	18.9	16.3	-	
67	364671	173877	33.6	29.8	29.7	27.5	29.1	26.5	28.2	26.5	30.9	30.7	37.2	30.3	30.0	25.8	-	
68	364631	173886	36.1	32.2	30.4	27.7	29.6	28.3	26.5	26.2	33.0	31.5	39.7	32.0	31.1	26.7	-	
69	364597	173892	33.5	26.5	29.9	24.4	26.7	27.0	25.1	24.9	30.2	26.1	34.8	30.9	28.3	24.4	-	
70	364533	173896	31.6	26.8	26.6	27.1	24.3	23.2	23.4	23.8	29.2	26.1	34.1	21.0	26.4	22.7	-	
71	365075	175918	24.2	20.4	22.0	20.3	16.5	16.2	16.7	16.5	19.3	18.6	28.2	22.0	20.1	17.3	-	
72	364990	175920	34.8	26.4	30.7	31.1	24.5	22.0	26.5	25.3	28.3	27.3	38.1	26.9	28.5	24.5	-	
74	364885	175772	25.1	23.7	25.9	26.8	20.0	21.7	22.4	18.7	25.9	22.4	32.3	25.3	24.2	20.8	-	
76	364722	175926	33.0	26.3	27.9	25.0	27.5	23.1	25.8	25.3	29.1	27.0	36.7	30.1	28.1	24.1	-	
83	372791	182241	23.7	19.5	19.7	20.0	15.4	16.9	18.1	16.8	21.6	16.6	25.2	20.4	19.5	16.8	-	
87A	357739	181334	26.5	27.9	23.1	22.6	24.1	15.8	17.7	18.9	27.6	25.8	21.2	27.6	-	-	-	Triplicate Site with 87A, 87B and 87C - Annual data provided for 87C only
87B	357739	181334	28.5	29.0	23.3	22.7	25.8	17.2	18.1	20.3	29.0	27.7	24.8	30.5	-	-	-	Triplicate Site with 87A, 87B and 87C - Annual data provided for 87C only
87C	357739	181334	26.6	28.7	24.6	21.5	25.5	16.7	18.2	18.3	28.9	28.0	24.4	29.9	24.1	20.7	-	Triplicate Site with 87A, 87B and 87C - Annual data provided for 87C only
92	364968	173836	32.5		28.4	22.9	26.8	24.9	23.1	23.5	28.9	27.0		28.4	26.6	22.9	-	
93	364979	173801	28.1	27.0	23.2	25.0	22.3	21.5	21.9	20.5	28.4	20.9	28.6	26.0	24.5	21.0	-	
95	365078	173846	30.1	25.6	32.4	29.4	26.2	25.9	27.5		31.1	26.9	37.0	28.2	29.1	25.0	-	
96	365164	173832	28.1	28.4	34.4	27.9	24.5	24.4	24.7		27.4	26.0	38.4	26.4	28.2	24.3	-	
98	365463	173785	33.4	29.4	28.3	27.6	26.5	26.5	25.3	23.2	30.0	29.1	35.2	31.3	28.8	24.8	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.86)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
101	364546	175951	27.6	23.7	22.5			16.3	17.2	17.3	17.2	20.9	27.6	25.1	21.5	18.5	-	
105	364932	176147	30.8	24.3	27.6	24.2	18.5	18.9	17.6	21.1	23.2	22.6	32.1	26.4	23.9	20.6	-	
106	363112	179547	19.8	17.2	16.6	14.6	14.4	11.1	12.7	15.7	16.2	17.5	21.3	21.6	16.5	14.2	-	
113	359112	181909	24.4	21.9	22.1	21.2	21.9	28.0	26.6	26.8	26.0	24.1	30.9	23.8	24.8	21.3	-	
114	355263	185351	28.6	23.6	22.9	24.8	20.1	22.0	21.8	22.4	26.8	22.8	27.5	23.6	23.9	20.6	-	
115	355212	185360	47.4	32.3	12.5	21.1	20.2	18.5	20.7	17.9	22.9	27.9	26.7	26.6	24.6	21.1	-	
117	359874	178259	32.4	28.2	30.9	31.7		26.8	28.0	24.5	32.4	30.8	28.2	32.8	29.7	25.5	-	
119	360263	179250	29.4	28.7	24.9	28.7	24.3	24.3	27.1	27.5	30.0	27.2	32.9	29.5	27.9	24.0	-	
122	360566	178229	30.3	29.5	26.4	27.0	21.4	19.0	21.5	22.5	23.9	30.0	30.3	29.7	26.0	22.3	-	
124	360918	178905	29.6	31.6	27.8	33.4	27.1	24.0	25.5	25.4	34.0	26.1	31.8	28.5	28.7	24.7	-	
125	360891	179005	29.5	26.4		21.8	23.6	19.4	19.9	23.7	25.4	27.1	33.1	31.4	25.6	22.0	-	
128	364587	174431	33.6	25.4	29.1	25.2	23.3	25.4	16.9	23.1	28.9	27.6	35.4	29.6	27.0	23.2	-	
129	357508	181059	30.3	26.2	21.5	26.2	19.9	22.8	24.0	25.7	25.7	21.1	28.6	24.7	24.7	21.3	-	
132	364178	172337	26.3	23.6	29.0	22.8	18.7	18.0	19.6	18.2	23.3	22.4	30.8	26.2	23.2	20.0	-	
133	363736	178507	21.6	25.4	26.5	33.5	23.0	27.3	30.6	23.8	29.6	18.1	31.4	23.3	26.2	22.5	-	
134	364048	178719	28.3	27.9	26.0	27.0	25.6	24.7	27.2	23.4	29.5	25.4	29.5	28.8	27.0	23.2	-	
135	364029	178413	26.0	22.4	24.9	27.7	19.4	21.6	24.0	21.2	25.8	19.3	30.7	26.2	24.1	20.7	-	
136	361242	180544	23.6	20.9	19.5	14.6	14.9	13.6	15.1	14.2	16.5	20.0	23.9	22.6	18.3	15.7	-	
137	366984	173563	41.7	36.7	36.7	33.4	28.5	32.5	30.3	26.1	35.2	31.7	43.9	33.1	34.2	29.4	-	
138	366941	173558	35.3	36.1	32.3	28.4	32.3	28.2	26.7	26.3	31.5	32.4	34.4	34.0	31.5	27.1	-	
139	366890	173560	43.5	38.3	39.8	30.5	38.5	36.8	33.8	36.2	37.8	36.6	40.8	35.0	37.3	32.1	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.86)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
141	366705	173581	33.9	29.4	30.0	23.5	23.9	21.8	22.5	22.9	25.7	28.0	33.9	28.2	27.0	23.2	-	
142	366613	173597	36.3	29.4	26.8	20.9	19.3	18.7	17.1	23.7	21.6	24.5	31.3	26.9	24.7	21.3	-	
143	366815	173574	26.0	25.4	21.7	23.3	20.1	16.7	18.0	18.2	22.3	21.6	28.0	24.2	22.1	19.0	-	
144	366913	173523	29.2	28.4	28.6	22.3	23.1	21.6	21.6	22.1	25.5	25.3	32.4	25.2	25.4	21.9	-	
145	367107	173531	27.2	23.9	23.0	17.4	20.1	18.4	15.7	18.2	20.4	21.8	27.9	23.7	21.5	18.5	19.1	
146	365910	173680	44.5	40.7	39.1	34.0	39.0	35.1	34.8	36.1	43.6	36.8	48.0	44.4	39.7	34.1	-	
147A	364586	174496	38.5	31.0	36.4	33.7	35.0	34.1	35.0	34.8	35.0	33.3	43.8	36.7	-	-	-	Triplicate Site with 147A, 147B and 147C - Annual data provided for 147C only
147B	364586	174496	39.4	31.0	37.6	35.1	34.7	35.8	34.7	34.8	37.9	39.4	43.8	35.8	-	-	-	Triplicate Site with 147A, 147B and 147C - Annual data provided for 147C only
147C	364586	174496	39.9	33.3	36.8	33.9	36.0	36.3	35.1	35.8	39.0	35.7	47.5	35.6	36.4	31.3	-	Triplicate Site with 147A, 147B and 147C - Annual data provided for 147C only
148	360077	178900	24.3	24.0	22.9	27.4	20.2	18.6	19.1	19.9	24.8	19.4	27.0	25.2	22.7	19.6	-	
149	360050	179021	27.5	29.9	25.8	30.0	20.5	22.6	23.8	26.2	27.4	23.9	32.9	27.9	26.5	22.8	-	
150	364528	174425	27.5	22.7	25.2	24.4	17.9	21.0	21.6	21.1	26.9	18.2	28.4	24.1	23.2	20.0	-	
151	364049	178726	28.1	29.7	28.5	25.7	25.5	24.0	24.2	22.5	27.9	28.3	34.1	28.2	27.2	23.4	-	
152	360945	182831	29.9	32.4	26.3	24.6	22.8	26.4	25.0	25.3	28.3	18.8	30.6	24.2	26.2	22.5	-	
153	361842	182417	18.3	18.7	16.8	17.3	13.1	11.5	12.9	13.0	15.2	16.1	20.7	21.9	16.3	14.0	-	
154	363242	180724	29.9	22.4	20.3	17.5	16.2	14.0	14.9	15.4	18.0	21.3	26.0	22.7	19.9	17.1	-	
155	363324	179854	22.6	20.5	16.9	12.2	10.4	13.2	13.9	14.1	17.2	16.5	25.3	20.2	16.9	14.5	-	
156	362400	177624	26.4	25.1	21.1	18.9	15.4	14.6	14.6	14.4	19.9	26.5	24.5	28.8	20.8	17.9	-	
157	363999	178505	27.9	21.6	27.7	20.6	22.6	21.2	18.6	20.3	24.1	29.2	33.5	27.4	24.6	21.1	-	
158	366157	178557	23.3	20.1	23.9	28.9	18.9	19.4	23.2	18.9	25.1	17.1	27.6	24.2	22.6	19.4	-	
159	372395	188581	34.0	22.2	26.2	25.8	17.9	25.0	26.3	23.6	30.6	22.7	37.1	24.5	26.3	22.6	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.86)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
160	364655	175931	34.3	26.0	29.4	25.9	25.7	24.7	26.0	25.9	29.3	24.7	37.0	28.3	28.1	24.1	-	
161	364906	176022	31.4	23.5	32.2	27.6	23.7	25.9	25.4	25.4	28.5	28.0	37.1	28.3	28.1	24.1	-	
162	364925	176062	28.3	26.6	27.0	27.1	22.9	21.3	20.9	19.8	28.2	25.5	30.9	28.9	25.6	22.0	-	
163	364918	175979	30.1	25.8	27.7	27.3	22.5	20.9	20.7	25.7	28.7	27.7	36.0	29.0	26.8	23.1	-	
164	364811	175919	31.4	26.2	27.3	25.5	25.0	22.2	24.4	23.3	28.2	25.5	33.2	28.5	26.7	23.0	-	
165	364906	175864	35.1	35.1	36.5	42.6	33.1	32.2	34.2	33.2	42.9	33.4	43.5	33.8	36.3	31.2	-	
166	364770	173695	29.9	27.1	24.5	25.6	23.4	22.9	23.7	20.1	26.3	24.2	35.8	27.8	25.9	22.3	-	
167	364652	173957	33.6	26.9	30.7	19.4	22.8	24.7		24.2	29.9	32.5	35.4	30.4	28.2	24.3	-	
168	365366	173805	29.6	26.0	25.3	27.1	19.0	23.5	22.5	23.0	28.4	21.4	30.9	24.9	25.1	21.6	-	
169	366714	173560	33.4	28.4	33.4	23.6	26.7	24.9	24.0	27.0	24.7	27.6	34.7	30.1	28.2	24.3	-	
170	360606	181675	32.2	25.7	23.4	24.1	19.7	19.1	20.8	20.7	24.9	21.3	26.2	23.8	23.5	20.2	-	
171	364664	174672	34.1	31.4	29.3	30.3	26.8	27.4	31.3	29.5	34.6	31.6	36.4	30.6	31.1	26.8	-	
172	365153	176812	34.8	26.0	30.3	25.8	27.6	26.6	26.0	28.5	30.6	28.0	37.9	29.8	29.3	25.2	-	
173	366459	176139	26.3	24.7	25.1	24.0	22.2	19.5	19.5	19.3	24.5	25.1	32.2	26.3	24.1	20.7	-	
174	372011	192189	20.5	16.1	18.3	18.4	12.5	12.7	15.0	14.9	17.8	15.0	23.8	16.4	16.8	14.5	-	
180	370605	172681	25.6	25.1	23.2	27.7	23.3		26.8	23.9	29.0	24.4	32.2	27.5	26.2	22.6	-	
181	367298	173452	28.2	24.4	22.4	22.3		22.5	23.9	19.9	22.4	23.4	31.0	25.6	24.2	20.8	-	
185	364634	175946	30.6	27.5	29.6	28.7	22.6	23.1	24.6	23.3	29.5	24.1	34.4	27.7	27.1	23.3	-	
186	366902	173559	38.1	35.2	35.6	28.2	26.5	27.6	27.1	28.6	32.1	26.0	32.5	30.8	30.7	26.4	-	
187	363785	189856		24.6	22.3	20.7	19.6	18.6	22.3	21.6	28.5	24.5	28.2	25.2	23.3	20.0	-	
188	360450	181066			37.3	36.7	42.0	48.0	48.7	44.9	44.0	52.7	54.4	42.8	45.1	38.8	36.3	

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

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

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

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

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within South Gloucestershire During 2020 and 2021

South Gloucestershire Council has not identified any new sources relating to air quality that have not been otherwise assessed through the planning process within the reporting years of 2020 and 2021.

