ADUR & WORTHING
COUNCILS

# 2023 Air Quality Annual Status Report (ASR)

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

**Date: June, 2023**

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|---|---|
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| **Report Reference Number** | A&W/ASR/2023 |
| **Date** | June 2023 |

# Executive Summary: Air Quality in Our Area

## Air Quality in Adur & Worthing

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

The mortality burden of air pollution within the UK is equivalent to 29,000 to 43,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

We have combined reporting for both Adur District and Worthing Borough into this single report. Data and actions for both Authorities are clearly labelled and referenced throughout.

### Adur

There are currently two Air Quality Management Areas (AQMAs) within the District: AQMA1 – High Street, Shoreham-by-Sea; and AQMA2 – Old Shoreham Road, Southwick. Both were declared for exceedances of the Nitrogen Dioxide annual mean objective. Levels of $NO_2$ in and around both AQMA's either decreased slightly or remained similar to those measured in 2021.

Adur District Council undertook automatic (continuous) monitoring of Nitrogen Dioxide ($NO_2$) and Particulate Matter ($PM_{2.5}$) at one site in Shoreham High Street (A259) during 2022. The measured $NO_2$ annual mean was 20.3µg/m$^3$, slightly up on the 2021 level, but

[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

[3] Defra. Air quality appraisal: damage cost guidance, January 2023

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

still below the objective of 40µg/m$^3$. There were no recorded exceedances of the one hour mean objective of 200µg/m.

No monitoring sites exceeded the annual mean objective of 40µg/m$^3$ during 2022 and levels in both AQMA's remain below the annual mean objectives.

We propose to revoke AQMA2 as measured levels have been below the annual mean objective for five years and we believe the AQMA is unlikely to be affected by major developments as much as the High Street AQMA1. Revocation is therefore scheduled for 2023.

As with previous years, we maintain that we must keep AQMA1 under review before making decisions on revocation. There remain a large number of approved major developments and only a few have so far started construction. Alongside other planned major developments for the Adur District (as detailed in section 2), we believe revocation of AQMA1 remains unrealistic at this time.

The $PM_{2.5}$ annual mean dropped from 16.2µg/m$^3$ to 11.6µg/m$^3$, this is below the permitted level of 25µg/m$^3$, but above the WHO guideline value of 5µg/m$^3$.

A draft of the new Adur Air Quality Action Plan (AQAP) progressed during 2022 and was scheduled for consultation in Spring 2023.

### Worthing

There is one Air Quality Management Area (AQMA) within Worthing: Worthing AQMA No.2 on the A27/A24 in Worthing, declared for exceeding the annual mean objective for $NO_2$ of 40µg/m$^3$.

Worthing Borough Council undertook automatic (continuous) monitoring of $NO_2$ and $PM_{2.5}$ at an affiliated AURN (Automatic Urban and Rural Network) site at Grove Lodge Worthing (A27) during 2022. Non-automatic (passive) monitoring of $NO_2$ also took place using 30 diffusion tubes across the Borough.

The continuous monitoring site at Grove Lodge recorded a drop in the $NO_2$ annual mean from to 27.6µg/m$^3$ to 25.4µg/m$^3$. The hourly mean objective of 200µg/m$^3$ was not exceeded at any time.

One monitoring site exceeded the annual mean objective of 40µg/$m^3$ during 2022; N30A Grove Lodge Cottages. Other sites registered an increase in measured levels of $NO_2$ in 2022, whilst some showed a decrease.

The measured level of $PM_{2.5}$ remained similar at 8.5µg/$m^3$, below the Limit Value of 25µg/$m^3$, but above the WHO guideline value.

Traffic levels in Adur increased around AQMA2 in Southwick and decreased at sites close to AQMA1. In Worthing traffic levels on the A27 at Grove Lodge increased very slightly.

Both Adur District and Worthing Borough Councils work with external partners, particularly West Sussex County Council. Much of our partnership work is achieved through the Sussex Air Quality partnership (https://sussex-air.net/). We progressed some interesting projects with schools through Sussex-air and progress was made on car clubs and development of the West Sussex County Council led programme of kerbside EV chargepoints.

Air Quality information is available on our website at https://www.adur-worthing.gov.uk/environmental-health/pollution/air-quality-and-pollution/local-air-quality-management/#page-content

## 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[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, has been published in 2023, providing more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[6] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely

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

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

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

During 2022 we progressed a number of measures in pursuit of improved air quality. These included working with consultants Bureau Veritas to produce a draft Adur Air Quality Action Plan; continued delivery of the Sussex-air Defra funded intervention programme in primary and secondary schools and expansion into Community Groups and Events; replace the continuous NOx analyser in Shoreham High Street; worked with the Environment Agency to plan a replacement monitoring station cabinet at Grove Lodge Worthing; began 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'[7] developments; provided two dedicated bays in Pond Road car park, Shoreham and two in High Street surface car park Worthing for car club use; worked with WSCC on designs for an Upper Shoreham Road cycle route and traffic calming measures for Middle Rd and Eastern Avenue, Shoreham and on cycle routes in Worthing; planned an expansion of the Council's bike share scheme (Donkey Bikes[8]); and as part of a Sussex-air consortium made a further bid.

## Conclusions and Priorities

Measured concentrations of $NO_2$ showed small increases and decreases at monitoring sites across Adur & Worthing and 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, exceeds the objective.

Levels of $PM_{2.5}$ were also measured below the current limit values.

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 progressed on some developments in 2022. Balancing the demand for

[7] as defined by Town and Country Planning (Development Management Procedure) Order (England) 2015

[8] https://timeforworthing.uk/bike-hire-worthing/

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 2023 include consulting on and publishing the new Adur Air Quality Action Plan; progressing a review of the 2015 Worthing Air Quality Action Plan including a new source apportionment study; revoking the Southwick AQMA2; reviewing our $PM_{2.5}$ monitoring results and looking at how levels could be reduced locally; working with our Sussex-air partners on the Defra funded projects (schools/communities and taxi engagement) and working with West Sussex County Council on the Connected Kerb EV charge point project.

## Local Engagement and How to get Involved

We engage with interested parties in the area, including community groups, elected members, transport planners, planning policy and development control. We are 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 with air quality data, news updates, educational resources, links and other services such as Sussex Air Quality Alert. See http://www.sussex-air.net/ for more information.

With development pressures across the Adur and Worthing area, it is important that interested parties try to work together to achieve favourable outcomes.

The Council is always interested in hearing from residents and businesses who may have innovative ideas to reduce air pollution in and around Adur & Worthing. You may contact us using our online form at https://www.adur-worthing.gov.uk/eforms/aw-ext-environmental-health.ofml.

Road vehicles produce over 50 per cent of the emissions of nitrogen oxides in the UK.

Before using your car, ask yourself:

- Could I walk or cycle instead of taking the car?
- Could I take a bus or train?
- Are the levels of air pollution high today? (See our website for forecasts: https://www.adur-worthing.gov.uk/environmental-health/pollution/air-quality-and-pollution/air-quality-monitoring/#airalert)

- Using quieter streets when you're on a bike or on foot can lower your exposure to air pollution by up to 20%.

<u>If you must drive:</u>

- 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.

<u>At home:</u>

- Buy water-based or low-solvent paints, varnishes, glues and wood preservatives.
- Half of all deliveries to workplaces are personal parcels for staff. By using pick-up points in corner shops or lockers in train stations you can help to reduce pollution from delivery vehicles. Where 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 $PM_{2.5}$. 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 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. However exposure can be considerably 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

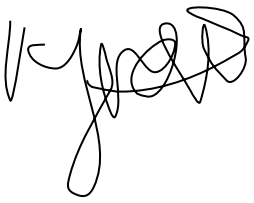
This ASR was prepared by the Public Health & Regulation Team at Adur and Worthing Councils, with the support of the following officers and departments:

- Adur & Worthing Councils Sustainability Team
- Jamie Dallen, Transport Planning and Policy Team; Planning Services, West Sussex County Council
- Peter Phillips, National Highways

This ASR has been approved by:

Cllr Kevin Boram, Adur Cabinet Member for Communities & Wellbeing

Cllr Vicki Wells, Worthing Cabinet Member for the Environment



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

If you have any comments please send them to:

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## Figures



## Tables

# 1 Local Air Quality Management

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

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

# 2 Actions to Improve Air Quality

## Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

A summary of AQMAs declared by Adur & Worthing can be found in Table 2.1. The table presents a description of the three AQMAs that are currently designated within Adur & Worthing.

Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- $NO_2$ annual mean

  Previously we have stated we would consider revoking Adur AQMA2 – Southwick. We did not progress this in 2022, but have included it within our revised Air Quality Action Plan and propose to revoke in 2023.

## 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 |
|---|---|---|---|---|---|---|---|---|---|
| **Adur District Council AQMA1** | Declared 2005 | $NO_2$ Annual Mean | An area encompassing the A259 High Street, Shoreham-by-Sea between Ropetackle Roundabout and Surry Street | NO | 42 | 24.2 | 5 | Adur Air Quality Action Plan 2007 | https://www.adur-worthing.gov.uk/media/media,104971,en.pdf |
| **Adur District Council AQMA2** | Declared 2005 | $NO_2$ Annual Mean | An area encompassing the A270 Old Shoreham Road, Southwick between Kingston Lane and Lower Drive | NO | 46 | 25.4 | 5 | Adur Air Quality Action Plan 2007 | https://www.adur-worthing.gov.uk/media/media,104971,en.pdf |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Worthing Borough Council AQMA No.2** | Declared 13/07/2010, Amended 15/12/2014 | $NO_2$ 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 | 44.7 | 0 | Worthing Air Quality Action Plan 2015 | https://www.adur-worthing.gov.uk/media/media,138133,en.pdf |

☒ **Adur DC & Worthing BC confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Adur DC & Worthing BC confirm that all current AQAPs have been submitted to Defra.**

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

Defra's appraisal of last year's ASR concluded

1. *The report contains extensive discussion on trends seen in monitored concentrations throughout 2021, which is commended. This level of detail is encouraged in future reports and is considered an example of good practice.*
2. *The Council is adopting a cautious approach in their decision to remove or maintain their AQMAs. Given the uncertainty in concentrations following the easing of restrictions, the Council intend to keep the AQMA in place until sufficient evidence is obtained. This action is supported.*
3. *It would be beneficial for the Council to include a screen grab of the national bias adjustment factor spreadsheet depicting the factor applied. Should the local factor be applied in future, evidence to demonstrate correct calculation of this factor will be required.*
    a. Noted and included in this year's report.
4. *Several $NO_2$'s are not subscripted in text throughout the report. The Council should ensure to correct such errors in future reports.*
    a. Noted
5. *Several Maps are included showing monitoring locations throughout the District. This is welcomed. It is suggested that a legend would be a useful addition to these maps to aid readability.*
    a. A legend has been added this year.
6. *Progress on measures is described in detail and upcoming measures are clearly stated. The council is commended for their meticulous documentation of their strategies.*
7. *The Council continually reviews their monitoring strategy each year. Diffusion tubes were removed this year in response to latest $NO_2$ data. This is an example of good practice.*

Adur & Worthing has taken forward a number of direct measures during the current reporting year of 2022 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2, with the type of measure and the progress Adur & Worthing have made during the reporting year of 2022 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective Action Plans, Adur & Worthing Sustainability Plan, West Sussex Walking and Cycling Strategy 2016 - 2026 and 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:

- Worked with consultants Bureau Veritas to produce a draft Adur Air Quality Action Plan. At the time of writing the Plan had been consulted upon and will be published in mid 2023.
- Continued delivery of the Sussex-air Defra funded intervention programme in primary and secondary schools and expansion into Community Groups and Events. As part of a Sussex-air consortium we successfully bid for Defra grant funding in 2021 for an extension to the project and adding the links to climate change. A Sustrans Air Quality officer engaged with schools and groups to investigate local air quality.

  Schools participating in 2022 included Shoreham Academy in Adur and Durrington High School, Davison High School for Girls and Bohunt School in Worthing.

  Other schools to have participated in the project since 2018 are Swiss Gardens Primary, St Nicholas and St Marys Primary and Eastbrook Primary in Adur and Downsbrook Primary, Thomas A Becket Infant and Junior Schools, Bohunt School, Worthing High, Chesswood Junior and Broadwater CofE School in Worthing;
- As part of the Sussex-air consortium we were successful in a funding bid to the Defra air quality grant to fund additional or replacement monitoring across Sussex. Part of this helped us fund a replacement continuous NOx analyser in Shoreham High Street, which replaced the existing monitor which was over 10 years old.
- Worked with the Environment Agency to plan a replacement monitoring station cabinet at Grove Lodge Worthing;
- Part of the successful Sussex-air funding bid to the Defra air quality grant to fund was for the purchase of low cost sensors (nodes), primarily for use in Brighton & Hove, but with some to be used in West Sussex.
- Also 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 work began in 2022 and is continuing into 2023;

- Continued to work with WSCC on the Connected Kerb EV charge point project, identifying and confirming kerbside sites across Adur & Worthing;
- Use of the Sussex Air Quality Emissions Mitigation Planning Guidance when looking at the impacts of 'major'[9] developments. The Guidance has assisted the Councils with obtaining costed air quality mitigation at development sites and relevant section 106 funds;
- Provision of two dedicated bays in Pond Road car park, Shoreham, and two in High Street surface car park, Worthing, for car club use. We also continued discussions with car club providers to develop these further;
- Discussions with WSCC around the design for an Upper Shoreham Road cycle route and traffic calming measures on Middle Road and Eastern Avenue, Shoreham;
- Discussions with WSCC around which cycle routes should be prioritised in Worthing;
- Planning for expansion of the Council's bike share scheme (Donkey Bikes[10]) in Worthing and into Adur for the first time
- As part of a Sussex-air consortium we made a further bid for Defra grant funding to continue funding the Sustrans run schools/community engagement project.
- 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 worked to implement these measures in partnership with the following stakeholders during 2022:

- West Sussex County Council
- Sussex-air

[9] as defined by Town and Country Planning (Development Management Procedure) Order (England) 2015

[10] https://timeforworthing.uk/bike-hire-worthing/

Adur and Worthing expect the following measures to be completed over the course of the next reporting year. Those marked * are key priorities.

- *Publish a new Adur Air Quality Action Plan following a period of public consultation in Spring 2023, drafted in partnership with West Sussex County Council and Bureau Veritas consultants;
- *Revocation of the Southwick AQMA2;
- *Work with National Highways and West Sussex County Council to develop and consult on a new Worthing Air Quality Action Plan;
- Provision of a new monitoring cabinet to house NOx and $PM_{2.5}$ measuring equipment at the Worthing A27 AURN site;
- Purchase and deployment of low cost sensors (nodes) through Sussex air. The work is being led by Brighton and Hove City Council and the majority will be deployed in the City, funded in part by City Council carbon neutral funds. However some will be deployed in other areas of Sussex and we are pushing for one to be used within the Adur & Worthing area.
- *Continue to work with WSCC on the Connected Kerb EV charge point project;
- *Engagement with the Sussex-air Defra funded schools and community group programme in Adur & Worthing;
- Revise the Sussex Air Quality & Emissions Mitigation Guidance for Planning as part of the Sussex-air project team;
- Continue dialogue with Car Club providers, particularly in new developments and those with reduced parking;
- *Continue discussions with WSCC to develop cycling routes on Upper Shoreham Road, Shoreham, traffic calming measures on Middle Road and Eastern Avenue, Shoreham; and priority routes in Worthing.
-

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

**A.** **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, particularly for the Adur District. 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. Similarly, there are several planning permissions granted for development at the Western Harbour Arm, Shoreham, or in the vicinity, some of which have commenced development.

### 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.

- 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. Construction work continues on site.

- AWDM/0021/22 created an additional 34 dwellings within the existing boundary of the site, by reducing the number of four and five bed dwellings and increasing the number of two and three bed homes.

- 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 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. This allocation includes

- 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 seeks 39 additional dwellings on this site;
- 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, was received (AWDM/1473/21).

- Schemes at 5 Brighton Road (Howard Kent site) have been refused and an appeal has been lodged.
- 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.
- 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.

### Worthing

***The Submission Draft Worthing Local Plan*** was submitted for Examination in June 2021. The Worthing Local Plan was expected to be adopted in spring 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.

**B.** 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;

**C.** Providing sufficient resources (financial and personnel) in order to progress and deliver effective air quality measures;

**D.** Identifying suitable sites for the provision of car club spaces alongside sufficient funding;

**E.** Identifying suitable sites for the installation of electric vehicle charge points (although this is becoming less of an issue as the Connected Kerb project develops);

**F.** 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:

- Adur Air Quality Action Plan (AQAP) – We commissioned air quality consultants Bureau Veritas to assist in the production of a new Action Plan, the draft of which was almost complete in 2022. This is due for consultation and publication in 2023.

- Resources delayed progress on AQMA2 revocation. This is now due in 2023, following completion of the new AQAP.

**Adur District Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in *Adur AQMA1***

**Worthing Borough Council**

**Whilst the measures stated above and in Error! Reference source not found. will help to contribute towards compliance, Worthing Borough Council anticipates that further measures may be required in subsequent years to achieve compliance and therefore enable the revocation of *Worthing Borough Council AQMA No.2*.**

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

| Measure No. | Measure | Category | Classification | Year Measure Introduced in AQAP | Estimated / Actual Completion Date | Organisations Involved | Funding Source | Defra AQ Grant Funding | Funding Status | Estimated Cost of Measure | Measure Status | Reduction in Pollutant / Emission from Measure | Key Performance Indicator | Progress to Date | Comments / Barriers to Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ADUR | | | | | | | |
| 1 | Adur/Worthing Car Club | Alternatives to private vehicle use | Car Clubs | 2014 | 2022 | Adur DC/Worthing BC/WSCC | Funding: Developer contributions/Adur DC | NO | Partially Funded | £50k - £100k | Implementation | 1% | Number of people using the service/Number of vehicles available | There are now two dedicated bays in Pond Road car park, Shoreham. Discussions with WSCC and car club providers continued during 2022. Car club providers continued discussions with developers regarding specific development sites in Shoreham. These developments are still yet to be completed. | Car clubs also embedded in planned new developments. |
| 2 | ~~LEZ/CAZ Feasibility~~ | ~~Promoting Low Emission Transport~~ | ~~Low Emission Zone (LEZ)~~ | ~~2018~~ | - | ~~Adur DC/WSCC~~ | ~~Unknown~~ | ~~NO~~ | ~~Not Funded~~ | ~~£1 million - £10 million~~ | Aborted | - | ~~Reduction in older Euro class HGV's/LGV's and buses within the AQMA~~ | ~~No further discussions have taken place~~ | ~~As per 2019, no CAZ planned. Acceptability, feasibility and enforcement questioned. For these reasons this is not seen as a priority at this stage. Any feasibility study would need to understand the benefits, costs, deliverability, enforceability, level of support and any unintended consequences.~~ |
| 3 | Embed AQ Emissions Mitigation Planning Guidance for Sussex into the planning process | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | 2012 | 2015 | Adur DC/Worthing BC | LA | NO | Funded | < £10k | Implementation | 1-5% | Low emission mitigation secured in local developments | Further revision of the Guidance expected in 2023. The guidance is signposted within the Adur Local Plan and the (draft in 2022) 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. | Will consider developing the Guidance into a Supplementary Planning Document if deemed necessary. |
| 4 | Improve emissions from the Council's vehicle fleet | Promoting Low Emission Transport | Public Vehicle Procurement - Prioritising uptake of low emission vehicles | 2012 | 2030 | Adur DC/Worthing BC | LA | NO | Partially Funded | £1 million - £10 million | Implementation | <1% | No. of vehicles replaced with better Euro standard/Pure EV models | Programme of fleet replacement with ev/hybrid vehicles continued, as and when vehicles they are due for replacement. All pool cars hybrids. Explore alternative fuels for refuse vehicles. | Barrier: Suitable vehicles are both available and affordable (e.g. HGV's/refuse vehicles). |
| 5 | Reduce AQ impact of ADC/WSCC staff travel | Promoting Travel Alternatives | Encourage / Facilitate home-working | 2012 | 2022 | Adur DC/Worthing BC/WSCC | LA | NO | Funded | £50k - £100k | Implementation | <1% | Staff travel surveys reduced commuting and business travel by car | 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. Pool cars now hybrid, EV's being actively investigated. | Barriers: local public transport links; staff owned fleet. |
| 6 | ~~HGV/LGV assessment~~ | ~~Vehicle Fleet Efficiency~~ | ~~Other~~ | ~~2016~~ | ~~2024~~ | ~~Adur DC~~ | ~~LA~~ | ~~NO~~ | ~~Not Funded~~ | ~~£10k - 50k~~ | Aborted | ~~<5%~~ | ~~Data on Euro Classes~~ | ~~Source Apportionment study shows LGV's contribute more than HGV's, hence why this action has been aborted~~ | ~~LGV's would be prioritised over HGV's.~~ |

| Measure No. | Measure | Category | Classification | Year Measure Introduced in AQAP | Estimated / Actual Completion Date | Organisations Involved | Funding Source | Defra AQ Grant Funding | Funding Status | Estimated Cost of Measure | Measure Status | Reduction in Pollutant / Emission from Measure | Key Performance Indicator | Progress to Date | Comments / Barriers to Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | EV charging infrastructure | Promoting Low Emission Transport | Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | 2016 | 2023 | Adur DC/Worthing BC/WSCC | Adur DC/Worthing BC/WSCC/Developer contributions | NO | Partially Funded | £500k - £1 million | Planning | 1-5% | Number of charge points provided | EV charge points continue to be provided for new 'major' developments aided by new Building Regulations Approved Document S; Connected Kerb, West Sussex County Council, Adur and Worthing Councils, Arun District Council, Crawley Borough Council, Horsham District Council, and Mid Sussex District Council 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. West Sussex County Council advertised proposals to introduce electric vehicle charging points on the highway at various locations in Adur. The consultation ran 17th November - 8th December 2022.<br><br>WSCC parking standards sets increasing year on year targets for EV charge points at new developments. | |
| 8 | Bus Fleet Improvements | Vehicle Fleet Efficiency | Vehicle Retrofitting programmes | 2010 | | BHCC/WSCC/ADC | DEFRA/DFT/OLEV grants/WSCC | NO | Partially Funded | £1 million - £10 million | Planning | 1-5% | Improvements in fleet emissions - Euro Categories | Adur & Worthing Councils and West Sussex County Council have supported Brighton & Hove City Council and other partners and Brighton and Hove Buses with bids to retrofit buses in and around the city and LEZ. Some of these routes pass through the Adur District. | Retrofitting or fleet replacement will bring reductions in emissions; small in AQMA. |
| 9 | Traffic light/pelican crossing optimisation/MOVA traffic control | Traffic Management | UTC, Congestion management, traffic reduction | 2010 | 2026 | WSCC | WSCC | NO | Funded | £50k - £100k | Implementation | 5-10% | Improvement in traffic flows | Signals continue to be optimised as far as reasonably practicable. | Improved flow/decrease in stop start driving would reduce emissions but future significant benefits are unlikely to be achieved given current optimisation. |
| 10 | Travel Plans secured through the planning process for all significant development sites in West Sussex | Promoting Travel Alternatives | Other | 2010 | 2026 | Adur DC/WSCC | Developer Contribution | NO | Partially Funded | £500k - £1 million | Implementation | 1-5% | Number of Plans Delivered | Plans continue to be secured as and when developments come forward. The Adur Local Plan adds weight to the requirement for travel plans; Shoreham Harbour JAAP includes policies for sustainable travel and infrastructure improvements. | Focus on increasing public transport, walking and cycling trips whilst minimising private car journeys. Discussions must include emissions mitigation considerations, can be protracted. |
| 11 | Promotion of walking and cycling | Promoting Travel Alternatives | Personalised Travel Planning | 2014 | 2023 | Adur DC/WSCC | Adur DC/Worthing BC/WSCC/Developer contributions | NO | Partially Funded | £100k - £500k | Implementation | 1-5% | Automatic cycle counters and travel surveys | The Living Streets "Walk To" campaign was run by WSCC and Living Streets in 2022, with some schools in Shoreham active in their participation. | Focus on reducing traffic congestion and promoting sustainable travel for trips to and from work (see also item 12). |

