



**Horsham  
District  
Council**



# 2022 Air Quality Annual Status Report (ASR)

## Horsham District Council

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

June 2022

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## Executive Summary: Air Quality in Our Area

This report details the results of air quality monitoring undertaken in 2021 across Horsham District and is prepared in accordance with the guidance issue by the Department for Environment, Food and Rural Affairs (Defra).

Local Authorities across the United Kingdom are required to regularly review and assess air quality in their areas, and to determine whether the air quality objectives set by the Government are likely to be achieved. Where exceedances are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

### Air Quality in Horsham District

Air pollution is associated with several 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<sup>1,2</sup>.

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

Horsham district is primarily agricultural in character and does not incorporate a significant heavy industrial base or major transport hubs. As reported last year, air quality in the majority of Horsham district is good however there are a few areas where elevated concentrations of pollutants occur.

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<sup>1</sup> Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

<sup>3</sup> Defra. Air quality appraisal: damage cost guidance, July 2021

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

The main source of air pollution locally are road traffic emissions from major roads, notably the A24, which intersects the district north – south; A264 to the north of Horsham; A272 and A281 at Cowfold; and A283 at Storrington. Two Air Quality Management Areas (AQMAs) have been declared in the district, in the village of Cowfold (Cowfold AQMA) and town centre of Storrington (Storrington AQMA), both for the exceedances of the annual mean objective for nitrogen dioxide (NO<sub>2</sub>).

Air Quality Action Plans (AQAPs) were prepared for both AQMAs; the Storrington AQAP was submitted to Defra in 2012 and the Cowfold AQAP in 2013. Work on the update of the AQAPs is ongoing and a revised district-wide AQAP will be published later in 2022 following a public consultation. The new AQAP will present and discuss the last ten years' worth of monitoring data and modelling results for future NO<sub>2</sub> concentrations in the AQMAs and will contain a range of schemes and measures that Horsham District Council (HDC) wishes to take forward. More information about the AQMAs can be found on [HDC's Air Quality webpage](#).

All long-term sites have shown an overall decreasing trend in NO<sub>2</sub> and Particulate Matter (both PM<sub>10</sub> and PM<sub>2.5</sub>) concentrations within the last 5 years. This is believed to have been driven to a large extent by general improvements in vehicle emissions standards but also to some extent by the implemented local traffic management measures, although it is difficult to isolate the impacts of individual interventions.

Although the work under the Local Air Quality Management (LAQM) is the legal obligation of district councils, actions aimed at improving air quality most of the time require the cooperation of other departments and organisations. HDC works in cooperation with other stakeholders, such as planning, Public Health England, West Sussex County Council (WSCC) highways, neighbouring Local Authorities, Sussex Air Partnership, and the Environment Agency.

The assessment and implementation of the identified traffic management schemes is done in cooperation with WSCC as they are the authority responsible for roads and transport management. Steering groups were set up for each of the AQMAs. They have contributed to the development of the Action Plans and are the decision-making body for the action plan measures to be taken forward. The Council is consulted on planning applications for HDC Development Management and WSCC minerals and waste.

## Actions to Improve Air Quality

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

The 2019 Clean Air Strategy<sup>5</sup> sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero<sup>6</sup> sets out the approach to reduce exhaust emissions from road transport through several mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Horsham District Council has taken forward several measures during the recent years in pursuit of improving local air quality. The key actions undertaken in 2021 were:

- Securing a new vehicle fleet for HDC's Neighbourhood Wardens
- Finalising a contract with Connected Kerb to deliver a district-wide electric vehicle charging point network
- Completion of the Horsham Local Cycling and Walking Infrastructure Plan
- Successful joint bid with Sussex-Air for funding from Defra's 2021/2022 Air Quality Grant
- Ongoing work with Planning Policy and Development Control to ensure the impacts of new development are mitigated and/or offset
- Joining Defra's Particulate Matter research study (with a duration of one year). New analysers were installed in Storrington in April 2022
- Continuation of the monitoring programme, which includes the operation and maintenance of three air quality monitoring stations, with the data and Air Alert forecasts shared at <http://www.sussex-air.net>
- Attending Defra's workshops for Local Air Quality Management and Sussex Air partnership meetings. With this, we can take informed proactive actions
- Air quality promotion via website and social media

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<sup>5</sup> Defra. Clean Air Strategy, 2019

<sup>6</sup> DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

The achievement of congestion improvement measures in Storrington and Cowfold has been challenging as there are no easy solutions, and many of the solutions fall outside the power of HDC to implement. Horsham District Council continues to work with WSCC to explore traffic management measures to reduce congestion and improve air quality. This has included revisiting and reviewing the evidence from all previous measures identified to understand what impacts these would be likely to have in terms of improving air quality, and whether the measures would be deliverable and provide value for money. A number of these measures are continuing to be explored. The identification of schemes that are feasible, deliverable and can generate a positive business case remain the principal challenges for progressing measures to improve air quality. A review of historical and new schemes both proposed and implemented in Storrington and Cowfold can be found on HDC's Air Quality webpage at [Storrington Air Quality Management](#) and [Cowfold Air Quality Management](#).

The air quality data monitored contributes to Sussex Air daily air pollution prediction service '[Sussex Air Quality Alert](#)'. This service is free to the public and helps people with respiratory and heart conditions who may be adversely affected by air pollution. Previous qualitative survey work established that subscribers to the service value it as an important resource.

