



2019 Air Quality Annual Status Report (ASR)

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

September 2019

South Gloucestershire Council

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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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

Air pollution can arise from many sources, including transport, industry and commercial and domestic heating, especially solid fuel burning. Pollutant levels are assessed against health-based national air quality objectives. 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 is within South Gloucestershire.

The 2018 mid-year population estimate for South Gloucestershire is 282,600⁴ which represents a 15% increase since the 2001 census (245,600). 87% of the population live in urban areas, largely in the built up areas immediately adjoining Bristol and the towns of Yate and Thornbury. The remaining 13% live in the more rural areas of South Gloucestershire. The total population is projected to increase to 335,200 in 2041⁵. With the population projected to continue rising, managing future development and providing vital transport infrastructure is a key challenge.

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

⁴ Source: Office for National Statistics (ONS) Mid-year estimates 2018 <https://www.southglos.gov.uk/council-and-democracy/census/key-facts-and-figures/>

⁵ Source: ONS 2016 subnational population projections 2018 <https://www.southglos.gov.uk/council-and-democracy/census/key-facts-and-figures/>

The main air pollutant of concern locally is nitrogen dioxide (NO₂), which mostly arises from road traffic (34%, rising to 80% near roadsides)⁶. Particulate matter is also a pollutant of concern with recent research indicating that there are no safe levels of this pollutant⁷. Sources of particulate matter (PM₁₀ 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.

While the air quality in South Gloucestershire is generally good, in some places the air quality does not meet the annual mean objective for nitrogen dioxide (40 µg/m³).

Air Quality Management Areas

There are three AQMAs currently declared in South Gloucestershire in relation to the annual mean objective for nitrogen dioxide:

- 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.
- Cribbs Causeway – adjacent to the M5 Junction 17 roundabout (however this AQMA is in the process of being revoked).

Full details of these AQMAs are included in Table 2.1 of this report and maps are available in Appendix E. Further information on the AQMAs 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.

Trends in monitored concentrations

In 2018, South Gloucestershire Council had 106 nitrogen dioxide monitoring sites, including the Yate automatic site, which also monitors particulate matter (PM₁₀).

The key outcomes from the monitoring are:

⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf

⁷ <https://laqm.defra.gov.uk/assets/63091defraairqualityguide9web.pdf>

⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf

- Nitrogen dioxide levels decreased across the majority (85%) of the monitoring sites compared to 2017, including at the Yate automatic station and in the Kingswood – Warmley and Staple Hill AQMAs.
- There was one location where the nitrogen dioxide annual mean objective was not met (i.e. exceeded) in South Gloucestershire in 2018, compared to three exceedances in 2017 and eleven in 2016.
- The single exceedance was within the Kingswood – Warmley AQMA (Site 146 Kingswood Hill Street – 40.8 $\mu\text{g}/\text{m}^3$). In comparison, there were two exceedances in 2017 and five in 2016 within the AQMA. Nitrogen dioxide concentrations decreased at 90% of the monitoring sites in this AQMA.
- There were no exceedances of the nitrogen dioxide annual mean objective in the Staple Hill AQMA, compared to one exceeding site in 2017 and five in 2016, and concentrations decreased at 94% of the monitoring sites within this AQMA.
- There were again no exceedances of the nitrogen dioxide annual mean objective in the Cribbs Causeway AQMA, with monitored concentrations well below the objective (25.2 $\mu\text{g}/\text{m}^3$), continuing a declining trend.
- There were no exceedances of the nitrogen dioxide annual mean objective 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).
- At the Yate automatic monitoring site, nitrogen dioxide concentrations were well below the annual mean objective with a decrease to 20 $\mu\text{g}/\text{m}^3$ from 23 $\mu\text{g}/\text{m}^3$ in 2017, continuing the overall declining trend at this site. There were also no exceedances of the 1-hour mean (200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year), continuing compliance with this objective.
- Particulate matter (PM_{10}) is also monitored at the Yate Automatic site and in 2018, the annual mean PM_{10} was 13 $\mu\text{g}/\text{m}^3$; a decrease from 14 $\mu\text{g}/\text{m}^3$ in 2017. Overall, the trends in annual mean PM_{10} concentrations at Yate have been slowly declining since 2010. The 24-hour mean objective (50 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 35 times a year) was also not exceeded.

- Overall, the decreasing trend across the majority of the monitoring sites in South Gloucestershire mirrors the national declining trend⁹. However, pollutant concentrations can vary significantly from year to year due to a number of factors, in particular the meteorological conditions, which can affect pollutant dispersion.

The monitoring results and trends in the data are discussed fully in Chapter 3 of the report and trend graphs are available in Appendix A.

Pollutant sources

The following sources of pollution were considered as part of the review of air quality for this report, as detailed in the Defra Local Air Quality Management Technical Guidance (LAQM.TG16)¹⁰.

- Road Traffic Sources
- Non-Road transport Sources
- Industrial Sources
- Commercial and Domestic Sources
- Fugitive and Uncontrolled Sources

No new major sources of emissions were identified. Full details are provided in Appendix D of the report.

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 same Directorate (Environment and Community Services) enabling close working between these teams. This has particularly allowed close working between Environmental Health, with their responsibilities for local air quality management and the Strategic Transport and Environment Policy Team, who currently lead on air quality action plan development and implementation. Furthermore, there is a close working relationship with the Public Health Team, 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.

⁹

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/796887/Air_Quality_Statistics_in_the_UK_1987_to_2018.pdf

¹⁰ <http://laqm.defra.gov.uk/technical-guidance/>

Work continues on the development of a council-wide approach to air quality, bringing together services which have an interest and/or impact on air quality, such as Public Health, Environmental Health, Transport Policy, Spatial Planning, Development Control, Street Care and Highways and Strategic Communications. This steering group will be jointly lead by the Director of Environmental and Community Services and the Director of Public Health and will also cover the Council's work on Climate Change to ensure there is a joined up approach across the two work areas, which are closely interlinked with often the same sources and interventions. It is anticipated that a council-wide Clean Air Strategy will result to complement the Council's existing Climate Change Strategy¹¹.

South Gloucestershire works closely with other neighbouring authorities in the West of England (Bath and North East Somerset, Bristol City and North Somerset Councils), particularly with regard to regional strategic work areas such as transport and planning, for example on Joint Local Transport Plans (the current JLTP3 and the emerging JLTP4¹²) and the Travel West¹³ brand which acknowledges commuters do not think in terms of Council boundaries.

The West of England Combined Authority (WECA) was established in 2017, with its constituent councils being Bath and North East Somerset, Bristol and South Gloucestershire. Its aim is to deliver economic growth for the region and address some of the challenges, such as transport, housing, productivity and skills. Crucially, WECA have powers over spending, previously held by central government, to improve the region's transport, housing, adult education and skills. WECA continue to also work closely with North Somerset Council.

Actions to Improve Air Quality

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 70 buses with emissions-reducing technology, 13 of which operate within the SGC AQMAs. A further 12 First Bus vehicles are currently having new Euro VI engines fitted. Funding has been awarded for an extension to this project under which a further 166 buses across the West of

¹¹ <https://www.southglos.gov.uk/documents/Climate-Change-Strategy-201823-Final-sgc-signed-v1.pdf>

¹² <https://travelwest.info/projects/joint-local-transport-plan>

¹³ <https://travelwest.info/>

England will be retrofitted with emissions-reducing technology by August 2020.

- 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. To date this funding has delivered 21 bio-methane powered buses, and the related re-fuelling infrastructure at one depot, with the remaining funding set to deliver a further 35 buses together with re-fuelling infrastructure at a second depot. The new buses will contribute to reducing air pollution levels across the West of England area, including 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 by 2021.
- Access funding secured to 2020, to enable the continuation of school, business and community travel planning measures to promote sustainable travel choices.
- The local transport capital programme 2016/17 approved a wider parking management review of the extended Kingswood - Warmley AQMA. A scheme implementing recommendations from the review to address parking issues along A420 Hill Street/Deanery Road was installed in 2018 and a scheme in Warmley is scheduled to be completed in 2019/20.

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 being progressed on a wider West of England basis aimed at reducing traffic congestion and improving air quality include:

- Metrobus - a new express bus service which began operating in 2018¹⁴
- Cribbs Patchway Metrobus Extension¹⁵ - an extension of the Metrobus network in South Gloucestershire
- MetroWest¹⁶ – improved rail services and infrastructure
- Cycle Ambition Fund – improvements to cycling and walking networks

¹⁴ <https://travelwest.info/metrobus>

¹⁵ <https://beta.southglos.gov.uk/cribbs-patchway-metrobus-extension/>

¹⁶ <https://travelwest.info/projects/metrowest>

- GoUltraLowWest¹⁷ - a grant funded project by Office for Low Emission Vehicles (OLEV) for the promotion of electric vehicles
- Joint Local Transport Plan (JLTP3) covering the period 2011 - 2026, is being updated to produce a new Joint Local Transport Plan (JLTP4) to take strategic transport planning beyond 2026 through to 2036. A greater emphasis will be placed on air quality in the JLTP4.

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

Hambrook Air Quality Action

Further to the Government's UK Air Quality Plan¹⁸ for nitrogen dioxide published in July 2017, South Gloucestershire Council was mandated by the Government in February 2018 to undertake a Targeted Feasibility Study. The study was required to identify possible actions that could be taken to reduce roadside nitrogen dioxide levels to meet the annual mean EU limit value of 40 µg/m³ on the A4174 Ring Road between the Bromley Heath and M32 Junction 1 roundabouts in the shortest time possible. The EU limit value applies where there is public access, so includes pedestrian and cycle paths, whereas the national (UK) air quality objectives apply where there is "relevant exposure", i.e. where the public are present for the averaging period of the objective, a calendar year in this case.

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 A4174 Hambrook junction. The outcome of the study was approved by the Joint Air Quality Unit (JAQU); a new joint unit formed between Defra and the Department for Transport (DfT) and funding was provided for the scheme.

The following measures were implemented through an Experimental Traffic Order (ETO) on 11 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

¹⁷ <https://travelwest.info/drive/electric-vehicles/go-ultra-low-west>

¹⁸ <https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017>

- Removal of the right turn facility from the B4058 from Frenchay onto the A4174
- Removal the westbound bus lane on the A4174 through the junction to the M32 traffic signals

An ETO allows a trial which can be in place for a period up to 18 months, during which time consideration is given to making the measures permanent. Orders are subject to a statutory process which allows the public to comment formally and provide feedback. The consultation, which runs until 11 February 2020, is available on the Council website at:

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

Further information about the scheme is available on the Council's website at

<https://www.southglos.gov.uk/transport-and-streets/streets/roads-road-works/major-roadworks/hambrook-air-quality-action/>

South Gloucestershire Council also continue to engage with Bristol City Council and Bath and North East Somerset Council on their Clean Air Plans and share progress on our mandated JAQU projects, though 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](#) website¹⁹ and for the Bath Clean Air Plan, on the [Bath Breathes](#) website²⁰.

Conclusions and Priorities

Declining trends in nitrogen dioxide levels and only one exceedance of the annual mean objective within the AQMAs shows an improving picture of air quality in South Gloucestershire in 2018.

The Kingswood – Warmley AQMA is still required as the single exceedance is within this AQMA. While there were no exceedances within the Staple Hill AQMA, two sites were “borderline” (within 10% of the annual mean objective i.e. greater than 36 µg/m³).

Defra advice is that AQMAs should remain in place until several years of data below 10% of the objective (36 µg/m³) is collected which can support revocation, as annual

¹⁹ <https://www.cleanairforbristol.org/>

²⁰ <http://www.bathnes.gov.uk/bath-breathes-2021>

mean pollutant concentrations can vary from year to year due to a number of factors, most notably meteorological conditions. So monitoring will continue and the situation reviewed before revocation of the Staple Hill AQMA can be considered.

There were again no exceedances of the nitrogen dioxide annual mean objective in the Cribbs Causeway AQMA, and monitored concentrations were well below the objective at the façade of the single residential property within the AQMA. There has been sustained compliance with the objective where there is relevant exposure for nine years (2010 -2018 inclusive) which confirms the case for the formal revocation of the AQMA.

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

- Complete the JAQU directed experimental scheme for the A4174 Hambrook junction to bring forward compliance with the annual mean NO₂ EU limit value, to consider the effectiveness of the scheme, and decide whether to make the measures permanent.
- Progress the review and update of the Air Quality Action Plan for Kingswood and Staple Hill to incorporate the extension of the Kingswood AQMA to Warmley. Progress on this has been limited in 2018/19 due to the resource impact of work on the JAQU mandated feasibility study, and implementation of the subsequent A4174 Hambrook Air Quality Action scheme.
- Proceed with the formal revocation of the Cribbs Causeway AQMA.
- Continue to develop the Clean Air Strategy to enable a council wide approach to air quality.

However, the Council faces major challenges at a time of significant pressure on public finances, particularly in relation to local government funding, which could impact on delivering air quality improvements.

There is significant pressure on transport systems within South Gloucestershire, due to the sheer level of travel demand generated by the current population and people coming into the area on a daily basis to work, shop and for leisure reasons. These pressures are shown through traffic congestion on the road network and capacity problems on local rail services.

The need for further housing growth within the West of England region also presents significant challenges. A joint approach to planning and transport across the region is essential to ensure that future growth decisions are made with an understanding of the necessary transport investment needed to achieve sustainable communities.

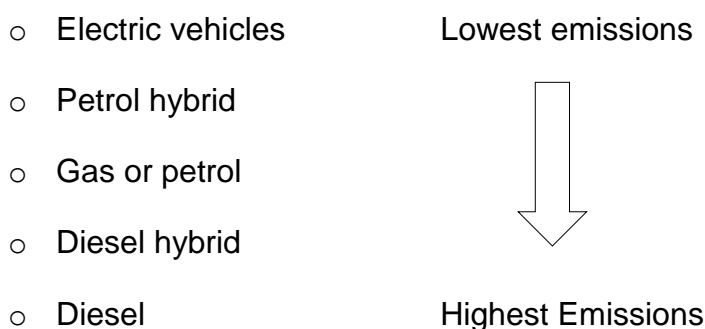
Local Engagement and How to get Involved

What you can do to reduce air pollution

There are lots of steps that everyone can take to improve air quality. By making informed personal choices, particularly around how we travel and heat our homes, we can 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, this not only reduces air pollution but also 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 as indicated below and opt for the cleanest vehicle you feasibly can.



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 that you are considering purchasing, there is an [online vehicle checker](#)²¹ on the Mayor of London/ London Assembly website.

- Visit the [Travel West](#)²² website 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:

- 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.
- Switch energy supplier to a renewable energy supplier. They sometimes work out cheaper and the way the energy is generated is less polluting.
- Consider installing “clean” renewable energy generation, for example via solar photovoltaics.
- Avoid solid fuel burners, such as stoves or fireplaces. If you already own one and choose to use it, make sure you follow the “[Open fires and wood-burning stoves](#)” advice leaflet²³ by using the right fuel on an efficient and well-maintained appliance. Some of South Gloucestershire is covered by a [Smoke Control Area](#)²⁴ which allows only approved appliances and fuels to be used.
- However, should you still plan to install a stove, then the lowest emission stoves currently on the market are those that are ‘Ecodesign Ready’. These will meet the future EU standards for all new stoves in the UK set to be introduced in 2022.

There are decisions 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.

²¹ <https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/cleaning-londons-vehicles>

²² <https://travelwest.info/>

²³ https://consult.defra.gov.uk/airquality/domestic-burning-of-wood-and-coal/supporting_documents/open%20fires%20wood%20burning%20stoves%20%20guideA4update12Oct.pdf

²⁴ <https://www.southglos.gov.uk/environment-and-planning/pollution/pollution-control-clean-air-act-approval/smoke-control-areas/>

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1 Local Air Quality Management

This report provides an overview of air quality in South Gloucestershire during 2018. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

The statutory air quality objectives applicable to LAQM in England can be found in Table F.1 in Appendix F.

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 must prepare an Air Quality Action Plan (AQAP) within 12-18 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 2014, a detailed assessment of air quality in Warmley along the A420 corridor east of the Kingswood AQMA identified new locations where the nitrogen dioxide annual mean objective was being exceeded. An extension of the Kingswood AQMA was proposed along the A420 to Warmley and following consultation, the Kingswood - Warmley AQMA was declared in December 2015.

Work to update the Air Quality Action Plan for Kingswood and Staple Hill by incorporating actions to cover the extension of the Kingswood AQMA to Warmley and include a wider range of actions to improve air quality in the AQMAs, has been delayed due to the resource impact of work on the JAQU mandated feasibility study, and implementation of the subsequent A4174 Hambrook Air Quality Action scheme.

Work has begun however, on a Clean Air Strategy to improve air quality across South Gloucestershire as well as in the AQMAs. Further information is provided in Section 2.2.

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/m³) and also the precautionary “borderline” level (36 µg/m³). This report confirms that in 2018, the nitrogen dioxide concentrations were again below the objective within this AQMA, demonstrating sustained compliance.

Revocation of this AQMA was proposed following Defra recommendation and a consultation²⁵ was undertaken early 2019. While more respondents objected to the AQMA revocation than supported it, mainly due to the expected future increase in traffic due to planned development in the area and overall concern about air quality, the monitoring results provide the fundamental evidence that there is no valid reason to retain the AQMA.

The Cribbs Causeway AQMA will therefore be revoked by a legal order, which will be submitted to Defra and made publicly available on the council's website. Monitoring will continue at this location to assess the impact of the new developments in the vicinity. Further information on the revocation of the Cribbs Causeway AQMA is available in Appendix D.

A summary of the current AQMAs declared by South Gloucestershire Council can be found in Table 2.1. This includes the Cribbs Causeway AQMA as it has not yet been formally revoked. The levels of exceedance at the declaration of the AQMAs (2010) and in 2018 are compared in Table 2.1. However, the monitoring undertaken within the AQMAs has changed during this timeframe to reflect extensions to the AQMAs and also to better represent relevant exposure. Consequently, the monitoring locations in 2018 are not necessarily directly comparable to those in 2010 and comparison between the exceedance levels may not provide a true reflection of trends in nitrogen dioxide levels over that timeframe.

The trends in annual mean nitrogen dioxide concentrations in the Kingswood – Warmley and Staple Hill AQMAs are shown in Figure A.3 to Figure A.5 and are discussed in Section 3.2.1. Distance adjusted monitoring data has also been provided in Table B.1 in Appendix B.

Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online 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, in Appendix E, maps of the current AQMAs are available in Figure E.1 to Figure E.3. Maps of the air quality monitoring locations in relation to the AQMAs

²⁵ https://consultations.southglos.gov.uk/consult/ti/Cribbs_AQMA/consultationHome

are also available in Figure E.8 (Cribbs Causeway AQMA), Figure E.10 (Staple Hill AQMA) and Figure E.11 to Figure E.13 (Kingswood – Warmley AQMA).

Table 2.1 Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan (including name, date of publication and link)
						At Declaration	Now	
AQMA 1 Cribbs Causeway	Declared 14 April 2010 NB: AQMA is in the process of being revoked.	NO ₂ Annual Mean	Bristol (North fringe) Cribbs Causeway	The area incorporates a single property (Hollywood Cottage, Blackhorse Hill) adjacent to the M5 Junction 17 Roundabout.	YES	33.0 µg/m ³ (Site 87 at façade 2010) NB: AQMA declared on basis of distance adjusted results of roadside sites (80 & 81) no longer in operation.	25.2 µg/m ³ (Triplicate Site 87 at façade average)	No Action Plan required as under objective
AQMA 2 Kingswood – Warmley	Declared 14 April 2010 Amended 25 May 2012 Amended 16 December 2015	NO ₂ Annual Mean	Bristol (East fringe) Kingswood & Warmley	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	NO	45.0 µg/m ³ (Site 68 at façade in Kingswood AQMA as declared in 2010. NB: no ground floor exposure)	40.8 µg/m ³ (Site 146 at façade in Kingswood – Warmley AQMA) 36.2 µg/m ³ (Site 68 at façade for comparison in former	2012 Air Quality Action Plan for Kingswood and Staple Hill (published March 2012) http://www.southglos.gov.uk/documents/cos120094.pdf (The AQAP is currently being updated to include the extension to Warmley in Dec 2015)

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				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.			Kingswood AQMA. NB: no ground floor exposure)	
AQMA 3 Staple Hill	Declared 14 April 2010 Amended 25 May 2012	NO ₂ Annual Mean	Bristol (East fringe) Staple Hill	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)	38.6 µg/m ³ (Site 165 at façade in Staple Hill AQMA. NB: no ground floor exposure) 35.4 µg/m ³ (Site 73 for comparison. NB: Distance adjusted result 30.8 µg/m ³ , but no ground floor exposure)	2012 Air Quality Action Plan for Kingswood and Staple Hill (published March 2012) http://www.southglos.gov.uk/documents/cos120094.pdf

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

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:

On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants.

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports.

- 1. This is an excellent report and provides a level of detail and discussion typically not seen in most ASRs. It is clearly presented, with discussions/data/AQAP measures divided by AQMA status. It acts as an exceptional first point of reference for concerned members of the public (or interested stakeholders); and clearly communicates the hard work the Council are undertaking to improve local air quality.*
- 2. Example calculations have been provided for all data corrections which are useful and encouraged in all future reports.*
- 3. The Council provide good commentary on the progress and status of their AQAP measures and the progress they have made during the last reporting period. The Council are encouraged to develop reduction targets for each AQAP measure. For further guidance please refer to LAQM Technical Guidance 16 (TG16).*
- 4. The Council provides a good level of discussion regarding developments and planning controls, and pollution sources.*
- 5. The Council provides good discussion of PM_{2.5} issues and the measures they have in place to address this harmful pollutant.*
- 6. The Council recently revised their monitoring programme to include a number of new sites, whilst also decommissioning sites with historically low concentrations. This is supported and as far as possible the Council should actively identify sites not fit for purpose and reutilise these resources elsewhere.*
- 7. The Council propose to revoke AQMA 1 Cribbs Causeway. In line with previous year's recommendations and supporting evidence this decision is supported. The remaining AQMAs should remain in place until several years of data, below 10% of the AQO, is collected and can support revocation.*

8. *Maps provided are clear and identify all monitoring sites as referenced in data tables.”*

South Gloucestershire Council has taken forward a number of direct measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in the 2012 Air Quality Action Plan for Kingswood and Staple Hill²⁶ and also in related plans and strategies, such as the current West of England Joint Local Transport Plan 3 (JLTP3) 2011 – 2026²⁷, 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. Goal 3 within JLTP3 is to improve air quality in the AQMAs.

Key completed measures are:

- Under the second round of the Clean Bus Technology Fund, First Bus and CT Plus have retrofitted 70 buses with emissions-reducing technology, 13 of which operate within the SGC AQMAs. A further 12 First Bus vehicles are currently having new Euro VI engines fitted. Funding has been awarded for an extension to this project under which a further 166 buses across the West of England will be retrofitted with emissions-reducing technology by August 2020.
- 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. To date this funding has delivered 21 bio-methane powered buses, and the related re-fuelling infrastructure at one depot, with the remaining funding set to deliver a further 35 buses together with re-fuelling infrastructure at a second depot. The new buses will contribute to reducing air pollution levels across the West of England area, including 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 by 2021.

²⁶ <http://www.southglos.gov.uk/documents/cos120094.pdf>

²⁷ <https://travelwest.info/projects/joint-local-transport-plan>

- Access funding secured to 2020, 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.
- Clean Bus Technology Funding (CBTF) awarded in December 2015 following a joint bid by Bristol, South Gloucestershire and Bath and North East Somerset Councils. The funding was used to upgrade 35 of the most polluting Euro II and III local buses by retrofitting Selective Catalytic Reduction Technology (SCRT) to achieve Euro Standard V/VI, thereby reducing tailpipe NOx emissions on those services, all of which operate in the Bristol, Bath and South Gloucestershire AQMAs. The retrofitting was completed in 2017.
- 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 Cribbs Causeway AQMA and should help maintain concentrations below the air quality objective.
- A signing review of delivery bays was undertaken during 2015 in Kingswood. Implementation of remedial measures following that review were completed in October 2016, which will improve local enforcement.
- The local transport capital programme 2016/17 approved a wider parking management review of the extended Kingswood - Warmley AQMA. A scheme implementing recommendations from the review to address parking issues along A420 Hill Street/Deanery Road was installed in 2018 and a scheme in Warmley is scheduled to be completed in 2019/20. This builds on the delivery of measure KS2 already delivered in the former Kingswood AQMA.

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

- Metrobus - a new express bus service, which began operating in 2018, aims to speed up journey times, relieve congestion, reduce pollution and give people improved access to key employment, education and leisure destinations²⁸. Further information is provided in Appendix D.
- Cribbs Patchway Metrobus Extension²⁹ - an extension of the Metrobus network in South Gloucestershire will provide an alternative, fast and direct route between Bristol Parkway railway station and The Mall bus station, and will also benefit communities in Stoke Gifford, Patchway and the forthcoming Cribbs Patchway New Neighbourhood on the former Filton Airfield site. Further information is provided in Appendix D.
- MetroWest³⁰ – 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 to Yate to a half-hourly service and includes plans for new rail stations at Henbury, North Filton and Ashley Down. This project is led by South Gloucestershire Council on behalf of the four West of England Councils. Further information is provided in Appendix D.
- Cycle Ambition Fund – improvements to cycling and walking networks and addressing barriers such as busy roads, crossing rivers and avoiding steep hills, to provide better door-to-door journeys. Various projects in South Gloucestershire include the Bromley Heath Walking and Cycling Bridge and Mangotsfield Cycle Path Lighting.
- Cribbs Patchway New Neighbourhood Cycle Links – a £3.125m package of walking and cycling schemes, recently awarded funding from the West of

²⁸ <https://travelwest.info/metrobus>

²⁹ <https://beta.southglos.gov.uk/cribbs-patchway-metrobus-extension/>

³⁰ <https://travelwest.info/projects/metrowest>

England combined authority. The aim of this project is to provide walking and cycling infrastructure links to the Cribbs Patchway New Neighbourhood 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.

- GoUltraLowWest³¹ - a grant funded project by Office for Low Emission Vehicles (OLEV) for investment in the promotion of electric vehicles throughout the West of England region, which includes doubling the existing provision of charge points to 400 in total, among other objectives. The Government's aspiration is that by 2040, every new car in the UK will be an ultra-low emission vehicle.
- A new Joint Local Transport Plan (JLTP4) is being developed to take strategic transport planning through to 2036. The Joint Transport Study³² previously developed by the four West of England Councils, will be implemented through JLTP4. A greater emphasis will be placed on air quality in JLTP4. Consultation on JLTP4 took place in early 2019 and it is anticipated that the final JLTP4 will be published in late 2019.

South Gloucestershire Council will also continue to engage with Bristol City Council and Bath and North East Somerset Council on their Clean Air Plans, though 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 website³³ and for the Bath Clean Air Plan, on the Bath Breathes website³⁴.

Hambrook Air Quality Action

Further to the Government's UK Air Quality Plan³⁵ for nitrogen dioxide published in July 2017, South Gloucestershire Council was mandated by the Government in February 2018 to undertake a Targeted Feasibility Study. The study was required to identify possible actions that could be taken to reduce roadside nitrogen dioxide levels to meet the annual mean EU limit value of 40 µg/m³ on the A4174 Ring Road

³¹ <https://travelwest.info/drive/electric-vehicles/go-ultra-low-west>

³² <https://www.jointplanningwofe.org.uk/consult/ti/JTSTransportVision>

³³ <https://www.cleanairforbristol.org/>

³⁴ <http://www.bathnes.gov.uk/bath-breathes-2021>

³⁵ <https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017>

between the Bromley Heath and M32 Junction 1 roundabouts 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 A4174 Hambrook junction. The outcome of the study was approved by the Joint Air Quality Unit (JAQU); a new 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 supplement³⁶ to the 2017 UK Air Quality Plan and were also published separately by Defra³⁷.

The Council was subsequently legally directed to implement the identified measures with full funding provided by JAQU. The following measures, as also shown in Figure 2.1, were implemented at the A4174 Hambrook junction on a trial basis through an Experimental Traffic Order (ETO) on 11 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 the westbound bus lane on the A4174 through the junction to the M32 traffic signals

³⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/746100/air-quality-no2-plan-supplement.pdf

³⁷ <https://uk-air.defra.gov.uk/library/no2ten/2018-la-tfs-documents>

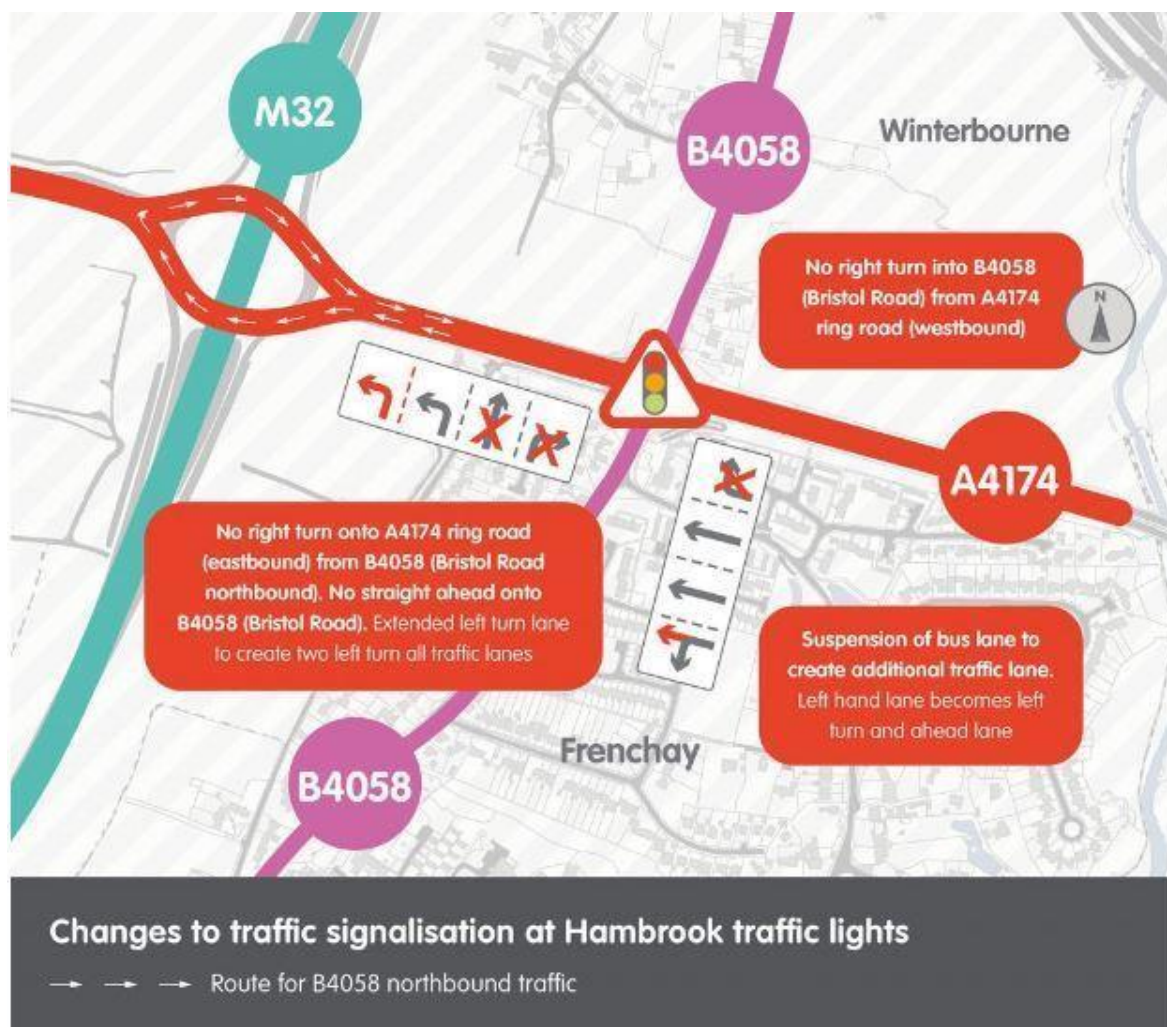


Figure 2.1 Traffic measures at A4174 Hambrook junction

An ETO allows a trial which can be in place 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, which runs until 11 February 2020, is available on the Council website at: https://consultations.southglos.gov.uk/consult.ti/PT.6296_Hambrook_E.T.O/consultationHome

Additional monitoring has been 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 EU limit value applies where there is public access (with some exceptions), so includes pedestrian and cycle paths. 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.

The Council has been monitoring nitrogen dioxide levels where people live near this junction for some years in line with LAQM requirements. The 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.

Further information about the scheme is available on the Council's website at <https://www.southglos.gov.uk/transport-and-streets/streets/roads-road-works/major-roadworks/hambrook-air-quality-action/>

Air Quality and Public Health Progress

The alignment of the air quality agenda and public health outcomes continued to be a focus during 2018-19.