| Measure No. | Measure | Category | Classification | Year Measure Introduced in AQAP | Estimated / Actual Completion Date | Organisations Involved | Funding Source | Defra AQ Grant Funding | Funding Status | Estimated Cost of Measure | Measure Status | Reduction in Pollutant / Emission from Measure | Key Performance Indicator | Progress to Date | Comments / Barriers to Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | School Travel Plans | Promoting Travel Alternatives | School Travel Plans | 2010 | 2021 | WSCC | WSCC/Defra Grants | NO | Funded | | Implementation | 0.01 | Hands-up travel mode surveys in schools | Schools are directed to Modeshift Stars for assistance with travel planning, which is a nationally recognised online travel planning tool. See entry 11 for information on Living Streets Walk To School. | Focus on promoting sustainable travel amongst young people and reducing peak time car traffic. WSCC Bikeability have been engaging the schools with cycle training (lots of work with primary and secondary schools across Adur to offer cycle training. |
| 13 | Promotion of LEV's | Public Information | Via the Internet | 2015 | 2030 | Adur DC/Worthing BC | LA/DLEV grants | NO | Funded | < £10k | Implementation | 0.01 | Number of LEV's | Information remains on website. | OLEV grants removed 2022 |
| 14 | Car Sharing | Public Information | Via the Internet | 2015 | | WSCC | WSCC | NO | Funded | | Implementation | 1-5% | Website hits/journeys planned/number of registrants/take-up of initiatives | Car share website www.westsussexcarshare.com | Focus on promoting sustainable travel/car. |
| 15 | Public Health Information Campaign | Public Information | Via the Internet | 2010 | | Adur DC/Worthing BC/WSCC | Adur DC/ Worthing DC/ WSCC | NO | Partially Funded | < £10k | Implementation | <1% | Number of promotional events, publications, social media. Annual increase in Sussex air Quality Alert subscribers | Liaison with WSCC Public Team who have supported the promotion of air Alert. Revamped Sussex-air website launched to provide a smoother more relevant customer experience including Shoreham High Street monitoring results and Diffusion tube data. | Attempt to reduce car journeys/increase walking and cycling, particularly through the AQMA, promotion of Sussex Air Quality Alert. |
| 16 | Air Quality Monitoring and availability of AQ information | Public Information | Via the Internet | 2010 | | Adur DC | Adur DC | NO | Funded | < £10k | Implementation | N/A | Reduction in levels of $NO_2$ | Council's webpages updated. Order placed to replace the NOx analyser in the Shoreham High Street Air Quality Monitoring Station. Anticipated installation early 2023. All monitoring results available via the Sussex-air website, link on Council's website. | |
| 17 | Transport network infrastructure improvements for new development | Traffic Management | UTC, Congestion management, traffic reduction | 2010 | | WSCC | WSCC/developer contributions | NO | Partially Funded | | Implementation | <1% | Number of infrastructure improvements | Stakeholder support, business cases, land release and funding opportunities considered for identified schemes at Norfolk Bridge junction and A259 Shoreham Adur Ferry Bridge to Brighton & Hove cycle scheme | Focus on minimising traffic congestion. Funding sought. |
| 18 | Anti-idling promotion | Traffic Management | Anti-idling enforcement | 2010 | | Adur DC/WSCC | WSCC/ Adur DC/ Sussex air | NO | Partially Funded | | Implementation | N/A | Localised Air quality monitoring | Anti-idling signs continue to be placed at stationary traffic hotspots when deemed necessary and/or as requested by the public, funded by Adur DC - e.g junctions and level crossings adjacent to the AQMA. | Campaigns to promote anti-idling more generally still being considered e.g. social media campaign. |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | New infrastructure for cyclists and pedestrians | Transport Planning and Infrastructure | Cycle network | 2010 | 2021 | WSCC | WSCC/developer contributions | NO | Partially Funded | | Implementation | <1% | Length of new cycle routes provided | Initial public engagement was undertaken on principles of A259 Shoreham Adur Ferry Bridge - Brighton & Hove cycle scheme in Spring 2022 (also see entry 21). New signal crossing for pedestrians and cyclists installed on A283 Steyning Road and engagement has continued on potential cycling and walking improvements on Upper Shoreham Road and around Middle Road Shoreham (also see entry 23). Each of these routes are identified within the Adur and Worthing Local Cycling & Walking Infrastructure Plan (LCWIP). | Minimising the impacts of traffic on local streets. Linked to Item 23 |
| 20 | Shoreham High Street and Norfolk Bridge infrastructure improvements to reduce traffic flow conflicts with car, bus and taxi bays, and improve access and public realm within the High Street | Transport Planning and Infrastructure | Other | 2010 | | WSCC | WSCC | NO | Not Funded | | Planning | 1-5% | Number of Projects Delivered | 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 and stakeholders regarding these scheme options is expected to take place. | Focus on reducing traffic congestion to improve air quality. |
| 21 | Shoreham Area Sustainable Transport Package Feasibility Study | Transport Planning and Infrastructure | Other | 2018 | | WSCC | WSCC/developer contributions | NO | Funded | | Planning | | Cycle counter flows, traffic counts, travel behaviour surveys | Feasibility Study completed for the development of high quality cycling facilities for the A259 Shoreham Adur Ferry Bridge to Brighton & Hove. Initial public engagement was undertaken on principles of scheme in Spring 2022, and planning also took place for public consultation on feasibility designs in early 2023. | Focus on promoting sustainable transport and minimising car use and vehicle congestion. Estimated completion TBC |
| 22 | Taxi Fleet Emission Improvements | Promoting Low Emission Transport | Taxi Licensing conditions | 2017 | | Adur DC | Adur DC/OLEV grants | NO | Not Funded | | Planning | 0.01 | Number of taxi's replaced with better Euro standard models | Discussions on fleet improvements through minimum standards. No further progress. | District wide improvement will have some limited effect in High Street, particularly at taxi rank |
| 23 | Active Travel Fund Schemes | Transport Planning and Infrastructure | Cycle network | 2020 | | WSCC | DFT Emergency Active Travel Fund/Active Travel Fund | NO | Funded | | Implementation | | Length of new cycle routes provided | Department for Transport Active Travel Fund funding received to develop designs for cycle route and pedestrian improvements in the Upper Shoreham Road, Eastern Avenue and Middle Road areas. Active Travel Fund funding used to deliver cycling and pedestrian signal crossing of A283 to link Downs Link with St Nicholas Lane near Upper Shoreham Road. Engagement has continued on potential cycling and walking improvements on Upper Shoreham Road and around Middle Road Shoreham. | Focus on promoting sustainable transport and minimising car use and vehicle congestion. |
| | | | | | | | **WORTHING** | | | | | | | | |

| Measure No. | Measure | Category | Classification | Year Measure Introduced in AQAP | Estimated / Actual Completion Date | Organisations Involved | Funding Source | Defra AQ Grant Funding | Funding Status | Estimated Cost of Measure | Measure Status | Reduction in Pollutant / Emission from Measure | Key Performance Indicator | Progress to Date | Comments / Barriers to Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 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 | 2015 | 2026 | National Highways (NH) | NH | NO | Partially Funded | > £10 million | Planning | High | Reduction in levels of $NO_2$ | 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 2 (RIS 2): 2020 to 2025, to improve capacity and flow of traffic on the A27 from Worthing to Lancing, including preparing revised plans ahead of a public consultation in early 2023 | |
| 2 | Cut Engine, Cut Pollution Signs | Traffic Management | Anti-idling enforcement | 2016 | 2020 | NH/WSCC | Worthing BC/NH/WSCC | NO | Funded | < £10k | Implementation | Low/Medium | Local AQ monitoring/reduction in $NO_2$ | AQMA anti idling signs on exit road from Lyons Farm. Additional signs will be erected at known traffic hotspots. | Funded by Worthing BC. Sussex-air funded additional signs at level crossings. For A27 and feeder roads Highway 'clutter' is a concern. |
| 3 | LEZ/CAZ Feasibility | Promoting Low Emission Transport | Low Emission Zone (LEZ) | 2016 | | NH/Worthing BC/ WSCC | NH | NO | Not Funded | £100k - £500k | Planning | High | Reduction in older Euro class HGV's/LGV's and buses within the AQMA | Highly unlikely to progress. National Highways A27 changes a priority. | As a NH road any CAZ/LEZ is an issue. Issues with displacement of vehicles onto surrounding local roads, Finance, Enforcement - meaning this is not current priority. |
| 4 | 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 | 2014 | 2015 | 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. | Consider developing the Guidance into a Supplementary Planning Document if deemed necessary. |

| Measure No. | Measure | Category | Classification | Year Measure Introduced in AQAP | Estimated / Actual Completion Date | Organisations Involved | Funding Source | Defra AQ Grant Funding | Funding Status | Estimated Cost of Measure | Measure Status | Reduction in Pollutant / Emission from Measure | Key Performance Indicator | Progress to Date | Comments / Barriers to Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 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 Document S ; Connected Kerb, West Sussex County Council, Adur and Worthing Councils, Arun District Council, Crawley Borough Council, Horsham District Council, and Mid Sussex District Council 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. West Sussex County Council advertised proposals to introduce electric vehicle charging points on the highway at various locations in Worthing. Consultation ran 17th November - 8th December 2022.<br><br>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 new Building Regulations Approved Document S |
| 6 | Worthing Car Club | Alternatives to private vehicle use | Car Clubs | 2015 | 2022 | 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 WSCC and car club providers continued during 2022. 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. |
| 7 | Public transport improvement | Transport Planning and Infrastructure | Public transport improvements -interchanges stations and services | 2010 | | 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 has committed funding to develop detailed designs for Worthing Railway Approach public realm and access improvements with the scheme programmed to be delivered in 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. | Subject to appropriate funding being made available. |
| 8 | WBC AND WSCC Staff Travel Planning | Promoting Travel Alternatives | Workplace Travel Planning | 2018 | | Worthing BC/ ADC/ WSCC | Worthing BC/ ADC/ WSCC | NO | Partially Funded | | Implementation | Low | Staff travel surveys reduced commuting and business travel by car | 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. Pool cars now hybrid, EV's being actively investigated. | |

| Measure No. | Measure | Category | Classification | Year Measure Introduced in AQAP | Estimated / Actual Completion Date | Organisations Involved | Funding Source | Defra AQ Grant Funding | Funding Status | Estimated Cost of Measure | Measure Status | Reduction in Pollutant / Emission from Measure | Key Performance Indicator | Progress to Date | Comments / Barriers to Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | Improve Emissions from Council's Vehicle fleet | Promoting Low Emission Transport | Company Vehicle Procurement - Prioritising uptake of low emission vehicles | 2015 | 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 ev/hybrid vehicles continued, as and when vehicles they are due for replacement. All pool cars hybrids. Exploring alternative fuels for larger vehicles including the fleet ofrefuse vehicles. | Barrier: Suitable vehicles are both available and affordable (e.g. HGV's/refuse vehicles). |
| 10 | Increase availability of AQ information in relation to impacts on Public Health | Public Information | Via the Internet | 2015 | | Worthing BC | Worthing BC | NO | Funded | < £10k | Implementation | Low | Reduction in levels of $NO_2$/No. of hits on AQ pages | Worthing AURN Grove Lodge Monitoring Station cabinet to be 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 |
| 11 | Embedding AQ in Adur & Worthing Public Health Plan | Policy Guidance and Development Control | Other policy | 2015 | 2020 | Worthing BC | Worthing BC | NO | Not Funded | < £10k | Completed | Low | Inclusion in each revision of public Health Plan | Air Quality embedded within Health & Wellbeing Plan 'Healthy AW 2021/2024' - https://www.adur-worthing.gov.uk/media/Media,130482,smxx.pdf. | |
| 12 | Promotion of Air Alert | Public Information | Via the Internet | 2014 | | 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 air Alert. Revamped Sussex-air website launched to provide 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. |
| 13 | Re-assess traffic light sequencing in AQMA | Traffic Management | UTC, Congestion management, traffic reduction | 2010 | | NH/WSCC | HE/WSCC | NO | Funded | | Implementation | Low | Reduction in levels of $NO_2$ | Ongoing optimisation by NH/WSCC. | |
| 14 | Safe Cycling and Walking Routes | Transport Planning and Infrastructure | Cycle network | 2010 | 2030 | NH/WSCC | NH/WSCC | NO | Funded | £1 million - £10 million | Implementation | Low | Length of new cycle routes provided | The Adur and Working Local Cycling and Walking Infrastructure Plan (LCWIP) was adopted in summer 2020. This sets out a series of primary and secondary cycling and walking routes intended to be supported by contributions from strategic developments across the Borough. Throughout 2022, construction of the Findon Valley to Findon village cycle path began, to connect cycle route from the A24 Findon village to Worthing through the AQMA (see entry 25). | There already exist cycle paths segregated from pedestrians in and around the Grove Lodge AQMA. |
| 15 | Travel plans for significant/major developments | Promoting Travel Alternatives | Other | 2015 | 2026 | Worthing BC/WSCC | Developer Contribution | NO | Partially Funded | £500k - £1 million | Implementation | 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.<br><br>The Submission Draft Worthing Local Plan was Submitted for Examination in June 2021. The revised Plan is expected to be formally adopted by the Council in 2023. | |
| 16 | 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 www.westsussexcarshare.com | Focus on promoting sustainable travel/car. Link on Worthing website. |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 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 | The Living Streets "Walk To" campaign was run by WSCC and Living Streets in 2022, with some schools in Worthing active in their participation | Focus on reducing traffic congestion and promoting sustainable travel for trips to and from work. Subject to available funding. |
| 18 | WSCC staff travel | Promoting Low Emission Transport | Company Vehicle Procurement - Prioritising uptake of low emission vehicles | 2014 | 2019 | WSCC | WSCC | NO | Funded | | Completed | Low | | Pool cars provided for casual user staff including EV's. | Renault Zoe's added in 2018. |
| 19 | School Travel Plans | Promoting Travel Alternatives | School Travel Plans | 2010 | | WSCC | WSCC | NO | Funded | | Completed | Low | | Schools are directed to Modeshift Stars for assistance with travel planning, which is a nationally recognised online travel planning tool. See entry 17 for information on Living Streets Walk To and Sussex-air schools project. | Focus on promoting sustainable travel amongst young people and reducing peak time car traffic. WSCC Bikeability has been engaging with primary and secondary schools across Worthing to offer cycle training. The Sussex-air/Defra funded project is hoped to have influenced school travel plans. |
| ~~20~~ | ~~Business Travel Plans~~ | ~~Promoting Travel Alternatives~~ | ~~Workplace Travel Planning~~ | ~~2017~~ | - | ~~Worthing BC~~ | ~~Worthing BC/ WSCC/Developer Contributions~~ | ~~YES~~ | ~~Partially Funded~~ | ~~< £10k~~ | Aborted | ~~Low~~ | ~~Number of plans devised/derived~~ | ~~Defra AQ grant project via Sussex-air for business fleet advice was unsuccessful. Uptake by businesses in Sussex was v poor, so project was taken no further.~~ | ~~Resource issues remain; Questions over whether LGV's should be prioritised over HGV's? A Source Apportionment update in 2023 will inform this.~~ |
| 21 | Worthing College Travel Plan Review | Promoting Travel Alternatives | School Travel Plans | 2015 | 2018 | Worthing BC/ WSCC | Worthing College | NO | Funded | | Completed | Low/Medium | Reduction in use of private cars for trips to/from College/ Increase in use of alternative modes of travel | Review completed 2018. | No further updates |
| 22 | HGV/LGV assessment | Transport Planning and Infrastructure | Route Mgt plans/Strategic routing for HGV's | 2016 | 2020 | Worthing BC | Worthing BC/WSCC | YES | Partially Funded | < £10k | Aborted | Low | Data on Euro Classes | Defra AQ grant project via Sussex-air for business fleet advice was unsuccessful. Uptake by businesses in Sussex was v poor, so project was not taken any further | The next Source Apportionment Update (due 2023) will identify the proportion of HGV's/LGV's and the weighting to be applied to HGV/LGV actions. |
| 23 | Ecostars for Local Fleet Operators | Vehicle Fleet Efficiency | Fleet efficiency and recognition schemes | 2016 | 2022 | Worthing BC | Worthing BC | NO | Not Funded | | Aborted | Low/Medium | Increase in new euro Class vehicles | No further developments | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | Increase and improve availability of WBC Air Quality Monitoring results | Public Information | Via the Internet | 2015 | | Worthing BC | Worthing BC | NO | Funded | £10k - 50k | Implementation | Low | Reduction in levels of $NO_2$/No. of hits on AQ pages | Council's webpages updated. Linked Worthing webpage to UK Air and Sussex-air for Grove Lodge AURN monitoring. | Revision of webpages ongoing |
| 25 | 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 construction underway during 2022. | Focus on promoting sustainable transport and minimising car use and vehicle congestion |

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Adur and Worthing Councils continue to develop approaches to address $PM_{2.5}$ in partnership with partners through Sussex-air.

The Clean Burn campaign, funded through the Sussex-air Defra funding, highlighting the issue of particulate emissions from domestic burning, remains linked to the council's website and was updated in 2022.

The Councils continue to consider the declaration of Smoke Control Areas (SCA). There is increasing political and public support for this to progress and will be considered as part of our revised Action Plans in 2023.

Both Adur District and Worthing Borough Council monitor levels of $PM_{2.5}$ 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 $PM_{2.5}$ 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 and Worthing Borough is 6%. This information is available from the following web link: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework.

The calculated mortality is equal to that for south east England, but greater than the avreage for England (5.6 %).

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

This section sets out the monitoring undertaken within 2022 by Adur District and Worthing Borough Councils and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2018 and 2022 to allow monitoring trends to be identified and discussed.

## Summary of Monitoring Undertaken

### 3.1.1 Automatic Monitoring Sites

Adur District and Worthing Borough Councils undertook automatic (continuous) monitoring at two sites during 2022. 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 Sussex-air webpage 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) diffusion tube monitoring of $NO_2$ at 27 sites during 2022 and Worthing Borough Council at 28 sites. Table A.2 in Appendix A presents the details of the non-automatic sites.

The following non-automatic sites were added during 2022:

- Grinstead Lane Roundabout, Lancing (Adur) - in response to concerns about air quality in the area as a result of queuing traffic alongside forthcoming new local developments and changes to road layout (A27).

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.

# Individual Pollutants

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

### 3.1.3 Nitrogen Dioxide ($NO_2$)

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

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

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

#### *A. Adur*

*Automatic Monitoring*

The measured annual mean at the continuous monitoring site in Shoreham High Street was 20.3µg/m$^3$ (data capture 92.5%). This is a slight increase over the level of 19.6µg/m$^3$ measured last year, but still below the objective of 40µg/m$^3$.

There were no recorded exceedances of the one hour mean objective of 200µg/m$^3$. Data capture was 90%.

*Non-Automatic Monitoring*

27 diffusion tubes were used during 2022, one of which was a new location. For the other 26 tubes, 10 showed small decreases in measured annual means when compared to 2022, ranging from -0.1µg/m$^3$ (S3) to -2.8µg/m$^3$ (S14) and 14 showed small increases, ranging from 0.1µg/m$^3$ (S47) to 3.2µg/m$^3$(S48).

All but one site recorded a data capture rate of 100%. Site S2 recorded 90%.

Importantly no monitoring sites exceeded the annual mean objective of 40µg/m$^3$ during 2022.

- *In and around AQMA1, Shoreham High Street:*

Measured levels remained broadly similar to 2021 levels. S17/18/19 are collocated tubes alongside the continuous analyser in the High Street. These recorded an average of 24.2µg/m$^3$ a 0.6µg/m$^3$ reduction on 2021, but 4µg/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 (just inside the AQMA) and S47 (just outside the AQMA), showed virtually no change in recorded levels. Measured levels were well below the objective at 18.8µg/m$^3$ and 16.9µg/m$^3$ respectively. West Street is regularly used by vehicles trying to avoid congestion along the High Street (A259).

Site S36 Victoria Road Footpath Shoreham, just to the north of AQMA1 showed a decrease of 0.9µg/m$^3$ to 18.6µg/m$^3$.

S37 Humphrey's Gap Shoreham showed an increase of 1.1µg/m$^3$ to 24.9µg/m$^3$.

Site S50 was erected on a facade within the AQMA in 2021, replacing site S49 near the continuous monitoring site. The measured level increased slightly in 2022 to 22.8µg/m$^3$.

West Sussex County Council (WSCC) reinstated the automatic traffic counter (ATC) in Shoreham High Street in November 2021. The measured AADT for 2022 was 15,120. As we have no data prior to this year we will need to wait a further year before making comparisons.

Whilst measured levels remain below the annual mean objective, we maintain that we must keep the measured levels in AQMA1 under review before making decisions about the future of the AQMA. There remain a large number of approved major developments which are either under construction or have yet to commence. A number of other planned major developments remain for the Adur District, detailed in section 2. Therefore it is our

intention not to revoke AQMA1 at this time. This was a view endorsed in the review of last year's ASR.

- *AQMA2, Southwick:*

Sites S8 and S9 are in Southwick within AQMA2. S8 increased by 0.3µg/m$^3$ to 23.2µg/m$^3$ and S9 fell by 0.8µg/m$^3$ to 25.4µg/m$^3$. Both are 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.

Interestingly the nearby WSCC automatic traffic counter recorded a 7% increase in AADT in the area, but this does not appear to have resulted in a significant increase in measured levels of $NO_2$.

In previous Adur ASR's we committed to consider revoking AQMA2 as measured levels had been below the annual mean objective for many years. Furthermore we believe this AQMA will not be affected as much by local developments as AQMA1.

Revocation was again delayed in 2022 however it is a priority for 2023.

- *Other Sites:*

Site S48 Grinstead Lane in Lancing showed the highest increase in the District, 3.2µg/m$^3$ to 30µg/m$^3$. Unfortunately there is no traffic data available at this location to see if the increase was a result of increased traffic.

A new tube site S52 was erected in Grinstead Lane close to the roundabout, in response to our concerns about levels in this area. The measured level here was 35.7µg/m$^3$ the highest level recorded in the District. This is a kerbside site and when levels are predicted back to the nearest receptor, they drop to 22.6µg/m$^3$.

Site S44 Upper Brighton Road, Lancing increased by 2.1µg/m$^3$ to 33.6µg/m$^3$. This site is adjacent to the eastbound A27 dual carriageway with the closest receptor just over 5m away.

The area around the Grinstead Lane roundabout on the A27 is an area we are keeping a close eye on, especially with some large development taking place nearby.

Site S51 close to the Sussex Pad on the A27 Lancing produced an annual mean of 22.8µg/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 2.1µg/m$^3$ to 25.7µg/m$^3$.

S45 Dolphin Mews Shoreham, adjacent to a level crossing where vehicles often queue and idle for prolonged periods, decreased from 17.2µg/m$^3$ to 16.4µg/m$^3$.

Site S14 in West Street Sompting recorded the largest decrease of 2.8µg/m$^3$ to 18.4µg/m$^3$.

### *B. Worthing*

*Automatic Monitoring*

The annual mean recorded at the continuous monitoring site WT2 Grove Lodge was 25.4 µg/m$^3$ (data capture 95%). This is a drop of 2.2ug/m$^3$, over the 2021 level. This is below the national objective of 40µg/m$^3$.

There were no recorded exceedances of the one hour mean objective of 200µg/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 $NO_2$ peaked at 51.4µg/m$^3$ in 2014, decreased in 2015 and then increased again in 2016 to 48µg/m$^3$. The nearest relevant receptor (a residential facade) is 18m away, meaning the level at the façade reduces further still.

Traffic levels within the AQMA increased slightly: by 2.2% westbound and 1.1% eastbound.

*Non-Automatic Monitoring*

30 diffusion tubes were used at 28 locations during 2022. 19 sites showed an increase in measured levels, 8 decreased and one showed no change. The largest increase was at site N24 (152 Upper Brighton Road) at 9.1µg/m$^3$ and the largest decrease was -3.4µg/m$^3$ at Site N66 (Sompting Road).

As in 2019, 2020 and 2021 only one monitoring site exceeded the annual mean objective of 40µg/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 increased very slightly by 0.3µg/m$^3$ to 44.7µg/m$^3$, still above the 40µg/m$^3$ objective. The monitoring site is adjacent to the westbound carriageway of the A27 with

the nearest residential façade just 2m away, so the measured level only decreases marginally to 44g/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 27.8µg/m$^3$, a reduction of 2µg/m$^3$ over 2021 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 large increase of 9.1µg/m$^3$ to 29.2µg/m$^3$. Whilst still below the 40µg/m$^3$ objective this is the second year running with an inrease, so we are keeping a close eye on this site.

Site N29 Downlands Parade, also close to the Lyons Farm junction of the A27/Sompting Road, showed an increase of 1.8µg/m$^3$ to 26µg/m$^3$.

Of the other monitoring sites within the AQMA there were small increases at N39 and N53 and a small decrease at N43. All were well below the objective of 40µg/m$^3$.

*Other Sites*

N57 Lyndhurst Road showed virtually no change (20.7µg/m$^3$), well below the annual mean objective. This area is close to a number of major development sites earmarked for major development, so we continue to closely monitor 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 the largest drop in levels, down 3.4 µg/m$^3$ to 21.5µg/m$^3$.

The tube in the busy High Street (N1C), close to Steyne Gardens, remained below the objective at 23.5µg/m$^3$.