## Conclusions and Priorities

An increase in NO<sub>2</sub> concentrations was observed across all sites in 2021 averaging 5% relative to 2020, which can be attributed to increased traffic volumes and congestion linked to the easing of the national and local covid restrictions. But relative to 2019 (pre pandemic) there was a decrease in NO<sub>2</sub> concentrations of 11%, as traffic volumes remained below 2019 levels. Long-term sites across the district have shown a continuing overall downward trend over the monitoring period, indicative of a gradual improvement in fleet emissions and traffic management related measures. No monitoring sites within the district exceeded the air quality annual and one-hour mean objectives for NO<sub>2</sub> in 2021.

In Storrington there was an increase of 8% in the annual mean NO<sub>2</sub> concentrations across monitoring sites relative to 2020, but in relation to 2019 (before the pandemic), in 2021 there was an average decrease of 10%. In 2021 only the monitoring location 47 (Storrington 19n) at the junction of Manley's Hill and School Hill measured concentrations within 10% of the annual mean objective, recording 39.6µg/m<sup>3</sup>, showing an increase of 3% on the previous year. Technically, HDC could proceed to revoking the West Street/High Street part of the Storrington AQMA, which has for several years been in compliance with the annual mean objective for NO<sub>2</sub>. However, continued action aimed at reducing traffic flows and congestion

on the High Street has benefited the air quality within the whole of the AQMA. As such, no changes are proposed at present and the boundaries of the Storrington AQMA can remain unchanged.

In Cowfold, the observed NO<sub>2</sub> concentrations stabilized relative to 2020, there was a decrease of the concentration of 1%, but in relation to 2019, in 2021 there was an average decrease of 13%. Monitoring location 37 (Cowfold 7n) has been the only one in Cowfold AQMA which exceeded the annual mean objective in the recent years (2017-2018). In 2021 the site showed a 3% increase to 31.2µg/m<sup>3</sup>. When corrected to the nearest residential exposure, Cowfold 7n has not exceeded the annual mean objective for NO<sub>2</sub> for five years. Yet, the Council would like to see the NO<sub>2</sub> levels decrease to 10% below the annual mean objective when corrected to the nearest residential exposure. It is also acknowledged that the traffic volumes were significantly reduced in the pandemic, which may have invalidated the results for 2020-2021. It is expected that the Cowfold AQMA will be revoked in the coming years; meanwhile the Cowfold AQMA is still required.

Regarding PM<sub>10</sub>, automatic monitoring at the Horsham Park Way site indicates that both the annual mean and 24-hour UK objective for PM<sub>10</sub> were complied with in 2021 and all the previous years of monitoring. Estimated annual mean PM<sub>2.5</sub> concentration has shown compliance with the national limit value in 2021 and all the previous years. The site has shown a decreasing trend in the past five years for both PM<sub>2.5</sub> and PM<sub>10</sub>.

The Council's priorities for the coming year are:

- Finalising the update of the Air Quality Action Plan for Storrington and Cowfold, including modelling and public consultation
- Delivery management of the Defra-funded taxi engagement campaign to facilitate a transition to EV vehicles by taxi drivers
- Continued work with Planning Policy and Development Control to secure air quality mitigation from new development
- Continuation and expansion of the monitoring programme, to include monitoring for particulate matter
- Community engagement through participation in the Defra's funded Sussex-Air Community Engagement project
- Improvements to the air quality website and communications to make air quality information more accessible to the public

- Exploring the viability of a Smoke Control Area declaration
- Delivery of the HDC's vehicle replacement programme
- Expansion of Electric Vehicle Network
- Continued work with WSCC to increase the rate of active travel to and from schools
- Continued work with the steering groups on the development and implementation of AQAP measures
- Participation in the next bid for Defra's air quality funding
- Internal applications for s106 funding to facilitate the implementation of actions within the AQAP

The main challenges and barriers to implementation that HDC anticipates facing are:

- Availability of resources and funding for AQAP measures
- Challenges related to cost-effectiveness and enforcement of measures to tackle localised air pollution hotspots in rural areas where problems arose due to through traffic

## Local Engagement and How to get Involved

The public can get involved by supporting behavioural change initiatives such as car sharing, walking, cycling, using public transport, joining the Car Club, buying zero-emissions vehicles for personal and commercial travel, turning liquid fuelled vehicle engine's off when stationary, minimising wood burning and only burning dry, well-seasoned wood and composting instead of having bonfires wherever possible. More information on how to get involved can be found at [Help to improve Horsham District's air quality page](#).

Two air quality Steering Groups have regular meetings in the district: Storrington Steering Group and Cowfold Steering group. Their objective is to progress the work on the Storrington and Cowfold Action Plans. Each group is a partnership of Councillors and officers from Horsham District Council and West Sussex County Council and includes representatives from the Parish Council. For further information on the work being done, please visit the Horsham District Council website or contact:

- Environmental Health and Licencing Department: tel. 01403 215609; email:[publichealth.licensing@horsham.gov.uk](mailto:publichealth.licensing@horsham.gov.uk)
- <https://www.horsham.gov.uk/environmental-health/air-quality>

## Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health and Licencing Department of Horsham District Council with the support and agreement of the following officers and departments:

- Sussex Air
- West Sussex County Council's (WSCC) Transport Planning and Policy

Following Defra's appraisal this ASR will be passed to approval by West Sussex Public Health.

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# 1 Local Air Quality Management

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

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Horsham District Council to improve air quality and any progress that has been made.

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

Horsham District is a predominantly rural area with a population of 142,217 (ONS UK 2018). The total area is 205 square miles. Horsham is the main town and the principal administrative and commercial centre within the district with a population of around 51 000.

Horsham District is well served by transport links to London, Gatwick Airport, the M25 and the coast. A network of subsidiary routes connects the villages and small centres of population. Emissions from road transport remains the main source of air pollution in the district.

