

ADUR & WORTHING  
COUNCILS



# 2024 Air Quality Annual Status Report (ASR)

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

Date: June 2024

Information	Adur & Worthing Details
Local Authority Officer	Nadeem Shad / Tessa Denny
Department	Public Health & Regulation
Address	Worthing Town Hall, Chapel Road, Worthing, West Sussex, BN11 1HA
Telephone	01273 263331
E-mail	<a href="mailto:publichealth.regulation@adur-worthing.gov.uk">publichealth.regulation@adur-worthing.gov.uk</a>
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## Executive Summary: Air Quality in Our Area

### Air Quality in Adur & Worthing

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year<sup>1</sup>.

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution<sup>2</sup>.

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

**Table ES 1 - Description of Key Pollutants**

Pollutant	Description
Nitrogen Dioxide (NO <sub>2</sub> )	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO <sub>2</sub> )	Sulphur dioxide (SO <sub>2</sub> ) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM <sub>10</sub> and PM <sub>2.5</sub> )	<p>Particulate matter is everything in the air that is not a gas.</p> <p>Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes.</p> <p>PM<sub>10</sub> refers to particles under 10 micrometres. Fine particulate matter or PM<sub>2.5</sub> are particles under 2.5 micrometres.</p>

<sup>1</sup> UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

<sup>2</sup> Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

## Actions to Improve Air Quality

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

The Environmental Improvement Plan<sup>3</sup> sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter (PM<sub>2.5</sub>), the pollutant of most harmful to human health. The Air Quality Strategy<sup>4</sup> provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero<sup>5</sup> details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel and the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

During 2023 we progressed a number of measures in pursuit of improved air quality. These included continued delivery of the Sussex-air Defra funded intervention programme in primary and secondary schools and expansion into Community Groups and Events; working with consultants Bureau Veritas to produce a draft Worthing Air Quality Action Plan; West Sussex County Council (WSCC) launched a School Streets trial at two schools; completing work on a taxi engagement project in Sussex; continued work with WSCC on the Connected Kerb EV charge point project; continued to use the Sussex Air Quality Emissions Mitigation Planning Guidance when looking at the impacts of 'major developments'<sup>6</sup>; launched consultations on bus service improvements and walking improvements/interventions; worked with WSCC to further develop Upper Shoreham Road and Middle Road active travel/crossing improvement schemes and opened a consultation on the Lancing Beach Green cycle path reroute and Durrington-Goring transport

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<sup>3</sup> Defra. Environmental Improvement Plan 2023, January 2023

<sup>4</sup> Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

<sup>5</sup> DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

<sup>6</sup> as defined by Town and Country Planning (Development Management Procedure) Order (England) 2015

improvements; continued discussions with car club providers to develop dedicated car club spaces; expanded the Council's bike share scheme (Donkey Bikes<sup>7</sup>) into Adur; undertook a prioritisation of the LCWIP (ranked cycle routes and identified walking & wheeling zones - areas with a density of schools, green spaces and services where walking should be simple but is often congested/difficult); WSCC published the results of the A259 segregated cycle route consultation which indicated enough support to move forward with the proposals and as part of a Sussex-air consortium made a further bid. Importantly we also revoked the two NO<sub>2</sub> Air Quality Management Areas in Adur - Shoreham High Street A259 (AQMA Order No, 1) and Old Shoreham Road A270 in Southwick (AQMA Order No, 2). Measurements have been consistently below the objective and less than 36µg/m<sup>3</sup>, or 10% below the objective, for 5 or more years and so both AQMA's were therefore revoked in December 2023.

## Conclusions and Priorities

Measured concentrations of NO<sub>2</sub> decreased at most monitoring sites across Adur & Worthing, with a few exceptions. All but one site was below the annual mean objective. That one site was within Worthing AQMA No.2 and when predicted back to the nearest façade, still exceeds the objective.

Levels of PM<sub>2.5</sub> were also measured below the current limit values in both Shoreham and Worthing. However the level in Shoreham High Street was above the Air Quality Strategy Objectives (Target Year 2040)<sup>8</sup> and above the World Health Organisation (WHO) annual mean guideline limit of 10µg/m<sup>3</sup>.

Development pressures remain in both Adur & Worthing. A large number of major developments have either been granted permission or are being planned for both areas, particularly in and around Worthing and Shoreham town centres and Shoreham Harbour. Construction commenced or continued on some developments in 2023. Balancing the

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<sup>7</sup> <https://timeforworthing.uk/bike-hire-worthing/>

<sup>8</sup> Provides a comparison to the future target value. Regulation 4 of the Environmental Targets (Fine Particulate Matter) (England) Regulations 2022 sets the target to ensure that the annual mean concentration of PM<sub>2.5</sub> in ambient air is equal to or less than 10 micrograms per cubic metre by 31st December 2040. This is a non-binding target for local authorities.

demand for development with the need to improve air quality brings challenges. These developments also bring opportunities to improve infrastructure, especially for walking and cycling.

Specific priority actions for 2024 include public consultation on and publication of the new Worthing Air Quality Action Plan; developing an Adur Air Quality Strategy; continue working with our Sussex-air partners on the Defra funded projects (schools/communities) and develop new engagement strategies enabling citizen science participation; Work with Public Health partners to understand the localised health impacts of poor air quality on our residents; Continue shaping improvements for walking and wheeling; promote active travel for shorter journeys; work with WSCC on the feasibility of their ongoing cycle route consultations and continue working with WSCC on the Connected Kerb EV charge point project.

## **Local Engagement and Community Involvement**

We endeavour to engage with interested parties in the area, including community groups, schools, bus providers, transport planners, planning policy and development control. The Councils are both active members of the Sussex Air Quality Partnership (Sussex-air), co-chairing the Group. The Partnership provides assistance to members and information to the public via their website, which provides air quality data, news updates, educational resources, links and the Sussex Air Quality Alert. See <http://www.sussex-air.net/> for more information.

With development pressures across the Adur and Worthing area, it is more important than ever for interested parties, associated authorities and infrastructure stakeholders to work together to achieve improved air quality outcomes. It is noted and regrettable that National Highways have not provided suitable content for this year's report.

Locally the Council will actively seek engagement from residents and businesses who may have innovative ideas to help reduce air pollution in and around Adur & Worthing.

Road vehicles produce over 50 per cent of the emissions of nitrogen oxides in the UK. Modelling shows that small diesel cars are responsible for 44% of the NO<sub>2</sub> concentrations in Worthing's AQMA. In addition, the Adur and Worthing fleet of diesel refuse collection vehicles (RCV) contributes to local emissions. Work is ongoing to expedite a diesel free fleet. In addition, a Rounds Review of the RCVs will help improve air quality locally.

The Sussex-air website provides tips for residents to help play their part to improve air quality: <https://sussex-air.net/>

Before using your car, ask yourself:

- Could I walk or cycle instead of taking the car?
- Could I take a bus or train?
- What is the forecast for air pollution today? (See <https://sussex-air.net/>)
- Using quieter streets when you're on a bike or on foot can lower your exposure to air pollution by up to 20%.

If you must drive:

- Drive smoothly and don't rev your engine unnecessarily. You'll save fuel, and your engine will also pollute less;
- Maintain your car. Keep the engine properly tuned and the tyres at the right pressure; and
- Turn off your engine when your car is stationary for prolonged periods, particularly at main junctions and level crossings. By not idling your engine you'll help to make the air cleaner for you, other drivers, pedestrians and cyclists.

At home:

- Buy water-based or low-solvent paints, varnishes, glues and wood preservatives.
- Consider using pick up points at shops or lockers in train stations to help reduce pollution from delivery vans which are often diesel. If this is not possible, grouping deliveries together can reduce the number of journeys made by delivery vans.
- Open fires and wood-burning stoves have risen in popularity, particularly as gas and electricity prices have risen substantially. This means more smoke from chimneys, which has a negative effect on air quality, particularly in relation to fine particulate matter PM<sub>2.5</sub>. This can cause breathing problems, asthma attacks and contribute to other health conditions. The use of inappropriate fuels such as treated or damp wood can cause additional problems with local air quality.

The website at the link below provides information and advice for those that use wood burning stoves or open fires. Following its advice can help reduce the effect of burning: <https://sussex-air.net/clean-burn/>.

- Avoid lighting bonfires and instead take waste to your local recycling centre for them to compost, sign up for our garden waste collection service, buy some garden waste sacks or make compost at home. Never burn household waste, particularly plastic, rubber, foam or paint. Levels of pollution can be quite high on bonfire night and other events/festivals and sensitive people, including people with respiratory conditions, may notice some effects. Exposure can be reduced by remaining indoors and keeping windows closed. Further information is available on our website at <https://www.adur-worthing.gov.uk/environmental-health/pollution/air-quality-and-pollution/bonfires-and-smoke/>.
- Consider signing up to our air quality alert service – Sussex Air Quality Alert is a service provided by the Sussex Air Quality Partnership that sends free messages informing you of episodes of poor air quality predicted in your area. See <https://sussex-air.net/sussex-air-quality-service-for-sussex/>.
- Information on Air Quality, including reports and monitoring results, is available on our website at <https://www.adur-worthing.gov.uk/environmental-health/pollution/air-quality-and-pollution/>. Information is also available at <http://www.sussex-air.net/>.

## Local Responsibilities and Commitment

This ASR was prepared by the Public Health & Regulation Team at Adur & Worthing Councils with the support and agreement of the following officers and departments:

- Adur & Worthing Councils Sustainability Team
- Jamie Dallen, Transport Planning and Policy Team; Planning Services, West Sussex County Council
- Unfortunately despite attempts at engagement, National Highways did not provide content suitable for the report this year.

This ASR has been approved by:

Cllr Jude Harvey, Adur Cabinet Member for the Environment

Cllr Vicki Wells, Worthing Cabinet Member for the Environment

A handwritten signature in black ink, appearing to read 'V Wells', with a stylized flourish at the end.

This ASR has not been signed off by the West Sussex Director of Public Health.

If you have any comments please send them to:

Adur & Worthing Councils, Public Health & Regulation, Worthing Town Hall, Chapel Road,  
Worthing, West Sussex, BN11 1HA

Telephone: 01903 221064 Email: [publichealth.regulation@adur-worthing.gov.uk](mailto:publichealth.regulation@adur-worthing.gov.uk)

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# 1 Local Air Quality Management

This report provides an overview of air quality in Adur & Worthing during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Adur District & Worthing Borough Councils to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table 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 should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

A summary of AQMAs declared by Adur & Worthing can be found in Table 2.1.

#### Worthing Borough Council

The table presents a description of the one AQMA that is currently designated within **Worthing**. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of the AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO<sub>2</sub> annual mean

#### Adur District Council

There are no AQMAs in Adur District, with the two previous AQMA's having been revoked in December 2023. A local Air Quality Strategy is currently under development.

**Table 2.1 – Declared Air Quality Management Areas**

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance : Declaration	Level of Exceedance : Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Worthing Borough Council AQMA No.2	Declared 13/07/2011 Amended 15/12/2014	NO2 Annual Mean	Crockhurst Hill, Offington Corner Roundabout, Warren Road, Grove Lodge Roundabout, Upper Brighton Road up to and including the Downlands Retail Centre and Lyons Way	YES	71.5	40.5	0	Worthing Air Quality Action Plan 2015	<a href="https://www.adur-worthing.gov.uk/media/media,138133,en.pdf">https://www.adur-worthing.gov.uk/media/media,138133,en.pdf</a>

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

Worthing Borough Council confirm that all current AQAPs have been submitted to Defra.

## 2.2 Progress and Impact of Measures to address Air Quality in Adur & Worthing

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed, and provides the information specified in the Guidance. The following comments were provided to help inform future reports:

1. *Comments from previous ASR appraisals are included and directly responded to, this is welcomed and encouraged for future reports.*
2. *The Councils have stated they will revoke Adur District Council AQMA 2 in 2023 as it has been consistently compliant with the AQO. This is an example of good practice. A conservative approach is being taken with regards to Adur District Council AQMA 1, which is understandable. Nonetheless, the council should keep this AQMA under review and consider revoking it, as it has also been compliant with objectives for five years.*
  - Both Adur AQMA's were revoked in December 2023.
3. *The council keep their monitoring network under review and adjust it as required, which is commended. They mention diffusion tubes which were added in 2022. However, the total number of tubes is less in 2022 than in 2021 (55 relative to the 59 in 2021). The council should include all changes made to the network in future reports to ensure clarity.*
  - This has been noted.
4. *The Council includes in depth discussion of trends in monitoring data, highlighting individual sites. This level of detail is welcomed and encourage for future reports.*
5. *The Council has robust QA/QC procedures. However, a statement should be included on whether the council followed the Defra calendar when deploying their diffusion tubes.*
  - This is included in Appendix C, as it was last year.
6. *The Council has included an additional appendix with traffic data at key road links. This is a useful to addition to understand changes in traffic within the council's jurisdiction.*

7. *Throughout the report, pollutant names are not subscripted correctly (eg. NO<sub>2</sub> instead of NO<sub>2</sub>). In particular within the tables and graph axis labels. Whilst this does not affect the readability of the report, the council should check the report for such errors in future.*

- Noted and checks increased this year.

Adur & Worthing has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2, with the type of measure and the progress the Councils have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in the Worthing Air Quality Action Plan, Adur and Worthing Sustainability Framework 2021-2023, West Sussex Walking and Cycling Strategy 2016-2026, Adur & Worthing Local Cycling and Walking Infrastructure Plan (LCWIP), West Sussex Transport Plan 2022-2036 (WSTP), West Sussex public health and sustainability framework – Creating healthy and sustainable places, West Sussex Electric Vehicle Strategy 2019-2030, Adur Local Plan 2017 and Worthing Local Plan 2023.

Key completed measures are:

- Revocation of the two NO<sub>2</sub> Air Quality Management Areas in Adur. Adur District Council declared by Order two AQMA's in 2005 for exceedances of the annual mean objective - Shoreham High Street A259 (AQMA Order No, 1) and Old Shoreham Road A270 in Southwick (AQMA Order No, 2). Measurements have been consistently below the objective and less than 36µg/m<sup>3</sup>, or 10% below the objective, for 5 or more years. Our annual status reports for the last few years had successfully argued that as a result of the large amount of development in and around AQMA1, we should retain it and keep a watching brief, whilst revoking AQMA2. As a result we produced a draft Air Quality Action Plan (AQAP) for Shoreham High Street which was subject to public consultation in Spring 2023. Defra were consulted and rejected the AQAP, stating that as we had shown compliance for 5 consecutive years, we should revoke both AQMA's. Both AQMA's were therefore revoked on 19 December 2023;
- Worked with consultants Bureau Veritas to produce a draft Worthing Air Quality Action Plan. At the time of writing, the Plan was due to be consulted upon following local and national elections;

- Continued delivery of the Sussex-air Defra funded intervention programme in primary and secondary schools. A Sustrans Air Quality officer engaged with schools and groups to investigate local air quality. Local schools to have participated in the project since 2018 are Shoreham Academy, Swiss Gardens Primary, St Nicholas and St Marys Primary and Eastbrook Primary in Adur; Downsbrook Primary, Thomas A Becket Infant and Junior Schools, Bohunt School, Durrington High School, Davison High School for Girls, Worthing High, Chesswood Junior and Broadwater CofE School in Worthing;
- A School Streets trial launched in 2023 at Swiss Gardens Primary, Shoreham and Thomas A Becket Junior School, Worthing. Our Sustrans work dovetailed with WSCC appointed Sustrans work at these locations;
- Part of the successful Defra grant bid was a taxi engagement project in Sussex, looking at how we could increase the uptake of EV's and associated charging. This included a survey of taxi operators. The results are being quantified;
- Continued to work with WSCC on the Connected Kerb EV charge point project, identifying and installing kerbside charge point sites across Adur & Worthing;
- Launched consultations on bus service improvements and walking improvements/interventions;
- Use of the Sussex Air Quality Emissions Mitigation Planning Guidance when looking at the impacts of 'major'<sup>9</sup> developments. The Guidance has assisted the Councils with obtaining costed air quality mitigation at development sites and relevant section 106 funds;
- Continued discussions with car club providers to develop dedicated car club spaces within Adur & Worthing;
- Further development work undertaken on Upper Shoreham Road and Middle Road active travel/crossing improvement schemes and opened a consultation on the Lancing Beach Green cycle path reroute;
- WSCC published the results of the A259 segregated cycle route consultation which indicated enough support to move forward with the proposals;
- Consultation open on Durrington-Goring transport improvements.
- Completion of Findon Valley Shared path improvements;
- Undertook a prioritisation of the LCWIP (ranked cycle routes and identified walking

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<sup>9</sup> as defined by Town and Country Planning (Development Management Procedure) Order (England) 2015

& wheeling zones - areas with a density of schools, green spaces and services where walking should be simple but is often congested/difficult);

- Expansion of the Council's bike share scheme (Donkey Bikes<sup>10</sup>) into Adur.
- Commissioning of 55 Ground Source Heat Pumps in Adur, replacing large communal gas boilers with zero emissions heating solutions;
- Installation of Air Source Heat Pumps at the Shoreham Centre to reduce gas combustion on site;
- Letting of a contract to design, build, own, operate and maintain a large, low carbon heat network in Worthing Town Centre, with complete removal of multiple large gas boilers from public and private sector developments.

Adur & Worthing expects the following measures to be completed over the course of the next reporting year:

- Consult on and publish a revised Air Quality Action Plan for Worthing;
- Publish an Air Quality Strategy for Adur;
- Deploy a low cost sensor (node) in Shoreham, as part of The Greater Brighton Real-time project, funded by the City Council's Carbon Neutral Fund and Defra's Air Quality Grant;
- Explore the purchase and deployment of a low cost sensor in order to monitor PM<sub>2.5</sub> in areas of high traffic density;
- Revise the Air Quality & Emissions Mitigation Planning Guidance for Sussex as part of the Sussex-air project team;
- Continue dialogue with Car Club providers in Adur and expand the Worthing Car Club, particularly in new developments and those with reduced parking;
- Continue to engage with the Sustrans Sussex-air Defra funded schools and community group programme in Adur & Worthing until October 2024 when funding ends;
- Continue to engage with WSCC on their school streets programme.

Adur & Worthing's priorities for the coming year are:

- Work with National Highways and West Sussex County Council to develop and consult on a new Adur Air Quality Strategy;

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<sup>10</sup> <https://timeforworthing.uk/bike-hire-worthing/>

- Publish a new Worthing Air Quality Action Plan following a period of public consultation during the Summer of 2024, which has been drafted in partnership with West Sussex County Council, National Highways and Bureau Veritas consultants;
- Continue to work with WSCC on the Connected Kerb EV charge point project;
- Continue shaping improvements for walking and wheeling, promote active travel for shorter journeys and work with WSCC on the feasibility of their ongoing cycle route consultations.

Adur & Worthing worked to implement these measures in partnership with the following stakeholders during 2023:

- West Sussex County Council
- Sussex-air

The principal challenges and barriers to implementation that Adur & Worthing anticipates facing are:

**Development pressures in both Adur and Worthing.** A large number of major developments have been granted permission and there are still a large number planned. Balancing the demand for development with good air quality is challenging. These developments do also bring opportunities to improve infrastructure, especially for walking and cycling, and thus limit the impacts on the existing AQMAs and avoid creating new hotspots. Many developments in Worthing, either granted or planned, are in or close to the Town Centre, away from the AQMA. Similarly, there are several planning permissions granted for development at the Western Harbour Arm, Shoreham, or in the vicinity, some of which are almost completed.

## Adur

Please note that an update of the Adur Local Plan has commenced.

### ***The Adur Local Plan 2017 allocated the following sites:***

- West Sompting – allocated in the Adur Local Plan for a minimum of 480 homes and a range of open space. Application AWDM/0323/19 was granted consent on 20th September 2021, for a total of 469 dwellings, subject to completion of a s106 agreement which is anticipated by the end of summer 2023. The S.106 was signed on 7th August 2023. Phase 1 for 96 units has been approved in full, and development has commenced.

- New Monks Farm. Application AWDM/0961/17 was determined on 4th February 2020 (following completion of the associated s106). Outline permission was granted for 249 dwellings and other matters including a country park and relocation and extension of a gypsy and traveller site, in addition to outline permission for 351 further dwellings, a primary school, and a non-food retail store (use class A1). This retail store was intended to replace the employment allocation originally sought by the Adur Local Plan 2017, creating a number of jobs, and contributing to the local economy. A Reserved Matters application for the additional dwellings was submitted in 2022. This proposed an increase of 34 dwellings from the outline approval. The plans submitted related to the erection of 385 dwellings and Community Hub (Flexible Class E/F1/F2 use). This application went to Adur Planning Committee on 30th November 2022 with the decision to grant the application subject to the completion of a planning obligation. The Deed of Variation to the original s106 agreement (under AWDM/0961/17) was signed on 13th February 2023 and supersedes some of the previous obligations. Development is well underway. The new Traveller Site has been completed and all pitches occupied, although all infrastructure required on-site is still delivered; and works on the new roundabout junction with the A27 is advanced and expected to be completed in the second half of 2024. In July 2021 IKEA announced that it would not be delivering its retail store; this allows the authority to seek commercial floor space (consistent with the Adur Local Plan policy requirement), but there may be an opportunity for further residential development.
- The New Monks Farm application is linked to planning ref. AWDM/1093/17 at Shoreham Airport due to a shared access to the A27. This site was allocated in the Adur Local Plan 2017 for 15,000 square metres of employment generating floorspace. (Subsequent to this, application planning ref. AWDM/1093/17 was granted consent for 25,000sqm of business floorspace in 2019). A reserved matters application (AWDM/1831/21) was submitted in October 2021, and permitted in July 2022. The development has now been constructed.

The Adur Local Plan (adopted 2017) allocates Shoreham Harbour Regeneration Area for a minimum of 1100 dwellings. Subsequently the Shoreham Harbour Joint Area Action Plan was adopted in 2019. At the time of writing, the following developments have come forward:

- 255 dwellings permitted at Kingston Wharf (AWDM/0204/20) in January 2021;

- Development at Free Wharf (AWDM/1497/17, 548 dwellings) was granted consent in 2018; application AWDM/1315/22 sought amendments for additional dwellings on this site bringing the total to 587 dwellings. Adur Planning Committee 31st January 2023 resolved to grant consent subject to s106 agreement, which was signed on 6th March 2024.
- A development of 14 units has been completed at Humphrey's Gap on Brighton Road (AWDM/1625/16);
- Mariner's Point (132 dwellings permitted before the adoption of the Adur Local Plan and JAAP) also falls within this allocation.
- An application for the development of 176 apartments at Frosts 69-75 Brighton Road, just outside AQMA1 and was approved on 16 June 2023 (AWDM/1473/21).
- Schemes at 5 Brighton Road (Howard Kent site) were initially refused; however following appeal, one was dismissed on 8 December 2023, but the revised scheme (AWDM/1962/22) for 21 townhouses and a block of 24 flats (with revised design and provision of on-site affordable housing) was allowed on appeal on 8 December 2023.
- The Mannings (AWDM/1281/19). This is a redevelopment of an existing residential (affordable housing) block. The scheme will deliver 74 units in total, a net addition of 40 dwellings. This was approved in October 2021. (This sits outside of, but nearby, the Western Harbour Arm allocation). Development is underway.
- Pilot Pub AWDM/2139/20. 34 apartments on the site of a former pub. *Although a recommendation to approve subject to s106 was made in April 2021 the s106 has still not been signed off.*

Current housing projections for the Shoreham Harbour JAPP show potential for more development than originally anticipated, significantly more than the original projections, adding parking pressure issues and therefore increasing the importance of alternatives to private car use such as car clubs. Work is being undertaken via a 'Placemaking Study' to look at options for the remaining area within the allocation.

## Worthing

The Worthing Local Plan was adopted in March 2023. The Plan includes the following allocations (dwelling numbers are minimums):

- Beeches Avenue - 90 dwellings
- Caravan Club - 100 dwellings

- Centenary House - 250 dwellings and employment uses (10,000 sqm)
- Civic Centre - integrated health hub (7,000 sqm)
- Decoy Farm - employment uses (14,000 sqm)
- Fulbeck Ave - 152 dwellings
- Grafton - 150 dwellings and commercial uses (2,500 sqm)
- HMRC offices - 250 dwellings and care home – in development
- Lyndhurst Road - 150 dwellings
- Martlets Way - 28 dwellings and employment uses (10,000 sqm)
- Stagecoach site - 60 dwellings and commercial uses (2,000 sqm)
- Teville Gate - 250 dwellings and commercial uses (4,000 sqm)
- Union Place - 150 dwellings and commercial uses (700 sqm)
- Upper Brighton Road - 123 dwellings

The sites at Upper Brighton Road and Beeches Avenue are in close proximity to the AQMA.