Site N54 on Brighton Road near the Aquarena, close to recent major developments, showed a small increase from 17.1µg/m$^3$ to 19.3µg/m$^3$, still well below the objective.

The two sites added in 2021, N71 King Street and N72 New Street, showed levels of 11.8µg/m$^3$and 12.3µg/m$^3$, virtually unchanged from 2021 and well below the objective.

Five year trend graphs are included in Appendix A.

### 3.1.4 Particulate Matter ($PM_{2.5}$)

Table A.6 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

**A. Adur** – $PM_{2.5}$ monitoring commenced in Shoreham High Street in August 2021. So 2022 is the first full year of $PM_{2.5}$ monitoring at this location. The measured ratified level for 2022 was 11.6µg/m$^3$ (data capture 87%[11]). The level for 2021 had to be annualised as measurements were only across for 5 months of the year) and was 16.2µg/m$^3$.

This is well below the EU Limit Value of 25µg/m$^3$ but above the Air Quality Strategy Objectives (Target Year 2040)[12] and above the World Health Organisation (WHO) annual mean guideline limit of 10µg/m$^3$.

**B. Worthing** - 2022 is our fifth full year of $PM_{2.5}$ monitoring at Grove Lodge (A27). The measured ratified level for 2022 was 8.5µg/m$^3$ (data capture 93%[13]), almost the same as the 2020 level of 8.8µg/m$^3$. This is still below the EU Limit Value of 25µg/m$^3$, the World Health Organisation (WHO) annual mean guideline limit of 10µg/m$^3$ and the Air Quality Strategy Objectives (Target Year 2040).

[11] $PM_{2.5}$ data invalid: 1/1/22 to 11/2/22 plus intermittent issues May – Dec 2022, resulting in 1181 hours loss of data.

[12] 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 $PM_{2.5}$ 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.

[13] 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) (1) | Distance to kerb of nearest road (m) (2) | Inlet Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| AD1 | High Street Shoreham | Kerbside | 521399 | 105039 | $NO_2$; PM2.5 | YES Adur AQMA1 | Chemiluminescence | 4 | 1.6 | 2 |
| WT2 | Grove Lodge, Worthing | Roadside | 514184 | 104963 | $NO_2$; 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) (1) | Distance to kerb of nearest road (m) (2) | Tube Co-located with a Continuous Analyser? | Tube Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| **ADUR** | | | | | | | | | | |
| S2 | Old Mill Close Fishersgate | Roadside | 525330 | 105085 | $NO_2$ | No | 3.5 | 1.5 | No | 2.5 |
| S3 | St. Aubyns Crescent Fishersgate | Urban Background | 525562 | 105313 | $NO_2$ | No | 5.1 | 2.4 | No | 2.5 |
| S7 | Queens Road Southwick | Urban Background | 524139 | 106321 | $NO_2$ | No | 3.0 | 2.5 | No | 2.5 |
| S8 | Underdown Road Southwick | Roadside | 524018 | 106070 | $NO_2$ | AQMA2 | 4.3 | 2.3 | No | 2.5 |
| S9 | Old Shoreham Road Southwick | Roadside | 523784 | 106081 | $NO_2$ | AQMA2 | 1.6 | 2.8 | No | 2.3 |
| S10 | Holmbush Roundabout Shoreham | Roadside | 523343 | 106111 | $NO_2$ | No | 27.0 | 1.7 | No | 2.8 |
| S11 | Lancing Manor Lancing | Roadside | 518820 | 105584 | $NO_2$ | No | 14.8 | 2.0 | No | 2.8 |
| S12 | Boundstone Lane Lancing | Roadside | 517731 | 105505 | $NO_2$ | No | 8.0 | 1.8 | No | 2.8 |
| S13 | Upper Brighton Road Sompting | Roadside | 517291 | 105550 | $NO_2$ | No | 8.6 | 4.6 | No | 2.3 |
| S14 | West Street Sompting | Urban Background | 516057 | 105190 | $NO_2$ | No | 3.6 | 1.2 | No | 2.0 |
| S17 | High Street AQMS 1 Shoreham | Kerbside | 521400 | 105040 | $NO_2$ | AQMA1 | 5.0 | 0.9 | Yes | 2.8 |
| S18 | High Street AQMS 2 Shoreham | Kerbside | 521400 | 105040 | $NO_2$ | AQMA1 | 5.0 | 0.9 | Yes | 2.8 |
| S19 | High Street AQMS 3 Shoreham | Kerbside | 521400 | 105040 | $NO_2$ | AQMA1 | 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) (1) | Distance to kerb of nearest road (m) (2) | Tube Co-located with a Continuous Analyser? | Tube Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| S25 | Mash Barn Lane Lancing | Roadside | 519117 | 105710 | $NO_2$ | No | N/A | 6.0 | No | 2.5 |
| S26 | Loose Lane Sompting | Suburban | 516536 | 104783 | $NO_2$ | No | 5.0 | 0.8 | No | 2.5 |
| S36 | Victoria Road Footpath Shoreham | Roadside | 521282 | 105254 | $NO_2$ | No | 5.8 | 1.9 | No | 2.5 |
| S37 | Humphrey's Gap Shoreham | Roadside | 522103 | 105126 | $NO_2$ | No | 0.5 | 1.7 | No | 2.8 |
| S39 | Brighton Road Kingston | Kerbside | 523329 | 104960 | $NO_2$ | No | 7.0 | 1.2 | No | 2.5 |
| S43 | Brunswick Road Shoreham | Roadside | 521733 | 105251 | $NO_2$ | No | 0.0 | 2.7 | No | 2.8 |
| S44 | Upper Brighton Road Lancing | Roadside | 518494 | 105464 | $NO_2$ | No | 5.4 | 2.0 | No | 3.0 |
| S45 | Dolphin Mews Shoreham | Roadside | 522300 | 105258 | $NO_2$ | No | 0.0 | 4.7 | No | 2.8 |
| S46 | West Street 1 Shoreham | Roadside | 521363 | 105082 | $NO_2$ | No | 0.0 | 1.3 | No | 2.5 |
| S47 | West Street 2 Shoreham | Roadside | 521375 | 105101 | $NO_2$ | AQMA1 | 0.0 | 1.3 | No | 2.5 |
| S48 | Grinstead Lane Lancing | Roadside | 518590 | 105463 | $NO_2$ | No | 4.0 | 3.3 | No | 2.5 |
| S50 | High Street Shoreham | Roadside | 521478 | 105002 | $NO_2$ | AQMA1 | 0.0 | 5.2 | No | 2.3 |
| S51 | Sussex Pad Lancing | Kerbside | 520042 | 106054 | $NO_2$ | No | 16.5 | 0.4 | No | 2.0 |
| S52 | Grinstead Lane Roundabout Lancing | Kerbside | 518560 | 105460 | $NO_2$ | No | 17.5 | 1.8 | No | 2.5 |
| **Worthing** | | | | | | | | | | |
| 4N | Heene Way (UK02) | Urban Background | 513609 | 102556 | $NO_2$ | No | 5.3 | 1.7 | No | 1.5 |

| Diffusion Tube ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? Which AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube Co-located with a Continuous Analyser? | Tube Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| 5N | Cleveland Road (UK01) | Urban Background | 512701 | 105562 | $NO_2$ | No | 6.2 | 2.5 | No | 2.0 |
| N1C | High Street East | Urban Centre | 515114 | 102670 | $NO_2$ | No | 0.0 | 3.3 | No | 2.0 |
| N5 | First Avenue | Roadside | 514495 | 105020 | $NO_2$ | Worthing AQMA No.2 | 15.2 | 2.2 | No | 1.5 |
| N8 | Littlehampton Road | Roadside | 513236 | 104651 | $NO_2$ | No | 14.1 | 1.5 | No | 3.5 |
| N11 | Dawes Close | Urban Background | 515812 | 103309 | $NO_2$ | No | 8.4 | 1.4 | No | 1.5 |
| N21 | Forest Lane | Suburban | 510611 | 105595 | $NO_2$ | Worthing AQMA No.2 | 14.5 | 60.5 | No | 2.0 |
| N22 | Falmer Close, C-Dust monitor | Urban Background | 511010 | 102226 | $NO_2$ | No | 14.6 | 2.2 | No | 2.0 |
| N24 | 152 Upper Brighton Road | Roadside | 515151 | 105109 | $NO_2$ | No | 0.0 | 8.0 | No | 1.5 |
| N25 | Warren Court | Suburban | 513845 | 105191 | $NO_2$ | Worthing AQMA No.2 | 0.0 | 17.3 | No | 2.0 |
| N28 | Chapel Road / Teville Road | Roadside | 514740 | 103173 | $NO_2$ | No | 1.6 | 3.0 | No | 2.0 |
| N29 | Downlands Parade | Roadside | 515014 | 105099 | $NO_2$ | No | 0.5 | 6.5 | No | 2.5 |
| N30A | Grove Lodge Cottages | Roadside | 514183 | 104948 | $NO_2$ | No | 0.2 | 2.2 | No | 2.5 |
| N31 | South Farm Road, Roundabout | Kerbside | 514317 | 103329 | $NO_2$ | Worthing AQMA No.2 | 4.0 | 0.9 | No | 3.0 |
| N39 | SW of Roundabout, Grove lodge | Roadside | 514088 | 104906 | $NO_2$ | Worthing AQMA No.2 | 47.8 | 2.2 | No | 2.5 |
| N42 | Norfolk House, 122 Chapel Road | Roadside | 514742 | 103234 | $NO_2$ | No | 0.0 | 3.4 | No | 2.5 |
| N43 | 23 Upper Brighton Road | Suburban | 514199 | 104982 | $NO_2$ | Worthing AQMA No.2 | 0.0 | 19.2 | No | 2.0 |
| N44A, N44B, N44C | AQMS O/S 21 Upper Brighton Road | Roadside | 514184 | 104963 | $NO_2$ | Worthing AQMA No.2 | 18.4 | 2.8 | Yes | 1.5 |

| Diffusion Tube ID | Site Name | Site Type | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Pollutants Monitored | In AQMA? Which AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube Co-located with a Continuous Analyser? | Tube Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| N48 | Shaftesbury Avenue | Roadside | 512063 | 103385 | $NO_2$ | No | 14.8 | 2.2 | No | 2.0 |
| N52 | Newland Road, outside 63 | Kerbside | 514973 | 103335 | $NO_2$ | No | 4.5 | 0.4 | No | 2.0 |
| N53 | Offington Corner | Roadside | 513278 | 105623 | $NO_2$ | Worthing AQMA No.2 | 20.5 | 6.0 | No | 2.0 |
| N54 | Aquarena | Roadside | 515595 | 102725 | $NO_2$ | No | 30.2 | 3.7 | No | 3.0 |
| N57 | Lyndhurst Road | Roadside | 515114 | 102975 | $NO_2$ | No | 0.0 | 3.5 | No | 2.5 |
| N64 | South Street, outside Starbucks | Urban Centre | 514946 | 102541 | $NO_2$ | No | 2.8 | 2.4 | No | 2.5 |
| N65 | Teville Road (opposite Unleashed) | Kerbside | 514543 | 103220 | $NO_2$ | No | 4.7 | 0.8 | No | 2.5 |
| N66 | Sompting Road | Roadside | 515067 | 105082 | $NO_2$ | Worthing AQMA No.2 | 3.7 | 4.7 | No | 2.5 |
| N71 | King Street | Roadside | 514548 | 103843 | $NO_2$ | No | 4.0 | 1.8 | No | 2.5 |
| N72 | New Street | Urban Centre | 514558 | 102416 | $NO_2$ | 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 $NO_2$ Monitoring Results: Automatic Monitoring (µg/m$^3$)

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2022 (%) (2) | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| AD1 | 521399 | 105039 | Kerbside | 93 | 93 | 29.2 | 26.0 | 20.0 | 19.6 | 20.3 |
| WT2 | 514184 | 104963 | Roadside | 95 | 95 | 36.8 | 32.9 | 26.0 | 27.6 | 25.4 |

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

**Notes:**

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

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

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

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

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

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

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

| Diffusion Tube ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2022 (%) (2) | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| **ADUR** | | | | | | | | | | |
| S2 | 525330 | 105085 | Roadside | 90.4109589 | 90.4 | 27.0 | 23.6 | 17.9 | 18.8 | 19.8 |
| S3 | 525562 | 105313 | Urban Background | 100 | 100.0 | 18.1 | 16.7 | 13.9 | 14.4 | 14.3 |
| S7 | 524139 | 106321 | Urban Background | 100 | 100.0 | 15.9 | 14.1 | 11.5 | 11.7 | 11.7 |
| S8 | 524018 | 106070 | Roadside | 100 | 100.0 | 30.4 | 27.5 | 21.1 | 22.9 | 23.2 |
| S9 | 523784 | 106081 | Roadside | 100 | 100.0 | 35.0 | 31.1 | 25.6 | 26.2 | 25.4 |
| S10 | 523343 | 106111 | Roadside | 100 | 100.0 | 27.0 | 23.2 | 19.2 | 20.1 | 20.3 |
| S11 | 518820 | 105584 | Roadside | 100 | 100.0 | 35.1 | 32.5 | 26.9 | 25.7 | 26.0 |
| S12 | 517731 | 105505 | Roadside | 100 | 100.0 | 30.2 | 25.8 | 20.7 | 20.8 | 22.2 |
| S13 | 517291 | 105550 | Roadside | 100 | 100.0 | 39.0 | 36.3 | 29.5 | 28.4 | 28.7 |
| S14 | 516057 | 105190 | Urban Background | 100 | 100.0 | 19.4 | 23.6 | 19.1 | 21.2 | 18.4 |
| S17 | 521400 | 105040 | Kerbside | 100 | 100.0 | 33.7 | 30.4 | 24.3 | 25.4 | 23.7 |
| S18 | 521400 | 105040 | Kerbside | 100 | 100.0 | 32.8 | 30.9 | 24.2 | 25.0 | 24.4 |
| S19 | 521400 | 105040 | Kerbside | 100 | 100.0 | 32.4 | 29.6 | 23.5 | 24.1 | 24.4 |
| S25 | 519117 | 105710 | Roadside | 100 | 100.0 | 30.4 | 26.2 | 21.5 | 27.8 | 25.7 |
| S26 | 516536 | 104783 | Suburban | 100 | 100.0 | 16.5 | 13.4 | 11.8 | 13.3 | 12.0 |
| S36 | 521282 | 105254 | Roadside | 100 | 100.0 | 26.6 | 24.3 | 18.3 | 19.4 | 18.6 |
| S37 | 522103 | 105126 | Roadside | 100 | 100.0 | 32.6 | 29.1 | 23.4 | 23.8 | 24.9 |
| S39 | 523329 | 104960 | Kerbside | 100 | 100.0 | 26.1 | 21.9 | 17.4 | 17.4 | 18.1 |
| S43 | 521733 | 105251 | Roadside | 100 | 100.0 | | 22.5 | 16.6 | 18.4 | 17.1 |
| S44 | 518494 | 105464 | Roadside | 100 | 100.0 | | 38.4 | 31.4 | 31.5 | 33.6 |
| S45 | 522300 | 105258 | Roadside | 100 | 100.0 | | 19.1 | 15.9 | 17.2 | 16.4 |
| S46 | 521363 | 105082 | Roadside | 100 | 100.0 | | | 18.3 | 18.8 | 18.8 |
| S47 | 521375 | 105101 | Roadside | 100 | 100.0 | | | 16.3 | 16.8 | 16.9 |
| S48 | 518590 | 105463 | Roadside | 100 | 100.0 | | | 25.7 | 26.8 | 30.0 |
| S50 | 521478 | 105002 | Roadside | 100 | 100.0 | | | | 22.2 | 22.8 |
| S51 | 520042 | 106054 | Kerbside | 100 | 100.0 | | | | 23.1 | 24.6 |
| S52 | 518560 | 105460 | Kerbside | 100 | 100.0 | | | | | 35.7 |

| Diffusion Tube ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) [1] | Valid Data Capture 2022 (%) [2] | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| **WORTHING** | | | | | | | | | | |
| 4N | 513609 | 102556 | Urban Background | 92.3 | 92.3 | 14.1 | 12.7 | 10.8 | 10.2 | 11.1 |
| 5N | 512701 | 105562 | Urban Background | 100 | 100.0 | 16.9 | 15.7 | 11.8 | 12.5 | 12.1 |
| N1C | 515114 | 102670 | Urban Centre | 92.3 | 92.3 | 28.5 | 26.2 | 19.8 | 22.2 | 23.5 |
| N5 | 514495 | 105020 | Roadside | 100 | 100.0 | 25.6 | 28.3 | 24.5 | 23.0 | 21.5 |
| N8 | 513236 | 104651 | Roadside | 100 | 100.0 | 29.6 | 28.6 | 22.8 | 22.3 | 23.6 |
| N11 | 515812 | 103309 | Urban Background | 100 | 100.0 | 15.7 | 13.4 | 11.8 | 11.9 | 11.8 |
| N21 | 510611 | 105595 | Suburban | 92.3 | 92.3 | 13.5 | 10.8 | 8.7 | 9.1 | 9.2 |
| N22 | 511010 | 102226 | Urban Background | 100 | 100.0 | 12.8 | 11.6 | 10.2 | 10.3 | 10.5 |
| N24 | 515151 | 105109 | Roadside | 100 | 100.0 | 34.5 | 23.5 | 18.4 | 20.1 | 29.2 |
| N25 | 513845 | 105191 | Suburban | 90.4 | 90.4 | 20.3 | 17.8 | 14.8 | 15.4 | 15.4 |
| N28 | 514740 | 103173 | Roadside | 100 | 100.0 | 33.4 | 27.2 | 17.3 | 17.3 | 17.6 |
| N29 | 515014 | 105099 | Roadside | 100 | 100.0 | 23.6 | 29.9 | 25.6 | 24.2 | 26.0 |
| N30A | 514183 | 104948 | Roadside | 84.1 | 84.1 | **60.1** | **56.6** | **45.1** | **44.4** | **44.7** |
| N31 | 514317 | 103329 | Kerbside | 100 | 100.0 | 27.1 | 25.8 | 20.8 | 20.2 | 20.6 |
| N39 | 514088 | 104906 | Roadside | 100 | 100.0 | 32.7 | 28.5 | 24.1 | 23.7 | 24.4 |
| N42 | 514742 | 103234 | Roadside | 100 | 100.0 | 26.6 | 24.2 | 18.1 | 17.3 | 19.5 |
| N43 | 514199 | 104982 | Suburban | 100 | 100.0 | 22.3 | 19.9 | 17.6 | 17.2 | 16.6 |
| N44A, N44B, N44C | 514184 | 104963 | Roadside | 100 | 100.0 | **40.7** | 36.1 | 31.1 | 29.8 | 27.8 |
| N48 | 512063 | 103385 | Roadside | 90.4 | 90.4 | 27.7 | 25.8 | 22.5 | 20.0 | 22.3 |
| N52 | 514973 | 103335 | Kerbside | 90.7 | 90.7 | 26.4 | 22.4 | 24.0 | 19.2 | 17.3 |
| N53 | 513278 | 105623 | Roadside | 100 | 100.0 | 33.9 | 30.7 | 30.2 | 23.7 | 24.4 |
| N54 | 515595 | 102725 | Roadside | 100 | 100.0 | 22.8 | 19.3 | 17.2 | 17.1 | 19.3 |
| N57 | 515114 | 102975 | Roadside | 100 | 100.0 | 25.0 | 23.4 | 23.9 | 20.8 | 20.7 |
| N64 | 514946 | 102541 | Urban Centre | 90.7 | 90.7 | | 27.9 | 23.8 | 20.9 | 21.4 |
| N65 | 514543 | 103220 | Kerbside | 100 | 100.0 | | 27.5 | 26.5 | 23.6 | 24.0 |
| N66 | 515067 | 105082 | Roadside | 90.7 | 90.7 | | | 29.8 | 24.9 | 21.5 |
| N71 | 514548 | 103843 | Roadside | 90.7 | 90.7 | | | | 11.7 | 11.8 |
| N72 | 514558 | 102416 | Urban Centre | 57.7 | 57.7 | | | | 12.0 | 12.3 |

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

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

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

**Notes:**

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

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

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

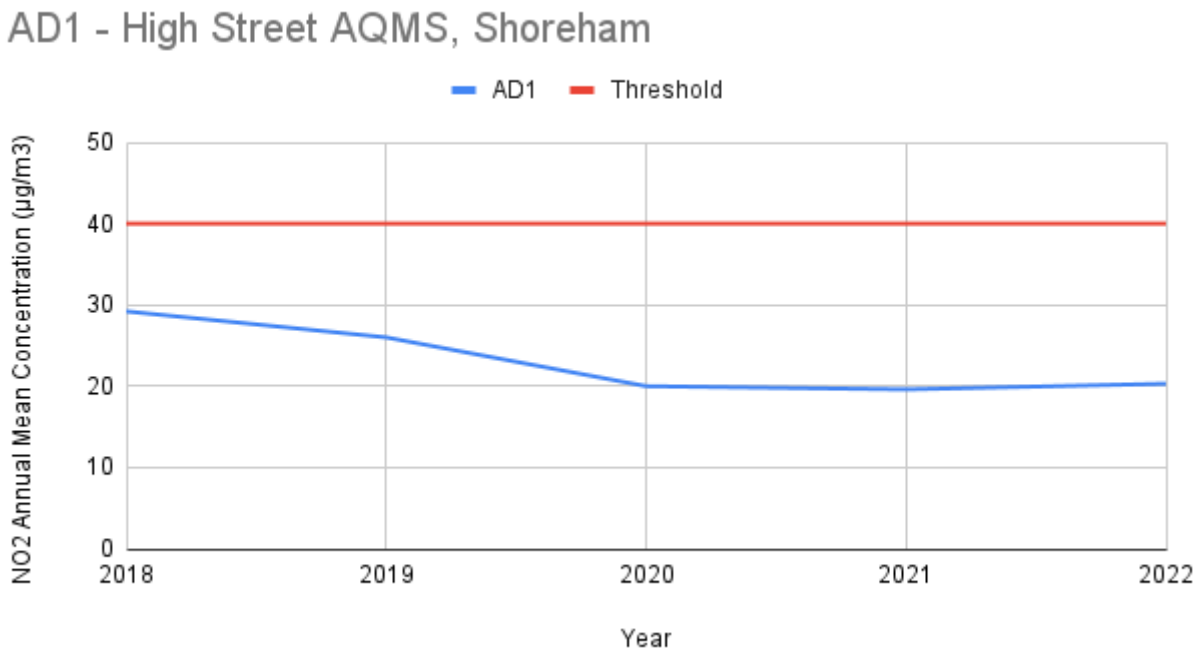
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

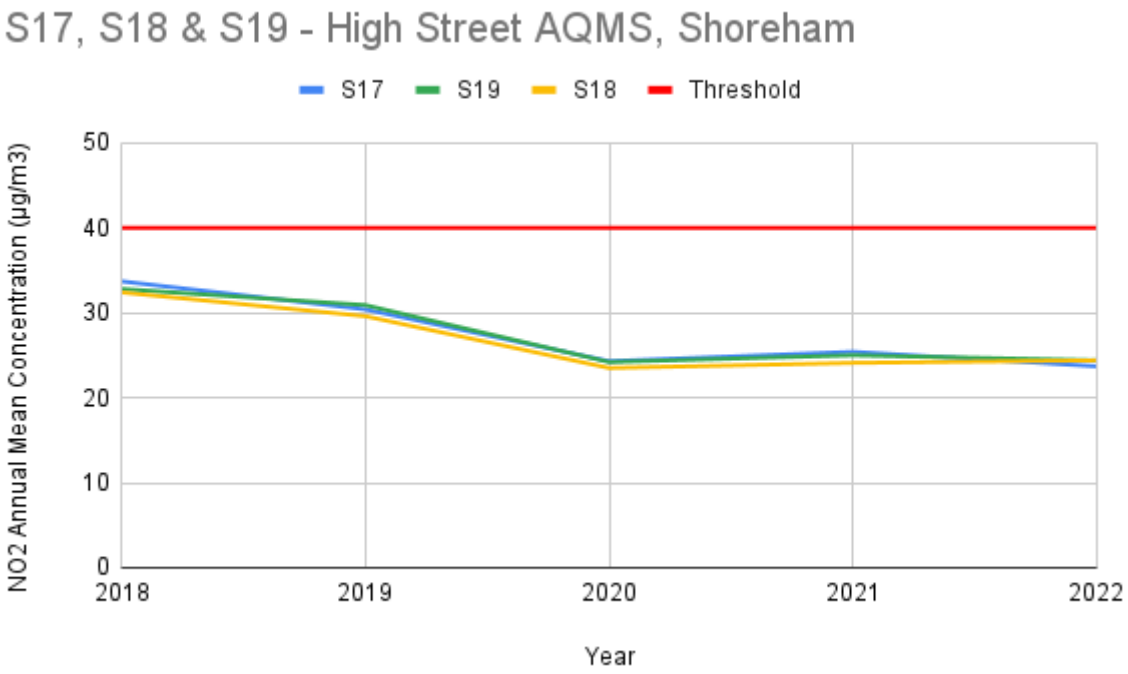
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