The Joint Strategic Needs Assessment (JSNA) completed in 2016 recognised the close links between spatial planning, transport and air quality. The South Gloucestershire Joint Health and Wellbeing Strategy 2017- 2021 was approved by the Health and Wellbeing Board in early 2018. The document contains four priority areas for collective action; one of these is to "Maximise the potential of our built and natural environment to enable healthy lifestyles and prevent disease".

The strategy highlights that poor air quality exacerbates heart and lung conditions, such as asthma and chronic obstructive pulmonary disease, and can contribute to premature death. It calls for the health impacts from poor air quality to be reduced through lower emissions and reduced exposure to pollutants. The Health and Wellbeing Board agreed to raise awareness of the impacts of air pollution on health and work with partners to promote a consistent approach. Progress on this objective is reported twice yearly and an awareness raising event for members of the Health and Wellbeing Board took place in September 2019.

In the 2018 ASR, it was reported that three "AQ Mesh" monitoring units were to be purchased, installed and maintained with public health funding. The purpose of these units is to provide indicative particulate monitoring in key areas of South Gloucestershire. The units were purchased and installed in 2018 and following a

period of co-location were placed at sites within the Kingswood-Warmley and Staple Hill AQMAs and also adjacent to the A4174 near Hambrook.

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 has entered into a partnership with the University of the West of England to provide a year's placement for a Public Health Registrar specialising in health and the built environment.

The Registrar began the placement in January 2019 and is leading on the development of a council-wide approach to air quality, bringing together services which have an interest and/or impact on air quality, including Environmental Health, Transport Policy, Spatial Planning, Development Control, Street Care and Highways and Strategic Communications. The steering group will be lead jointly by the Director of Environmental and Community Services and the Director of Public Health and will also cover the Council's work on Climate Change to ensure there is a joined up approach across the two work areas, which are closely interlinked with often the same sources and interventions. It is anticipated that a council-wide Clean Air Strategy will result to complement the Council's existing Climate Change Strategy³⁸.

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 as strategic plans, such as the Joint Local Transport Plan 4, are developed and are also included within local planning policy, such as the emerging South Gloucestershire Council Local Plan.

The Council has received funding to investigate the redevelopment potential of Kingswood High Street, including the possibility of re-routing parts of the transport network in this area. This work has the potential to greatly improve or even alleviate air quality issues in Kingswood. Consequently officers from public health and environmental health are working closely with colleagues in planning to ensure that air quality considerations are given appropriate priority.

³⁸ <https://www.southglos.gov.uk/documents/Climate-Change-Strategy-201823-Final-sgc-signed-v1.pdf>

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

- Complete the JAQU directed experimental scheme for the A4174 Hambrook junction to bring forward compliance with the annual mean NO₂ limit value, to consider the effectiveness of the scheme, and decide whether to make the measures permanent.
- Progress the review and update of the Air Quality Action Plan for Kingswood and Staple Hill to incorporate the extension of the Kingswood AQMA to Warmley. Progress on this has been limited in 2018/19 due to the resource impact of work on the JAQU mandated feasibility study, and implementation of the subsequent A4174 Hambrook Air Quality Action scheme.
- Continue to develop the Clean Air Strategy to enable a council wide approach to air quality.

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

- Continued significant pressure on local government funding, which could impact on delivering air quality improvements.
- The transport system within South Gloucestershire is under pressure, due to the travel demand generated by the current population and by people coming into the area on a daily basis to work, shop and for leisure reasons. These pressures are shown through traffic congestion on the road network and capacity problems on local rail services.

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 AQMA's.

Table 2.2 Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
Kingswood Action Plan											
KS1	Travel Plan for Kingswood Civic Centre	Promoting Travel Alternatives	Workplace Travel Planning	South Gloucestershire Council Local Transport Capital Programme (LTCP)	2011/12	2012 onwards	<ul style="list-style-type: none"> Reduction in solo occupancy vehicles Increased cycling levels Increased walking levels 	No specific target emissions reduction.	Action complete. Implementation of travel plan is continuous process.	completed	
KS2	Parking review (Kingswood)	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	South Gloucestershire Council LTCP	2012-14	2014 - 2018	<ul style="list-style-type: none"> Road safety benefits Reduced congestion 	None, impact considered too small to be measurable.	Initial parking review implemented in 2015/16. 3 additional measures from the 2nd phase of the review have been delayed, but are now expected to be implemented within the current financial year.	estimated 2019/20	
KS3	Ensure air quality is a priority in development of transport schemes (Kingswood)	Transport Planning and Infrastructure	Other	South Gloucestershire Council LTCP	2013/14	2013/14	Number of actions taken forward within Capital Programme	No specific target emissions reduction.	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.	Action completed 2013	
KS4	Bus partnership (Kingswood) Working with operators to address AQ issues	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	South Gloucestershire Council in partnership with bus operators and neighbouring local authorities OLEV Grant	2012/13	2013 onwards	Number of buses replaced for lower emission vehicles	No specific target emissions reduction.	<p>The £4.79m OLEV funding for bio-methane buses has so far delivered 21 buses and 1 re-fuelling station, with 35 more buses and another re-fuelling station planned.</p> <p>A second successful Clean Bus Technology Fund (CBTF) bid has delivered 70 buses retrofitted to improve from euro IV to euro VI standard and 12 further buses having new</p>	Continuous process	

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Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
									engines fitted. with further funding now confirmed to deliver a further 166 buses by August 2020		
KS5	Review of Council Fleet to ensure lowest emission vehicles (Kingswood)	Vehicle Fleet Efficiency	Other	South Gloucestershire Council OLEV Grant	2012/13	2013 onwards	Reduction in vehicle emissions	No specific target emissions reduction.	The Council continually assesses its in-house vehicle fleet requirements, we are seeking to reduce the overall fleet size, we continue to increase the number of low or zero emission vehicles within the existing fleet and all replacement vehicles introduced into the fleet meet or exceed the latest emission standards. OLEV funding received in January 2016, will ensure 20% of Council fleet will be Low Emission vehicles by 2021. The entire fleet of pool cars at main SGC offices were electric from early 2017.	Continuous process	
KS6	Promotion of more efficient use of taxi ranks and bus stops (Kingswood).	Vehicle Fleet Efficiency	Driver training and ECO driving aids	South Gloucestershire Council in liaison with taxi operators and bus operators LTCP	2012/13	2013 onwards	Number of bus/taxi operators signed up to programme	No specific target emissions reduction.	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.	Continuous process	
KS7	Ensure adequate landscaping is considered within new planning applications and urban	Policy Guidance and Development Control	Other policy	South Gloucestershire Council Council Funds	2012/13	2013 onwards	Number of new trees planted. NB: Data relating to the indicator for this measure is not currently available.	No specific target emissions reduction.	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.	Action completed 2013.	

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Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
	designs (Kingswood)										
KS8	Promotion of VOSA Smoky Vehicle Hotline (Kingswood)	Public Information	Via the Internet	South Gloucestershire Council n/a	2012/13	2012/13	Number of vehicles reported to VOSA (data not currently available).	No specific target emissions reduction.	Information added to the Council's website on the Exhaust emissions testing and Improving air quality webpages.	Action completed 2013.	
KM1	School travel planning (Kingswood)	Promoting Travel Alternatives	School Travel Plans	South Gloucestershire Council in conjunction with local schools DfT Grant Funding	2012/13	2013 onwards	'Hands up' surveys within participating schools indicate mode share for pupils arriving at school.	No specific target emissions reduction.	A series of interventions undertaken annually with LSTF and STTY funding since 2013 to promote sustainable travel in schools. Access funding confirmed to continue this until 2020, we await a government announcement on further rounds of funding to continue this work.	Continuous process.	Further progress subject to funding availability.
KM2	Travel planning for Kingswood Town Centre (Kingswood)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	South Gloucestershire Council in conjunction with Kingswood Business Association DfT Grant Funding	2013/14	2014 onwards	Measured by increased: <ul style="list-style-type: none"> • Cycling levels • Bus patronage • Walking levels 	No specific target emissions reduction.	A series of measures to encourage sustainable travel offered to businesses and communities as part of LSTF and STTY projects. Access funding confirmed to continue measures until 2020, we await a government announcement on further rounds of funding to continue this work.	Continuous process.	Further progress subject to funding availability.
KM3	Review bus terminals and timing points (Kingswood)	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	South Gloucestershire Council in conjunction with bus operators Undertaken by operators	2012/13	2013/14	Reduction in number of buses idling at bus stops	No specific target emissions reduction.	Review of bus network to reduce no. of services terminating in AQMA. Bus stop infrastructure and parking review schemes to improve traffic flow.	Action completed 2014/15	
KM4	Smarter Choices promotion s/ roadshows	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	South Gloucestershire Council DfT Grant Funding	2013/14	2014 - 2016	Measured by increased: <ul style="list-style-type: none"> • Cycling levels • Bus 	No specific target emissions reduction.	Access West continues to build on the work delivered through LSTF and STTY, working with Businesses, Schools and Communities across South	Continuous process.	

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Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
	(Kingswood)						patronage • Walking levels Also measure by number of proactive events		Gloucestershire to promote and support sustainable and active travel choices. The funding for the Access West work programme will continue to March 2020.		
KM5	Cycling infrastructure (Kingswood)	Transport Planning and Infrastructure	Cycle network	South Gloucestershire Council LTCP and DfT Grant Funding	2012/13	2014 onwards	Increases in numbers of cyclists as measured as part of the Joint Local Transport Plan (JLTP3) Annual Progress Reports.	No specific target emissions reduction.	Cycle parking installed at John Cabot School as part of LSTF. No other cycle infrastructure schemes within the AQMA or surrounding area in recent years. Cycle infrastructure is constantly under review as issues and possible measures are identified by Officers, Members and the public.	Continuous process.	Further progress subject to funding availability.
KL1	ECO Stars Fleet Recognition Scheme (Kingswood)	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	South Gloucestershire Council Unknown at Present	2012/13	2013/14	Membership numbers.	No specific target emissions reduction.	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.	Unknown at present.	Resource availability currently prevents implementation
KL2	Car club (Kingswood)	Alternatives to private vehicle use	Car Clubs	South Gloucestershire Council Unknown at Present	2012/13	2014/15	Car club membership	No specific target emissions reduction	Long term action - discussions have been held with car club operators, but have yet to result in a firm commitment to install one in this location. Progress likely to be dependent on results seen from the Car Clubs being established elsewhere in the Council area.	Unknown at present.	
KL3	Restrict traffic turning movements onto A420 (Kingswood)	Traffic Management	UTC, Congestion management, traffic reduction	South Gloucestershire Council LTCP	2012/13	2016/17	Reduction in volume of traffic travelling towards and along A420	No specific target emissions reduction	Long term action - preparatory work has commenced. Micro-simulation model to test options commissioned to assess impact of LTCP and developer proposals upon air quality. Progress with Modelling work has stalled due to need to focus	2019/2020.	

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Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
									resources on JAQU mandated study for SGC		
KL4	Review traffic signal numbers and operations (Kingswood)	Traffic Management	UTC, Congestion management, traffic reduction	South Gloucestershire Council LTCP	2012-14	2014/15	Improved traffic speeds and reduced congestion	No specific target emissions reduction.	MOVA signalling system has been installed 3 junctions in the AQMA to improve traffic flow. A review of mid-block pedestrian signals within the AQMA was undertaken in 2014 and recommends the removal of 1 or 2 pedestrian crossings from Kingswood High Street. This scheme is subject to future funding bids.	Review completed. Implementation unknown	Implementation dependant on securing funding.
KL5	Review of delivery bays (Kingswood)	Freight and Delivery Management	Delivery and Service plans	South Gloucestershire Council LTCP	2012/13	2016/17	<ul style="list-style-type: none"> • Number of reported issues with delivery bays • Reduced congestion 	No specific target emissions reduction	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.	Action completed 2013/14	
KL6	Controlled deliveries/ collections (Kingswood)	Freight and Delivery Management	Freight Consolidation Centre	South Gloucestershire Council Unknown at Present	2016/17	2019/20	Number of delivery & collection agreements made with businesses	No specific target emissions reduction	Long term action - no progress yet.	2020/21	
KL7	Reclassify strategic routes and signing strategy (Kingswood)	Traffic Management	Other	South Gloucestershire Council Unknown at Present	2016/17	2019/20	Reduction in traffic volumes on and travelling towards A420	No specific target emissions reduction	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	Unknown at present.	
KL8	Taxi ranks (Kingswood)	Promoting Low Emission Transport	Taxi emission incentives	South Gloucestershire Council in conjunction with taxi operators Unknown at Present	2015/16	2019/20	Production of review report	No specific target emissions reduction	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	Unknown at present.	

South Gloucestershire Council

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
CR39/2013	Improved pedestrian crossing facilities at High St/ Alma Rd (Kingswood)	Promoting Travel Alternatives	Promotion of walking	South Gloucestershire Council LTCP	2014/15	2015/16	Implement infrastructure improvements to promote walking	No specific target emissions reduction	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 15/16.	2015/16	
Staple Hill Action Plan											
SS1	Ensure air quality is a priority in development of transport schemes (Staple Hill)	Transport Planning and Infrastructure	Other	South Gloucestershire Council LTCP	2012/13	2013/14	Number of actions taken forward within Capital Programme	No specific target emissions reduction	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.	Action completed 2013	
SS2	Bus partnership (Staple Hill) Working with operators to address AQ issues	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	South Gloucestershire Council in partnership with bus operators OLEV Grant	2012/13	2013 onwards	Number of buses replaced for lower emission vehicles.	No specific target emissions reduction	The £4.79m OLEV funding for bio-methane buses has so far delivered 21 buses and 1 re-fuelling station, with 35 more buses and another re-fuelling station planned. A second Successful Clean Bus Technology Fund (CBTF) bid has delivered 70 buses retrofitted to improve from euro IV to euro VI standard and 12 further buses having new engines fitted. with further funding now confirmed to deliver a further 166 buses by august 2020	Continuous process	
SS3	Review of Council Fleet to ensure lowest emission	Vehicle Fleet Efficiency	Other	South Gloucestershire Council OLEV Grant	2012/13	2013 onwards	Reduction in vehicle emissions	No specific target emissions reduction	The Council continually assesses its in-house vehicle fleet requirements, we are seeking to reduce the overall fleet size, we continue to increase the number of low or	Continuous process	

South Gloucestershire Council

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
	vehicles (Staple Hill)								zero emission vehicles within the existing fleet and all replacement vehicles introduced into the fleet meet or exceed the latest emission standards. OLEV funding received in January 2016, will ensure 20% of Council fleet will be Low Emission vehicles by 2021. The entire fleet of pool cars at main SGC offices were electric from early 2017.		
SS4	Promotion of more efficient use of taxi ranks and bus stops (Staple Hill)	Vehicle Fleet Efficiency	Driver training and ECO driving aids	South Gloucestershire Council in liaison with taxi operators and bus operators LTCP	2012/13	2017/18	Number of bus/taxi operators signed up to programme	No specific target emissions reduction	The parking review as part of SM4 is complete and any subsequent issues have been addressed. 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.	Continuous process	
SS5	Ensure adequate landscaping is considered within new planning applications and urban designs (Staple Hill)	Policy Guidance and Development Control	Other policy	South Gloucestershire Council Council Funds	2012/13	2014 onwards	Number of new trees planted. NB: Data relating to the indicator for this measure is not currently available.	No specific target emissions reduction.	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.	Action completed 2013.	
SS6	Promotion of VOSA Smoky Vehicle Hotline (Staple Hill)	Public Information	Via the Internet	South Gloucestershire Council n/a	2012/13	2012/13	Number of vehicles reported to VOSA (data not currently available).	No specific target emissions reduction.	Information added to the Council's website on the Exhaust emissions testing and Improving air quality webpages.	Action completed 2013.	

South Gloucestershire Council

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
SM1	School travel planning (Staple Hill)	Promoting Travel Alternatives	School Travel Plans	South Gloucestershire Council in conjunction with local schools DfT Grant funding	2012/13	2013 onwards	'Hands up' surveys within participating schools indicate mode share for pupils arriving at school.	No specific target emissions reduction.	A series of interventions undertaken annually with LSTF and STTY funding since 2013 to promote sustainable travel in schools. Access funding confirmed to continue this until 2020, we await a government announcement on further rounds of funding to continue this work.	Continuous process.	Further progress subject to funding availability.
SM2	Travel planning for Staple Hill Town Centre	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	South Gloucestershire Council in conjunction with Staple Hill Chamber of Trade DfT Grant funding	2013/14	2014 onwards	Measured by increased: • Cycling levels • Bus patronage • Walking levels	No specific target emissions reduction.	A series of measures to encourage sustainable travel offered to businesses and communities as part of LSTF and STTY projects. Access funding confirmed to continue measures until 2020, we await a government announcement on further rounds of funding to continue this work.	Continuous process.	Further progress subject to funding availability.
SM3	Relocation of bus stops on Soundwell Road (Staple Hill)	Traffic Management	UTC, Congestion management, traffic reduction	South Gloucestershire Council LTCP	2012/13	2013/14	Measured by relocation of bus stop	No specific target emissions reduction.	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.	Action closed.	
SM4	Parking Review (Staple Hill)	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	South Gloucestershire Council LTCP	2013/14	2014/15	Measured by: • Road safety benefits • Reduced congestion	Impact of action considered too small to be measurable.	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.	2014/15	
SM5	Smarter Choices promotions /roadshow	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	South Gloucestershire Council DfT Grant funding	2013/14	2014-16	Measured by increased: • Cycling levels • Bus	No specific target emissions reduction.	Access West continues to build on the work delivered through LSTF and STTY, working with Businesses, Schools and Communities across South	Continuous process.	

South Gloucestershire Council

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
	s (Staple Hill)						patronage • Walking levels Also measure by number of proactive events		Gloucestershire to promote and support sustainable and active travel choices. The funding for the Access West work programme will continue to March 2020.		
SM6	Cycling infrastructure (Staple Hill)	Transport Planning and Infrastructure	Cycle network	South Gloucestershire Council DfT Grant funding	2012/13	2014 onwards	Increases in numbers of cyclists as measured as part of the Joint Local Transport Plan (JLTP3) Annual Progress Reports.	No specific target emissions reduction.	Two grant funded cycle route lighting schemes were implemented nearby between 2014 and 2016. Cycle infrastructure is constantly under review as issues and possible measures are identified by Officers, Members and the public.	Continuous process.	Further progress subject to funding availability.
SL1	ECO Stars Fleet Recognition Scheme (Staple Hill)	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	South Gloucestershire Council Unknown at present	2012/13	2013/14	Membership numbers.	No specific target emissions reduction.	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.	Unknown at present.	Resource availability currently prevents implementation
SL2	Car club (Staple Hill)	Alternatives to private vehicle use	Car Clubs	South Gloucestershire Council Unknown at present	2012/13	2014/15	Car club membership	No specific target emissions reduction	Long term action - discussions have been held with car club operators, but have yet to result in a firm commitment to install one in this location. Progress likely to be dependent on results seen from the Car Clubs being established elsewhere in the Council area.	Unknown at present.	
SL3	Review traffic signal numbers and operations (Staple Hill)	Traffic Management	UTC, Congestion management, traffic reduction	South Gloucestershire Council Defra Grant funding/ LTCP	2012/13	2013/14	Improved traffic speeds and reduced congestion	No specific target emissions reduction.	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.	Action completed and closed 2013/14	

South Gloucestershire Council

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
SL4	Review of delivery bays (Staple Hill)	Freight and Delivery Management	Delivery and Service plans	South Gloucestershire Council LTCP	2012/13	Implementation 2014/15 as part of Parking Review (SM4)	Measured by • number of reported issues with delivery bays • Reduced congestion	No specific target emissions reduction	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.	Action completed 2013/14	
SL5	Restrict traffic turning movements at A4017 junction (Staple Hill)	Traffic Management	UTC, Congestion management, traffic reduction	South Gloucestershire Council Unknown at present	2016/17	2019/20	Measured by reduction in traffic volumes at A4017 junction	No specific target emissions reduction	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	Unknown at present.	
SL6	Controlled deliveries/collections (Staple Hill)	Freight and Delivery Management	Freight Consolidation Centre	South Gloucestershire Council Unknown at present	2016/17	2019/20	Measured by number of delivery & collection agreements made with businesses	No specific target emissions reduction	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	Unknown at present.	
SL7	Reclassify strategic routes and signing strategy (Staple Hill)	Traffic Management	Other	South Gloucestershire Council Unknown at present	2016/17	2019/20	Measured by reduction in traffic volumes on and travelling towards A4017.	No specific target emissions reduction	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	Unknown at present.	

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.

This specific role within local air quality management supports efforts to reduce exposure at national level and also links strongly to the public health agenda, in particular the Public Health Outcome Framework (PHOF)³⁹ and specifically, the following indicator:

- PHOF Indicator 3.01 Health Protection: Fraction of all cause adult mortality attributable to anthropogenic (originating from human activity) particulate air pollution (measured as fine particulate matter PM_{2.5}).

Estimates of mortality burden are based on modelled annual average concentrations of fine particulate matter (PM_{2.5}) originating from human activities in each local authority area. The estimates of the fraction of mortality attributable to long-term exposure to particulate air pollution range from 2.5% in the lowest local authority area (Isles of Scilly) to 7.1% in City of London.

In 2017, the most recent year for which data is available, the estimated fraction of mortality in South Gloucestershire was 5.1%. This is comparable with England as a whole (5.1%), but higher than the South West region average (4.4%). The other West of England unitary authorities are; Bristol (5.1%), Bath and North East Somerset (4.7%) and North Somerset (4.3%). The estimated fractions of mortality have decreased for all the above mentioned areas when compared to the previously reported 2016 data.

The Council's Joint Strategic Needs Assessment (JSNA)⁴⁰ contains information on air quality impacts on the South Gloucestershire population, including data for

³⁹ <http://www.phoutcomes.info/>

⁴⁰ [Joint Strategic Needs Assessment](#)

attributable deaths and associated life years lost. The associated Joint Health and Wellbeing Strategy 2017-21⁴¹ has included as one of its four priorities:

“Maximise the potential of our built and natural environment to enable healthy lifestyles and prevent disease”

The strategy recognises that poor air quality exacerbates heart and lung conditions such as asthma and chronic obstructive pulmonary disease and that the effect of air pollution can contribute to the premature death of people who already have serious illnesses. Within the strategy, the Health and Wellbeing Board pledge to:

“Raise awareness of the impacts of air pollution and poor air quality on health, and work with partners in South Gloucestershire and more widely to promote a consistent and unified approach to improve air quality and reduce health impacts associated with air pollution”.

The PHOF indicator discussed above has been adopted within the Health and Wellbeing Board’s own suite of performance indicators, which are reported annually to senior Elected Members. This recognition of air pollution politically and at senior levels within the Council is necessary to move this agenda forward and provides evidence that South Gloucestershire Council recognises it is expected to work towards reducing emissions and concentrations of PM_{2.5} in its area.

As advised in previous annual status reports, a public health business case was successful in obtaining funding for the purchase of three “AQ Mesh” monitoring units. These are small outdoor air quality monitors, which are configured to deliver localised real-time readings of a variety of pollutants including PM_{2.5}. The Units were purchased in 2017 and installed early in 2018 in the following locations:

- Within the Kingswood-Warmley AQMA
- Within the Staple Hill AQMA
- Adjacent to the A4174 near Hambrook.

The setting of the units in ‘worst-case’ locations has provided a level of indicative monitoring data for PM_{2.5}. However, initial issues with the reliability of the instrument sensors lead to an incomplete data set. For this reason the 2018 data is not considered sufficiently robust to report under the LAQM framework.

⁴¹ <http://www.southglos.gov.uk/health-and-social-care/staying-healthy/health-strategies/joint-health-and-wellbeing-strategy-jhws/>

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 also contribute to reducing emissions and concentrations of PM_{2.5}. While the measures are primarily aimed at reducing nitrogen dioxide, road traffic is also a source of particulate matter so the implementation of measures will have co-benefits.
- The wider regional transport initiatives, such as Metrobus⁴², 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}, 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}.
- Alongside measures to tackle nitrogen dioxide in the updated Action Plan, consideration will also be given to reducing emissions and concentrations of PM_{2.5}. The Council is mindful of the potential co-benefits of action plan measures on multiple pollutants of concern and will follow appropriate guidance, such as the LAQM Action Toolbox in Annex A of the Defra LAQM Technical Guidance (TG16), which indicates measures that will likely be beneficial to reducing PM_{2.5} levels (in addition to other pollutants).
- Some of South Gloucestershire is covered by a Smoke Control Area⁴³ 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 developing Clean Air Strategy to better control particulate (and NO_x) emissions from open fires and wood-burning stoves. The Council's Environmental Health team has produced an information sheet on Solid Fuel Appliances Smoke

⁴² <https://travelwest.info/metrobus>

⁴³ <https://www.southglos.gov.uk/environment-and-planning/pollution/pollution-control-clean-air-act-approval/smoke-control-areas/>

Control⁴⁴ and will investigate smoke complaints. Non-compliance with smoke control legislation can result in a fine of up to £1000.

- 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 within the “[Open fires and wood-burning stoves](#)” guidance leaflet⁴⁵ 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 terms of the current situation with regard to PM_{2.5} concentrations locally, while there is no regulatory standard applied to the PM_{2.5} role for local authorities, the EU Ambient Air Quality Directive⁴⁶ does however set out air quality standards for PM_{2.5}, which can act as a guide:

- Annual average EU limit value of 25 µg/m³ by 2020.
- EU target value of 15% reduction in concentrations at urban background locations between 2010 and 2020.

While South Gloucestershire Council does not locally monitor PM_{2.5} with a reference monitor, the local PM_{2.5} concentrations have been estimated from the PM₁₀ concentrations measured at the Yate automatic monitoring site, using the method specified in Technical Guidance LAQM TG16 Box 7.7. The results of this are provided in Table A.9. The estimated local PM_{2.5} concentrations (9.1 µg/m³) are below the annual average EU limit value and a greater % reduction (35%) than the EU target value of 15% can be seen in the concentrations between 2010 and 2018.

⁴⁴ <http://www.southglos.gov.uk/documents/Solid-Fuel-Appliances.pdf>

⁴⁵ https://consult.defra.gov.uk/airquality/domestic-burning-of-wood-and-coal/supporting_documents/open%20fires%20wood%20burning%20stoves%20%20guideA4update12Oct.pdf

⁴⁶ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:152:0001:0044:EN:PDF>

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

3.1 Summary of Monitoring Undertaken

This section sets out what monitoring has taken place and how it compares with objectives. Local authorities no longer 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) website⁴⁷.

3.1.1 Automatic Monitoring Sites

South Gloucestershire Council undertook automatic (continuous) monitoring at one site in Yate during 2018. Nitrogen dioxide (NO₂) is monitored using an API Model 200A chemiluminescent analyser and particulate matter (PM₁₀) is monitored using a Met One BAM 1020 Beta-Attenuated Mass (BAM) Monitor (unheated). Table A.1 in Appendix A shows the details of the Yate automatic monitoring site.

Maps showing the location of the monitoring site are provided in Figure E.4 and Figure E.5 in Appendix E. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

South Gloucestershire Council undertook non- automatic (passive) monitoring of NO₂ at 105 sites during 2018. Table A.2 in Appendix A shows the details of the sites.

Triplicate monitoring (using three diffusion tubes) is undertaken at three of the monitoring locations to ensure robust monitoring datasets:

- Yate, Station Road, where the tubes are co-located with the automatic monitoring station (sites 4A, B and C - these sites were previously numbered 4, 5 and 6).
- At the façade of the single property in the 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, Syston Way and Downend Road, where

⁴⁷ <https://uk-air.defra.gov.uk/>

concentrations have been borderline with the annual mean objective (sites 147A, B and C).

The monitoring results are reported for 111 diffusion tubes in total.

In 2018, one new diffusion tube monitoring sites was set up in Charfield in response to concerns about air quality raised by local residents (site 174).

The following four diffusion tube sites ceased operation in October 2018, although the results are reported for 2018;

- Site 42 Little Stoke – 21 Braydon Avenue because monitored concentrations have been consistently well below the annual mean objective.
- Site 58 Longwell Green – Kingsfield Lane/Aspects Leisure site because monitored concentrations have been consistently well below the annual mean objective.
- Site 118 Filton Northville - 19 Gloucester Rd Nth Dental Lab because monitored concentrations have been consistently below the annual mean objective and there is no relevant exposure at ground floor.
- Site 123 Filton - 542 Filton Avenue Spar because monitored concentrations have been consistently below the annual mean objective and there is no relevant exposure at ground floor.

Maps showing the location of the diffusion tube monitoring sites are provided in Appendix E. 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 adjusted for bias and annualised, where relevant. Distance corrected results are reported in Table B.1 (in Appendix B). Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations from the automatic and non-automatic (diffusion tube) monitoring sites for the past 5 years with the air quality objective of 40µg/m³.

Automatic Monitoring Data

The results of monitoring at the Yate automatic site show the NO₂ concentrations are well below the annual mean objective in 2018 and all other reported years (Table A.3, Appendix A). The trend data presented in Figure A.1 (Appendix A) shows an overall gradual decline in annual mean nitrogen dioxide concentrations. In 2018, there was a decrease to 20 µg/m³ compared to 23 µg/m³ in 2017.

Table A.4 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200 µg/m³, not to be exceeded more than 18 times per year. There were no exceedances of the 1-hour mean (200 µg/m³) recorded at the Yate automatic monitoring site during 2018 and the site has been below the hourly mean objective in all reported years.

Non-Automatic (Diffusion Tube) Monitoring Data

The NO₂ annual mean concentrations from the diffusion tube monitoring sites are provided in Table A.3 (Appendix A). The data reported in Table A.3 has been bias adjusted and annualised.

Bias adjusted, annualised and distance corrected diffusion tube monitoring data, including the full 2018 dataset of monthly mean values, is provided in Table B.1 (Appendix B).

Discussion of 2018 Diffusion Tube Monitoring Results

Exceeding Sites

In 2018, an exceedance of the annual mean objective was measured at one monitoring site, compared to three exceedances in 2017 and eleven in 2016. The exceeding site is within the Kingswood – Warmley AQMA, which in comparison, had two exceeding sites in 2017 and five in 2016. The exceeding site is detailed below:

- Site 146 Kingswood - 34 Hill Street (downpipe on façade)

There were no exceeding sites within the Staple Hill AQMA, in comparison there was one exceeding site in 2017 and five in 2016. There were no exceedances within the Cribbs Causeway AQMA or outside of the AQMAs where there is relevant exposure.

No annual means greater than 60 µg/m³ were recorded at any of the diffusion tube monitoring sites, so exceedances of the 1-hour mean objective are considered unlikely.

Borderline Exceedances

There were nine sites approaching the objective i.e. within 10% of the objective at $36 \mu\text{g}/\text{m}^3$ or above in 2018, compared to thirteen in 2017 and fifteen in 2016. Of these, five sites are within the Kingswood – Warmley AQMA (sites 68, 95, 116, 137 and 139), three are within the Staple Hill AQMA (sites 61, 75 and 165) and one (site 147B as part of a triplicate site) is outside the AQMAs.

All of the borderline sites are at façade, apart from at sites 61 and 75 in the Staple Hill AQMA. Distance adjustment of the results for these two sites to the nearest façade using the “Nitrogen dioxide fall off with distance” calculator⁴⁸, reduces the annual mean concentrations further below the objective as shown in Table C.1 (Appendix C), although site 61 remains just within 10% of the objective at $36.0 \mu\text{g}/\text{m}^3$.

It should be noted however, that there is no relevant exposure at ground floor level in relation to sites 61, 75 and 165 in the Staple Hill AQMA, and also at sites 68 and 95 in the Kingswood - Warmley AQMA. Although there is first floor exposure at the majority of these sites, or at first floor in adjoining properties, the concentrations at first floor, or any higher floors, would be further reduced.

The final borderline result in 2018 was for one of the tubes (147B) which is part of the triplicate site located in Soundwell - 264 Soundwell Rd, outside of the AQMAs. The monitoring is at façade and is representative of relevant exposure. This site has hovered around the annual mean objective, marginally exceeding it in 2014 ($40.6 \mu\text{g}/\text{m}^3$), although in 2015, the concentration was below the objective, but still borderline ($38.7 \mu\text{g}/\text{m}^3$). Triplicate diffusion tube monitoring (147A, B and C) was set up in March 2016 to ensure more robust monitoring at this location.