- A.** Development pressures in both Adur and Worthing could also have an effect on traffic volumes in the other District, particularly along the A27 and within the Worthing AQMA;
- B.** Providing sufficient resources in order to progress and deliver effective air quality measures. As part of the Sussex-air consortium we were unsuccessful in our bid to Defra's 2023 air quality grant fund to expand the Sustrans community engagement work and work with Global Action Plan targeting particulates. So unfortunately the Sustrans work will now cease in 2024;
- C.** Identifying suitable sites for the provision of car club spaces alongside sufficient funding;
- D.** Purchasing alternatively fuelled larger vehicles (HGV's) to replace conventionally fuelled vehicles within the Council's fleet will depend on suitable funding and sourcing appropriate vehicles and refuelling facilities.

Progress on the following measures has been slower than expected due to:

- Worthing Air Quality Action Plan (AQAP) – We commissioned air quality consultants Bureau Veritas to assist us in the production of a new Action Plan. The Plan was delayed as a result of slow engagement from National Highways. The Draft Plan

has now been accepted by Defra and we are waiting for the elections to be completed before going out to public consultation in Summer 2024.

Worthing Borough Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in AQMA No.2.

**Table 2.2 – Progress on Measures to Improve Air Quality**

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation	
								<b>ADUR</b>								
1	Adur/Worthing Car Club	Alternatives to private vehicle use	Car Clubs	2022		Adur DC/Worthing BC/WSCC	Developer contributions/Adur DC	NO	Partially Funded	£100k - £500k	Implementation	Small impact upon NO <sub>2</sub> concentrations from measure individually, estimated to be less than 1µg/m <sup>3</sup> based upon a low to medium uptake.	Number of car sharing individuals  Website hits/journeys planned/Number of registrants/take-up of initiatives	Car club providers continued discussions with developers regarding specific development sites in Shoreham. These developments are still yet to be completed.  Two dedicated bays in Pond Road car park, Shoreham.	Encouragement of Car Clubs as well as Car Sharing schemes. Car clubs also embedded in planned new developments.	
2	Embed AQ Emissions Mitigation Planning Guidance for Sussex into the planning process	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2012		Adur DC/Worthing BC/WSCC	LA	NO	Funded	< £10k	Implementation	Low	Low emission mitigation secured in local developments	Revised Guidance published in April 2021. The guidance is signposted within the Adur Local Plan and the Worthing local Plan. Guidance and appropriate mitigation is flagged as a requirement at an early stage. Emission mitigation assessments required from major developments to ensure meaningful mitigation. Shoreham Harbour JAAP includes policies for sustainable travel and infrastructure improvements.	Consider developing the Guidance into a Supplementary Planning Document if deemed necessary.	
3	Behavioural Change Campaign	Promoting Travel Alternatives	Other/ Encourage / Facilitate home-working	2023		Adur DC/Worthing BC/WSCC/Sussex-air	ADC/WSCC/Sussex-air		Partially Funded	<£10k	Planning	NO <sub>2</sub> measure to raise public awareness	Number of campaigns	Sussex Air Sustrans led DEFRA funded project worked with schools and communities, including across Adur to raise awareness of air pollution throughout 2023. School Streets Trial launched in 2023 at Swiss Gardens Primary School, Shoreham.  Adur & Worthing & WSCC EASIT scheme for staff and local businesses continues. All pool cars now hybrid. Newer cleaner models being phased in.	Educational behaviour change campaigns at schools and workplaces to reduce single occupancy car trips and promote the switch to sustainable alternatives. Including promotion of district wide clean air days, homeworking where possible. Linked to Carbon Neutrality policies and schemes.  Employer-based / school travel plans to encourage active travel including walking to school incentives.  School streets trial.	
4	Ultra Low/Zero Emission Vehicle Encouragement	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising	2022		Adur DC/Worthing BC/WSCC	Adur DC/ WSCC/Sussex-air	NO	Partially Funded	£1m - £10m	Implementation	Small impact upon NO <sub>2</sub> concentrations from	Number of Low Emissions Vehicles	Programme of fleet replacement with EV/hybrid vehicles continues, as and when vehicles are due for	Procuring ultra low or zero emission vehicles for council owned	

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
			uptake of low emission vehicles									measure individually, estimated to be less than 1µg/m <sup>3</sup> based upon a low to medium uptake.		replacement. All pool cars hybrids. Explore alternative fuels for refuse vehicles. EV charge points continue to be provided for new 'major' developments aided by new Building Regulations Approved Documents; West Sussex County Council, Adur and Worthing Councils, and all other West Sussex local planning authorities together with Connected Kerb have formed a partnership to provide a new chargepoint network across West Sussex. The partners are working together to install thousands of chargepoints across the county within the next ten years, forming the new West Sussex Chargepoint Network. WSSC parking standards sets increasing year on year targets for ev charge points at new developments.	fleets. Including further development of alternative fuel, installing EV charge points on council land, in accordance with EV strategy. This also links to part of the West Sussex County Council EV Strategy to improve charging infrastructure.
5	Bus and Taxi Fleet Improvements	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2023		ADC/WSSC/Sussex-air/Bus operators	ADC/WSSC/Sussex-air	Yes	Partially Funded	£100k - £500k	Implementation	Small impact upon NO <sub>2</sub> concentrations from measure individually, estimated to be less than 1µg/m <sup>3</sup> based upon a low to medium uptake.	Number of ultra-low emission busses and EV Taxis	Defra funded Sussex-air taxi fleet study has been completed, including a survey of taxi operators. Results are being quantified. Bus operators in West Sussex continue to explore low emission fuel technologies in their fleets and local authorities are in dialogue with operators as plans develop, including consideration of any funding opportunities as they arise. Work with Brighton & Hove City Council continued to reduce emissions on routes through Adur/Worthing and into the Brighton LEZ. Adur and Worthing launched a consultation on bus service improvements, WSSC are updating their Bus Service Improvement Plan.	Collaboration with bus operators to introduce ultra-low emission vehicles into the bus fleet. Target use of ULEV into the problem areas. Review taxi EV charging provision, taxi rank locations and update licence fees to encourage EV uptake.
6	Public Transport Encouragement	Transport Planning and Infrastructure	Public transport improvements -interchanges stations and services	2023		WSSC/ADC/public transport operators	WSSC/ADC	No		£100k-£500k	Planning	Small impact upon NO <sub>2</sub> concentrations from measure individually, estimated to be less than 1µg/m <sup>3</sup> based upon a low to medium uptake.	Number of campaigns and use of public transport.	BSIP funding awarded for West Sussex includes improved provision of real time passenger information screens at bus stops and junction traffic light priority signal upgrades in particular to support the Coastliner Route 700 service.	Improvements to public transport infrastructure, frequency, routes and incentivise usage, including rail travel services and information campaigns focusing on tourists to district. This also links to the West Sussex Bus Service Improvement Plan.

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7	Domestic emissions reduction campaigns focused on PM2.5	Public information	Other	2022	2025	ADC/WBC/Sussex-air	ADC/Sussex-air	Yes	Part funded	£10k-£50k	Implementation	PM <sub>2.5</sub> measure to raise public awareness	Number of Campaigns		Includes consideration of Smoke Control Areas and domestic and commercial emissions reduction work.
8	Active Travel	Transport Planning and Infrastructure	Cycle Network	2023		Adur DC/WBC/WSCC/Sussex-air	Adur DC/WSCC/Sussex-air	NO	Partially Funded	<£10K	Planning	Reduction in NO <sub>2</sub> concentrations and raises public awareness	Number of those using active travel. Number of those using cycle facilities and number of cycle routes	<p>Public consultation took place on A259 Shoreham to Hove and Lancing and Sompting cycling and walking infrastructure improvements in 2023, with A259 and east-west route Lancing Sompting schemes subsequently progressing to next stage of design and business case development. Further development work undertaken on Upper Shoreham Road and Middle Road active travel/crossing improvement schemes.</p> <p>Launched a consultation on walking improvements/interventions, Undertook a prioritisation of the LCWIP (ranked cycle routes and identified walking &amp; wheeling zones - areas with a density of schools, green spaces and services where walking should be simple but is often congested/difficult).</p> <p>WSCC are updating their LCWIP and Active Travel Strategy.</p> <p>Donkey Bike scheme expanded into Adur and installed 170 cycle racks and 4 tool stations.</p> <p>Consultations launched on Lancing Beach Green cycle path reroute and cycle routes in Shoreham.</p>	Improving cycle parking facilities, cycle and scooter rental schemes, signage and providing new cycle and pedestrianised routes in line with Adur and Worthing Local Cycling and Walking Infrastructure Plan.
9	Public Health Information based campaigns and ongoing monitoring	Public Information	Other	2023		Adur DC/Worthing BC/WSCC/Sussex-air	AdurDC/WSCC/Sussex-air	Yes (part)	Partially Funded	£50-100k	Implementation	NO <sub>2</sub> measure to raise public awareness	Number of Campaigns	Liaison with WSCC Public Health/Sustainability teams who have supported the promotion of Sussex-air Alert. Sussex-air CleanBurn site promoted via Adur and Worthing's website; continuous NO <sub>x</sub> and PM <sub>2.5</sub> monitoring in Shoreham High St; NO <sub>2</sub> diffusion tubes across Adur.	Continue to use Sussex AQ Alert and commitment to ongoing measurements of AQ pollutants. Ongoing funding will be key
10	Transport Management/Road/Junction improvements and Anti Idling	Traffic Management	UTC, Congestion management, traffic reduction	2023	2025	WSCC/ADC/WBC	To be determined - developer contributions	NO	Partially Funded	£1m - £10m	Planning	Reduction in NO <sub>2</sub> concentrations	Reduction in NO <sub>2</sub> Emissions	Anti idling signs placed at known hotspots; Feasibility work undertaken through Shoreham Town Centre Study 2014. Scheme options for Norfolk Bridge junction were reviewed in 2022 given challenges of limited highway space. Further engagement with Members	Improvements to A259/A283 Norfolk Bridge roundabout. Traffic light/pelican crossing optimisation/MOV A traffic control.

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															and stakeholders is required to understand level of support for potential interventions given highway space constraints. Engagement undertaken in 2023 to understand views on potential Controlled Parking Zone in Shoreham Town Centre.	Review of Shoreham parking and parking restrictions.  Scheduling business delivery time away from peak hours, waiting and loading restrictions/ keep clear zones.  Level crossings  Review of bus stops within High Street, traffic signage, routing and car park signposting.
<b>WORTHING</b>																
1	A27 Highway Improvements	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2023	2026	National Highways (NH)	NH	NO	Partially Funded	> £10 million	Planning	High	Reduction in levels of NO <sub>2</sub>		National Highways have been working with key stakeholders to identify a package of potential improvements to meet the revised objectives in the government's Road Investment Strategy 3 (RIS 3): 2025 to 2030, to improve capacity and flow of traffic on the A27 from Worthing to Lancing,	
2	Cut Engine, Cut Pollution Signs	Traffic Management	Anti-idling enforcement	2023	2025	NH/WSCC	Worthing BC/NH/WSCC	NO	Funded	< £10k	Implementation	Low/Medium	Local AQ monitoring/reduction in NO <sub>2</sub>		Consider the case for further 'Cut Engine, Cut pollution' signs in locations with extended stationary traffic queue hotspots ' Temporary signs funded by Worthing BC. Sussex-air funded new signs at level crossings. For the A27 National highways will need to consider and approve any signage	
3	Embed Air Quality Emissions Mitigation Planning Guidance for Sussex into the planning process/planning policies	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2025	Worthing BC/WSCC	Worthing BC/WSCC	NO	Funded	< £10k	Implementation	Low	LE mitigation secured in developments		Revised Guidance published April 2021. The guidance is signposted within the Worthing Local Plan. Guidance and appropriate mitigation is flagged as a requirement at an early stage. Emission mitigation assessments required from major developments to ensure meaningful mitigation. Progress with revised guidance has been slow, now due second half of 2024. Developing the Guidance into a Supplementary Planning Document is considered unlikely and unnecessary.	

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
4	EV vehicles and infrastructure	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2016	2025	Worthing BC/WSCC	Worthing BC/WSCC/NH	NO	Partially Funded		Implementation	Low/Medium	Number of charge points provided	EV charge points continue to be provided for new 'major' developments aided by new Building Regulations Approved Documents ; West Sussex County Council, Adur and Worthing Councils, and all other West Sussex local planning authorities together with Connected Kerb have formed a partnership to provide a new chargepoint network across West Sussex. The partners are working together to install thousands of chargepoints across the county within the next ten years, forming the new West Sussex Chargepoint Network. New on street chargepoints have been provided across the Council area in 2023. WSCC parking standards sets increasing year on year targets for EV charge points at new developments.	Focus is to increase the number of eV's. Discussions continue successfully with developers as part of AQ mitigation packages, aided by Building Regulations Approved Document S.
5	Worthing Car Club	Alternatives to private vehicle use	Car Clubs	2015	2029	Worthing BC/ADC	Worthing BC/Developer Contributions	NO	Partially Funded	£50k - £100k	Implementation	Low	Number of people using the service/ Number of vehicles	There are two dedicated bays in High Street surface car park Worthing. Discussions with car club providers continued during 2023. Car club providers continued discussions with developers regarding specific development sites. Developments nearing completion.	V. small reduction in AQMA, however larger reductions anticipated elsewhere (e.g. town centre where new developments are more likely to be car free). Car clubs embedded in planned new developments.
6	Public transport improvement	Transport Planning and Infrastructure	Public transport improvements -interchanges stations and services	2012	2025	WSCC	WSCC/DFT/OLEV	NO	Partially Funded		Implementation	Low	Journey time and passenger number improvements	WSCC and WBC proposals for Worthing Station Railway Approach are expected to benefit pedestrians, cyclists, and train, bus and taxi users. WSCC is expected to deliver Worthing Railway Approach public realm and access improvements during 2024. Bus operators in West Sussex continue to explore low emission fuel technologies in their fleets and local authorities are in dialogue with operators as plans develop, including consideration of any funding opportunities as they arise. Work with Brighton & Hove City Council continued to reduce emissions on routes through Adur/Worthing and into the Brighton LEZ. Adur and Worthing launched a consultation on bus service improvements and a consultation is open on Durrington-Goring transport improvements.  WSCC are updating their Bus Service Improvement Plan.	Subject to appropriate funding being made available.

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7	WBC and WSCC Staff Travel Planning	Promoting Travel Alternatives	Workplace Travel Planning	2021		Worthing BC/ ADC/ WSCC	Worthing BC/ ADC/ WSCC	NO	Partially Funded		Implementation	Low	Staff travel surveys reduced commuting and business travel by car	WBC Staff Travel Plan updated in 2021. Hybrid models for mixed working from home/office is the business model now. Adur & Worthing & WSCC EASIT scheme for staff and local businesses continues. All pool cars hybrid with a replacement programme in progress with newer cleaner models.	
8	Improve Emissions from Council's Vehicle fleet	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2023	2030	Worthing BC/ADC/ WSCC	Worthing BC/ADC/WSCC	NO	Partially Funded	£1 million - £10 million	Implementation	Low	No. of vehicles replaced with better Euro standard models	Programme of fleet replacement with low emission vehicles, as and when vehicles are due for replacement. All A&WC pool cars hybrids. Exploring alternative fuels for larger vehicles including the fleet of refuse vehicles. EV's now part of WSCC pool car fleet.	Finance; Suitable vehicles that are both available and affordable (e.g. HGV's/refuse vehicles).
9	Increase availability of AQ information in relation to impacts on Public Health	Public Information	Via the Internet	2023	2026	Worthing BC	Worthing BC	NO	Funded	< £10k	Implementation	Low	Reduction in levels of NO2/No. of hits on AQ pages	Worthing AURN Grove Lodge Monitoring Station cabinet replaced in early 2023. AQ information available via UK Air and the Sussex-air website, links on Council website.	Measure success of AQAP/levels in AQMA. Assist with PM2.5 strategy
10	Promotion of Sussex Air Quality Alert Service	Public Information	Via the Internet	2014	2026	Worthing BC	Worthing BC/ WSCC	NO	Partially Funded	£10k - 50k	Implementation	Low	Annual increase in subscriber numbers	Liaison with WSCC Public Team who have supported the promotion of alert services. Sussex-air website provides a smoother more relevant customer experience including Worthing Grove Lodge monitoring results and Diffusion tube data.	Attempt to reduce car journeys and increase walking and cycling through the AQMA.  Promotion of alert service.
11	Re-assess traffic light sequencing in AQMA	Traffic Management	UTC, Congestion management, traffic reduction	2012		NH/WSCC	NH/WSCC	NO	Funded		Implementation	Low	Reduction in levels of NO <sub>2</sub>	Ongoing optimisation by NH/WSCC.	
12	Safe Cycling and Walking Routes	Transport Planning and Infrastructure	Cycle network	2012	2030	NH/WSCC	NH/WSCC	NO	Funded	£1 million - £10 million	Implementation	Low	Length of new cycle routes provided	Launched a consultation on walking improvements/interventions. Undertook a prioritisation of the LCWIP (ranked cycle routes and identified walking & wheeling zones - areas with a density of schools, green spaces and services where walking should be simple but is often congested/difficult). In 2023 the Findon Valley shared path improvements were completed (see entry 17).WSCC are updating their LCWIP and Active Travel Strategy.	There already exist cycle paths segregated from pedestrians in and around the Grove Lodge AQMA.
13	Travel plans for significant/major developments	Promoting Travel Alternatives	Other	2023	2026	Worthing BC/WSCC	Developer Contribution	NO	Partially Funded	£500k - £1 million	Planning	Low	Number of plans delivered	Plans continue to be secured as and when developments come forward. The Local Plan adds weight to the requirement for travel plans. The Worthing Local Plan was formally adopted by the Council in 2023.	

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14	Car Sharing	Alternatives to private vehicle use	Car & lift sharing schemes	2015		WSCC	WSCC	NO	Funded		Implementation	Low	Website hits/journeys planned/Number of registrants/take-up of initiatives	Car share website <a href="http://www.westsussexcarshare.com">www.westsussexcarshare.com</a>	Focus on promoting sustainable travel/car. Link on Worthing website.
15	Cycling & Walking promotion	Promoting Travel Alternatives	Promotion of cycling	2015		Worthing BC/WSCC	WSCC/Developer Contributions	NO	Partially Funded		Implementation	Low	Automatic cycle counters and travel surveys	WSCC Bikeability has been engaging with primary and secondary schools across Worthing to offer cycle training. In addition Sustrans have been working with schools through a Sussex-air engagement programme.3 active travel to school areas. Installed 170 cycle racks and 4 tool stations. School Streets Trial launched in 2023 at Thomas A Becket Junior School, Worthing	Focus on reducing traffic congestion and promoting sustainable travel for trips to and from work. Subject to available funding.
16	Increase and improve availability of WBC Air Quality Monitoring results	Public Information	Via the Internet	2015	2026	Worthing BC	Worthing BC	NO	Funded	£10k - 50k	Implementation	Low	Reduction in levels of NO <sub>2</sub> /No. of hits on AQ pages	Councils webpages updated alongside Sussex-air webpage updates.	Revision of webpages ongoing
17	Active Travel Fund Schemes	Transport Planning and Infrastructure		2020	2020	WSCC	DfT Active Travel Fund	NO	Funded		Implementation	Low	Length of new cycle routes provided	Department for Transport Active Travel Fund funding received to deliver Findon Valley to Findon cycle scheme to connect cycle route from the A24 Findon village to Worthing through the AQMA, with scheme open in early 2023.	Focus on promoting sustainable transport and minimising car use and vehicle congestion

## 2.3 PM<sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy<sup>11</sup>, local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter (PM<sub>2.5</sub>). There is clear evidence that PM<sub>2.5</sub> (particulate matter smaller 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Adur & Worthing is taking the following measures to address PM<sub>2.5</sub> in partnership with partners through Sussex-air:

- Where wood burning must take place, promoting cleaner burning via the *Clean Burn* pages on the Sussex-air website, funded through Defra funding. This highlights the issue of particulate emissions from domestic burning and remains linked to the council's website.
- The Councils continue to consider the declaration of Smoke Control Areas (SCA). There is increasing support for this and will be considered as part of our revised Worthing Air Quality Action Plan and Adur Air Quality Strategy in 2024.
- Both Adur District and Worthing Borough Council monitor levels of PM<sub>2.5</sub> through the automatic monitoring sites in Shoreham High Street (site ref. AD1) and the AURN affiliated continuous monitoring site at A27 Grove Lodge, Worthing (Site ref. WT2). Both monitoring sites will assist us with assessing PM<sub>2.5</sub> and developing strategies to address particulates.
- Work carried out by Public Health England as part of the Public Health Outcomes Framework (PHOF) shows that the mortality associated with particulate air pollution within Adur District is 4.6% and Worthing Borough is 4.7%. This information is available from the following web link: <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework>. The calculated mortality is lower than that for both the south east of England (5.7%) and for England (5.8 %).

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<sup>11</sup> Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

It is our intention that the new Worthing Air Quality Action Plan and Adur Air Quality Strategy, both due in 2024, will include action(s) targeting particulate matter.

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

This section sets out the monitoring undertaken within 2023 by Adur & Worthing and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

### 3.1 Summary of Monitoring Undertaken

#### 3.1.1 Automatic Monitoring Sites

Adur & Worthing undertook automatic (continuous) monitoring at two sites during 2023. Table A.1 in Appendix A shows the details of the automatic monitoring sites.

NB. Local authorities do not have to report annually on the following pollutants: 1,3-butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. The <https://sussex-air.net/> page presents automatic monitoring results for Adur & Worthing, with automatic monitoring results also available through the UK-Air website .

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

#### 3.1.2 Non-Automatic Monitoring Sites

Adur District Council undertook non-automatic (i.e. passive) monitoring of NO<sub>2</sub> at 28 sites during 2023. Worthing Borough Council undertook non-automatic monitoring of NO<sub>2</sub> at 28 sites during 2023.

Table A.2 in Appendix A presents the details of the non-automatic sites.

The following non-automatic site was added in 2023:

- S53 Abinger Lodge, Lancing (Adur). This is a roadside site located on the A259 - one of only two east-west arterial roads through the District. The tube is situated close to three residential blocks consisting of 14 flats. Two of these blocks are

within five metres of the kerb. Traditional, two-storey, detached housing is being replaced along the southern side of this road by three-storey, semi-detached town houses. Not only higher, these semi-detached houses extend sideways from the original footprint, closing gaps between properties. There are concerns this could result in a street canyoning effect, hence why the tube was installed.

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

## 3.2 Individual Pollutants

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

### 3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past five years with the air quality objective of 40µg/m<sup>3</sup>. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2023 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past five years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year.

#### A. Adur

##### Automatic Monitoring

The measured annual mean at the continuous monitoring site in Shoreham High Street was  $21.0\mu\text{g}/\text{m}^3$  (data capture 95.9%). This is a slight increase over the  $20.3\mu\text{g}/\text{m}^3$  measured last year, but still well below the objective of  $40\mu\text{g}/\text{m}^3$ .

There were no recorded exceedances of the one hour mean objective of  $200\mu\text{g}/\text{m}^3$ .

### Non-Automatic Monitoring

28 diffusion tubes were used during 2023, one of which was at a new location. The other 27 tubes all showed small decreases in measured annual means when compared to 2022, ranging from  $-0.2\mu\text{g}/\text{m}^3$  (S18 & S46) to  $-2.5\mu\text{g}/\text{m}^3$  (S48).

All but three sites recorded a data capture rate of 100%. Sites S8 and S51 recorded 92% and the new location Site S53 recorded 59.6% as it was only added in June 2023.

Importantly no monitoring sites exceeded the annual mean objective of  $40\mu\text{g}/\text{m}^3$  during 2023.

### *Shoreham sites in and around what was AQMA1*

S17/18/19 are collocated tubes alongside the continuous analyser in the High Street. These recorded an average of  $23.3\mu\text{g}/\text{m}^3$ , a  $0.9\mu\text{g}/\text{m}^3$  reduction on 2022 but  $2.3\mu\text{g}/\text{m}^3$  above the continuous monitoring result at this location. This difference is likely to be the result of the lower accuracy of diffusion tube monitoring.