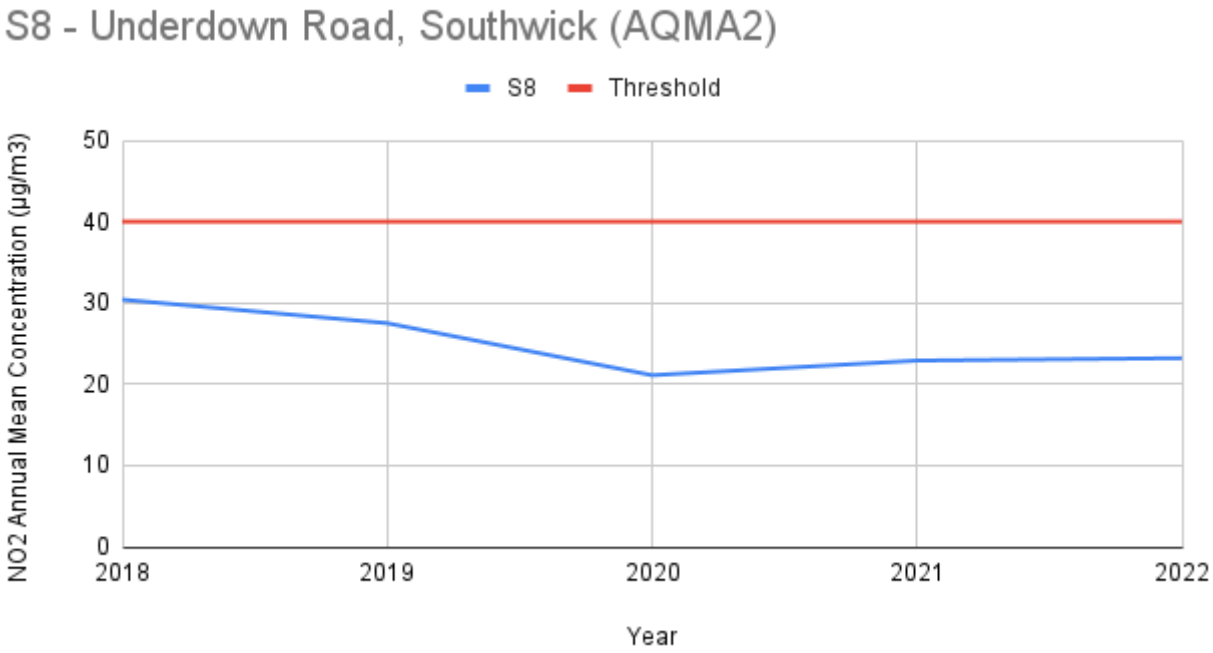
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

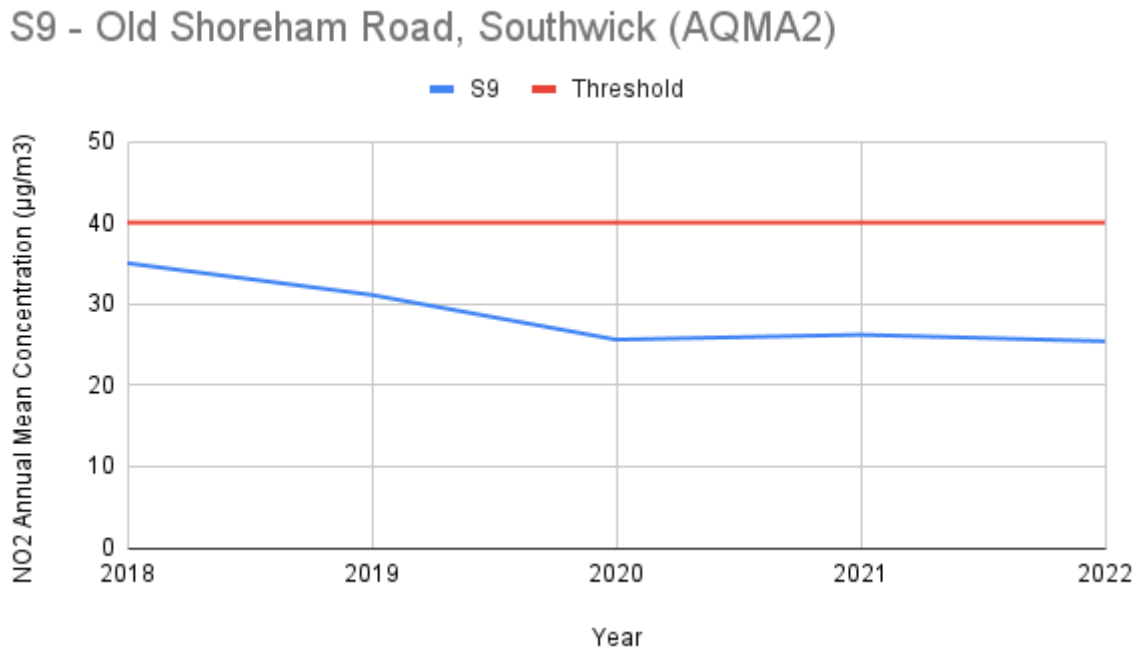
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

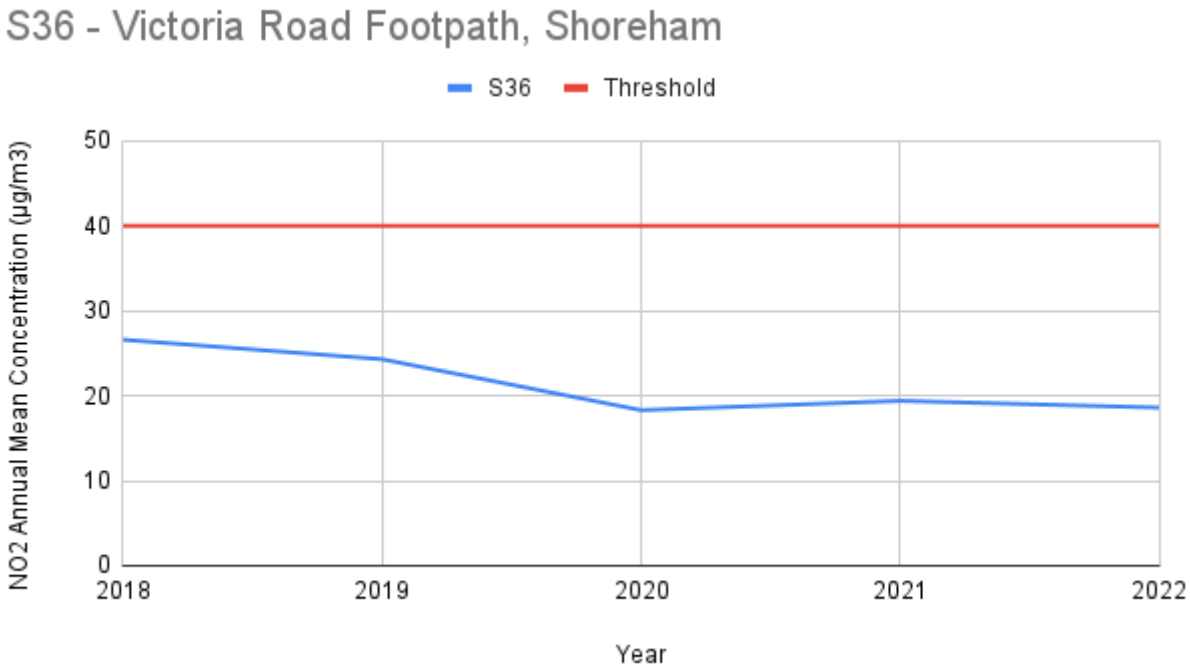
**Figure A.1 – ADUR Trends in Annual Mean $NO_2$ Concentrations**

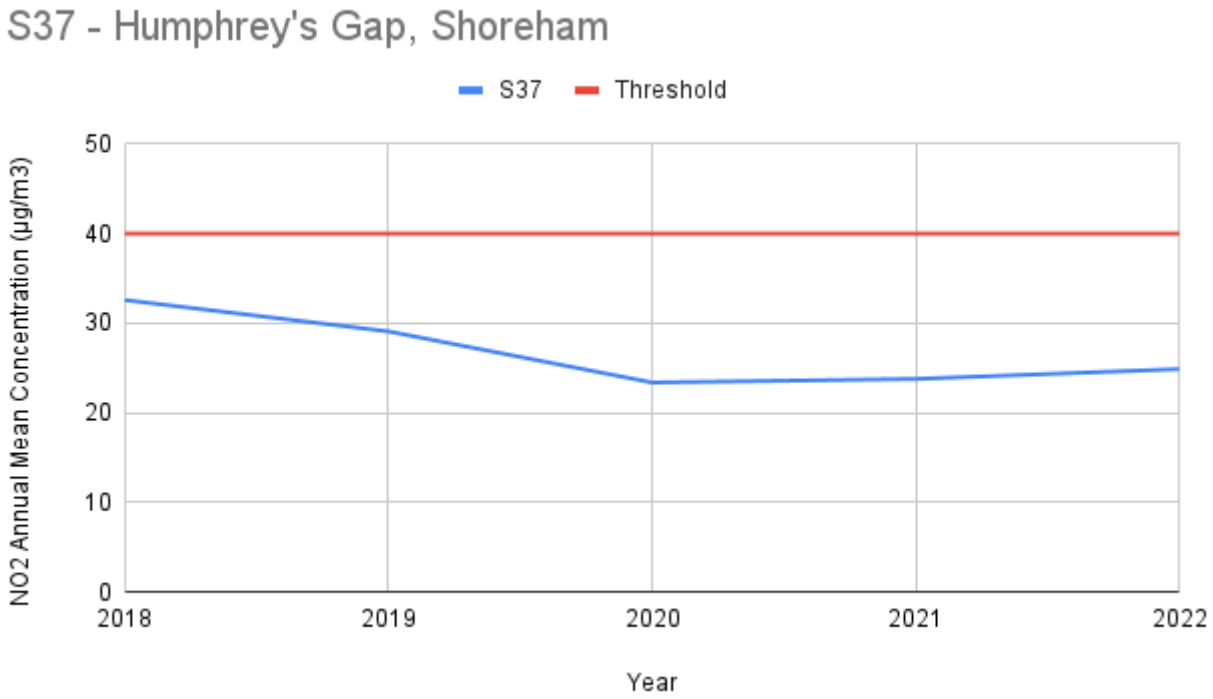


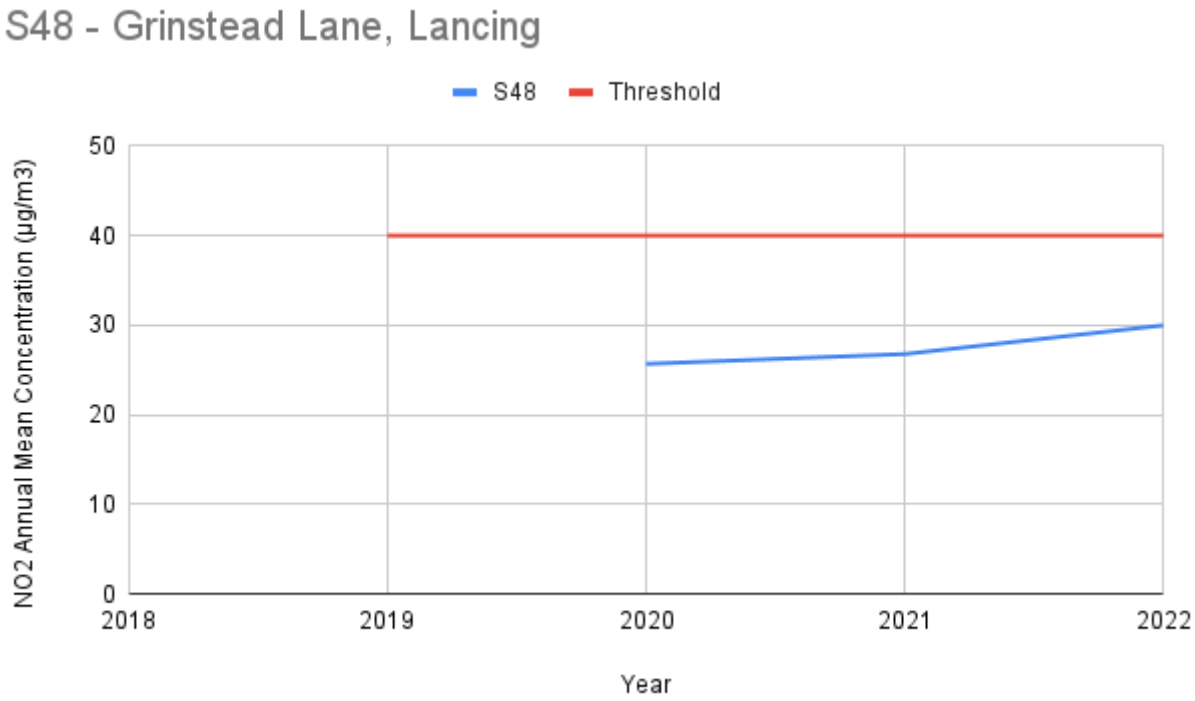

S17, S18 & S19 - High Street AQMS, Shoreham
S17
S19
S18
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year

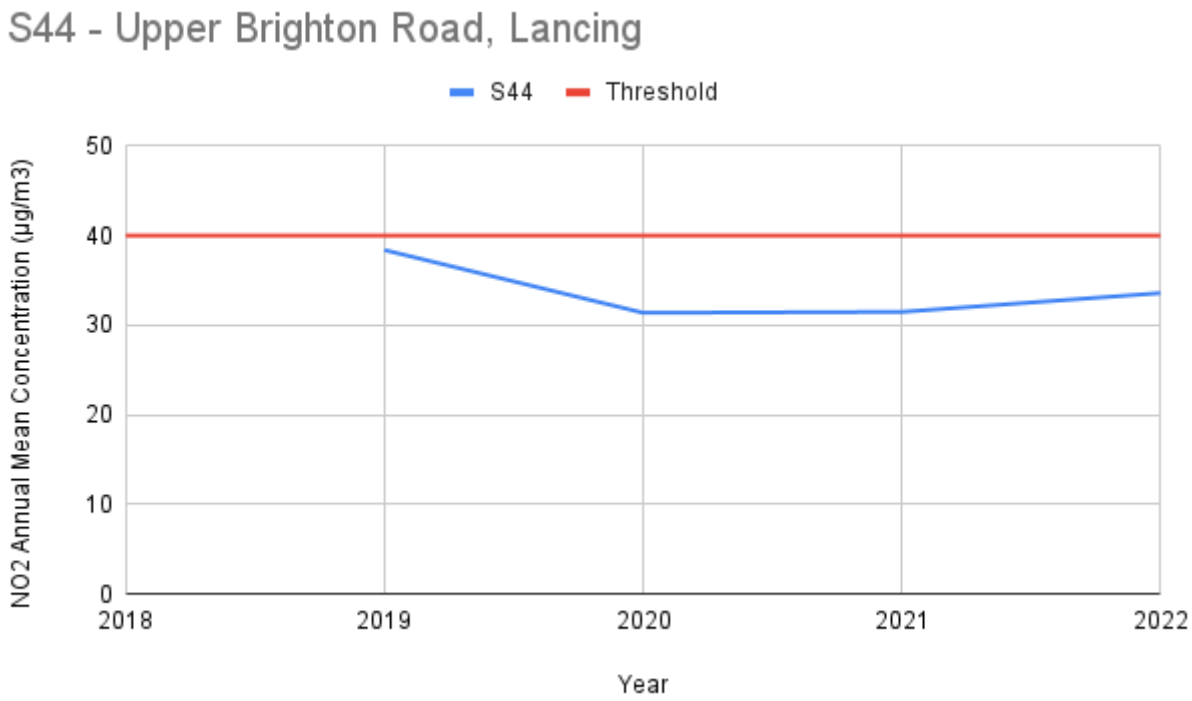

S8 - Underdown Road, Southwick (AQMA2)
S8
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year

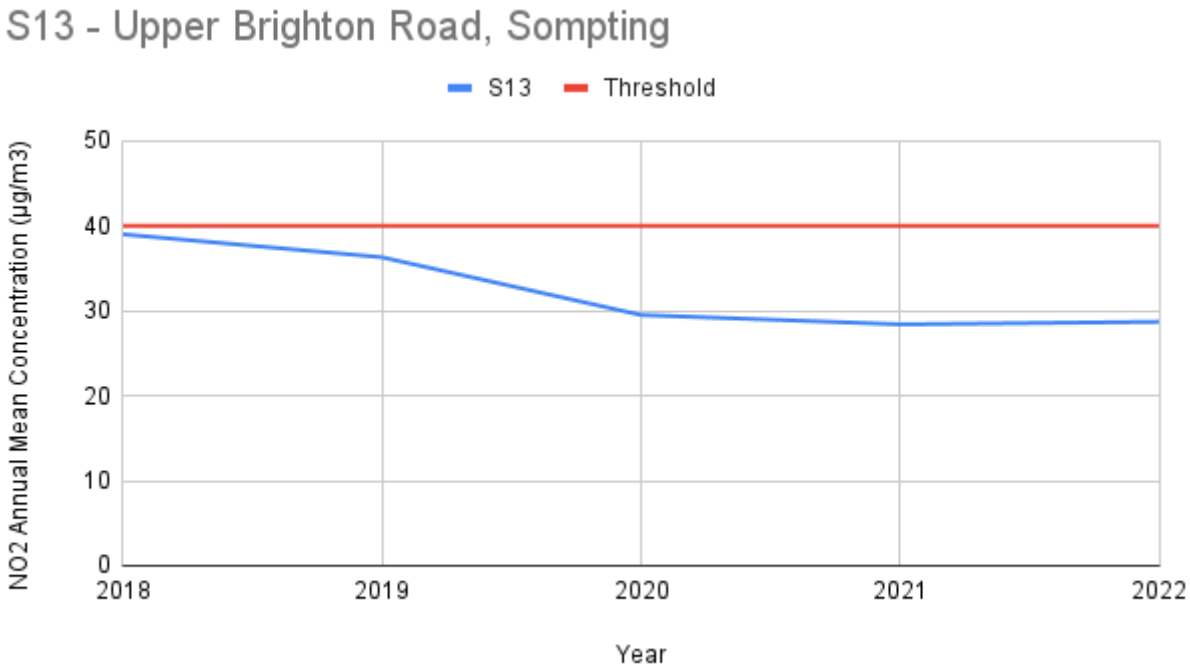

S9 - Old Shoreham Road, Southwick (AQMA2)
S9
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year


S36 - Victoria Road Footpath, Shoreham
S36
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year


S37 - Humphrey's Gap, Shoreham
S37
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year


S48 - Grinstead Lane, Lancing
S48
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year


S44 - Upper Brighton Road, Lancing
S44
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year


S13 - Upper Brighton Road, Sompting
S13
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year