In 2016, the nitrogen dioxide concentration recorded at the existing site 147 (which in effect became one of the triplicate tubes (147A)) was $39.9 \mu\text{g}/\text{m}^3$, so marginally below the annual mean objective. This was with a data capture of 92%. However, due to the commencement of the triplicate monitoring in March and the loss of the whole set of triplicate tubes in December 2016, the data capture for the additional two tubes; 147B and C at the site dropped to 67%. With the data capture below 75%, this led to annualised means being calculated which were above the objective (147B $46.5 \mu\text{g}/\text{m}^3$ and 147C $46.6 \mu\text{g}/\text{m}^3$). However, the 2016 raw monthly triplicate

⁴⁸ <http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>

monitoring results showed good precision when checked using the precision and accuracy LAQM spreadsheet tool⁴⁹ and with the non-annualised results for 147B and C, an average bias adjusted annual mean of 38.7 µg/m³ was attained, which was below the objective.

In 2017, the triplicate results showed good precision and an average bias adjusted annual mean of the triplicate tubes of 38.1 µg/m³ was attained, which was below the objective, although still borderline.

In 2018, the raw monthly triplicate monitoring results again showed good precision when checked using the precision and accuracy tool. While a borderline result was recorded at 147B, lower results were recorded for the other two tubes (147A and 147C) and an average bias adjusted annual mean of the triplicate tubes of 35.3 µg/m³ was attained. The overall result for site 147 would consequently not be considered borderline as it is below the precautionary level of 36 µg/m³ and therefore, not within 10% of the objective. This site will continue to be kept under review to check compliance is sustained.

All the borderline sites will continue to be closely observed, especially with regard to planning or transport developments that may affect future nitrogen dioxide concentrations.

Trends in Annual Mean Nitrogen Dioxide Concentrations

In 2018, decreases in monitored nitrogen dioxide concentrations were observed as a general trend across the majority (85%) of the monitoring sites in South Gloucestershire, including the Yate automatic station.

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. The trends in the Kingswood – Warmley AQMA are shown in Figure A.3 (Kingswood section) and Figure A.4 (Warmley section) and the trends in the Staple Hill AQMA in Figure A.5. For ease of reference, the diffusion tube monitoring results within the Kingswood – Warmley and Staple Hill AQMAs can be found in Table A.7 and Table A.8 respectively.

In the Kingswood – Warmley AQMA, there was only one site (146) that exceeded the annual mean objective in 2018 (40.8 µg/m³). In comparison to 2017 when there were

⁴⁹ <http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html>

two exceeding sites (139 and 146) and the highest exceedance was $46.3 \mu\text{g}/\text{m}^3$ at site 146, the number of exceeding sites has decreased as has the extent of exceedance.

In the Staple Hill AQMA, there were no exceedances at any of the monitoring sites in 2018. In comparison, there was one exceedance in 2017 which was at site 75 ($40.3 \mu\text{g}/\text{m}^3$) and as previously discussed, relevant exposure for site 75 is set back and the estimated concentration following distance adjustment was below the annual mean objective at the nearest façade. Also there is no relevant exposure at ground floor or first floor level in relation to site 75, although there is first floor exposure at an adjoining property.

The monitoring site locations within the Staple Hill AQMA were reviewed in 2017 and additional monitoring was set up at façade to better represent relevant exposure, where this was possible, and existing monitoring sites were retained for initial comparison. This allows for a more robust assessment of whether concentrations are below the objective where there is relevant exposure and therefore, whether the AQMA is still required. The monitoring results are further discussed in Appendix D.

In summary, there were two sites in the Staple Hill AQMA in 2018 that were borderline (i.e. within 10% of the objective); site 165 (one of the new sites set up at façade) and site 61, an existing site which remained (just) borderline following distance adjustment. Defra advise that AQMAs should remain in place until several years of data below 10% of the objective (i.e. $36 \mu\text{g}/\text{m}^3$) is collected and can support revocation.

The overall trends in nitrogen dioxide concentrations in the Kingswood – Warmley and Staple Hill AQMAs have been relatively stable over the past decade with a gradual downward trend in the last two years. In 2018, concentrations fell at all sites in the AQMAs, apart from two sites (69 and 95) in the Kingswood – Warmley AQMA; one of which (site 95) is borderline; and one borderline site (165) in the Staple Hill AQMA. It is difficult to determine exactly why concentrations would have increased at these sites, although for site 165, the 2018 annual mean was based on a full year whereas in 2017, it was based on 9 months data capture.

Overall, the decreases in monitored nitrogen dioxide concentrations at the majority of sites within the AQMAs are in line with the general decreasing trend across the majority of the monitoring sites in South Gloucestershire and also mirror the national

declining trend as provided in the Defra Statistical Release dated 25 April 2019⁵⁰.

Annual mean pollutant concentrations can vary from year to year due to a number of factors, most notably meteorological conditions. Day-to-day changes in weather have a great influence on air quality. Levels of pollutants that are relatively high on a still day when dispersion is limited can be much lower the next day or even the next hour if wind direction changes or wind speeds increase.

Revocation of the Cribbs Causeway AQMA

There were again no exceedances of the nitrogen dioxide annual mean objective in the Cribbs Causeway AQMA, with monitored concentrations well below the objective ($25.2 \mu\text{g}/\text{m}^3$) at the façade of the single residential property within the AQMA, continuing a declining trend. There has been sustained compliance with the objective where there is relevant exposure for nine years (2010 -2018 inclusive) which confirms the case for the formal revocation of the AQMA.

The revocation of the AQMA and the trends in annual mean nitrogen dioxide concentrations within this AQMA, are further discussed in Appendix D.

3.2.2 Particulate Matter (PM₁₀)

The PM₁₀ 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.5 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of $40 \mu\text{g}/\text{m}^3$.

Table A.6 in Appendix A compares the ratified continuous monitored PM₁₀ daily (24-hour) mean concentrations for the past 5 years with the air quality objective of $50 \mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times per year.

The PM₁₀ concentrations measured at the Yate automatic site are well below the annual mean and 24-hour mean objectives in 2018 and all other reported years. In 2018, the annual mean was $13 \mu\text{g}/\text{m}^3$, showing a decrease from the 2017 annual mean of $14 \mu\text{g}/\text{m}^3$. The trend data presented in Figure A.2 (Appendix A) shows that overall, the annual mean PM₁₀ concentrations at Yate have been slowly declining since 2010. The maximum 24-hour mean was $40 \mu\text{g}/\text{m}^3$ so the 24-hour mean objective was not exceeded.

⁵⁰https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/796887/Air_Quality_Statistics_in_the_UK_1987_to_2018.pdf

Appendices

Appendix A: Monitoring Results

Appendix B: Full Monthly Diffusion Tube Results for 2018

Appendix C: Air Quality Monitoring Data QA/QC

Appendix D: Supporting Technical Information

Appendix E: Maps

Appendix F: Summary of Air Quality Objectives in England

Appendix A: Monitoring Results

Table A.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
-	Yate Station Road	Roadside	370418	182525	NO ₂	NO	Chemiluminescent	N/A	6	1.6
					PM ₁₀		Gravimetric (BAM)			1.8

Notes:

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

(2) N/A if not applicable.

Table A.2 Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
1	Yate – 88 Station Road The Candle	Roadside	370692	182499	NO ₂	NO	4.6	2.5	NO	2.7
4A	Yate - Station Road Co-Location 1	Roadside	370418	182525	NO ₂	NO	N/A	6	YES	2.4
4B	Yate - Station Road Co-location 2	Roadside	370418	182525	NO ₂	NO	N/A	6	YES	2.4
4C	Yate - Station Road Co-location 3	Roadside	370418	182525	NO ₂	NO	N/A	6	YES	2.4
10	Filton - 152 Gloucester Road North – Pizza Bello façade	Roadside	360266	179136	NO ₂	NO	0	3.5	NO	2.3
11	Thornbury – 48 High Street Uniq Family Wealth	Roadside	363654	189893	NO ₂	NO	2.8	0.6	NO	2.5
12	Stoke Gifford - Church Road Rear of Aviva	Roadside	362161	179570	NO ₂	NO	N/A	1	NO	2.6
13	Filton - MOD Roundabout	Roadside	361523	178732	NO ₂	NO	N/A	1	NO	2.3
21	Downend – Boscombe Crescent St Augustines Church	Urban Background	365673	177475	NO ₂	NO	N/A	1.5	NO	2.5
22	Hanham – 44 High Street Lloyds Bank	Roadside	364116	172413	NO ₂	NO	N/A	3	NO	2.4
27	Kingswood - 90 Regent Street Nat West façade	Roadside	364866	173835	NO ₂	YES	0	2	NO	2.8
29	Staple Hill - 123 High Street Backhouse Bet	Roadside	364822	175932	NO ₂	YES	2	1	NO	2.7

South Gloucestershire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
34	Bradley Stoke – 109 Ormonds Close M4 East of Almondsbury Interchange	Roadside	362395	182544	NO ₂	NO	11	24.8 (M4 33)	NO	2.5
35	Bradley Stoke - Woodlands Lane M4 East of Almondsbury Interchange (lp47)	Roadside	362118	183031	NO ₂	NO	9.8	3.3 (M4 22.5)	NO	2.5
36	Hambrook – Whiteshill M4 East of M32 Fairwater	Roadside	364544	178855	NO ₂	NO	9.6*	30 (M4)	NO	2.2
37	Almondsbury - Old Aust Road M4 West of Almondsbury Interchange	Roadside	361147	184846	NO ₂	NO	N/A	7 (M4)	NO	2.3
38	Severn Beach – Ableton Lane Severn Beach Primary School	Urban Background	354282	184653	NO ₂	NO	0	49	NO	2.5
42	Little Stoke – 21 Braydon Ave	Urban Background	361418	181674	NO ₂	NO	8	1.5	NO	2.9
44	Stoke Gifford - Hatchet Road	Roadside	362061	180025	NO ₂	NO	14	4	NO	2.8
46	Winterbourne - High Street opp Winterbourne Academy	Roadside	364852	180758	NO ₂	NO	16.5	1.3	NO	2.6
53	Hambrook – Bristol Road Rear of 17 Fenbrook Close	Roadside	363907	178389	NO ₂	NO	16	6.5	NO	1.9
54	Longwell Green - A431 / Aldermoor Way	Roadside	365256	171656	NO ₂	NO	N/A	1.5	NO	2.7
57	Coalpit Heath - Badminton Rd Frome Valley Kitchens	Roadside	367742	181160	NO ₂	NO	12	2	NO	2.5

South Gloucestershire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
58	Longwell Green - Kingsfield Lane/ Aspects Leisure Site (lp6)	Roadside	365327	172141	NO ₂	NO	27	31 (A4174)	NO	2.7
60	Downend - North Street Kustom Floors & Furniture	Roadside	365101	176688	NO ₂	NO	4	0.5	NO	2.6
61	Staple Hill Crossroads - 1 Broad Street William Hill	Roadside	364926	175926	NO ₂	YES	0.95	2.3	NO	2.5
62	Staple Hill Crossroads - 2 Broad Street 501 Bar façade	Roadside	364909	175908	NO ₂	YES	0	1.5	NO	2.4
63	Patchway – 28 Park Leaze	Roadside	359487	182479	NO ₂	NO	8	1.5	NO	2.5
67	Kingswood - 40 Regent Street Thomas Cook façade	Roadside	364671	173877	NO ₂	YES	0	2.5	NO	2.8
68	Kingswood - 26-32 Regent Street Store Twenty One façade	Roadside	364631	173886	NO ₂	YES	0	2.5	NO	2.7
69	Kingswood - 12 Regent Street Domino's Pizza façade	Roadside	364597	173892	NO ₂	YES	0	2.5	NO	2.0
70	Kingswood - Two Mile Hill Road Job Centre Plus façade	Roadside	364533	173896	NO ₂	YES	0	2.5	NO	2.5
71	Staple Hill - 11 The Square Bunch Florist	Roadside	365075	175918	NO ₂	YES	0.5	6.5	NO	2.7
72	Staple Hill - 25 Broad Street Westbury Inks	Roadside	364990	175920	NO ₂	YES	6.5	1.5	NO	2.7
73	Staple Hill - 11 Soundwell Road Starlight	Roadside	364902	175843	NO ₂	YES	1.5	0.4	NO	2.5

South Gloucestershire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
74	Staple Hill - 29-31 Soundwell Road opp Page Comm Assoc	Roadside	364885	175772	NO ₂	YES	4	0.4	NO	2.5
75	Staple Hill - 118 High Street Lloyd Bottoms/Eclipse Sewing	Roadside	364856	175917	NO ₂	YES	2.5	0.5	NO	2.5
76	Staple Hill - 84-86 High Street Staple Hill Oak Pub façade	Roadside	364722	175926	NO ₂	YES	0	2	NO	2.7
78	Staple Hill - 9-11 Victoria Street	Roadside	364909	176016	NO ₂	YES	3.7	1.2	NO	2.6
79	Staple Hill - 27-29 Victoria Street	Roadside	364913	176067	NO ₂	YES	3.3	1.2	NO	2.6
83	Chipping Sodbury – 51A Broad Street façade	Roadside	372791	182241	NO ₂	NO	0	4.7	NO	2.2
87A	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	Roadside	357739	181334	NO ₂	YES	0	13	NO	1.7
87B	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	Roadside	357739	181334	NO ₂	YES	0	13	NO	1.7
87C	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	Roadside	357739	181334	NO ₂	YES	0	13	NO	1.7
92	Kingswood - Regent Street Entertainment & Sports Club	Roadside	364968	173836	NO ₂	YES	0	2	NO	2.7
93	Kingswood - Hanham Road Exchange Court Flats	Roadside	364979	173801	NO ₂	YES	0	2	NO	2.8
95	Kingswood - 45 High Street Adam Lee	Roadside	365078	173846	NO ₂	YES	0	2.7	NO	2.5

South Gloucestershire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
96	Kingswood - 71 High Street SGYH Youth Housing	Roadside	365164	173832	NO ₂	YES	5.5	2.3	NO	2.7
98	Kingswood - High Street Sainsbury's Local façade	Roadside	365463	173785	NO ₂	YES	N/A	2.5	NO	2.6
101	Staple Hill - High Street lp outside Beech House	Roadside	364546	175951	NO ₂	NO	9	1.5	NO	2.9
102	Staple Hill - 58 High Street CBS Consultants	Roadside	364637	175934	NO ₂	YES	0	1.5	NO	2.4
105	Staple Hill - North Street lp outside no 2	Roadside	364932	176147	NO ₂	YES	2.5	2	NO	2.7
106	Stoke Gifford - 73 Hambrook Lane façade	Other ⁽³⁾	363112	179559	NO ₂	NO	0	10	NO	1.9
113	Patchway - 5 Falcon Close façade	Roadside	359112	181909	NO ₂	NO	0	7.5 (M5 45)	NO	1.9
114	Pilning - 23 Keens Grove façade	Roadside	355263	185351	NO ₂	NO	0	7	NO	2.3
115	Pilning - 2 Wick Road façade	Roadside	355212	185360	NO ₂	NO	0	8.5	NO	2.3
116	Warmley - 14 High Street (former Webbs) lp at façade	Roadside	366882	173562	NO ₂	YES	0	2.2	NO	3.1
117	Filton Northville - 29 Gloucester Road North Rowe Vets	Roadside	359874	178259	NO ₂	NO	2.5	2.9	NO	2.5
118	Filton Northville - 19 Gloucester Road North Dental Lab	Roadside	359875	178207	NO ₂	NO	3.4	4.7	NO	2.4

South Gloucestershire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
119	Filton - 137 Gloucester Road North	Roadside	360263	179250	NO ₂	NO	0.5	3.6	NO	2.5
122	Filton - 549 Filton Avenue	Roadside	360566	178229	NO ₂	NO	4.5	4	NO	2.1
123	Filton - 542 Filton Avenue Spar	Roadside	360575	178265	NO ₂	NO	5	4	NO	2.4
124	Filton - 702a Filton Ave Way Ahead	Roadside	360918	178905	NO ₂	NO	6.6	1.9	NO	2.3
125	Filton - 71 Station Road	Roadside	360891	179005	NO ₂	NO	5.4	0.5 (A4174 9.3)	NO	2.6
128	Kingswood - 109 Downend Road	Roadside	364587	174431	NO ₂	NO	1.6	1.4	NO	2.4
129	Cribbs Causeway – 1 Holly Cottages rear façade	Roadside	357508	181059	NO ₂	NO	0	18 (M5 44)	NO	2.1
130	Cribbs Causeway – 2 Mayfield Cottages façade	Roadside	357488	181011	NO ₂	NO	0	17 (A4018 38)	NO	1.8
132	Hanham - 66 High St Sassy Hair Studio	Roadside	364178	172337	NO ₂	NO	0.6	2.7	NO	2.5
133	Hambrook - 123 Old Gloucester Road façade (dp)	Roadside	363736	178507	NO ₂	NO	0	10.4 (A4174)	NO	1.9
134	Hambrook – Bristol Road, Old Bakery façade (dp)	Roadside	364048	178719	NO ₂	NO	0	2.2	NO	1.9
135	Frenchay – Harford Drive Dyrham Flats	Roadside	364029	178413	NO ₂	NO	12.5*	24.5 (A4174)	NO	2.5
136	Little Stoke – 26 Gipsy Patch Lane façade (dp)	Roadside	361242	180544	NO ₂	NO	0	12.0	NO	2.2

South Gloucestershire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
137	Warmley - 35 High Street (lp at façade)	Roadside	366984	173563	NO ₂	YES	0	1.9	NO	2.6
138	Warmley - 18 High Street façade (dp)	Roadside	366941	173558	NO ₂	YES	0	2.0	NO	2.8
139	Warmley - 14 High Street (former Webbs) façade (dp)	Roadside	366890	173560	NO ₂	YES	0	2.3	NO	2.7
141	Warmley - 41 Deanery Road façade (dp)	Roadside	366705	173581	NO ₂	YES	0	7.7	NO	2.7
142	Warmley - 33 Deanery Road Warmley Court façade (dp)	Roadside	366613	173597	NO ₂	YES	0	8.9 (A4174 18.2)	NO	2.0
143	Warmley - 1 High Street Ideal Pharmacy façade (dp)	Roadside	366815	173574	NO ₂	YES	0	5	NO	2.5
144	Warmley - 8 Tower Road North façade (dp)	Roadside	366913	173523	NO ₂	NO	0	4.3	NO	2.0
145	Warmley - 1 London Road (Cycle Path)	Roadside	367107	173531	NO ₂	YES	4.9*	5	NO	2.3
146	Kingswood - 34 Hill Street façade (dp)	Roadside	365910	173680	NO ₂	YES	0	1.6	NO	2.2
147A	Soundwell - 264 Soundwell Rd façade (dp)	Roadside	364586	174496	NO ₂	NO	0	2.6	NO	2.3
147B	Soundwell - 264 Soundwell Rd façade (dp)	Roadside	364586	174496	NO ₂	NO	0	2.6	NO	2.3
147C	Soundwell - 264 Soundwell Rd façade (dp)	Roadside	364586	174496	NO ₂	NO	0	2.6	NO	2.3

South Gloucestershire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
148	Filton – 109 Gloucester Road North façade (dp)	Roadside	360076	178901	NO ₂	NO	0	10.2	NO	1.9
149	Filton – 707 Southmead Road façade (dp)	Roadside	360050	179020	NO ₂	NO	0	9.8	NO	1.8
150	Soundwell – 296 Soundwell Road façade (dp)	Roadside	364528	174425	NO ₂	NO	0	4.3	NO	1.7
151	Hambrook – Bristol Road Old Bakery FP signpost	Roadside	364048	178726	NO ₂	NO	1*	1.2	NO	2.3
152	Bradley Stoke -188 Oaktree Crescent Ip49	Roadside	360942	182833	NO ₂	NO	1*	12.2	NO	2.8
153	Bradley Stoke -141 Wheatfield Drive (façade)	Roadside	361841	182417	NO ₂	NO	0	8.2	NO	2.1
154	Bradley Stoke - 166 Ellan Hay Road (façade)	Roadside	363241	180724	NO ₂	NO	0	9.7	NO	1.8
155	Stoke Gifford - 3 Earl Close (façade)	Roadside	363324	179854	NO ₂	NO	0	26.5 (SGTL)	NO	2.2
156	Stoke Gifford - Lancelot Road Ip1	Roadside	362400	177624	NO ₂	NO	21.2	1.8	NO	2.4
157	Hambrook - Bristol Road Poplars House (façade)	Roadside	364006	178517	NO ₂	NO	0	30.8	NO	2.2
158	Downend - 5 Wick Wick Close (façade)	Roadside	366156	178556	NO ₂	NO	0	20.2 (A4174)	NO	2.1
159	Wickwar - 21 High Street (façade)	Roadside	372395	188581	NO ₂	NO	0	2.5	NO	2.3
160	Staple Hill - 62 High Street Ip10	Roadside	364655	175931	NO ₂	YES	0.4	1.6	NO	2.9

South Gloucestershire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
161	Staple Hill - 13 Victoria Street (façade)	Roadside	364906	176022	NO ₂	YES	0	4.4	NO	2.0
162	Staple Hill - 28 Victoria Street (façade)	Roadside	364925	176062	NO ₂	YES	0	4.8	NO	1.9
163	Staple Hill - 2 Victoria Street (façade)	Roadside	364918	175979	NO ₂	YES	0	4.8	NO	1.9
164	Staple Hill - 102 High Street Charlie & Co Barbers (façade)	Roadside	364811	175919	NO ₂	YES	0	3.5	NO	2.2
165	Staple Hill - 3 Soundwell Rd Chinese Kitchen (façade)	Roadside	364906	175864	NO ₂	YES	0	1.5	NO	2.5
166	Kingswood - 12 Cecil Road Ip9	Roadside	364770	173695	NO ₂	NO	2.1	1.5	NO	2.5
167	Kingswood - 7 Downend Road Ip4	Roadside	364652	173957	NO ₂	NO	2.9	2.3	NO	2.4
168	Kingswood - 133 High Street (façade)	Roadside	365366	173805	NO ₂	YES	0	3.1	NO	2.4
169	Warmley - 20 Deanery Road Warmley Community Centre (façade)	Roadside	366714	173560	NO ₂	YES	0	4.2	NO	2.5
170	Patchway - 204 Gloucester Road front façade	Roadside	360606	181675	NO ₂	NO	0	10.5	NO	2.3
171	Soundwell - 225 Soundwell Rd (façade)	Roadside	364664	174672	NO ₂	NO	0	2.6	NO	2.7
172	Downend - 31 Badminton Road Brownes (façade)	Roadside	365153	176812	NO ₂	NO	0	5.4	NO	2.2

South Gloucestershire Council

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
173	Mangotsfield - 10 Cossham Street (façade)	Roadside	366459	176138	NO ₂	NO	0	2.4	NO	2.3
174	Charfield - 25 Wotton Road facade dp	Roadside	372011	192189	NO ₂	NO	0	4.7	NO	2.4

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property). * Where the receptor is located off to the side of the monitor rather than behind the monitor.

(2) N/A if not applicable.

(3) Other locations where any special source orientated monitoring is undertaken in relation to specific emission sources; in this case, railway line.

Table A.3 Annual Mean NO₂ Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
-	Yate Station Road (Automatic)	Roadside	Automatic	n/a	99.5%	24	21	24	23	20
1	Yate – 88 Station Road The Candle	Roadside	Diffusion Tube	n/a	100%	31.4	29.1	32.2	29.6	27.4
4A	Yate - Station Road Co-Location 1	Roadside	Diffusion Tube	n/a	100%	25.0	22.7	24.7	22.1	20.1
4B	Yate - Station Road Co-location 2	Roadside	Diffusion Tube	n/a	100%	24.3	23.0	22.7	22.8	19.9
4C	Yate - Station Road Co-location 3	Roadside	Diffusion Tube	n/a	100%	24.6	22.8	24.7	23.2	20.5
10	Filton - 152 Gloucester Road North Pizza Bello façade	Roadside	Diffusion Tube	n/a	92%	38.1	33.2	34.1 ^a	34.7	34.7
11	Thornbury – 48 High Street Uniq Family Wealth	Roadside	Diffusion Tube	n/a	100%	27.6	25.5	26.8	25.6	24.7
12	Stoke Gifford - Church Road Rear of Aviva	Roadside	Diffusion Tube	n/a	92%	31.0	28.6	29.7	28.4	27.7
13	Filton - MOD Roundabout	Roadside	Diffusion Tube	n/a	100%	33.7	32.1	34.6	30.1	31.7
21	Downend – Boscombe Crescent St Augustines Church	Urban Background	Diffusion Tube	n/a	100%	17.7	16.6	17.4	16.4	14.9
22	Hanham – 44 High Street Lloyds Bank	Roadside	Diffusion Tube	n/a	100%	31.5	28.7	30.7	29.6	28.3
27	Kingswood - 90 Regent Street Nat West façade	Roadside	Diffusion Tube	n/a	100%	31.0	30.2	31.4	29.8	27.0

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Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
29	Staple Hill - 123 High Street Backhouse Bet	Roadside	Diffusion Tube	n/a	100%	35.2	31.2	36.2	30.9	28.1
34	Bradley Stoke – 109 Ormonds Close M4 East of Almondsbury Interchange	Roadside	Diffusion Tube	n/a	100%	31.5	28.9	31.0	26.9	26.1
35	Bradley Stoke - Woodlands Lane M4 East of Almondsbury Interchange (lp47)	Roadside	Diffusion Tube	n/a	100%	32.0	27.9	32.0	26.1	26.5
36	Hambrook – Whiteshill M4 East of M32 Fairwater	Roadside	Diffusion Tube	n/a	92%	20.5	19.3	19.4	18.8	18.8
37	Almondsbury - Old Aust Road M4 West of Almondsbury Interchange	Roadside	Diffusion Tube	n/a	92%	31.3	31.5	32.2	25.2	30.7
38	Severn Beach – Ableton Lane Severn Beach Primary School	Urban Background	Diffusion Tube	n/a	92%	14.9	14.6	14.6	13.8	13.6
42	Little Stoke – 21 Braydon Ave	Urban Background	Diffusion Tube	n/a	75%	23.1	22.2	23.9	22.0	20.0
44	Stoke Gifford - Hatchet Road	Roadside	Diffusion Tube	n/a	100%	31.5	29.8	31.9	30.1	30.6
46	Winterbourne - High Street opp Winterbourne Academy	Roadside	Diffusion Tube	n/a	100%	32.7	29.4	32.9	28.8	25.1
53	Hambrook – Bristol Road Rear of 17 Fenbrook Close	Roadside	Diffusion Tube	n/a	100%	34.7	30.0	33.7	27.9	27.7
54	Longwell Green - A431 / Aldermoor Way	Roadside	Diffusion Tube	n/a	92%	33.6	30.2	34.9	31.9	30.2

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Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
57	Coalpit Heath - Badminton Rd Frome Valley Kitchens	Roadside	Diffusion Tube	n/a	100%	32.4	29.0	28.7	24.7	23.6
58	Longwell Green - Kingsfield Lane/ Aspects Leisure Site (lp6)	Roadside	Diffusion Tube	n/a	75%	20.8	20.4	22.4	19.2	18.8
60	Downend - North Street Kustom Floors & Furniture	Roadside	Diffusion Tube	n/a	92%	33.7	30.7	33.7	28.4	28.4
61	Staple Hill Crossroads - 1 Broad Street William Hill	Roadside	Diffusion Tube	n/a	100%	41.5	39.4	41.5	39.2	37.8
62	Staple Hill Crossroads - 2 Broad Street 501 Bar façade	Roadside	Diffusion Tube	n/a	100%	36.0	36.4	39.2	34.6	33.6
63	Patchway – 28 Park Leaze	Roadside	Diffusion Tube	n/a	92%	25.6	23.1	25.9	24.8	22.2
67	Kingswood - 40 Regent Street Thomas Cook façade	Roadside	Diffusion Tube	n/a	100%	40.2	38.1	40.7	37.9	34.0
68	Kingswood - 26-32 Regent Street Store Twenty One façade	Roadside	Diffusion Tube	n/a	83%	40.1	40.5	42.5	39.7	36.2
69	Kingswood - 12 Regent Street Domino's Pizza façade	Roadside	Diffusion Tube	n/a	83%	36.2	34.8	36.5	33.2	33.9
70	Kingswood - Two Mile Hill Road Job Centre Plus façade	Roadside	Diffusion Tube	n/a	100%	32.1	31.0	32.7	30.8	30.1
71	Staple Hill - 11 The Square Bunch Florist	Roadside	Diffusion Tube	n/a	92%	24.7	23.6	26.1	24.6	21.5
72	Staple Hill - 25 Broad Street Westbury Inks	Roadside	Diffusion Tube	n/a	100%	31.9	32.2	36.2	31.1	28.1

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Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
73	Staple Hill - 11 Soundwell Road Starlight	Roadside	Diffusion Tube	n/a	100%	39.9	40.4	40.2	37.3	35.4
74	Staple Hill - 29-31 Soundwell Road opp Page Community Association	Roadside	Diffusion Tube	n/a	92%	28.1	28.5	30.9	27.1	27.0
75	Staple Hill - 118 High Street Lloyd Bottoms/Eclipse Sewing	Roadside	Diffusion Tube	n/a	100%	45.3	44.8	46.1	40.3	37.2
76	Staple Hill - 84-86 High Street Staple Hill Oak Pub façade	Roadside	Diffusion Tube	n/a	100%	36.2	34.9	36.9	32.9	29.3
78	Staple Hill - 9-11 Victoria Street	Roadside	Diffusion Tube	n/a	100%	43.3	41.5	44.9	39.0	35.4
79	Staple Hill - 27-29 Victoria Street	Roadside	Diffusion Tube	n/a	92%	37.5	37.5	37.2	34.7	34.1
83	Chipping Sodbury – 51A Broad Street façade	Roadside	Diffusion Tube	n/a	100%	22.4	23.1	25.4	22.8	21.9
87A	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	Roadside	Diffusion Tube	n/a	100%	34.9	28.4	28.3 ^a	26.6	24.7
87B	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	Roadside	Diffusion Tube	n/a	100%	34.3	28.7	29.9 ^a	27.2	25.4
87C	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	Roadside	Diffusion Tube	n/a	100%	34.3	29.5	29.3 ^a	27.2	25.5
92	Kingswood - Regent Street Entertainment & Sports Club	Roadside	Diffusion Tube	n/a	100%	34.0	34.1	36.7	33.2	30.5
93	Kingswood - Hanham Road Exchange Court Flats	Roadside	Diffusion Tube	n/a	100%	29.5	29.2	31.1	26.7	26.6
95	Kingswood - 45 High Street Adam Lee	Roadside	Diffusion Tube	n/a	100%	34.5	34.3	39.6	36.6	37.8

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Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
96	Kingswood - 71 High Street SGYH Youth Housing	Roadside	Diffusion Tube	n/a	100%	36.0	34.2	37.0	35.0	31.3
98	Kingswood - High Street Sainsbury's Local façade	Roadside	Diffusion Tube	n/a	100%	37.1	37.0	35.3	34.8	32.2
101	Staple Hill - High Street lp outside Beech House	Roadside	Diffusion Tube	n/a	100%	26.3	25.7	28.5	25.4	23.3
102	Staple Hill - 58 High Street CBS Consultants	Roadside	Diffusion Tube	n/a	100%	39.8	38.4	40.7	37.2	32.4
105	Staple Hill - North Street lp outside no 2	Roadside	Diffusion Tube	n/a	100%	27.3	26.7	29.8	27.0	25.0
106	Stoke Gifford - 73 Hambrook Lane façade	Other	Diffusion Tube	n/a	100%	21.6	20.1	20.9	20.5	18.7
113	Patchway - 5 Falcon Close façade	Roadside	Diffusion Tube	n/a	100%	30.2	32.4	31.9	30.3	27.2
114	Pilning - 23 Keens Grove façade	Roadside	Diffusion Tube	n/a	100%	25.6	25.7	27.5	23.4	24.5
115	Pilning - 2 Wick Road façade	Roadside	Diffusion Tube	n/a	100%	25.9	24.9	25.5	24.2	23.0
116	Warmley - 14 High Street (former Webbs) lp at façade	Roadside	Diffusion Tube	n/a	100%	40.8	42.9	40.2 ^a	39.7	38.3
117	Filton Northville - 29 Gloucester Road North Rowe Vets	Roadside	Diffusion Tube	n/a	100%	32.7	31.0	34.2	30.5	29.7
118	Filton Northville - 19 Gloucester Road North Dental Lab	Roadside	Diffusion Tube	n/a	83%	31.3	30.4	32.8	30.5	28.4