Additional Air Quality Works Undertaken by South Gloucestershire Council During 2020 and 2021

South Gloucestershire Council has not completed any additional studies within the reporting years of 2020 and 2021. However, a Clean Air Strategy for South Gloucestershire has been produced and a new Clean Air Action Plan developed on which public consultation is anticipated in Autumn 2022. There has also been continued monitoring and management of the JAQU Air Quality scheme implemented on the A4174 at Hambrook. Further details are provided in Section 2 on these pieces of work.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes have been prepared and analysed by Somerset County Council Scientific Services since 2019, following a change from Gradko for the years 2017 and 2018. Somerset County Council Scientific Services also previously prepared and analysed the diffusion tubes for the period 2012 - 2016. The tubes are prepared by the laboratory using 20% triethanolamine (TEA) in water and the method follows the Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance document[74].

[74] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/practical-guidance/

While the laboratory is not UKAS accredited, it participates in the AIR-NO_2 Proficiency Testing (PT) scheme for which the results were 100% satisfactory during 2020 and 2021[75], apart from two AIR PT testing rounds that were cancelled due to the pandemic in 2020 (AR037 May-June 2020 and AR 039 July and August). The diffusion tube Precision Summary Results[76] also show Somerset County Council Scientific Services to have good tube precision (the ability for a measurement to be consistently reproduced) in 2020 and 2021.

The tube changing frequency is in adherence with the Diffusion Tube Monitoring Calendar of suggested exposure periods for 2020 and 2021[77] and is carried out by South Gloucestershire Council officers.

Diffusion Tube Annualisation

In 2020, one diffusion tube site (101) had data capture less than 75% (but greater than 25%) because of tubes going missing from site, resulting in 67% data capture. The annualised mean was estimated using the Diffusion Tube Data Processing Tool with 2020 data from four AURN monitoring sites; Bristol St. Pauls, Newport, Swindon Walcot and Charlton Mackrell, which met the minimum 85% data capture requirements.

The calculated annualisation factors and annualised mean for site 101 are shown in Table C.2.

In 2021, all the diffusion tube monitoring locations recorded data capture of at least 75%, therefore it was not required to annualise any monitoring data.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the combined 2020 and 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results

[75] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/qa-qc-framework/

[76] Precision and Accuracy | LAQM (defra.gov.uk)

[77] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/diffusion-tube-monitoring-calendar/

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.

National Bias Adjustment Factor

During 2020 and 2021, the Council operated a co-location study at the Yate automatic monitoring site and the studies were included in the national database of co-location surveys for both years. The national bias adjustment factor (BAF) for 2020 was 0.85 (spreadsheet version 06/21) and for 2021, the national BAF was 0.86 (spreadsheet version 06/22).

Local Bias Adjustment Factor

The Diffusion Tube Precision and Accuracy Bias spreadsheet[78] was used to compare the triplicate co-located diffusion tubes (Site 4A, B and C) with the automatic monitoring data at Yate and calculate local bias adjustment factors of 0.77 for 2020 and 0.76 for 2021, as shown in Figure C.1 and Figure C.2 respectively.

Figure C.1 – 2020 Precision and Accuracy spreadsheet for Yate Co-location Study

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm $^{-3}$	Tube 2 µgm $^{-3}$	Tube 3 µgm $^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	08/01/2020	04/02/2020	28.2	30.3	26.5	28	1.9	7	4.8	20	99.7	Good	Good
2	04/02/2020	03/03/2020	22.2	22.3	21.4	22	0.5	2	1.2	17	99.7	Good	Good
3	03/03/2020	01/04/2020	18.0	19.2	18.0	18	0.7	4	1.8	16.3	99.4	Good	Good
4	01/04/2020	28/04/2020	11.2	10.9	10.3	11	0.5	4	1.2	12.3	99.2	Good	Good
5	28/04/2020	02/06/2020	10.1	9.9	9.8	10	0.2	2	0.4	9	96.6	Good	Good
6	02/06/2020	30/06/2020	13.2	14.0		14	0.6	4	5.1	9	99.6	Good	Good
7	30/06/2020	29/07/2020	11.7	13.3	13.1	13	0.8	7	2.1	8	99.6	Good	Good
8	29/07/2020	03/09/2020	16.7	14.8	16.5	16	1.1	7	2.6	10	99.8	Good	Good
9	03/09/2020	29/09/2020	21.4	16.0	19.7	19	2.7	14	6.8	13	99.7	Good	Good
10	29/09/2020	03/11/2020	21.6	22.2	21.6	22	0.4	2	0.9	14	99.6	Good	Good
11	03/11/2020	01/12/2020	29.6	27.1	27.3	28	1.4	5	3.5	22.5	95.7	Good	Good
12	01/12/2020	05/01/2021	26.0	24.9	23.0	25	1.5	6	3.7	21.7	99.8	Good	Good
13													
												Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey -->

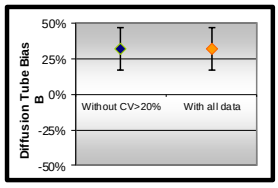
Site Name/ ID:	Yate Station Road Co-location

Precision	12 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.77 (0.69 - 0.87)
Bias B	30% (15% - 45%)
Diffusion Tubes Mean:	19 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	14 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	14 (13 - 16) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.77 (0.69 - 0.87)
Bias B	30% (15% - 45%)
Diffusion Tubes Mean:	19 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	14 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	14 (13 - 16) µgm^{-3}



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Version 04 - February 2011

[78] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/local-bias/

Figure C.2 – 2021 Precision and Accuracy spreadsheet for Yate Co-location Study

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	05/01/2021	02/02/2021	24.5	26.7	25.9	26	1.1	4	2.8
2	02/02/2021	01/03/2021	21.4	21.1	21.5	21	0.2	1	0.5
3	01/03/2021	29/03/2021	19.8	20.1	20.3	20	0.2	1	0.6
4	29/03/2021	04/05/2021	16.6	17.3	15.5	16	0.9	6	2.3
5	04/05/2021	01/06/2021	15.4	16.7	16.0	16	0.7	4	1.7
6	01/06/2021	28/06/2021	15.1	15.5	14.8	15	0.4	3	0.9
7	28/06/2021	02/08/2021	14.8	16.3	15.2	15	0.8	5	1.9
8	02/08/2021	31/08/2021	17.3	15.0	16.2	16	1.1	7	2.8
9	31/08/2021	27/09/2021	19.8	19.3	19.5	20	0.3	1	0.7
10	27/09/2021	02/11/2021	19.2	20.8	20.4	20	0.8	4	2.0
11	02/11/2021	30/11/2021	25.8	29.1	26.9	27	1.6	6	4.1
12	30/11/2021	04/01/2021	22.1	20.8	21.7	22	0.7	3	1.7
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
19.1	99.7	Good	Good
14.7	99.5	Good	Good
16.1	99.7	Good	Good
16.2	96.4	Good	Good
13.0	92.1	Good	Good
10.6	99.5	Good	Good
11.0	99.4	Good	Good
10.5	99.7	Good	Good
14.0	99.4	Good	Good
14.9	99.5	Good	Good
22.4	95.5	Good	Good
16.3	99.0	Good	Good
	Overall survey -->	Good precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Yate Station Road Co-location

Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

Bias calculated using 12 periods of data
Bias factor A 0.76 (0.71 - 0.82)
Bias B 31% (23% - 40%)

Diffusion Tubes Mean: 20 µgm^{-3}
Mean CV (Precision): 4

Automatic Mean: 15 µgm^{-3}
Data Capture for periods used: 98%

Adjusted Tubes Mean: 15 (14 - 16) µgm^{-3}

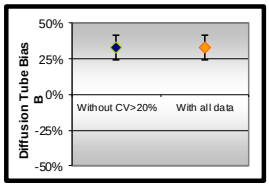
Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 12 periods of data
Bias factor A 0.76 (0.71 - 0.82)
Bias B 31% (23% - 40%)

Diffusion Tubes Mean: 20 µgm^{-3}
Mean CV (Precision): 4

Automatic Mean: 15 µgm^{-3}
Data Capture for periods used: 98%

Adjusted Tubes Mean: 15 (14 - 16) µgm^{-3}



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Discussion of Choice of Factor to Use

South Gloucestershire Council applied the national bias adjustment factor of **0.85** to the **2020** monitoring data and the national bias adjustment factor of **0.86** to the **2021** monitoring data.

While the national bias adjustment factors of 0.85 (2020) and 0.86 (2021) compare reasonably well with the local bias adjustment factors of 0.77 (2020) and 0.76 (2021), the national factors are more conservative being slightly higher in both years.

Guidance on the choice of bias adjustment factor is included in LAQM TG16 Box 7.13. Having considered this guidance, it was decided it would be more robust and precautionary to use the more conservative national bias adjustment factors of 0.85 for 2020 and 0.86 for 2021 as opposed to the local BAFs.

It should be noted that the June revision of the national BAF spreadsheet for Somerset Scientific Services is usually more conservative in value and significantly more robust in terms of the number of studies compared to the March version. For example, in 2020, the March (v03/21) BAF was 0.76, while the June (v06/21) BAF was 0.85; and in 2021, the March (v03/22) BAF was 0.77, while the June (v06/22) BAF was 0.86. In terms of number of colocations studies, for both 2020 and 2021, the March spreadsheets (v03/21 and

v03/22) had only 2 studies (SGC and Somerset CC intercomparison study), while for 2020, the June spreadsheet (v06/21) had 10 studies, with 6 Bristol City Council co-location studies and 2 Wiltshire studies having been added, and for 2021. the June spreadsheet (v06/22) had 11 studies, with 7 Bristol CC co-location studies and 2 Wiltshire studies added.

LAQM Helpdesk and Defra advice was sought regarding this issue for the 2021 data bias adjustment, particularly as the stipulated deadline for the 2022 ASR was 30 June 2022 so the later releases of the national BAF spreadsheet could not necessarily be considered and the revised BAF used. In light of this, it was agreed by Defra that the data should be processed using the revised national BAF in spreadsheet version 06/22 to ensure the reported data was robust and the report deadline was extended to accommodate this.

A summary of bias adjustment factors used by South Gloucestershire Council over the past five years is presented in Table C.1. The bias adjustment factor used in these years has been the more conservative bias adjustment factor to give the worse-case annual means.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor	Laboratory
2021	National	06/22	0.86	Somerset CC
2020	National	06/21	0.85	Somerset CC
2019	National	06/20	0.83	Somerset CC
2018	Local	-	0.94	Gradko
2017	Local	-	0.91	Gradko

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 available on the LAQM Support website. The background NO_2 concentrations were taken from the Defra

Background Mapping Data[79]. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1 and Table B.2.

Distance correction has been considered for monitoring sites where the annual mean concentration is greater than 36µg/m^3 and the monitoring site is not located at a point of relevant exposure (taking the limitations of the calculator into account). There were no sites in 2020 that required distance adjusting for this reason but there was one site in 2021 (site 188) in Patchway that was above 36µg/m^3 (at 38.8 µg/m^3) and not at a façade of relevant exposure. This site is located at roadside on the A38 Gloucester Road near the junction with Hayes Way, but the façades of the nearest properties are set back further from the road. The distance adjusted result remained marginally borderline at 36.3 µg/m^3.

Two further sites (sites 36 and 145) required distance adjusting in both 2020 and 2021 because the monitoring sites are further from the kerb than the nearest receptor. However, distance adjusted results could not be calculated for site 36 as the bias adjusted annual mean NO_2 concentrations were less than the mapped annual mean NO_2 background concentrations in both years. The distance adjusted annual means at site 145 remained well below the objective in both 2020 and 2021. The NO_2 Fall off with Distance calculations are shown in Table C.4.

Precision Check for Triplicate Tubes

Precision in relation to diffusion tubes is the ability of the measurements to be reproduced. Precision cannot be corrected but can be improved by careful handling of the diffusion tubes in the laboratory and in the field. Triplicate tubes (i.e. three diffusion tubes at one location) are used to provide more robust monitoring at key locations. For example, aside from the co-location studies at the Yate automatic monitoring station (site 4ABC) and the AQ Mesh sites (185ABC and 186ABC), there are also triplicate tubes in the former Cribbs Causeway AQMA (site 87ABC) and at a site where there had been previous marginal exceedances of the annual mean NO_2 objective in Soundwell (site 147ABC).

The precision of the 2020 and 2021 triplicate results were checked using the precision and accuracy LAQM spreadsheet tool[80] and all of the triplicate tube sites showed good precision in both years.