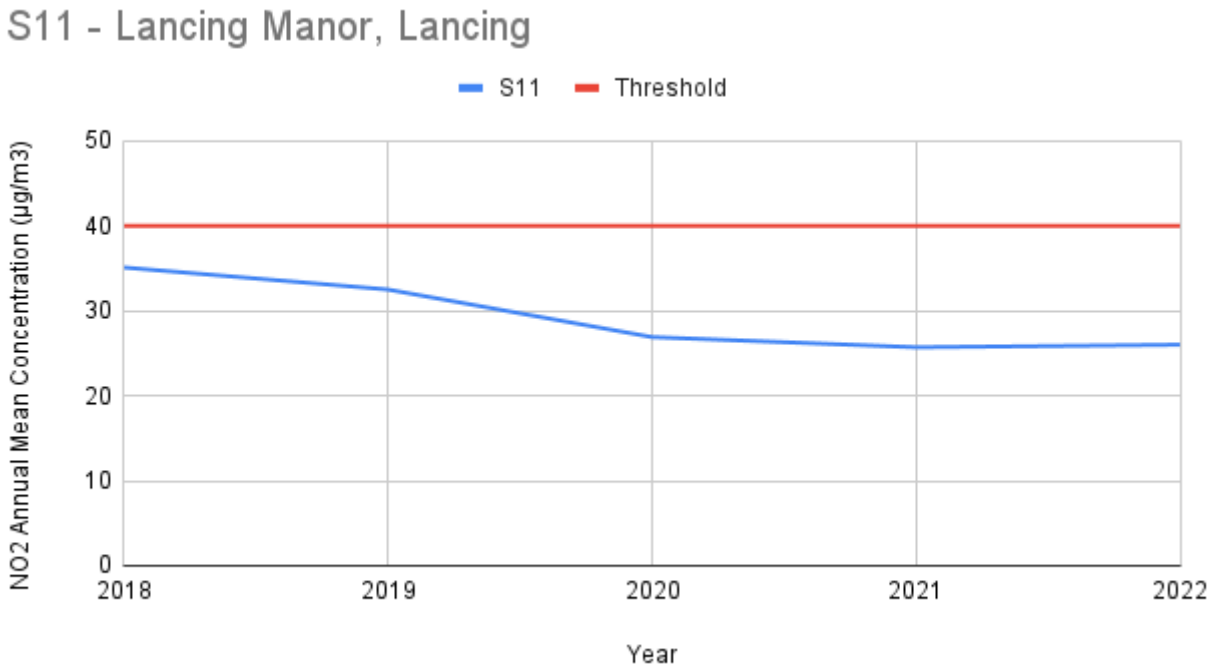
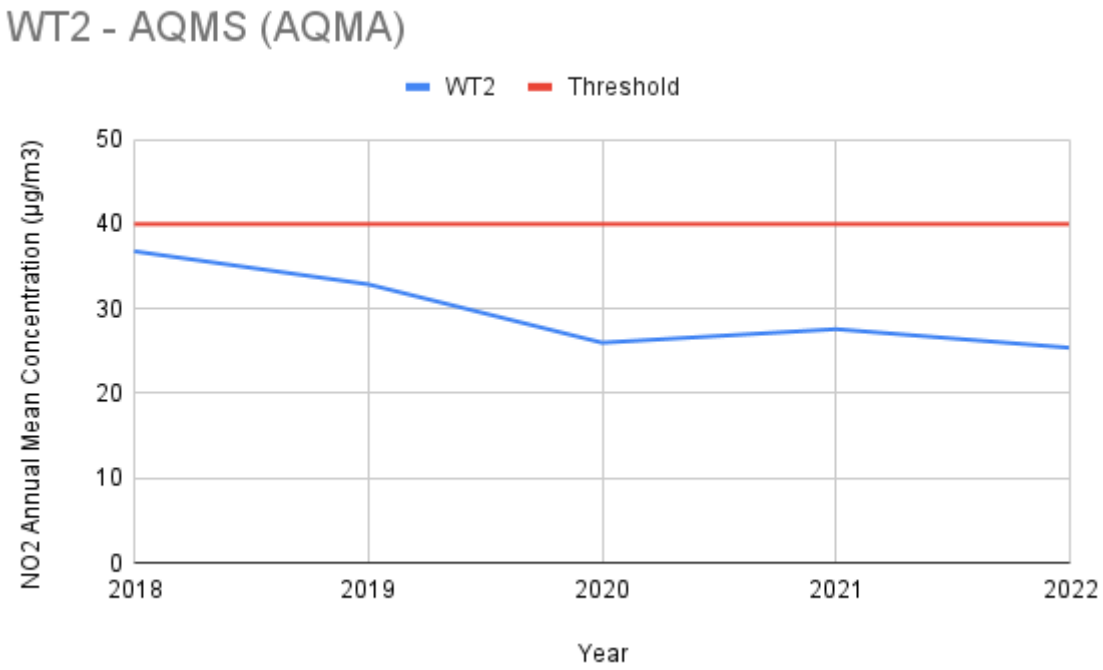
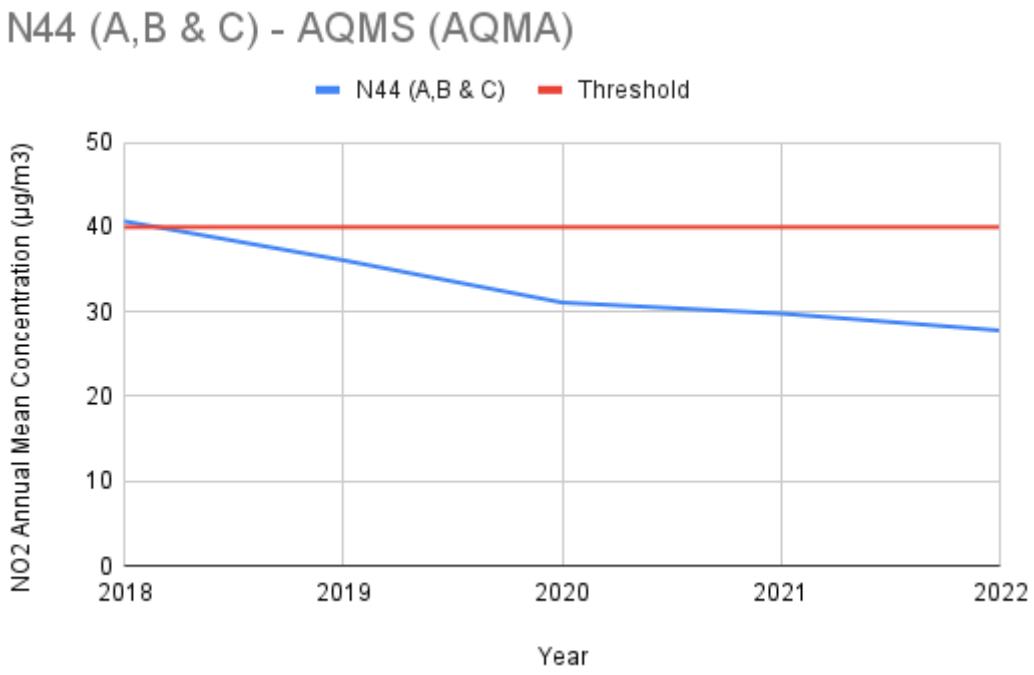
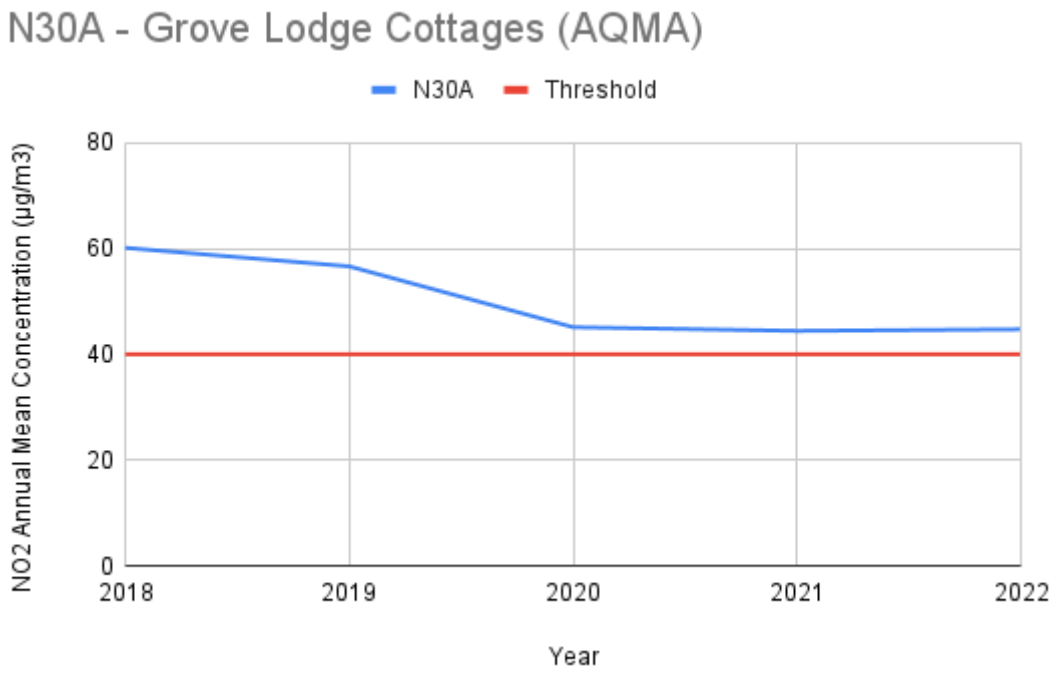
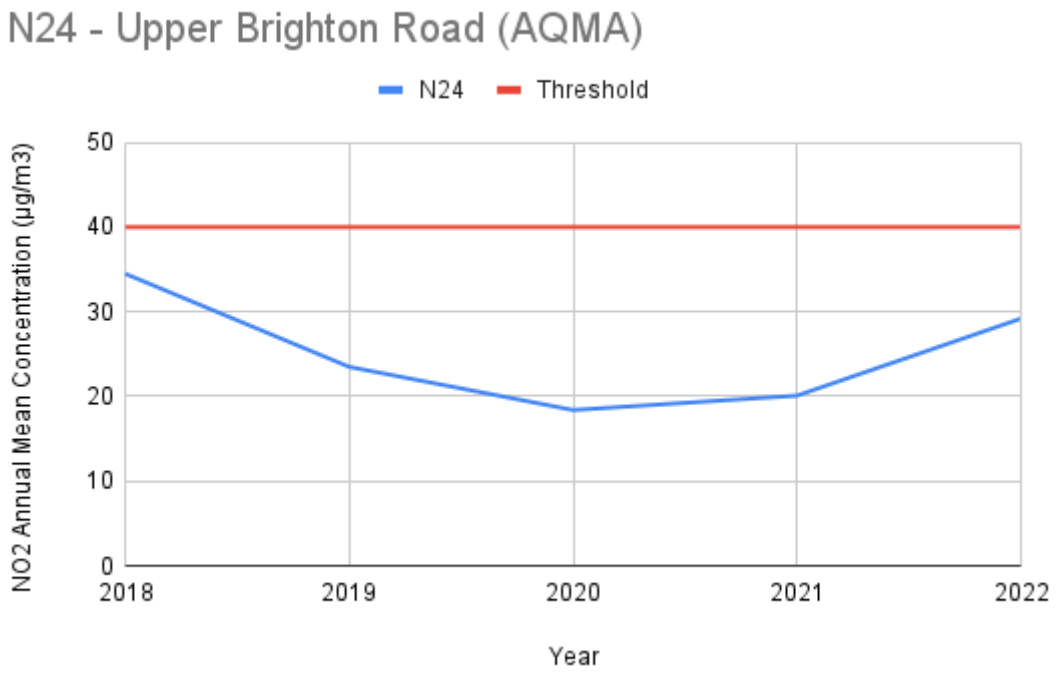

S11 - Lancing Manor, Lancing
S11
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year

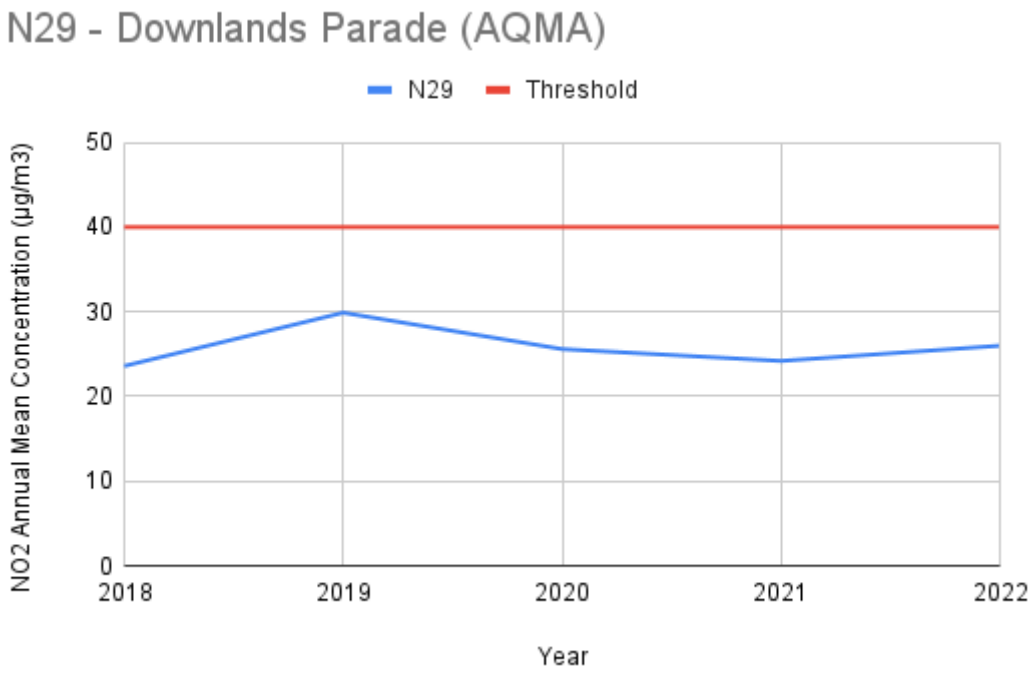
**Figure A.2 – WORTHING Trends in Annual Mean $NO_2$ Concentrations**

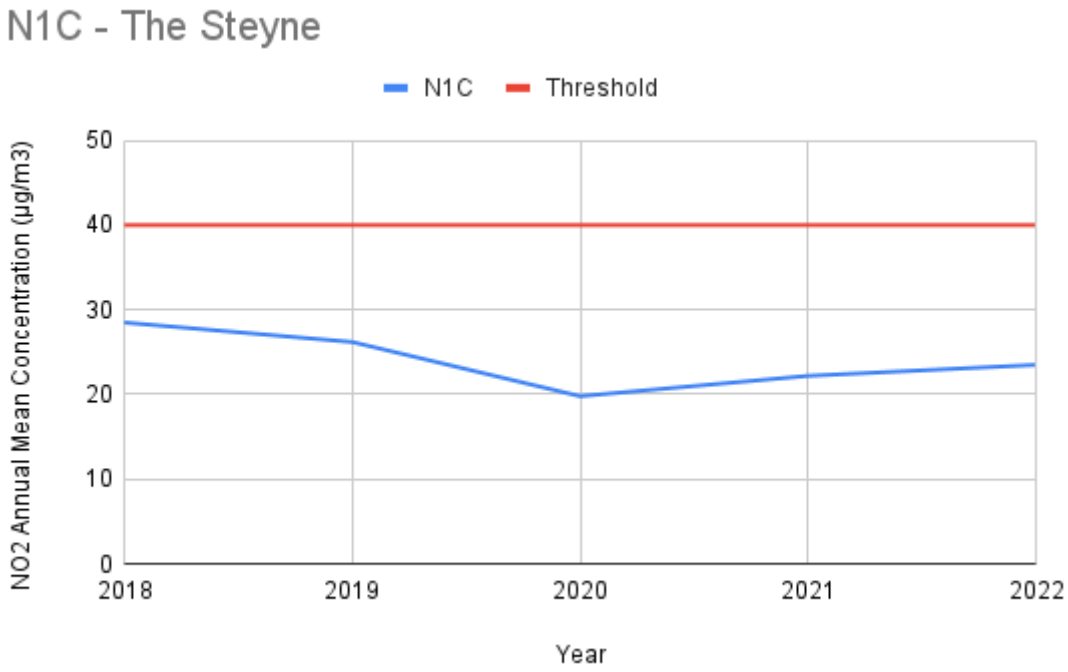


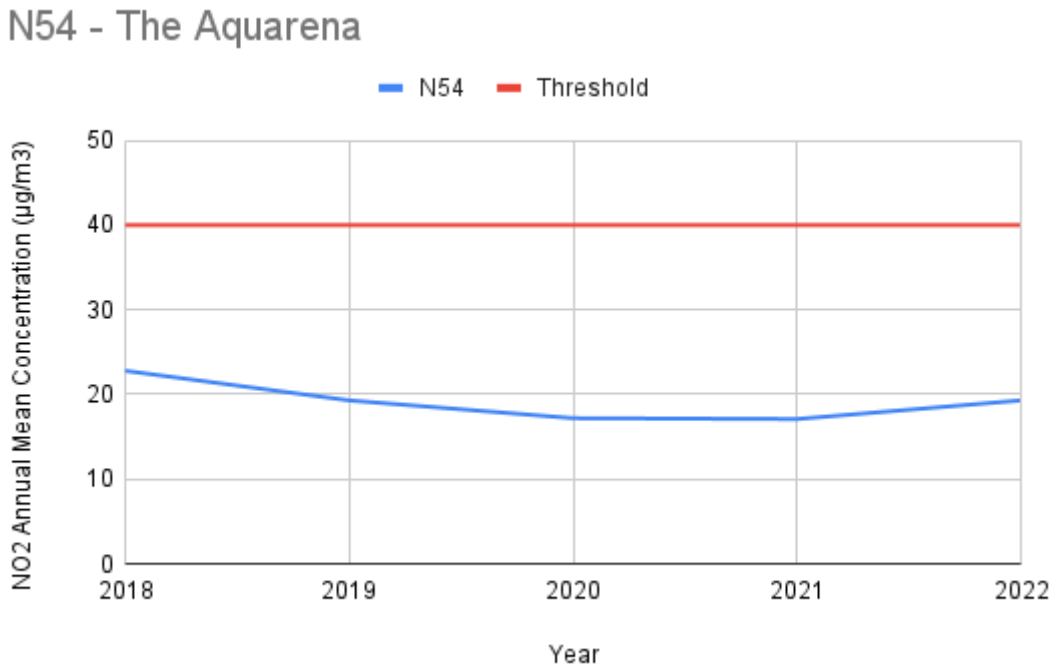

N44 (A,B & C) - AQMS (AQMA)
N44 (A,B & C)
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year

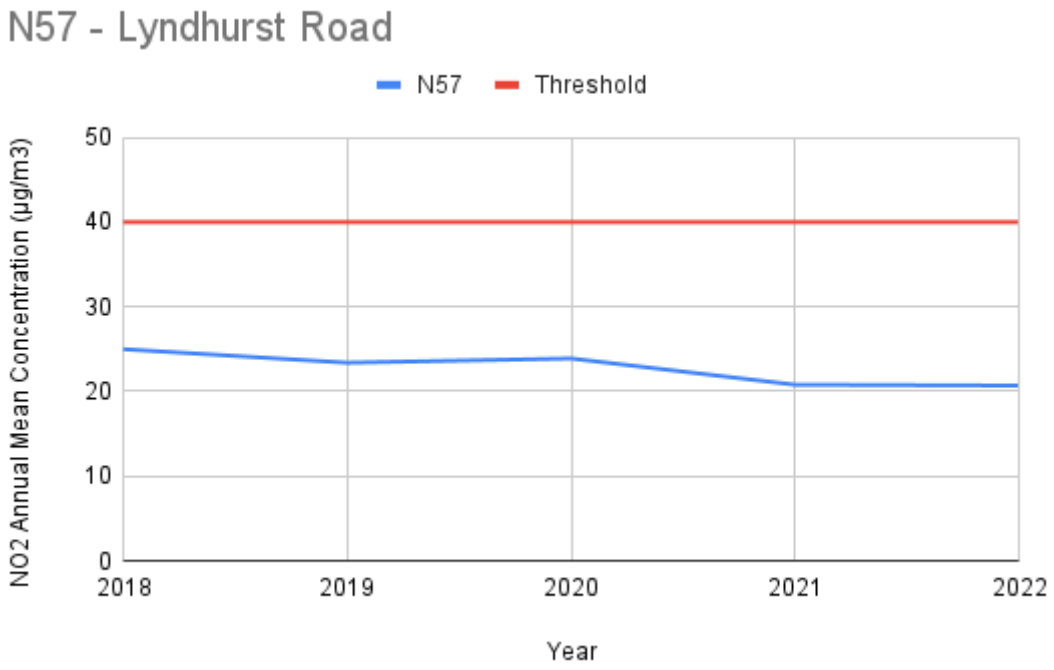

N30A - Grove Lodge Cottages (AQMA)
N30A
Threshold
NO2 Annual Mean Concentration (µg/m3)
80
60
40
20
0
2018
2019
2020
2021
2022
Year


N24 - Upper Brighton Road (AQMA)
N24
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year


N29 - Downlands Parade (AQMA)
N29
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year


N1C - The Steyne
N1C
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year


N54 - The Aquarena
N54
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year


N57 - Lyndhurst Road
N57
Threshold
NO2 Annual Mean Concentration (µg/m3)
50
40
30
20
10
0
2018
2019
2020
2021
2022
Year

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

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2022 (%) (2) | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| AD1 | 521399 | 105039 | Kerbside | 93 | 93 | 0 | 0 | 0 | 0 | 0 |
| WT2 | 514184 | 104963 | Roadside | 95 | 95 | 0 | 0 | 0 | 0 | 0 |

**Notes:**

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

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

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

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

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

## Table A.6 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m$^3$)

| Site ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2022 (%) (2) | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| AD1 | 521399 | 105039 | Kerbside | 87 | 87 | n/a | n/a | n/a | 16.2 | 11.6 |
| WT2 | 514184 | 104963 | Roadside | 93 | 93 | 10.6 | 9.9 | 8.0 | 8.7 | 8.8 |

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

**Notes:**

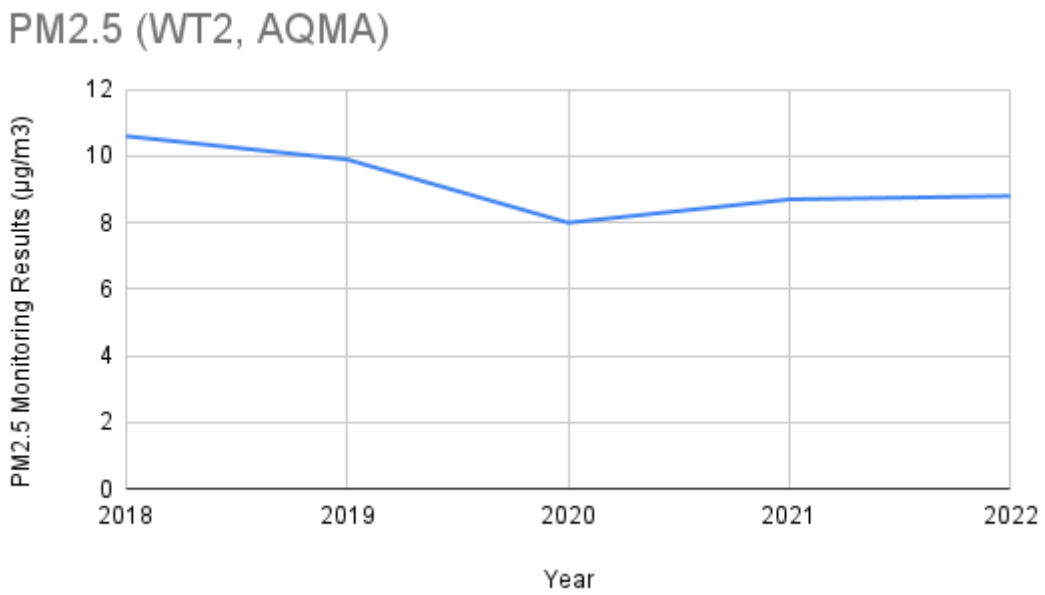
The annual mean concentrations are presented as µg/m$^3$.

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.2 – Trends in Annual Mean $PM_{2.5}$ Concentrations - Worthing**




**No trend chart is included for Adur as less than 2 years data available**

# Appendix B: Full Monthly Diffusion Tube Results for 2022

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

| DT ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean: Raw Data | Annual Mean: Annualised and Bias Adjusted (0.82) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ADUR** | | | | | | | | | | | | | | | | | | |
| S2 | 525330 | 105085 | 26.4 | 25.9 | 32.9 | | 23.3 | 19.1 | 22.8 | 19.3 | 20.3 | 23.3 | 22.8 | 29.2 | 24.1 | 19.8 | | |
| S3 | 525562 | 105313 | 24.7 | 19.6 | 21.3 | 15.3 | 15.7 | 14.4 | 12.5 | 14.1 | 13.9 | 17.2 | 16.8 | 23.5 | 17.4 | 14.3 | | |
| S7 | 524139 | 106321 | 21.8 | 14.6 | 17.5 | 13.7 | 11.8 | 10.2 | 10.5 | 10.2 | 12.4 | 13.3 | 15.6 | 19.8 | 14.3 | 11.7 | | |
| S8 | 524018 | 106070 | 38.7 | 28.0 | 35.7 | 25.5 | 26.3 | 22.0 | 22.6 | 22.1 | 25.7 | 28.0 | 30.1 | 35.7 | 28.3 | 23.2 | | |
| S9 | 523784 | 106081 | 35.0 | 30.7 | 37.8 | 28.5 | 27.7 | 27.5 | 28.3 | 30.2 | 32.3 | 28.2 | 29.5 | 35.8 | 31.0 | 25.4 | | |
| S10 | 523343 | 106111 | 36.6 | 19.0 | 31.3 | 26.8 | 19.5 | 18.3 | 21.0 | 21.5 | 26.0 | 19.1 | 23.2 | 34.3 | 24.7 | 20.3 | | |
| S11 | 518820 | 105584 | 48.1 | 28.3 | 35.2 | 32.6 | 28.8 | 27.7 | 27.8 | 29.9 | 34.6 | 26.1 | 30.0 | 30.8 | 31.7 | 26.0 | | |
| S12 | 517731 | 105505 | 40.7 | 25.9 | 28.4 | 28.0 | 23.9 | 19.9 | 23.9 | 27.0 | 27.0 | 21.5 | 25.6 | 32.9 | 27.1 | 22.2 | | |
| S13 | 517291 | 105550 | 33.2 | 35.1 | 38.3 | 28.7 | 38.7 | 37.0 | 38.3 | 37.9 | 29.6 | 35.7 | 34.3 | 32.5 | 34.9 | 28.7 | | |
| S14 | 516057 | 105190 | 28.3 | 13.0 | 27.2 | 21.1 | 24.8 | 22.5 | 23.3 | 19.6 | 15.1 | 21.0 | 25.6 | 28.5 | 22.5 | 18.4 | | |
| S17 | 521400 | 105040 | 36.5 | 26.6 | 30.7 | 25.8 | 29.9 | 26.2 | 27.7 | 29.4 | 25.3 | 27.0 | 28.2 | 34.4 | 29.0 | 23.7 | | |
| S18 | 521400 | 105040 | 36.4 | 31.7 | 33.1 | 27.6 | 30.9 | 30.2 | 27.6 | 28.9 | 25.6 | 28.0 | 26.5 | 30.7 | 29.8 | 24.4 | | |
| S19 | 521400 | 105040 | 35.6 | 32.2 | 32.6 | 28.5 | 29.4 | 27.8 | 26.8 | 28.9 | 27.3 | 27.2 | 28.2 | 32.7 | 29.8 | 24.4 | | |
| S25 | 519117 | 105710 | 43.6 | 30.2 | 33.0 | 29.0 | 28.5 | 30.7 | 29.8 | 30.4 | 33.0 | 29.0 | 27.4 | 31.1 | 31.3 | 25.7 | | |
| S26 | 516536 | 104783 | 21.0 | 19.3 | 14.0 | 13.5 | 11.6 | 10.5 | 10.3 | 10.5 | 11.4 | 12.2 | 16.8 | 24.0 | 14.6 | 12.0 | | |
| S36 | 521282 | 105254 | 32.9 | 18.7 | 28.6 | 20.8 | 17.1 | 19.2 | 22.2 | 24.1 | 22.6 | 17.5 | 20.7 | 27.1 | 22.6 | 18.6 | | |
| S37 | 522103 | 105126 | 36.7 | 29.0 | 34.6 | 26.9 | 29.3 | 30.1 | 28.8 | 32.4 | 27.0 | 29.2 | 28.8 | 31.0 | 30.3 | 24.9 | | |
| S39 | 523329 | 104960 | 35.9 | 17.5 | 29.6 | 22.0 | 18.2 | 16.3 | 18.4 | 16.7 | 21.8 | 16.9 | 22.1 | 30.1 | 22.1 | 18.1 | | |
| S43 | 521733 | 105251 | 32.4 | 17.8 | 24.4 | 20.4 | 18.0 | 16.1 | 17.9 | 18.5 | 19.1 | 19.0 | 19.9 | 27.3 | 20.9 | 17.1 | | |
| S44 | 518494 | 105464 | 45.8 | 40.3 | 43.4 | 33.5 | 40.4 | 41.7 | 39.4 | 47.0 | 37.9 | 41.5 | 35.7 | 45.2 | 41.0 | 33.6 | | |
| S45 | 522300 | 105258 | 30.0 | 16.5 | 25.8 | 19.8 | 15.4 | 15.2 | 16.8 | 18.5 | 19.7 | 18.0 | 18.3 | 26.8 | 20.1 | 16.4 | | |
| S46 | 521363 | 105082 | 30.1 | 22.6 | 22.5 | 19.7 | 23.0 | 20.6 | 20.5 | 19.8 | 23.0 | 22.7 | 24.1 | 26.2 | 22.9 | 18.8 | | |
| S47 | 521375 | 105101 | 27.8 | 20.2 | 22.6 | 18.3 | 18.5 | 17.8 | 17.7 | 20.0 | 20.3 | 20.0 | 18.1 | 26.7 | 20.7 | 16.9 | | |
| S48 | 518590 | 105463 | 44.4 | 41.2 | 41.1 | 35.2 | 32.8 | 31.9 | 32.3 | 36.5 | 40.3 | 31.9 | 35.1 | 35.9 | 36.5 | 30.0 | | |
| S50 | 521478 | 105002 | 38.2 | 28.9 | 30.3 | 24.6 | 27.9 | 24.1 | 24.7 | 24.8 | 25.4 | 24.2 | 28.5 | 32.9 | 27.9 | 22.8 | | |