Tubes in West Street Shoreham, S46 and S47, showed virtually no change in levels and were well below the objective at  $18.6\mu\text{g}/\text{m}^3$  and  $16.0\mu\text{g}/\text{m}^3$  respectively. West Street is regularly used by vehicles trying to avoid congestion along the High Street (A259).

Site S36 Victoria Road Footpath showed a decrease of  $0.8\mu\text{g}/\text{m}^3$  to  $17.8\mu\text{g}/\text{m}^3$ .

S37 Humphrey's Gap showed an increase of  $1.5\mu\text{g}/\text{m}^3$  to  $23.4\mu\text{g}/\text{m}^3$ .

Site S50 was erected on a facade in the High Street in 2021, replacing site S49 near the continuous monitoring site. The measured level decreased in 2023 to  $20.5\mu\text{g}/\text{m}^3$ .

S45 Dolphin Mews, adjacent to a level crossing where vehicles often queue and idle for prolonged periods, decreased from  $16.4\mu\text{g}/\text{m}^3$  to  $14.6\mu\text{g}/\text{m}^3$ .

West Sussex County Council (WSCC) reinstated the automatic traffic counter (ATC) in Shoreham High Street in November 2021. The measured AADT for 2023 was 15,332. This was a slight increase of 212 vehicles compared to 2022.

### *Southwick in what was AQMA2*

Site S8 decreased by  $0.3\mu\text{g}/\text{m}^3$  to  $22.9\mu\text{g}/\text{m}^3$  and S9 fell by  $1.8\mu\text{g}/\text{m}^3$  to  $23.6\mu\text{g}/\text{m}^3$ . Both are well below the annual mean objective. Both are roadside locations and levels drop further when predicted back to the nearest receptors, 4m and 2m away respectively.

The nearby WSCC automatic traffic counter recorded a 0.1% increase in AADT in the area and does not appear to have resulted in a significant increase in measured levels of  $\text{NO}_2$ .

### *Lancing*

Site S48 Grinstead Lane in Lancing recorded the largest decrease in the District of  $2.5\mu\text{g}/\text{m}^3$  to  $27.5\mu\text{g}/\text{m}^3$ . Last year it recorded the largest increase.

Site S52 was erected in Grinstead Lane close to the roundabout in 2022, in response to our concerns about levels in this area. Levels decreased by  $0.5\mu\text{g}/\text{m}^3$  to  $35.2\mu\text{g}/\text{m}^3$  in 2023 but this was still the highest level recorded in the District. This is a kerbside site and the nearest receptors are 17.5m away so when levels are predicted back they drop to  $22.2\mu\text{g}/\text{m}^3$ .

Site S44 Upper Brighton Road, Lancing decreased by  $1.8\mu\text{g}/\text{m}^3$  to  $31.8\mu\text{g}/\text{m}^3$ . This site is adjacent to the eastbound A27 dual carriageway with the closest receptor just over 5m away.

Site S51 close to the Sussex Pad on the A27 Lancing produced an annual mean of  $23.0\mu\text{g}/\text{m}^3$ . This site is close to a new roundabout under construction to service the New Monks Farm development adjacent to the A27. The tube is not located at a site of relevant exposure.

Site S25 Mash Barn Lane in Lancing showed a fall of  $1.3\mu\text{g}/\text{m}^3$  to  $24.4\mu\text{g}/\text{m}^3$ .

New tube site S53 Abinger Lodge, Lancing gave a level here of  $12.8\mu\text{g}/\text{m}^3$ . This is a roadside site and the result annualised as it started part way through the year.

We continue to keep an eye on the A27 in Lancing, particularly around the Grinstead Lane roundabout, with large developments taking place nearby.

### *Sompting*

Site S14 in West Street Sompting recorded a decrease of  $0.3\mu\text{g}/\text{m}^3$  to  $18.1\mu\text{g}/\text{m}^3$ .

## ***B. Worthing***

### *Automatic Monitoring*

The annual mean recorded at the continuous monitoring site WT2 Grove Lodge in AQMA No.2 was  $23.4 \mu\text{g}/\text{m}^3$  (data capture 84.9%). This is a drop of  $2.0\mu\text{g}/\text{m}^3$  from the 2022 level. This is below the national objective of  $40\mu\text{g}/\text{m}^3$ .

There were no exceedances of the one hour mean objective of  $200\mu\text{g}/\text{m}^3$ .

The automatic monitoring site is an AURN affiliated site located adjacent to the A27, a single lane strategic trunk route through Worthing with slow moving or stationary traffic for prolonged periods. Annual average  $\text{NO}_2$  peaked at  $51.4\mu\text{g}/\text{m}^3$  in 2014, decreased in 2015 and then increased again in 2016 to  $48\mu\text{g}/\text{m}^3$ . Since then levels have been steadily falling. The nearest relevant receptor (a residential facade) is 18m away, meaning levels at the facade reduce further.

Unfortunately we do not have traffic data from National Highways for 2023 in a format we can present.

### Non-Automatic Monitoring

30 diffusion tubes were used at 28 locations during 2023. Two sites showed an increase in measured levels and 26 sites decreased. The largest increase was  $+2.0\mu\text{g}/\text{m}^3$  at site N52 (Newland Road) taking the annual mean to  $19.3\mu\text{g}/\text{m}^3$ , still well below the objective. The largest decrease was  $-3.8\mu\text{g}/\text{m}^3$  at Site N48 (Shaftesbury Avenue) taking the annual mean down to  $18.5\mu\text{g}/\text{m}^3$ .

As in previous years only one monitoring site exceeded the annual mean objective of  $40\mu\text{g}/\text{m}^3$  – N30A Grove Lodge Cottages.

### *In and around AQMA No.2*

N30A Grove Lodge Cottages continued to show the highest levels of any monitoring site. Measured levels decreased by  $3.7\mu\text{g}/\text{m}^3$  to  $41.0\mu\text{g}/\text{m}^3$ , however this is still above the  $40\mu\text{g}/\text{m}^3$  objective. The monitoring site is adjacent to the westbound carriageway of the A27 with the nearest residential facade just 2m away, so the measured level only decreases to  $40.4\mu\text{g}/\text{m}^3$  when predicted back.

The collocated tubes N44A/B/C alongside the continuous monitor again recorded a reduction in levels, the average of the three being  $26.1\mu\text{g}/\text{m}^3$ , a reduction of  $1.7\mu\text{g}/\text{m}^3$  over 2022 levels. This difference in levels measured when compared to the automatic analyser is likely to be the result of the lower accuracy of diffusion tube monitoring.

Site N24 close to Lyons Farm on the A27 showed a decrease of  $3.0\mu\text{g}/\text{m}^3$  to  $26.2\mu\text{g}/\text{m}^3$ , below the  $40\mu\text{g}/\text{m}^3$  objective.

Site N29 Downlands Parade, close to the Lyons Farm junction of the east-west A27 and north-south Sompting Road, also showed a decrease - of  $3.3\mu\text{g}/\text{m}^3$  to  $22.7\mu\text{g}/\text{m}^3$ .

Of the other monitoring sites within the AQMA there was a decrease of  $3.5\mu\text{g}/\text{m}^3$  to  $20.95\mu\text{g}/\text{m}^3$  at N39 and small decreases at N53 and N43. All were well below the objective of  $40\mu\text{g}/\text{m}^3$ .

### *Other Sites*

N57 Lyndhurst Road showed a decrease to  $19.5\mu\text{g}/\text{m}^3$ , well below the annual mean objective. This area is close to a number of sites earmarked for major development, so we continue to closely monitor any changes here.

N66 Sompting Lane, Worthing which was installed in 2020 as it is located at a site of traffic queuing to access the A27, showed an increase in levels, up  $2.0\mu\text{g}/\text{m}^3$  to  $23.5\mu\text{g}/\text{m}^3$ .

The tube in the busy High Street (N1C), close to Steyne Gardens, decreased further and remained below the objective at  $21.4\mu\text{g}/\text{m}^3$ .

Site N54 on Brighton Road (A259) near the Aquarena, close to recent major developments, showed a decrease from  $19.3\mu\text{g}/\text{m}^3$  to  $19.1\mu\text{g}/\text{m}^3$ , still well below the objective.

The two sites added in 2021, N71 King Street and N72 New Street both showed levels of  $11.5\mu\text{g}/\text{m}^3$ , well below the objective.

Five year trend graphs are included in Appendix A.

### **3.2.2 Particulate Matter (PM<sub>2.5</sub>)**

Table A.6 in Appendix A presents the ratified and adjusted monitored PM<sub>2.5</sub> annual mean concentrations for the past five years.

- A. Adur** - PM<sub>2.5</sub> monitoring commenced in Shoreham High Street in August 2021. The first full year of PM<sub>2.5</sub> monitoring at this location was in 2022. The measured validated level for 2023 was  **$10.7\mu\text{g}/\text{m}^3$** . This result is annualised as data capture was less than 75% at 71.9%<sup>12</sup>. This is well below the EU Limit Value of  $25\mu\text{g}/\text{m}^3$

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<sup>12</sup> The PM<sub>2.5</sub> instrument (BAM1020) experienced operational issues through the year.

but above the Air Quality Strategy Objectives (Target Year 2040)<sup>13</sup> and above the World Health Organisation (WHO) annual mean guideline limit of 10µg/m<sup>3</sup>.

**B. Worthing** - 2023 is our sixth full year of PM<sub>2.5</sub> monitoring at Grove Lodge (A27).

The measured ratified level for 2023 was **8.7µg/m<sup>3</sup>**. Data capture was only 48.2%<sup>14</sup> as the site was relocated and the cabinet replaced during 2023, meaning the site was out of action for some of the year. This result is therefore annualised.

This is still below the EU Limit Value of 25µg/m<sup>3</sup>, the World Health Organisation (WHO) annual mean guideline limit of 10µg/m<sup>3</sup> and the Air Quality Strategy Objectives (Target Year 2040).

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<sup>13</sup> Provides a comparison to the future target value. Regulation 4 of the Environmental Targets (Fine Particulate Matter) (England) Regulations 2022 sets the target to ensure that the annual mean concentration of PM<sub>2.5</sub> in ambient air is equal to or less than 10 micrograms per cubic metre by 31st December 2040. This is a non-binding target for local authorities.

<sup>14</sup> AURN data capture rates available on UK-AIR.

## Appendix A: Monitoring Results

**Table A.1 – Details of Automatic Monitoring Sites**

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
AD1	High Street Shoreham	Kerbside	521399	105039	NO2; PM2.5	No	Chemiluminescence	4	1.6	2
WT2	Grove Lodge, Worthing	Roadside	514184	104963	NO2; PM2.5	YES Worthing AQMA No.2	Chemiluminescence	18.3	2.9	1.75

**Notes:**

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

(2) N/A if not applicable

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
<b>ADUR</b>										
S2	Old Mill Close Fishersgate	Roadside	525330	105085	NO2	No	3.5	1.5	No	2.5
S3	St. Aubyns Crescent Fishersgate	Urban Background	525562	105313	NO2	No	5.1	2.4	No	2.5
S7	Queens Road Southwick	Urban Background	524139	106321	NO2	No	3.0	2.5	No	2.5
S8	Underdown Road Southwick	Roadside	524018	106070	NO2	No	4.3	2.3	No	2.5
S9	Old Shoreham Road Southwick	Roadside	523784	106081	NO2	No	1.6	2.8	No	2.3
S10	Holmbush Roundabout Shoreham	Roadside	523343	106111	NO2	No	27.0	1.7	No	2.8
S11	Lancing Manor Lancing	Roadside	518820	105584	NO2	No	14.8	2.0	No	2.8
S12	Boundstone Lane Lancing	Roadside	517731	105505	NO2	No	8.0	1.8	No	2.8
S13	Upper Brighton Road Sompting	Roadside	517291	105550	NO2	No	8.6	4.6	No	2.3
S14	West Street Sompting	Urban Background	516057	105190	NO2	No	3.6	1.2	No	2.0
S17	High Street AQMS 1 Shoreham	Kerbside	521400	105040	NO2	No	5.0	0.9	Yes	2.8
S18	High Street AQMS 2 Shoreham	Kerbside	521400	105040	NO2	No	5.0	0.9	Yes	2.8
S19	High Street AQMS 3 Shoreham	Kerbside	521400	105040	NO2	No	5.0	0.9	Yes	2.8

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
S25	Mash Barn Lane Lancing	Roadside	519117	105710	NO2	No	N/A	6.0	No	2.5
S26	Loose Lane Sompting	Suburban	516536	104783	NO2	No	5.0	0.8	No	2.5
S36	Victoria Road Footpath Shoreham	Roadside	521282	105254	NO2	No	5.8	1.9	No	2.5
S37	Humphrey's Gap Shoreham	Roadside	522103	105126	NO2	No	0.5	1.7	No	2.8
S39	Brighton Road Kingston	Kerbside	523329	104960	NO2	No	7.0	1.2	No	2.5
S43	Brunswick Road Shoreham	Roadside	521733	105251	NO2	No	0.0	2.7	No	2.8
S44	Upper Brighton Road Lancing	Roadside	518494	105464	NO2	No	5.4	2.0	No	3.0
S45	Dolphin Mews Shoreham	Roadside	522300	105258	NO2	No	0.0	4.7	No	2.8
S46	West Street 1 Shoreham	Roadside	521363	105082	NO2	No	0.0	1.3	No	2.5
S47	West Street 2 Shoreham	Roadside	521375	105101	NO2	No	0.0	1.3	No	2.5
S48	Grinstead Lane Lancing	Roadside	518590	105463	NO2	No	4.0	3.3	No	2.5
S50	High Street Shoreham	Roadside	521478	105002	NO2	No	0.0	5.2	No	2.3
S51	Sussex Pad Lancing	Kerbside	520042	106054	NO2	No	16.5	0.4	No	2.0
S52	Grinstead Lane Roundabout Lancing	Kerbside	518560	105460	NO2	No	17.5	1.8	No	2.5
S53	Abinger Lodge (#439) Lancing	Roadside	520196	104350	NO2	No	7.0	2.5	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
<b>WORTHING</b>										
4N	Heene Way (UK02)	Urban Background	513609	102556	NO2	No	5.3	1.7	No	1.5
5N	Cleveland Road (UK01)	Urban Background	512701	105562	NO2	No	6.2	2.5	No	2.0
N1C	High Street East	Urban Centre	515114	102670	NO2	No	0.0	3.3	No	2.0
N5	First Avenue	Roadside	514495	105020	NO2	Worthing AQMA No.2	15.2	2.2	No	1.5
N8	Littlehampton Road	Roadside	513236	104651	NO2	No	14.1	1.5	No	3.5
N11	Dawes Close	Urban Background	515812	103309	NO2	No	8.4	1.4	No	1.5
N21	Forest Lane	Suburban	510611	105595	NO2	Worthing AQMA No.2	14.5	60.5	No	2.0
N22	Falmer Close, C-Dust monitor	Urban Background	511010	102226	NO2	No	14.6	2.2	No	2.0
N24	152 Upper Brighton Road	Roadside	515151	105109	NO2	No	0.0	8.0	No	1.5
N25	Warren Court	Suburban	513845	105191	NO2	Worthing AQMA No.2	0.0	17.3	No	2.0
N28	Chapel Road / Teville Road	Roadside	514740	103173	NO2	No	1.6	3.0	No	2.0
N29	Downlands Parade	Roadside	515014	105099	NO2	Worthing AQMA No.2	0.5	6.5	No	2.5
N30A	Grove Lodge Cottages	Roadside	514183	104948	NO2	Worthing AQMA No.2	0.2	2.2	No	2.5
N31	South Farm Road, Roundabout	Kerbside	514317	103329	NO2	Worthing AQMA No.2	4.0	0.9	No	3.0
N39	SW of Roundabout, Grove lodge	Roadside	514088	104906	NO2	Worthing AQMA No.2	47.8	2.2	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
N42	Norfolk House, 122 Chapel Road	Roadside	514742	103234	NO2	No	0.0	3.4	No	2.5
N43	23 Upper Brighton Road	Suburban	514199	104982	NO2	Worthing AQMA No.2	0.0	19.2	No	2.0
N44A, N44B, N44C	AQMS O/S 21 Upper Brighton Road	Roadside	514184	104963	NO2	Worthing AQMA No.2	18.4	2.8	Yes	1.5
N48	Shaftesbury Avenue	Roadside	512063	103385	NO2	No	14.8	2.2	No	2.0
N52	Newland Road, outside 63	Kerbside	514973	103335	NO2	No	4.5	0.4	No	2.0
N53	Offington Corner	Roadside	513278	105623	NO2	Worthing AQMA No.2	20.5	6.0	No	2.0
N54	Aquarena	Roadside	515595	102725	NO2	No	30.2	3.7	No	3.0
N57	Lyndhurst Road	Roadside	515114	102975	NO2	No	0.0	3.5	No	2.5
N64	South Street, outside Starbucks	Urban Centre	514946	102541	NO2	No	2.8	2.4	No	2.5
N65	Teville Road (opposite Unleashed)	Kerbside	514543	103220	NO2	No	4.7	0.8	No	2.5
N66	Sompting Road	Roadside	515067	105082	NO2	Worthing AQMA No.2	3.7	4.7	No	2.5
N71	King Street	Roadside	514548	103843	NO2	No	4.0	1.8	No	2.5
N72	New Street	Urban Centre	514558	102416	NO2	No	0.5	1.0	No	2.0

**Notes:**

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

(2) N/A if not applicable.

**Table A.3 – Annual Mean NO<sub>2</sub> Monitoring Results: Automatic Monitoring (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
AD1	521399	105039	Kerbside	95.9	95.9	26.0	20.0	19.6	20.3	21
WT2	514184	104963	Roadside	84.9	84.9	32.9	26.0	27.6	25.4	23.4

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

☒ **Where exceedances of the NO<sub>2</sub> annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for 2023**

**Notes:**

The annual mean concentrations are presented as µg/m<sup>3</sup>.

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

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

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

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

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

**Table A.4 – Annual Mean NO<sub>2</sub> Monitoring Results: Non-Automatic Monitoring (µg/m<sup>3</sup>)**

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
<b>ADUR</b>										
S2	525330	105085	Roadside	100	100.0	23.6	17.9	18.8	19.8	18.1
S3	525562	105313	Urban Background	100	100.0	16.7	13.9	14.4	14.3	13.1
S7	524139	106321	Urban Background	100	100.0	14.1	11.5	11.7	11.7	10.7
S8	524018	106070	Roadside	100	92.0	27.5	21.1	22.9	23.2	22.9
S9	523784	106081	Roadside	100	100.0	31.1	25.6	26.2	25.4	23.6
S10	523343	106111	Roadside	100	100.0	23.2	19.2	20.1	20.3	18.0
S11	518820	105584	Roadside	100	100.0	32.5	26.9	25.7	26.0	25.2
S12	517731	105505	Roadside	100	100.0	25.8	20.7	20.8	22.2	21.6
S13	517291	105550	Roadside	100	100.0	36.3	29.5	28.4	28.7	27.7
S14	516057	105190	Urban Background	100	100.0	23.6	19.1	21.2	18.4	18.1
S17	521400	105040	Kerbside	100	100.0	30.4	24.3	25.4	23.7	23.3
S18	521400	105040	Kerbside	100	100.0	30.9	24.2	25.0	24.4	24.2
S19	521400	105040	Kerbside	100	100.0	29.6	23.5	24.1	24.4	22.5
S25	519117	105710	Roadside	100	100.0	26.2	21.5	27.8	25.7	24.4
S26	516536	104783	Suburban	100	100.0	13.4	11.8	13.3	12.0	11.7
S36	521282	105254	Roadside	100	100.0	24.3	18.3	19.4	18.6	17.8
S37	522103	105126	Roadside	100	100.0	29.1	23.4	23.8	24.9	23.4
S39	523329	104960	Kerbside	100	100.0	21.9	17.4	17.4	18.1	17.2
S43	521733	105251	Roadside	100	100.0	22.5	16.6	18.4	17.1	16.7
S44	518494	105464	Roadside	100	100.0	38.4	31.4	31.5	33.6	31.8
S45	522300	105258	Roadside	100	100.0	19.1	15.9	17.2	16.4	14.6
S46	521363	105082	Roadside	100	100.0		18.3	18.8	18.8	18.6
S47	521375	105101	Roadside	100	100.0		16.3	16.8	16.9	16.0
S48	518590	105463	Roadside	100	100.0		25.7	26.8	30.0	27.5
S50	521478	105002	Roadside	100	100.0			22.2	22.8	20.5
S51	520042	106054	Kerbside	100	92.0			23.1	24.6	23.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
S52	518560	105460	Kerbside	100	100.0				35.7	35.2
S53	520196	104350	Roadside	100	59.6					12.8
<b>WORTHING</b>										
4N	513609	102556	Urban Background	100	100.0	12.7	10.8	10.2	11.1	9.5
5N	512701	105562	Urban Background	100	100.0	15.7	11.8	12.5	12.1	11.2
N1C	515114	102670	Urban Centre	91.8	91.8	26.2	19.8	22.2	23.5	21.4
N5	514495	105020	Roadside	100	100.0	28.3	24.5	23.0	21.5	21.2
N8	513236	104651	Roadside	100	100.0	28.6	22.8	22.3	23.6	22.0
N11	515812	103309	Urban Background	100	100.0	13.4	11.8	11.9	11.8	10.8
N21	510611	105595	Suburban	92.3	92.3	10.8	8.7	9.1	9.2	8.0
N22	511010	102226	Urban Background	100	100.0	11.6	10.2	10.3	10.5	8.5
N24	515151	105109	Roadside	100	100.0	23.5	18.4	20.1	29.2	26.2
N25	513845	105191	Suburban	100	100.0	17.8	14.8	15.4	15.4	14.2
N28	514740	103173	Roadside	100	100.0	27.2	17.3	17.3	17.6	16.0
N29	515014	105099	Roadside	92.3	92.3	29.9	25.6	24.2	26.0	22.7
N30A	514183	104948	Roadside	100	100.0	<b>56.6</b>	<b>45.1</b>	<b>44.4</b>	<b>44.7</b>	<b>41.0</b>
N31	514317	103329	Kerbside	81.1	81.1	25.8	20.8	20.2	20.6	20.3
N39	514088	104906	Roadside	100	100.0	28.5	24.1	23.7	24.4	20.9
N42	514742	103234	Roadside	83	83.0	24.2	18.1	17.3	19.5	17.6
N43	514199	104982	Suburban	100	100.0	19.9	17.6	17.2	16.6	16.0
N44A, N44B, N44C	514184	104963	Roadside	100	100.0	36.1	31.1	29.8	27.8	26.1
N48	512063	103385	Roadside	76.2	76.2	25.8	22.5	20.0	22.3	18.5
N52	514973	103335	Kerbside	73.2	73.2	22.4	24.0	19.2	17.3	19.3
N53	513278	105623	Roadside	100	100.0	30.7	30.2	23.7	24.4	24.0
N54	515595	102725	Roadside	83	83.0	19.3	17.2	17.1	19.3	19.1
N57	515114	102975	Roadside	100	100.0	23.4	23.9	20.8	20.7	19.5
N64	514946	102541	Urban Centre	100	100.0	27.9	23.8	20.9	21.4	20.2
N65	514543	103220	Kerbside	92.3	92.3	27.5	26.5	23.6	24.0	20.4

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
N66	515067	105082	Roadside	92.3	92.3		29.8	24.9	21.5	23.5
N71	514548	103843	Roadside	90.4	90.4			11.7	11.8	11.5
N72	514558	102416	Urban Centre	100	100.0			12.0	12.3	11.5

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

Diffusion tube data has been bias adjusted

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

#### Notes:

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

Exceedances of the NO<sub>2</sub> annual mean objective of 40 $\mu\text{g}/\text{m}^3$  are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60 $\mu\text{g}/\text{m}^3$ , indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