[79] Background Mapping data for local authorities - 2018 - Defra, UK

[80] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/precision-and-accuracy/

QA/QC of Automatic Monitoring

The automatic monitoring sites follow the QA/QC programme outlined below:

- Regular checks on the data to ensure analysers and communications are operating correctly and faults are reported as soon as possible by Air Quality Data Management (AQDM) under contract to South Gloucestershire Council
- Four-weekly Local Site Operator (LSO) duties, including site inspections and calibration checks on the analysers using nationally traceable standard gases by Bristol City Council (BCC) under contract to South Gloucestershire Council
- Ad-hoc site inspections to check equipment operational status, site security and detect equipment malfunction as necessary by SGC Environmental Protection Officers
- Repairs as required and planned six monthly servicing and re-calibration of the analysers by Enviro Technology Services under contract to South Gloucestershire Council.

Calibration methods

Calibration procedures are carried out four-weekly by BCC. The methodology for the calibration procedure, which includes a two point zero/span calibration check, is derived from the manufacturers' instruction handbooks and from the AURN Site Operator's Manual as follows:

- Pre-calibration check - the site condition and status of the analyser is recorded prior to the zero/span check being conducted
- Zero check – the response of the analyser to the absence of the gas being monitored
- Span check – the response of the analyser to the presence of the gas of a known concentration
- Post calibration check - the site condition and status of the analyser on completion of all checks.

Each analyser zero/span check is fully documented and the records are kept centrally using Google Sheets. The calibration factors are calculated in Google Sheets and used in the data scaling and ratification process.

The two point calibration is conducted on the NO_x analysers using a zero air scrubber and a reference nitric oxide (NO) mixture at a concentration of approximately 470 ppb, which is supplied and certified by BOC. The contents of the portable scrubber used for zero air generation (hopcalite, activated charcoal, purafil and drierite) are changed when necessary or at least every six months.

Equipment Servicing and Maintenance

The automatic analysers and associated equipment are serviced and maintained on a planned schedule following manufacturers' instructions. A six monthly full service and multi-point recalibration is carried out on the Yate NO_x analyser under contract by the equipment suppliers; EnviroTechnology Services. The multi-point calibration involves the use of zero air, NO and NO_2 calibration gases, which are again traceable to national standards, enabling the analyser data slope and offset factors to be reset. A check on the efficiency of the molybdenum converter is undertaken during the services.

The contract also covers unscheduled site visits and repairs, for example in the event of equipment failure, within a specified period of time to minimise data loss. Results of the servicing, calibrations and repairs are fully documented and stored centrally.

Data Processing, Validation and Ratification

During 2020 and 2021, raw data from the Yate analysers was downloaded automatically twice a day to a designated PC within the council via a modem and telephone line from the site. All data is collected by Opsis EnviMan software. The data from the analysers was visually screened in-house using EnviMan ComVisioner to check for obvious erroneous data and equipment faults.

Air Quality Data Management (AQDM) also collect the automatic monitoring data and undertake the subsequent validation, scaling and ratification of the data in accordance with LAQM (TG16) on behalf of the Council. Data validation involves continually screening algorithmically and manually for anomalies. This includes visual examination of the data to check for any spurious or unusual measurements, such as large spikes, 'flat-lines' and excessive negative data. Suspicious data is "flagged" for further investigation. The data is scaled against the four weekly and full six monthly calibration data.

During data ratification, all the information relating to the dataset and monitoring location is critically reviewed and any initial spurious data that was flagged is re-examined and appropriately edited. The original raw dataset is kept for reference. The monitoring data is

compared to trends at nearby AURN sites throughout the whole process. The ratified data is the final data presented in this report.

The real-time automatic monitoring data for South Gloucestershire is available on the Air Quality in the United Kingdom (ukairquality.net) website. The monitoring data for the "closed" automatic monitoring stations that have ceased operation; Filton (NO_2 and PM_{10}), Kingswood (NO_2 and PM_{10}) and Badminton (O_3) is also available on this website.

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

The PM_{10} data measured by the unheated Beta Attenuation Monitor (BAM) at the Yate automatic monitoring site have been adjusted to gravimetric equivalent by using a factor of 0.833. The PM_{10} measurements are made using a smart heated BAM 1020 at the Stoke Gifford A4174 automatic monitoring site so have been adjusted to gravimetric equivalent using a factor of 0.96618.

The $PM_{2.5}$ measurements are made at the Stoke Gifford A4174 automatic monitoring site using a smart heated BAM 1020 and do not require correction.

Automatic Monitoring Annualisation

The 2021 NO_2, PM_{10}, $PM_{2.5}$ and O_3 monitoring data from the Stoke Gifford A4174 automatic monitoring site required annualisation as the site was operational from 24 August 2021, so the data capture for the year was less than 75% but greater than 25%.

The annualised means were estimated following guidance in LAQM.TG16 Chapter 7 using 2021 data from a minimum of three, or four AURN monitoring sites where data was available that met the minimum 85% data capture requirements. The AURN sites used for the PM_{10} and $PM_{2.5}$ annualisation were Bristol St. Paul's, Newport and Cardiff Centre. For NO_2, the above three sites were used plus Swindon Walcot; and for O_3, Bristol St Paul's and Cardiff Centre were used along with Charlton Mackrell and Cwmbran Crownbridge. All of these AURN sites are within a 50 mile radius of the Stoke Gifford A4174 automatic monitoring site as required by LAQM.TG16 Box 7.9. The annualisation data is presented in Table C.2.

The Yate automatic monitoring site recorded data capture of greater than 75% so annualisation was not required.

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, there is no relevant exposure in relation to the Yate or Stoke Gifford A4174 automatic monitoring sites, so distance adjustment of the data is not appropriate or possible.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Year	Site ID	Annualisation Factor Bristol St Paul's	Annualisation Factor Newport	Annualisation Factor Swindon Walcot	Annualisation Factor Charlton Mackrell	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
2020	101	0.8606	0.8902	0.8733	0.9022	0.8815	23.8	21.0	**NO_2 Diffusion tube site Staple Hill High Street Beech House**

Year	Site ID	Annualisation Factor Bristol St Paul's	Annualisation Factor Newport	Annualisation Factor Cardiff Centre	Annualisation Factor Swindon Walcot	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
2021	SG2	0.8359	0.8849	0.8810	0.9655	0.8918	24	21.4	**NO_2 Stoke Gifford A4174 Automatic Site**

Year	Site ID	Annualisation Factor Bristol St Paul's	Annualisation Factor Newport	Annualisation Factor Cardiff Centre	Annualisation Factor	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
2021	SG2	1.0451	1.0669	0.9868	-	1.0329	15	15.5	**PM_{10} Stoke Gifford A4174 Automatic Site**
2021	SG2	1.0032	1.0798	1.0876	-	1.0569	7	7.4	**$PM_{2.5}$ Stoke Gifford A4174 Automatic Site**

Year	Site ID	Annualisation Factor Bristol St Paul's	Annualisation Factor Cardiff Centre	Annualisation Factor Charlton Mackrell	Annualisation Factor Cwmbran Crownbridge	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
2021	SG2	1.1363	1.1429	1.1451	1.1345	1.1397	43	49.0	**O_3 Stoke Gifford A4174 Automatic Site**

Table C.3 – Local Bias Adjustment Calculation

	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
2020					
Periods used to calculate bias	12				
Bias Factor A	0.77 (0.69 - 0.87)				
Bias Factor B	30% (15% - 45%)				
Diffusion Tube Mean (µg/m^3)	19				
Mean CV (Precision)	5%				
Automatic Mean (µg/m^3)	14				
Data Capture	99%				
Adjusted Tube Mean (µg/m^3)	14 (13 - 16)				
2021					
Periods used to calculate bias	12				
Bias Factor A	0.76 (0.71 - 0.82)				
Bias Factor B	31% (23% - 40%)				
Diffusion Tube Mean (µg/m^3)	20				
Mean CV (Precision)	4%				
Automatic Mean (µg/m^3)	15				
Data Capture	98%				
Adjusted Tube Mean (µg/m^3)	15 (14 – 16)				

Notes:

The local bias adjustment factors were **not** used to bias adjust the 2020 and 2021 diffusion tube results and are included for information only.

Table C.4 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Year	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
2020							
	36	30.0	12.5	13.6	17.9	-	*Error: Measured concentration must be above background concentration.*
	145	5.0	3.8	16.6	10.7	17.1	
2021							
	36	30.0	12.5	12.9	16.9	-	*Error: Measured concentration must be above background concentration.*
	145	5.0	3.8	18.5	10.3	19.1	
	188	3.6	5.9	38.8	20.0	*36.3*	*Predicted concentration at Receptor within 10% the AQS objective.*

Appendix D: Maps of Monitoring Locations and AQMAs

Figure D.1 – Staple Hill AQMA (Amended 2012)

Figure D.2 – Kingswood – Warmley AQMA (Amended 2015)

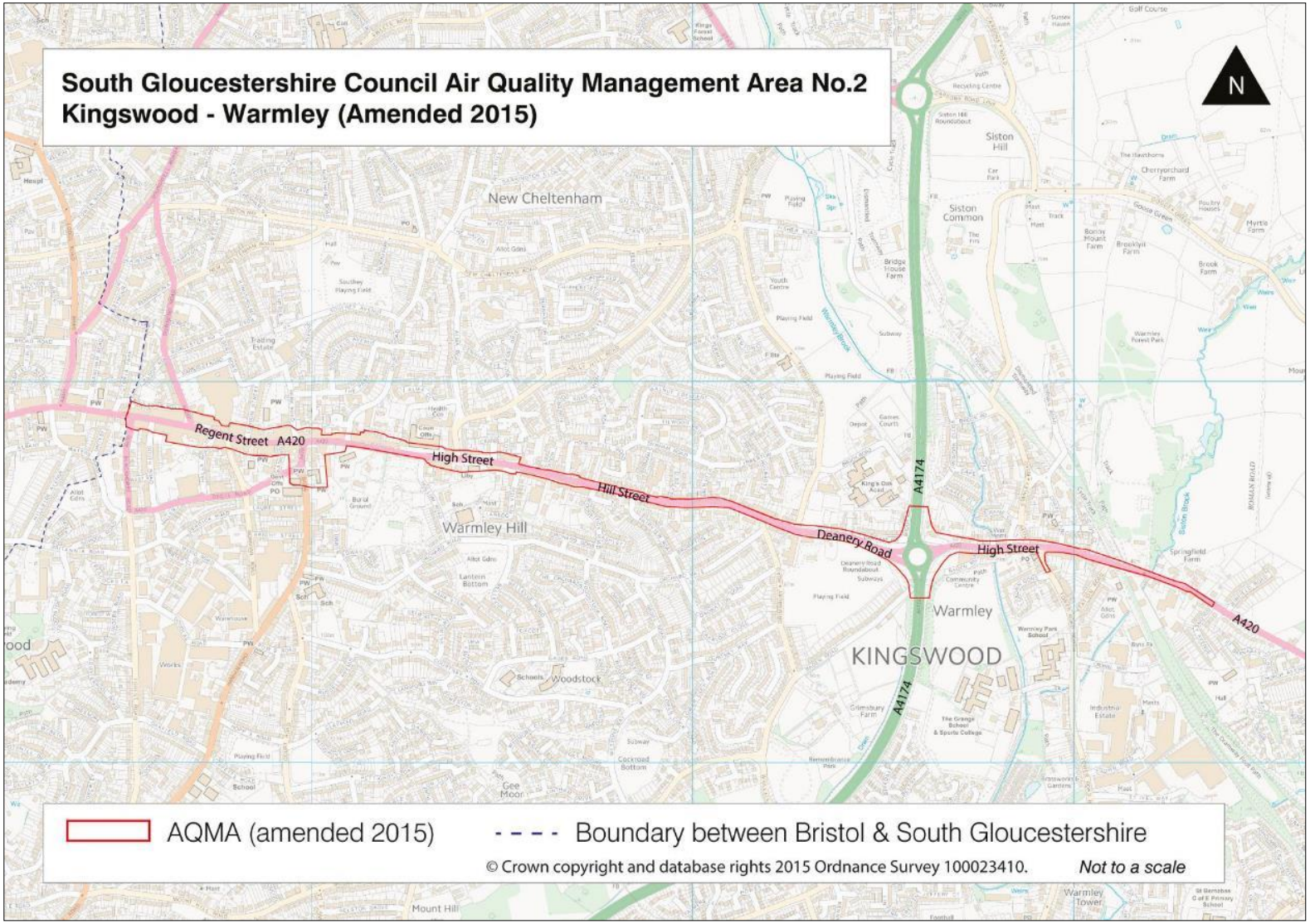
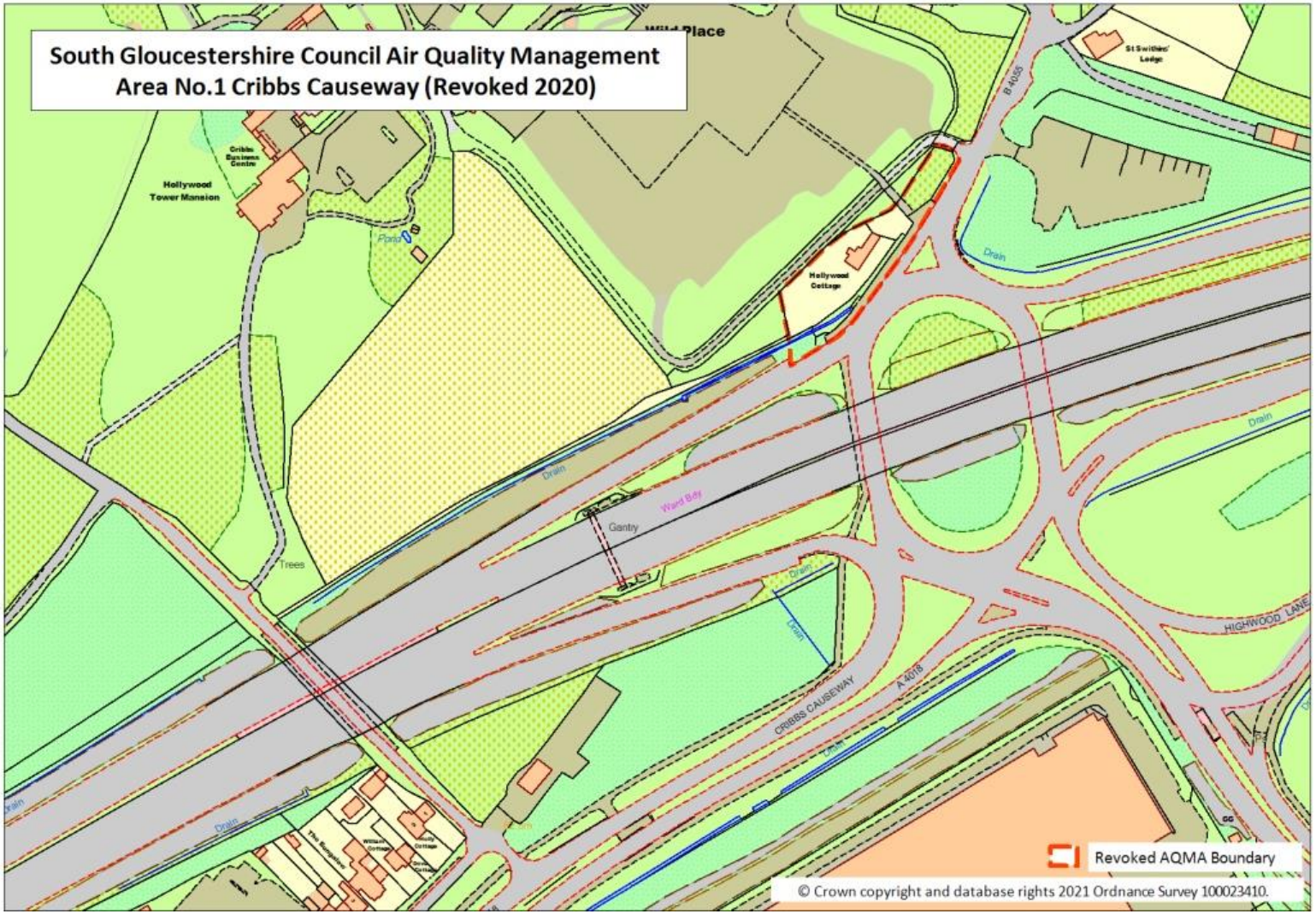