| DT ID | X OS Grid Ref (Easting) | Y OS Grid Ref (Northing) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean: Raw Data | Annual Mean: Annualised and Bias Adjusted (0.82) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S51 | 520042 | 106054 | 28.8 | 30.6 | 32.3 | 24.7 | 35.5 | 32.0 | 31.5 | 29.6 | 25.7 | 30.5 | 30.9 | 27.8 | 30.0 | 24.6 | | |
| S52 | 518560 | 105460 | 52.8 | 36.0 | 43.8 | 45.0 | 41.0 | 37.9 | 37.3 | 47.5 | 47.0 | 42.2 | 44.4 | 47.6 | 43.5 | 35.7 | | |
| **WORTHING** | | | | | | | | | | | | | | | | | | |
| 4N | 513609 | 102556 | 22.5 | 13.4 | 19.1 | 12.7 | 10.4 | 9.0 | | 10.4 | 10.1 | 9.8 | 12.9 | 18.9 | 13.6 | 11.1 | | |
| 5N | 512701 | 105562 | 21.8 | 13.5 | 17.5 | 14.4 | 11.1 | 10.2 | 11.2 | 12.3 | 12.8 | 12.3 | 16.3 | 23.6 | 14.8 | 12.1 | | |
| N1C | 515114 | 102670 | 34.5 | 22.8 | 36.7 | 27.5 | 25.2 | 23.9 | 29.9 | 33.4 | | 23.5 | 24.4 | 33.7 | 28.7 | 23.5 | | |
| N5 | 514495 | 105020 | 33.7 | 28.1 | 24.4 | 23.9 | 27.1 | 24.3 | 26.2 | 23.7 | 26.0 | 23.1 | 27.3 | 26.6 | 26.2 | 21.5 | | |
| N8 | 513236 | 104651 | 34.1 | 26.8 | 34.9 | 30.0 | 26.3 | 24.1 | 31.8 | 26.5 | 24.5 | 27.3 | 29.6 | 29.9 | 28.8 | 23.6 | | |
| N11 | 515812 | 103309 | 22.6 | 15.0 | 18.1 | 13.0 | 11.2 | 10.0 | 11.0 | 10.7 | 13.6 | 12.4 | 14.2 | 20.8 | 14.4 | 11.8 | | |
| N21 | 510611 | 105595 | 16.8 | 10.6 | 13.5 | 11.1 | 9.0 | 7.2 | 9.2 | 9.9 | | 9.9 | 11.3 | 14.6 | 11.2 | 9.2 | | |
| N22 | 511010 | 102226 | 19.6 | 10.2 | 16.6 | 12.5 | 9.9 | 8.7 | 10.3 | 9.8 | 11.3 | 9.9 | 15.1 | 20.4 | 12.9 | 10.5 | | |
| N24 | 515151 | 105109 | 49.8 | 31.4 | 39.1 | 38.5 | 32.6 | 27.3 | 30.6 | 33.4 | 36.9 | 31.5 | 37.3 | 39.1 | 35.6 | 29.2 | | |
| N25 | 513845 | 105191 | 26.2 | 19.1 | 21.8 | 16.5 | 16.0 | 14.1 | 15.7 | 15.8 | 17.1 | | 20.5 | 23.3 | 18.7 | 15.4 | | |
| N28 | 514740 | 103173 | 31.6 | 15.6 | 27.3 | 21.8 | 17.0 | 15.9 | 18.9 | 21.8 | 23.8 | 17.9 | 19.8 | 26.0 | 21.5 | 17.6 | | |
| N29 | 515014 | 105099 | 35.3 | 27.2 | 37.7 | 30.4 | 26.1 | 28.0 | 33.0 | 36.1 | 31.2 | 32.1 | 31.2 | 32.7 | 31.7 | 26.0 | | |
| N30A | 514183 | 104948 | 58.3 | 50.7 | 60.3 | 53.3 | 53.7 | | | 61.2 | 52.2 | 51.6 | 54.1 | 49.8 | 54.5 | **44.7** | **44.0** | |
| N31 | 514317 | 103329 | 32.9 | 23.6 | 28.2 | 20.2 | 23.8 | 20.6 | 23.4 | 22.1 | 22.8 | 22.0 | 28.5 | 33.4 | 25.1 | 20.6 | | |
| N39 | 514088 | 104906 | 37.6 | 24.9 | 40.4 | 31.9 | 25.5 | 24.4 | 27.9 | 31.6 | 32.9 | 23.6 | 25.1 | 31.8 | 29.8 | 24.4 | | |
| N42 | 514742 | 103234 | 29.5 | 19.4 | 33.5 | 24.5 | 19.5 | 20.1 | 23.7 | 24.7 | 22.1 | 21.0 | 23.3 | 24.0 | 23.8 | 19.5 | | |
| N43 | 514199 | 104982 | 28.7 | 21.7 | 20.7 | 17.3 | 18.8 | 16.5 | 18.2 | 17.6 | 18.3 | 19.5 | 22.3 | 23.4 | 20.2 | 16.6 | | |
| N44A | 514184 | 104963 | 41.6 | 29.3 | 30.4 | 33.4 | 32.3 | 32.8 | 30.3 | 34.1 | 36.0 | 34.1 | 32.5 | 32.2 | - | - | | Triplicate Site with N44A, N44B and N44C - Annual data provided for N44C only |
| N44B | 514184 | 104963 | | 35.1 | 29.9 | 32.6 | 27.7 | 31.5 | 34.1 | 34.0 | 36.0 | 33.0 | 33.3 | 35.9 | - | - | | Triplicate Site with N44A, N44B and N44C - Annual data provided for N44C only |
| N44C | 514184 | 104963 | 38.2 | 34.5 | 36.7 | 35.0 | 32.5 | 32.7 | 36.1 | 36.1 | 34.8 | 33.2 | 34.4 | 32.6 | 33.9 | 27.8 | | Triplicate Site with N44A, N44B and N44C - Annual data provided for N44C only |
| N48 | 512063 | 103385 | 34.7 | 23.6 | 31.6 | 23.5 | 22.4 | 19.7 | 25.2 | 27.2 | 24.5 | | 37.4 | 29.8 | 27.2 | 22.3 | | |
| N52 | 514973 | 103335 | 37.5 | 27.6 | 21.7 | 17.9 | 16.6 | 16.3 | 15.6 | 17.4 | 20.2 | 18.0 | 22.8 | | 21.0 | 17.3 | | |
| N53 | 513278 | 105623 | 33.9 | 34.8 | 33.5 | 25.6 | 30.7 | 29.1 | 34.4 | 14.5 | 27.9 | 32.2 | 28.8 | 31.5 | 29.7 | 24.4 | | |
| N54 | 515595 | 102725 | 30.4 | 20.0 | 31.0 | 22.6 | 21.6 | 21.5 | 22.8 | 22.8 | 21.4 | 21.9 | 23.1 | 23.9 | 23.6 | 19.3 | | |
| N57 | 515114 | 102975 | 33.7 | 23.9 | 26.9 | 25.2 | 22.3 | 20.2 | 20.2 | 24.5 | 25.6 | 22.6 | 25.1 | 32.5 | 25.2 | 20.7 | | |
| N64 | 514946 | 102541 | 33.4 | 22.6 | 30.3 | 29.4 | 22.6 | 22.4 | 26.2 | 28.6 | 25.4 | 24.1 | 21.6 | | 26.0 | 21.4 | | |

| 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 (0.82) | Annual Mean: Distance Corrected to Nearest Exposure | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N65 | 514543 | 103220 | 40.7 | 27.6 | 33.1 | 27.4 | 24.1 | 23.7 | 25.4 | 36.9 | 27.5 | 26.0 | 27.6 | 31.4 | 29.3 | 24.0 | | |
| N66 | 515067 | 105082 | 40.0 | 27.1 | 30.8 | 11.9 | 27.1 | 15.6 | 21.8 | 29.0 | 29.1 | 25.4 | 30.7 | | 26.2 | 21.5 | | |
| N71 | 514548 | 103843 | 23.8 | 14.0 | 20.5 | 13.1 | 11.1 | 9.6 | 11.9 | 12.7 | 13.7 | 12.4 | 15.0 | | 14.3 | 11.8 | | |
| N72 | 514558 | 102416 | 19.8 | 14.3 | | | | | | 13.5 | 12.8 | 12.3 | 14.8 | 22.0 | 15.6 | 12.3 | | |

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

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.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 2022 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

**Notes:**

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

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

See Appendix C for details on bias adjustment and annualisation.

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

## New or Changed Sources Identified Within Adur & Worthing During 2022

Adur District and Worthing Borough Councils have not identified any new sources relating to air quality within the reporting year of 2022.

## Additional Air Quality Works Undertaken by Adur & Worthing During 2022

Adur District Council commissioned specialist consultants Bureau Veritas to help develop a new air quality Action Plan for Adur towards the end of 2021. Work on the draft progressed through 2022 and the new plan will be published in 2023.

Worthing Borough Council commissioned Bureau Veritas consultants to help develop a revised air quality Action Plan for Worthing towards the end of 2022. This work will progress in 2023.

## QA/QC of Diffusion Tube Monitoring

$NO_2$ diffusion tubes are provided and analysed by Gradko laboratory. The $NO_2$ tube preparation method used is 50% triethanolamine (TEA) in Acetone**.**

In order to ensure $NO_2$ 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 $NO_2$ 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 and participates in laboratory performance and proficiency testing schemes. These provide strict performance criteria for participating laboratories to meet, ensuring $NO_2$ concentrations reported are of a high calibre.

Gradko participate in the AIR $NO_2$ 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%.

All monitoring was completed in adherence with the 2022 Diffusion Tube Monitoring Calendar.

Data from the $NO_2$ 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

UKAS TESTING

2187

Accredited to ISO/IEC 17025:2017

**Gradko International Ltd**
**(Trading as Gradko Environmental)**

**Issue No:** 024 **Issue date:** 15 April 2020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**E-Mail: diffusion@gradko.co.uk**
**Website: www.gradko.co.uk**


**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 | Chemical Tests | Documented In-House Methods |
| | Ammonia as ammonium ($NH_4^+$) | GLM 8 by Ion Chromatography |
| | Benzene<br>Toluene<br>Ethyl benzene<br>Xylene | GLM 4 by Thermal Desorption/ FID Gas Chromatography |
| | Hydrogen chloride as chloride ($Cl^-$)<br>Nitrogen dioxide as nitrite ($NO_2^-$)<br>Sulphur dioxide as sulphate ($SO_4^{2-}$)<br>Hydrogen fluoride as fluoride ($F^-$) | GLM 3 by Ion Chromatography |
| | Hydrogen sulphide | GLM 5 by Colorimetric determination (UV Spectrophotometry) |
| | Ozone as nitrate ($NO_3^-$) | GLM 2 by Ion Chromatography |
| | Nitrogen Dioxide as nitrite ($NO_2^-$) | GLM 7 by Colorimetric determination (UV Spectrophotometry) |
| | Sulphur dioxide as sulphate ($SO_4^{2-}$) | GLM 1 by Ion Chromatography |
| | Formaldehyde as formaldehyde-DNPH | GLM 18 by HPLC |
| | Volatile Organic Compounds including:<br>Benzene<br>Toluene<br>Ethylbenzene<br>p-Xylene<br>o-Xylene | GLM 13 by Thermal Desorption GC-Mass Spectrometry |

| | |
|---|---|
| UKAS TESTING<br>2187<br>Accredited to ISO/IEC 17025:2017 | **Schedule of Accreditation**<br>issued by<br>**United Kingdom Accreditation Service**<br>2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK<br><br>**Gradko International Ltd**<br>**(Trading as Gradko Environmental)**<br>**Issue No:** 024 **Issue date:** 15 April 2020 |

**Testing performed at main address only**

| 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 (cont'd) | Chemical Tests (cont'd) | |
| | Qualitative Analysis and Estimation of Volatile Organic Compounds on diffusion (sorbent) tubes and monitors | GLM 13 by Thermal Desorption GC-Mass Spectrometry with estimations in accordance with ISO standard 16000-6 |
| | Naphthalene | GLM 13-1 by Thermal Desorption GC-Mass Spectrometry |
| | Tetrachloroethylene<br>Trichloroethylene | GLM 13-2 by Thermal Desorption GC-Mass Spectrometry |
| | trans-1,2-Dichloroethene<br>cis-1,2-Dichloroethene | GLM 13-3 by Thermal Desorption GC-Mass Spectrometry |
| | Indane<br>Styrene | GLM 13-4 by Thermal Desorption GC-Mass Spectrometry |
| | 1,2,3-Trimethylbenzene<br>1,2,4-Trimethylbenzene<br>1,3,5-Trimethylbenzene | GLM 13-5 by Thermal Desorption GC-Mass Spectrometry |
| | 1,3-Butadiene | GLM 13-6 by Thermal Desorption GC-Mass Spectrometry |
| | Carbon Disulphide | GLM 13-7 by Thermal Desorption GC-Mass Spectrometry |
| | Vinyl Chloride | GLM 13-8 by Thermal Desorption GC-Mass Spectrometry |
| | Flexible scope for quantitative analysis of Volatile Organic Compounds on diffusion (sorbent) tubes and monitors in accordance with methods developed and validated by in-house procedure LWI 47 | LWI 47 by Thermal Desorption GC-Mass Spectrometry |
| END | | |

# Certificate of Accreditation

UKAS
UNITED KINGDOM ACCREDITATION SERVICE

## Gradko International Ltd (Trading as Gradko Environmental)

Testing Laboratory No. 2187

**Is accredited in accordance with International Standard ISO/IEC 17025:2017 – General Requirements for the competence of testing and calibration laboratories.**

This accreditation demonstrates technical competence for a defined scope specified in the schedule to this certificate, and the operation of a management system (refer joint ISO-ILAC-IAF Communiqué dated April 2017). The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued.

The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from www.ukas.com.

This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements.

**Matt Gantley**, *Chief Executive Officer*
United Kingdom Accreditation Service

Initial Accreditation: 31 January 2001
Certificate Issued: 15 April 2020

ilac-MRA UKAS

*Scan QR Code to verify*

UKAS is appointed as the sole national accreditation body for the UK by The Accreditation Regulations 2009 (SI No 3155/2009) and operates under a Memorandum of Understanding (MoU) with the Department for Business, Energy and Industrial Strategy (BEIS).

## Diffusion Tube Annualisation

All but one diffusion tube monitoring location within Adur & Worthing recorded data capture of less than 75%, Worthing site N72. Annualisation was therefore carried out for this site, the details are contained in Table C.1 below.

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

| Site ID | Annualisation Factor Site WT2 | Annualisation Factor Site AD1 | Annualisation Factor Site 3 | Annualisation Factor Site 4 | Average Annualisation Factor | Raw Data Annual Mean | Annualised Annual Mean |
|---|---|---|---|---|---|---|---|
| N72 | 0.9555 | 0.9681 | | | 0.9618 | 15.6 | 15.0 |

## Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from $NO_x$/$NO_2$ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

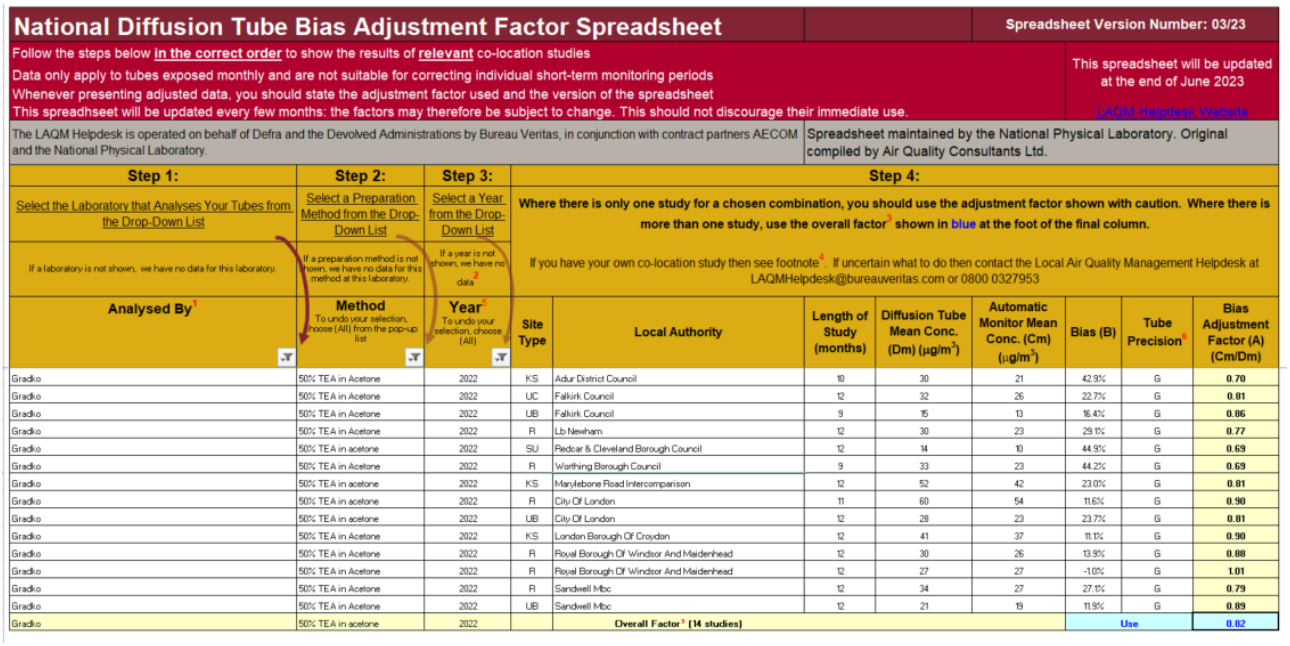
Adur & Worthing have applied a national bias adjustment factor of **0.82** to the 2022 monitoring data. A summary of bias adjustment factors used by Adur & Worthing over the past five years is presented in Table C.2.

A screenshot of the National Bias Adjustment Factor Spreadsheet has also been added for information.

### Table C.2 – Bias Adjustment Factor

| Monitoring Year | Local or National | If National, Version of National Spreadsheet | Adjustment Factor |
|---|---|---|---|
| **2022** | National | 03/23 | 0.82 |
| **2021** | National | 06/22 | 0.82 |

| | | | |
|---|---|---|---|
| **2020** | National | 09/21 | 0.84 |
| **2019** | National | 03/20 | 0.87 |
| **2018** | National | 03/19 | 0.92 |



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

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

This spreadsheet will be updated at the end of June 2023
LAQM Helpdesk Website

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

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

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

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

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

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

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

| Analysed By[1] | Method (To undo your selection, choose (All) from the pop-up list) | Year[2] (To undo your selection, choose (All)) | Site Type | Local Authority | Length of Study (months) | Diffusion Tube Mean Conc. (Dm) (µg/m³) | Automatic Monitor Mean Conc. (Cm) (µg/m³) | Bias (B) | Tube Precision[4] | Bias Adjustment Factor (A) (Cm/Dm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Gradko | 50% TEA in Acetone | 2022 | KS | Adur District Council | 10 | 30 | 21 | 42.9% | G | 0.70 |
| Gradko | 50% TEA in Acetone | 2022 | UC | Falkirk Council | 12 | 32 | 26 | 22.7% | G | 0.81 |
| Gradko | 50% TEA in Acetone | 2022 | UB | Falkirk Council | 9 | 15 | 13 | 16.4% | G | 0.86 |
| Gradko | 50% TEA in Acetone | 2022 | R | Lb Newham | 12 | 30 | 23 | 29.1% | G | 0.77 |
| Gradko | 50% TEA in acetone | 2022 | SU | Redcar & Cleveland Borough Council | 12 | 14 | 10 | 44.9% | G | 0.69 |
| Gradko | 50% TEA in Acetone | 2022 | R | Worthing Borough Council | 9 | 33 | 23 | 44.2% | G | 0.69 |
| Gradko | 50% TEA in acetone | 2022 | KS | Marylebone Road Intercomparison | 12 | 52 | 42 | 23.0% | G | 0.81 |
| Gradko | 50% TEA in acetone | 2022 | R | City Of London | 11 | 60 | 54 | 11.6% | G | 0.90 |
| Gradko | 50% TEA in acetone | 2022 | UB | City Of London | 12 | 28 | 23 | 23.7% | G | 0.81 |
| Gradko | 50% TEA in Acetone | 2022 | KS | London Borough Of Croydon | 12 | 41 | 37 | 11.1% | G | 0.90 |
| Gradko | 50% TEA in Acetone | 2022 | R | Royal Borough Of Windsor And Maidenhead | 12 | 30 | 26 | 13.9% | G | 0.88 |
| Gradko | 50% TEA in Acetone | 2022 | R | Royal Borough Of Windsor And Maidenhead | 12 | 27 | 27 | -1.0% | G | 1.01 |
| Gradko | 50% TEA in Acetone | 2022 | R | Sandwell Mbc | 12 | 34 | 27 | 27.1% | G | 0.79 |
| Gradko | 50% TEA in Acetone | 2022 | UB | Sandwell Mbc | 12 | 21 | 19 | 11.9% | G | 0.89 |
| Gradko | 50% TEA in acetone | 2022 | | Overall Factor[3] (14 studies) | | | | Use | | 0.82 |

## $NO_2$ Fall-off with Distance from the Road

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

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

| Site ID | Distance (m): Monitoring Site to Kerb | Distance (m): Receptor to Kerb | Monitored Concentration (Annualised and Bias Adjusted | Background Concentration | Concentration Predicted at Receptor | Comments |
|---|---|---|---|---|---|---|
| N30A | 2.2 | 2.4 | **44.7** | 11.5 | **44.0** | *Predicted concentration at* |

| 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 |
|---|---|---|---|---|---|---|
| | | | | | | *Receptor above AQS objective.* |

## 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/). 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 2022 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.

Data for both sites is available via www.sussex-air.net/

Worthing data is also available via the UKAir website - https://uk-air.defra.gov.uk/data/data_selector

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

The type of $PM_{10}$ and $PM_{2.5}$ monitors utilised within Adur District and Worthing Borough Councils do not require the application of a correction factor

### Automatic Monitoring Annualisation

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

## $NO_2$ Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the $NO_2$ concentration at the nearest location relevant for exposure has been estimated using the $NO_2$ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean $NO_2$ concentrations corrected for distance are presented in Table B.1.

No automatic $NO_2$ monitoring locations within Adur & Worthing required distance correction during 2022.

We have calculated the fall off with distance for sites of specific interest. As the annual mean concentration at all monitoring locations except N30A were less than 36µg/m$^3$, such calculations are not strictly necessary, but included for information.