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Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
119	Filton - 137 Gloucester Road North	Roadside	Diffusion Tube	n/a	100%	36.1	33.6	34.6	30.2	30.1
122	Filton - 549 Filton Avenue	Roadside	Diffusion Tube	n/a	100%	33.2	30.6	31.4	29.4	29.0
123	Filton - 542 Filton Avenue Spar	Roadside	Diffusion Tube	n/a	83%	31.9	30.1	31.2	29.2	29.6
124	Filton - 702a Filton Ave Way Ahead	Roadside	Diffusion Tube	n/a	100%	35.0	32.1	34.4	29.7	32.0
125	Filton - 71 Station Road	Roadside	Diffusion Tube	n/a	92%	26.7	25.8	26.7	29.1	26.8
128	Kingswood - 109 Downend Road	Roadside	Diffusion Tube	n/a	92%	32.9	33.2	34.6	31.7	30.0
129	Cribbs Causeway – 1 Holly Cottages rear façade	Roadside	Diffusion Tube	n/a	100%	29.9	29.5	33.4	29.2	28.6
130	Cribbs Causeway – 2 Mayfield Cottages façade	Roadside	Diffusion Tube	n/a	100%	27.3	26.8	28.9	26.5	24.9
132	Hanham - 66 High Street Sassy Hair Studio	Roadside	Diffusion Tube	n/a	92%	31.9	29.2	31.6	29.0	28.8
133	Hambrook - 123 Old Gloucester Road façade (dp)	Roadside	Diffusion Tube	n/a	100%	27.6	28.4	30.7	25.6	25.9
134	Hambrook – Bristol Road Old Bakery façade (dp)	Roadside	Diffusion Tube	n/a	100%	39.4	36.0	37.4	32.7	28.3
135	Frenchay – Harford Drive Dyrham Flats	Roadside	Diffusion Tube	n/a	100%	27.0	26.8	28.5	27.4	24.0

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Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
136	Little Stoke – 26 Gipsy Patch Lane façade (dp)	Roadside	Diffusion Tube	n/a	100%	23.7	22.1	22.9	22.5	21.4
137	Warmley - 35 High Street (lp at façade)	Roadside	Diffusion Tube	n/a	100%	42.3	43.2	43.7	39.0	37.2
138	Warmley - 18 High Street façade (dp)	Roadside	Diffusion Tube	n/a	100%	39.2	37.5	37.3	36.3	33.7
139	Warmley - 14 High Street (former Webbs) façade (dp)	Roadside	Diffusion Tube	n/a	100%	36.6	39.6	38.3 ^a	41.4 ^a	37.2
141	Warmley - 41 Deanery Road façade (dp)	Roadside	Diffusion Tube	n/a	100%	34.5	30.9	32.6	31.8	29.0
142	Warmley - 33 Deanery Road Warmley Court façade (dp)	Roadside	Diffusion Tube	n/a	100%	29.7	29.7	29.3	29.0	26.8
143	Warmley - 1 High Street Ideal Pharmacy façade (dp)	Roadside	Diffusion Tube	n/a	100%	26.1	25.6	27.1	25.1	23.1
144	Warmley - 8 Tower Road North façade (dp)	Roadside	Diffusion Tube	n/a	100%	26.6	26.5	25.7	25.3	22.9
145	Warmley - 1 London Road (Cycle Path)	Roadside	Diffusion Tube	n/a	92%	25.5	25.6	26.0	26.8	23.6
146	Kingswood - 34 Hill Street façade (dp)	Roadside	Diffusion Tube	n/a	100%	46.1	41.8	45.7	46.3	40.8
147A	Soundwell - 264 Soundwell Road façade (dp)	Roadside	Diffusion Tube	n/a	100%	40.6	38.7	39.9	37.3	33.9
147B	Soundwell - 264 Soundwell Road façade (dp)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	46.5 ^a	37.8	36.7

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Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
147C	Soundwell - 264 Soundwell Road façade (dp)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	46.6 ^a	39.4	35.5
148	Filton – 109 Gloucester Road North façade (dp)	Roadside	Diffusion Tube	n/a	100%	28.9	34.0	34.2	24.2	23.9
149	Filton – 707 Southmead Road façade (dp)	Roadside	Diffusion Tube	n/a	100%	30.4	29.4	31.3	26.9	27.8
150	Soundwell – 296 Soundwell Road façade (dp)	Roadside	Diffusion Tube	n/a	100%	30.9	29.4	32.7	26.1	26.3
151	Hambrook – Bristol Road Old Bakery FP signpost	Roadside	Diffusion Tube	n/a	100%	39.9	39.5	38.8	35.5	29.8
152	Bradley Stoke 188 Oaktree Crescent Ip49	Roadside	Diffusion Tube	n/a	92%	n/a	30.9 ^a	30.1	30.5	27.4
153	Bradley Stoke – 141 Wheatfield Drive (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	18.2	22.2	19.5	18.2
154	Bradley Stoke - 166 Ellan Hay Road (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	20.5	25.0	22.5	20.4
155	Stoke Gifford - 3 Earl Close (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	17.2	21.8	19.5	19.2
156	Stoke Gifford - Lancelot Road Ip1	Roadside	Diffusion Tube	n/a	100%	n/a	19.9	23.2	21.8	21.1
157	Hambrook - Bristol Road Poplars House (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	30.5 ^a	28.7	25.3	23.0
158	Downend - 5 Wick Wick Close (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	28.4 ^a	29.6	24.8	24.6
159	Wickwar - 21 High Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	27.2	26.7

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Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
160	Staple Hill - 62 High Street Ip10	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	30.9	29.3
161	Staple Hill - 13 Victoria Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	29.8	26.8
162	Staple Hill - 28 Victoria Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	25.7	25.5
163	Staple Hill - 2 Victoria Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	26.9	26.4
164	Staple Hill - 102 High Street Charlie & Co Barbers (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	28.3	28.2
165	Staple Hill - 3 Soundwell Rd Chinese Kitchen (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	36.3	38.6
166	Kingswood - 12 Cecil Road Ip9	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	27.9	28.8
167	Kingswood - 7 Downend Road Ip4	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	32.5	30.4
168	Kingswood - 133 High Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	29.4 ^a	28.1
169	Warmley - 20 Deanery Road Warmley Community Centre (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	36.9 ^a	29.0
170	Patchway - 204 Gloucester Road front façade	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	24.3 ^a	24.1
171	Soundwell - 225 Soundwell Rd (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	32.1 ^a	29.5

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
172	Downend - 31 Badminton Road Brownes (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	35.2 ^a	30.6
173	Mangotsfield - 10 Cossham Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	27.0 ^a	24.8
174	Charfield - 25 Wotton Road facade dp	Roadside	Diffusion Tube	100%	75%	n/a	n/a	n/a	n/a	18.0

☒ Diffusion tube data has been bias corrected

☒ Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40 µg/m³ are shown in **red bold**

Borderline results within 10% of NO₂ annual mean objective (>36 µg/m³) are shown in **blue bold italics**

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(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) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in 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 2014 – 2017 where full calendar year data capture <75%.

Figure A.1 Trends in Annual Mean NO2 Concentrations at automatic sites

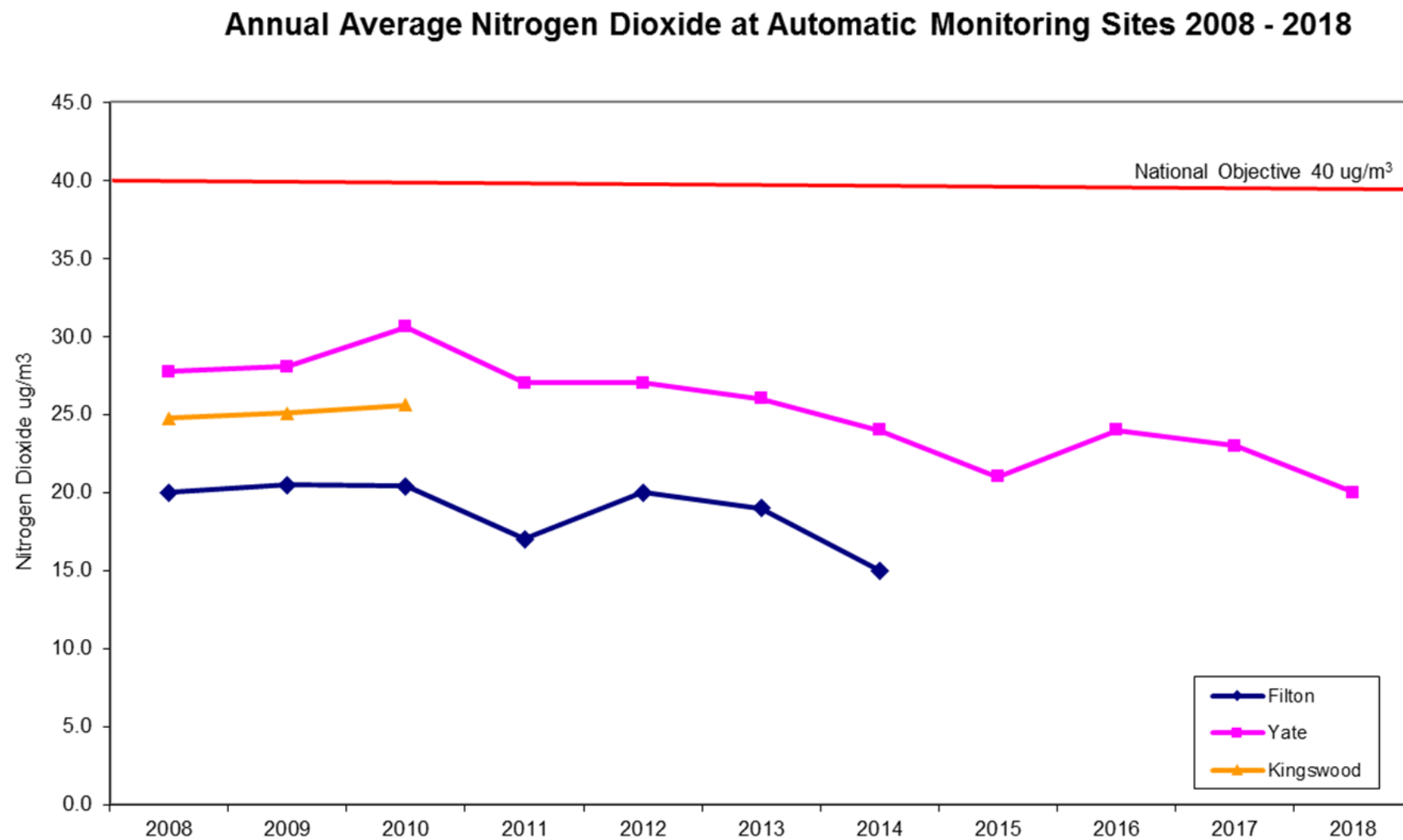


Table A.4 1-Hour Mean NO₂ Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
						2014	2015	2016	2017	2018
-	Yate Station Road	Roadside	Automatic	n/a	99.5%	0	0	0	0	0

Notes:

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 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%).

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

Table A.5 Annual Mean PM₁₀ Monitoring Results

Site ID	Site Name	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
-	Yate Station Road	Roadside	n/a	87.6%	15	15	14	14	13

☑ Annualisation has been conducted where data capture is <75%. However data capture has been above 75% for all years shown so it has not been necessary to annualise the data.

Notes:

Exceedances of the PM₁₀ annual mean objective of 40 µg/m³ 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%).

(3) All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, where valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.2 Trends in Annual Mean PM₁₀ Concentrations at Automatic sites

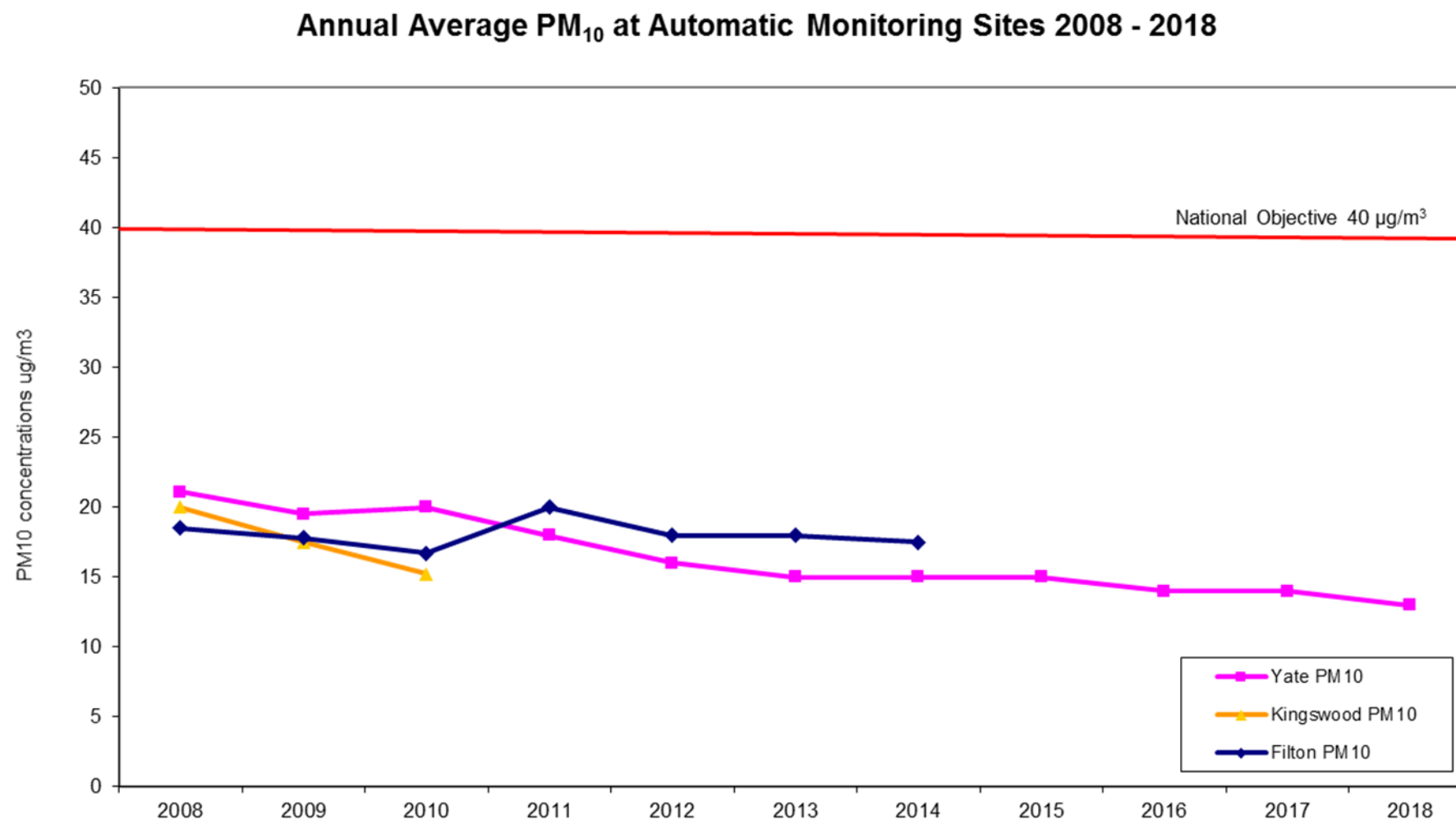


Table A.6 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Name	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
					2014	2015	2016	2017	2018
-	Yate Station Road	Roadside	n/a	87.6%	1	4	0	0	0

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 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%).

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

Table A.7 Kingswood - Warmley AQMA Annual Mean NO₂ Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
27	Kingswood - 90 Regent Street Nat West façade	Roadside	Diffusion Tube	n/a	100%	31.0	30.2	31.4	29.8	27.0
67	Kingswood - 40 Regent Street Thomas Cook façade	Roadside	Diffusion Tube	n/a	100%	40.2	38.1	40.7	37.9	34.0
68	Kingswood - 26-32 Regent Street Store Twenty One façade	Roadside	Diffusion Tube	n/a	83%	40.1	40.5	42.5	39.7	36.2
69	Kingswood - 12 Regent Street Domino's Pizza façade	Roadside	Diffusion Tube	n/a	83%	36.2	34.8	36.5	33.2	33.9
70	Kingswood - Two Mile Hill Road Job Centre Plus façade	Roadside	Diffusion Tube	n/a	100%	32.1	31.0	32.7	30.8	30.1
92	Kingswood - Regent Street Entertainment & Sports Club	Roadside	Diffusion Tube	n/a	100%	34.0	34.1	36.7	33.2	30.5
93	Kingswood - Hanham Road Exchange Court Flats	Roadside	Diffusion Tube	n/a	100%	29.5	29.2	31.1	26.7	26.6
95	Kingswood - 45 High Street Adam Lee	Roadside	Diffusion Tube	n/a	100%	34.5	34.3	39.6	36.6	37.8
96	Kingswood - 71 High Street Homeless Project	Roadside	Diffusion Tube	n/a	100%	36.0	34.2	37.0	35.0	31.3
98	Kingswood - High Street Sainsbury's Local façade	Roadside	Diffusion Tube	n/a	100%	37.1	37.0	35.3	34.8	32.2
116	Warmley - 14 High Street (former Webbs) Ip at façade	Roadside	Diffusion Tube	n/a	100%	40.8	42.9	40.2 ^a	39.7	38.3
137	Warmley - 35 High Street (Ip at façade)	Roadside	Diffusion Tube	n/a	100%	42.3	43.2	43.7	39.0	37.2

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Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
138	Warmley - 18 High Street façade (dp)	Roadside	Diffusion Tube	n/a	100%	39.2	37.5	37.3	36.3	33.7
139	Warmley - 14 High Street (former Webbs) façade (dp)	Roadside	Diffusion Tube	n/a	100%	36.6	39.6	38.3 ^a	41.4 ^a	37.2
141	Warmley - 41 Deanery Road façade (dp)	Roadside	Diffusion Tube	n/a	100%	34.5	30.9	32.6	31.8	29.0
142	Warmley - 33 Deanery Road Warmley Court façade (dp)	Roadside	Diffusion Tube	n/a	100%	29.7	29.7	29.3	29.0	26.8
143	Warmley - 1 High Street Ideal Pharmacy façade (dp)	Roadside	Diffusion Tube	n/a	100%	26.1	25.6	27.1	25.1	23.1
145	Warmley - 1 London Road (Cycle Path)	Roadside	Diffusion Tube	n/a	92%	25.5	25.6	26.0	26.8	23.6
146	Kingswood - 34 Hill Street façade (dp)	Roadside	Diffusion Tube	n/a	100%	46.1	41.8	45.7	46.3	40.8
168	Kingswood - 133 High Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	29.4 ^a	28.1
169	Warmley - 20 Deanery Road Warmley Community Centre (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	36.9 ^a	29.0

☒ Diffusion tube data has been bias corrected

☒ Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40 µg/m³ are shown in **red bold**

Borderline results within 10% of NO₂ annual mean objective (>36 µg/m³) are shown in **blue bold italics**

NO₂ annual means exceeding 60 µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(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) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in 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 2014 – 2017 where full calendar year data capture <75%).

Figure A.3 Trends in Annual Mean Nitrogen Dioxide Concentrations in Kingswood Section of Kingswood - Warmley AQMA

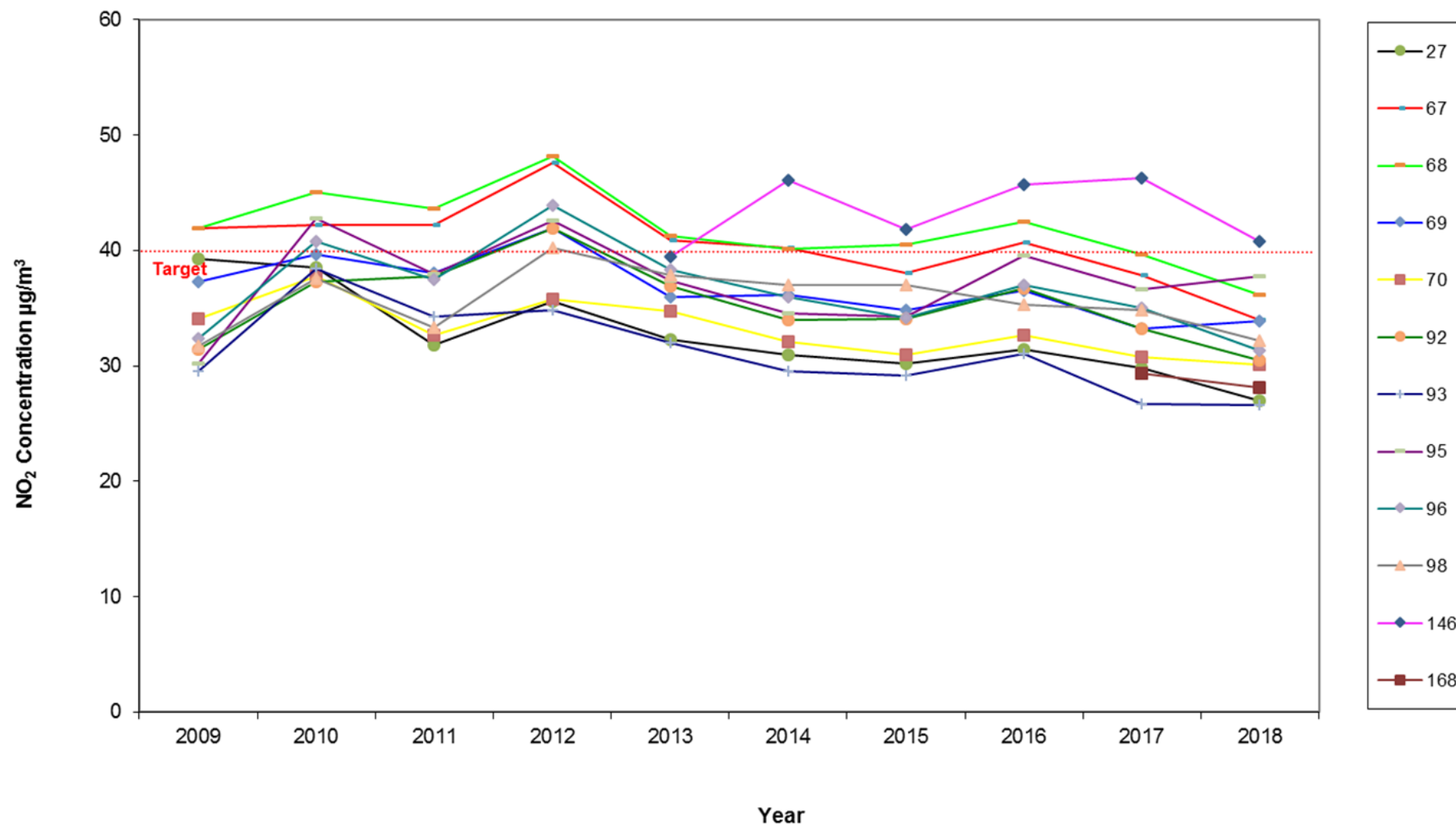


Figure A.4 Trends in Annual Mean Nitrogen Dioxide Concentrations in Warmley Section of Kingswood - Warmley AQMA

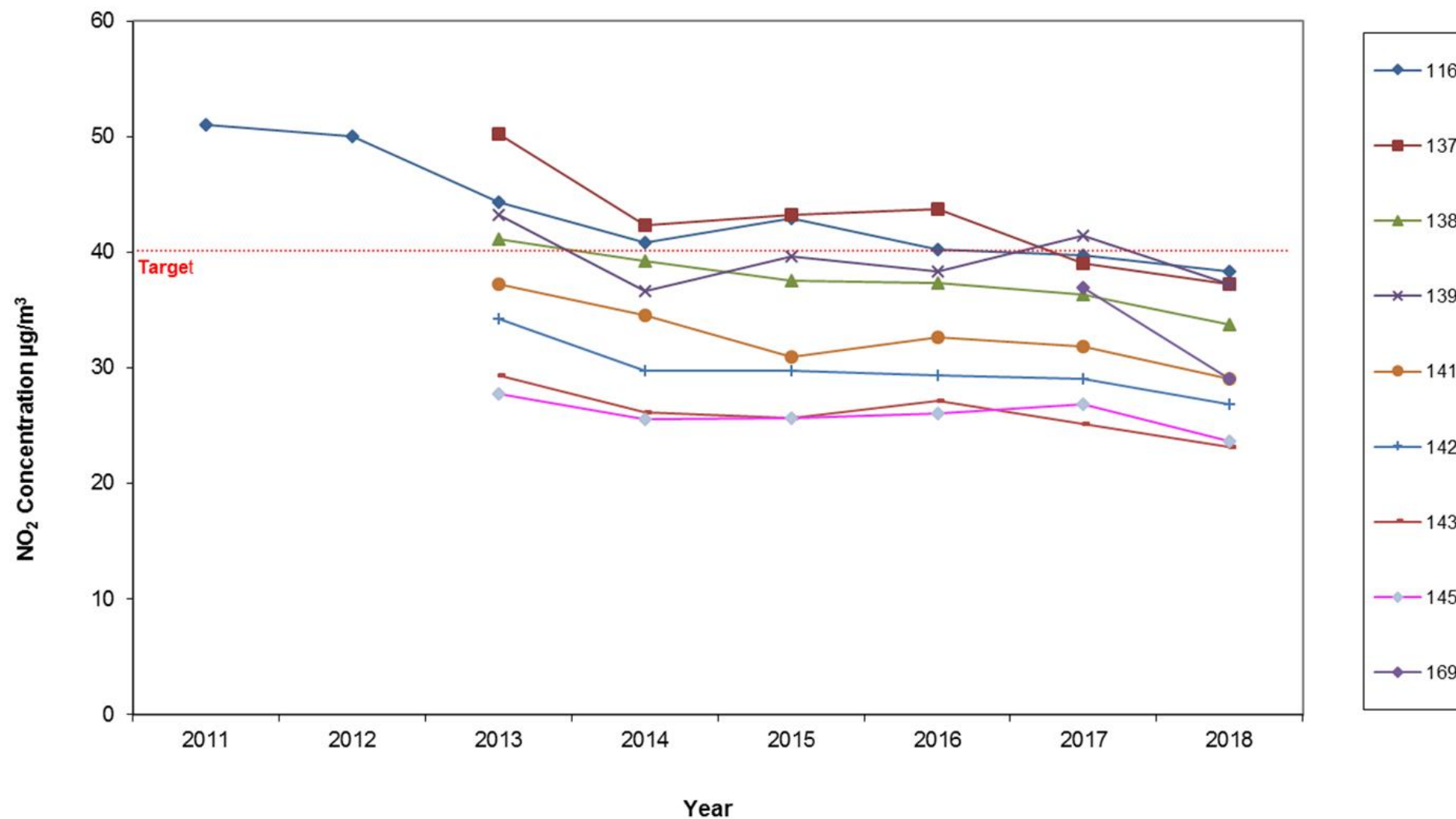


Table A.8 Staple Hill AQMA Annual Mean NO₂ Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
29	Staple Hill - 123 High Street Backhouse Bet	Roadside	Diffusion Tube	n/a	100%	35.2	31.2	36.2	30.9	28.1
61	Staple Hill Crossroads - 1 Broad Street William Hill	Roadside	Diffusion Tube	n/a	100%	41.5	39.4	41.5	39.2	37.8
62	Staple Hill Crossroads - 2 Broad Street 501 Bar façade	Roadside	Diffusion Tube	n/a	100%	36.0	36.4	39.2	34.6	33.6
71	Staple Hill - 11 The Square Bunch Florist	Roadside	Diffusion Tube	n/a	92%	24.7	23.6	26.1	24.6	21.5
72	Staple Hill - 25 Broad Street Westbury Inks	Roadside	Diffusion Tube	n/a	100%	31.9	32.2	36.2	31.1	28.1
73	Staple Hill - 11 Soundwell Road Starlight	Roadside	Diffusion Tube	n/a	100%	39.9	40.4	40.2	37.3	35.4
74	Staple Hill - 29-31 Soundwell Road opp Page Community Association	Roadside	Diffusion Tube	n/a	92%	28.1	28.5	30.9	27.1	27.0
75	Staple Hill - 118 High Street Lloyd Bottoms/Eclipse Sewing	Roadside	Diffusion Tube	n/a	100%	45.3	44.8	46.1	40.3	37.2
76	Staple Hill - 84-86 High Street Staple Hill Oak Pub façade	Roadside	Diffusion Tube	n/a	100%	36.2	34.9	36.9	32.9	29.3
78	Staple Hill - 9-11 Victoria Street	Roadside	Diffusion Tube	n/a	100%	43.3	41.5	44.9	39.0	35.4
79	Staple Hill - 27-29 Victoria Street	Roadside	Diffusion Tube	n/a	92%	37.5	37.5	37.2	34.7	34.1
102	Staple Hill - 58 High Street CBS Consultants	Roadside	Diffusion Tube	n/a	100%	39.8	38.4	40.7	37.2	32.4

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
						2014	2015	2016	2017	2018
105	Staple Hill - North Street lp outside no 2	Roadside	Diffusion Tube	n/a	100%	27.3	26.7	29.8	27.0	25.0
160	Staple Hill - 62 High Street lp10	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	30.9	29.3
161	Staple Hill - 13 Victoria Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	29.8	26.8
162	Staple Hill - 28 Victoria Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	25.7	25.5
163	Staple Hill - 2 Victoria Street (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	26.9	26.4
164	Staple Hill - 102 High Street Charlie & Co Barbers (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	28.3	28.2
165	Staple Hill - 3 Soundwell Rd Chinese Kitchen (façade)	Roadside	Diffusion Tube	n/a	100%	n/a	n/a	n/a	36.3	38.6

☒ Diffusion tube data has been bias corrected

☒ Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40 µg/m³ are shown in **red bold**

Borderline results within 10% of NO₂ annual mean objective (>36 µg/m³) are shown in **blue bold italics**

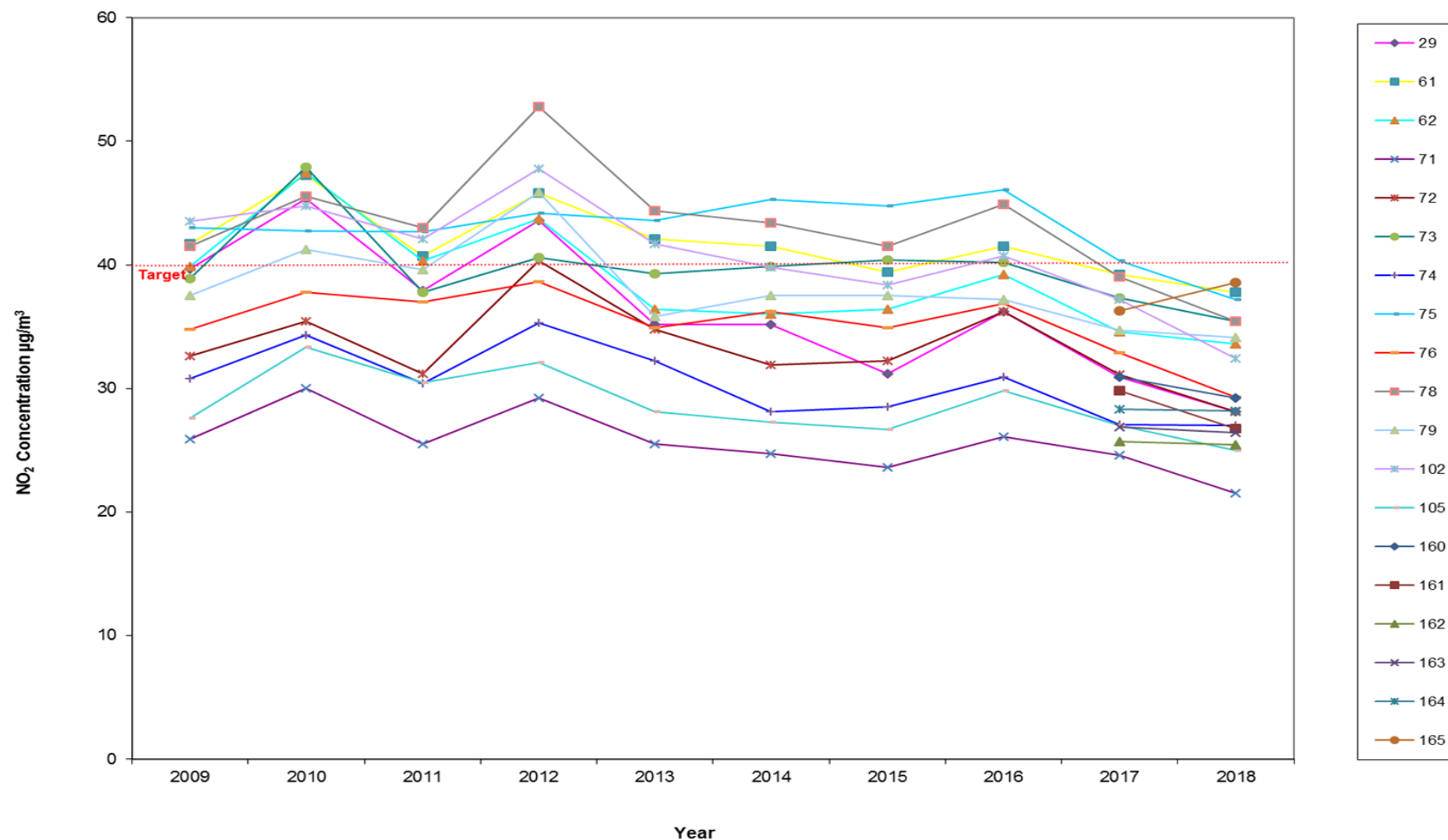
NO₂ annual means exceeding 60 µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(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) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in 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 2014 – 2017 where full calendar year data capture <75%).