Figure D.3 – Cribbs Causeway AQMA (Revoked 2020)



Maps of Automatic Monitoring Sites

Figure D.4 – Automatic Monitoring Sites in South Gloucestershire

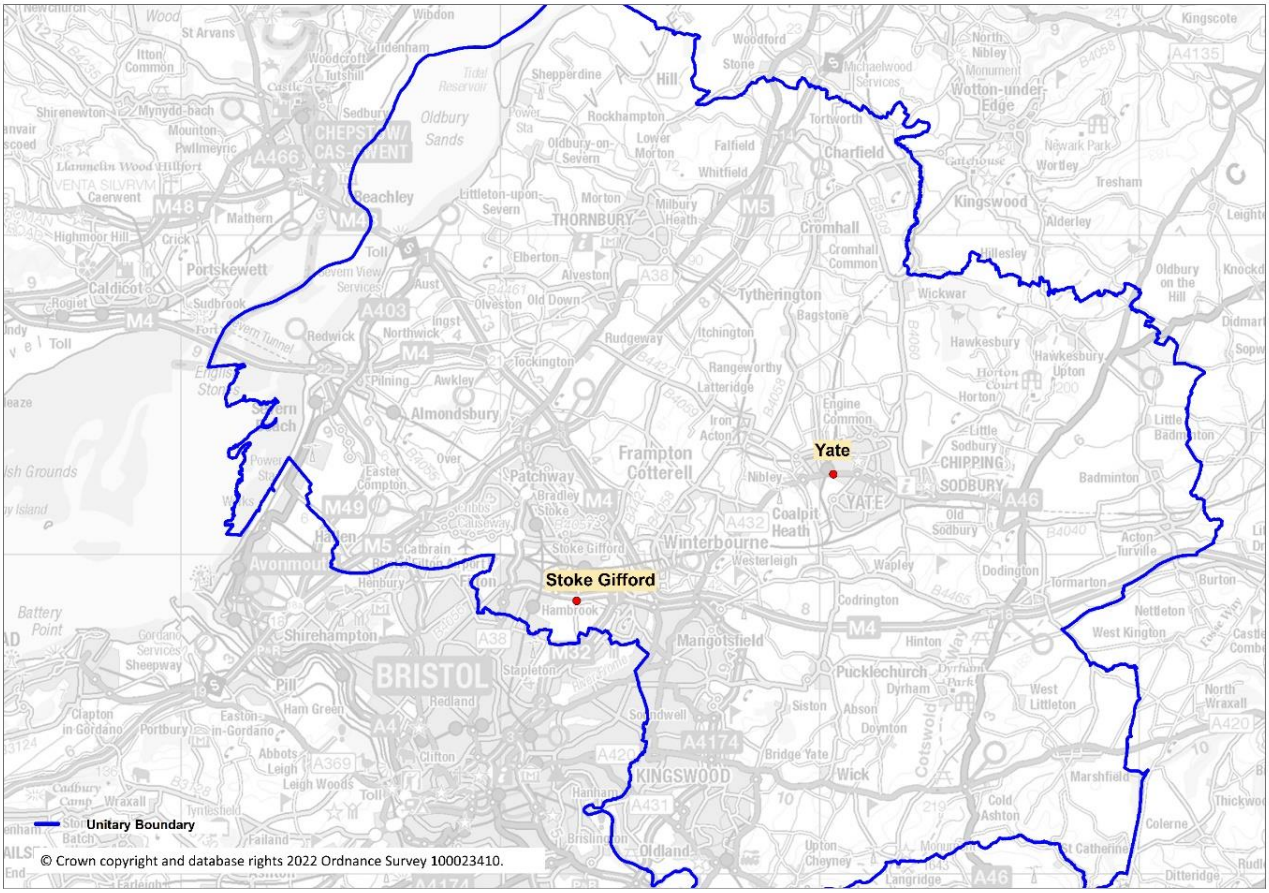


Figure D. 5 – Automatic Monitoring Site Yate - Station Road

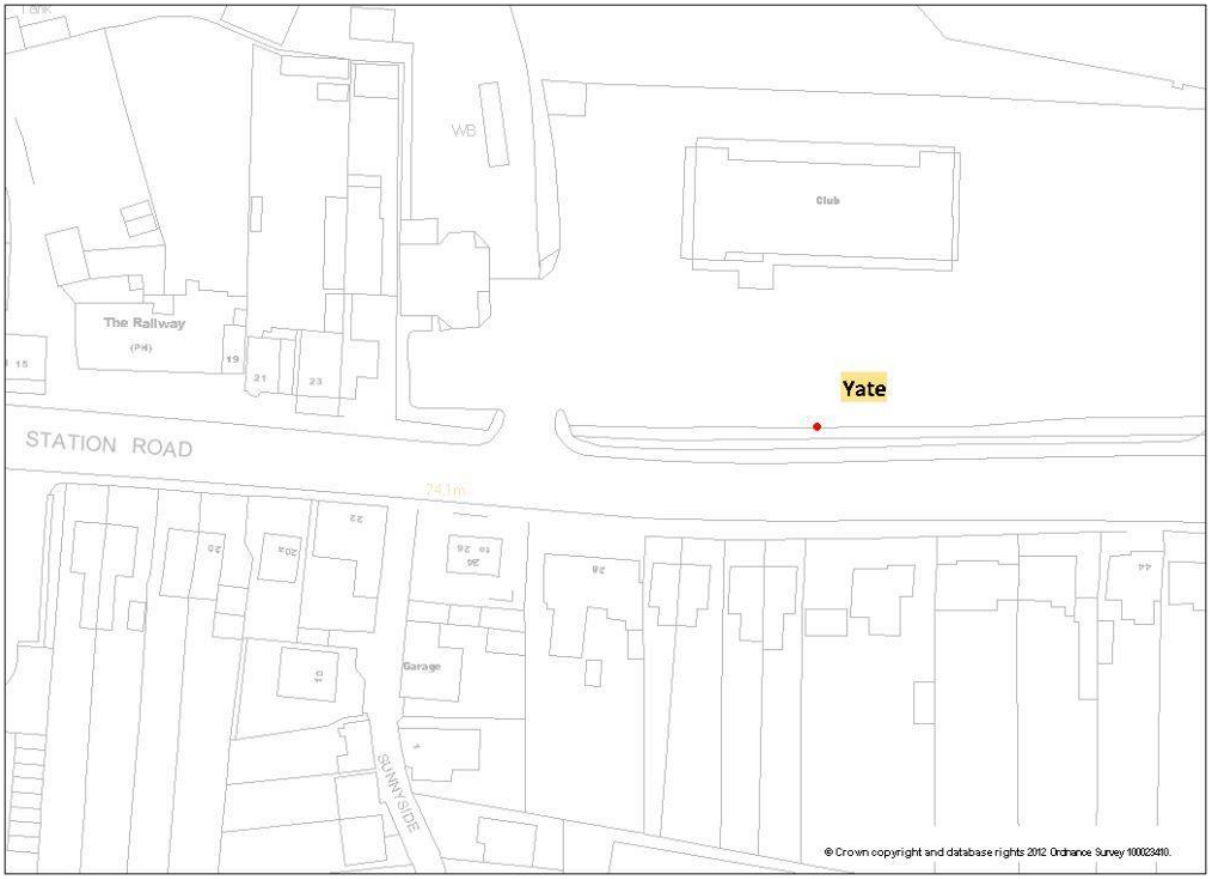


Figure D. 6 – Automatic Monitoring Site Stoke Gifford A4174 Ring Road

Maps of Diffusion Tube Monitoring Sites

Figure D.7 – All Diffusion Tube Sites showing locations of following Figures

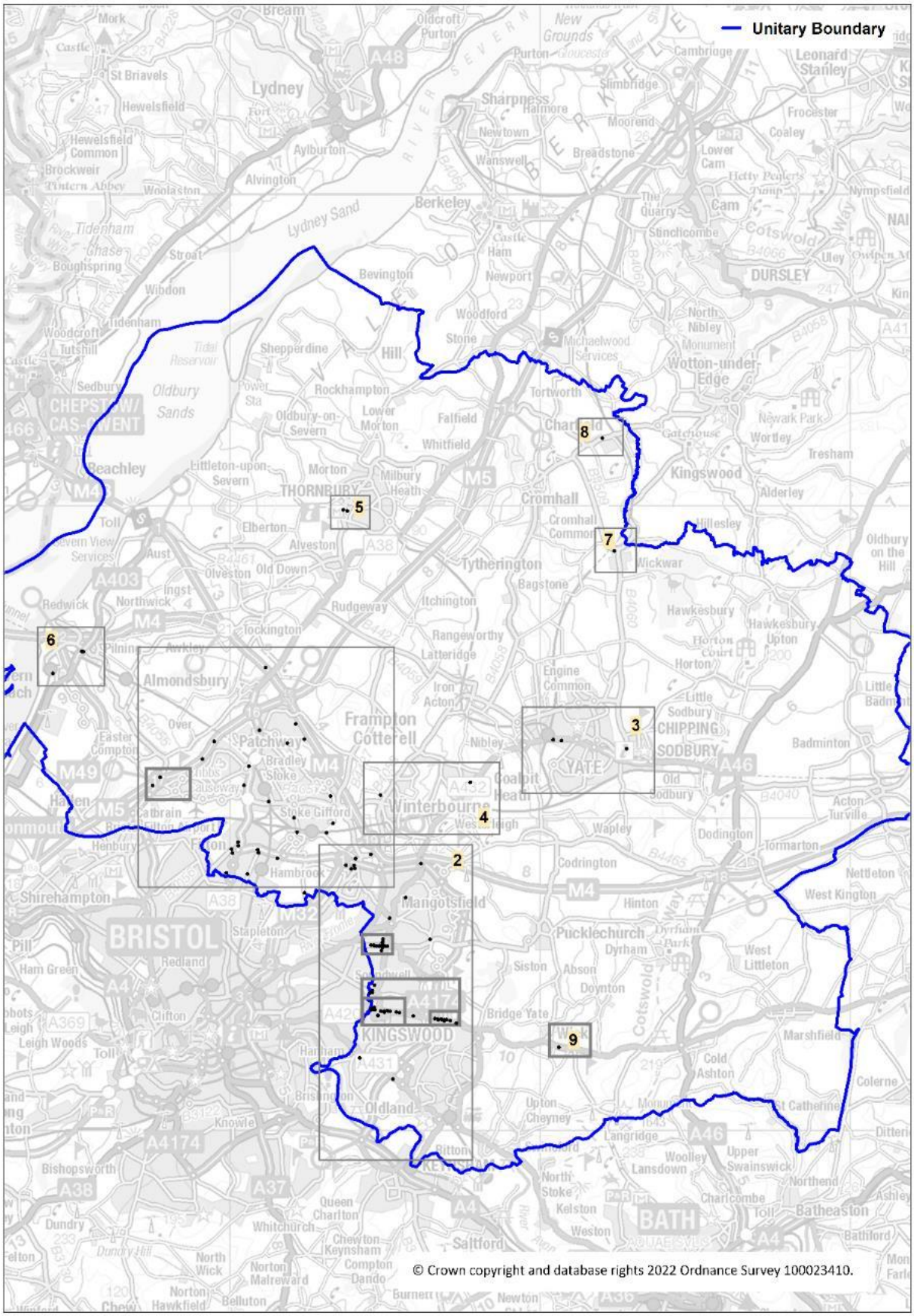


Figure D.8 – Diffusion Tube Sites in Bristol North (Box 1 Figure D.7)