### S8

Enter data into the pink cells

| | | | |
|---|---|---|---|
| Step 1 | How far from the KERB was your measurement made (in metres)? | 2.3 | metres |
| Step 2 | How far from the KERB is your receptor (in metres)? | 6.6 | metres |
| Step 3 | What is the local annual mean background $NO_2$ concentration (in µg/m$^3$)? | 11.31544 | µg/m$^3$ |
| Step 4 | What is your measured annual mean $NO_2$ concentration (in µg/m$^3$)? | 23.2429 | µg/m$^3$ |
| Result | The predicted annual mean $NO_2$ concentration (in µg/m$^3$) at your receptor | 20.2 | µg/m$^3$ |

### S9

Enter data into the pink cells

| | | | |
|---|---|---|---|
| Step 1 | How far from the KERB was your measurement made (in metres)? | 2.8 | metres |
| Step 2 | How far from the KERB is your receptor (in metres)? | 4.4 | metres |
| Step 3 | What is the local annual mean background $NO_2$ concentration (in µg/m$^3$)? | 12.91058 | µg/m$^3$ |
| Step 4 | What is your measured annual mean $NO_2$ concentration (in µg/m$^3$)? | 25.3865167 | µg/m$^3$ |
| Result | The predicted annual mean $NO_2$ concentration (in µg/m$^3$) at your receptor | 24.0 | µg/m$^3$ |

## S44

Enter data into the pink cells

| | | | |
|---|---|---|---|
| Step 1 | How far from the KERB was your measurement made (in metres)? | 2.0 | metres |
| Step 2 | How far from the KERB is your receptor (in metres)? | 6.4 | metres |
| Step 3 | What is the local annual mean background $NO_2$ concentration (in $\mu g/m^3$)? | 11.59836 | $\mu g/m^3$ |
| Step 4 | What is your measured annual mean $NO_2$ concentration (in $\mu g/m^3$)? | 33.60565 | $\mu g/m^3$ |
| Result | The predicted annual mean $NO_2$ concentration (in $\mu g/m^3$) at your receptor | 27.6 | $\mu g/m^3$ |

## S48

Enter data into the pink cells

| | | | |
|---|---|---|---|
| Step 1 | How far from the KERB was your measurement made (in metres)? | 3.3 | metres |
| Step 2 | How far from the KERB is your receptor (in metres)? | 4 | metres |
| Step 3 | What is the local annual mean background $NO_2$ concentration (in $\mu g/m^3$)? | 11.59836 | $\mu g/m^3$ |
| Step 4 | What is your measured annual mean $NO_2$ concentration (in $\mu g/m^3$)? | 29.9628 | $\mu g/m^3$ |
| Result | The predicted annual mean $NO_2$ concentration (in $\mu g/m^3$) at your receptor | 29.0 | $\mu g/m^3$ |

## N30A

Enter data into the pink cells

| | | | |
|---|---|---|---|
| Step 1 | How far from the KERB was your measurement made (in metres)? | 2.2 | metres |
| Step 2 | How far from the KERB is your receptor (in metres)? | 2.4 | metres |
| Step 3 | What is the local annual mean background $NO_2$ concentration (in $\mu g/m^3$)? | 11.47381 | $\mu g/m^3$ |
| Step 4 | What is your measured annual mean $NO_2$ concentration (in $\mu g/m^3$)? | 44.71214 | $\mu g/m^3$ |
| Result | The predicted annual mean $NO_2$ concentration (in $\mu g/m^3$) at your receptor | 44.0 | $\mu g/m^3$ |

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

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

**See next page**

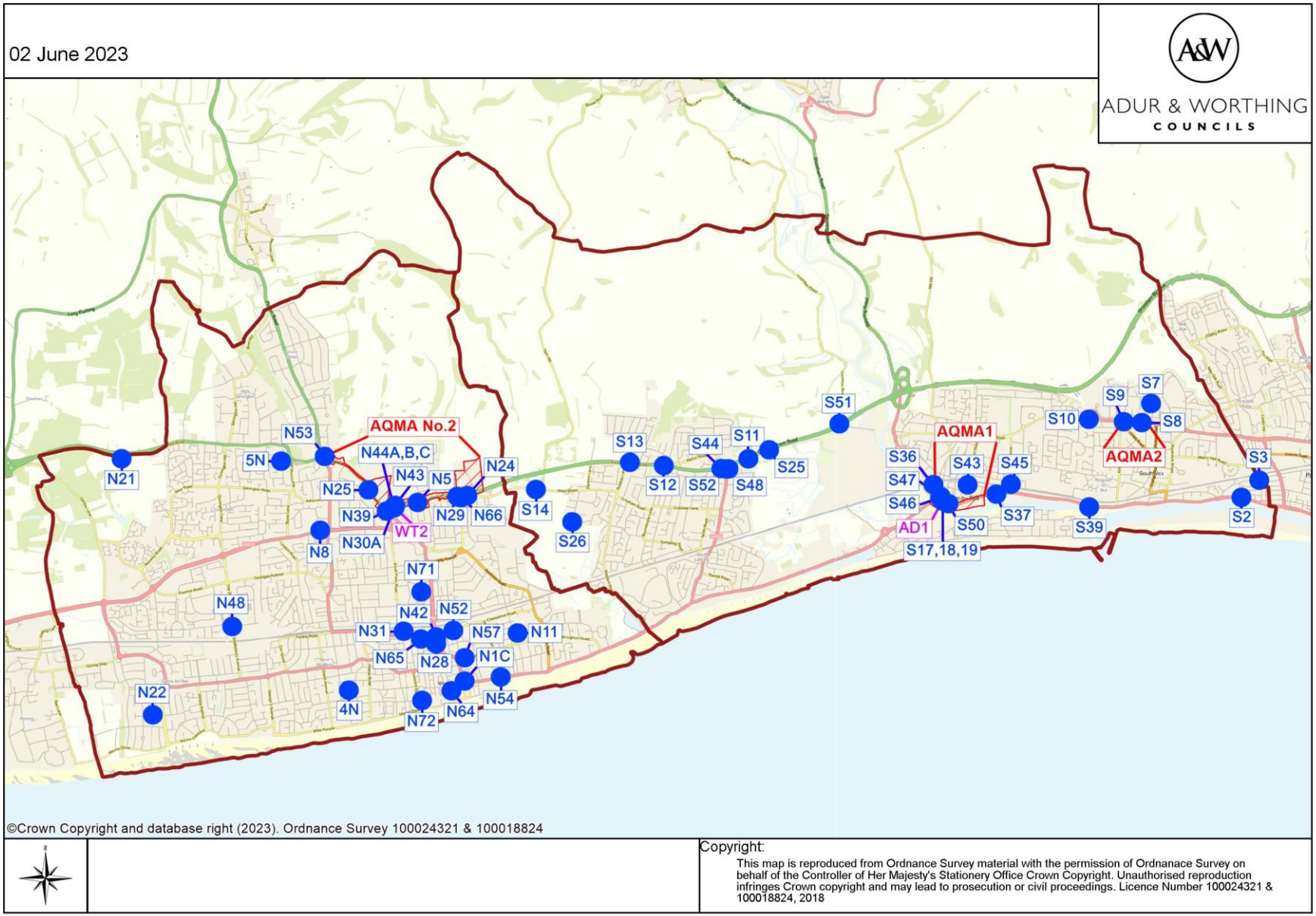

02 June 2023
ADUR & WORTHING
COUNCILS
AQMA No.2
AQMA1
AQMA2
N21
N53
5N
N44A,B,C
N43
N5
N24
N25
N39
N29
N66
WT2
N8
N30A
S14
S26
S13
S12
S52
S44
S48
S11
S25
S51
S36
S47
S46
AD1
S43
S45
S37
S50
S17,18,19
S10
S9
S7
S8
S3
S2
S39
N71
N48
N42
N52
N31
N57
N11
N65
N28
N1C
N54
N64
N72
4N
N22
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**Figure D.2 – Map of Non-Automatic Monitoring Sites in Adur**

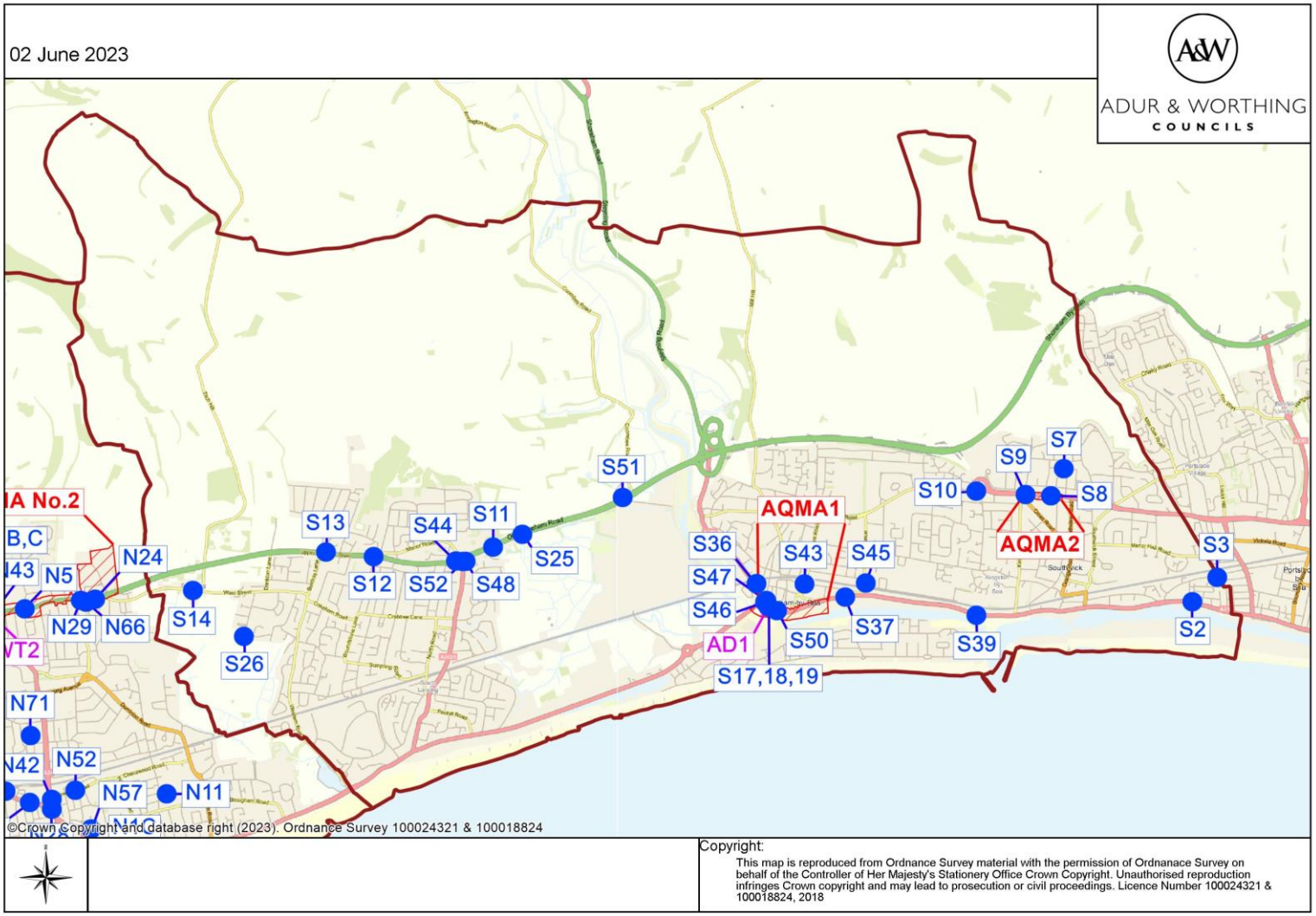


**Figure D.3 – Map of Non-Automatic Monitoring Sites in Adur – Shoreham/AQMA1**

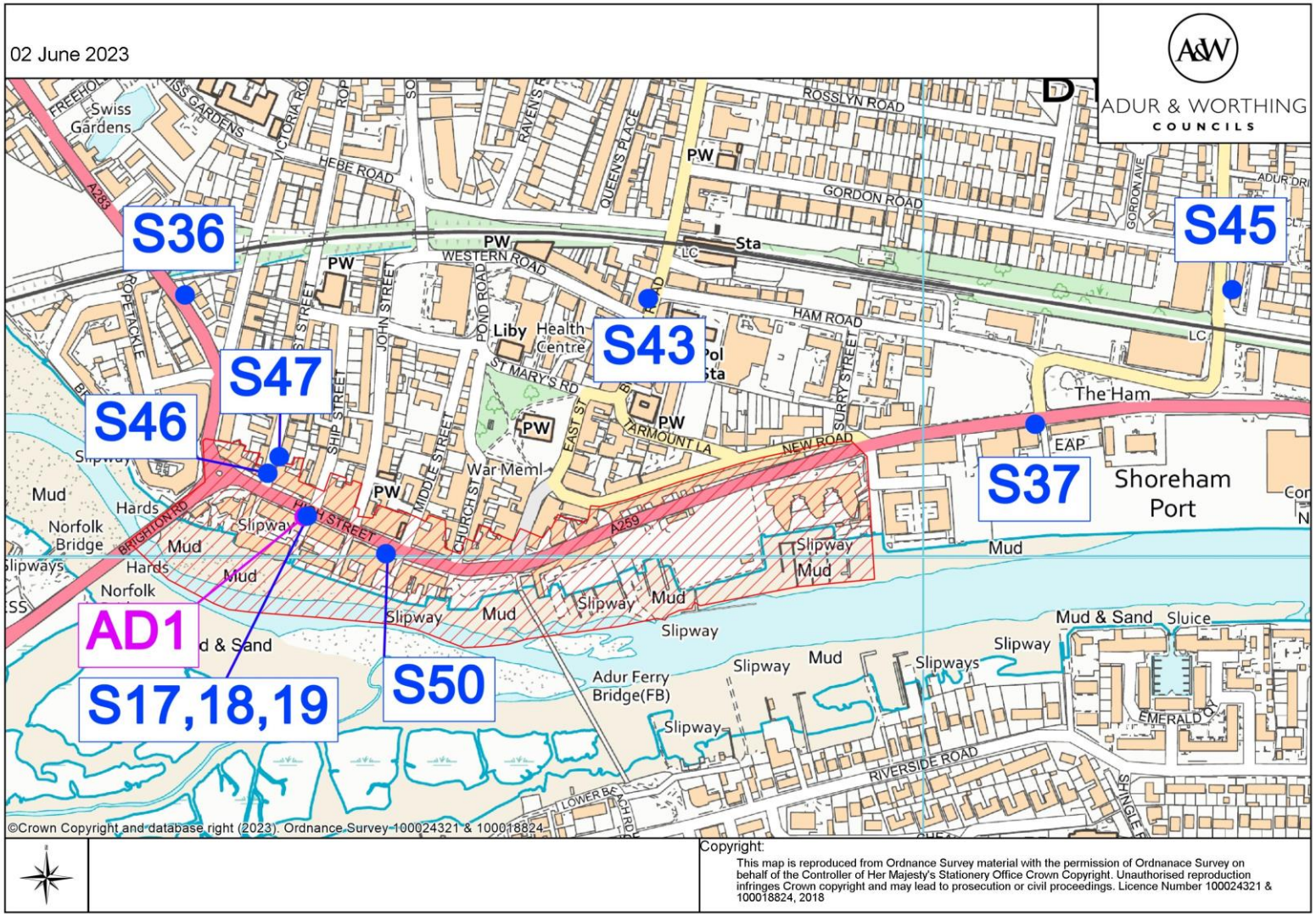


**Figure D.4 – Map of Non-Automatic Monitoring Sites in Adur – Southwick/AQMA2**

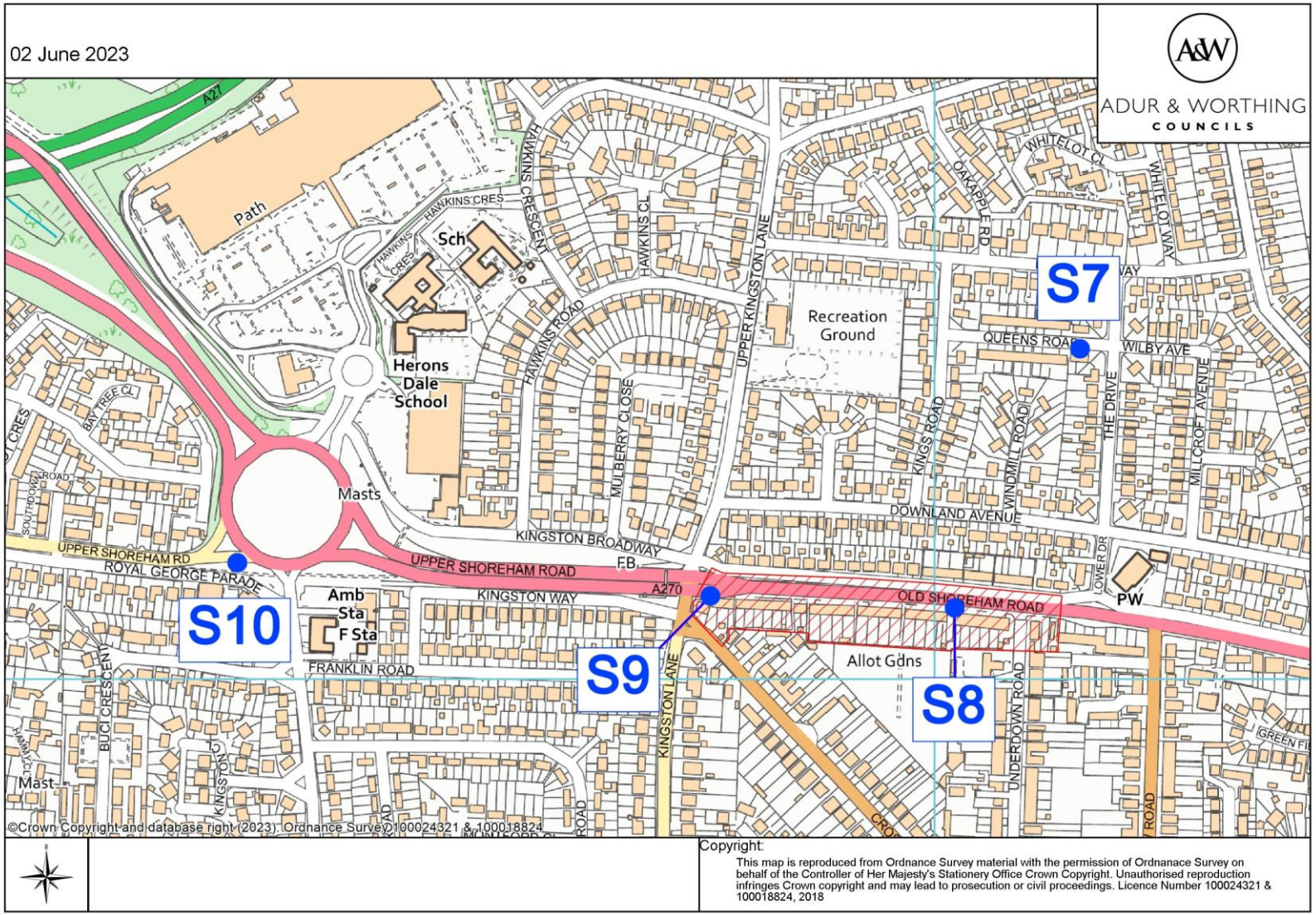


**Figure D.5 – Map of Non-Automatic Monitoring Sites in Adur – Lancing**

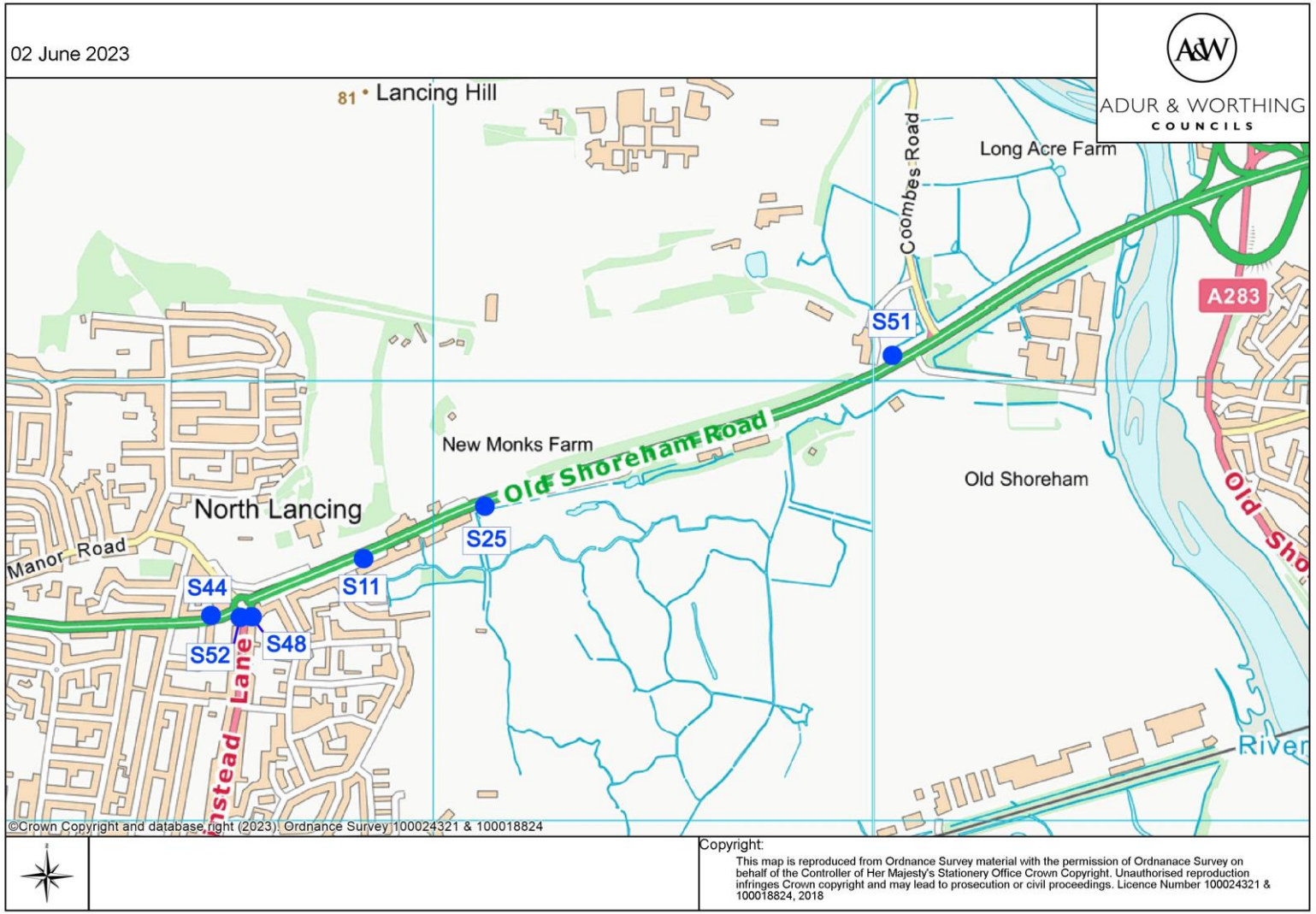
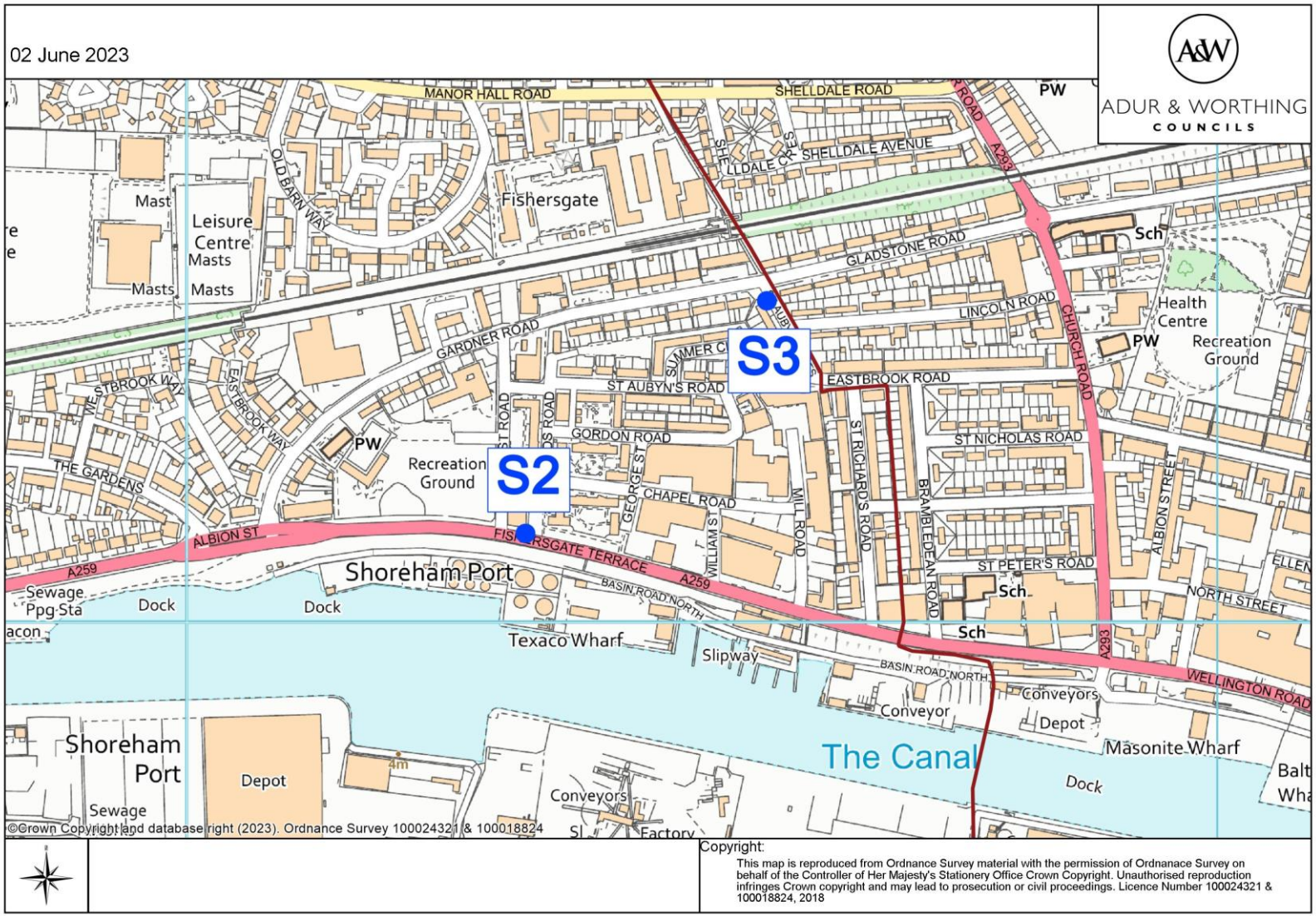