A large proportion of the district is composed of countryside with a varied landscape of woodland, heathland, downland, river valleys and meadows being represented. Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest, and Sites of Nature Conservation Importance overlap the area. At the southern end of the district is the South Downs National Park. Agriculture remains a major user of land within the district. Significant industrial premises include a mechanical biological waste treatment facility and landfill site to the north of Horsham town and two brickworks.

The main source of air pollution in the district is road traffic emissions from major roads, notably the A24, A272 and A283, A281 and A264. Two Air Quality Management Areas (AQMAs) have been declared in the district, both for the exceedances of the annual mean nitrogen dioxide (NO<sub>2</sub>) objective: Storrington AQMA was declared in December 2010 in the

town centre of Storrington along the A283 and Cowfold AQMA was declared in September 2011 in the village centre of Cowfold along the A272/A281.

Steering groups were set up in the community for each of the AQMAs. The work of the steering groups contributed largely to the development of Action Plans for the AQMAs.

## 2 Actions to Improve Air Quality

### 2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Horsham District Council can be found in Table 2.1. The table presents a description of the two AQMAs that are currently designated within Horsham District. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and the air quality monitoring locations in relation to the AQMAs. The air quality objective pertinent to the current AQMA designations is NO<sub>2</sub> annual mean.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Horsham AQMA No1	December 2010	Nitrogen dioxide NO <sub>2</sub> – Annual Mean	Storrington town centre incorporating West Street, the High Street, and part of School Hill and Manleys Hill.	NO – Roads controlled by WSCC	50.2µg/m <sup>3</sup> (Storrington 1,2)	39.6µg/m <sup>3</sup>	Storrington Air Quality Action Plan, October 2012	<a href="https://www.horsham.gov.uk/environmental-health/air-quality/storrington-air-quality-management">https://www.horsham.gov.uk/environmental-health/air-quality/storrington-air-quality-management</a>
Horsham Cowfold AQMA	October 2011	Nitrogen dioxide NO <sub>2</sub> – Annual Mean	Cowfold town centre incorporating The Street, part of Station Road and Bolney Road.	NO – Roads controlled by WSCC	40.5µg/m <sup>3</sup> (Cowfold 1,2) 45.9µg/m <sup>3</sup> (Cowfold 7n)	31.2µg/m <sup>3</sup>	Cowfold Air Quality Action Plan, September 2013	<a href="https://www.horsham.gov.uk/environmental-health/air-quality/cowfold-air-quality-management">https://www.horsham.gov.uk/environmental-health/air-quality/cowfold-air-quality-management</a>

- Horsham District Council confirm the information on UK-Air regarding their AQMA(s) is up to date.
- Horsham District Council confirm that all current AQAPs have been submitted to Defra.

## 2.2 Progress and Impact of Measures to address Air Quality in Horsham District

Defra's appraisal of last year's ASR found inconsistency of information presented between tables, therefore the ASR 2021 was promptly reviewed and updated, and afterwards approved. It was also suggested that the Council should make it a priority to update the AQAPs. Progress have been made in updating the AQAPs, and now HDC has the necessary resources to model the AQMAs and formally update it.

Horsham District Council has taken forward several direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.3. Twenty measures are included within Table 2.3, with the type of measure and the progress HDC have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.3.

More detail on these measures can be found in their respective Action Plans and previous Annual Status Reports at [HDC's Air Quality Reports and Assessments page](#). Key completed measures are:

- Securing a new vehicle fleet for HDC's Neighbourhood Wardens. Six new hybrid vehicles have been purchased ([HDC's news page](#))
- Finalising a contract with Connected Kerb to deliver a district-wide electric vehicle charging point network
- Completion of the Horsham Local Cycling and Walking Infrastructure Plan
- Ongoing work with Planning Policy and Development Control to ensure the impacts of new development are mitigated and/or offset
- Successful joint bid with Sussex-Air for funding from Defra's 2021/2022 Air Quality Grant. The project's focus is on community engagement and includes work with schools and local community. A new PM analyser will be added to HDC's mentoring network. The funding will also cover work with taxi operators in West Sussex to facilitate a transition to electric vehicles
- Joining Defra's Particulate Matter research study with a duration of one year. New analysers were installed in Storrington in April 2022

- Attending Defra’s workshops for Local Air Quality Management and Sussex Air partnership meetings, also webinars on new technologies and changes in legislation. With this, we can take informed proactive actions
- Continuation of the monitoring programme, which includes the operation and maintenance of three air quality monitoring stations with the data and Air Alert forecasts shared at <http://www.sussex-air.net>
- Air quality promotion via website and social media

### Community Engagement (Schools)

The Sustrans Air-mazing Journeys, delivered with DEFRA funding, started in 2018. It has raised awareness of air quality with 27 schools across Sussex in 2018/19, 28 in 2020-21 and a further 34 in 2021/22. Cycling to school was up by 4.3% and driving to school decreased by 7.7% after engaging with the project.

In response to the lockdown and requests from teachers, Sustrans created a new series of videos called Air Quality Explorers<sup>7</sup> with knowledge and fun activities framed as challenges for children and their families to complete within their local area. And more technical videos which explain key methods for exploring air pollution. Several live virtual lessons were taught using Zoom, Teams and Meets often to entire year groups simultaneously.

Since the beginning of the project 83 schools have signed up, 6 of them are located in Horsham District (Table 2.2).