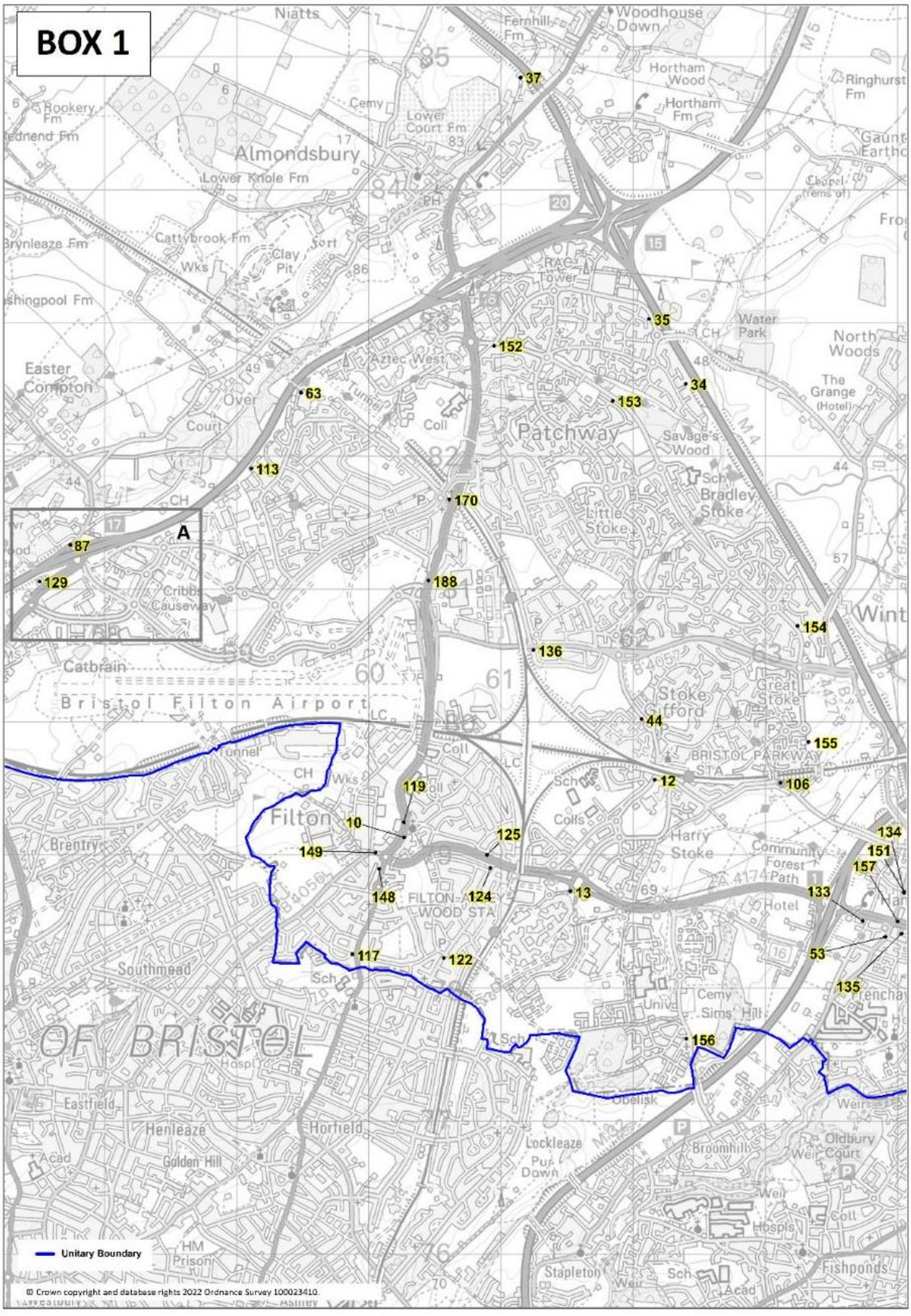


Figure D.9 – Diffusion Tube Sites in Cribbs Causeway (Box A Figure D.8)

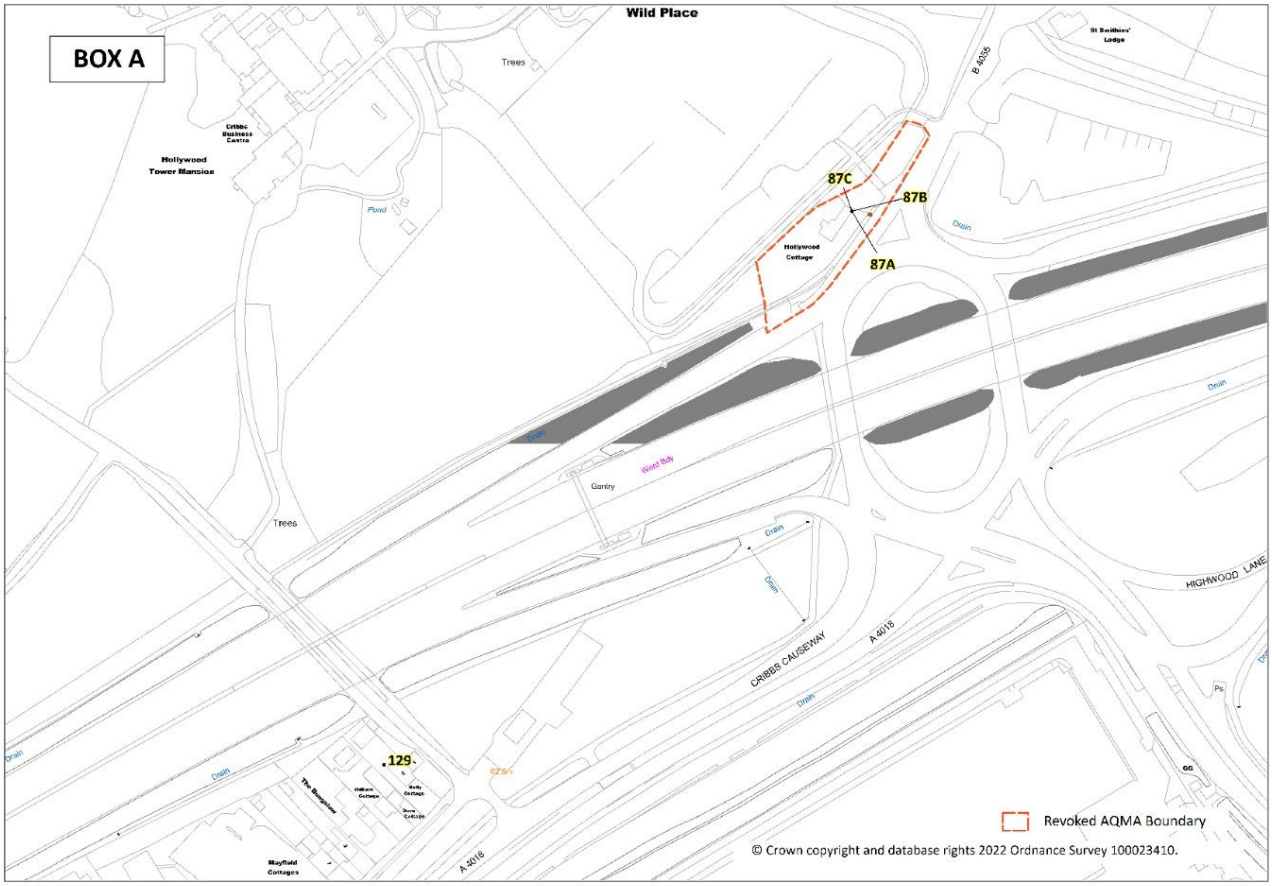


Figure D.10 – Diffusion Tube Sites in Bristol East (Box 2 Figure D.7)

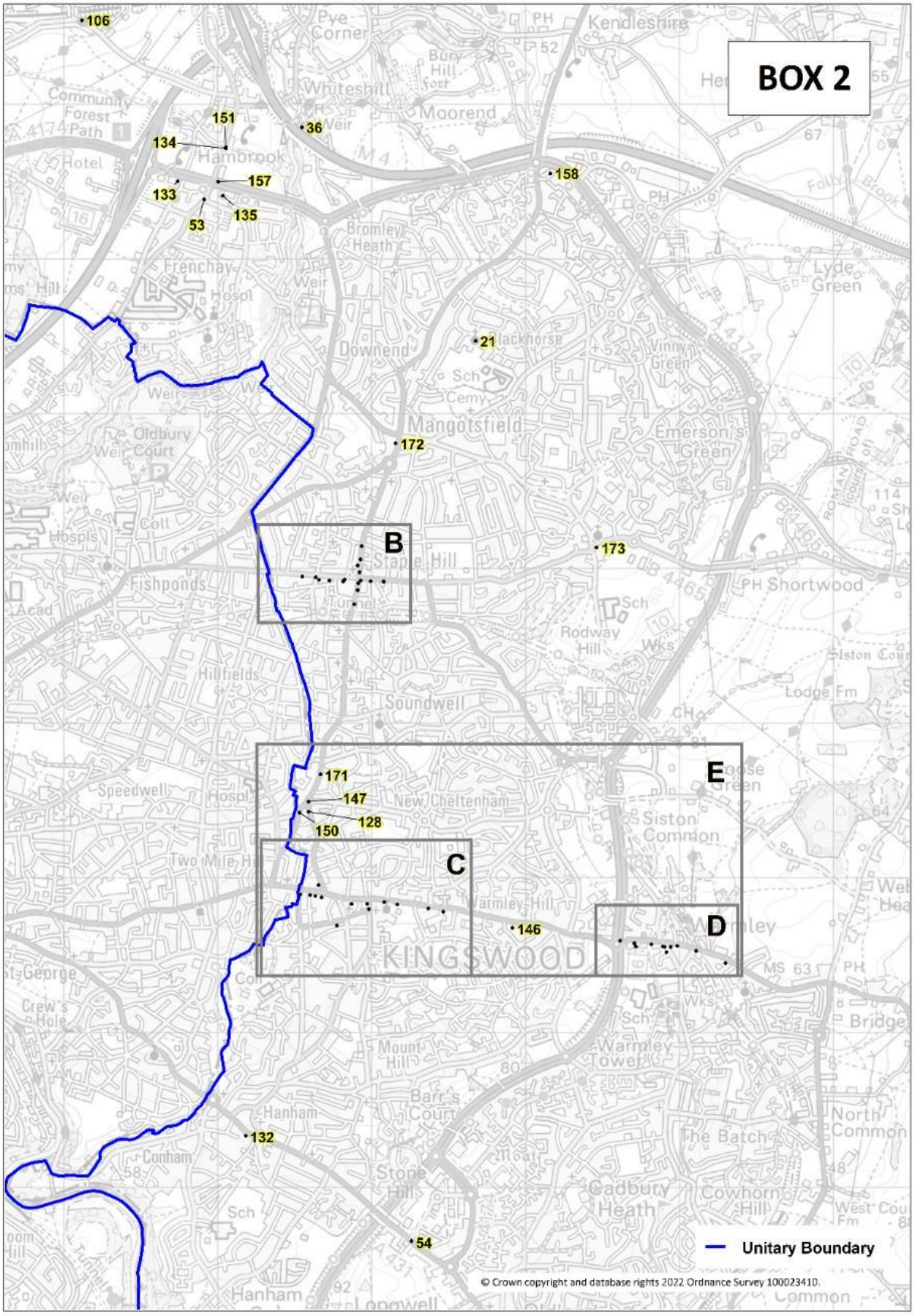


Figure D.11 – Diffusion Tube Sites in Staple Hill (Box B Figure D.10)