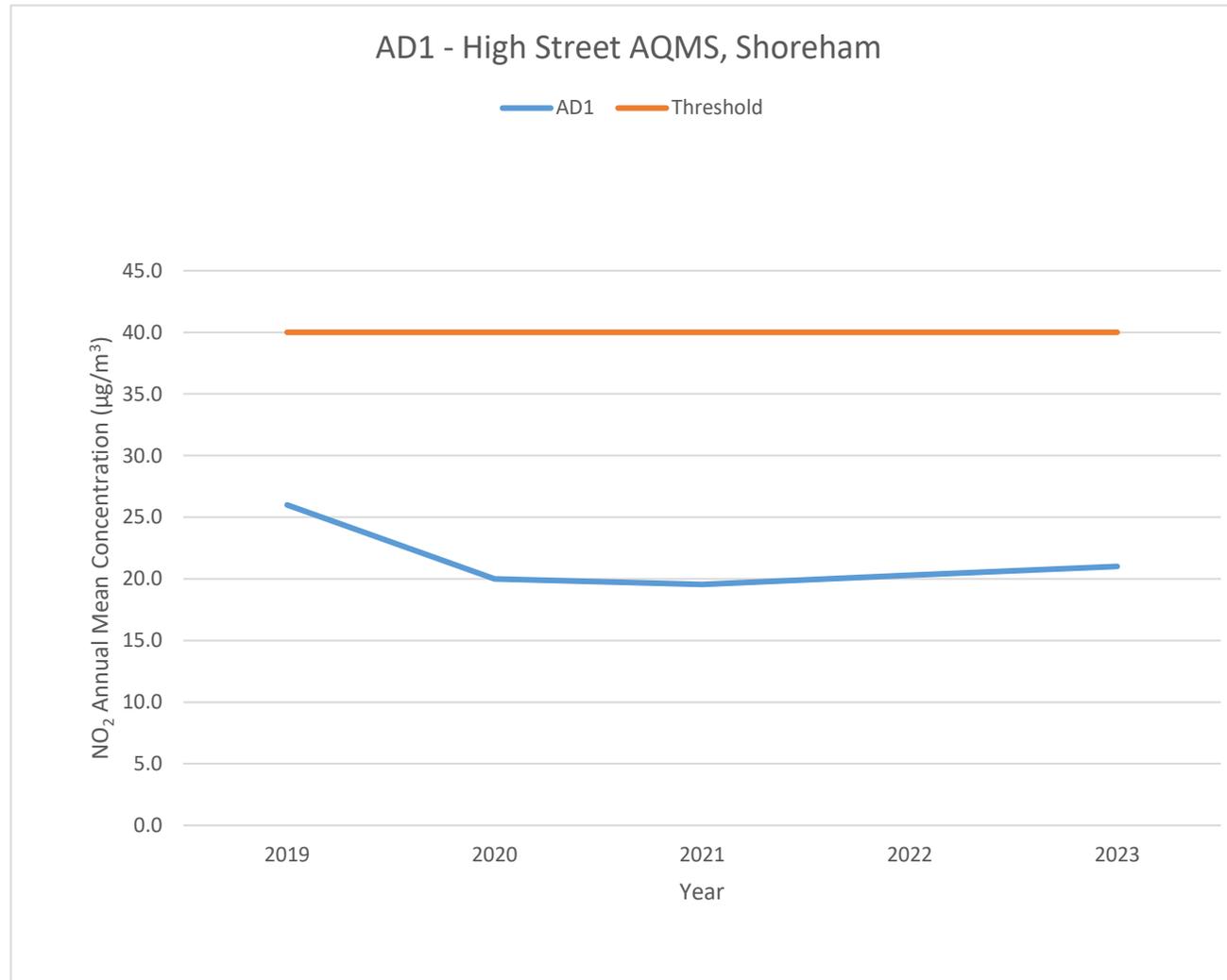
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

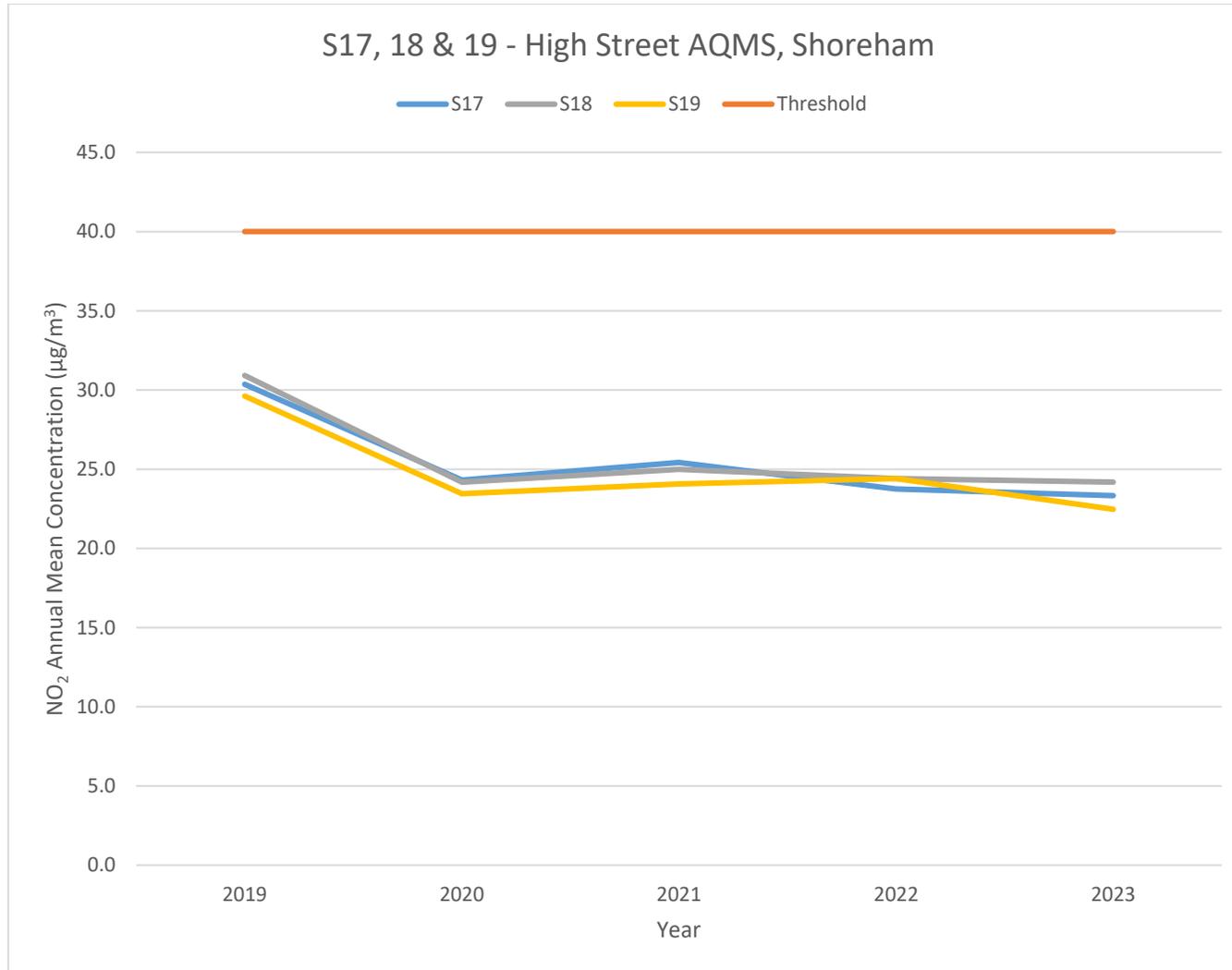
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

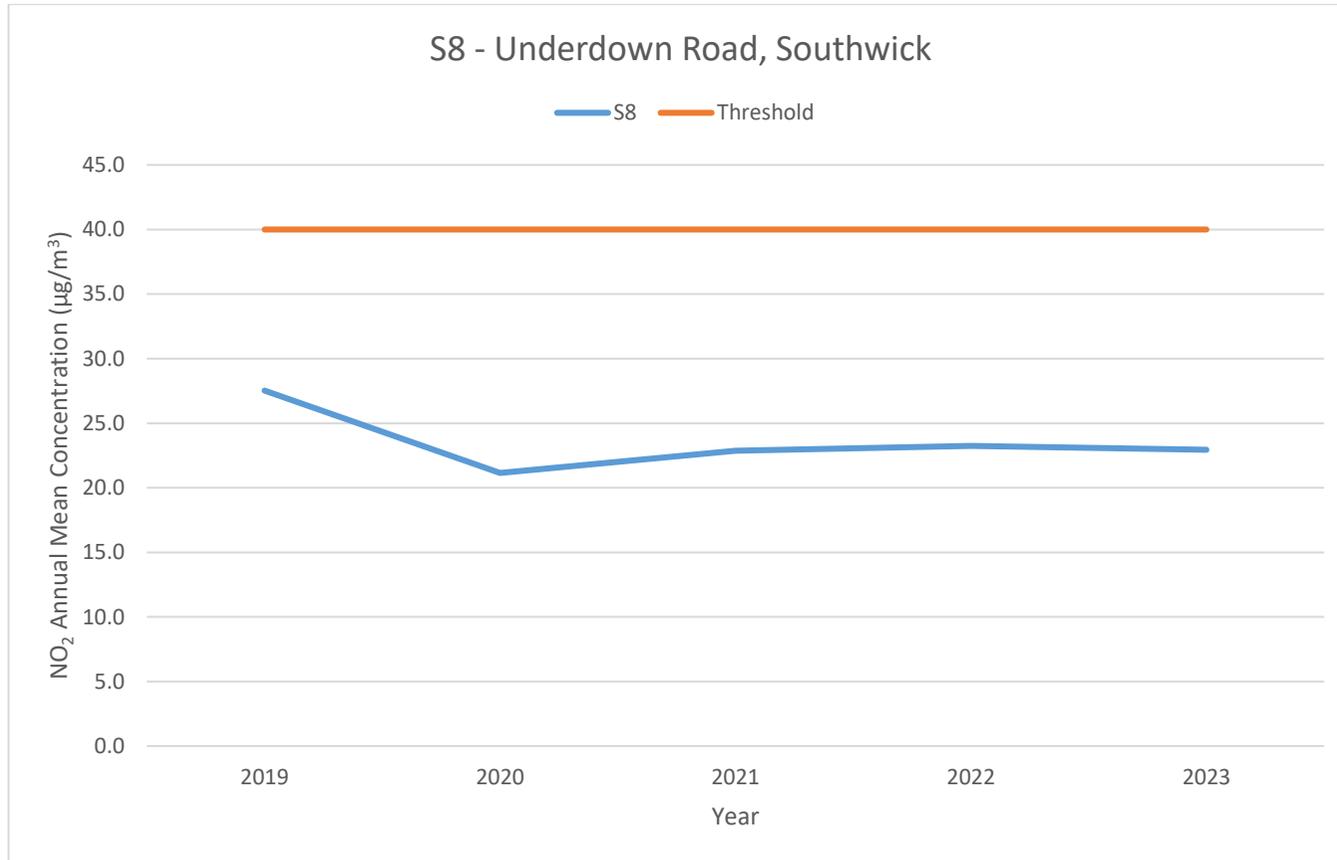
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

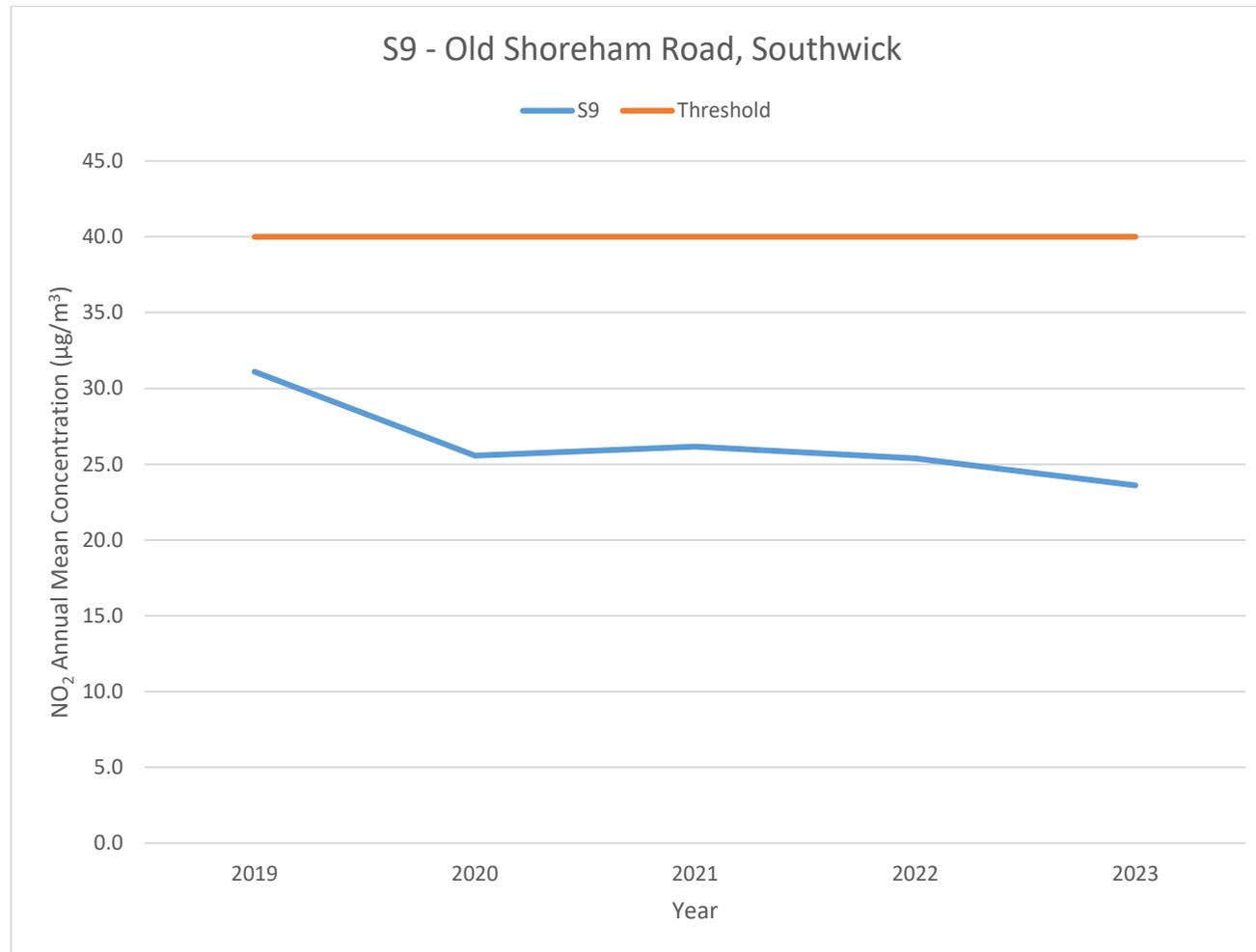
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

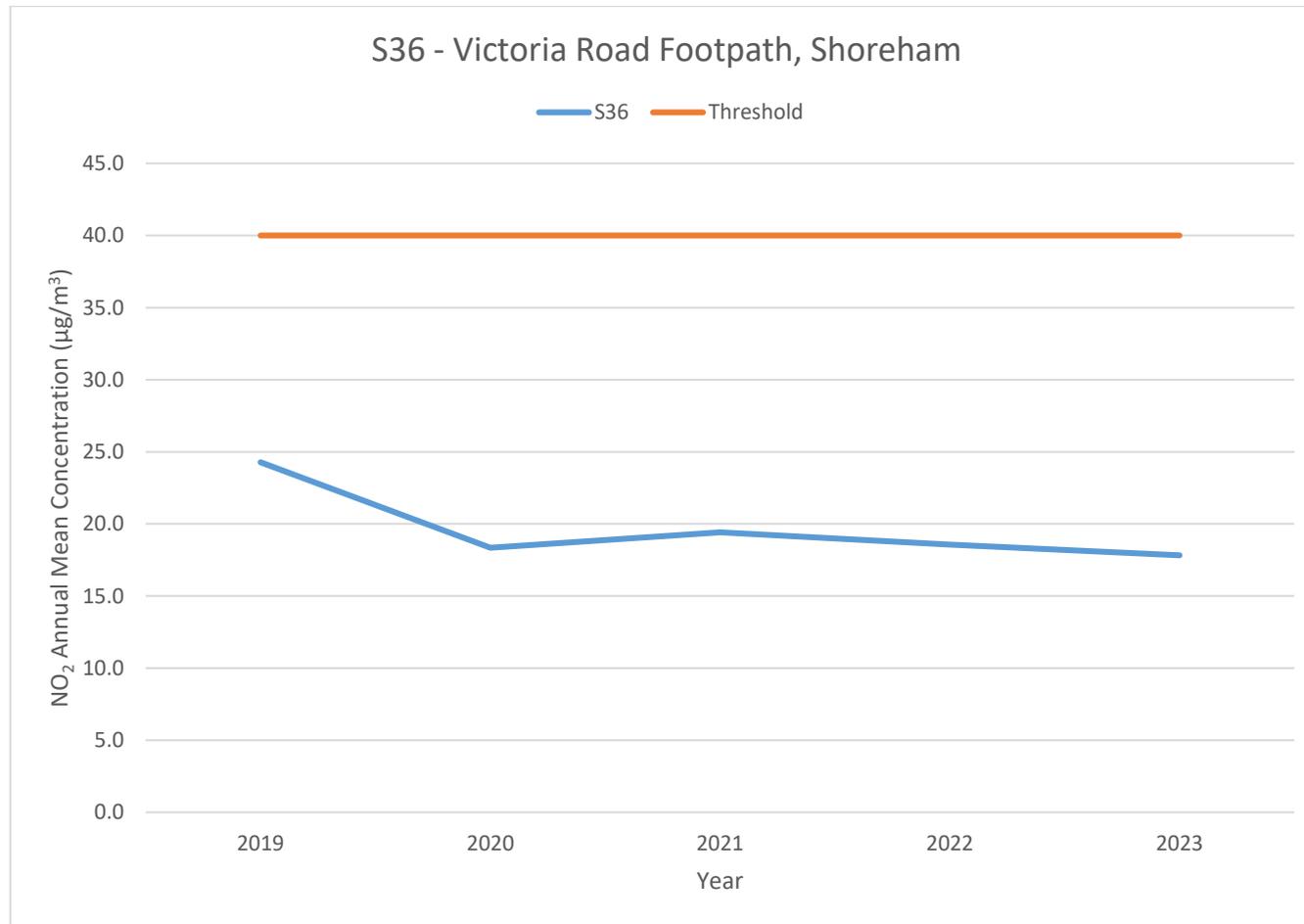
**Figure A.1 – Trends in Annual Mean NO<sub>2</sub> Concentrations - ADUR**