**Table 2.2 - Schools in Horsham District that signed up for the project**

Signed up year	Age	School
2018/19	Primary	Storrington First, Pulborough
2018/19	Primary	Thakenham Primary, Horsham
2020/21	Secondary	Steyning Grammar
2020/21	Primary	Southwater Junior (Horsham)
2020/21	Primary	Northolmes Junior School (Horsham)
2020/21	Primary	Littlehaven Infant School (Horsham)

<sup>7</sup> <https://www.youtube.com/channel/UCM9YpmS2nhJVcoyW9t6E-Mg/videos>

60 nitrogen dioxide diffusion tubes have been mounted in schools across Sussex with the results of these tubes directly informing the air quality sessions and activities within schools. These results have then formed an integral part of the following lessons.

Sustrans Big Pedal<sup>8</sup> challenge, the UK's largest inter-school cycling, walking, wheeling, and scooting challenge, day 3 focussed on Air Quality and saw schools engage in tailored activities to explore the air around their school. 23 schools in East Sussex took part, as well as 8 in Crawley, 22 in West Sussex and 11 in Brighton & Hove.

Twitter proved to be an important tool to communicate the project. Two schools have heard of the project directly through social media and signed up as a result.

Students who took part in sessions took knowledge tests at baseline and follow up with students' awareness and understanding increasing throughout the delivery. Average scores prior to taking part being at 40%, rising to 96% at follow up. Project extension was successful in Defra's Air Quality Grant to new schools across Sussex using the session structure that has previously proved successful.

### **Electric Vehicle (EV) Charge Point Strategy**

In March 2020 HDC approved its Electric Vehicle (EV) Charge Point Strategy which aims to enable the provision of EV infrastructure across the district. In the end of 2021, HDC and WSCC signed a contract with Connected Kerb which will enable a large scale roll out of electric vehicle chargepoints across the county and the Horsham District within the next decade.

For the Horsham District, this project will see thousands of chargepoints installed on streets, in public sector car parks and on community facilities, helping many drivers without off street parking to go electric. More information can be found in [HDC's electric cars and charging points page](#).

HDC, Brighton-Hove Council and Sussex Air were successful with their bid for the 2021/2022 Air Quality Grant which included a Taxi Study. The aim of the proposed taxi engagement project is to facilitate a transition to EV vehicles by taxi drivers and it will help the district to build an infrastructure that is convenient, reliable and works for the taxi trade and will drive the progression of taxi licensing policies for EV drivers. The outcomes of the

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<sup>8</sup> <https://bigpedal.org.uk/lists/49>

study will be passed to Connected Kerb to follow on with technical and financial feasibility surveys to enable installations at the proposed sites.

## **A27 Improvements (Arundel bypass)**

The Road Investment Strategy produced by DfT in March 2015 allocated a budget for the A27 schemes including the A27 Arundel bypass and A27 Worthing and Lancing improvements. This is expected to reduce traffic flows through Storrington where longer distance traffic is avoiding the A27 due to congestion. Following Highways England consultation in late summer 2017, an initial preferred route announcement in 2018, a further consultation in 2019 and review period, a preferred route announcement was made in October 2020. Option 5BV1 has been chosen as the preferred route, which involves a new dual carriageway between Crossbush junction and a new junction with the existing A27 near Tye Lane.

This option is expected to bring a reduction in the total vehicle numbers on the A283 route through Storrington - which is currently used by drivers wanting to avoid traffic on the A27. It is also expected to reduce traffic flows through Cowfold where longer distance traffic is avoiding the A27 due to congestion (for example longer distance journeys between Haywards Heath and Chichester).

Horsham District Council's priorities for the coming year are:

- Finalising the update of the Air Quality Action Plan for Storrington and Cowfold, including modelling and public consultation
- Delivery management of the Defra-funded taxi engagement campaign to facilitate a transition to EV vehicles by taxi drivers
- Continued work with Planning Policy and Development Control to secure air quality mitigation from new development
- Continuation and expansion of the monitoring programme, to include monitoring for particulate matter
- Community engagement through participation in the Defra's funded Sussex-Air Community Engagement project
- Improvements to the air quality website and communications to make air quality information more accessible to the public
- Exploring the viability of a Smoke Control Area declaration
- Delivery of the HDC's vehicle replacement programme

- Expansion of Electric Vehicle Network
- Continued work with WSCC to increase the rate of active travel to and from schools
- Continued work with the steering groups on the development and implementation of AQAP measures
- Review of other traffic management / congestion improvement schemes for Storrington and Cowfold
- Participation in the next bid for Defra's air quality funding
- Internal applications for s106 funding to facilitate the implementation of actions within the AQAP

Horsham District Council worked to implement these measures in partnership with the following stakeholders during 2021:

- Planning Officers
- Public Health England
- WSCC highways
- Neighbouring districts local authorities
- Sussex Air Partnership
- Environmental Agency

The principal challenges and barriers to implementation that Horsham District Council anticipates facing are the identification of schemes that are feasible, deliverable and can generate a positive business case and having funding to pursue bigger projects. The achievement of congestion improvement measures in Storrington and Cowfold has been challenging as there are no easy solutions, and many of the solutions fall outside the power of HDC to implement.

Horsham District Council anticipates that the measures stated above and in Table 2.3 will achieve compliance in Cowfold AQMA within the next few years.

Whilst the measures stated above and in Table 2.3 will help to contribute towards compliance, Horsham District Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Storrington AQMA. This conclusion is drawn on the basis of current monitoring results from Storrington 19 - the worst-case monitoring location in the Storrington AQMA.