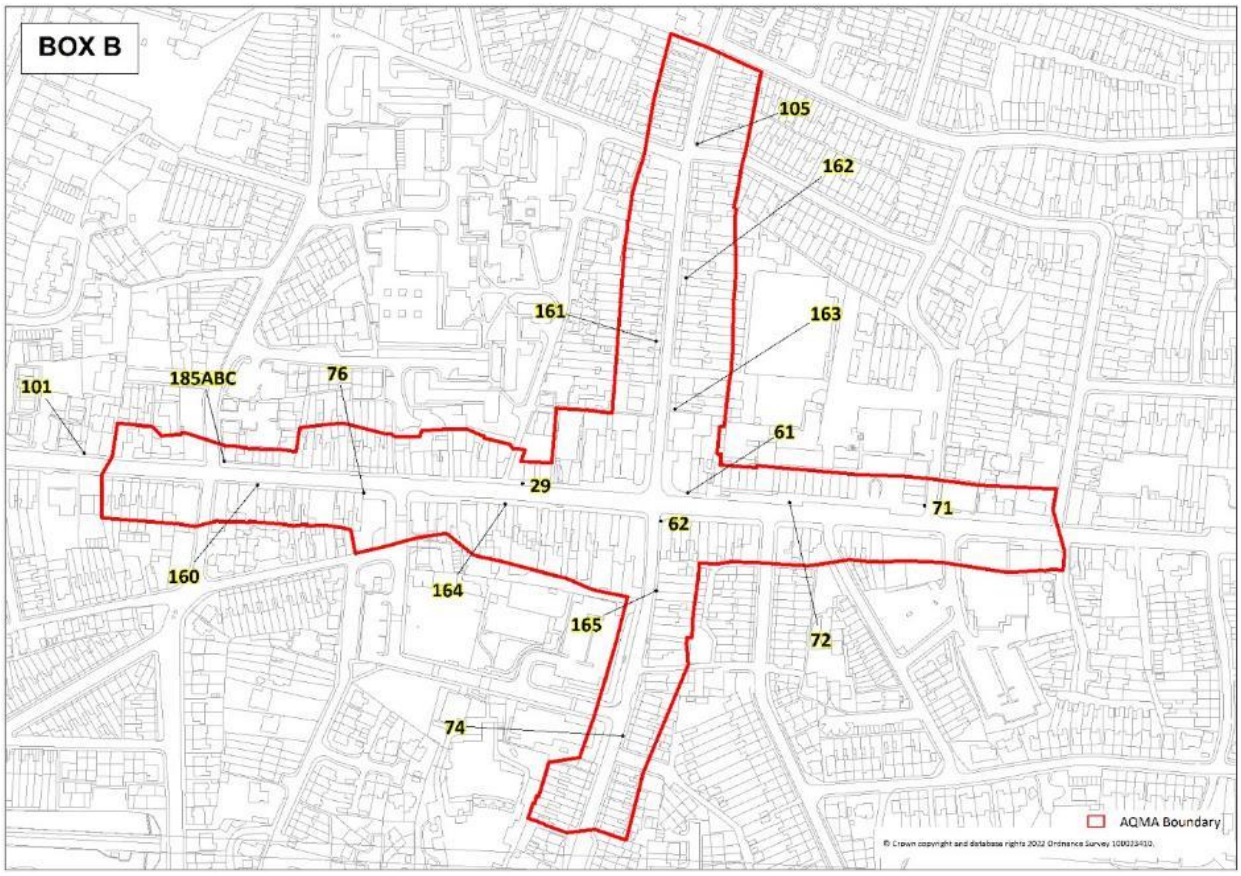


Figure D.12 – Diffusion Tube Sites in Kingswood (Box C Figure D.10)

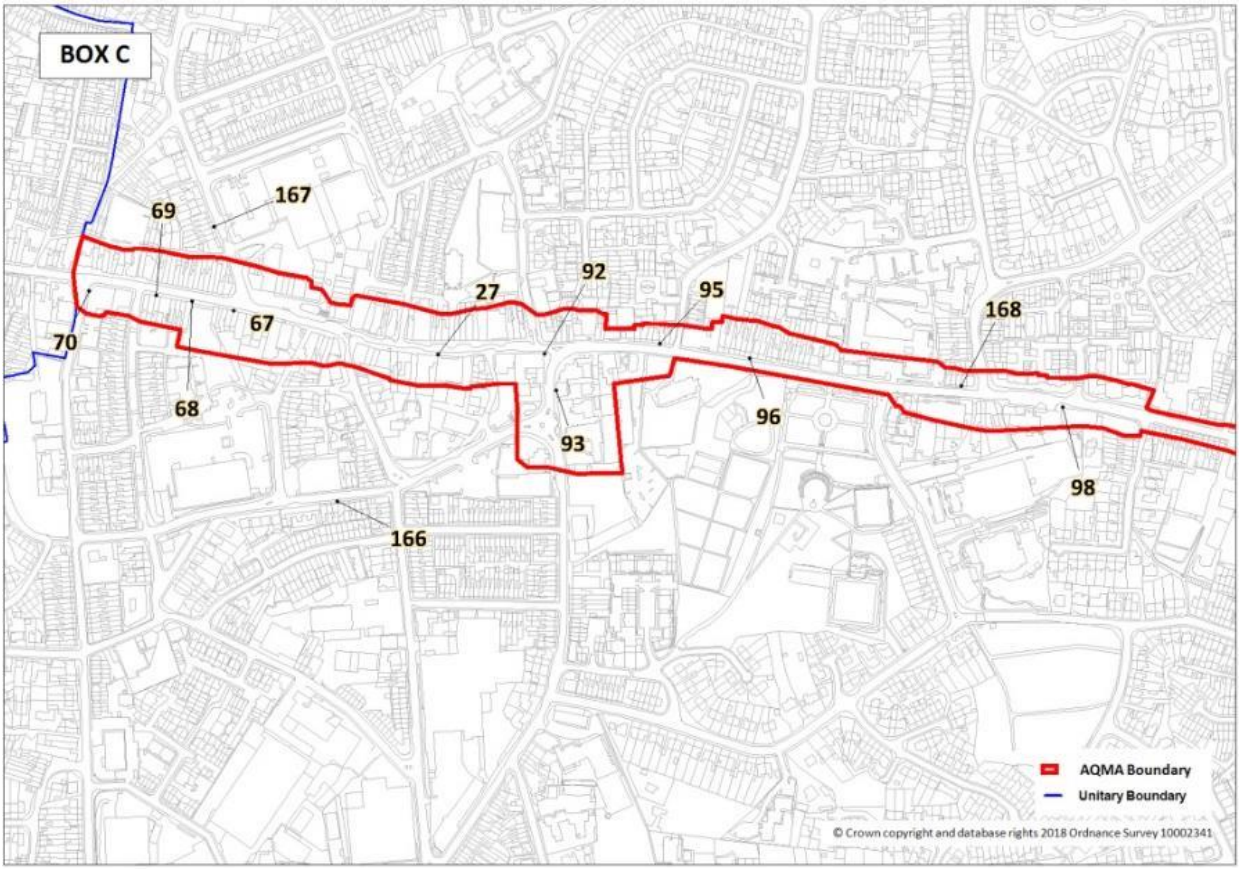


Figure D.13 – Diffusion Tube Sites in Warmley (Box D Figure D.10)

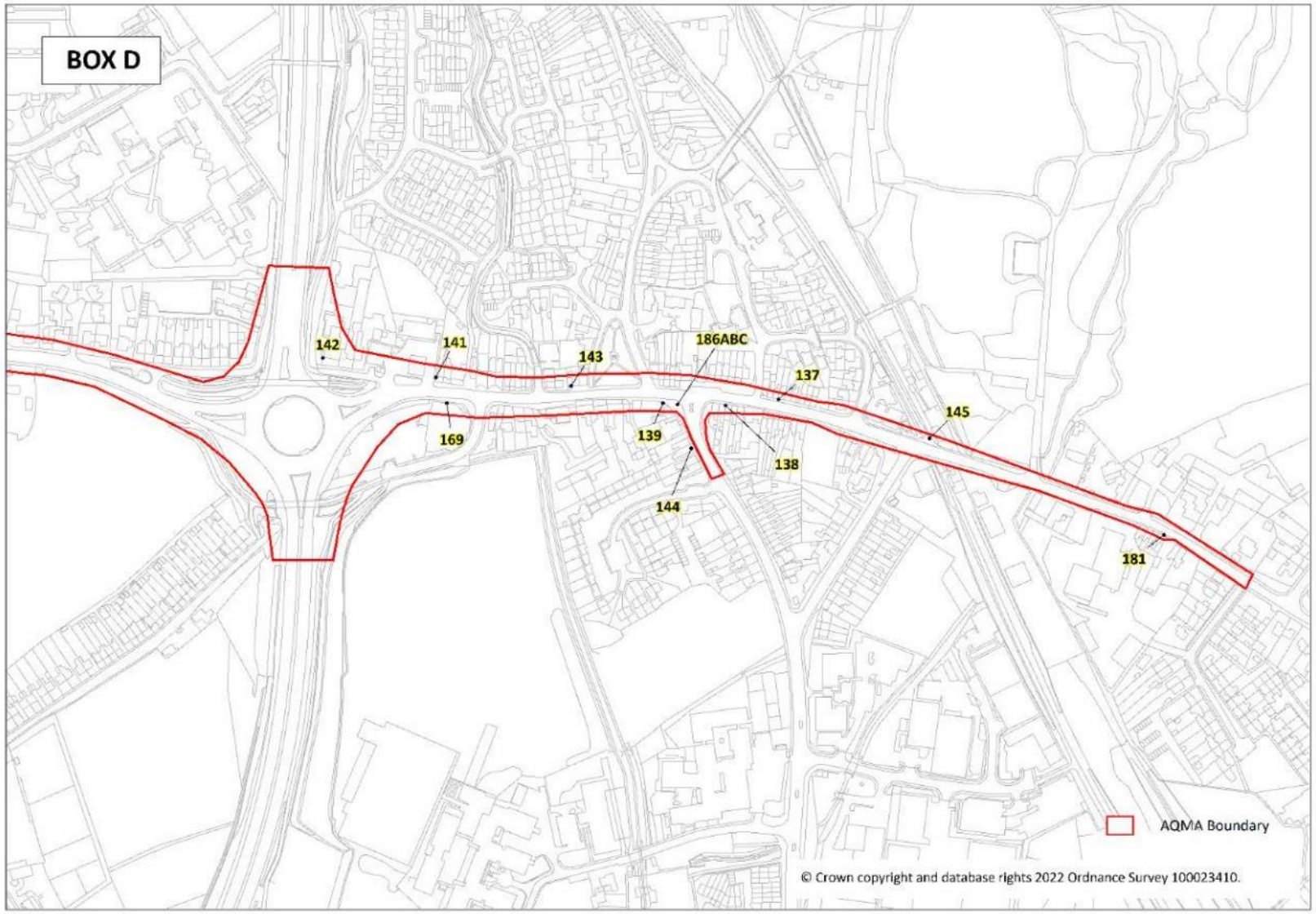


Figure D.14 – Diffusion Tube Sites in Kingswood & Warmley (Box E Figure D.10)