**Figure D.6 – Map of Non-Automatic Monitoring Sites in Adur – Fishersgate**



## Figure D.7 – Map of Non-Automatic Monitoring Sites in Worthing

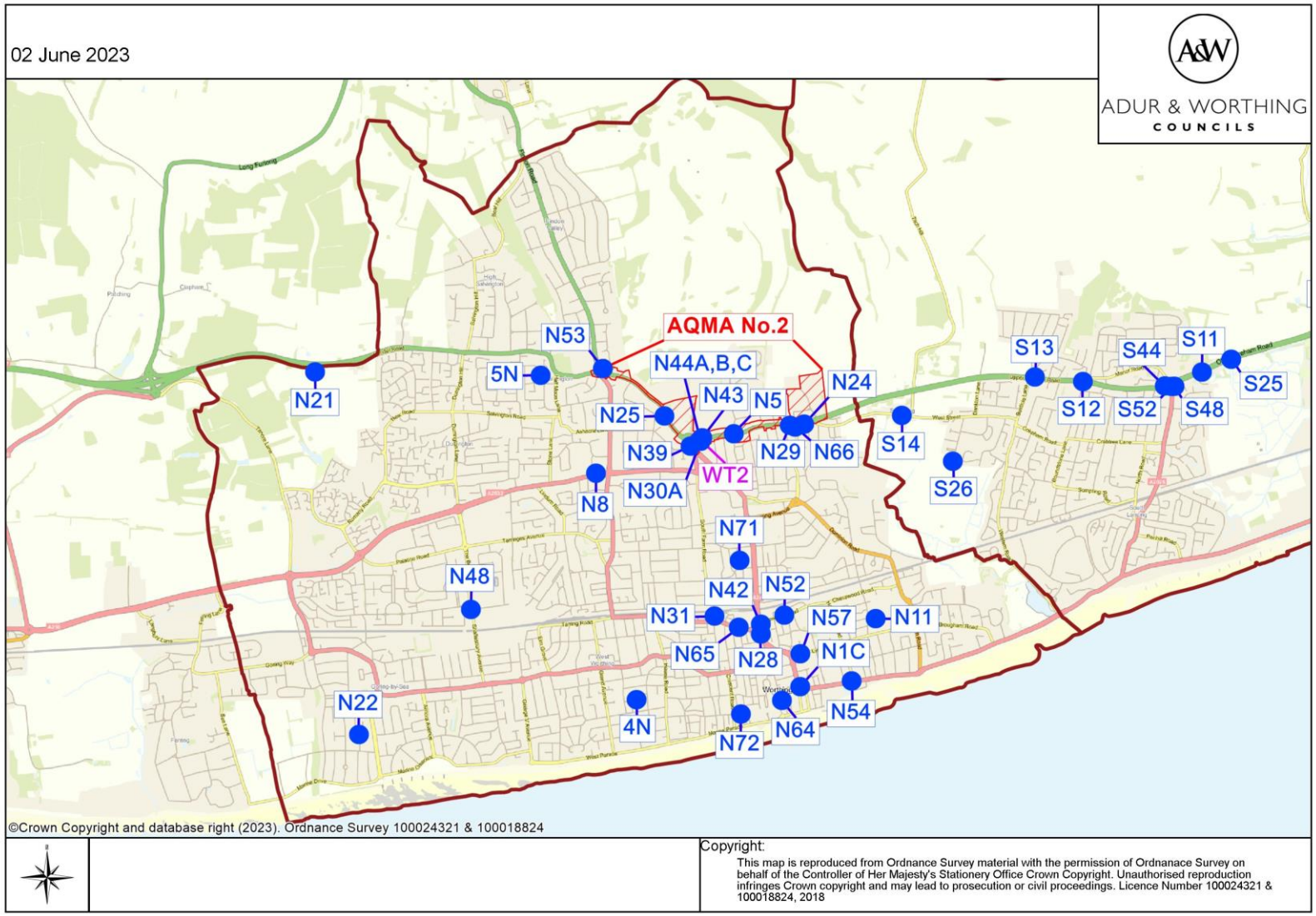


**Figure D.8 – Map of Non-Automatic Monitoring Sites in Worthing – A27/AQMA No.21**

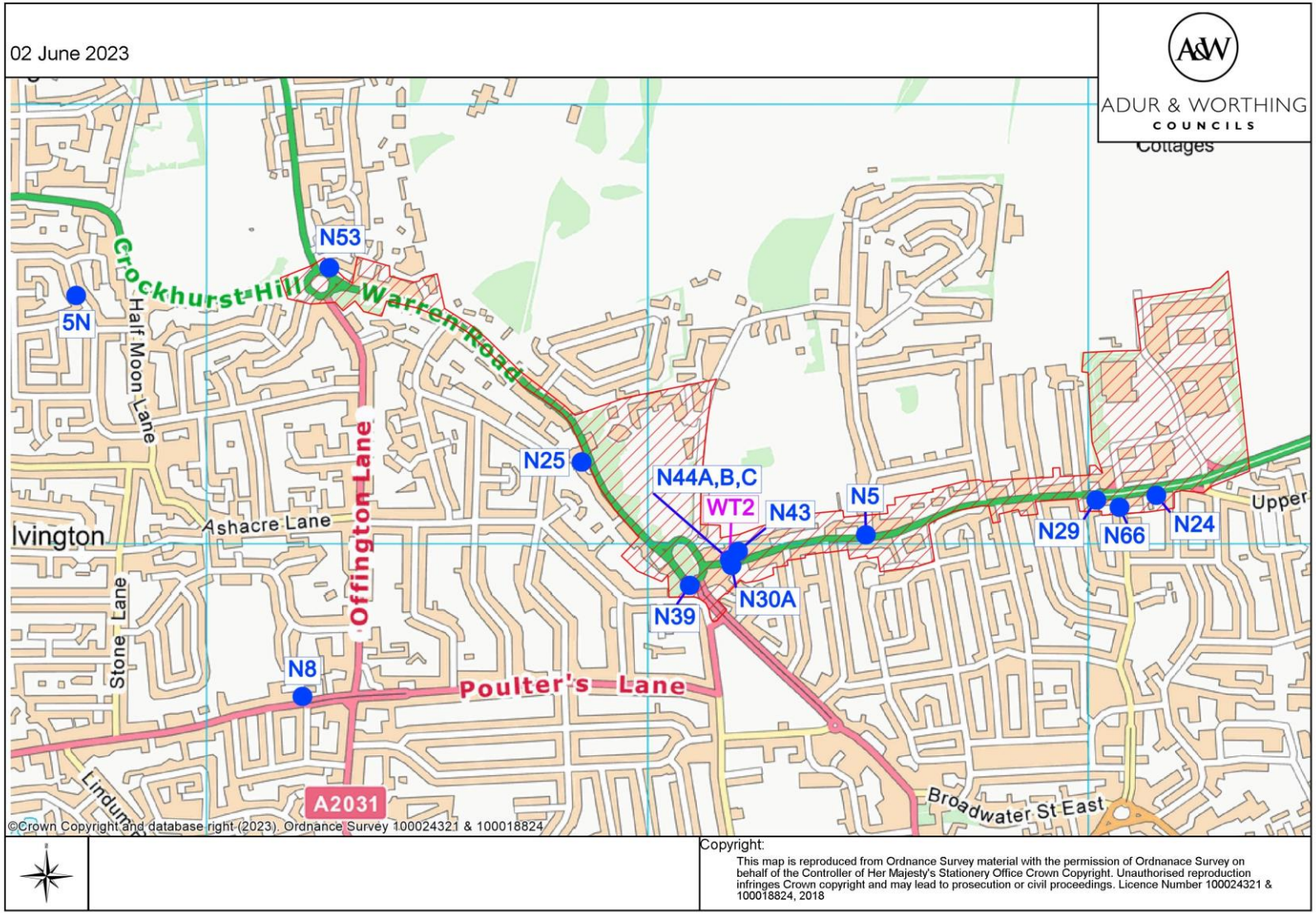


**Figure D.9 – Map of Non-Automatic Monitoring Sites in Worthing Central & East**

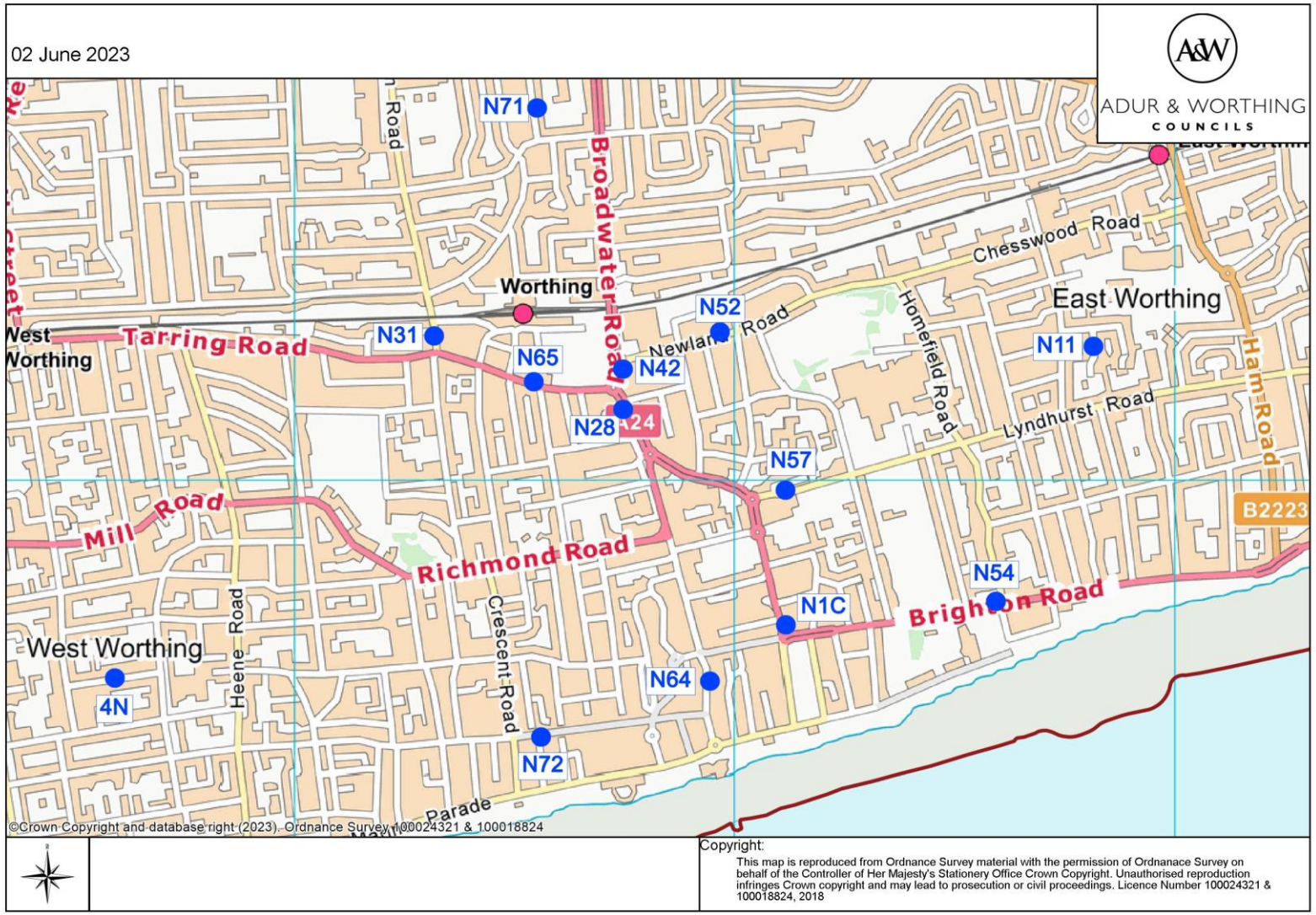


**Figure D.10 – Map of Non-Automatic Monitoring Sites in Worthing – Goring**

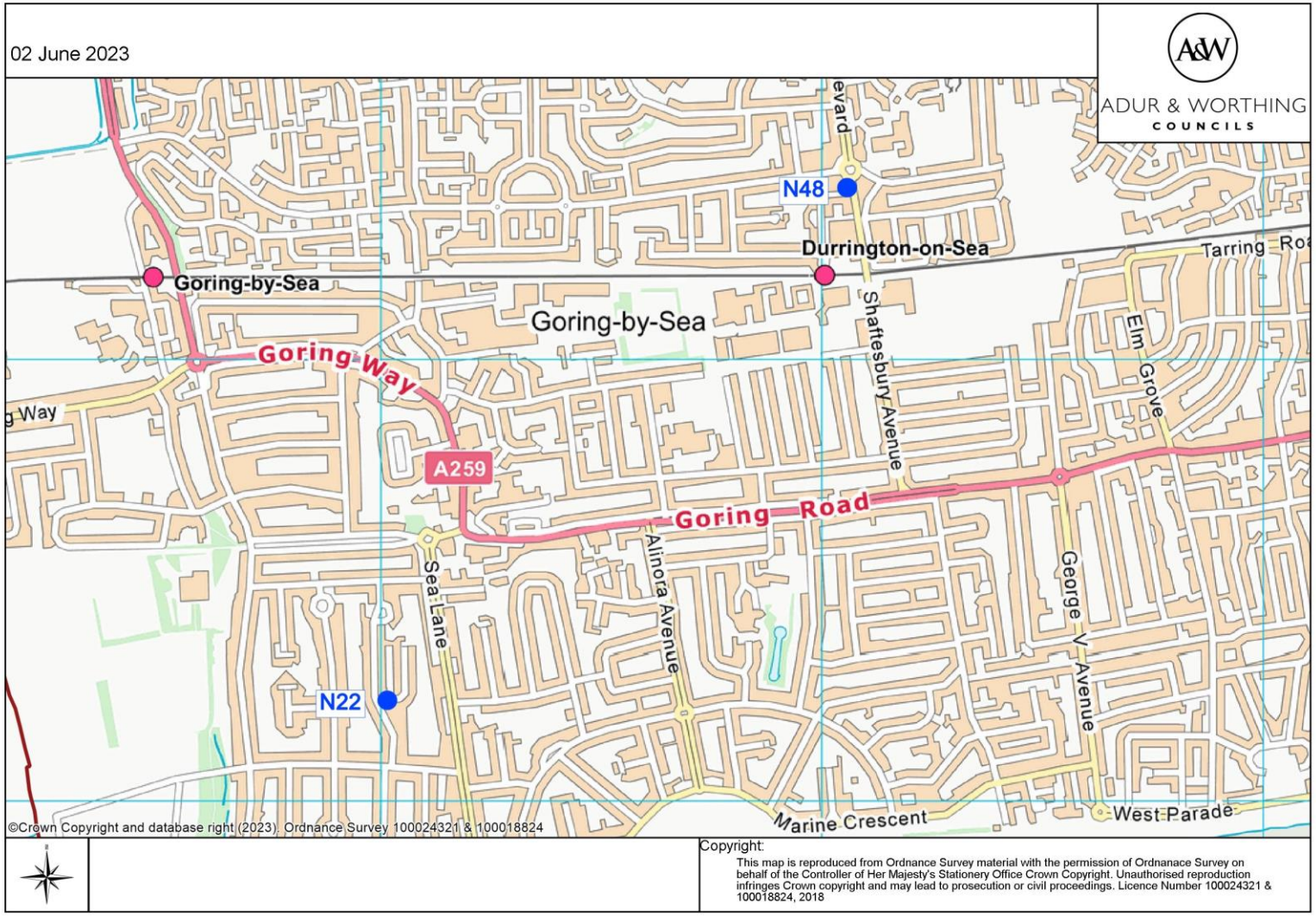
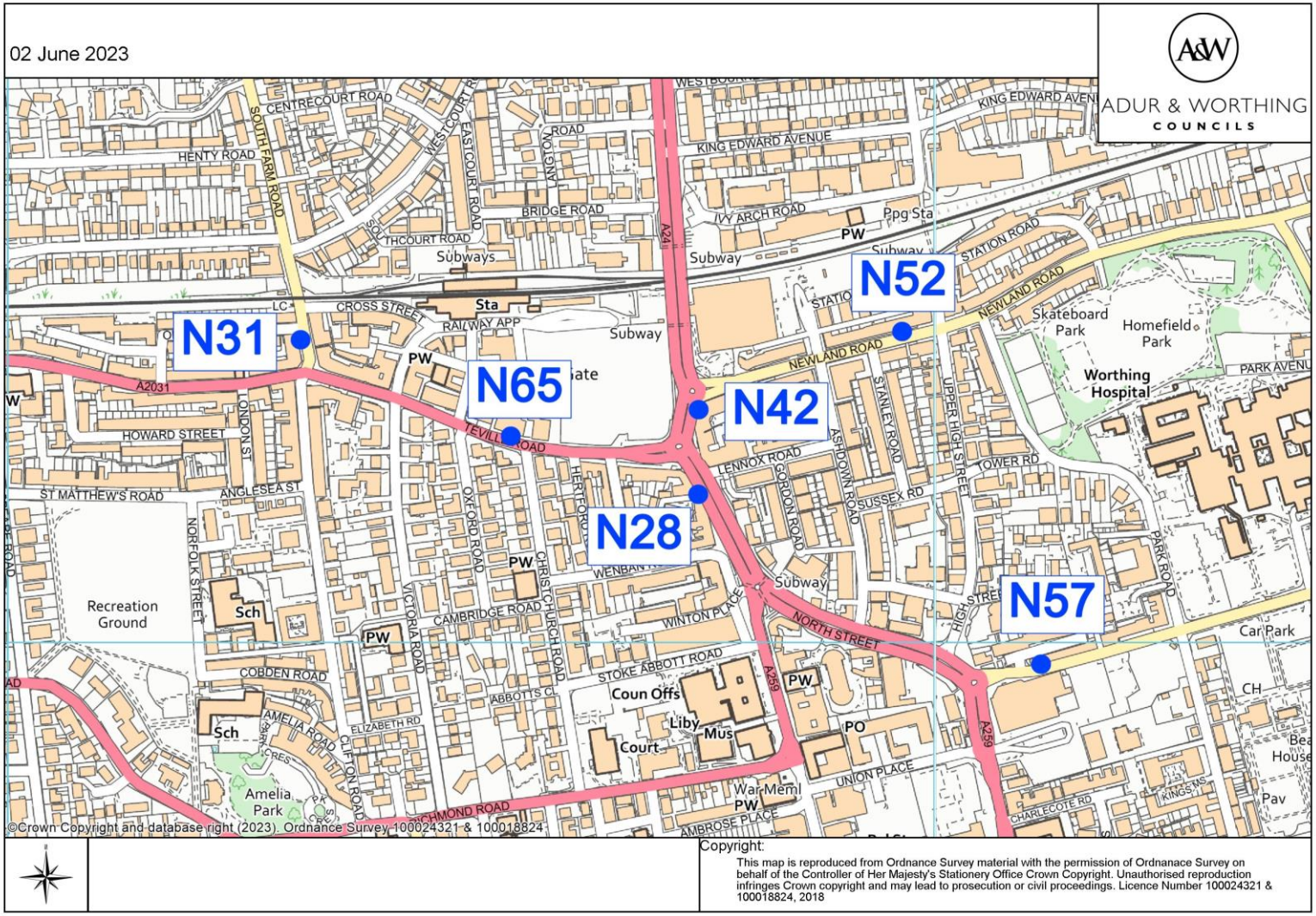


**Figure D.11– Map of Non-Automatic Monitoring Sites in Worthing – A24**



# 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 close to the Southwick AQMA2. Traffic volumes at the locations around AQMA1 High Street Shoreham, although these were very small decreases. The traffic counter in Shoreham High Street (within AQMA1) was only reinstated in November 2021, so we have no previous data with which to compare.
- Traffic data from Highways England for the A27 Shoreham to Lancing shows AADT volumes increased by 4% in 2022.

**Table E.1 – Adur Traffic Data 2016-22**

| | | AADT | | | | | | | Difference | % Difference |
|---|---|---|---|---|---|---|---|---|---|---|
| Site no. | Location | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2021-22 | |
| 5035 | A270 Old Shoreham Road, west of Southview Road, Southwick | 23,667 | 23,671 | 23,288 | 23,541 | N/A | 21,229 | 22,806 | +1,577 | 7% |
| 257 | A259 east of New Salts Farm Roundabout, Shoreham | 25,915 | 25,415 | 25,194 | 24,730 | 20,991 | 22,266 | 22,242 | -24 | -0.1% |
| 5037 | A283 Old Shoreham Road, o/p no.138, Shoreham | 13,665 | 13,659 | 13,775 | 12,087 | 10,324 | 11,261 | 11,124 | -137 | -1.2% |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 5036 | A259 High Street, East of Middle St, Shoreham | No data | No data | No data | No data | No data | No data | 15,120 | / | / |
| - | A27 eastbound between A2025 (Grinstead Lane) and A283 | No data | No data | 23774 | 26768 | 23458 | 25021 | 26084 | 1063 | 4.2% |
| - | A27 westbound between A283 and A2025 | No data | No data | 24910 | 25520 | 22789 | 24057 | 25079 | 1022 | 4.2% |

### Worthing

- Traffic data from Highways England for the A27 through Worthing shows AADT volumes increased slightly by 2% and 1% in 2022. Data for 2016 - 2022 for both carriageways of the A27 near Grove Lodge is shown below. This is well below the increase seen in 2021 (due to covid lockdowns) and back to pre-covid levels.

**Table E.2 – Worthing Traffic Data 2016-22**

| NTIS Link ID | NTIS Link Location Name | AADT 2016 | AADT 2017 | AADT 2018 | AADT 2019 | AADT 2020 | AADT 2021 | AADT 2022 | Difference 2021-22 | % Difference |
|---|---|---|---|---|---|---|---|---|---|---|
| 103024103 | A27 westbound between A2025 (Grinstead Lane Lancing) and A24 near Worthing (east) | 15,334 | 14,511 | 14,994 | 16,354 | 14,350 | 15,819 | 16,161 | +342 | +2.2 |
| 125021201 | A27 eastbound between A24 near Worthing (east) and A2025 | 18,454 | 15,849 | 15,527 | 16,642 | 14,622 | 16,539 | 16,714 | +175 | +1.1 |

# Appendix F: Summary of Air Quality Objectives in England

### Table F.2 – Air Quality Objectives in England[14]

| Pollutant | Air Quality Objective: Concentration | Air Quality Objective: Measured as |
|---|---|---|
| Nitrogen Dioxide ($NO_2$) | 200µg/$m^3$ not to be exceeded more than 18 times a year | 1-hour mean |
| Nitrogen Dioxide ($NO_2$) | 40µg/$m^3$ | Annual mean |
| Particulate Matter ($PM_{10}$) | 50µg/$m^3$, not to be exceeded more than 35 times a year | 24-hour mean |
| Particulate Matter ($PM_{10}$) | 40µg/$m^3$ | Annual mean |
| Sulphur Dioxide ($SO_2$) | 350µg/$m^3$, not to be exceeded more than 24 times a year | 1-hour mean |
| Sulphur Dioxide ($SO_2$) | 125µg/$m^3$, not to be exceeded more than 3 times a year | 24-hour mean |
| Sulphur Dioxide ($SO_2$) | 266µg/$m^3$, not to be exceeded more than 35 times a year | 15-minute mean |

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

# Glossary of Terms

| Abbreviation | Description |
|---|---|
| AADT | Annual Average Daily Traffic |
| 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 |
| AQMS | Air Quality Monitoring Station |
| 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 |
| $NO_2$ | Nitrogen Dioxide |
| $NO_x$ | Nitrogen Oxides |
| $PM_{10}$ | Airborne particulate matter with an aerodynamic diameter of 10µm or less |
| $PM_{2.5}$ | Airborne particulate matter with an aerodynamic diameter of 2.5µm or less |
| QA/QC | Quality Assurance and Quality Control |
| $SO_2$ | Sulphur Dioxide |

# 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.
- Air Quality and Emission Mitigation Guidance for Sussex (2021) - Available from https://www.sussex-air.net/