**Table 2.3 – Progress on Measures to Improve Air Quality**

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved and Funding	Measure Status	Reduction in Pollutant Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Air quality and emissions mitigation guidance for Sussex	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2014	Ongoing	HDC	Implementation	1% in the AQMA	Reduction in emissions from transport associated with new development through mitigation and compensation. Assessment of emissions from development required with application. Scheme of mitigation required.	The updated guidance (2021) has been published on HDC website and its application is tested in HDC and neighbouring districts within Sussex. It provides advice to developers on how to address local air quality when making a planning application.	As the Local Plan is currently under review, this presents an opportunity to strengthen the wording of HDC's air quality policy. The Council is also looking to adopt the Air Quality and Emission Mitigation Guidance as a Supplementary Planning Document (SPD).
2	Electric vehicle charging project	Promoting Low Emission Transport	Other	2020	2031	HDC / WSCC	Implementation	Small initial impact on emissions but aim to facilitate the uptake of more LE vehicles.	Increase % of charging points installed on streets	Contract with Connected Kerb which will enable the large scale to roll out of thousands of public electric vehicle chargepoints across the District within the next decade was signed in 2021	
3	Taxi Study	Promoting Low Emission Transport	Taxi emission incentives	2021	2023	HDC / WSCC / Sussex Air Defra AQ Grant	Planning	Small initial impact on emissions but aim to facilitate the uptake of more LE vehicles.	Increase % of ULEV's by Taxis and private hire vehicles	Bid for the air quality grant was successful. Project will need to be reviewed to include the work being done by Connected Kerb	Taxi engagement campaign to facilitate a transition to EV vehicles by taxi drivers.
4	Community Engagement	Public Information	Via other mechanisms	2021	2023	HDC / Sussex Air Defra AQ Grant	Planning	No direct impact on emission reductions	Awareness raising events, attending community events with interactive stalls, online training and knowledge building events for community groups and distribution of NO2 diffusion tubes.	Bid for the air quality grant was successful.	
5	Replacement of HDC vehicle fleet	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	2013	Ongoing	HDC	Ongoing	Small initial impact on emissions but aim to facilitate the uptake of more LE vehicles.	Introduction & increase % of ULEV's into Council's vehicle fleet.	Replacement of HDC Neighbourhood Wardens vehicle fleet from petrol to hybrid vehicles	
6	Sussex Air website	Public Information	Via the Internet		Ongoing	Sussex Air / HDC	Ongoing	No direct impact on emission reductions but optimising use of monitoring network data	Increase access to the website	Information on how to help improve air quality, Clean Burn Sussex Project, health advice, health effects and real time air quality information	
7	Walking and Cycling Measures	Promoting Travel Alternatives	Other		Ongoing	HDC / WSCC	Planning	Their direct impact on air quality issues in the short to medium are not likely to be significant, however they form part of a wider approach of promoting a	Increase in active travel	Potential WSCC Local Transport Improvement Programme (LTIP) walking and cycling path improvement identified to link Water Lane with Hurston Lane using Riverside Walk and Public Rights of Way	Proposals for the Water Lane to Hurston Lane improvement require the support of local schools to progress. WSCC no longer has dedicated Safer Routes to School officers to focus on school travel plans but supports schools with advice on travel planning when approached.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved and Funding	Measure Status	Reduction in Pollutant Emission from Measure	Key Indicator	Performance	Progress to Date	Comments / Barriers to Implementation
								culture of using alternative travel options to single occupancy car use				
8	AirAlert	Public Information	Via other mechanisms	2006	Ongoing	Sussex Air / HDC	Ongoing	No direct impact on emission reductions but optimising use of monitoring network data for health associated benefits.	Increase in subscriptions to pollution alert service within Horsham district.		Health study started in 2006. Increase in subscriptions. Cold and heat alerts added to service over the recent years.	
9	[Storrington] Assess impact of Low Emission Zone (LEZ) in Storrington	Policy Guidance and Development Control	Low Emissions Strategy	2018		HDC / WSCC	Aborted		Reduction in nitrogen dioxide concentrations in Storrington. Improved traffic flow / reduction in traffic congestion.		A trial was undertaken over the period 2014-2016 in partnership with Siemens UK using their Greenzone low emission zone solution. The scheme could not go ahead due to the Greenzone system not operating well in a rural setting. Signal reception problems affected the system resulting in significant loss of data, whilst there were also problems with the categorisation of vehicles into Euro standard categories. Additional considerations were needed to be given to the practical enforceability of any LEZ restrictions, whether exemptions were needed for local access, and the impacts of the LEZ on local businesses and the local community.	It is expected that there would still remain significant challenges with the practical enforcement of any restrictions and exemptions required for local access even if technological issues were overcome. It is recommended that other measures such as improvement to the A27 and A24 routes to encourage strategic longer distance traffic flows to use these routes, and potential other traffic management measures are considered ahead of revisiting this measure.
10	[Storrington] Review on-street car parking and loading bay provision	Traffic Management	UTC, Congestion management, traffic reduction	2013		HDC/WSCC	On Hold	1% in the AQMA	Reduction in nitrogen dioxide concentrations in Storrington. Improved traffic flow / reduction in traffic congestion.		Some issues related to the scheme: The potential impact of congestion related air quality issues associated with deliveries and parking is not known; Potential sensitivities regarding changes to availability of parking; The need to meet the needs of local businesses requiring deliveries.	A more detailed air quality assessment of changes to and re-designation of parking-bays and loading bays could be investigated further. Progression of a review will likely require local support and identification of resource to support this.
11	[Storrington] Installation of CCTV equipment at the mini-roundabout of School Hill	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high	2019		HDC/Storrington & Sullington Parish Council	On Hold	1% in the AQMA	Reduction in nitrogen dioxide concentrations in Storrington. Improved traffic flow / reduction in traffic congestion.		WSCC have no powers to use ANPR cameras to issue Penalty Charge Notice and the cost estimates for CCTV ANPR camera equipment obtained in 2020 were found prohibitively high.	WSCC would have to apply for Part 6 powers, but they do not have plans to do this before June 2023