Figure A.5 Trends in Annual Mean Nitrogen Dioxide Concentrations in Staple Hill AQMA



Estimated PM_{2.5} ConcentrationsTable A.9 Estimation of PM_{2.5} concentrations and % reductions

Year	Yate PM ₁₀ Annual Means ⁽¹⁾ (µg/m ³)	Yate Estimated PM _{2.5} Annual Means (PM ₁₀ x 0.7) ⁽²⁾ (µg/m ³)	Bristol St. Pauls (AURN) Monitored PM _{2.5} Annual Means ⁽³⁾ (µg/m ³)
2018	13	9.1	12
2017	14	9.8	10
2016	14	9.8	12
2015	15	10.5	10
2014	15	10.5	13
2013	15	10.5	13
2012	16	11.2	13
2011	18	12.6	15
2010	20	14	14
% Reduction 2010 -2018	35%	35%	14%

(1) As reported in Table A.5, Appendix A

(2) Estimated as per Technical Guidance LAQM TG16 Box 7.7

(3) Obtained from UK-AIR Data Archive Annual and Exceedance Statistics

<https://uk-air.defra.gov.uk/data/exceedance>

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 NO₂ Monthly Diffusion Tube Results – 2018

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
1	Yate – 88 Station Road The Candle	37.2	27.9	35.5	25.2	30.6	18.8	28.2	27.2	27.8	31.5	29.0	30.2	29.1	27.4	24.2
4A	Yate - Station Road Co-Location 1	23.7	20.2	27.0	20.6	18.4	9.3	18.6	19.5	21.2	24.3	26.3	27.1	21.3	20.1	n/a
4B	Yate - Station Road Co-location 2	27.9	19.0	23.4	19.3	18.5	10.8	19.0	20.1	21.4	24.1	23.0	28.0	21.2	19.9	n/a
4C	Yate - Station Road Co-location 3	28.6	19.3	29.3	19.5	18.9	11.4	19.2	19.4	20.3	24.1	24.7	26.9	21.8	20.5	n/a
10	Filton - 152 Gloucester Road North Pizza Bello façade	45.3	38.7	39.6	33.8	38.3	26.2	34.3		28.4	40.6	41.5	39.4	36.9	34.7	-
11	Thornbury – 48 High Street Uniq Family Wealth	27.2	26.1	25.1	23.3	23.8	18.6	27.0	23.6	26.5	31.0	30.3	32.2	26.2	24.7	20.5
12	Stoke Gifford - Church Road Rear of Aviva	36.8	33.3	33.7	23.3	31.8	22.8	26.9		25.4	33.6	30.2	26.6	29.5	27.7	n/a
13	Filton - MOD Roundabout	35.6	38.4	36.6	30.4	39.0	32.2	30.8	25.5	28.1	40.5	35.9	31.4	33.7	31.7	n/a
21	Downend – Boscombe Crescent St Augustines Church	22.9	19.5	21.0	15.9	11.2	10.0	11.8	11.1	12.0	17.8	17.2	19.6	15.8	14.9	n/a

South Gloucestershire Council

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised (¹)	Distance Corrected to Nearest Exposure (²)
22	Hanham – 44 High Street Lloyds Bank	31.0	29.1	28.5	31.9	32.1	21.8	30.7	26.7	25.1	31.7	36.2	36.8	30.1	28.3	n/a
27	Kingswood - 90 Regent Street Nat West façade	36.9	29.3	28.4	22.6	27.0	19.7	30.1	29.6	26.4	31.8	29.5	33.5	28.7	27.0	-
29	Staple Hill - 123 High Street Backhouse Bet	35.1	30.9	34.0	31.1	34.6	24.8	31.7	24.2	25.5	31.8	27.3	27.7	29.9	28.1	25.6
34	Bradley Stoke – 109 Ormonds Close M4 East of Almondsbury Interchange	34.9	32.8	34.9	23.7	29.7	24.4	21.2	20.8	23.9	29.2	28.3	29.0	27.7	26.1	25.0
35	Bradley Stoke - Woodlands Lane M4 East of Almondsbury Interchange (lp47)	31.4	35.0	33.5	27.4	28.5	24.7	23.7	20.1	23.8	33.5	29.7	27.3	28.2	26.5	24.1
36	Hambrook – Whiteshill M4 East of M32 Fairwater	22.9	23.0	19.0	18.9	17.3		19.2	19.9	15.3	22.3	20.8	21.2	20.0	18.8	n/r
37	Almondsbury - Old Aust Road M4 West of Almondsbury Interchange	31.2	34.4	37.8	26.6		36.0	29.9	23.3	25.0	34.9	42.8	37.8	32.7	30.7	n/a
38	Severn Beach – Ableton Lane Severn Beach Primary School	18.0	16.1	16.0	12.5	14.1	9.5	12.7	11.6	13.6		16.9	18.2	14.5	13.6	-
42	Little Stoke – 21 Braydon Ave	27.4	22.9	23.3	18.2	19.9		18.1	16.7	20.0	24.7			21.2	20.0	18.6
44	Stoke Gifford - Hatchet Road	34.5	34.4	37.5	28.7	30.1	23.6	32.0	27.9	32.8	36.3	35.4	38.0	32.6	30.6	24.5

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Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised (¹)	Distance Corrected to Nearest Exposure (²)
46	Winterbourne - High Street opp Winterbourne Academy	30.2	30.6	29.2	22.8	26.3	20.3	23.7	23.8	26.1	29.0	28.7	29.7	26.7	25.1	20.8
53	Hambrook – Bristol Road Rear of 17 Fenbrook Close	31.3	36.2	33.7	30.0	36.6	29.0	26.6	21.0	22.8	32.3	30.8	23.3	29.5	27.7	25.1
54	Longwell Green - A431 / Aldermoor Way	32.5	33.6	25.7	29.8	36.3	26.2	32.3	31.2	31.2	35.8		38.2	32.1	30.2	n/a
57	Coalpit Heath - Badminton Rd Frome Valley Kitchens	31.3	22.4	30.8	20.5	22.6	15.7	23.7	20.7	25.0	30.5	29.0	29.1	25.1	23.6	19.2
58	Longwell Green - Kingsfield Lane/ Aspects Leisure Site (lp6)	23.0	24.4	23.5	19.8	17.0		17.2	15.4	17.3	22.0			20.0	18.8	n/r
60	Downend - North Street Kustom Floors & Furniture	32.4	31.9	37.4	27.5	29.9	21.3	29.4	25.0		31.9	32.9	32.2	30.2	28.4	23.5
61	Staple Hill Crossroads - 1 Broad Street William Hill	46.4	44.8	39.0	44.2	45.2	31.4	43.0	37.9	35.3	38.8	36.9	39.1	40.2	37.8	36.0
62	Staple Hill Crossroads - 2 Broad Street 501 Bar façade	36.4	33.1	36.4	36.4	37.8	26.1	39.6	32.0	31.7	40.8	39.0	40.2	35.8	33.6	-
63	Patchway – 28 Park Leaze	23.7	26.1	24.8	21.5	23.6		22.0	20.0	19.2	25.3	26.4	26.8	23.6	22.2	22.0
67	Kingswood - 40 Regent Street Thomas Cook façade	43.6	36.5	41.3	29.7	34.8	21.3	38.3	36.1	33.5	36.9	36.3	45.1	36.1	34.0	-
68	Kingswood - 26-32 Regent Street Store Twenty One façade	46.6	35.6	40.2		36.2	25.0		38.1	34.7	42.5	43.5	43.0	38.5	36.2	-

South Gloucestershire Council

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised (¹)	Distance Corrected to Nearest Exposure (²)
69	Kingswood - 12 Regent Street Domino's Pizza façade	40.1	33.1			36.4	26.2	37.6	35.0	33.1	33.8	39.4	45.6	36.0	33.9	-
70	Kingswood - Two Mile Hill Road Job Centre Plus façade	38.2	31.8	37.9	30.0	32.8	21.7	30.7	26.1	27.8	36.1	36.0	34.7	32.0	30.1	-
71	Staple Hill - 11 The Square Bunch Florist	28.7	22.8	25.0	18.7	22.4	16.0		19.8	22.4	26.0	23.2	26.6	22.9	21.5	21.4
72	Staple Hill - 25 Broad Street Westbury Inks	36.9	30.3	33.7	25.4	29.4	21.0	30.1	27.8	25.9	33.7	26.8	37.2	29.8	28.1	23.9
73	Staple Hill - 11 Soundwell Road Starlight	42.9	41.3	43.5	35.9	43.5	28.1	37.6	30.1	33.6	42.9	33.9	38.4	37.7	35.4	30.8
74	Staple Hill - 29-31 Soundwell Road opp Page Comm Assoc	32.8	31.2		28.1	32.7	25.3	28.2	21.0	25.0	32.6	30.0	28.6	28.7	27.0	22.8
75	Staple Hill - 118 High Street Lloyd Bottoms/Eclipse Sewing	51.6	35.4	45.6	38.4	39.0	27.5	40.8	33.0	35.1	41.3	42.4	44.4	39.5	37.2	30.7
76	Staple Hill - 84-86 High Street Staple Hill Oak Pub façade	40.5	25.9	35.2	27.4	32.8	19.9	30.5	32.1	29.1	33.2	33.5	33.6	31.1	29.3	-
78	Staple Hill - 9-11 Victoria Street	42.9	37.1	40.3	34.4	36.9	21.1	38.3	35.9	38.8	45.7	38.9	41.2	37.6	35.4	29.7
79	Staple Hill - 27-29 Victoria Street	39.0	33.7	39.8	32.3	32.3		33.6	35.7	32.3	39.7	43.6	37.1	36.3	34.1	29.1
83	Chipping Sodbury – 51A Broad Street façade	24.8	23.4	29.6	23.1	25.0	18.4	22.5	18.5	20.5	26.0	21.4	26.0	23.3	21.9	-

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised (¹)	Distance Corrected to Nearest Exposure (²)
87A	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	29.8	24.9	29.3	26.4	23.1	19.3	22.1	19.5	25.5	26.3	35.3	33.1	26.2	24.7	-
87B	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	29.9	26.9	31.8	19.8	25.3	21.0	22.5	20.6	26.4	28.5	36.6	35.0	27.0	25.4	-
87C	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	33.4	26.9	32.4	24.0	18.5	17.5	23.5	21.7	26.7	27.7	38.7	34.6	27.1	25.5	-
92	Kingswood - Regent Street Entertainment & Sports Club	45.0	32.7	33.2	26.0	34.3	20.0	35.9	33.0	27.7	32.6	31.5	37.9	32.5	30.5	-
93	Kingswood - Hanham Road Exchange Court Flats	33.3	31.3	32.4	19.0	32.2	24.9	28.1	22.1	23.2	30.3	31.0	32.2	28.3	26.6	-
95	Kingswood - 45 High Street Adam Lee	51.5	41.4	32.8	32.5	46.0	34.8	44.5	42.1	40.5	45.9	34.2	36.1	40.2	37.8	-
96	Kingswood - 71 High Street Homeless Project	40.9	35.3	35.2	28.5	33.2	22.3	34.0	30.3	30.7	35.3	34.6	39.4	33.3	31.3	26.4
98	Kingswood - High Street Sainsbury's Local façade	40.6	31.6	34.9	32.0	34.3	24.8	35.3	30.2	30.9	37.6	37.5	40.9	34.2	32.2	-
101	Staple Hill - High Street lp outside Beech House	30.3	21.9	30.6	24.1	25.0	17.0	22.0	21.0	21.7	27.7	27.3	28.7	24.8	23.3	20.5
102	Staple Hill - 58 High Street CBS Consultants	39.1	31.6	41.1	32.7	39.5	24.4	36.2	34.9	30.6	34.2	32.3	37.1	34.5	32.4	-
105	Staple Hill - North Street lp outside no 2	35.0	25.1	29.4	26.0	20.1	16.5	24.7	22.9	23.8	31.5	32.4	32.3	26.6	25.0	23.3

South Gloucestershire Council

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised (¹)	Distance Corrected to Nearest Exposure (²)
106	Stoke Gifford - 73 Hambrook Lane façade	24.7	23.3	18.2	18.6	20.3	13.7	18.0	17.8	18.8	21.3	21.5	22.2	19.9	18.7	-
113	Patchway - 5 Falcon Close façade	29.7	28.0	27.5	29.5	33.0	21.7	36.1	30.4	28.3	33.5	22.7	27.0	28.9	27.2	-
114	Pilning - 23 Keens Grove façade	28.4	25.5	25.8	24.5	28.9	22.9	25.8	25.2	23.4	29.3	26.8	25.8	26.0	24.5	-
115	Pilning - 2 Wick Road façade	21.6	23.6	26.3	23.8	23.5	17.8	25.9	22.4	26.3	27.4	27.5	27.9	24.5	23.0	-
116	Warmley - 14 High Street (former Webbs) Ip at façade	51.1	39.0	37.6	38.9	39.6	31.1	43.7	39.5	35.9	43.3	43.5	46.0	40.8	38.3	-
117	Filton Northville - 29 Gloucester Road North Rowe Vets	31.0	36.8	33.4	29.9	35.0	21.2	32.9	28.9	29.2	36.7	32.0	32.1	31.6	29.7	27.3
118	Filton Northville - 19 Gloucester Road North Dental Lab	38.5	36.8	36.1	28.7	29.8	22.8	24.8	25.9	28.4	30.2			30.2	28.4	26.2
119	Filton - 137 Gloucester Road North	38.3	36.6	36.0	29.7	33.7	23.1	32.3	26.5	26.0	33.7	35.4	33.0	32.0	30.1	29.6
122	Filton - 549 Filton Avenue	39.2	34.8	35.0	28.3	29.4	26.7	24.6	24.4	26.9	31.5	37.4	32.4	30.9	29.0	26.2
123	Filton - 542 Filton Avenue Spar	36.3	37.1	35.1	28.0	33.5	29.7	25.0	25.1	29.0	35.7			31.4	29.6	26.4
124	Filton - 702a Filton Ave Way Ahead	36.1	43.2	39.0	28.2	37.1	34.0	26.4	22.8	26.6	38.7	43.0	33.0	34.0	32.0	26.3

South Gloucestershire Council

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised (¹)	Distance Corrected to Nearest Exposure (²)
125	Filton - 71 Station Road	36.5	30.9	31.8	24.3		16.4	20.3	22.3	25.4	34.1	38.4	33.0	28.5	26.8	22.0
128	Kingswood - 109 Downend Road	39.5	32.0	34.1	30.7	33.4	21.8	30.4		30.8	34.2	30.9	33.2	31.9	30.0	27.7
129	Cribbs Causeway – 1 Holly Cottages façade	29.0	30.0	33.3	30.4	38.1	28.3	30.6	27.3	26.6	30.9	27.4	33.3	30.4	28.6	-
130	Cribbs Causeway – 2 Mayfield Cottages façade	31.5	24.2	26.3	18.9	31.3	23.0	26.9	24.7	25.5	28.3	30.8	26.7	26.5	24.9	-
132	Hanham - 66 High St Sassy Hair Studio	34.6	31.5	28.7	28.2	32.8		29.7	26.1	26.7	29.4	36.5	32.4	30.6	28.8	28.1
133	Hambrook - 123 Old Gloucester Road façade (dp)	29.2	30.1	24.7	24.4	37.3	31.1	27.4	23.5	25.9	31.5	21.9	24.0	27.6	25.9	-
134	Hambrook – Bristol Road, Old Bakery façade (dp)	30.8	34.3	33.0	27.8	34.9	30.2	31.3	29.6	28.7	35.6	12.3	32.5	30.1	28.3	-
135	Frenchay – Harford Drive Dyrham Flats	31.1	32.3	20.5	22.3	34.0	24.2	26.0	19.9	21.9	28.4	24.3	21.9	25.6	24.0	23.7
136	Little Stoke – 26 Gipsy Patch Lane façade (dp)	27.7	28.2	21.7	22.2	22.9	15.7	20.9	18.9	18.8	26.6	25.5	23.6	22.7	21.4	-
137	Warmley - 35 High Street (lp at façade)	39.3	40.3	38.8	33.8	48.1	37.5	48.2	38.5	31.1	41.4	36.5	41.0	39.6	37.2	-
138	Warmley - 18 High Street façade (dp)	46.6	35.5	36.7	29.7	33.8	23.5	37.8	36.5	32.4	40.1	40.0	38.0	35.9	33.7	-

South Gloucestershire Council

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised (¹)	Distance Corrected to Nearest Exposure (²)
139	Warmley - 14 High Street (former Webbs) façade (dp)	49.1	38.3	39.9	39.4	43.5	28.3	44.5	39.3	38.7	33.5	37.4	42.9	39.6	37.2	-
141	Warmley - 41 Deanery Road façade (dp)	40.0	32.7	32.2	30.3	27.4	19.4	32.3	30.6	29.2	32.5	30.0	33.6	30.9	29.0	-
142	Warmley - 33 Deanery Road Warmley Court façade (dp)	38.2	31.3	27.8	29.1	26.5	13.7	28.6	28.0	27.4	32.2	30.9	28.9	28.5	26.8	-
143	Warmley - 1 High Street Ideal Pharmacy façade (dp)	26.0	27.0	26.3	25.0	23.0	16.7	23.5	22.6	23.3	28.2	26.0	27.4	24.6	23.1	-
144	Warmley - 8 Tower Road North façade (dp)	29.8	24.7	23.5	21.7	23.9	15.3	24.4	23.0	23.1	27.9	26.6	28.0	24.3	22.9	-
145	Warmley - 1 London Road (Cycle Path)	31.9	27.4	27.3	25.3		18.2	24.1	22.9	20.6	26.2	24.3	28.1	25.1	23.6	24.2
146	Kingswood - 34 Hill St façade (dp)	54.7	40.8	36.6	41.7	43.2	28.4	45.3	42.2	41.2	45.6	50.2	50.7	43.4	40.8	-
147A	Soundwell - 264 Soundwell Rd façade (dp)	39.2	36.1	38.9	32.7	40.1	24.7	41.4	32.8	36.6	36.1	36.4	37.4	36.0	33.9	-
147B	Soundwell - 264 Soundwell Rd façade (dp)	38.9	38.0	39.4	34.8	41.5	30.3	44.4	38.0	38.6	44.7	40.0	39.7	39.0	36.7	-
147C	Soundwell - 264 Soundwell Rd façade (dp)	42.1	37.0	38.3	37.6	43.1	24.3	44.9	34.6	37.3	42.2	35.6	35.7	37.7	35.5	-
148	Filton – 109 Gloucester Road North façade (dp)	27.9	32.6	29.2	22.0	29.2	24.8	21.2	17.2	20.1	28.9	27.4	24.1	25.4	23.9	-

South Gloucestershire Council

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised (¹)	Distance Corrected to Nearest Exposure (²)
149	Filton – 707 Southmead Road façade (dp)	31.2	34.8	37.0	27.6	33.3	26.8	25.6	22.3	24.3	31.7	33.1	27.5	29.6	27.8	-
150	Soundwell – 296 Soundwell Road façade (dp)	28.8	30.3	29.7	29.1	30.7	25.7	26.2	20.6	23.8	31.6	29.4	30.0	28.0	26.3	-
151	Hambrook – Bristol Road Old Bakery FP signpost	36.6	34.2	32.5	29.3	30.7	26.8	32.6	30.4	29.7	36.1	29.4	32.4	31.7	29.8	-
152	Bradley Stoke -188 Oaktree Crescent Ip49	36.6	32.3	31.1	27.1	33.6	25.3		23.7	26.9	21.6	32.6	30.1	29.2	27.4	27.5
153	Bradley Stoke -141 Wheatfield Drive (façade)	22.7	23.0	22.8	16.3	19.3	12.2	15.6	13.9	18.1	21.5	23.8	22.8	19.3	18.2	-
154	Bradley Stoke - 166 Ellan Hay Road (façade)	27.0	19.9	24.3	20.3	19.0	13.4	18.7	18.5	20.4	26.6	27.3	24.6	21.7	20.4	-
155	Stoke Gifford - 3 Earl Close (façade)	26.3	22.3	22.4	17.8	19.2	12.6	16.1	16.5	18.3	25.7	23.0	25.2	20.5	19.2	-
156	Stoke Gifford - Lancelot Road Ip1	27.3	25.5	26.1	19.1	21.7	14.4	16.1	16.2	19.0	28.4	30.9	24.8	22.5	21.1	18.9
157	Hambrook - Bristol Road Poplars House (façade)	30.1	26.4	25.3	21.0	24.4	15.5	23.5	24.0	24.7	26.5	25.7	26.6	24.5	23.0	-
158	Downend - 5 Wick Wick Close (façade)	24.5	28.6	28.8	21.9	31.1	26.4	27.6	21.4	24.9	30.5	25.0	22.9	26.1	24.6	-
159	Wickwar - 21 High Street (façade)	30.9	30.8	28.0	25.5	35.6	22.6	30.6	22.7	23.5	32.1	28.9	29.6	28.4	26.7	-

South Gloucestershire Council

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised (¹)	Distance Corrected to Nearest Exposure (²)
160	Staple Hill - 62 High Street Ip10	39.3	25.8	40.0	28.7	30.7	20.2	30.2	28.5	27.3	32.5	33.0	37.2	31.1	29.3	28.7
161	Staple Hill - 13 Victoria Street (façade)	35.9	29.6	32.0	27.2	27.4	16.1	30.8	28.8	21.7	31.7	31.0	29.4	28.5	26.8	-
162	Staple Hill - 28 Victoria Street (façade)	29.0	27.4	32.1	23.3	27.1	21.6	24.4	21.1	22.3	30.6	33.0	33.0	27.1	25.5	-
163	Staple Hill - 2 Victoria Street (façade)	34.0	29.8	32.2	24.0	27.9	19.3	27.1	23.9	26.8	32.1	30.6	29.8	28.1	26.4	-
164	Staple Hill - 102 High Street Charlie & Co Barbers (façade)	37.4	28.9	33.6	29.7	31.0	17.1	28.2	28.6	23.9	33.2	34.6	33.5	30.0	28.2	-
165	Staple Hill - 3 Soundwell Rd Chinese Kitchen (façade)	44.0	42.7	44.2	41.9	48.9	36.8	40.3	30.4	32.6	45.4	45.5	39.9	41.0	38.6	-
166	Kingswood - 12 Cecil Road Ip9	42.2	28.1	33.5	29.2	29.7	18.2	30.2	29.2	27.5	32.9	32.0	34.5	30.6	28.8	26.3
167	Kingswood - 7 Downend Road Ip4	39.3	30.1	36.0	33.0	28.1	18.1	34.6	32.0	28.6	37.2	34.0	37.2	32.3	30.4	27.5
168	Kingswood - 133 High Street (façade)	38.7	27.2	30.2	26.5	36.0	26.2	31.8	23.8	26.9	31.2	30.8	29.7	29.9	28.1	-
169	Warmley - 20 Deanery Road Warmley Community Centre (façade)	43.6	32.6	27.1	28.6	31.4	24.0	34.0	31.9	29.6	31.6	28.6	26.6	30.8	29.0	-

Site ID	Site Name	NO ₂ Mean Concentrations (µg/m ³)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.94) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
170	Patchway - 204 Gloucester Road front façade	26.7	27.1	26.3	25.4	28.6	22.2	23.1	19.6	21.1	32.0	28.4	27.8	25.7	24.1	-
171	Soundwell - 225 Soundwell Rd (façade)	36.7	32.3	34.2	26.1	35.0	20.9	32.2	26.9	30.4	36.8	32.1	33.2	31.4	29.5	-
172	Downend - 31 Badminton Road Brownes (façade)	38.4	33.0	35.1	28.2	34.1	20.5	33.0	34.0	33.8	34.8	29.7	36.2	32.6	30.6	-
173	Mangotsfield - 10 Cossham Street (façade)	33.1	24.6	34.9	25.9	25.0	18.3	22.8	20.6	23.6	28.2	30.8	28.6	26.4	24.8	-
174	Charfield - 25 Wotton Road facade dp	N/O	N/O	N/O	19.9	21.0	15.0	18.7	17.2	16.7	23.1	19.5	21.3	19.2	18.0	-

☒ Local bias adjustment factor used

☐ National bias adjustment factor used

☒ Annualisation has been conducted where data capture is <75% (NB: No sites <75% data capture in 2018)

☒ Where applicable, data has been distance corrected for relevant exposure

Notes:

Exceedances of the NO₂ annual mean objective of 40 µg/m³ are show in **red bold**

Borderline results within 10% of NO₂ annual mean objective (>36 µg/m³) are shown in **blue bold italics**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure (- where monitoring location at façade of relevant exposure so distance correction not required; n/a where not applicable as no relevant exposure; n/r (no result) where distance adjustment could not be calculated (see Appendix C)

N/O Not operational

Appendix C: Air Quality Monitoring Data QA/QC

QA/QC of Diffusion Tube Monitoring

In 2018, the diffusion tubes were prepared and analysed by Gradko, as in 2017, following a change from Somerset County Council Scientific Services for the period 2012 - 2016. The tubes are prepared by Gradko using 20% triethanolamine (TEA) in water. Gradko are UKAS accredited for diffusion tube analysis and the laboratory participates in the AIR-NO₂ Proficiency Testing (PT) scheme for which the results were 100% satisfactory in 2018⁵¹.

The tube changing frequency is in line with the calendar of suggested exposure periods for 2018⁵² and is carried out by South Gloucestershire Council officers.

Data Ratification and Bias Adjustment

The diffusion tube results are examined on a monthly basis to identify any spurious data and any suspect data is investigated further. Trends in monitored levels across the diffusion tube sites are compared to take into account seasonal factors, such as changing weather patterns and increased traffic flows, and to detect any local changes at the sites, such as road works. The monthly raw data is then averaged for the calendar year to give an annual mean.

While diffusion tubes provide a simple, cost-effective way of monitoring a wide range of locations, the accuracy of the tubes can be variable depending on the laboratory preparation, handling and analysis. To overcome this, a Bias Adjustment Factor, is applied to the raw mean for the relevant monitoring period. This factor is calculated from monitoring sites where triplicate diffusion tubes are co-located with an automatic NO_x analyser by comparing results of the two measurement methods.

Diffusion Tube Bias Adjustment Factors

National Bias Adjustment Factor

During 2018, the Council operated a co-location study at the Yate automatic monitoring site and the study was included in the national bias adjustment factors database provided by the LAQM Helpdesk. Combined bias adjustment factors from

⁵¹ <https://laqm.defra.gov.uk/assets/laqmno2performancedatauptofebruary2019v1.pdf>

⁵² <https://laqm.defra.gov.uk/assets/dttimetable2018v1.pdf>

the local authority co-location studies are calculated for each laboratory that analyse diffusion tubes⁵³.

The 2018 national bias-adjustment factor for Gradko obtained at the time the data was compiled for this report was 0.93 (spreadsheet version 03/19).

The Summary of Precision Results for NO₂ Diffusion Tube Co-location Studies, by Laboratory⁵⁴ show Gradko to have good tube precision (the ability for a measurement to be consistently reproduced) in 2018.

Local Bias Adjustment Factor

The precision and accuracy spreadsheet available on the LAQM Tools Defra webpage⁵⁵ was used to compare the triplicate co-located diffusion tubes with the automatic monitor in Yate and calculate a local bias adjustment factor for 2018 of 0.94 as shown in Figure C.1.

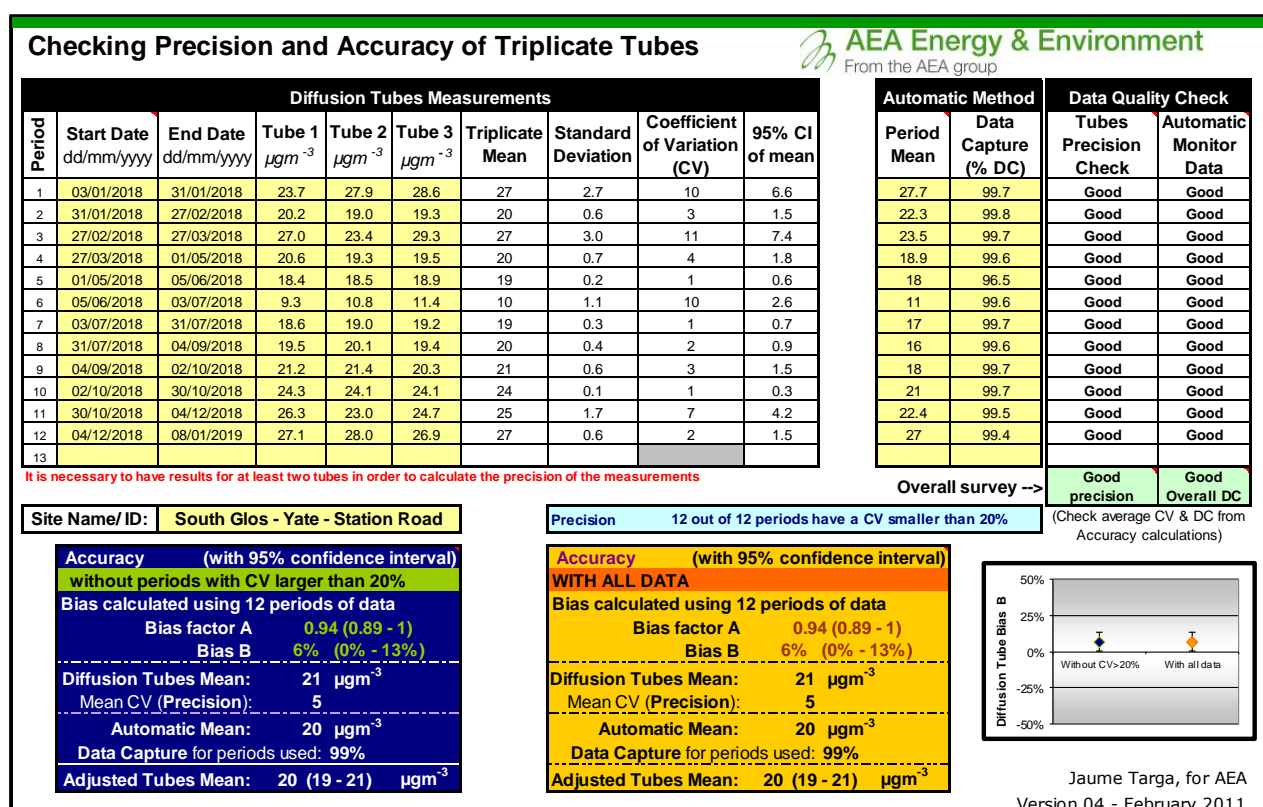


Figure C.1 2018 Precision and Accuracy spreadsheet for Yate Co-location Study

⁵³ <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

⁵⁴ <https://laqm.defra.gov.uk/diffusion-tubes/precision.html>

⁵⁵ <http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html>

Discussion of Choice of Factor to Use

For 2018, the national bias adjustment factor (0.93) and local bias adjustment factor (0.94) compare well, with the local bias adjustment factor being slightly more conservative.

Guidance on the choice of bias adjustment factor is included in LAQM TG16 Box 7.11. Having considered this guidance, it was decided it would be more robust and precautionary to use the local bias adjustment factor of 0.94 as this would give the worse-case annual means.

Short-term to Long-term Data adjustment

In 2018, data capture was equal to or greater than 75% at all monitoring sites so short term to long term data adjustment (annualisation) was not required.

Where monthly results are not shown in Table B.1, this is due to a combination of missing or compromised tubes and/or monitoring ceasing towards the end of 2018. However, as the data capture overall for 2018 was not less than 75% annualisation was not necessary as detailed in LAQM TG16.

Distance Adjustment to façade

It is not always possible to locate diffusion tubes on building facades representing worst case exposure. However, nitrogen dioxide concentrations fall off rapidly with increasing distance from the roadside so where the monitoring location is closer to the road than a location of relevant exposure, the NO₂ concentration can be estimated at the nearest location of relevant exposure using the NO₂ fall-off with distance calculator⁵⁶ on the LAQM Tools Defra webpage. Distance correction of results to the façade is particularly important for monitoring sites where exceedances or borderline NO₂ concentrations (i.e. within 10% of the objective), have been recorded.

In 2018, the only exceeding monitoring site (site 146) is located at façade so does not require distance adjusting. There were two borderline monitoring sites (sites 61 & 75) where relevant exposure is set back from the monitoring site. Both of these sites are located within the Staple Hill AQMA. The results have been distance corrected to

⁵⁶ <https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>

the façade of the nearest relevant receptor using the NO₂ fall-off with distance calculator and the data and results from the calculator are presented in Table C.1.

When the results are adjusted for distance, only site 61 remains borderline with an estimated concentration of 36.0 µg/m³. It should also be noted there is no relevant exposure at ground floor level in relation to either site 61 or 75 and concentrations at higher floors would be further reduced.