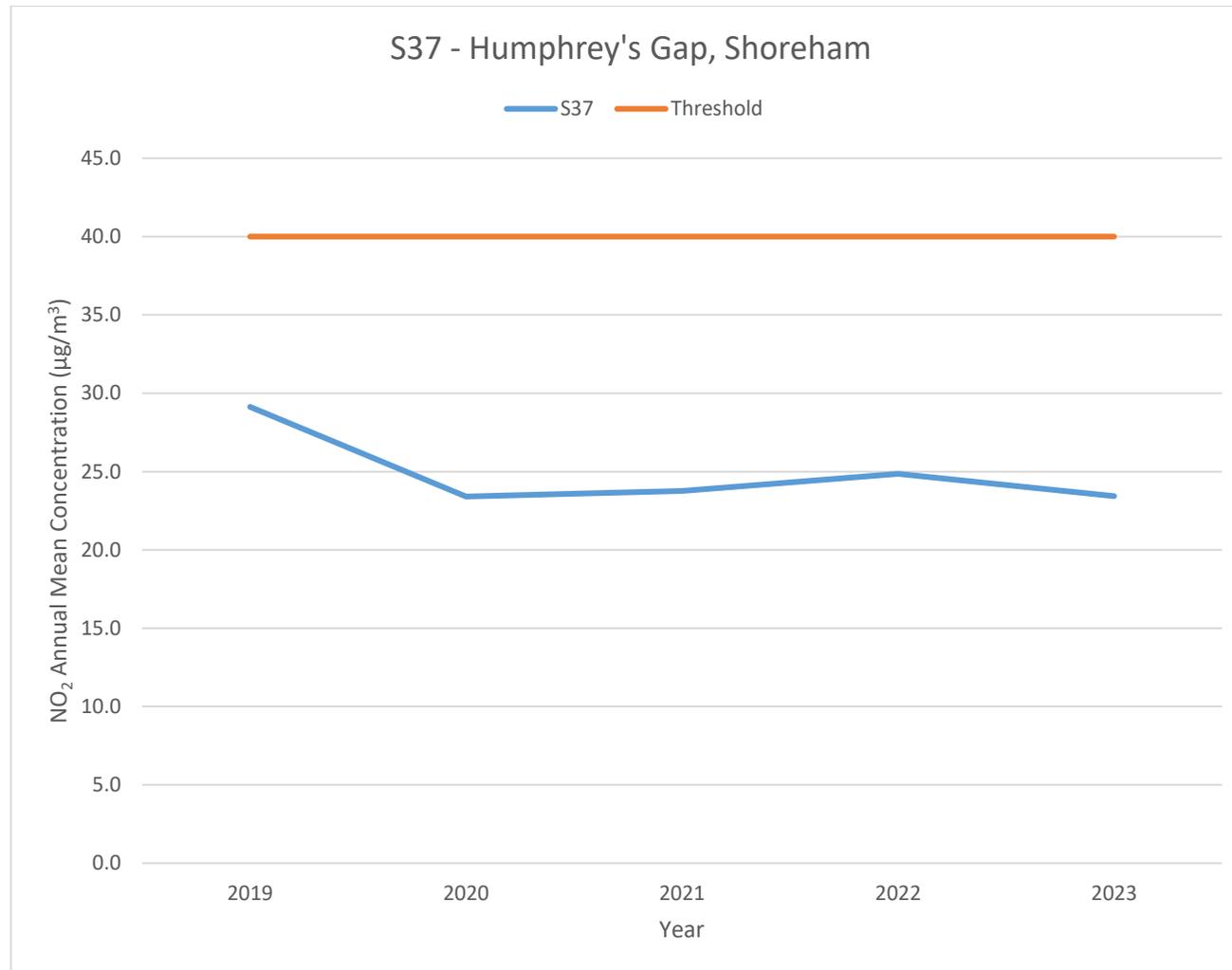


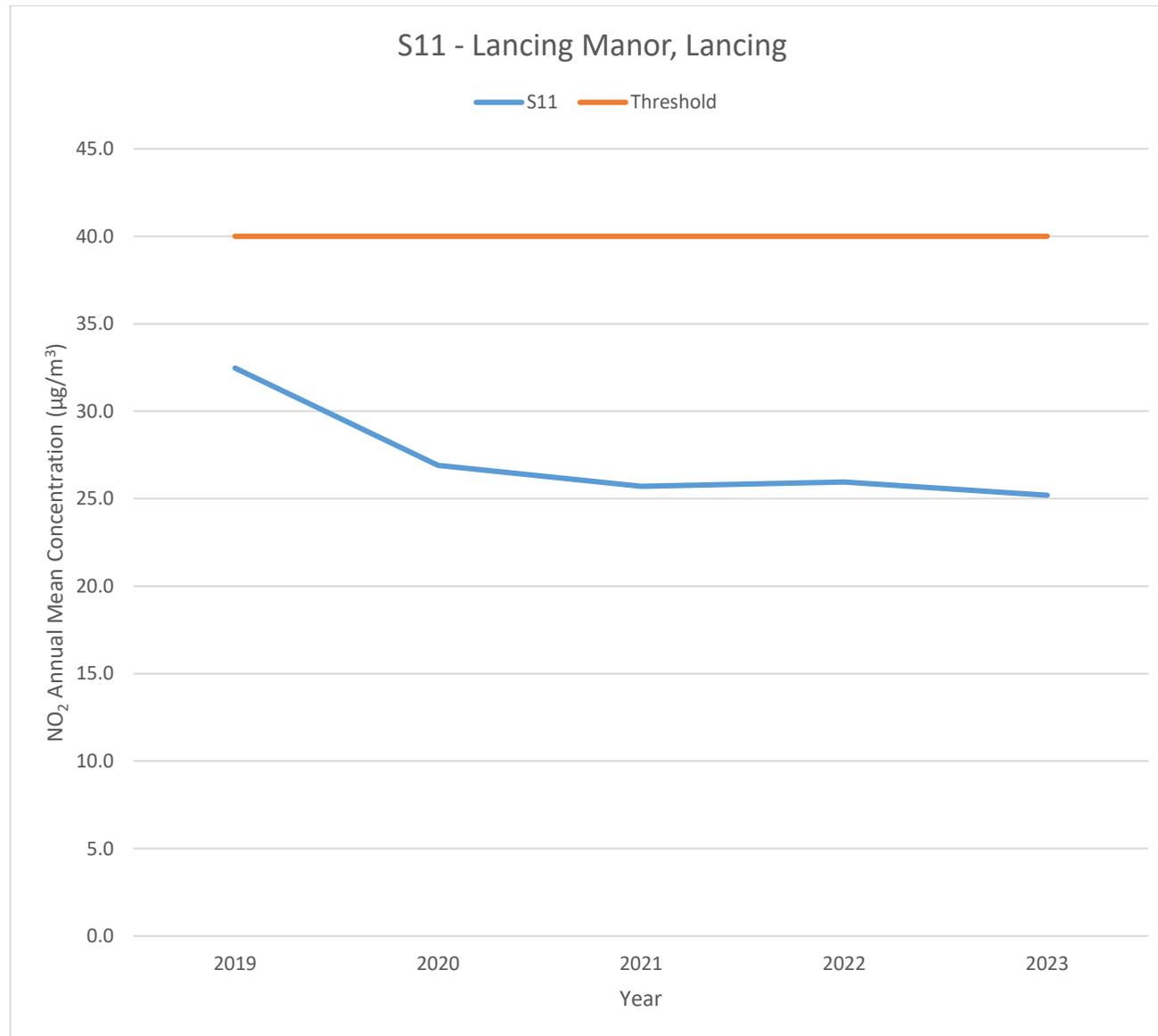


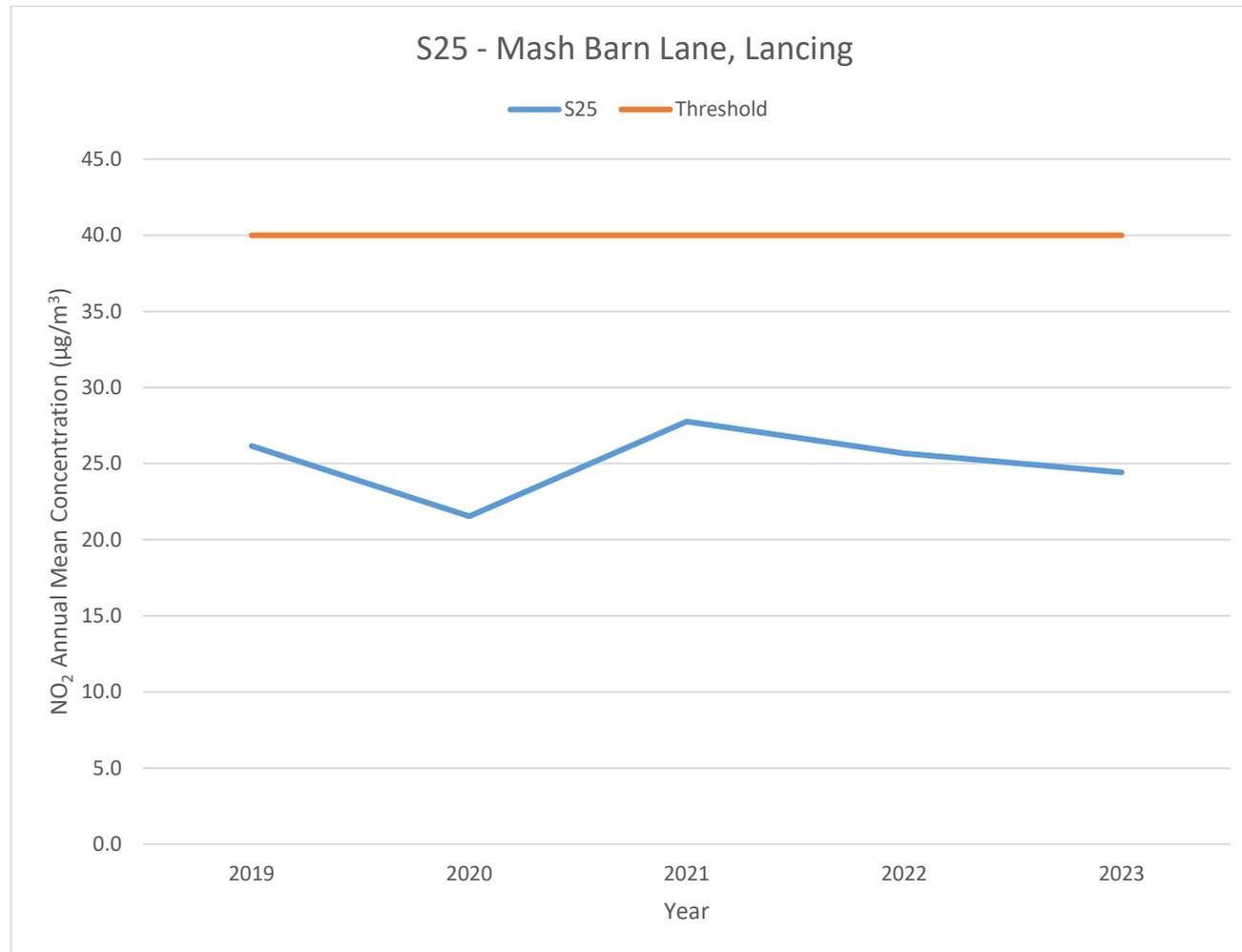


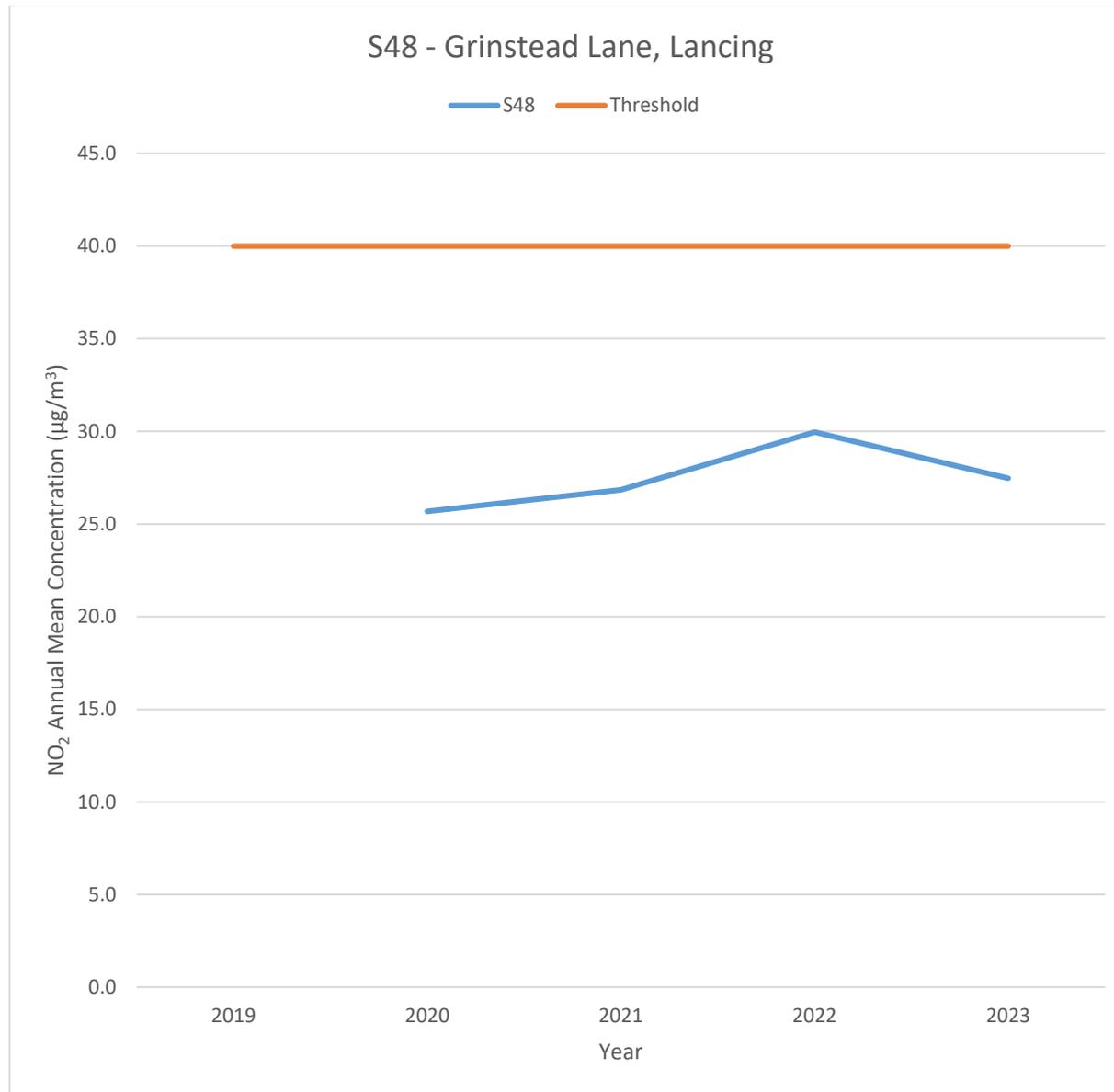


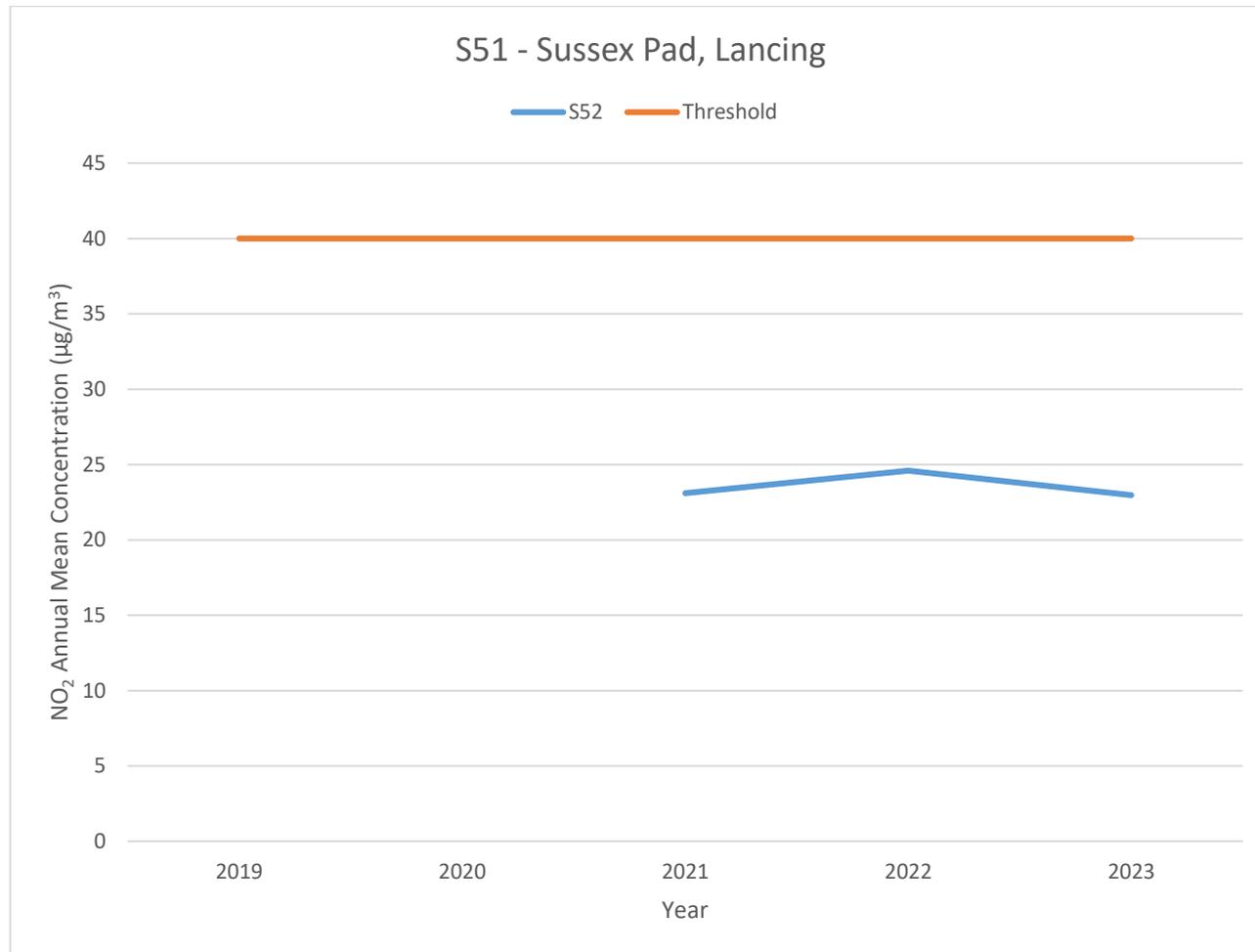


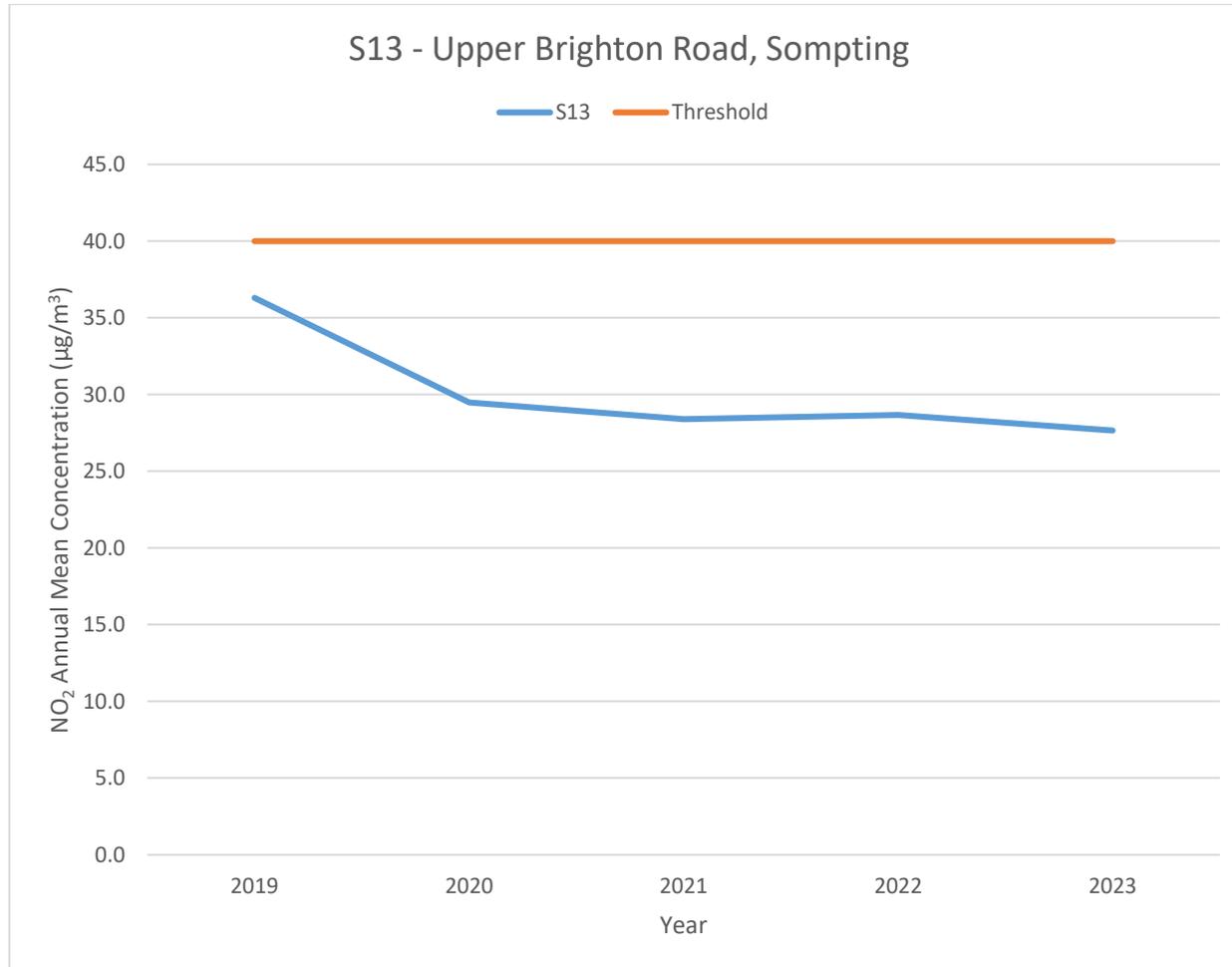




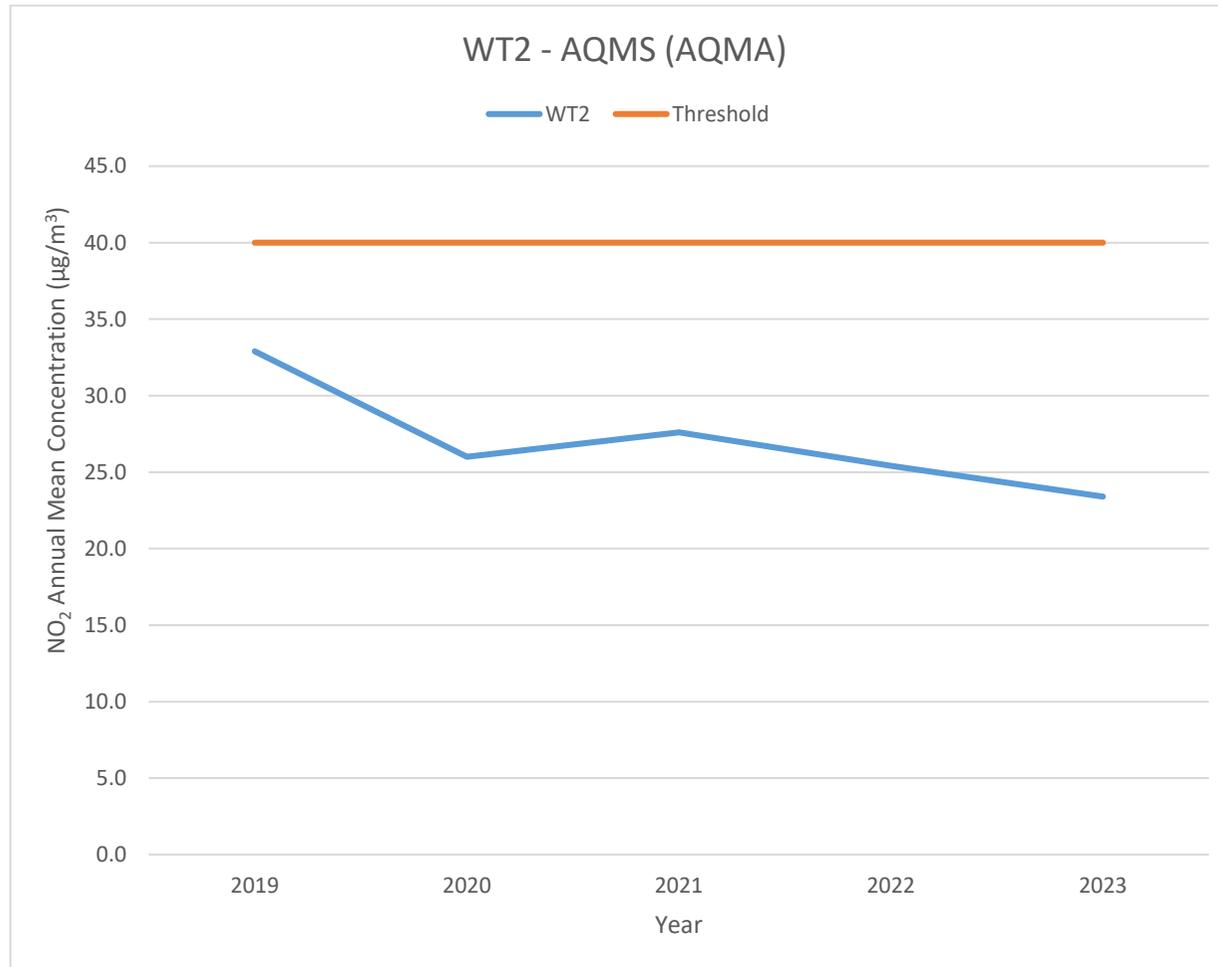


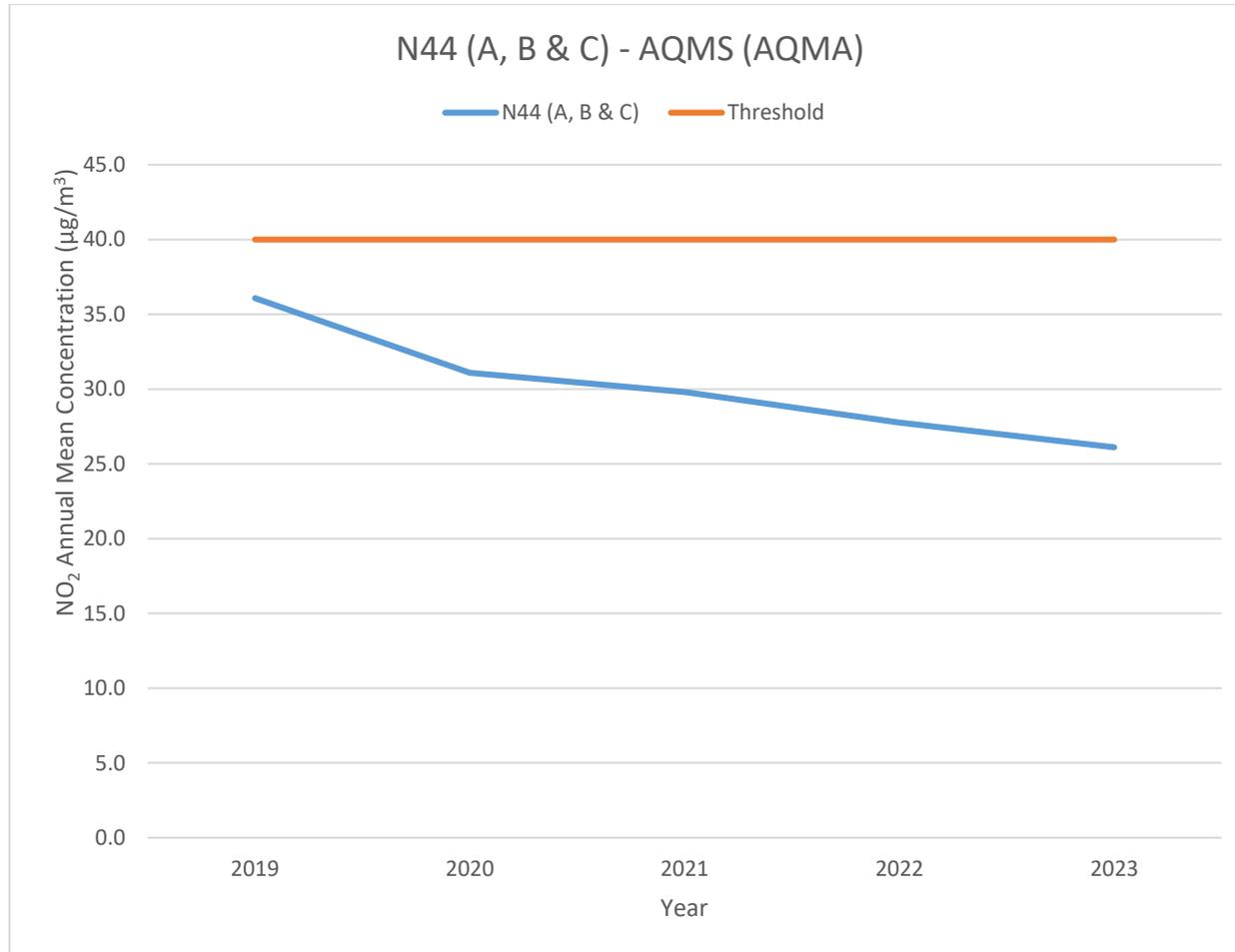


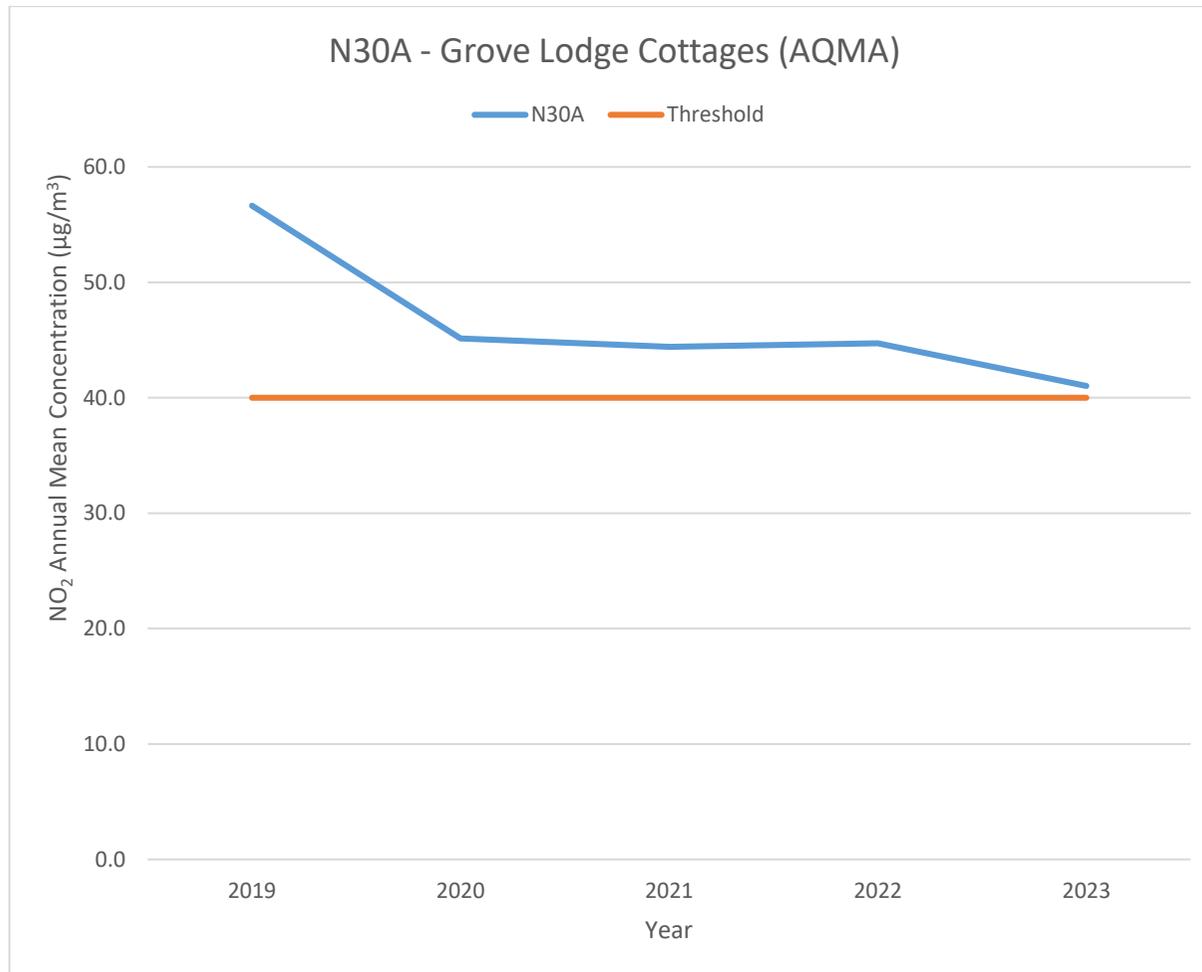


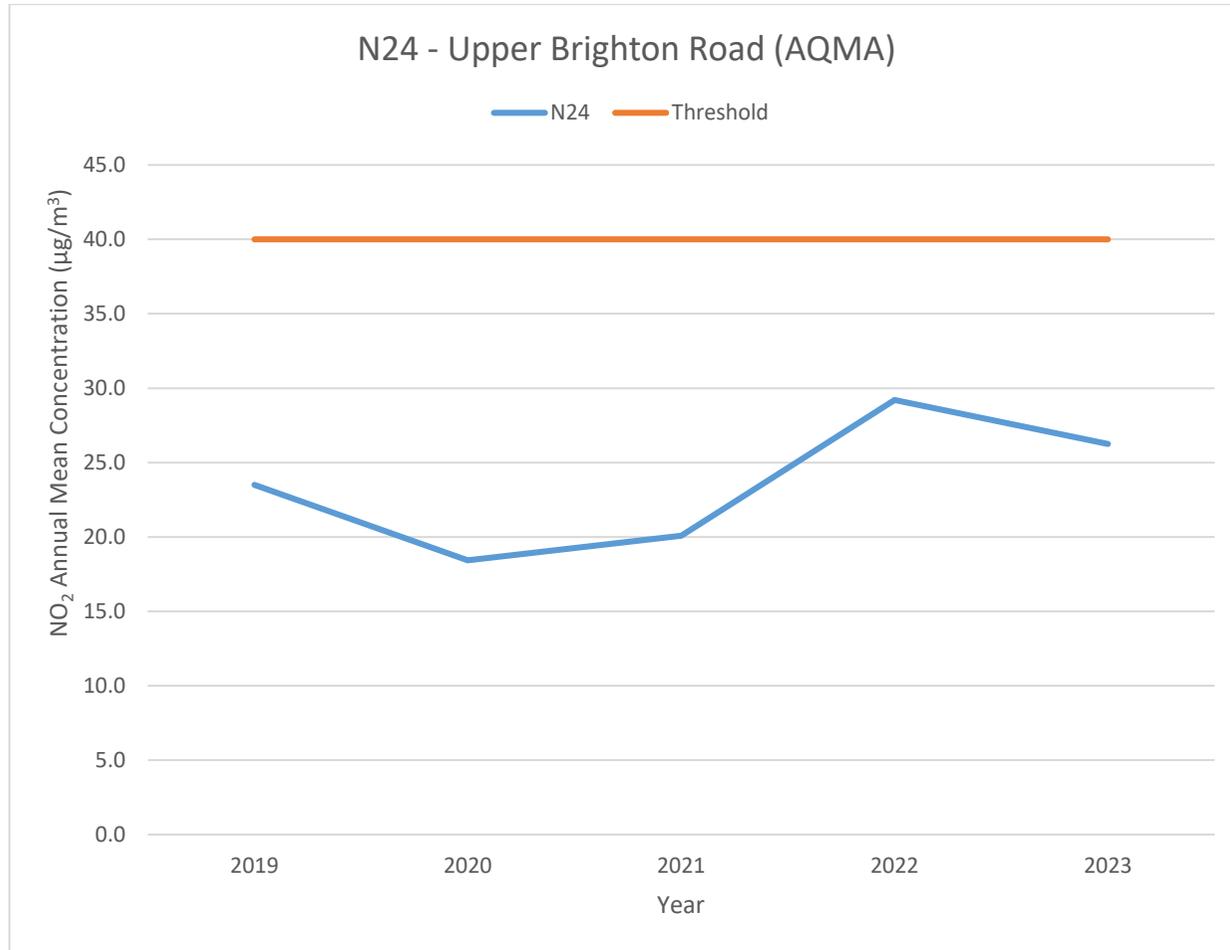


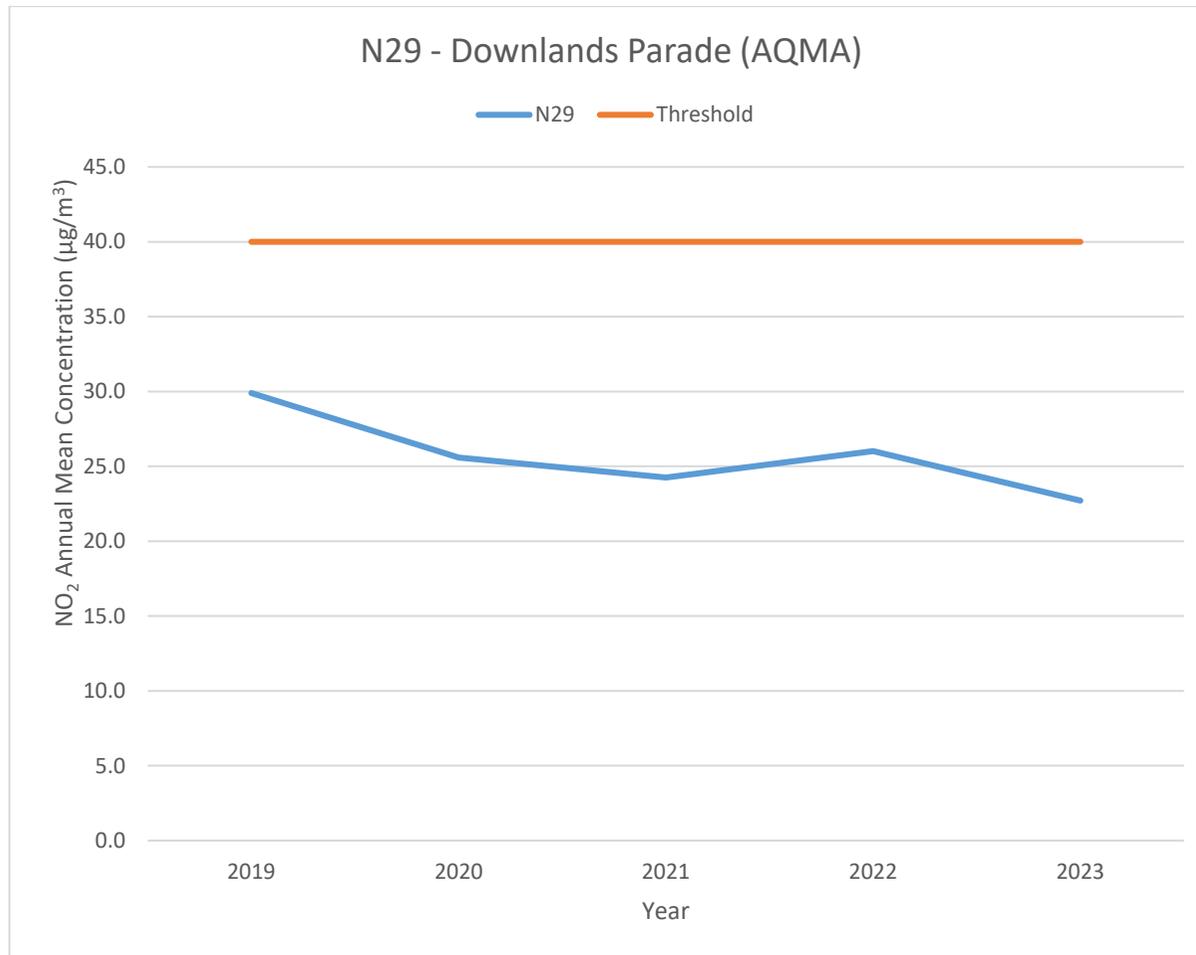
**Figure A.2 – Trends in Annual Mean NO<sub>2</sub> Concentrations - WORTHING**

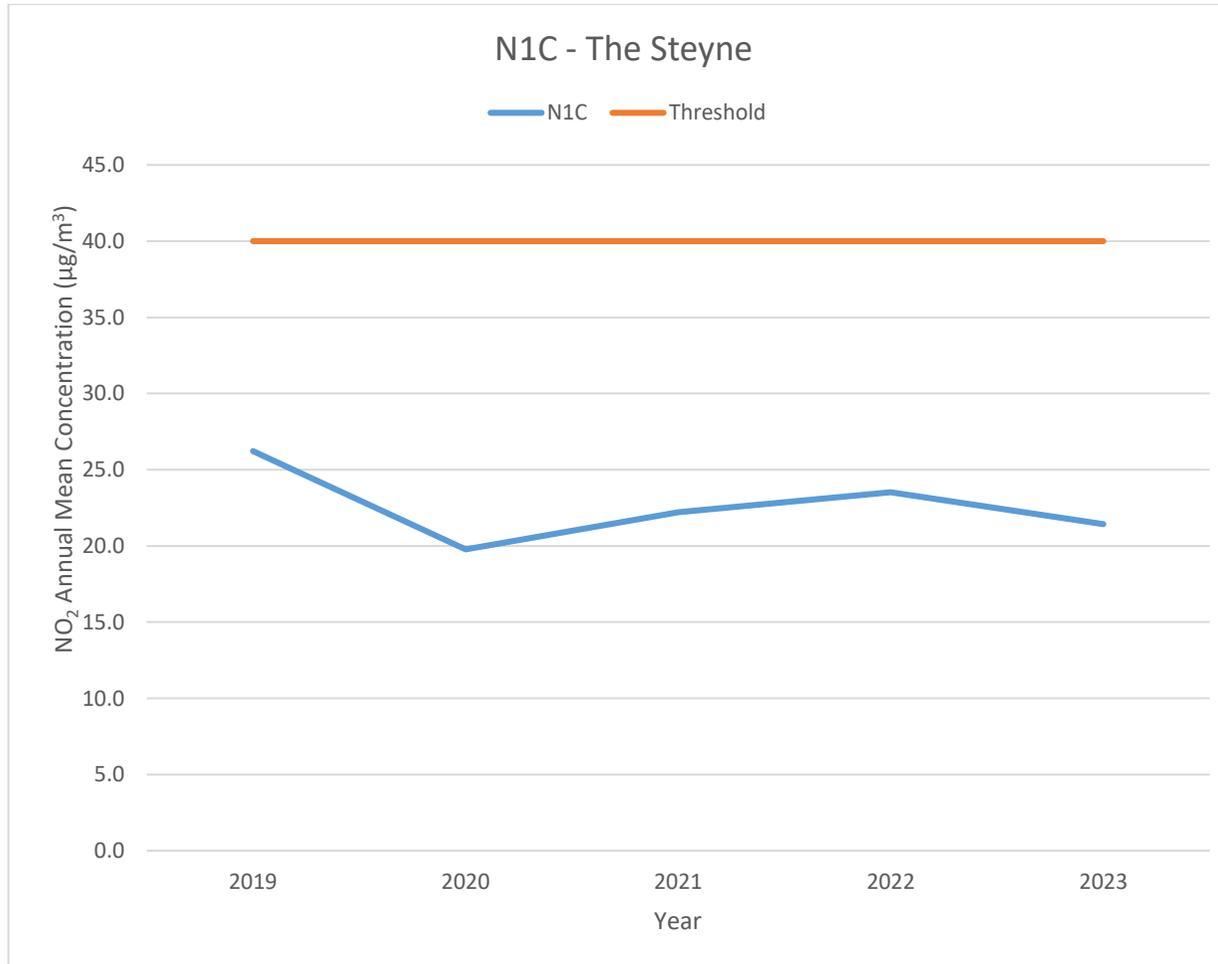


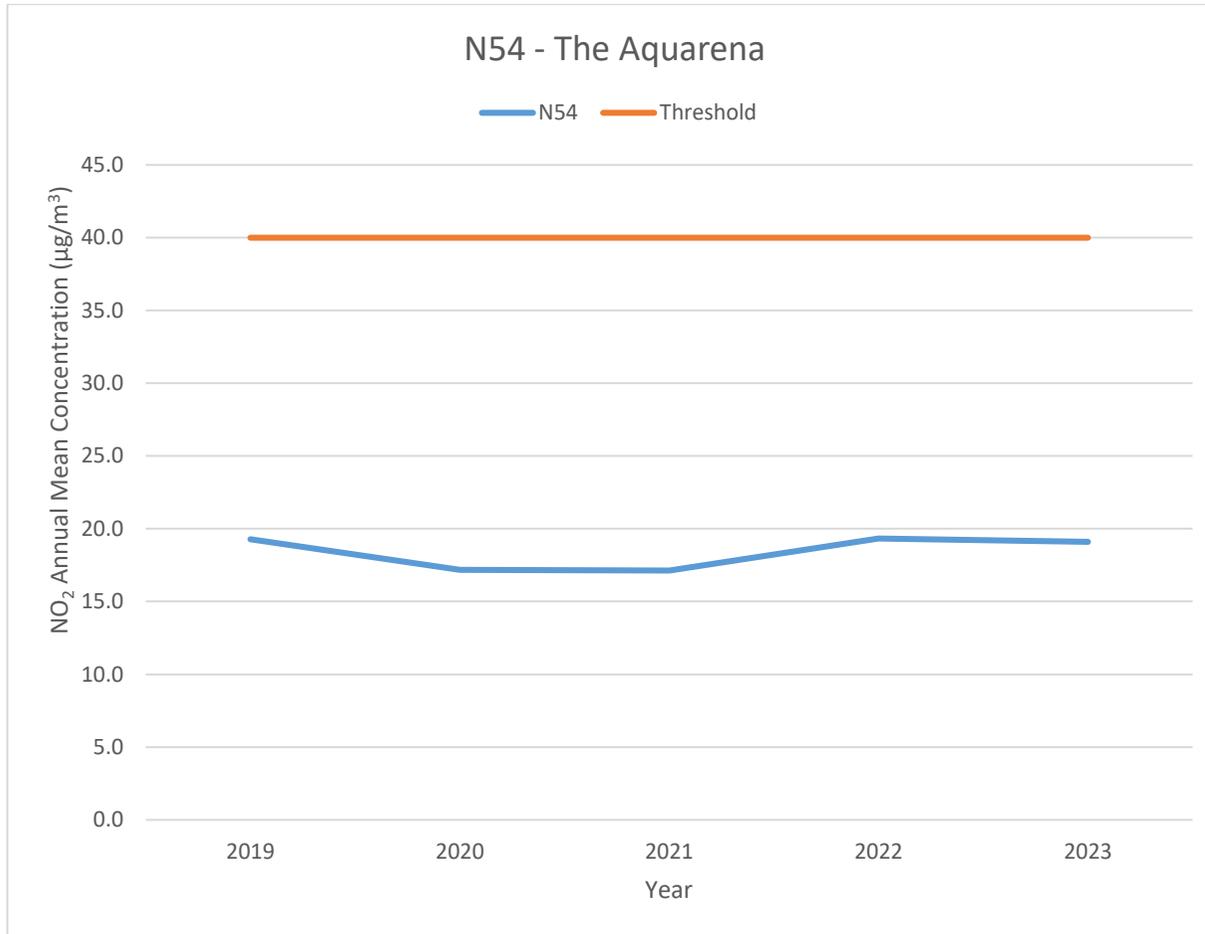


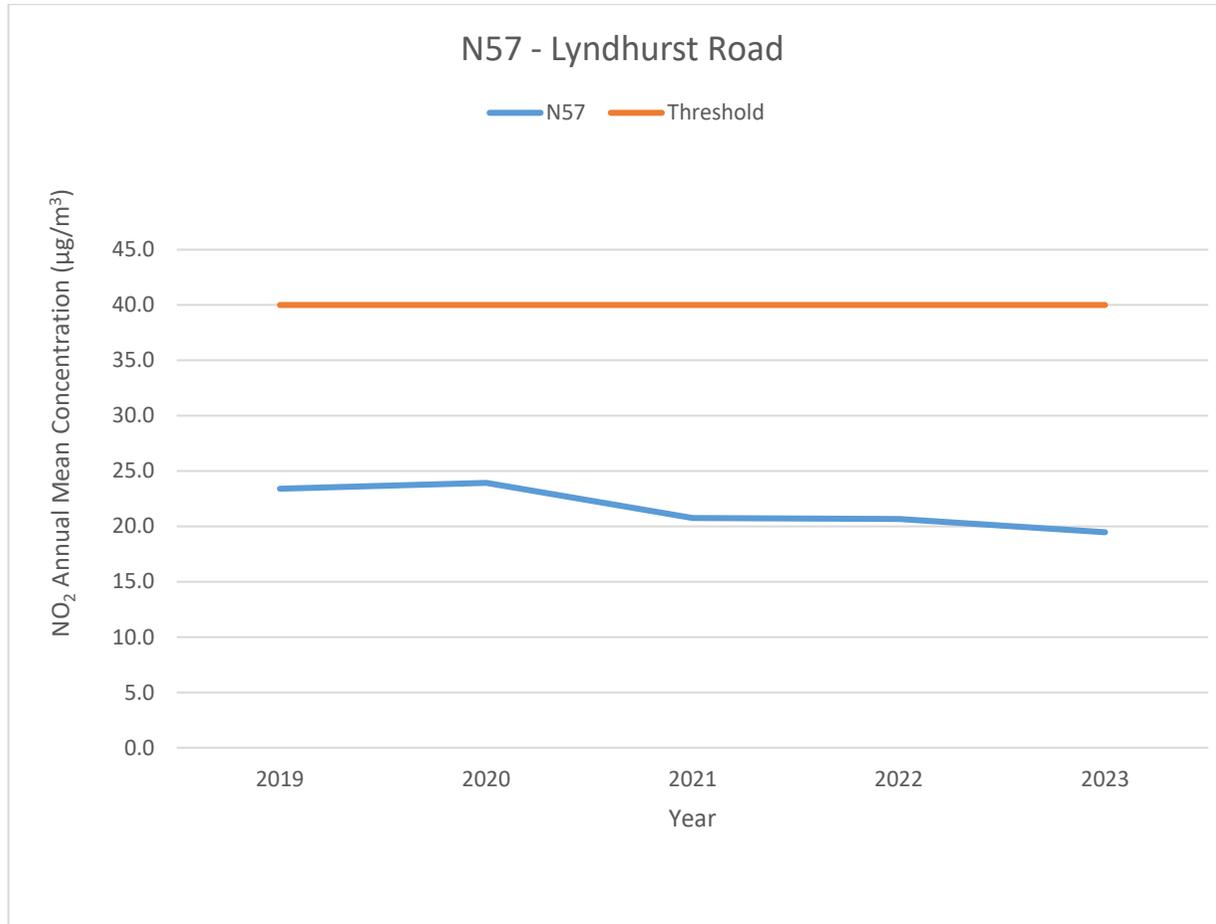