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved and Funding	Measure Status	Reduction in Pollutant Emission from Measure	Key Indicator	Performance	Progress to Date	Comments / Barriers to Implementation
	and Manley's Hill to enforce the weight restriction for HGVs accessing School Hill.		vehicle occupancy lane									
12	[Storrington] Evaluate synchronisation for two pedestrian crossings along the High Street/West Street.	Traffic Management	Other	2013	2019	HDC/ WSCC	Aborted	1% in the AQMA	Reduction in nitrogen dioxide concentrations in Storrington. Improved traffic flow / reduction in traffic congestion.		Discussion with WSCC transport planning team concluded that a feasibility study of linking the pedestrian crossings by MOVA would not be worthwhile	There are doubts about how much any further benefits from MOVA could be realised because of blocking back caused by the other mini-roundabout and traffic interactions along the High Street.
13	[Storrington] Advisory lorry route signage improvements within the Storrington AQMA	Traffic Management	Other	2013	Ongoing	HDC/ WSCC	Planning	Unknown but expected low	Improved traffic flow / reduction in traffic congestion.		Advisory signage already exists for lorry traffic entering Storrington from the A283 Washington Road needing to access "Water Lane Trading estate", whilst all traffic for West Chiltington and Thakeham are advertised to use Water Lane; A voluntary agreement exists for Waitrose deliveries to access Waitrose via Water Lane, Thakeham Road, and School Hill, and signs have been installed to support this.	WSCC will be undertaking a review in 2022 of the effectiveness of current signs in relation to the lorry routing in particular to the east of Storrington, and also in relation to the weight restriction on School Hill highlighted above.
14	[Storrington] Freight Delivery Partnership	Promoting Low Emission Transport	Public Vehicle Procurement – Prioritising uptake of low emission vehicles	2013	Ongoing	HDC / WSCC	Ongoing	Unknown but expected low	Emission reductions sought through partnership working with local businesses to minimise impact of deliveries etc. on the village.		Encourage use of WSCC preferred lorry route rather than A283 through Storrington AQMA; investigate opportunities for local and shared deliveries; Encourage use of low emission delivery vehicles to local stores within AQMA, provide links to CNG refuelling strategy	
15	[Storrington] Community minibus	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	2013	Ongoing	HDC / WSCC	Ongoing	1 % in the AQMA	Enhance existing Storrington minibus service by replacing existing diesel fleet with Low /Zero emission vehicles.			Liaise with local bus operators to improve the emissions standards of buses operating through the AQMA
16	[Storrington] Improve bus service and	Alternatives to private vehicle use	Other	2013	Ongoing	HDC / WSCC	Ongoing	1 % in the AQMA	Work with local bus service to utilise best available Euro standard vehicles for AQMA routes. Promote use of transport /travel plans to			Subsidise strategic bus services to village schools; Investigate provision of local real-time bus information at bus stops to promote use

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved and Funding	Measure Status	Reduction in Pollutant Emission from Measure	Key Indicator Performance	Progress to Date	Comments / Barriers to Implementation
	information								increase use of sustainable transport.		
17	[Storrington and Cowfold] A27 Improvements (Arundel Bypass)	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2013	Unknown	Highways England/ WSCC	Planning	2.5% in the AQMA	Reduction in nitrogen dioxide concentrations. Improved traffic flow / reduction in traffic congestion.	The consultation on the latest designs for the A27 Arundel Bypass happened in the first quarter of 2022	If approved, construction of the Arundel bypass scheme is currently scheduled to commence in 2024 with completion scheduled for 2027;
18	[Storrington and Cowfold] A27 Improvements (Worthing & Lancing)	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	Unknown	Highways England/ WSCC	Planning	2.5% in the AQMA	Reduction in nitrogen dioxide concentrations. Improved traffic flow / reduction in traffic congestion.	Highway England have been working closely with key stakeholders to identify a package of potential improvements to meet the revised objectives in the government's Road Investment Strategy 2 (RIS2): 2020 to 2025, to improve the capacity and flow of traffic on the A27 from Worthing to Lancing.	National Highways are expected to consult on options for the A27 Worthing and Lancing scheme during autumn 2022
19	[Cowfold] A272 Road Realignment (Realignment of A272 Bolney Road adjacent to Huntscroft Cottages)	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2014	Unknown	HDC/ WSCC	Aborted	10% annual emission reduction in the AQMA	Reduction in nitrogen dioxide concentrations in Cowfold. Improved traffic flow / reduction in traffic congestion.	- This scheme has previously been assessed through the WSCC Community Highways Scheme process and received a low benefit to cost ratio (an initial estimate of the scheme cost in 2017 was over £200,000), so the scheme was not selected to be taken forward through the County Councils Integrated Works Programme. This assumed that no third-party funding was available to support the scheme. - Depending on the degree of realignment required it is likely that this could affect large trees and corner of the children's playpark so this scheme could impact the character of this area of the village. - HDC have previously put forward this scheme for the annual DEFRA air quality grant fund, but the scheme was rejected as it was not deemed to result in an overall reduction in emissions, just move emissions further away from the receptors.	Given the low value for money score from the WSCC Community Highways Scheme process, the DEFRA recognition that this would not reduce emissions, and the potential impacts on the character of the village, it is not recommended that this scheme is progressed further.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved and Funding	Measure Status	Reduction in Pollutant Emission from Measure	Key Indicator	Performance	Progress to Date	Comments / Barriers to Implementation
20	Strategic improvements to the A24 Worthing-Horsham corridor	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	Unknown	Highways England / WSCC	Planning	Unknown but expected low-medium	Reduction in nitrogen dioxide concentrations. Improved traffic flow / reduction in traffic congestion.		WSCC has undertaken a feasibility study of the A24 corridor between Worthing and Horsham including a package of traffic junction and sustainable transport measures. These proposals intended to encourage longer distance traffic flows to stay on the A27, A280 and A24 corridors for journeys for example to and from the south west and north east of the county, and to avoid use of less suitable routes such as the B2139/A283 through Amberley and Storrington.	This scheme is in the early stages of development and requires the further development of designs, consultation, development of business case and securing of funding to deliver the package of measures.