The distance adjusted results were also calculated in the same way for the other monitoring sites where monitoring is not directly at a location of relevant exposure (i.e. façade) and are reported in Table B.1 in Appendix B, apart from site 36, where the measured annual mean NO₂ concentration (18.8 µg/m³) was less than the local annual mean background NO₂ concentration (21.0 µg/m³) and site 58, where the receptor is more than 50m away from the kerb so the distance calculator could not estimate the concentrations.

Table C.1 Adjustment of Annual Mean NO₂ at “borderline” sites to nearest façade

Site No.	Site Name	Monitor distance to kerb (m)	Receptor distance to kerb (m)	Background NO ₂ 2018 (µg/m ³)	Annual mean concentrations 2018 (µg/m ³) adjusted for bias	Adjusted to façade (µg/m ³)
61	Staple Hill Crossroads – 1 Broad Street William Hill	2.3	3.25	16.7	37.8	36.0
75	Staple Hill – 118 High Street Lloyd Bottoms/Eclipse Sewing	0.5	3.0	16.7	37.2	30.7

Notes:

Exceedances of the NO₂ annual mean objective of 40 µg/m³ are shown in **red bold**

Borderline results within 10% of NO₂ annual mean objective (>36 µg/m³) are shown in **blue bold italics**

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
- Four-weekly 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, detect equipment malfunction and to change inlet filters
- Repairs as required and planned six monthly servicing and re-calibration of the analysers by EnviroTechnology 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 sheets 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 NO₂ 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

Raw data from the Yate analysers is 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 Opsi EnviMan software. The data from the analysers is visually screened regularly in-house using EnviMan ComVisioner to check for obvious erroneous data and equipment faults.

The data is also collected by Air Quality Data Management (AQDM). AQDM then undertakes 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.

PM₁₀ Monitoring Adjustment

The PM₁₀ data measured by the Beta Attenuation Monitor (BAM) at the Yate automatic monitoring site have been adjusted to gravimetric equivalent by using a factor of 0.833.

Appendix D: Supporting Technical Information

Monitoring Review in Staple Hill AQMA

The monitoring site locations in the Staple Hill AQMA were reviewed in 2017, as while the results from the existing monitoring sites can be distance adjusted to the façade using the “Nitrogen dioxide fall off with distance” calculator⁵⁷ where relevant exposure is set back from the site, the calculator has some uncertainty and provides an estimated concentration only, so diffusion tubes should ideally be located at relevant receptor façades.

Six additional monitoring sites (160 – 165) were set up at façade to better represent relevant exposure and monitor in the potential worse case locations, where this was possible bearing in mind there are many commercial/retail premises within the AQMA. Existing monitoring sites in similar locations but closer to the roadside, were retained for initial comparison. A map showing the location of the diffusion tube monitoring sites is provided in Figure E.10 (Appendix E).

The 2018 results from the established sites closer to the road, the distanced adjusted results for these sites and the new sites at nearby worse-case façades of relevant exposure are shown in Table D.1 and discussed below.

Site 160 was set up adjacent to a façade of relevant exposure at ground floor to better represent relevant exposure in a worse-case location near the High Street, Pendennis Road, Acacia Road crossroads because there is no ground floor relevant exposure at existing site 102 at this junction, although there is relevant exposure at first floor. While the result for site 160 also requires distance adjustment to correct for the small distance the tube is located away from the façade on a lamp post, the result (28.7 $\mu\text{g}/\text{m}^3$) compares reasonably well to that at site 102 (32.4 $\mu\text{g}/\text{m}^3$), considering site 102 is located closer to the crossroad junction, and neither site was borderline (i.e. within 10% of the objective).

On Victoria Street, sites 161 and 162 were set up at façades of relevant exposure in effect to eventually replace site 78 and site 79 respectively, which are closer to the roadside. The monitored concentration at site 161 was 26.8 $\mu\text{g}/\text{m}^3$ compares reasonably well to the distance adjusted result of 29.7 $\mu\text{g}/\text{m}^3$ for site 78, with the

⁵⁷ <http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>

distance adjusted result showing a conservative higher estimate. Site 162 is on the opposite side of the road to site 79 but is located in a worse case location on the side of the road where traffic can queue up to the Broad Street/ High Street/ Soundwell Road/Victoria Street crossroads. Although not directly comparable as the monitoring sites are on opposite sides of the road, the results for both sites are well below the objective with a monitoring result of $25.5 \mu\text{g}/\text{m}^3$ at site 162 and the distance adjusted result of $29.1 \mu\text{g}/\text{m}^3$ for site 79.

Site 163 was set up on the same side of Victoria Street as site 162 at the façade of the property closest to the crossroads in a worse-case location of relevant exposure, because at the closest existing site (61) around the corner on Broad Street, there is no relevant exposure at ground floor or first floor as it is single storey. Although not strictly comparable locations, the monitored concentration at site 163 ($26.4 \mu\text{g}/\text{m}^3$) was well below the objective, and site 61 remained just borderline ($36.0 \mu\text{g}/\text{m}^3$) on distance adjustment but with no relevant exposure.

Site 164 was set up at façade slightly further west along High Street (B4465) than the existing site 75 located closer to the roadside, which pre-2018 consistently exceeded the objective. The monitored concentration at site 164 was $28.2 \mu\text{g}/\text{m}^3$ and compares reasonably to distance adjusted result for site 75 ($30.7 \mu\text{g}/\text{m}^3$). However site 164 is more representative of where there is likely to be relevant exposure, being at façade, although it should be noted that there is no relevant exposure at ground floor level in relation to site 75 or 164 as the premises are commercial/retail premises, however there is relevant exposure at first floor level in respect of site 164.

Site 165 was set up at façade on Soundwell Road within the narrow street canyon section closer to the Broad Street/High Street/Soundwell Road/Victoria Street crossroads than the existing site 73. 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. The results show the monitoring better represents a worse-case location with a borderline concentration of $38.6 \mu\text{g}/\text{m}^3$ at site 165, compared to the distance adjusted result at site 73 of $30.8 \mu\text{g}/\text{m}^3$ and where concentrations at higher floors would be further reduced.

As discussed in Chapter 3, there were only two sites in 2018 that were borderline within the AQMA; site 165, a new sites set up at worst-case façade and site 61, an existing site which remained (just) borderline following distance adjustment.

Defra advice is that AQMAs should remain in place until several years of data below 10% of the objective (i.e. $36 \mu\text{g}/\text{m}^3$) is collected which can support revocation, as annual mean pollutant concentrations can vary from year to year due to a number of factors, most notably meteorological conditions.

Therefore, monitoring will continue and the situation reviewed before revocation of the AQMA can be considered. However, while existing monitoring sites close to the road were retained for initial comparison purposes, where these sites have effectively been replaced with new monitoring sites located at worse case facades of relevant exposure, the existing sites will cease operating at the end of 2019. This ensures the monitoring network remains fit for purpose and allows monitoring to be deployed elsewhere as necessary.

Table D.1 Comparison of Staple Hill AQMA monitoring sites at roadside and façade of the nearest receptors

Site No.	Site Name (Existing Sites close to roadside)	Annual mean concentrations 2018 ($\mu\text{g}/\text{m}^3$) adjusted for bias	Adjusted to façade ($\mu\text{g}/\text{m}^3$)	Site No. (comparison new site at façade)	Site Name	Annual mean concentrations 2018 ($\mu\text{g}/\text{m}^3$) adjusted for bias	Adjusted to façade ($\mu\text{g}/\text{m}^3$)
61	Staple Hill Crossroads – 1 Broad Street William Hill	37.8	36.0	163	Staple Hill - 2 Victoria Street (façade)	26.4	-
73	Staple Hill – 11 Soundwell Road Starlight	35.4	30.8	165	Staple Hill - 3 Soundwell Rd Chinese Kitchen (façade)	38.6	-
75	Staple Hill – 118 High Street Lloyd Bottoms/Eclipse Sewing	37.2	30.7	164	Staple Hill - 102 High Street Charlie & Co Barbers (façade)	28.2	-
78	Staple Hill – 9-11 Victoria Street	35.4	29.7	161	Staple Hill - 13 Victoria Street (façade)	26.8	-
79	Staple Hill - 27-29 Victoria Street	34.1	29.1	162	Staple Hill - 28 Victoria Street (façade)	25.5	-
102	Staple Hill - 58 High Street CBS Consultants (TL adj to façade)	32.4	-	160	Staple Hill - 62 High Street lp10 adjacent to façade	29.3	28.7

Notes:

Exceedances of the NO₂ annual mean objective of 40 $\mu\text{g}/\text{m}^3$ are show in **red bold**

Borderline results within 10% of NO₂ annual mean objective (>36 $\mu\text{g}/\text{m}^3$) are shown in **blue bold italics**

Revocation of Cribbs Causeway AQMA

Background

The Cribbs Causeway AQMA was declared in April 2010 adjacent to the M5 Junction 17 roundabout following a detailed assessment⁵⁸. A map of AQMA is provided in Figure E.1 in Appendix E.

The AQMA was declared on the basis of exceeding distance adjusted results from roadside monitoring sites 80 and 81. Following the declaration, a further assessment of air quality within the AQMA was undertaken. As part of this, a monitoring site (87) was set up at the façade of the single residential property within the AQMA and the roadside sites (80 and 81) ceased operation.

The Further Assessment Report 2011 concluded the 2010 nitrogen dioxide concentration ($33.0 \mu\text{g}/\text{m}^3$) at site 87 was below the annual mean objective, indicating the AQMA may not be required. As a precaution, the recommendation was made to continue monitoring and review the 2011 results. If these were also below the objective, it might then be appropriate to revoke the AQMA.

The 2011 result ($34.0 \mu\text{g}/\text{m}^3$) also showed the annual mean nitrogen dioxide concentration at site 87 was below the objective. Revocation of the AQMA was proposed in the 2012 Updating and Screening Assessment, however, the Defra appraisal of the report recommended the AQMA be retained pending further monitoring results, as while 2010 and 2011 results were below the objective, pollutant concentrations can vary significantly from one year to another.

The Council accepted the recommendation to retain the AQMA and review further monitoring results. Triplicate diffusion tube monitoring, which is considered to be more robust, was set up at the façade of the single property within the AQMA in 2013. The average of the triplicate monitored concentrations in 2013 was $32.3 \mu\text{g}/\text{m}^3$, in 2014, $34.5 \mu\text{g}/\text{m}^3$ and in 2015, $28.9 \mu\text{g}/\text{m}^3$. Works completed at the M5 junction 17 in 2015/16 following Local Pinch Point Funding secured in 2013 to manage the impact of planned development in the Cribbs Causeway/Patchway area and reduce congestion, is likely to have contributed to the significant decrease in concentrations in 2015.

⁵⁸ <https://www.southglos.gov.uk/documents/cos090126.pdf>

In 2016, the data capture for the triplicate tubes was 67% so the data was annualised in line with LAQM TG16. The average of the annualised triplicate results was 29.1 $\mu\text{g}/\text{m}^3$, similar to that in 2015. In 2017, the average of the triplicate results was 27.0 $\mu\text{g}/\text{m}^3$, a decrease of 2.1 $\mu\text{g}/\text{m}^3$ in comparison to the 2016 result.

In 2018, the precision between the triplicate results was checked as in previous years using the precision and accuracy LAQM spreadsheet tool⁵⁹ and the precision was shown to be good. The declining trend in concentrations continued as the average of the triplicate results was 25.2 $\mu\text{g}/\text{m}^3$, a decrease of 1.8 $\mu\text{g}/\text{m}^3$ when compared to the 2017 result. The results of the triplicate monitoring at site 87 undertaken since 2013 are shown in Table D.2.

Table D.2 Triplicate Monitoring Results in the Cribbs Causeway AQMA

Site ID	Site Name	NO ₂ Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) ⁽¹⁾					
		2013	2014	2015	2016	2017	2018
87A	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	32.7	34.9	28.4	28.3 ^a	26.6	24.7
87B	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	32.2	34.3	28.7	29.9 ^a	27.2	25.4
87C	Cribbs Causeway – Blackhorse Hill Hollywood Cottage façade	32.1	34.3	29.5	29.3 ^a	27.2	25.5
Triplicate Average		32.3	34.5	28.9	29.1^a	27.0	25.2

⁽¹⁾ Means for diffusion tubes have been corrected for bias⁶⁰

^a Annualisation has been conducted where data capture is <75% as per Boxes 7.9 and 7.10 in LAQM.TG16⁶¹.

Revocation

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 $\mu\text{g}/\text{m}^3$) and also the precautionary “borderline” level (36 $\mu\text{g}/\text{m}^3$). This demonstrates sustained compliance with the objective where there is relevant exposure for nine years (2010 – 2018 inclusive).

Revocation of the AQMA was proposed in the 2017 ASR following Defra’s recommendation that revocation should be considered and Council Cabinet

⁵⁹ <http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html>

⁶⁰ <https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html>

⁶¹ <https://laqm.defra.gov.uk/technical-guidance/>

members subsequently approved the revocation in 2018 based on the evidence. There is a requirement in the Environment Act 1995 to consult on the revocation of an AQMA and a consultation was carried out between 30 January and 20 March 2019.

The consultation methodology consisted of a dedicated consultation webpage with an online survey and paper survey to download. Letters were sent out to all addresses within a 250 metre buffer zone around the AQMA and information was sent to Town and Parish Councils, South Gloucestershire councillors, local voluntary and community organisations and also to a range of other stakeholders and interested parties. The full consultation methodology is provided in the Consultation Outcome Report on the consultation webpage⁶².

The consultation survey received 34 responses and four emails were also received. Half of the total number of respondents (19 out of 38) were not in favour of revoking the AQMA at Cribbs Causeway, while just under a quarter of respondents (9) supported it, with the remaining respondents either unsure or not stating an opinion. The main reason for objections was the expected future increase in traffic due to planned development in the area and overall concern about air quality. The Consultation Outcome Report contains the full analysis of the consultation survey responses.

Although more of the respondents objected to the revocation of the AQMA than supported it, the monitoring results provide the fundamental evidence that there is no valid reason to retain the AQMA and that it should therefore be revoked. Sustained compliance with the objective and the precautionary “borderline” level where there is relevant exposure within the AQMA, has been demonstrated for nine years. It is considered very unlikely that nitrogen dioxide concentrations would so significantly increase to cause future exceedances at this location, despite the new development planned in the vicinity and changes such as the removal of the tolls on the Prince of Wales and Severn Bridges.

The Cribbs Causeway AQMA will therefore be formally revoked by a legal order, which will be submitted to Defra and other statutory consultees and will also be made publicly available on the Council’s website. It is emphasised that monitoring at this

⁶² https://consultations.southglos.gov.uk/consult/ti/Cribbs_AQMA/consultationHome

location will remain in place to check the future impact of any changes, including current and future development in the vicinity.

As the nitrogen dioxide concentrations at the residential property within the AQMA have been below the annual average objective since the AQMA was declared, an action plan has not been required.

Screening of Potential Pollution Sources

The following potential pollution sources, as detailed in LAQM TG16, have been considered to identify whether there are any new or significantly changed sources, or any new exposure near existing sources, since the 2017 Annual Status Report.

Road Traffic Sources

No additional road traffic sources have been newly identified from the following potential sources below:

- Narrow congested streets with residential properties close to the kerb
- Busy streets where people may spend 1 hour or more close to traffic
- Roads with a high flow of heavy duty vehicles
- Junctions
- New roads constructed or proposed since last review and assessment
- Roads with significantly changed traffic flows
- Bus and coach stations

However, in terms of traffic generating proposals, there are a number of large scale developments proposed, some of which have already come forward. All significant developments have been or will be fully assessed through the planning system to ensure that the potential impacts on air quality are quantified and fully understood.

To update from the 2018 ASR, further information on current major road transport projects in South Gloucestershire is included below.

Metrobus

Metrobus is a new express bus service that started operating in the West of England in 2018. The construction of the network was a joint project between South Gloucestershire Council, Bristol City Council and North Somerset Council.

Metrobus aims to speed up journey times, relieve congestion, reduce pollution and give people improved access to key employment, education and leisure destinations by providing a rapid, high capacity public transport system using a combination of segregated busways, bus lanes, priority at junctions and off-bus ticketing.

Metrobus services commenced in May and September 2018 on the m3 and m2 routes respectively, and on the m1 route in January 2019. The routes are shown in Figure D.1.

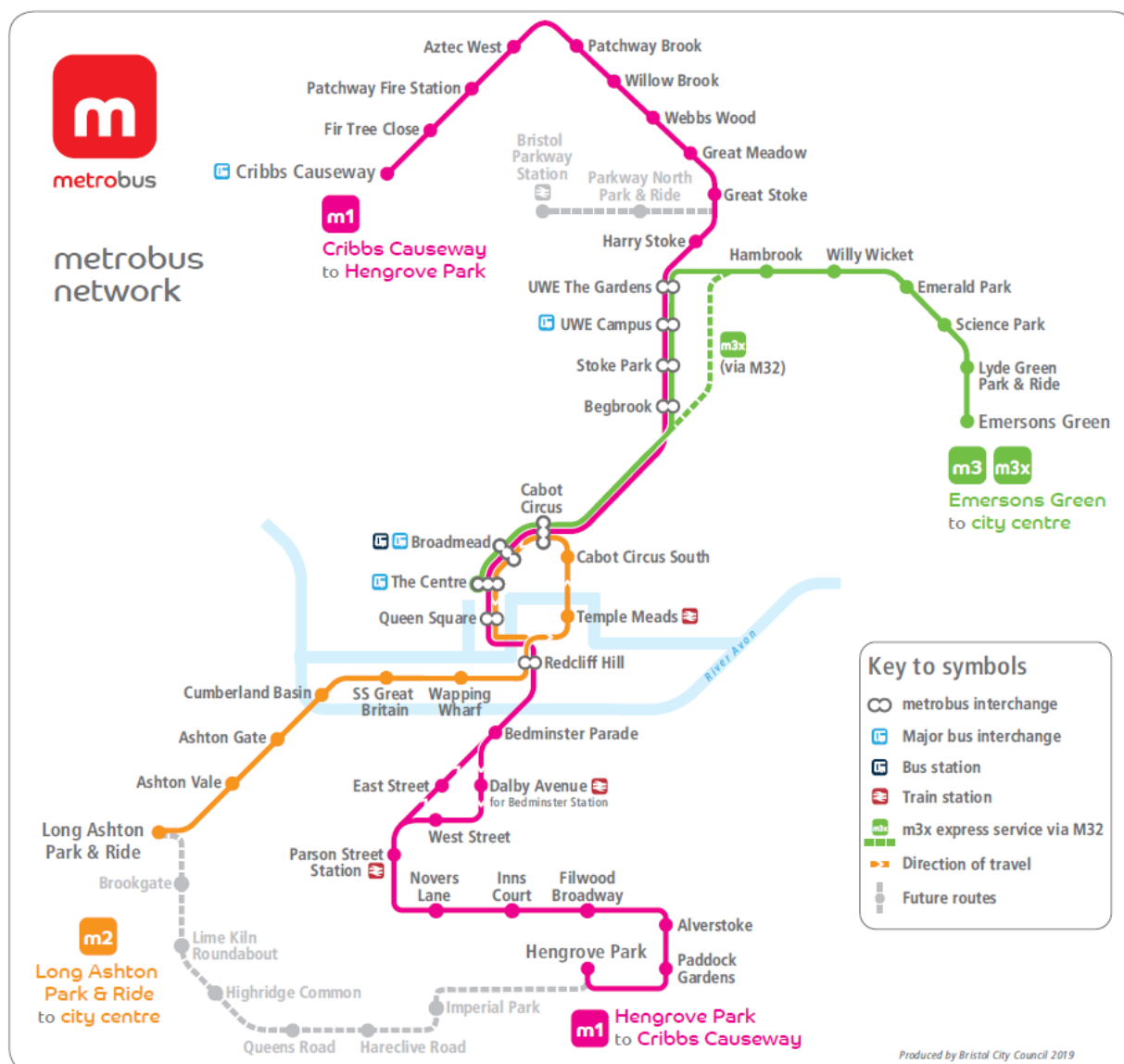


Figure D.1 Metrobus Network

The m3 service runs from Emersons Green in South Gloucestershire to Bristol City Centre, via Lyde Green Park and Ride and University of West of England (UWE) Frenchay campus. The m3x is an express commuter service based on the m3 route, which further reduces journey times.

The m2 service operates from Long Ashton Park and Ride in North Somerset via Temple Meads mainline railway station to the City Centre. Both the m2 and m3 services are operated by First West of England and had already carried over 600,000 customers prior to the launch of the m1 service in January 2019.

The m1 service runs from Hengrove in the south of Bristol to the city centre, on to UWE, Bradley Stoke and Aztec West to finish at Cribbs Causeway in South Gloucestershire. Part of its route is along the Stoke Gifford Transport Link; a new road opened in December 2017, which runs from Parkway North in Stoke Gifford to the A4174 Ring Road at Harry Stoke. This service is operated by Bristol Community Transport (BCT) under contract to First West of England.

Metrobus services use a combination of Euro 6 diesel (as a minimum) and biogas vehicles. A Euro 6 engine emits fewer emissions than the average diesel Euro 6 car despite having up to 20 times more capacity⁶³. Bio-methane gas is generated from waste food and offers more than an 80% reduction in greenhouse gases and a 95% reduction in nitrogen oxides (NOx) compared to older diesel buses.

BCT invested £7 million in a fleet of 21 biogas buses for the m1 Metrobus service and a new permanent bio-methane gas filling station work opened in July 2019 at their depot in Bristol, replacing the temporary filling station which had been fuelling the fleet since the m1 route came in to service in January 2019. The new station represents a £960,000 investment by First West of England that has been supported by the Office of Low Emission Vehicles (OLEV) Low Emission Bus Fund⁶⁴.

Monitoring of the potential impacts of the Metrobus Scheme commenced in 2015 when seven new diffusion tube monitoring sites (sites 152 – 158) were set up to assess before and after the scheme was implemented. The 2018 monitoring results show nitrogen dioxide concentrations to be well below the annual mean objective at all of these sites.

The monitoring will continue and be reviewed as necessary, for example if any new relevant exposure is introduced through residential development adjacent to Stoke Gifford Transport Link as part of the East of Harry Stoke new neighbourhood. No further work is required at this stage.

Cribbs Patchway Metrobus Extension

This planned extension of the Metrobus network in South Gloucestershire will provide an alternative, fast and direct route between Bristol Parkway railway station and The

⁶³ https://metrobusbristol.co.uk/metrobus_is_different/

⁶⁴ http://bristolcommunitytransport.org.uk/1547/New+bio-methane+gas+bus+filling+station+opens+at+BCT/the_hct_group/bristol_community_transport/bristol_community_transport_news#

Mall bus station, and will also benefit communities in Stoke Gifford, Patchway and the forthcoming Cribbs Patchway New Neighbourhood on the former Filton Airfield.

Much of the Metrobus extension will be on existing routes which does not require any work, although some new sections are being built. Planned works include the replacement of the existing railway bridge with a wider bridge on Gipsy Patch Lane to enable both a general traffic and a bus lane in each direction as well as shared use cycle and pedestrian pathways.

The main construction work is programmed to start from summer 2019 and is due to last until early 2022. The construction work will include extensive traffic management, including an approximate eight month closure of Gipsy Patch Lane from early 2020 to enable the replacement of the railway bridge.

Further information is available on the CPME webpage on the Council's website⁶⁵.

M49 Avonmouth Junction

Highways England committed, along with South Gloucestershire Council and Bristol City Council to build a new junction on the M49 in order to unlock the economic potential of the Avonmouth Severnside Enterprise Area. The area is an important regional employment site and the largest brownfield site in Western Europe and the site is expected to attract new economic activity and associated employment in diverse sectors including energy generation, waste management, manufacturing, warehousing and distribution.

The port of Avonmouth and the Avonmouth Severnside Enterprise Area to the west of Bristol currently have no direct access to the M49 which has hindered proposals to support economic growth in the area. The junction on the M49 will open up these areas, ease congestion and contribute to the economic growth of the region.

The new junction is located in South Gloucestershire to the south of the Western Approach Distribution Park and west of the village of Easter Compton. It will use the existing bridge at Farm Lane with a second bridge built immediately next to it, which will include a dedicated lane for walkers, cyclists and other users. Two stubs will be left on the new roundabout when the scheme is complete to allow the junction to be connected to the local road network to support future development in this area.

⁶⁵ https://beta.southglos.gov.uk/cribbs-patchway-metrobus-extension/#mctoc_1di8ei4mc8

The main construction work on the new junction started in July 2018 and is expected to end in December 2019. Further information is available on the Highways England website⁶⁶.

The project was assessed against the criteria in Annex III of the EIA Directive 2014/52/EU (amending 2011/92/EU) and it was concluded that no permanent, long term significant negative effects are anticipated as a result of the project taking into account the location and characteristics of the development and the nature of the potential impacts. Best practice mitigation measures will be delivered via a Construction Environmental Management Plan (CEMP).

Non-Road Transport Sources

No additional non-road transport sources have been identified since the 2017 ASR. This includes the following:

- Airports
- Railways
- Ports
- Non-Road Mobile Machinery (NRMM).

Non-road mobile machinery (NRMM) was specified as a new potential pollution source in LAQM TG16. As a result of this, the example measures of how NRMM emissions from construction sites may be minimised, as specified in paragraph 7.25 of LAQM TG16, are recommended as a planning condition to Planning Officers, where appropriate.

To update from the 2018 ASR, the following information is included:

Electrification of Great Western Railway Line

The Department of Transport first announced plans to electrify the Great Western Main Line to Cardiff via Bristol Parkway, and to Bath and Bristol Temple Meads back in 2011⁶⁷. Trains began running under electric power between London Paddington and Bristol Parkway, following the completion of overhead line equipment between

⁶⁶ <https://highwaysengland.co.uk/projects/m49-avonmouth-junction/>

⁶⁷ <http://www.dft.gov.uk/news/press-releases/dft-press-20110301/>

Swindon and Bristol Parkway in December 2018. Work is continuing to complete the section between Bristol Parkway and Cardiff, with the main focus in South Wales.

The size of the high-speed train fleet operated by GWR is also set to double. 93 new Intercity Express Trains will replace existing services by the end of 2019 with the first trains this autumn, starting with routes to Bristol, South Wales, and the Cotswolds⁶⁸.

This together will bring about faster journey times between Bristol and London and increased capacity. Electrified railways are quieter and more reliable than non-electrified railways and particularly benefit air quality as no air pollutants are emitted at the trackside because electric trains have zero emissions at the point of use.

Further information on modernising the Great Western Mainline in South Gloucestershire can be found on the Network Rail website⁶⁹.

MetroWest

The MetroWest project is a package of major rail improvements for the West of England region. The project is being delivered in two phases by the West of England councils, working in partnership with Network Rail and Great Western Railway, along with a separate new stations package looking at the potential for future new stations.

Phase 1 proposes to:

- Re-open the Portishead rail line to Bristol, with a new station at Portishead and the re-opening of the former station at Pill
- 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 on track for 2021.

The project is led by North Somerset Council on behalf of the four West of England councils, as the Portishead line will run through North Somerset to Bristol.

Phase 2 project is proposing to re-open the Henbury Line to an hourly spur passenger service and increase train services to Yate to a half-hourly service and the plans include new rail stations at Henbury, North Filton and Ashley Down. This project is led by South Gloucestershire Council on behalf of the four West of England Councils as most of this phase will be in South Gloucestershire.

⁶⁸ <https://www.gwr.com/about-us/modernising-gwr/iet>

⁶⁹ <https://www.networkrail.co.uk/running-the-railway/our-routes/western/great-western-mainline/south-gloucestershire/>

The new stations package considers the potential for additional new stations at Saltford, Ashton Gate and Corsham. Further information about MetroWest is available on the Travel West website⁷⁰.

Industrial Sources

Industrial sources include the following:

- Industrial Installations
- Major Petrol Storage Depots
- Petrol Stations
- Poultry Farms

Industrial sources are controlled by the Environment Agency (EA) and by local authorities under the Pollution Prevention and Control Regulations and through the Clean Air Act. Details of the EA permitted installations (Part A1) in South Gloucestershire are available on the EA website⁷¹. A list of the Part A2 and B installations permitted by South Gloucestershire Council are available on our website⁷².

In 2018, there was one new Part B industrial process permit issued to Pulse Printing Products for the manufacture of coatings (LAEP B 084). None of the existing permitted processes appeared to have ceased in 2018.

No additional industrial sources in South Gloucestershire have been newly identified. Any new processes would be assessed as part of the permitting process and would not be likely to give rise to significant pollution emissions.

Commercial and Domestic Sources

Commercial and domestic sources include the following:

- Gas-Fired CHP combustion – Individual Installations
- Biomass Combustion – Individual Installations
- Biomass Combustion – Combined Installations

⁷⁰ <https://travelwest.info/projects/metrowest>

⁷¹ <https://environment.data.gov.uk/public-register/industrial-installations/registration?easting=&northing=&name-search=&number-search=&local-authority=South+Gloucestershire&address-search=&postcode=&dist=1>

⁷² <https://www.southglos.gov.uk/documents/List-of-IPC-permits-2.pdf>

- Other Solid Fuel Combustion

There were no newly identified sources which were not considered through the planning process, apart from Biomass Combustion – Combined Installations, which are screened below.

Biomass Combustion – Combined Installations

Numerous small biomass combustion units, while acceptable individually, may have a cumulative impact on PM₁₀ concentrations. Some of South Gloucestershire is covered by a Smoke Control Area⁷³ which allows only approved fuels and appliances to be used.

The Council's Building Control Department collate notifications of solid fuel equipment installations provided by HETAS; the official body recognised by the Government to approve solid fuel domestic heating appliances. The 2017 and 2018 installations were considered in addition to the 2011 -2016 installations to assess the cumulative impacts of the total known installations. (The 2017 installations were included as the data was previously unavailable for the 2018 ASR).

Information on the type of fuel used was not available so it has been assumed that the installations could burn both biomass (wood) and other solid fuel. The installations were mapped using GIS (Geographical Information System). A 500m grid was derived from this data and a total figure for PM₁₀ emission per year was calculated according to the guidance in Box 7.3 LAQM TG16. The appliance type was assumed to be a stove. The PM₁₀ emissions for the appliances were taken from the LAQM Tools Defra webpage⁷⁴. The updated factors were applied retrospectively for all years considered. The fuel type was assumed to be biomass (wood) as this is the mostly likely fuel to be burnt, because the smoke control area only covers part of South Gloucestershire. Emissions per household were therefore 34.7 kg per year.

The emissions per 500m grid square were compared with the annual PM₁₀ emission threshold in the Biomass Emissions Screening Tool (v7) for combined Installations available on the LAQM Tools Webpage⁷⁵. The 2018 maximum PM₁₀ background concentration in South Gloucestershire from the background maps is 17.03 µg/m³. Use of the maximum PM₁₀ background concentration for the whole district ensures a

⁷³ <https://www.southglos.gov.uk/environment-and-planning/pollution/pollution-control-clean-air-act-approval/smoke-control-areas/>

⁷⁴ <http://laqm.defra.gov.uk/review-and-assessment/tools/combustion-emission-factors.html>

⁷⁵ <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions.html#biomass>

robust approach and maintains consistency with previous biomass combined installation screening assessments.

The highest emitting grid square (with 41 appliances) is located in Staple Hill, adjacent to the AQMA. Using the assumptions above, this grid square would emit 1423 kg per year. From the screening tool, the threshold for the maximum 17.03 $\mu\text{g}/\text{m}^3$ background PM_{10} concentration (as worse case) would be approximately 6824 kg PM_{10} per year, so the actual emissions are estimated to be well below the threshold. Even if each appliance was assumed to be a stove with “other solid fuel” as the primary fuel; the worse-case scenario at 39 kg per year per household, the maximum grid would emit 1599 kg PM_{10} per year, which is still well under the threshold.

Most of the addresses listed appear to be domestic properties. It is quite probable that there is under-reporting of the number of properties burning solid fuel or biomass, due to people not notifying Building Control of work to their property to enable this. However, the threshold emission rate is high enough for PM_{10} to make this not a significant concern, although with the highest number of appliances located in a grid square adjacent to the AQMA, consideration will be given to including appropriate action to reduce this potential pollution source in the review of the Air Quality Action Plan and also in the development of the Council’s Clean Air Strategy.

A map showing the individual solid fuel installations and PM_{10} emissions (assuming biomass (wood) as the fuel) per 500m grid square is provided in Figure D.2. A Map showing the location of the highest emitting grid square, which is adjacent to the Staple Hill AQMA is provided in Figure D.3.