**Table A.5 – 1-Hour Mean NO<sub>2</sub> Monitoring Results, Number of 1-Hour Means > 200µg/m<sup>3</sup>**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
AD1	521399	105039	Kerbside	95.9	95.9	0	0	0	0	0
WT2	514184	104963	Roadside	84.9	84.9	0	0	0	0	0

**Notes:**

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

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

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

**Table A.6 – Annual Mean PM<sub>2.5</sub> Monitoring Results (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2023 (%) <sup>(2)</sup>	2019	2020	2021	2022	2023
AD1	521399	105039	Kerbside	71.9	71.9	n/a	n/a	16.2	11.6	10.7
WT2	514184	104963	Roadside	48.2	48.2	9.9	8.0	8.7	8.8	8.7

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

**Notes:**

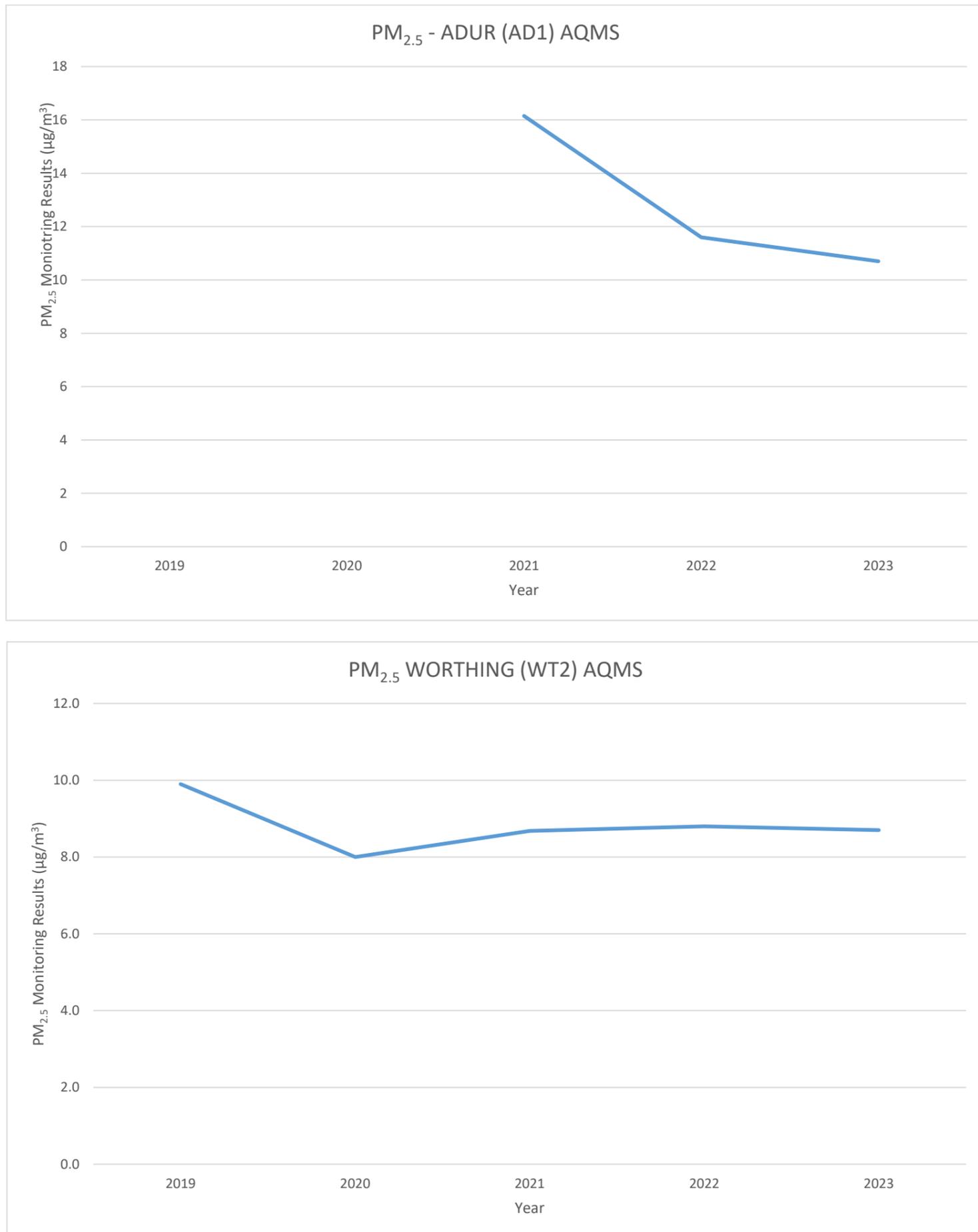
The annual mean concentrations are presented as µg/m<sup>3</sup>.