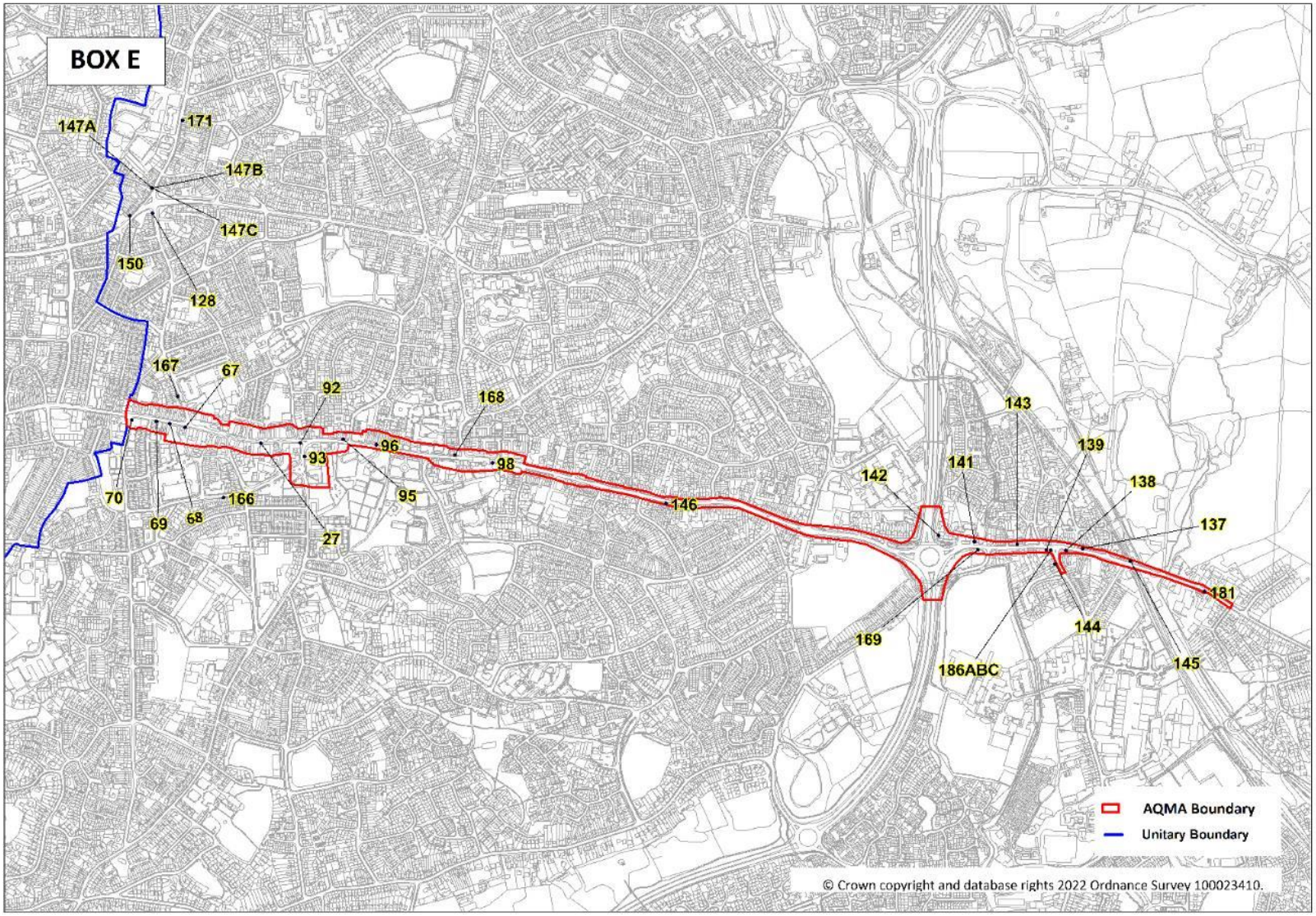


Figure D.15 – Diffusion Tube Sites in Yate and Chipping Sodbury (Box 3 Figure D.7)

Figure D.16 – Diffusion Tube Sites in Winterbourne & Coalpit Heath (Box 4 Figure D.7)

Figure D.17 – Diffusion Tube Sites in Thornbury (Box 5 Figure D.7)

Figure D.18 – Diffusion Tube Sites in Severn Beach and Pilning (Box 6 Figure D.7)

Figure D.19 – Diffusion Tube Site in Wickwar (Box 7 Figure D.7)

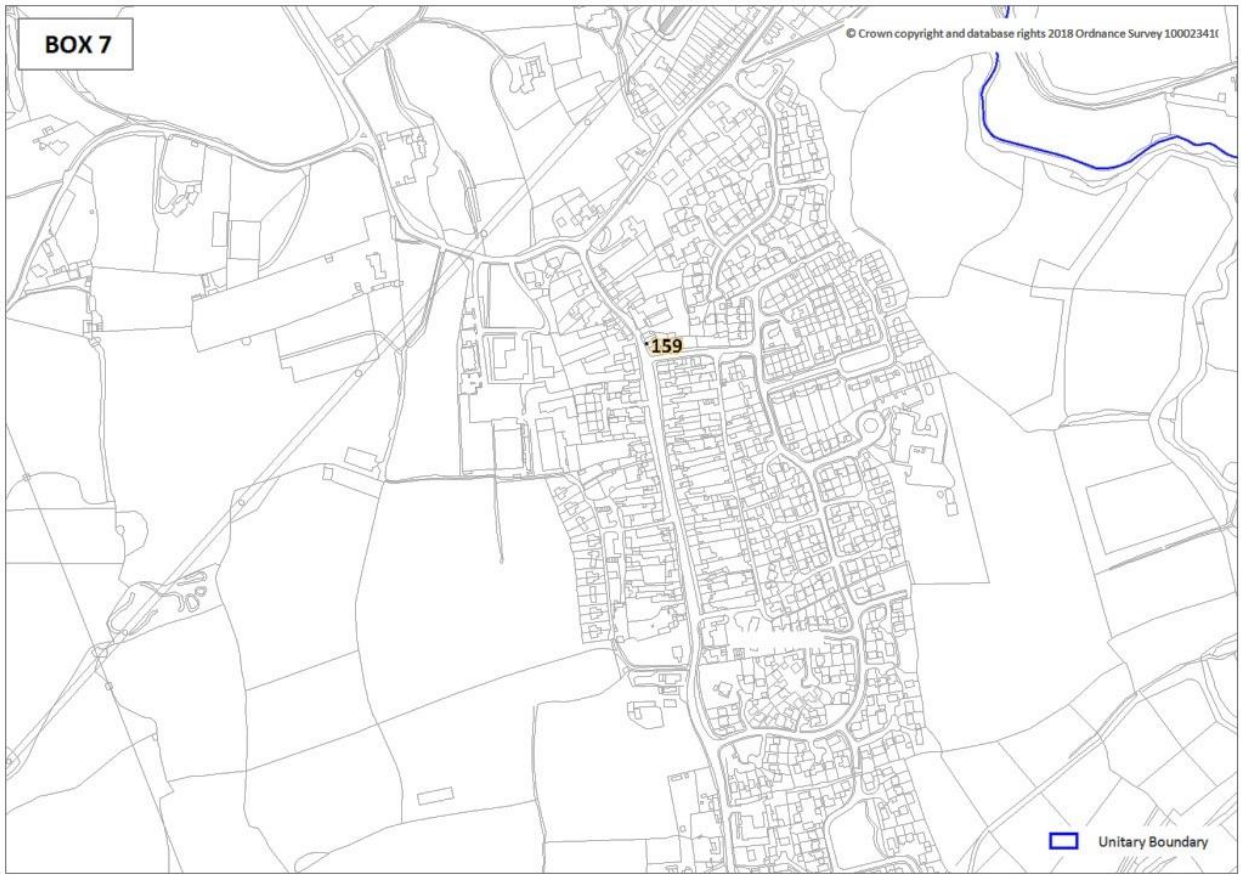


Figure D.20 – Diffusion Tube Site in Charfield (Box 8 Figure D.7)

Figure D.21 – Diffusion Tube Site in Wick (Box 9 Figure D.7)

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[81]

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR, combined with the 2022 ASR in this case. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[82] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[83] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean

[82] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[83] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

concentrations were between 20 and 30% relative to pre-pandemic levels, which represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions were gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within South Gloucestershire

The impacts of the Covid-19 pandemic on nitrogen dioxide concentrations are discussed in Section 3 of the ASR but the key points are summarised below:

- At the Yate Automatic Monitoring site, there was a 26% decrease in the annual mean NO2 concentrations between 2019 (19 µg/m3) and 2020 (14 µg/m3). This is on a par with the average 25% reductions in NO2 concentrations seen across the national automatic urban and rural monitoring network (AURN) in 2020. The annual mean concentration increased slightly in 2021 to 15 µg/m3 when travel restrictions were less stringent.
- In 2020, annual mean nitrogen dioxide concentrations decreased by an average of 22% across all diffusion tube monitoring sites in South Gloucestershire due to the impacts of the Covid-19 pandemic travel restrictions from March 2020.
- No exceedences of pollutant objectives were observed at any LAQM monitoring site, including those in the AQMAs, during 2020 or 2021.
- At the single previously exceeding site in 2019 (and 2018) in the Kingswood – Warmley AQMA (Site 146 Kingswood – 34 Hill Street), the annual mean concentration decreased by 15% from 42.3 µg/m^3 in 2019 to 35.9 µg/m^3 in 2020. The concentration decreased further at this site in 2021 to 34.1 µg/m^3 (a 19 % decrease from 2019).

- Across the monitoring sites in the Kingswood – Warmley AQMA, annual mean concentrations decreased by an average of 22% from 2019 to 2020, followed by an average 4% increase from 2020 to 2021 as the pandemic restrictions eased.
- In the Staple Hill AQMA, the annual mean concentrations decreased by an average of 23% from 2019 to 2020 due to the impacts of the pandemic restrictions. There was then an average 6% increase in annual mean concentrations from 2020 to 2021 as the restrictions eased.

While there were no exceedences or borderline sites within 10% of the objective within the AQMAs in 2020, revocation of the AQMAs based on compliance being achieved in 2020 is not considered appropriate, as advised in the Defra Covid-19: Supplementary Guidance for LAQM Reporting in 2021[84]. This is because 2020 is not representative of long-term trends in pollutant concentrations and it is uncertain whether the air quality objectives would continue to be met in future years. This is also likely to be applicable to the 2021 monitoring data.

Figure F.1 shows a comparison of the 2019, 2020 and 2021 monthly NO_2 concentrations at the Yate Automatic Monitoring site and the percentage (%) difference in the monthly NO_2 concentrations in 2020 and 2021 compared to 2019 are shown in Figure F.2.

The NO_2 concentrations pre-pandemic in January and February 2020 were already significantly lower compared to the same months in 2019. Pollutant concentrations can vary due to many factors, most notably meteorological conditions, in any year. However, a drop and prolonged lower concentrations can be seen following the first “lockdown” which began on 23 March 2020 with restrictions starting to be eased in July.

The impact of the second lockdown for 4 weeks from 5 November 2020 and the return to the “Tier” system of restrictions from 2 December (South Gloucestershire was in Tier 3) is less obvious with seasonal meteorological changes also affecting concentrations. The impact of the third lockdown which began on 6 January 2021 is more obvious with lower concentrations in January and February that year. Concentrations can then be seen to increase following the lifting of all restrictions on 19 July 2021.

[84] Covid-19-Supplementary-Guidance-for-Local-Air-Quality-Management-Reporting-in-2021-v1.pdf (defra.gov.uk)

Figure F.1 – Comparison of 2019 - 2021 Monthly NO_2 Concentrations at Yate Automatic Monitoring Site