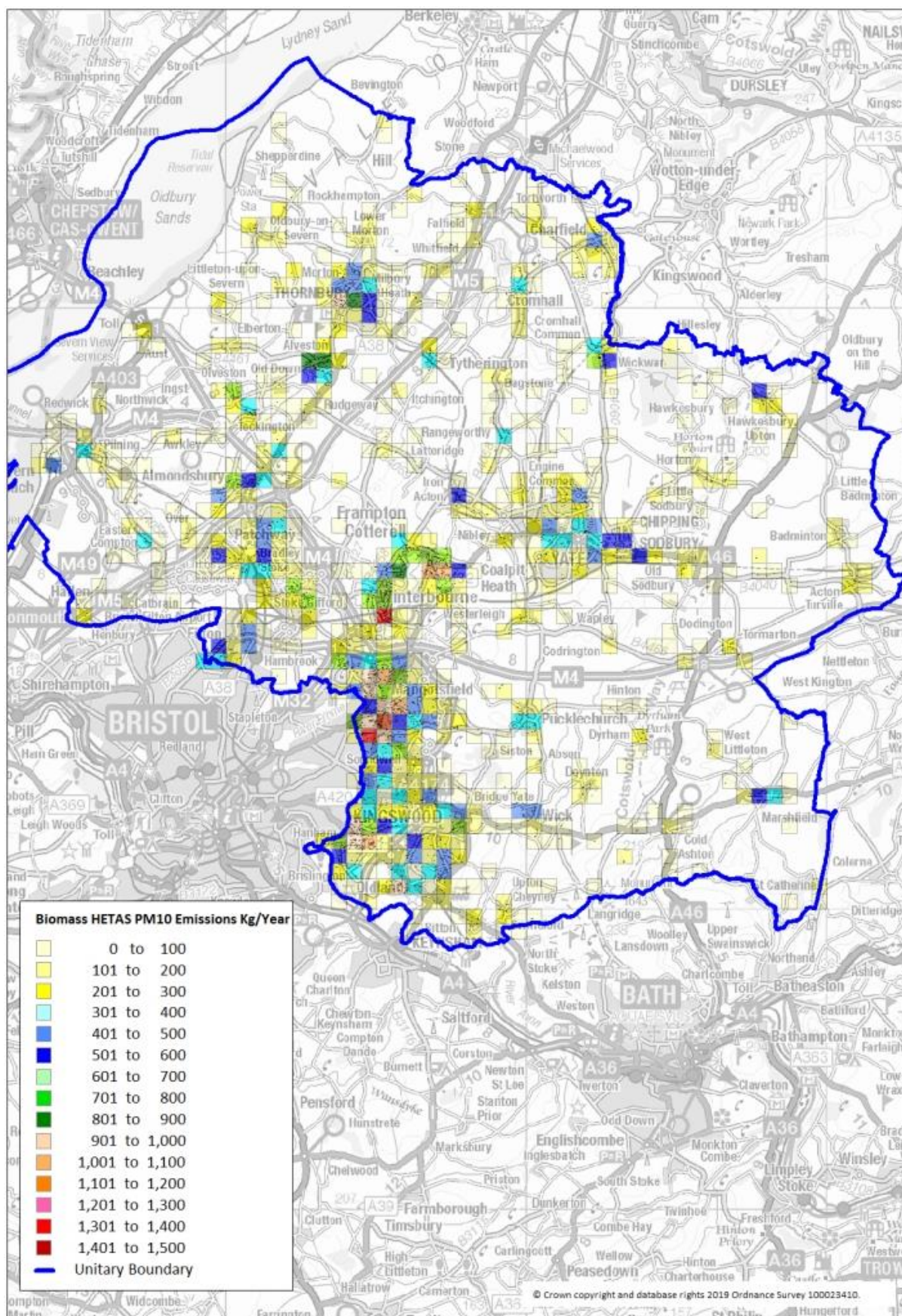


Figure D.2 Individual Solid Fuel Installations and PM10 Emissions per 500m Grid Square (Biomass as fuel)

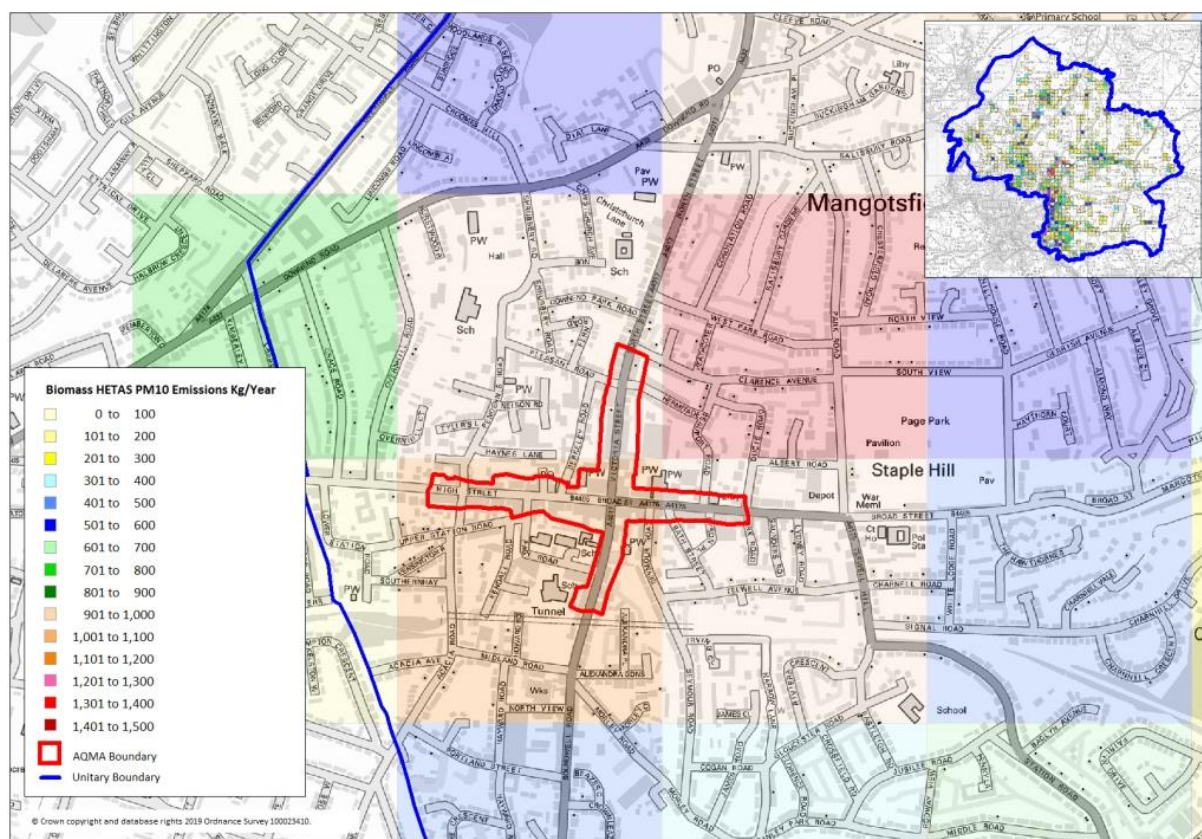


Figure D.3 Location of highest emitting 500m Grid Square - Individual Solid Fuel Installations and PM₁₀ Emissions (Biomass as fuel)

Fugitive or uncontrolled sources

Dust emissions from a range of fugitive or uncontrolled sources can give rise to elevated PM₁₀ concentrations. Dust may arise from sources such as quarries, landfill sites, stockyards, construction sites and waste management sites, particularly from the handling of dusty materials, the passage of vehicles over unpaved roads, process dust, e.g. concrete cutting and wind-blown dust from stockpiles and dusty surfaces.

Fugitive emissions from quarries and landfill sites have been previously assessed and any complaints received are addressed under the procedures for permitted activities.

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 on nearby sensitive receptors. However, there were some issues with dust from construction sites during the hottest summer on record for England in 2018⁷⁶. As a result, future planning conditions are being tightened to enable stricter

⁷⁶ <https://www.bbc.co.uk/news/uk-45399134>

controls and to allow for the potential for planning enforcement action. A checklist is also being developed for officers to evaluate CEMPs submitted by developers prior to planning conditions being discharged. Otherwise there were no new fugitive or uncontrolled sources identified in 2018.

Appendix E: Maps of Monitoring Locations and AQMAs

Maps of Current Air Quality Management Areas

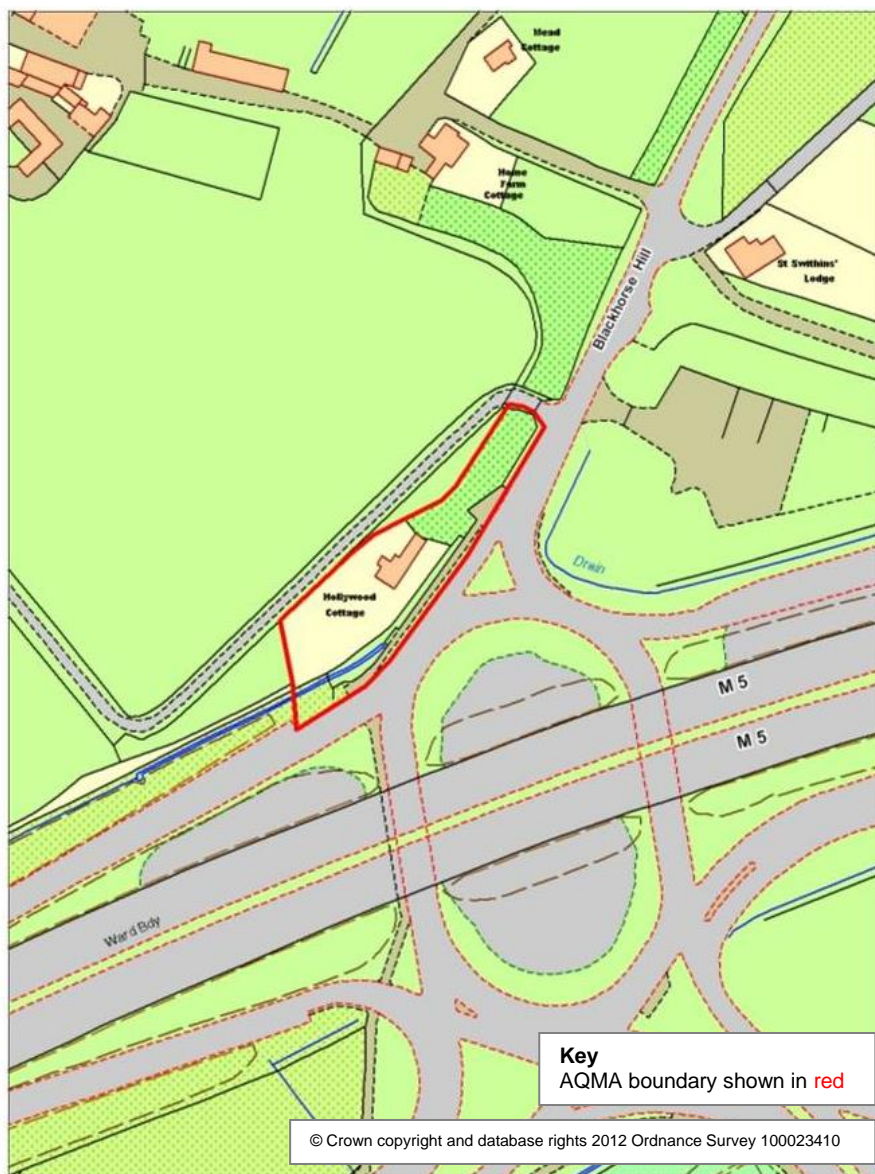


Figure E.1 Cribbs Causeway AQMA (Declared 2010)

(NB: This AQMA is in the process of being revoked.)

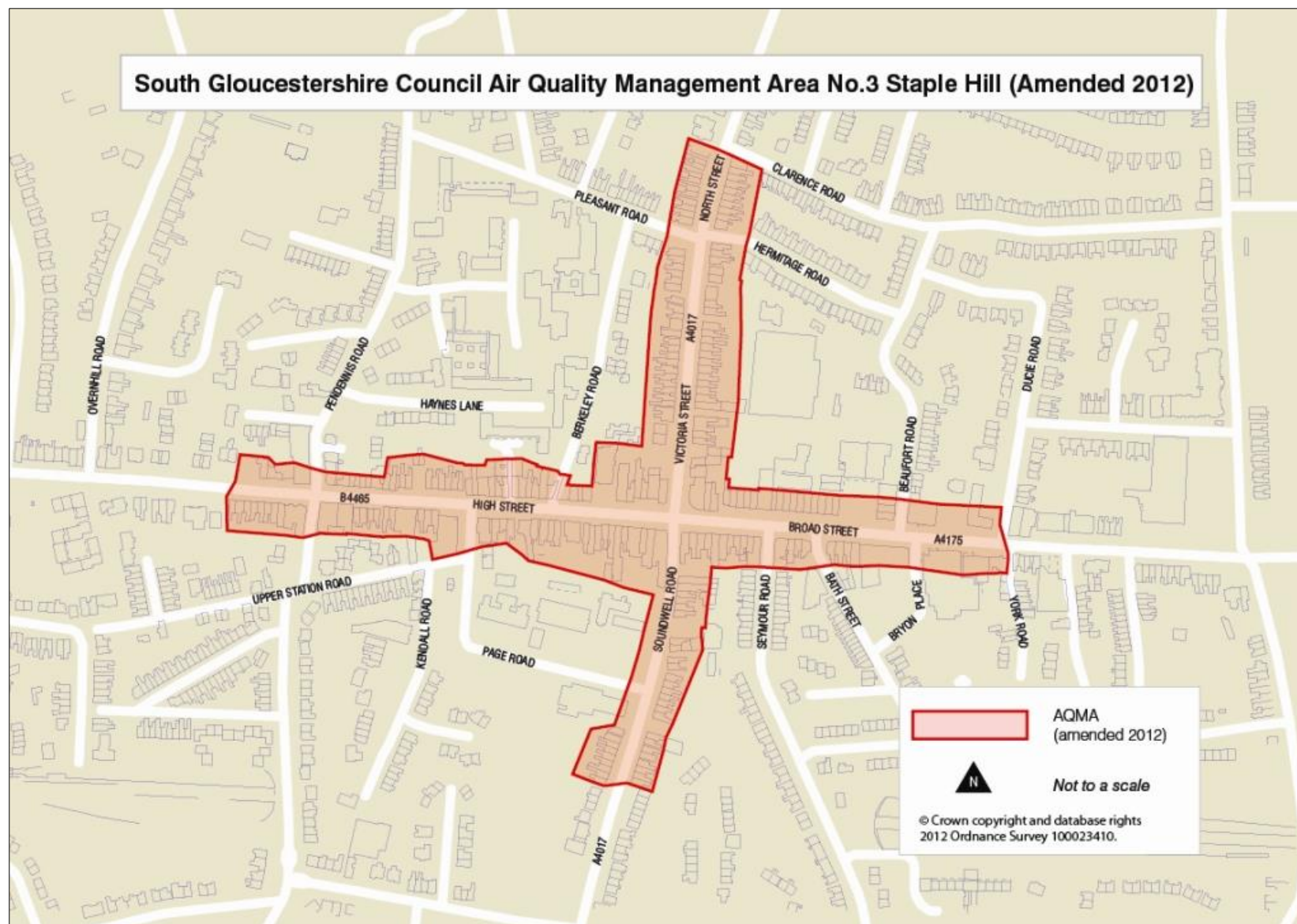


Figure E.2 Staple Hill AQMA (Amended 2012)

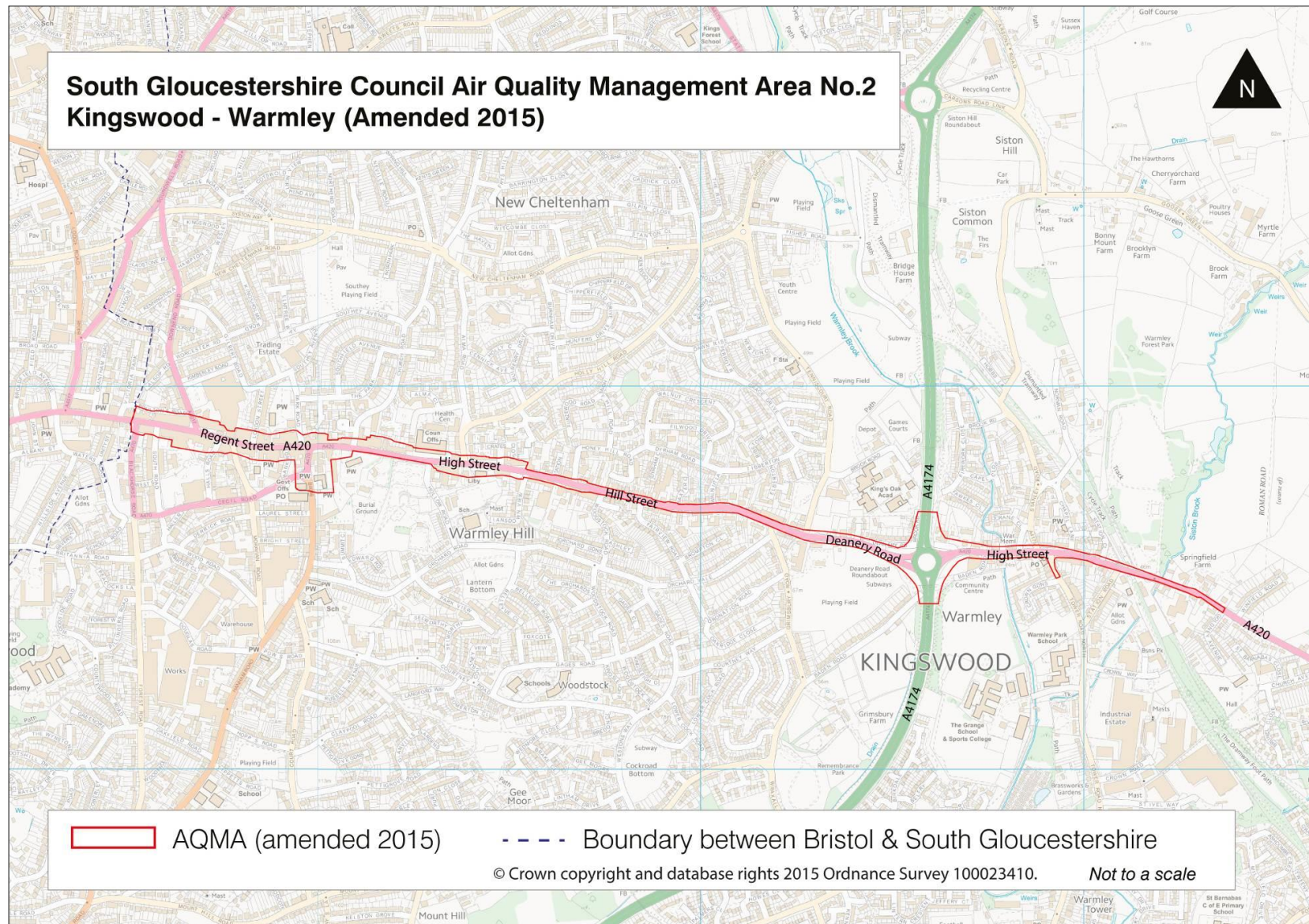


Figure E.3 Kingswood – Warmley AQMA (Amended 2015)

Maps of Monitoring Locations

Maps of Automatic Monitoring Site

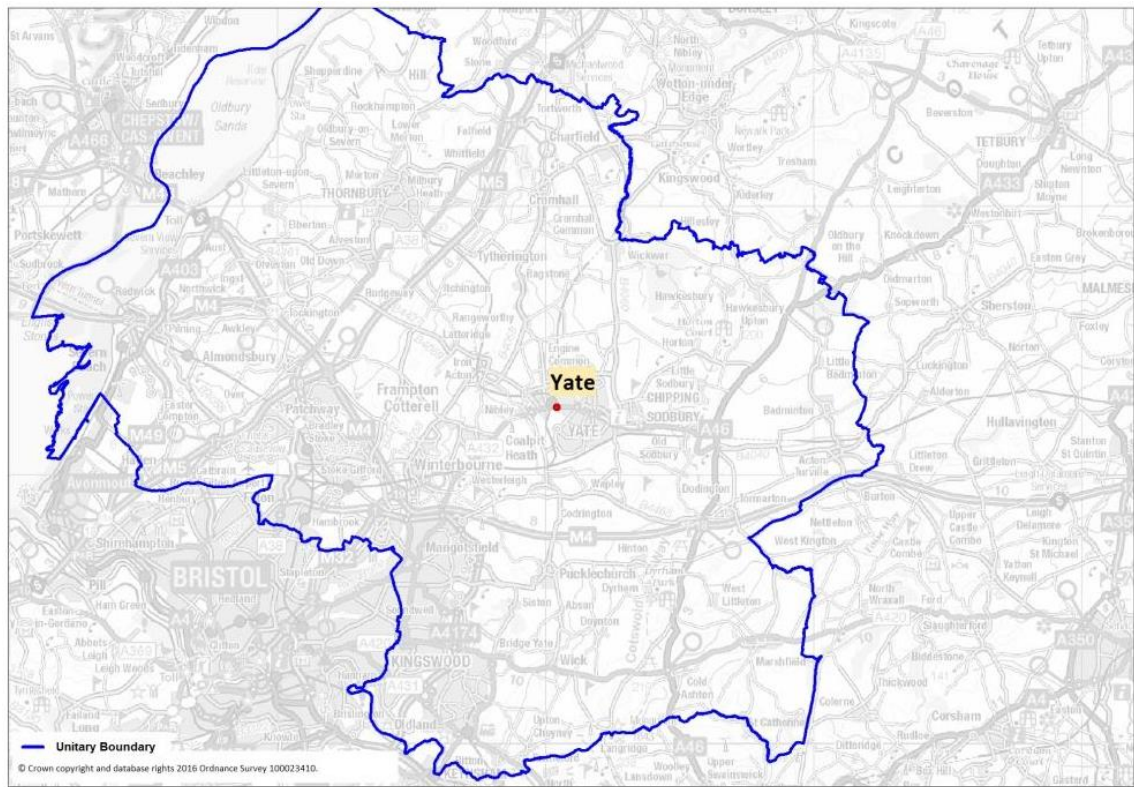


Figure E.4 Automatic Monitoring Site in South Gloucestershire – Yate

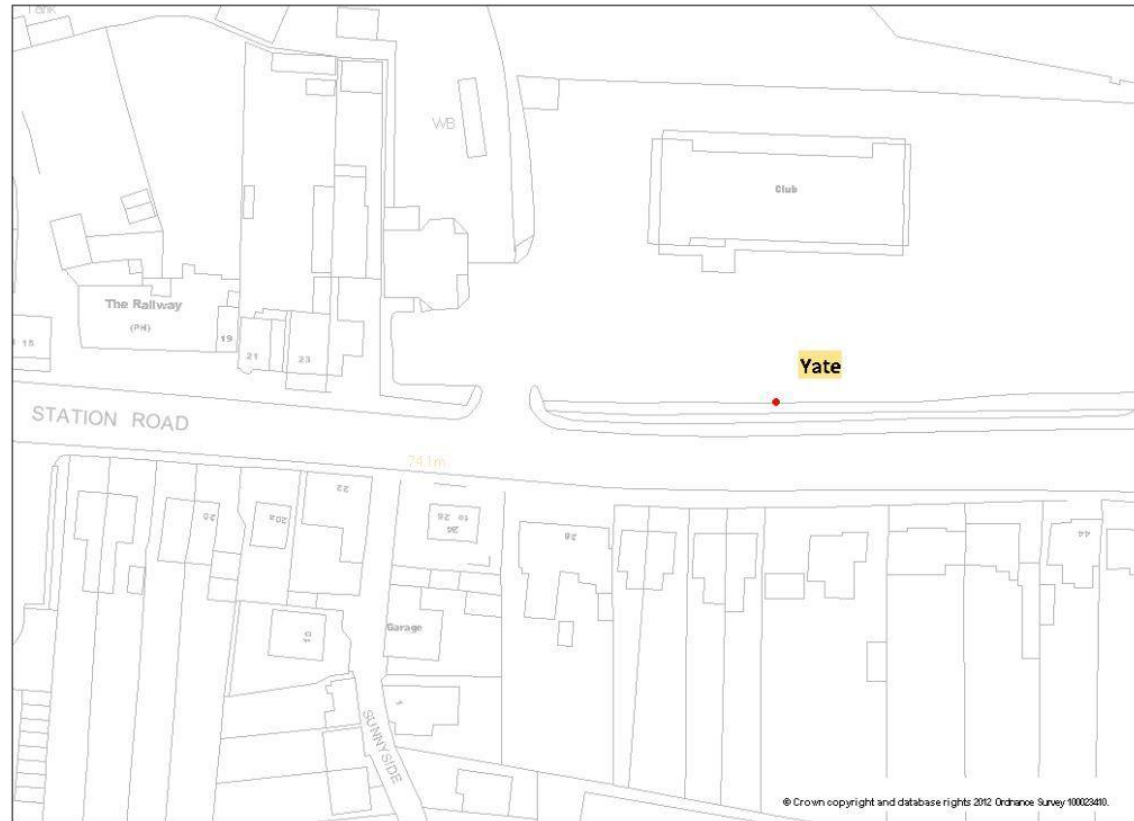


Figure E.5 Automatic Monitoring Site Yate - Station Road

Maps of Diffusion Tube Monitoring Sites

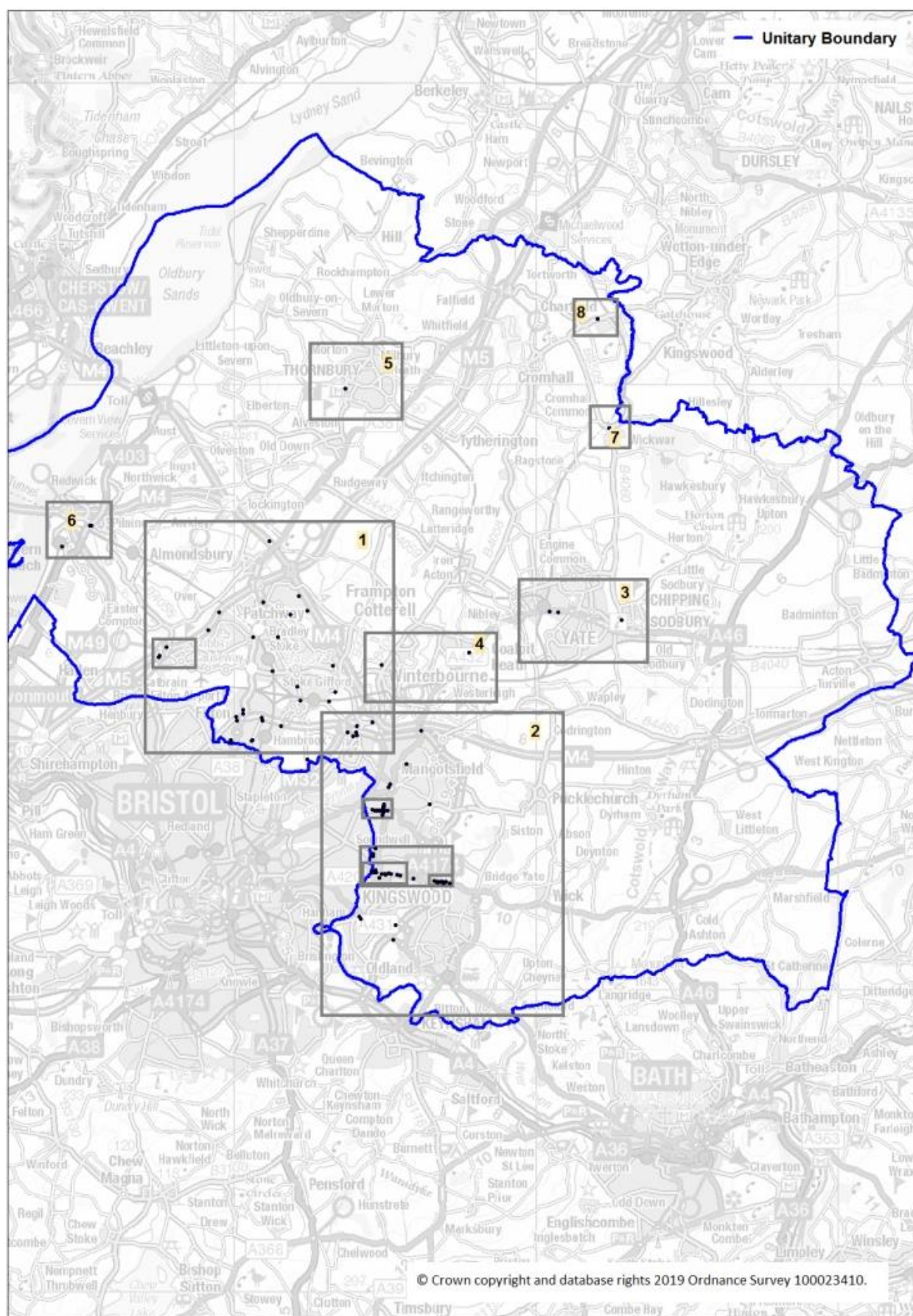


Figure E.6 All Diffusion Tube Sites showing locations of following Figures

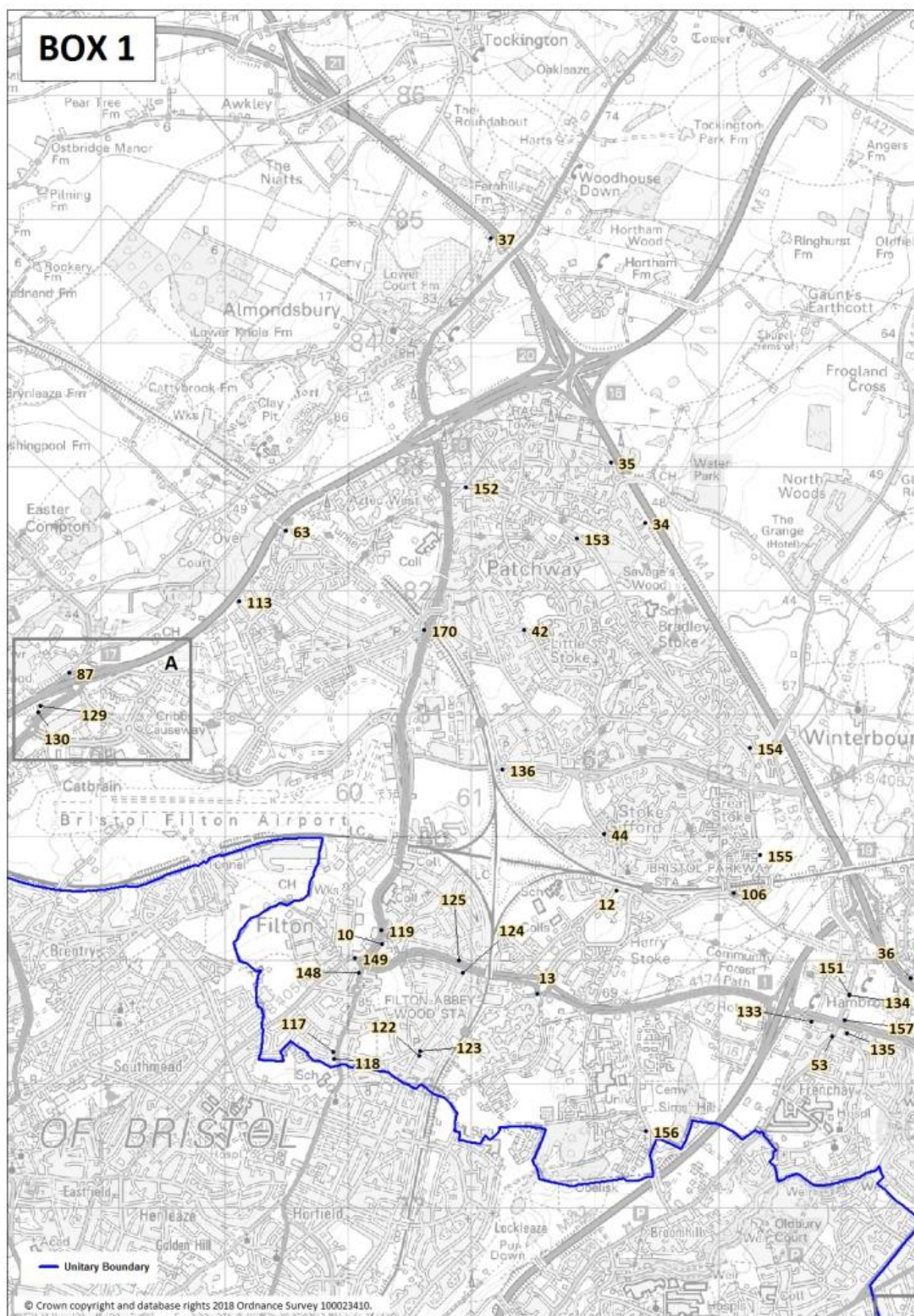


Figure E.7 Diffusion Tube Sites in Bristol North (Box 1 Figure E.6)