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

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

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

**Figure A.3 – Trends in Annual Mean PM<sub>2.5</sub> Concentrations**



## Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO<sub>2</sub> 2023 Diffusion Tube Results (µg/m<sup>3</sup>)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure
<b>ADUR</b>																	
S2	525330	105085	21.6	33.3	21.5	23.3	18.1	17.8	17.2	17.1	22.6	23.0	24.8	21.3	21.8	18.1	-
S3	525562	105313	22.1	24.1	16.9	13.5	12.2	13.1	11.9	12.3	15.3	16.7	16.6	14.8	15.8	13.1	-
S7	524139	106321	17.3	17.9	13.9	12.2	9.5	9.5	9.3	9.5	11.4	12.5	18.2	13.5	12.9	10.7	-
S8	524018	106070	26.2	37.9	25.2	25.9	20.5	22.2		34.4	28.3	23.9	33.9	25.6	27.6	22.9	-
S9	523784	106081	34.5	39.3	27.4	29.9	23.5	26.7	20.6	26.3	32.5	26.4	28.7	25.5	28.4	23.6	-
S10	523343	106111	24.3	31.8	21.7	20.6	21.7	18.8	13.5	19.3	25.1	21.0	26.3	15.9	21.7	18.0	-
S11	518820	105584	40.7	43.3	27.8	29.2	27.4	27.4	21.9	26.3	29.8	28.7	31.4	30.4	30.4	25.2	-
S12	517731	105505	31.3	38.2	23.1	26.0	22.1	23.1	19.4	22.4	27.4	27.1	30.2	22.4	26.0	21.6	-
S13	517291	105550	31.7	38.1	32.7	37.5	26.2	34.7	38.0	32.2	33.6	36.6	29.8	28.8	33.3	27.7	-
S14	516057	105190	26.4	31.1	20.8	18.1	18.3	20.2	19.0	9.3	26.1	22.7	27.8	21.2	21.8	18.1	-
S17	521400	105040	32.8	38.0	30.5	28.5	24.0	27.3	23.7	24.9	27.4	25.1	29.9	25.4	28.1	23.3	-
S18	521400	105040	29.5	37.9	29.8	30.1	23.0	27.7	24.2	25.9	30.5	31.6	32.3	27.1	29.1	24.2	-
S19	521400	105040	29.8	33.2	29.8	28.9	20.4	26.8	22.0	24.7	27.9	27.5	29.8	24.1	27.1	22.5	-
S25	519117	105710	38.6	41.1	26.8	26.6	28.6	28.5	25.1	23.3	28.2	31.8	27.9	26.4	29.4	24.4	-
S26	516536	104783	20.1	20.0	13.9	11.1	10.3	11.3	9.3	20.4	11.7	13.4	16.8	10.4	14.1	11.7	-
S36	521282	105254	27.3	31.1	24.1	22.3	19.7	23.6	13.8	18.2	24.2	17.0	19.1	17.3	21.5	17.8	-
S37	522103	105126	29.3	35.8	24.8	30.9	26.2	27.5	23.7	26.9	33.4	30.3	23.8	26.3	28.2	23.4	-
S39	523329	104960	24.8	30.6	18.8	21.6	17.0	17.8	14.3	17.2	19.8	18.6	29.1	18.5	20.7	17.2	-
S43	521733	105251	27.5	29.0	20.4	17.5	17.0	17.3	14.8	17.3	21.1	18.1	23.5	18.6	20.2	16.7	-
S44	518494	105464	40.4	47.1	35.4	34.1	40.2	40.2	36.5	35.3	40.1	41.7	38.0	30.8	38.3	31.8	-
S45	522300	105258	20.0	26.4	18.3	18.5	16.0	16.0	11.9	14.4	18.6	17.7	20.2	13.6	17.6	14.6	-
S46	521363	105082	28.3	31.1	24.5	18.2	17.7	19.9	17.9	17.9	22.2	23.3	26.4	21.7	22.4	18.6	-
S47	521375	105101	23.3	26.8	20.1	15.1	15.6	18.0	15.8	15.6	20.8	20.5	20.0	19.9	19.3	16.0	-
S48	518590	105463	37.1	44.5	28.9	29.7	28.3	27.1	43.2	26.5	35.4	30.3	38.4	27.8	33.1	27.5	-
S50	521478	105002	31.3	34.5	25.2	25.6	21.1	21.8	22.2	22.9	27.1	11.0	27.8	25.7	24.7	20.5	-

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure
S51	520042	106054	19.9	23.8	28.1	24.5	24.7	30.2		47.8	29.5	30.8	21.3	23.8	27.7	23.0	-
S52	518560	105460	47.3	47.9	35.2	42.6	42.5	48.2	43.2	39.2	35.9	43.4	44.6	38.8	42.4	35.2	-
S53	520196	104350						10.8	13.8	12.7	14.8	11.1	19.0	17.5	14.3	13.3	-
<b>WORTHING</b>																	
4N	513609	102556	18.5	16.2	11.7	11.9	8.7	8.5	7.4	8.8	10.1	9.8	15.7	10.6	11.5	9.5	-
5N	512701	105562	21.4	20.3	13.5	12.4	11.6	10.6	9.3	9.6	11.7	12.8	17.7	11.1	13.5	11.2	-
N1C	515114	102670	27.3	35.7	24.2	27.7	26.9	23.9	15.5	24.8	28.3	21.8	27.7		25.8	21.4	-
N5	514495	105020	29.6	30.2	26.0	24.5	20.0	23.1	22.7	25.2	26.8	27.7	26.8	23.6	25.5	21.2	-
N8	513236	104651	30.4	37.2	27.3	25.1	25.0	24.6	20.3	22.9	25.0	27.0	30.6	22.9	26.5	22.0	-
N11	515812	103309	20.6	20.4	13.3	9.7	10.1	10.0	9.4	9.5	11.8	13.0	19.1	9.8	13.0	10.8	-
N21	510611	105595	13.1	15.7	10.3	8.4	9.3	8.0	6.1	8.0	9.4	8.7		9.1	9.6	8.0	-
N22	511010	102226	17.2	15.0	11.3	9.4	7.7	8.9	6.0	7.8	9.4	8.4	13.1	9.0	10.3	8.5	-
N24	515151	105109	34.4	46.6	27.1	31.5	29.7	30.0	21.7	28.3	30.1	32.1	38.6	29.3	31.6	26.2	-
N25	513845	105191	24.0	23.5	17.7	17.3	13.2	13.1	12.5	14.5	16.9	16.2	20.9	15.6	17.1	14.2	-
N28	514740	103173	26.0	29.0	20.4	18.8	18.5	17.5	11.0	15.8	19.8	15.4	24.2	15.5	19.3	16.0	-
N29	515014	105099	23.6	33.9	25.6	31.1	26.3	28.0	23.3	27.3	32.6	29.4		20.0	27.4	22.7	-
N30A	514183	104948	51.4	58.7	45.8	47.7	45.7	46.0	51.5	47.6	59.5	51.9	44.2	43.1	49.4	<b>41.0</b>	<b>40.4</b>
N31	514317	103329	24.8	30.6		19.8	30.5		18.9	20.7	25.7	23.7	26.6	23.6	24.5	20.3	-
N39	514088	104906	21.0	38.0	24.6	24.1	27.9	24.9	19.2	23.4	27.1	23.8	29.3	18.4	25.1	20.9	-
N42	514742	103234	26.9	25.7	21.0	24.8	20.0	20.6	14.7	18.8	22.7			16.8	21.2	17.6	-
N43	514199	104982	24.6	26.2	19.9	15.7	16.6	16.4	17.0	15.5	19.0	19.5	23.2	18.1	19.3	16.0	-
N44A	514184	104963	38.0	37.0	31.3	30.0	33.9	31.0	29.9	29.9	31.3	30.2	31.7	27.8	-	-	-
N44B	514184	104963	40.0	34.9	34.4	30.3	28.7	28.0	28.7	29.2	30.3	31.2	31.4	25.1	-	-	-
N44C	514184	104963	33.3	38.8	30.2	29.3	33.5	28.9	26.2	30.9	34.3	31.1	32.6	29.2	31.5	26.1	-
N48	512063	103385		30.5	21.8	22.8	20.2	20.0		17.1	27.4	16.7	24.7		22.3	18.5	-
N52	514973	103335		34.3	20.3	16.3	17.6		19.7		24.0	21.9	31.7	23.1	23.2	19.3	-
N53	513278	105623	34.7	34.4	27.8	27.8	20.6	25.5	29.2	26.4	30.7	30.6	30.0	29.1	28.9	24.0	-
N54	515595	102725	29.1	35.2	24.9	21.8	22.0	23.8	17.8	19.9			22.0	13.6	23.0	19.1	-
N57	515114	102975	33.7	35.7	23.0	23.2	22.6	14.5	11.5	17.9	25.2	24.1	28.3	21.9	23.5	19.5	-
N64	514946	102541	26.4	32.0	21.1	24.8	26.4	26.4	19.6	22.6	26.1	23.2	24.0	19.2	24.3	20.2	-
N65	514543	103220	32.5	32.6	23.7	20.4	21.1	19.3	18.3	22.7		25.5	32.5	21.7	24.6	20.4	-

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure
N66	515067	105082	35.4	36.2	28.1	27.0	27.5	25.2	23.6	24.6	29.6	26.7		28.2	28.4	23.5	-
N71	514548	103843	18.8	21.7	14.6	14.2	10.9		9.2	9.6	12.9	13.2	18.5	9.0	13.9	11.5	-
N72	514558	102416	21.2	22.2	14.0	11.3	11.9	9.7	9.4	11.3	13.0	13.4	18.0	11.4	13.9	11.5	-

- All erroneous data has been removed from the NO<sub>2</sub> diffusion tube dataset presented in Table B.1.
- Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.
- National bias adjustment factor used.
- Where applicable, data has been distance corrected for relevant exposure in the final column.
- Adur & Worthing confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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

### **New or Changed Sources Identified Within Adur & Worthing During 2023**

Adur & Worthing has not identified any new sources relating to air quality within the reporting year of 2023.

### **Additional Air Quality Works Undertaken by Adur & Worthing During 2023**

Adur & Worthing has not completed any additional works within the reporting year of 2023.

### **QA/QC of Diffusion Tube Monitoring**

NO<sub>2</sub> diffusion tubes are provided and analysed by Gradko laboratory. The NO<sub>2</sub> tube preparation method used is 50% triethanolamine (TEA) in Acetone.

In order to ensure NO<sub>2</sub> concentrations are of a high quality, strict performance criteria need to be met through the execution of QA and QC procedures. A number of factors have been identified as influencing the performance of NO<sub>2</sub> diffusion tubes including the laboratory preparing and analysing the tubes, and the tube preparation method (AEA, 2008). QA and QC procedures ensure that uncertainties in the data are minimised and allow the best estimate of true concentrations to be determined. Gradko participate in several national quality schemes such as Air PT, LEAP and Field Intercomparison, giving confidence in analysis results. Since April 2014, Gradko has taken part in AIR PT, which combines two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme.

Gradko International Ltd is a UKAS accredited laboratory (No. 2187) to ISO17025:2017 and participates in laboratory performance and proficiency testing schemes. These provide strict performance criteria for participating laboratories to meet, ensuring NO<sub>2</sub> concentrations reported are of a high calibre.

Gradko participate in the AIR NO<sub>2</sub> Proficiency Testing (PT) Scheme. The AIR PT scheme uses diffusion tubes laboratory spiked with a Nitrite solution to test each participating

laboratory's analytical performance on a quarterly basis. Defra advise that diffusion tubes used for LAQM should be obtained from laboratories that have demonstrated satisfactory performance in the AIR-PT scheme. Gradko's performance in the first half of 2022 was 100% (more recent performance data was not available at the time of writing).

All monitoring was completed following the 2023 Defra Diffusion Tube Monitoring Calendar.

Data from the NO<sub>2</sub> diffusion tubes has been compared and bias corrected to the factors produced from the UK co-location data-base available from Defra,

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

**Schedule of Accreditation**  
issued by  
**United Kingdom Accreditation Service**  
2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

 Accredited to <b>ISO/IEC 17025:2017</b>	<b>Gradko International Ltd</b> <b>(Trading as Gradko Environmental)</b> Issue No: 026    Issue date: 10 November 2023	
	St Martins House 77 Wales Street Winchester Hampshire SO23 0RH	Contact: Mr A Poole Tel: +44 (0)1962 860331 Fax: +44 (0)1962 841339 E-Mail: <a href="mailto:diffusion@gradko.co.uk">diffusion@gradko.co.uk</a> Website: <a href="http://www.gradko.co.uk">www.gradko.co.uk</a>
Testing performed at the above address only		

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
ATMOSPHERIC POLLUTANTS Collected on diffusion (sorbent) tubes and monitors	<u>Chemical Tests</u>	Documented In-House Methods
	Ammonia as ammonium (NH <sub>4</sub> <sup>+</sup> )	GLM 8 by Ion Chromatography
	Benzene Toluene Ethyl benzene Xylene	GLM 4 by Thermal Desorption/ FID Gas Chromatography
	Hydrogen chloride as chloride (Cl <sup>-</sup> ) Nitrogen dioxide as nitrite (NO <sub>2</sub> <sup>-</sup> ) Sulphur dioxide as sulphate (SO <sub>4</sub> <sup>2-</sup> ) Hydrogen fluoride as fluoride (F <sup>-</sup> )	GLM 3 by Ion Chromatography
	Hydrogen sulphide	GLM 5 by Colorimetric determination (UV Spectrophotometry)
	Ozone as nitrate (NO <sub>3</sub> <sup>-</sup> )	GLM 2 by Ion Chromatography
	Nitrogen Dioxide as nitrite (NO <sub>2</sub> <sup>-</sup> )	GLM 7 by Colorimetric determination (UV Spectrophotometry)
	Sulphur dioxide as sulphate (SO <sub>4</sub> <sup>2-</sup> )	GLM 1 by Ion Chromatography
	Formaldehyde as formaldehyde-DNPH	GLM 18 by HPLC
	Volatile Organic Compounds including: Benzene Toluene Ethylbenzene p-Xylene o-Xylene	GLM 13 by Thermal Desorption GC-Mass Spectrometry

**Diffusion Tube Annualisation**

Two diffusion tube monitoring locations within Adur & Worthing recorded data capture of less than 75% - Worthing site N52 Newlands Road and Adur site S53 Abinger Lodge

Lancing, the latter because monitoring did not commence until June 2023. Annualisation was therefore carried out for these sites, the details are contained in Table C.1 below.

**Table C.1 – Annualisation Summary (concentrations presented in  $\mu\text{g}/\text{m}^3$ )**

### Adur NO<sub>2</sub>

Diffusion Tube ID	Annualisation Factor AD1	Annualisation Factor WT2	Annualisation Factor BH0 (Brighton & Hove)	Annualisation Factor LL1 (Wealden)	Average Annualisation Factor	Raw Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Annualised Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )
S53	1.1606	1.0052	1.1286	1.2170	1.1279	14.3	16.1

### Worthing NO<sub>2</sub>

Diffusion Tube ID	Annualisation Factor WT2	Annualisation Factor AD1	Annualisation Factor BH0 (Brighton & Hove)	Annualisation Factor LL1 (Wealden)	Average Annualisation Factor	Raw Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Annualised Data Simple Annual Mean ( $\mu\text{g}/\text{m}^3$ )
N52	-	0.9617	0.9891	1.0203	0.9904	23.2	-

### PM<sub>2.5</sub> (automatic monitoring)

Site ID	Annualisation Factor Southampton	Annualisation Factor Portsmouth	Annualisation Factor Lullington Heath	Average Annualisation Factor	Measured Data Simple Annual Mean	Annualised Data Estimated Annual Mean
AD1	1.007486341	1.002889883	0.9995756846	1.003317303	10.71252402	10.748060710
WT2	1.00617774	1.000874846	0.9969417176	1.001331435	8.701664289	8.713249986

### Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2024 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO<sub>x</sub>/NO<sub>2</sub>

continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

As in previous years, Adur & Worthing have applied a national bias adjustment factor of 0.83 to the 2023 monitoring data. A summary of bias adjustment factors used by Adur & Worthing over the past five years is presented in Table C.2.

**Table C.2 – Bias Adjustment Factor**

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.83
2022	National	03/23	0.82
2021	National	06/22	0.82
2020	National	09/21	0.84
2019	National	03/20	0.87

National Diffusion Tube Bias Adjustment Factor Spreadsheet						Spreadsheet Version Number: 03/24					
Follow the steps below <a href="#">in the correct order</a> to show the results of <a href="#">relevant</a> co-location studies						This spreadsheet will be updated at the end of June 2024					
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods						LAQM Helpdesk Website					
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet						Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.					
This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.											
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.											
Step 1:	Step 2:	Step 3:	Step 4:								
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.								
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data.	If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953								
Analysed By <sup>1</sup>	Method <sup>2</sup>	Year <sup>3</sup>	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m <sup>3</sup> )	Automatic Monitor Mean Conc. (Cm) (µg/m <sup>3</sup> )	Bias (B)	Tube Precision <sup>4</sup>	Bias Adjustment Factor (A) (Cm/Dm)	
Gradko	50% TEA in acetone	2023	UB	City Of London Corporation	10	28	22	26.3%	G	0.79	
Gradko	50% TEA in acetone	2023	R	City Of London Corporation	11	36	31	15.0%	G	0.87	
Gradko	50% TEA in acetone	2023	R	LB Newham	12	27	21	28.0%	G	0.78	
Gradko	50% TEA in acetone	2023	SU	Redcar And Cleveland Borough Council	12	14	10	48.0%	G	0.68	
Gradko	50% TEA in Acetone	2023	R	Sandwell Mbc	12	33	26	27.6%	G	0.78	
Gradko	50% TEA in acetone	2023	UB	Sandwell Mbc	11	21	18	15.8%	G	0.86	
Gradko	50% TEA in acetone	2023	R	Sandwell Mbc	12	23	20	14.2%	S	0.88	
Gradko	50% TEA in Acetone	2023	UC	Falkirk Council	12	33	29	14.9%	G	0.87	
Gradko	50% TEA in Acetone	2023	UB	Falkirk Council	12	15	13	8.9%	G	0.92	
Gradko	50% TEA in acetone	2023	R	London Borough Of Lewisham	11	33	27	22.7%	G	0.82	
Gradko	50% TEA in Acetone	2023	R	London Borough Of Merton	12	37	31	18.5%	G	0.84	
Gradko	50% TEA in acetone	2023	KS	Marylebone Road intercomparison	11	47	38	25.7%	G	0.80	
Gradko	50% TEA in acetone	2023	R	Royal Borough Of Windsor And Maidenhead	11	27	23	21.6%	G	0.82	
Gradko	50% TEA in acetone	2023	R	Royal Borough Of Windsor And Maidenhead	12	24	24	0.6%	G	0.99	
Gradko	50% TEA in acetone	2023	R	London Borough Of Richmond Upon Thames	11	18	16	15.6%	G	0.86	
Gradko	50% TEA in acetone	2023	Overall Factor <sup>5</sup> (15 studies)						Use		0.83

**NO<sub>2</sub> Fall-off with Distance from the Road**

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO<sub>2</sub> concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO<sub>2</sub> fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-

automatic annual mean NO<sub>2</sub> concentrations corrected for distance are presented in Table B.1.

**Table C.3 – Non-Automatic NO<sub>2</sub> Fall off With Distance Calculations (concentrations presented in µg/m<sup>3</sup>)**

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted)	Background Concentration	Concentration Predicted at Receptor	Comments
<b>ADUR</b>						
S9	2.8	4.4	23.6	12.4	22.3	
S17	0.9	5.9	23.3	10.7	18.6	
S18	0.9	5.9	24.2	10.7	19.2	
S19	0.9	5.9	22.5	10.7	18.1	
S52	1.8	19.3	35.2	11.2	22.2	
<b>WORTHING</b>						
N30A	2.2	2.4	41.0	11.1	40.4	AQMA No.2

## QA/QC of Automatic Monitoring

**Adur:** The automatic continuous monitoring site in Shoreham High Street (site AD1) is part of the Sussex-air monitoring network ([www.sussex-air.net/](http://www.sussex-air.net/)). The site is serviced every six months and Local Site Operator (LSO) routine calibrations are completed by Adur District Council every two weeks. Data ratification is carried out via the Sussex-air data management contract, which for 2023 was with Bureau Veritas.

**Worthing:** The automatic continuous monitoring site at Grove Lodge Worthing is part of the national Automatic Urban and Rural Network (AURN) and complies with the EU Directive on ambient air quality (2008/50/EC). The site is audited and serviced every six months and Local Site Operator (LSO) routine calibrations are completed by Worthing Borough Council every two weeks. For information on data ratification please visit

[https://uk-air.defra.gov.uk/assets/documents/Data\\_Validation\\_and\\_Ratification\\_Process\\_Apr\\_2017.pdf](https://uk-air.defra.gov.uk/assets/documents/Data_Validation_and_Ratification_Process_Apr_2017.pdf).

Data for both sites is available via [www.sussex-air.net/](http://www.sussex-air.net/)

Worthing data is also available via the UKAir website - [https://uk-air.defra.gov.uk/data/data\\_selector](https://uk-air.defra.gov.uk/data/data_selector)

## PM<sub>10</sub> and PM<sub>2.5</sub> Monitoring Adjustment

The type of PM<sub>10</sub> and PM<sub>2.5</sub> monitors utilised within Adur District and Worthing Borough Councils do not require the application of a correction factor.

## Automatic Monitoring Annualisation

As the data capture rates for PM<sub>2.5</sub> at both continuous monitoring sites AD1 and WT2 were <75%, annualisation has been completed. Please see Table C.1.

## NO<sub>2</sub> Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO<sub>2</sub> concentration at the nearest location relevant for exposure has been estimated using the NO<sub>2</sub> fall-off with distance calculator available on the LAQM Support website. Where appropriate, automatic annual mean NO<sub>2</sub> concentrations corrected for distance are presented in Table A.3.

No automatic NO<sub>2</sub> monitoring locations within Adur & Worthing required distance correction during 2023.