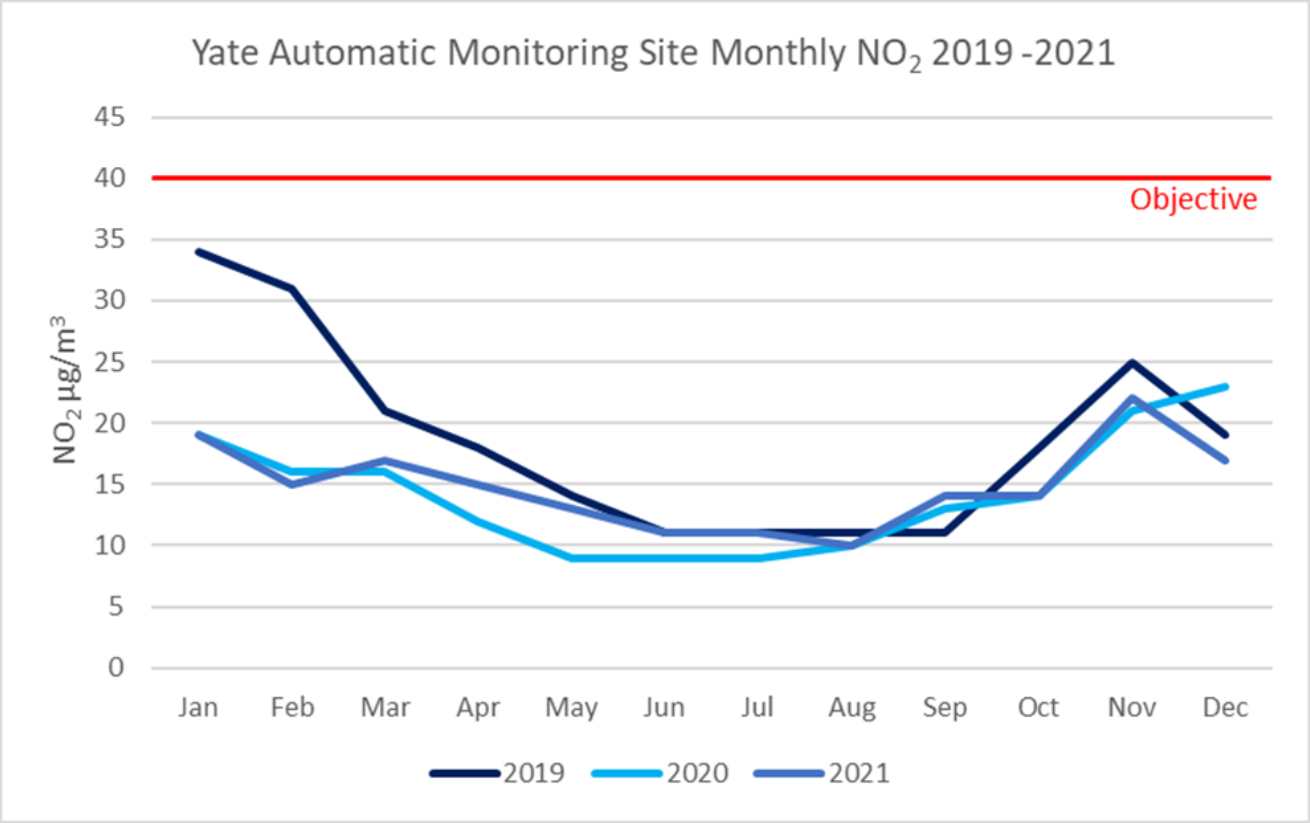
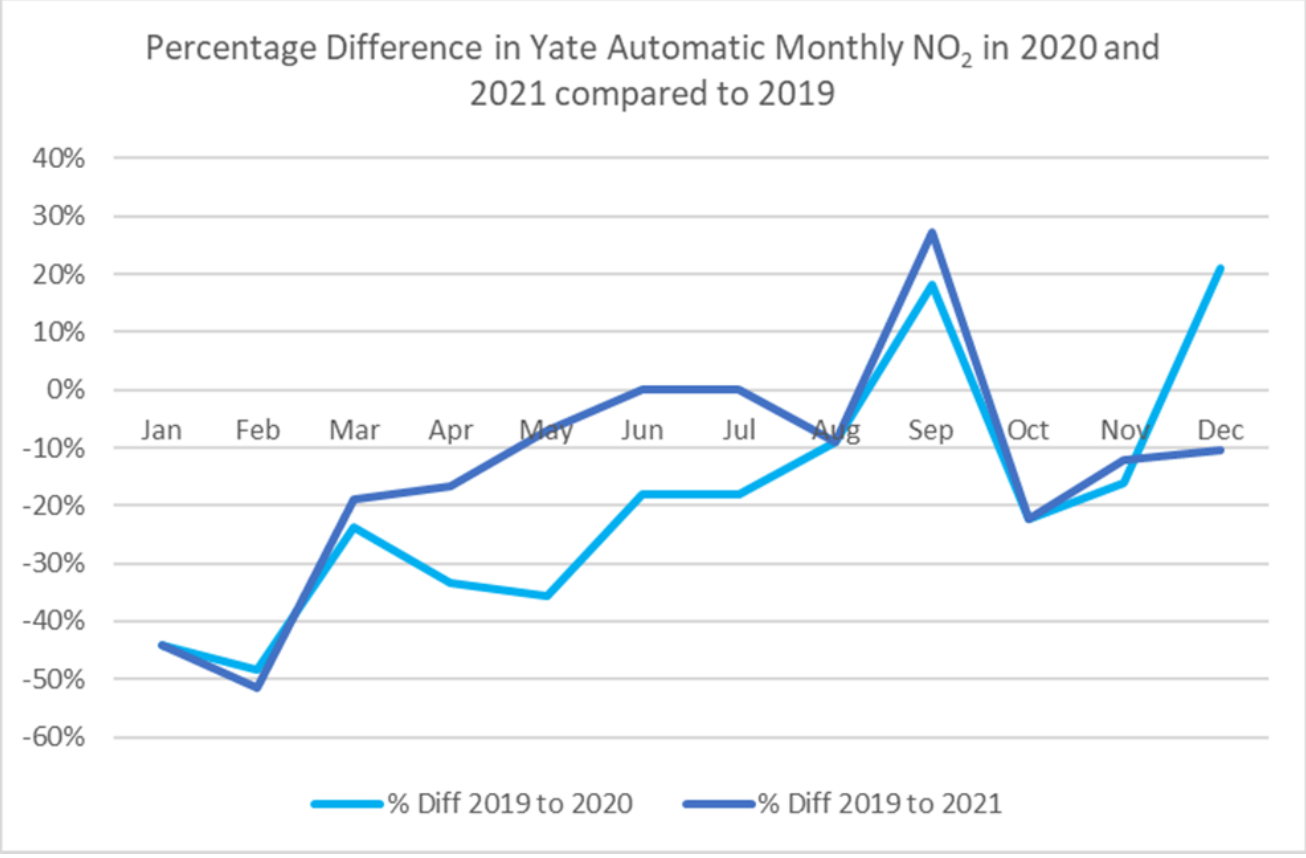


Figure F.2 – Percentage Difference in Yate Automatic Site Monthly NO_2 Concentrations in 2020 and 2021 compared to 2019



The PM_{10} annual mean at the Yate automatic site in 2020 was 11 µg/m^3; a 15% reduction compared to 13 µg/m^3 in 2019. In 2021, the annual mean rose slightly to 12 µg/m^3. The pandemic impacts on PM_{10} concentrations were less marked than on NO_2 as was the case for $PM_{2.5}$ discussed above.

Opportunities Presented by COVID-19 upon LAQM within South Gloucestershire

In response to the COVID-19 pandemic, the UK government announced the introduction of an Emergency Active Travel Fund and issued statutory guidance around the implementation of emergency travel schemes (ETS). This was done to encourage local authorities across England to create new opportunities for commuters and other road users to take up active forms of travel, to make active travel safer, and to facilitate greater social distancing, particularly along busy high streets.

South Gloucestershire Council introduced a range of ETS from mid-2020. These can be categorised into four groups:

- Cycle lanes – road lanes that segregate cyclists from car users helping to increase safety and the visibility of cyclists.
- Low traffic neighbourhoods (LTN) – the creation of low traffic residential neighbourhoods by restricting car access through residential streets.
- School streets - the closure of roads near schools during drop off/pick up times.
- Widened pavements - the widening of pavements along busy High Streets to facilitate social distancing.

Schemes were located across South Gloucestershire including on Thornbury High Street, Station Road (Yate) and Hatchet Road (Stoke Gifford). Further information in relation to Thornbury High Street is available on the council's website Thornbury High Street | BETA - South Gloucestershire Council (southglos.gov.uk).

Schemes located close to the AQMAs included:

- Signal Road/Charnell Road, Staple Hill: A two-point road closure to create a low traffic neighbourhood trial scheme implemented under 18-month experimental traffic regulation order, providing point closures on Signal Road and Charnell Road. This prevented rat running and provided a quiet street access to the Bristol and Bath

Railway path. However, the decision was taken to remove measures at the end of the experimental order as a result of public feedback. The council are exploring options for alternative traffic/speed reduction measures in the area.

- Kings Oak Academy, Kingswood: School Street – closure during drop off and pick up times currently in place as a temporary scheme. The scheme will be made permanent.
- Staple Hill High Street: local widening of footway at a pinch point – Initially a trial shuttle signal scheme was implemented on Staple Hill High Street, which enabled more pedestrian space and cycle lanes in both directions, alongside a point closure on Page Road (to prevent rat running and provide a quiet route for cyclists). The scheme was removed following negative feedback from local businesses and some residents regarding accessibility issues. The trial scheme was replaced with a localised widening of the footway to provide more space around a busy bus stop.
- Pendennis Road, Staple Hill: Widen footways outside Christchurch School - Scheme was initially implemented on a trial basis but construction is underway to provide a permanent widened footway to improve the pedestrian route to Christchurch school.
- Park School, Kingswood: footway widening outside The Park School was initially implemented as a temporary measure. Permanent widening of footways on the three relevant streets is due to be undertaken over the summer of 2022.

Challenges and Constraints Imposed by COVID-19 upon LAQM within South Gloucestershire

The details of challenges and/or constraints experienced in relation to LAQM, particularly in 2020, that can be attributed to the pandemic are detailed below.

- The diffusion tubes for March 2020 were not able to be returned to Somerset Scientific Services for analysis because the laboratory closed for a short period of time. The tubes were stored for longer than normal in the Environmental Health sampling refrigerator (between 3 – 28 April) but were stored adhering to laboratory guidance. **Small impact**
- The development of the Air Quality Action Plan (or Clean Air Action Plan for South Gloucestershire) was delayed slightly but work did progress and it is anticipated

that consultation on the draft Clean Air Action Plan will be undertaken in Autumn 2022. **Small impact**

The impacts as presented above are aligned with the criteria as defined in Table F.1 – Impact Matrix, with professional judgement considered as part of their application. Otherwise, the supply of diffusion tubes was maintained by Somerset Scientific Services and the tubes were deployed in line with the Defra Diffusion Tube exposure calendar.

The challenges and constraints of the emergency active travel measures introduced during the Covid-19 pandemic are currently being evaluated as part of an independent research project. The research aims to:

- evaluate the impact of the emergency travel schemes on people's travel behaviour (which will help make decisions and recommendations for similar schemes in the future).
- provide recommendations on how to collect and best use data to monitor future travel schemes.

The research will be made available on the council's webpage Emergency active travel measures during Covid-19 | BETA - South Gloucestershire Council (southglos.gov.uk)

Table F.1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

Appendix G: Ozone Monitoring

Ozone at ground level is a secondary pollutant formed by the photochemical reaction of pollutants, such as nitrogen oxides (NO_x) from vehicle and industry emissions and volatile organic compounds (VOCs) emitted by vehicles, solvents and industry, with sunlight. It is one of the major constituents of photochemical smog. Ozone in the lower atmosphere is also a greenhouse gas.

South Gloucestershire Council monitored Ozone (O_3) concentrations at the new automatic monitoring site (SG2) in Stoke Gifford on the A4174 Ring Road near Coldharbour Lane and UWE from 24 August 2021, along with the pollutants NO_2, PM_{10} and $PM_{2.5}$ previously discussed in Section 3 of this report. The Council has previously monitored ozone at a more rural monitoring site in Badminton from 1998 until early 2015, with the last data from this site reported in the 2015 Air Quality Updating and Screening Assessment[85].

The transboundary nature of ozone is recognised in the Government's UK Air Quality Strategy[86]. Consequently, the objective for ozone is not included in the Local Air Quality Management regime. However, the ozone objective (100 µg/m^3, measured as a running 8-hour mean, not to be exceeded more than ten times a year) is a guide for the reporting of locally monitored ozone concentrations.

Table G.1 presents the ratified and adjusted monitored O_3 annual mean concentrations and Table G.2 compares the ratified continuous monitored O_3 daily maximum running 8-hour mean concentrations with the ozone objective.

In 2021, the annualised mean was 49 µg/m^3. During the monitoring period, there were 3 days when the maximum running 8-hour mean objective of 100 µg/m^3 was exceeded. The maximum running 8-hour mean was 123 µg/m^3.

Table A.1 in Appendix A shows the details of the automatic monitoring site and maps showing its location are provided in Appendix D. Further details on how the data has been adjusted are included in Appendix C. The Air Quality in the United Kingdom

[85] https://www.southglos.gov.uk//documents/Air-quality-management-updating-and-screening-assessment-2015.pdf

[86] Air Quality Strategy Vol 1 (publishing.service.gov.uk)

(ukairquality.net) website presents the automatic monitoring results for South Gloucestershire Council.

Table G.1 – Annual Mean O_3 Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2021
SG2 Stoke Gifford A4174 Coldharbour Lane	362384	178562	Roadside	99.5	35.4	49.0

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

Notes:

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

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

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

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

Table G.2 – 8-Hour Mean O_3 Monitoring Results, Number of O_3 Daily Maximum Running 8-Hour Means > 100 µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2021
SG2 Stoke Gifford A4174 Coldharbour Lane	362384	178562	Roadside	99.5	35.4	3

Notes:

Results are presented as the number of running 8-hour periods where daily mean concentrations greater than 100µg/m^3 have been recorded during the monitoring period. There is an annual allowance of 10 days. The ozone standard is not set in regulations.

Exceedances of the Ozone guideline objective of 100 µg/m^3 (not to be exceeded more than 10 times/year) are shown in **bold**.

(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%).

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
AURN	Automatic Urban and Rural Network – a national automatic monitoring network
BAM	Beta Attenuation Monitor (for Particulate Matter measurement)
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
Exceedance	A period of time where the concentration of a pollutant is greater than the appropriate air quality objective
JAQU	Joint Air Quality Unit between Defra and Department for Transport
JLTP	Joint Local Transport Plan
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SGC	South Gloucestershire Council
$\mu g/m^3$	Microgrammes per cubic metre
WECA	West of England Combined Authority

References

Defra, 2016a. Local Air Quality Management Policy Guidance (LAQM.PG16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.

Defra, 2021a. Local Air Quality Management Technical Guidance (LAQM.TG16). April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.

Defra & Department for Transport 2017. UK plan for tackling roadside nitrogen dioxide concentrations

Defra, 2019a. Clean Air Strategy

HM Government, 1995. Environment Act

South Gloucestershire Council, 2012a. Air Quality Action Plan: Kingswood and Staple Hill

South Gloucestershire Council, 2014. Detailed Assessment of Warmley A420 2014

South Gloucestershire Council, 2016a. 2015 Air Quality Updating and Screening Assessment (incorporating 2014 Air Quality Progress Report)

South Gloucestershire Council, 2016b. Joint Strategic Needs Assessment

South Gloucestershire Council, 2017. 2017 Air Quality Annual Status Report

South Gloucestershire Council, 2018. 2018 Air Quality Annual Status Report

South Gloucestershire Council, 2019b. 2019 Air Quality Annual Status Report

South Gloucestershire Council, 2021b. 2020 Air Quality Annual Status Report

South Gloucestershire Health & Wellbeing Board, 2021c. South Gloucestershire Joint Health & Wellbeing Strategy, 2021 - 2025

West of England Partnership, 2020. Joint Local Transport Plan (JLTP4)