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

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

PM<sub>2.5</sub> has not been monitored in the district for the past several years, the district reported a population-weighted concentration of 6.8ug/m<sup>3</sup> for the period of 2020<sup>9</sup>. PM<sub>2.5</sub> levels are used to calculate an indicator in the Public Health Outcomes Framework (PHOF) – Fraction of Mortality Attributable to Particulate Matter Pollution. This indicator is calculated for each local authority in England, and it intended to enable Directors of Public Health to prioritise action on air quality in their local area. The estimated fraction of mortality attributable to long-term exposure to current (2019) levels of anthropogenic PM<sub>2.5</sub> was 4.8% in the Horsham district<sup>10</sup>. This places the district mid-way between the areas with the lowest estimated mortality burden in England (the fraction of around 2%) and urbanised areas (London) which show the highest rates of mortality attributable to anthropogenic PM<sub>2.5</sub> (7%)<sup>11</sup>. The 2019 data is used as it is the latest dataset made available at the time of writing.

In the first quarter of 2022, Horsham District was chosen by Defra to take part in Particulate Matter study with a duration of one year. Three new PM analysers were installed in Storrington station in March 2022 for scientific research purpose, which includes a BAM 1020, a Palas Fidas 200 and a PM reference method. These analysers will monitor and provide data for both PM<sub>10</sub> and PM<sub>2.5</sub>.

Research has shown that wood burning is a large contributor to primary emissions of PM<sub>2.5</sub>. Unsurprisingly, solid fuel burning has had a significant contribution to the concentrations of

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<sup>9</sup> PHE (2022) Public Health Profiles.

<https://fingertips.phe.org.uk/search/air%20pollution#page/0/gid/1/pat/6/par/E12000008/ati/101/are/E07000210>.

<sup>10</sup> As above

<sup>11</sup> As above

PM<sub>2.5</sub> in the South East region. That contribution has been quantified by King's College at 6 to 9% annually, averaged across urban areas<sup>12</sup>. In 2018 HDC was successful in securing Defra's funding towards the Clean Burn Sussex project, aimed at the promotion of least polluting fuels and stoves. The project was a collaboration of 15 authorities in Sussex to raise awareness about domestic burning and promote better burning methods and choices. A dedicated website for clean burning (<https://sussex-air.net/clean-burn/>) has been in operation from November 2019. Summary findings from the project are available for view on the website.

In agreement with the principles of the *Air Quality and Emissions Mitigation Guidance for Sussex* (2021) all new developments are required to implement mitigation/offsetting measures commensurate with their size/predicted emissions of NO<sub>2</sub> and PM<sub>2.5</sub>.

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<sup>12</sup> Environmental Research Group - King's College London (2019) Airborne particles from wood burning in UK cities

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

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

### 3.1 Summary of Monitoring Undertaken

#### 3.1.1 Automatic Monitoring Sites

Horsham District Council undertook automatic (continuous) monitoring at three sites during 2021, all monitoring stations have triplicate collocated NO<sub>2</sub> diffusion tubes. Table A.1 in Appendix A: shows the details of the automatic monitoring sites. All automatic monitoring results are available through the Sussex Air and UK-Air websites<sup>13</sup>.

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:.

HDC is a member of the Sussex Air Quality Partnership (Sussex Air) which benefits from the co-ordinated monitoring of air pollutants across the region. The Sussex Air Quality Monitoring Network is managed and co-ordinated by Bureau Veritas, on behalf of Sussex-air and they provide data calibration and ratification of results. All data from the network is published at [www.sussex-air.net](http://www.sussex-air.net).

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<sup>13</sup> National monitoring results are available at <https://uk-air.defra.gov.uk/data/> and air quality across Sussex are available at <https://sussex-air.net/>

### 3.1.2 Non-Automatic Monitoring Sites

Horsham District Council undertook non- automatic (i.e. passive) monitoring of NO<sub>2</sub> at 42 sites during 2021 with 49 diffusion tubes. Table A.2 in Appendix A: presents the details of the non-automatic sites.

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:.

All diffusion tubes have relevant exposure within 10m of the kerbside, except for tubes:

- Horsham 6N – receptor at Rusper Road located 11m from kerbside
- Horsham 7N – receptor at Warnham Road located 12m from kerbside
- Storrington 14 – receptor at Washington Road located 19m from kerbside

Triplicate tubes have been maintained at all three automatic analyser sites:

- HO2 Horsham Park Way (junction of Park Street and Park Way in Horsham)
- HO4 Storrington AURN (junction of Manley's Hill and Meadowside in Storrington)
- HO5 Cowfold (Bolney Road/The Street, Cowfold)

There were no changes to the diffusion tube monitoring survey in 2021.

## 3.2 Individual Pollutants

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

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

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

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

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

For comparison, the new guideline value for NO<sub>2</sub> published by WHO in 2021 is 10µg/m<sup>3</sup> taken as annual mean<sup>14</sup>.

### Automatic Monitoring Data

Data capture was good (above 75%) during 2021 at all three sites and, as such, no annualisation has been required.