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

### Figure D.1 – Map of Automatic and Non-Automatic Monitoring Sites in Adur and Worthing

Automatic sites marked in purple

See next page







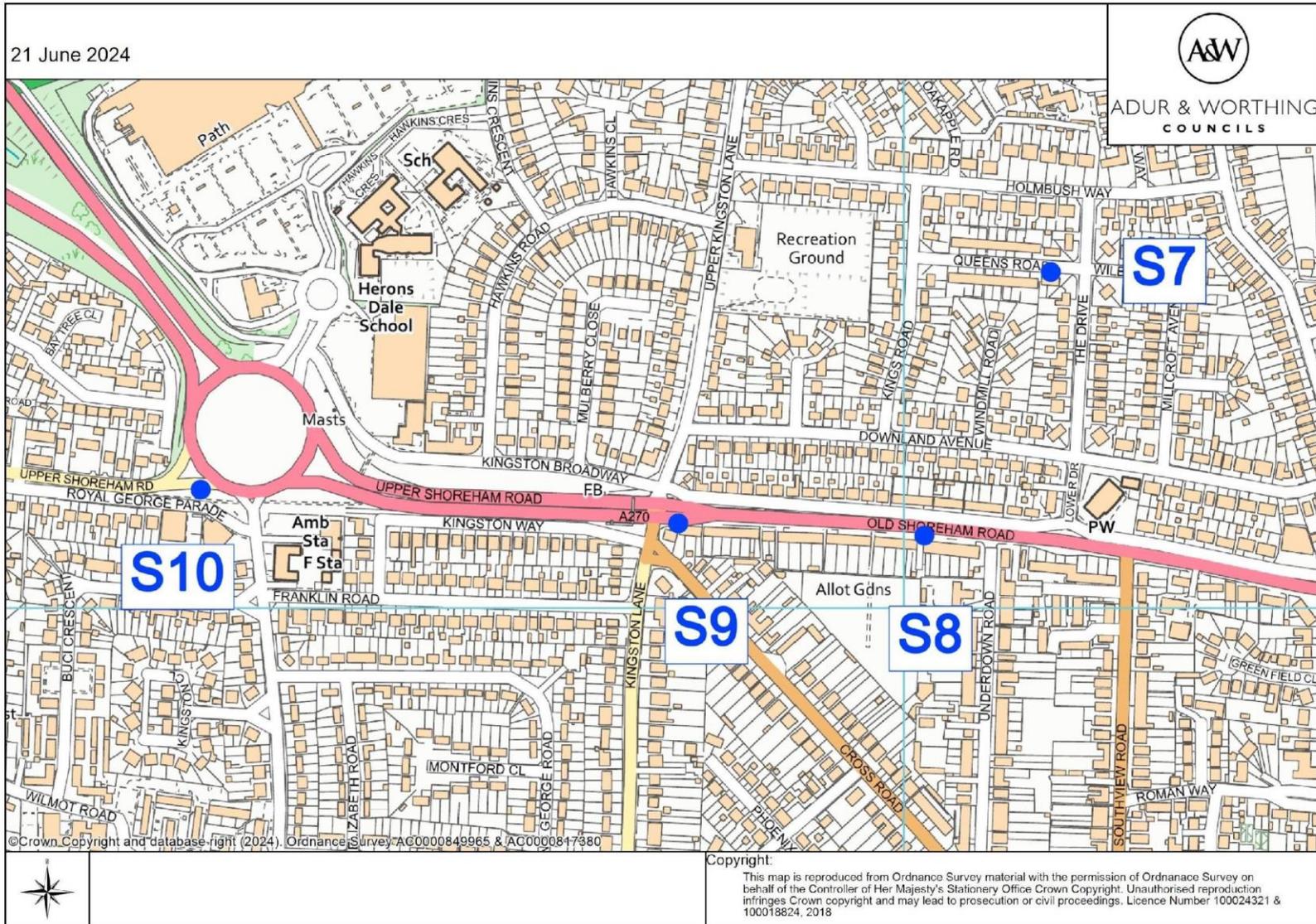


Figure D.5 – Map of Monitoring Sites in Adur – Lancing

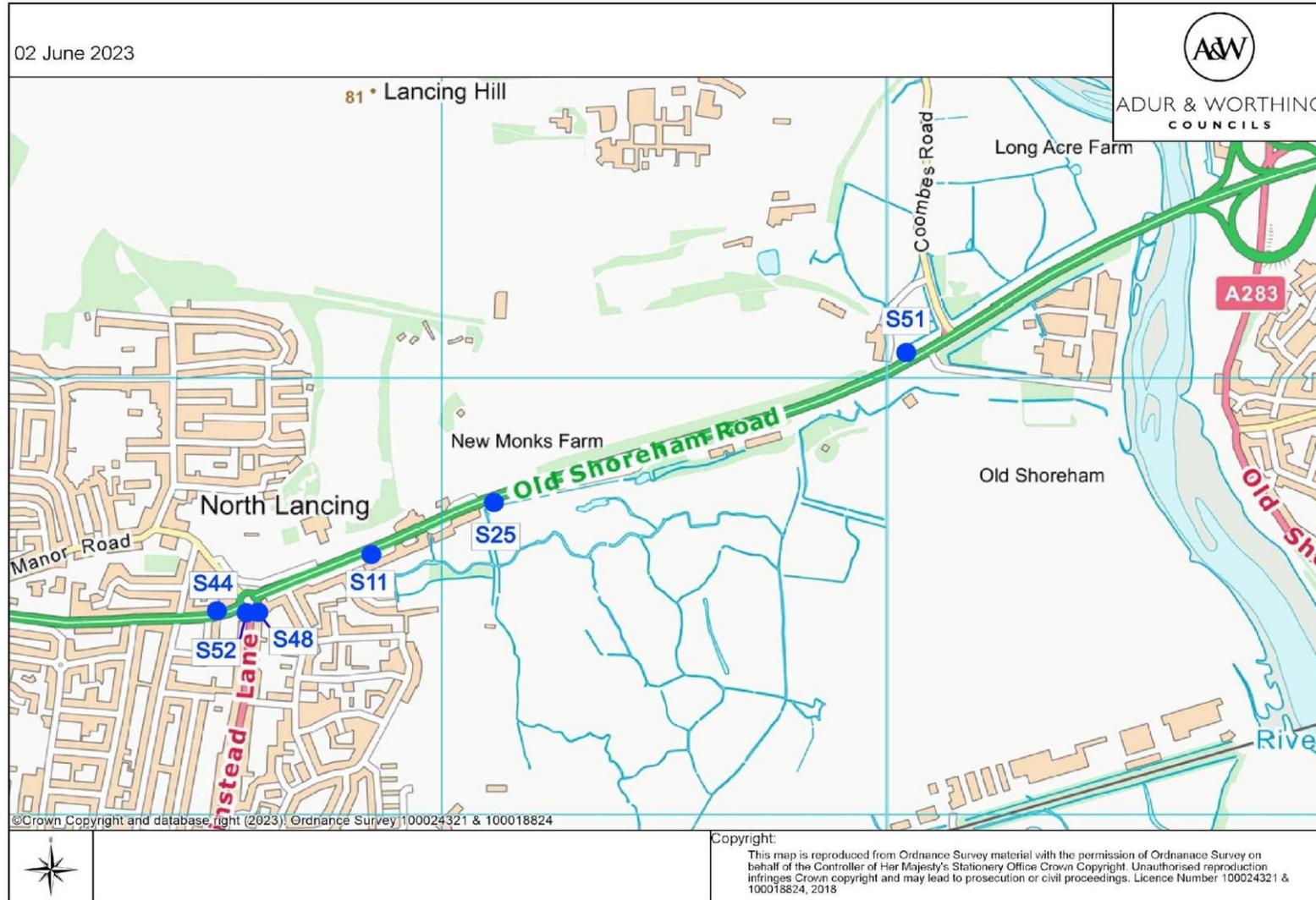




Figure D.7 – Map of Monitoring Sites in Worthing

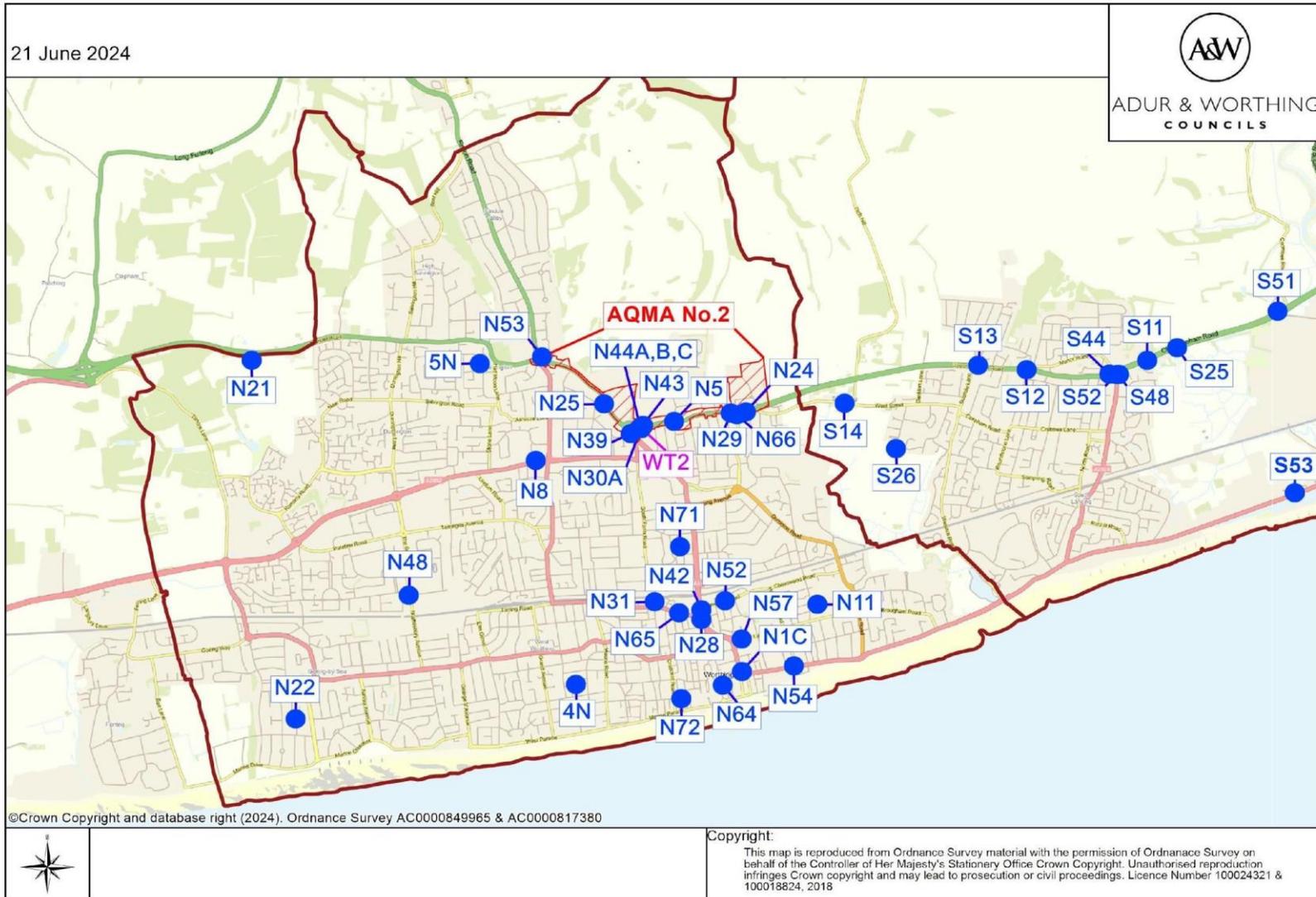


Figure D.8 – Map of Monitoring Sites in Worthing – A27/AQMA No.2

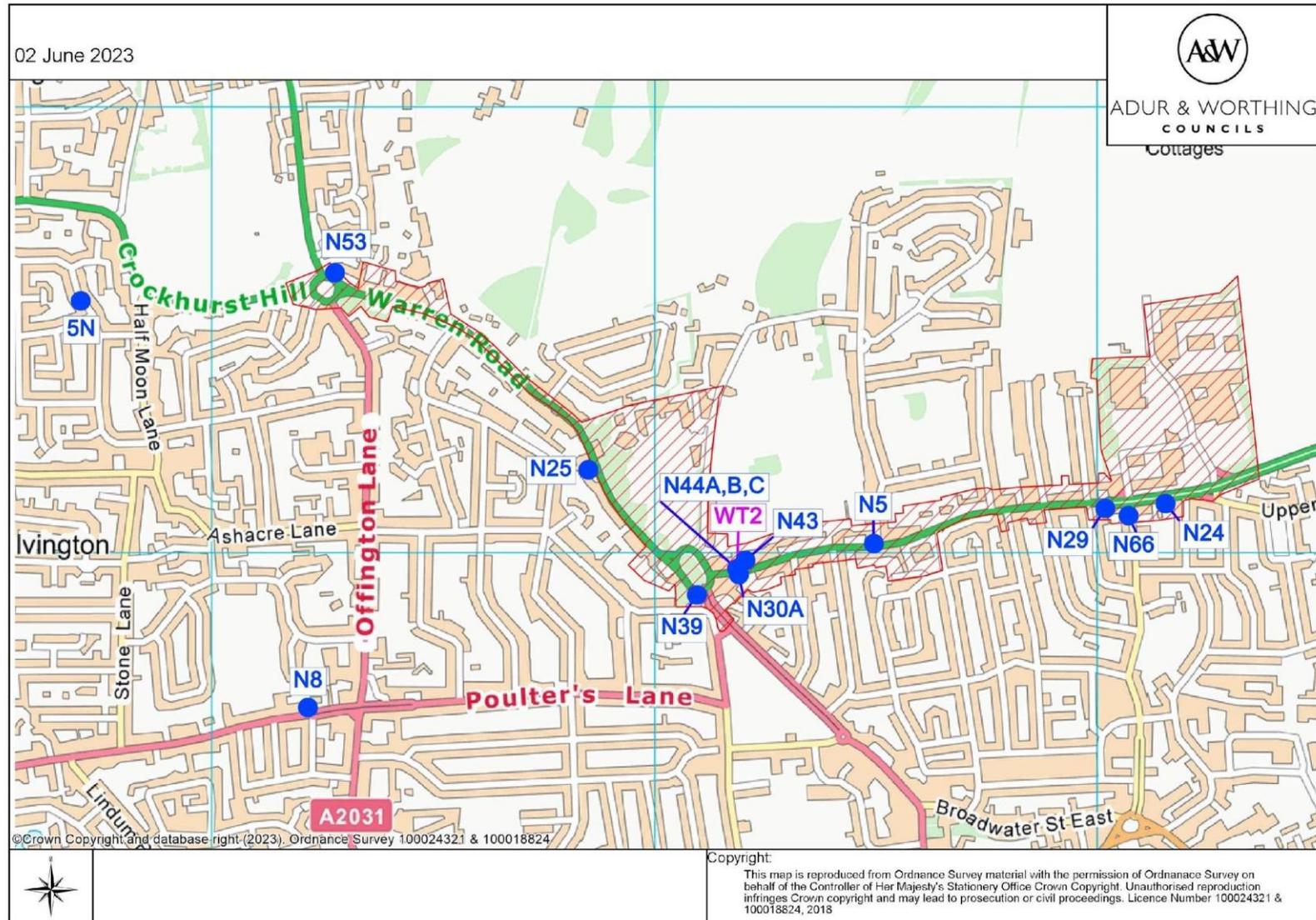




Figure D.10 – Map of Monitoring Sites in Worthing – A24

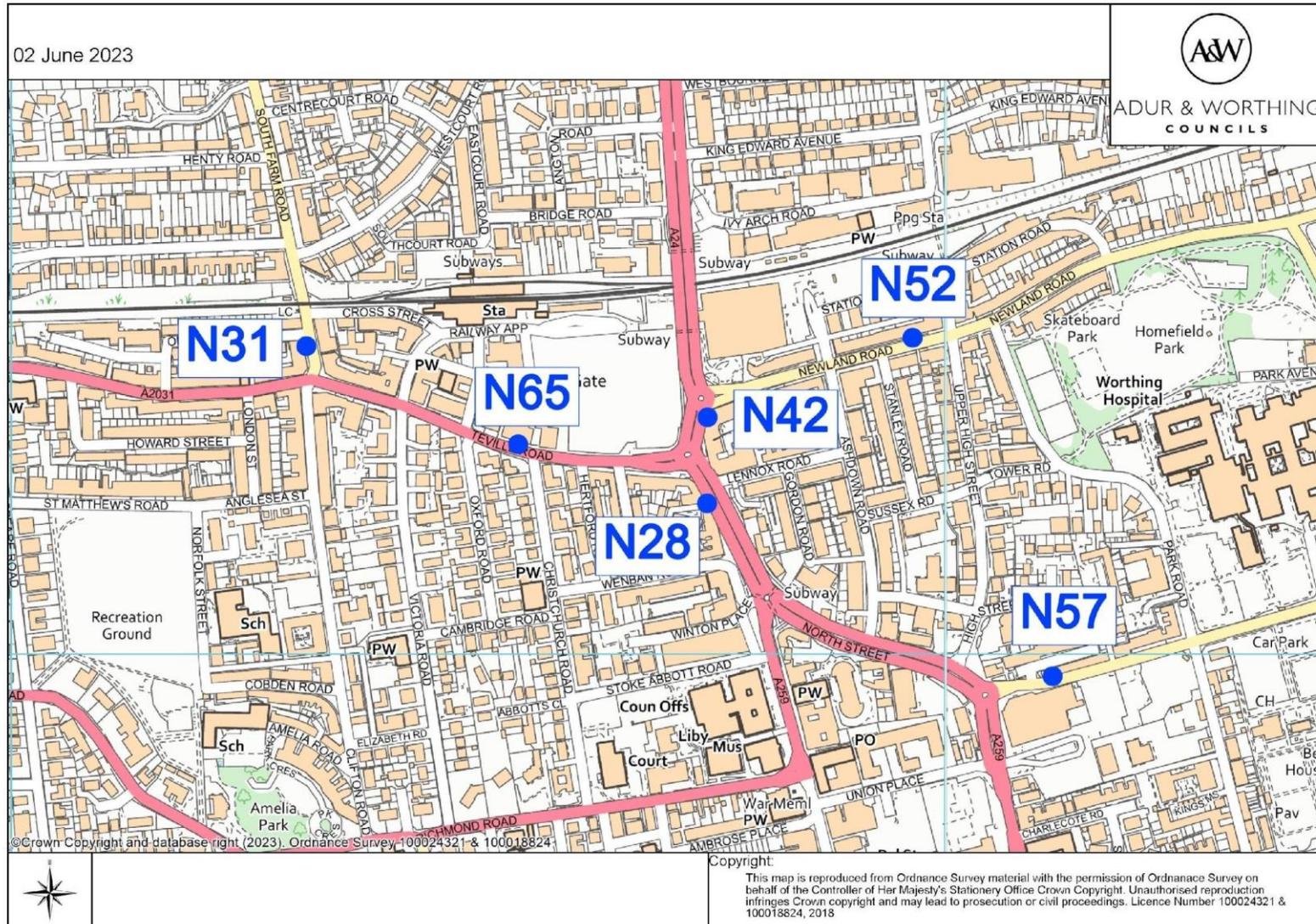
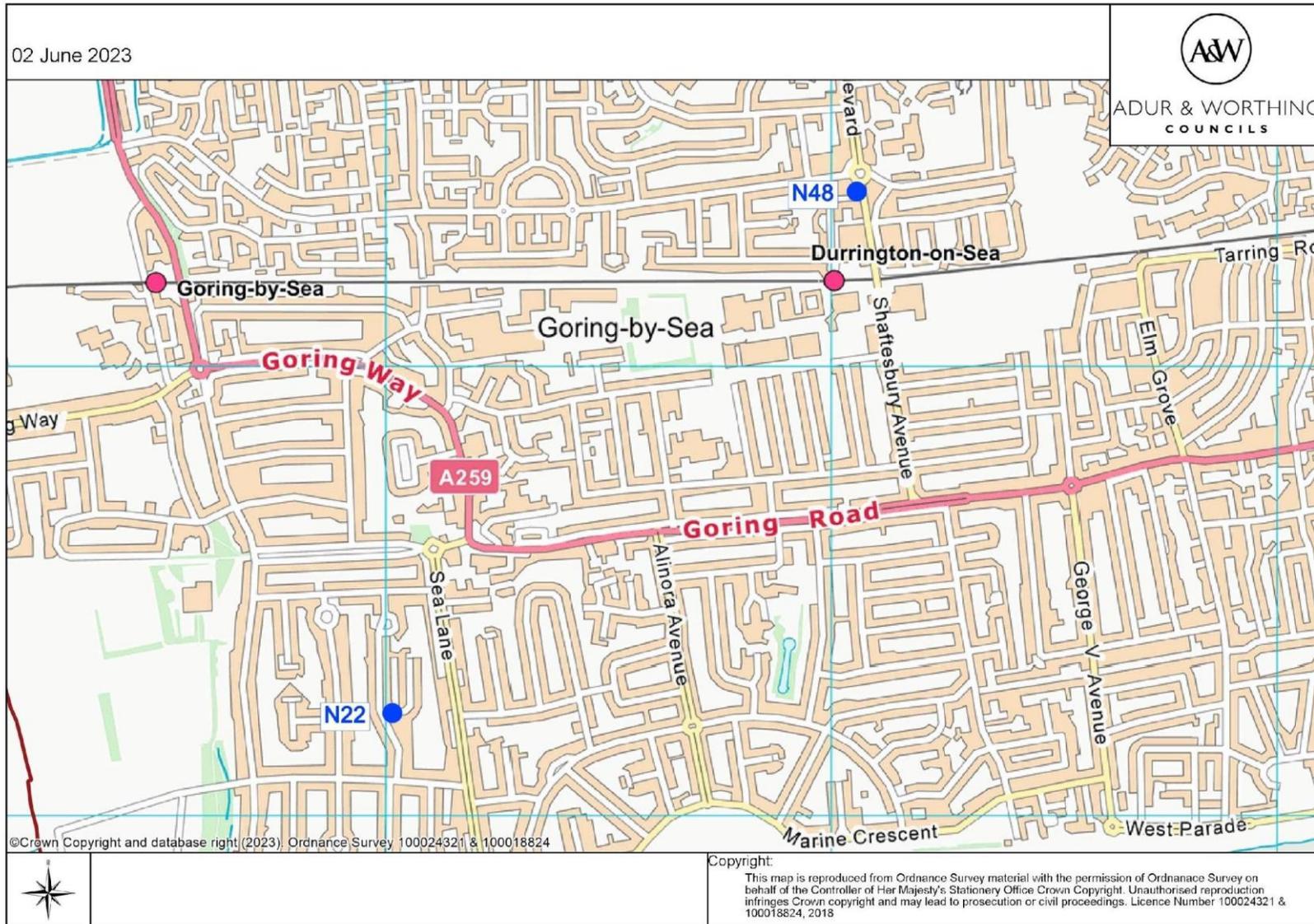


Figure D.11 – Map of Monitoring Sites in Worthing – Goring



## Appendix E: Traffic Data

### Adur

Traffic data has been obtained from West Sussex County Council (WSCC) for four locations in Adur, allowing a comparison of traffic numbers. The table below shows Annual Average Daily Traffic (AADT) data for these sites. Volumes increased marginally in Southwick to 22,837 vehicles, almost the same as 2022. The traffic counter in Shoreham High Street showed a small increase to 15,332, an increase of 212 vehicles. Traffic volumes at the New Salts Farm Roundabout, Shoreham increased almost 5% compared to last year. Some large development is taking place nearby and the increase in the volume of traffic is thought to reflect this. The A283 Old Shoreham Road traffic counter showed a further decrease in the volume of and is almost at 2020 levels.

Traffic data was requested from National Highways for the A27 Shoreham to Lancing on a number of occasions, however at the time of writing suitable data had not been received.

**Table E.1 – Adur Traffic Data 2017-2023**

Site no.	Location	AADT							Difference	% Difference
		2017	2018	2019	2020	2021	2022	2023	2022-23	
5035	A270 Old Shoreham Road, west of Southview Road, Southwick	23,671	23,288	23,541	N/A	21,229	22,806	22,837	+31	0.1%
257	A259 east of New Salts Farm Roundabout, Shoreham	25,415	25,194	24,730	20,991	22,266	22,242	23,310	-1,068	4.8%

5037	A283 Old Shoreham Road, o/p no.138, Shoreham	13,659	13,775	12,087	10,324	11,261	11,124	10,668	-456	-4%
5036	A259 High Street, East of Middle St, Shoreham	No data	15,120	15,332	+212	1.4%				
-	A27 eastbound between A2025 (Grinstead Lane) and A283	No data	23774	26768	23458	25021	26084	-	-	-
-	A27 westbound between A283 and A2025	No data	24910	25520	22789	24057	25079	-	-	-

### Worthing

Traffic data was requested from National Highways for the A27 through Worthing on a number of occasions, however at the time of writing suitable data had not been received.

**Table E.2 – Worthing Traffic Data 2017-2023**

NTIS Link ID	NTIS Link Location Name	AAOT 2017	AAOT 2018	AAOT 2019	AAOT 2020	AAOT 2021	AAOT 2022	AAOT 2023	Difference 2022-23	% Difference
103024103	A27 westbound between A2025 (Grinstead	14,511	14,994	16,354	14,350	15,819	16,161	-	-	-

	Lane Lancing) and A24 near Worthing (east)									
1250212 01	A27 eastbound between A24 near Worthing (east) and A2025	15,849	15,527	16,642	14,622	16,539	16,714	-	-	-

## Appendix F: Summary of Air Quality Objectives in England

**Table F.1 – Air Quality Objectives in England<sup>15</sup>**

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

<sup>15</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide

## References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.
- Air Quality and Emission Mitigation Guidance for Sussex (2021) - Available from <https://www.sussex-air.net/>