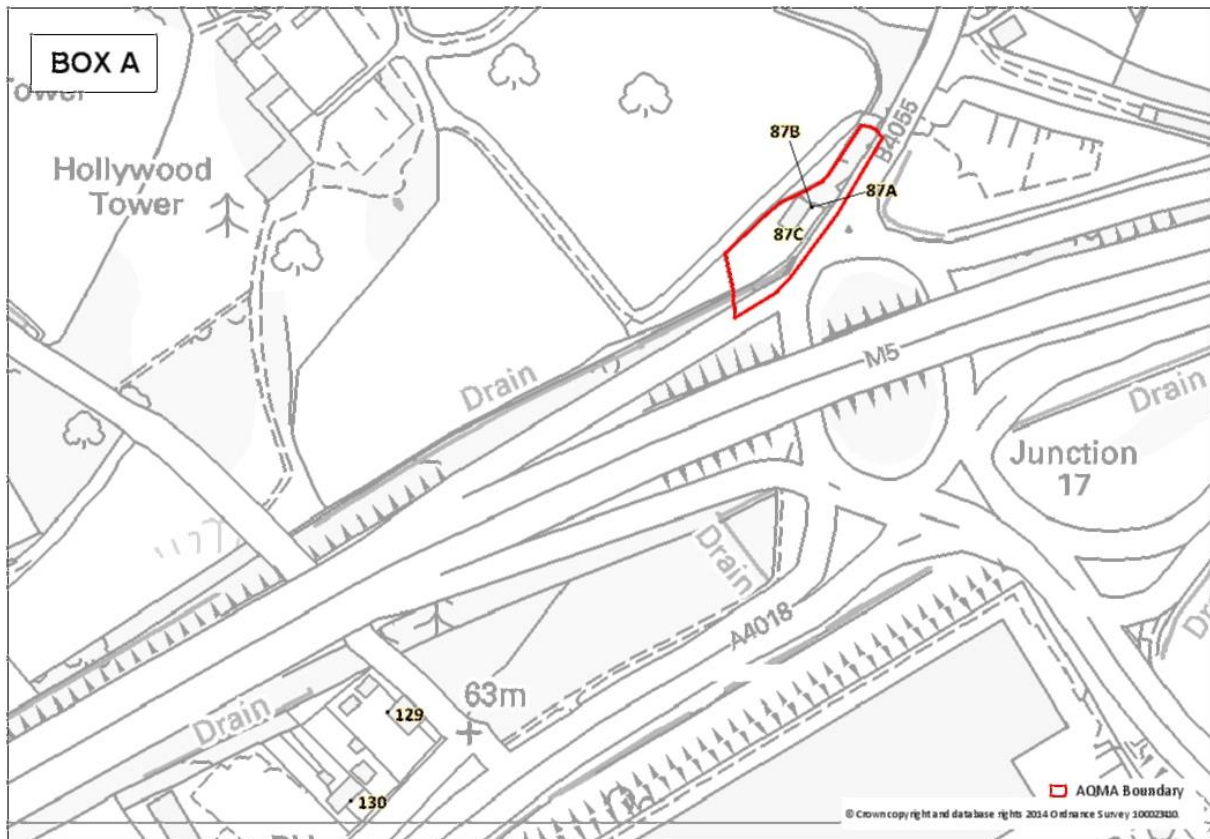


Figure E.8 Diffusion Tube Sites in Cribbs Causeway (Box A Figure E.7)

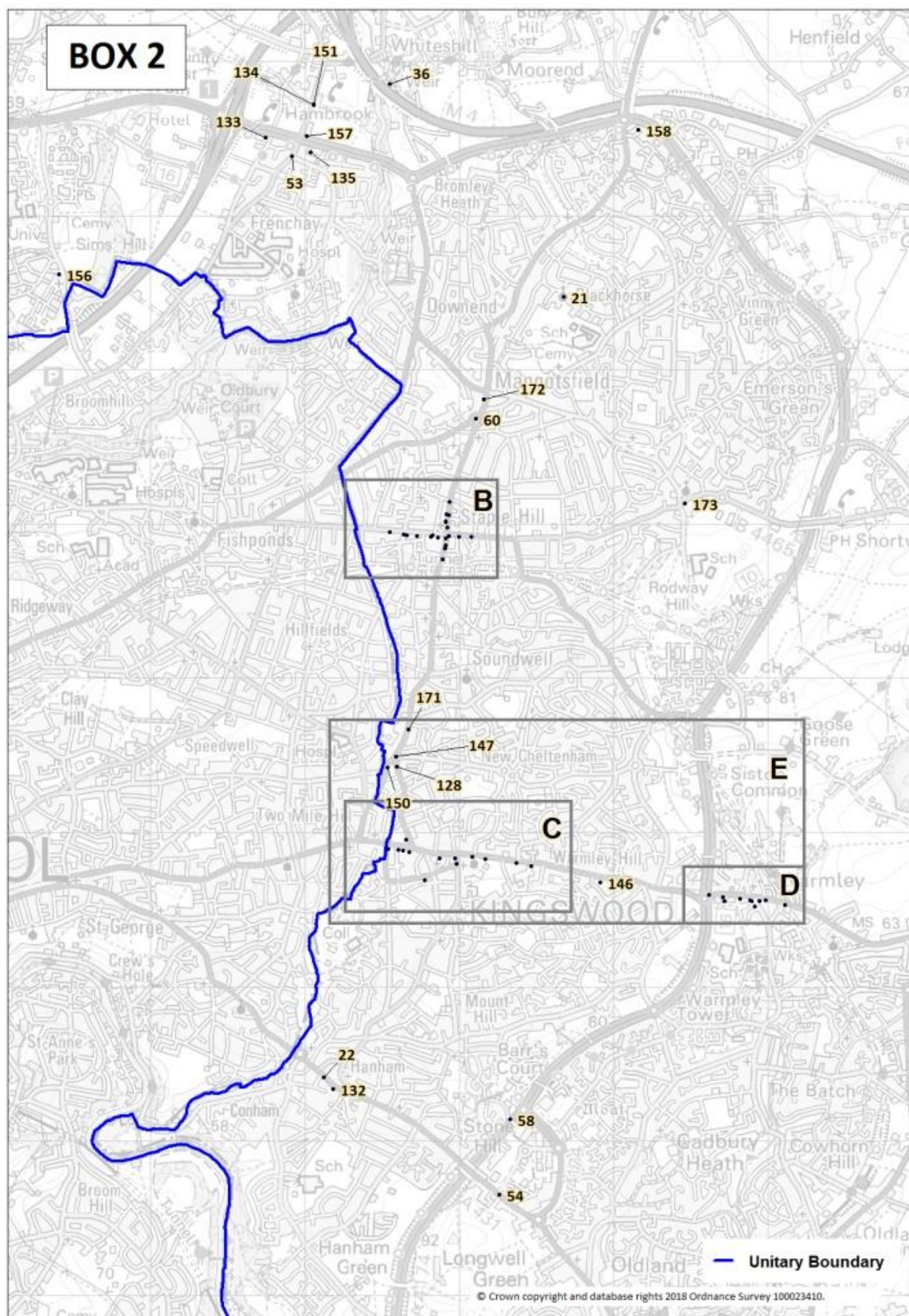


Figure E.9 Diffusion Tube Sites in Bristol East (Box 2 Figure E.6)

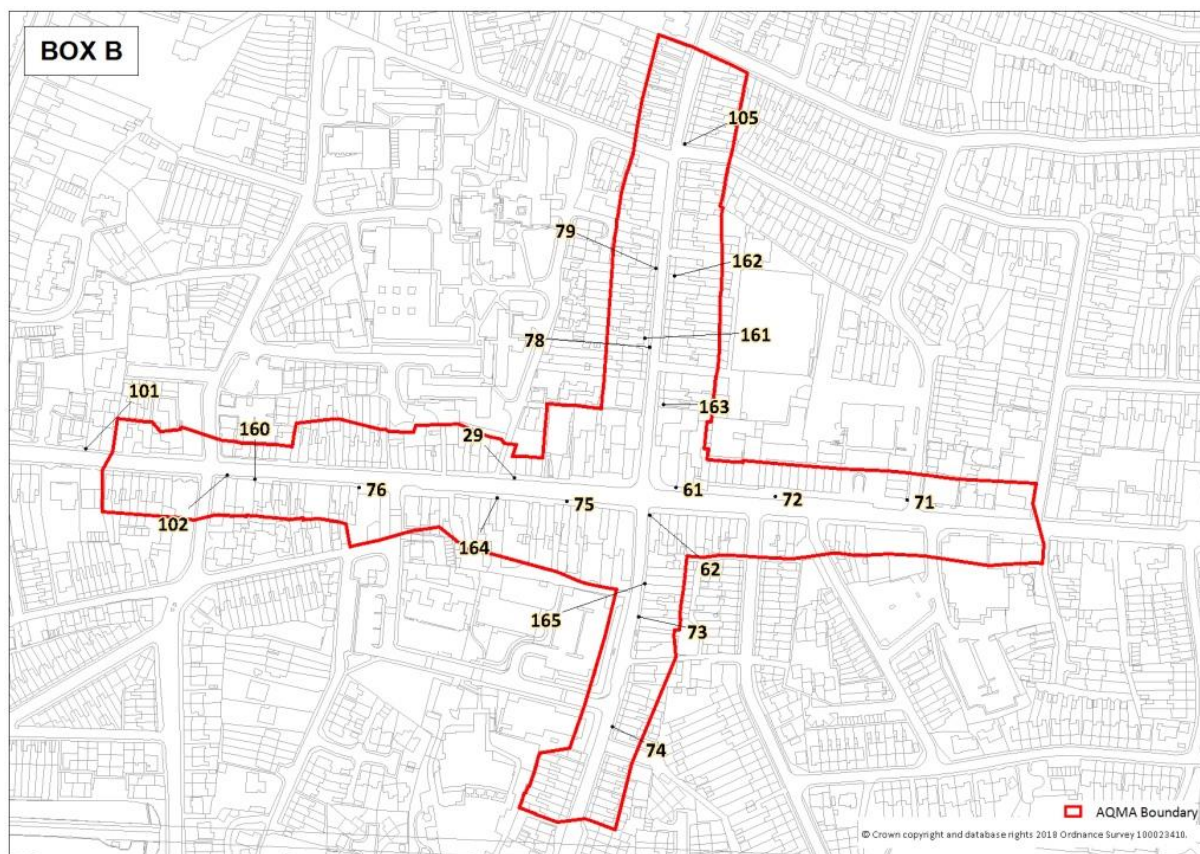


Figure E.10 Diffusion Tube Sites in Staple Hill (Box B Figure E.9)

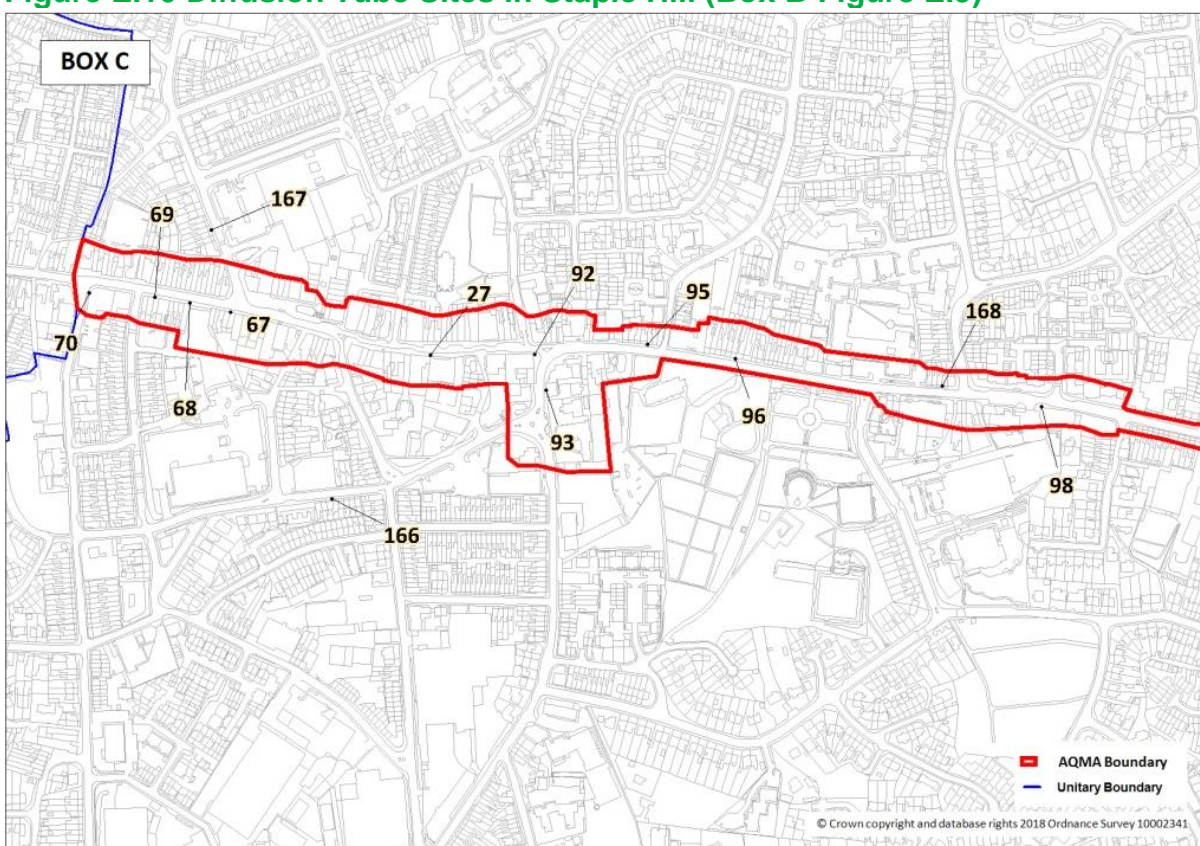


Figure E.11 Diffusion Tube Sites in Kingswood (Box C Figure E.9)

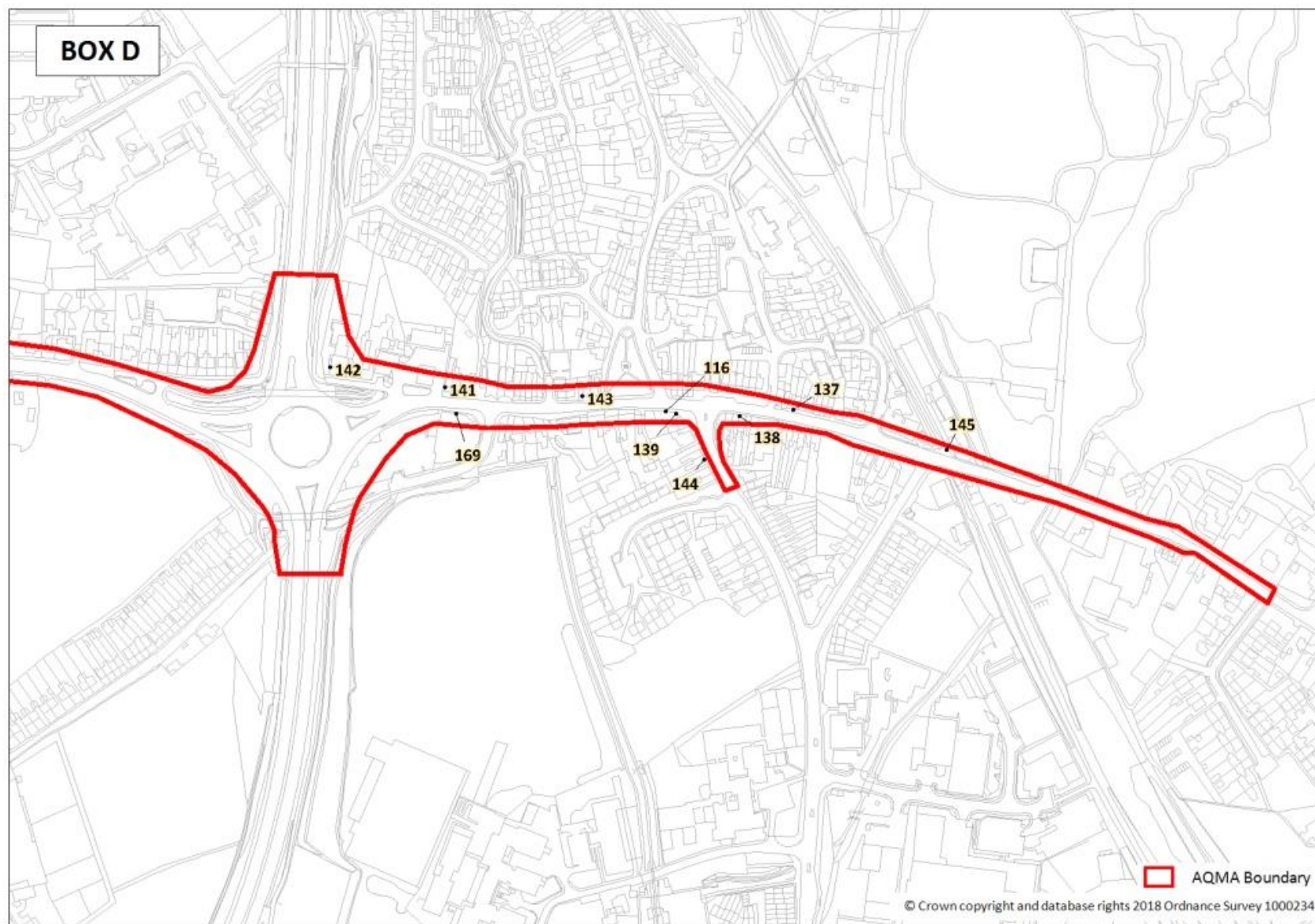


Figure E.12 Diffusion Tube Sites in Warmley (Box D Figure E.9)

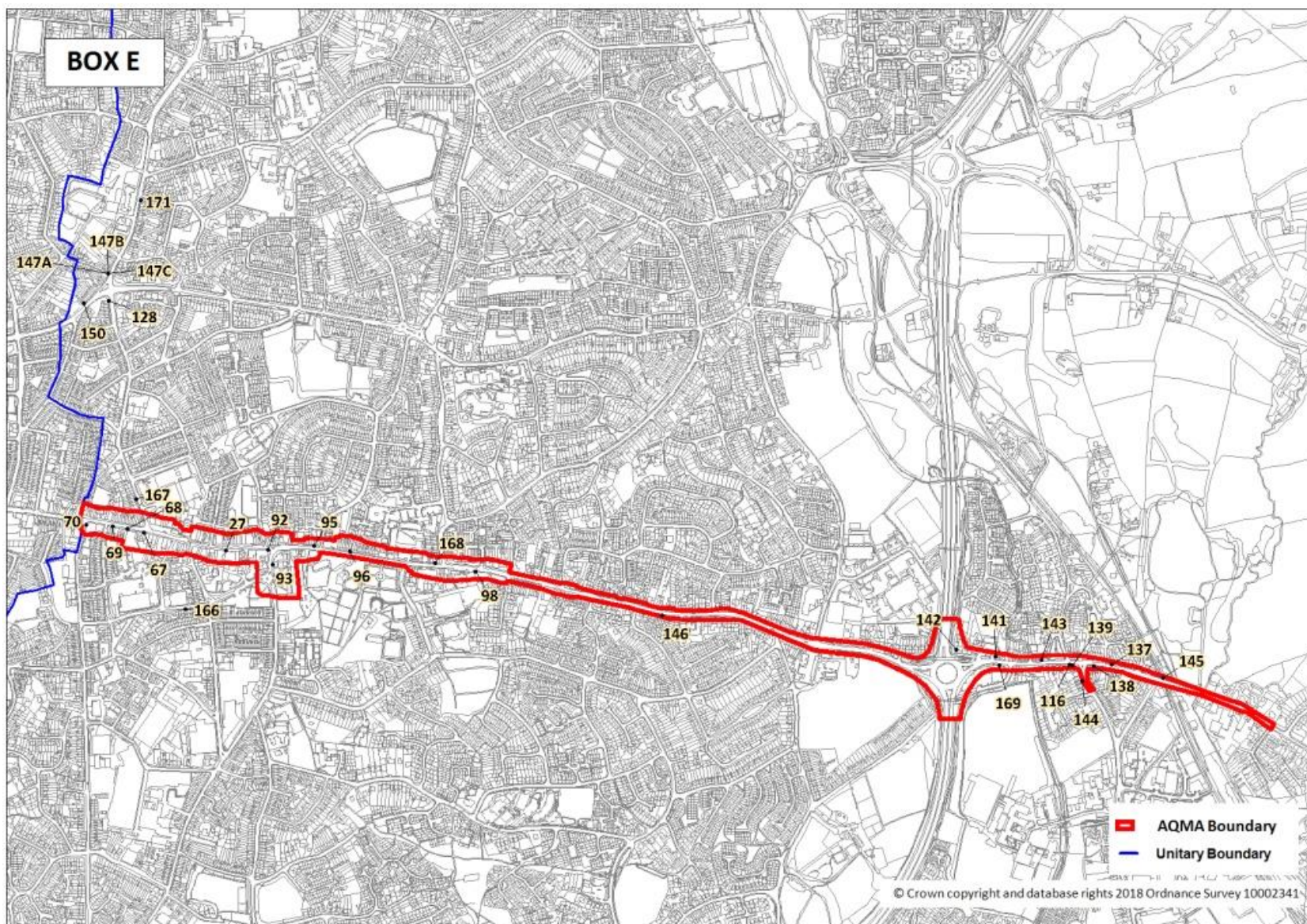


Figure E.13 Diffusion Tube Sites in Kingswood & Warmley (Box E Figure E.9)

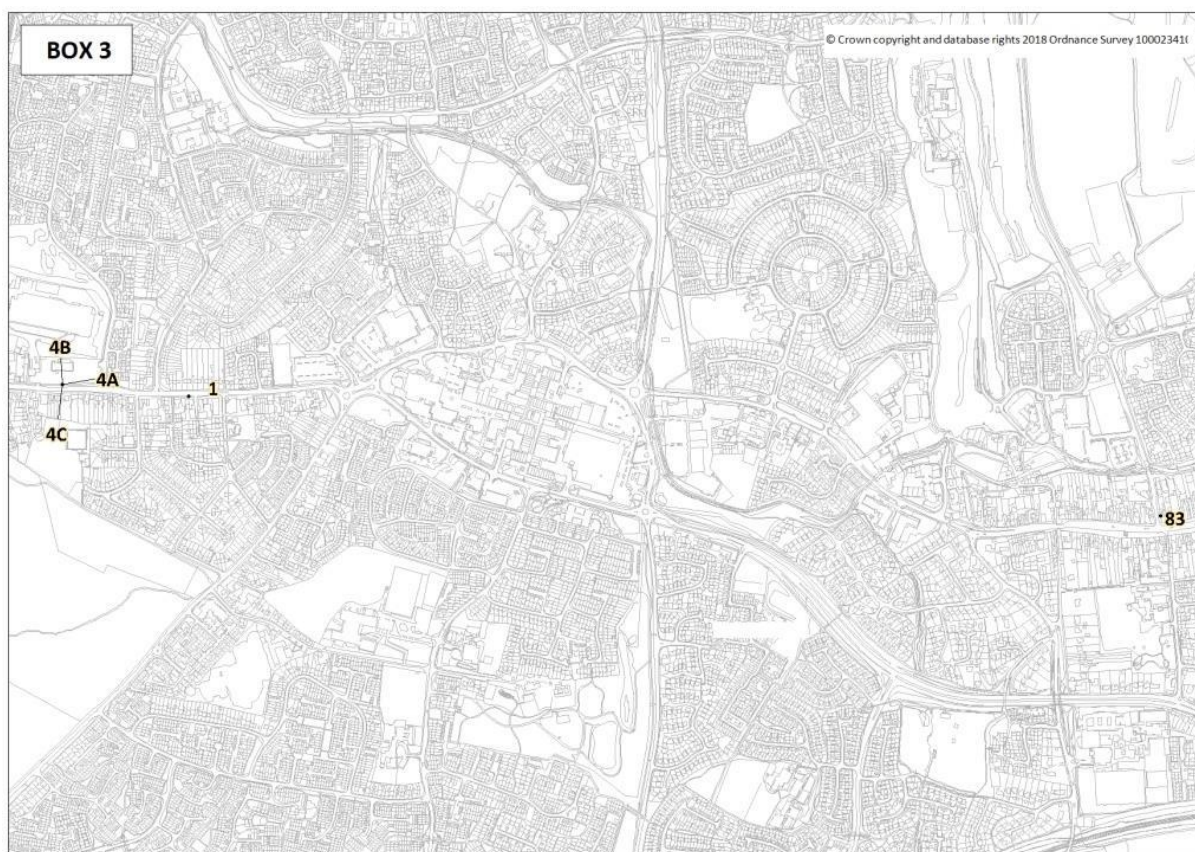


Figure E.14 Diffusion Tube Sites in Yate and Chipping Sodbury (Box 3 Figure E.6)



Figure E.15 Diffusion Tube Sites in Winterbourne & Coalpit Heath (Box 4 Figure E.6)



Figure E.16 Diffusion Tube Site in Thornbury (Box 5 Figure E.6)

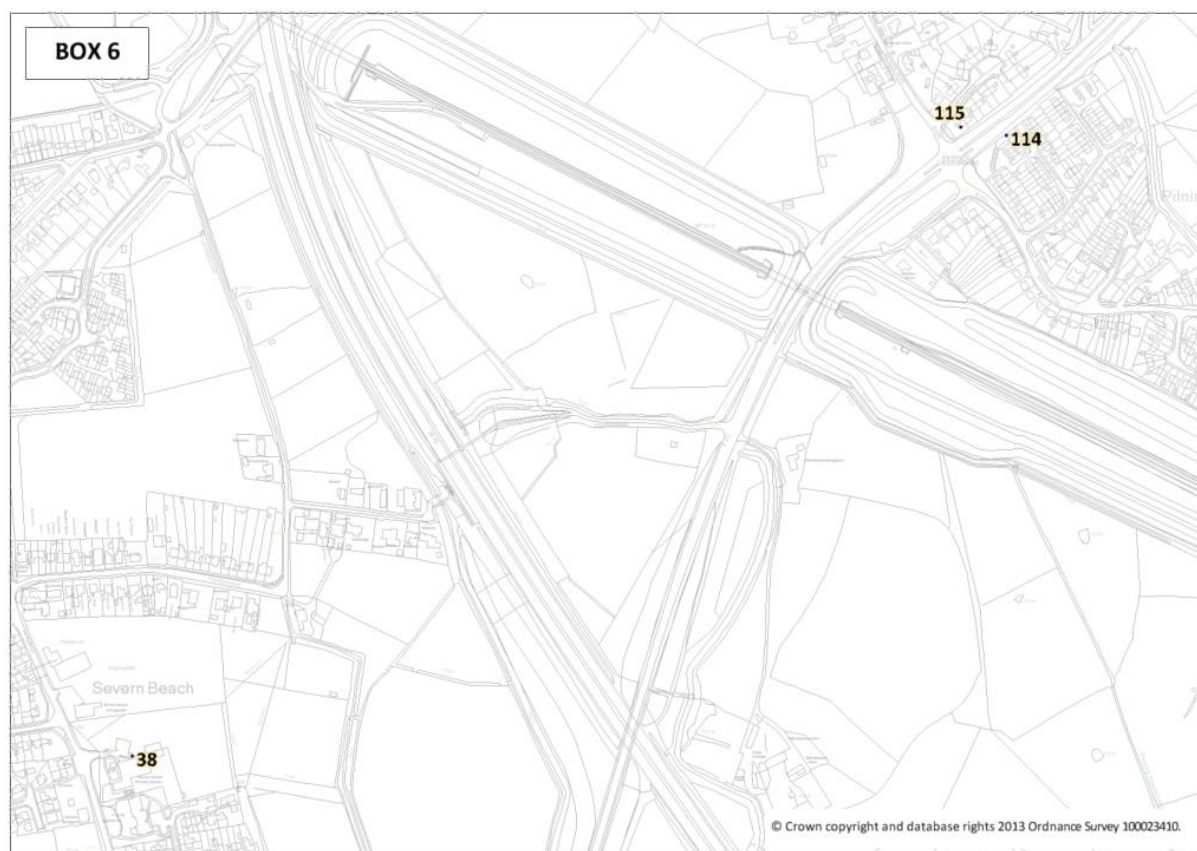


Figure E.17 Diffusion Tube Sites in Severn Beach and Pilning (Box 6 Figure E.6)

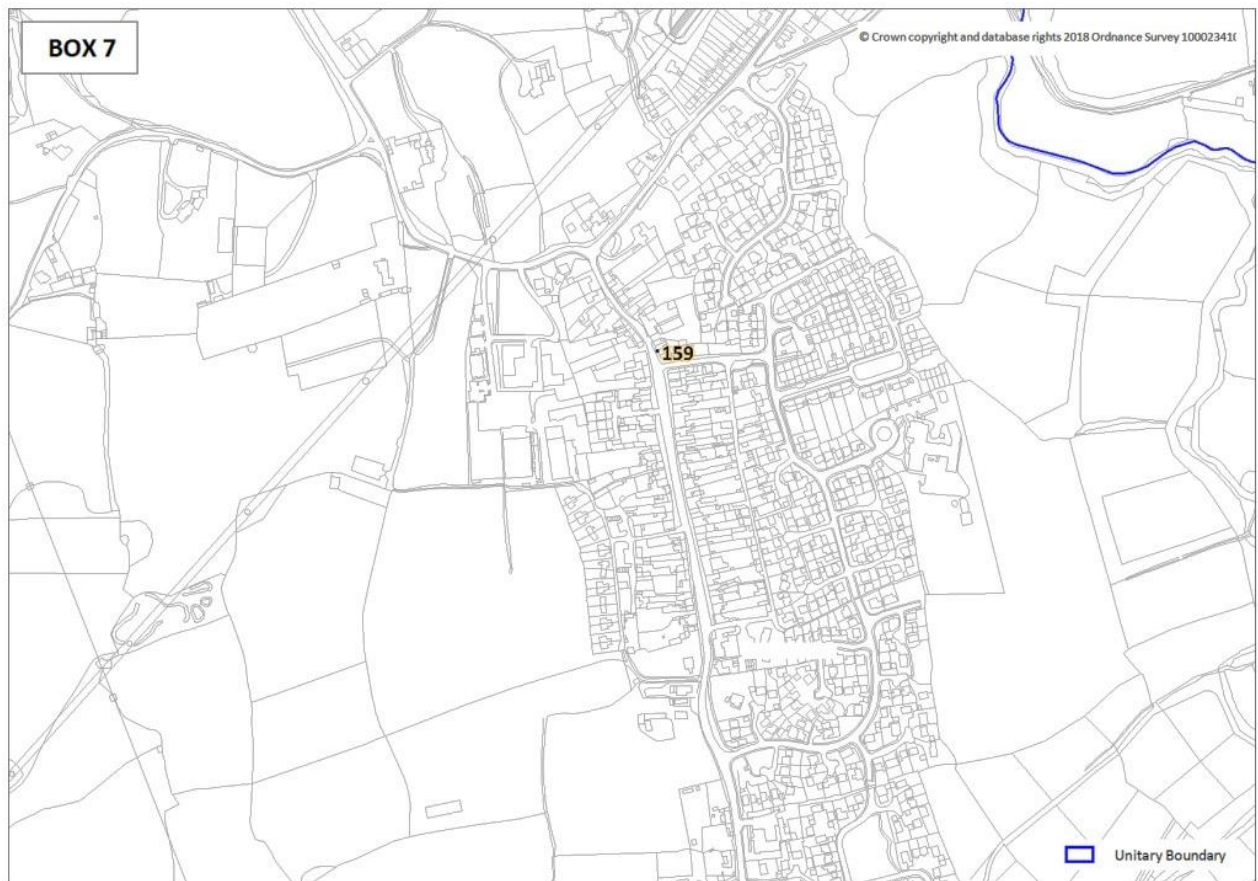


Figure E.18 Diffusion Tube Site in Wickwar (Box 7 Figure E.6)



Figure E.19 Diffusion Tube Site in Charfield (Box 8 Figure E.6)

Appendix F: Summary of Air Quality Objectives in England

Table F.1 Air Quality Objectives in England

Pollutant	Air Quality Objective ⁷⁷	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁷⁷ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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	Air quality Annual Status Report
AURN	Automatic Urban and Rural Network – a national automatic monitoring network
BAM	Beta Attenuation Monitor (for PM ₁₀ measurement)
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
Exceedance	A period of time where the concentration of a pollutant is greater than the appropriate air quality objective
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 (micrometres or microns) 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
WoE	West of England Authorities (Bath & North East Somerset, Bristol City Council, North Somerset and South Gloucestershire Council)
µg/m ³	Microgrammes per cubic metre

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