The results at the three monitoring stations indicate that the NO<sub>2</sub> objectives for 2021 were not exceeded, with annual mean concentrations well below the annual mean objective level of 40µg/m<sup>3</sup> and no measured exceedances of the 1-hour objective.

Figure A.2 in Appendix A: presents the trends for annual, hour, month, and weekdays mean of NO<sub>2</sub> concentrations throughout the year.

Two of the three sites – HO2 Horsham Park Way and HO4 Storrington AURN saw respective increases in NO<sub>2</sub> concentrations of 12% and 16% relative to 2020 which can be attributed to the ease on the Covid restrictions and people going back to work and schools. Interestingly, HO5 Cowfold record a reduction in NO<sub>2</sub> concentrations in 2021 of 13%, the site had not report significant reductions during the pandemic. When comparing the annual mean NO<sub>2</sub> concentrations from 2021 to pre-pandemic (2019) levels, all three stations reported a decrease of approximately 12%.

The analysis of hourly mean concentrations by day of the week indicates that the highest concentrations were recorded during morning and afternoon traffic peaks throughout the working week from Monday to Friday for all three stations.

The annual mean NO<sub>2</sub> concentration for Horsham Park Way for 2021 was 21.1µg/m<sup>3</sup>. The highest concentrations in the year were recorded in November and December, of 27.6µg/m<sup>3</sup> and 24.6µg/m<sup>3</sup>, respectively.

For the Storrington AURN site, the annual mean NO<sub>2</sub> concentration for 2021 was 20.1µg/m<sup>3</sup>. The highest concentrations in the year were recorded in April and November, of 23.7µg/m<sup>3</sup> and 24.3µg/m<sup>3</sup> respectively.

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<sup>14</sup> WHO global air quality guidelines 2021

The measured annual mean NO<sub>2</sub> concentration at the Cowfold station in 2021 was 20.3µg/m<sup>3</sup>. The highest concentration in the year was recorded in November 25.9µg/m<sup>3</sup>. The level recorded in October is markedly higher than those at the other two sites.

Figure A.2 shows an overall decreasing trend in NO<sub>2</sub> concentrations at the monitoring locations for the last 5 years of monitoring.

### Diffusion Tubes Data

Overall data capture for the survey in 2021 was good (9 or more months' worth of data) at all sites. The results for 2021 (shown in Table A.4 and Table B.1) have been corrected using a local bias correction factor of 0.80, as obtained from three co-location studies at HO2 Horsham Parkway, HO4 Storrington and HO5 Cowfold. Full details of the bias adjustment and QA/QC procedure are provided in Appendix C.

In 2021 there were no monitoring sites where the annual mean NO<sub>2</sub> objective was exceeded. But one site (47 – Storrington 19n) located within the Storrington AQMA, measured concentrations within 10% of the annual mean objective (i.e. 36µg/m<sup>3</sup> or more). Which demonstrates that Storrington AQMA is still required.

Figure A.3 to Figure A.6 in Appendix A: show the trends in annual mean NO<sub>2</sub> concentrations measured at the diffusion tube sites over the monitoring period 2017-2021. The results of diffusion tube monitoring overall indicate an increase of 5% in NO<sub>2</sub> concentrations in 2021 as compared to the previous year. But an overall decrease of 11% in relation to 2019 (before the pandemic). All the long-term sites show a continuing overall downward trend in measured concentrations of NO<sub>2</sub> over the last five years, which applies both to roadside and background locations. This can be attributed to decreasing background concentrations and is also indicative of a gradual improvement in fleet emissions.

### Horsham Town Sites

Horsham sites showed an average increase of 5% in 2021 in relation to 2020. The highest annual mean NO<sub>2</sub> concentration of 33.4µg/m<sup>3</sup> was recorded at monitoring site 26 (Horsham 12), located on Albion Way, a partial ring road connecting major routes in and out of Horsham Town Centre. But in relation to 2019 (before the pandemic), in 2021 there was a decrease of 12%.

## Storrington Sites

Storrington sites showed an increase of 8% in 2021 in relation to 2020, but an overall decrease of 10% in relation to 2019 (before the pandemic). The sites located within the AQMA recorded a 4% increase in relation to 2020, but an overall decrease of 13% in relation to 2019.

Whilst the AQMA encompasses the whole High Street in the town centre, in the recent years the only area in exceedance of the annual mean objective for NO<sub>2</sub> has been the mini roundabout of Manley's Hill and School Hill, as shown by the results at site 47 (Storrington 19). Site 47 and site 13 (Storrington 1) recorded the highest annual mean NO<sub>2</sub> levels for the year (39.6µg/m<sup>3</sup> and 34.34µg/m<sup>3</sup>).

Monitoring sites 16 and 34 have reported values within 10% of the annual mean objective in 2017 and 2018. Regarding 2021, there was an increase in their annual mean concentrations on 2020, but a decrease of 13% and 11% respectively in relation to 2019.

## Cowfold Sites

Cowfold sites did not show an overall increase or decrease in relation to 2020, but in relation to 2019 (before the pandemic), there was a decrease of 13%. The sites located within the AQMA recorded a 4% increase in relation to 2020, but an overall decrease of 13% in relation to 2019.

There wasn't any breach of annual mean NO<sub>2</sub> objective in the past three years, although site 37 (Cowfold 7n) reached a concentration of 36.1µg/m<sup>3</sup> in 2019, which is within 10% of the annual mean objective.

It is expected that the Cowfold AQMA will be revoked in the coming years. However, pollutant concentrations may vary significantly from one year to the next, and the Local Air Quality Management Technical Guidance (TG-16)<sup>15</sup> states that the revocation of an AQMA should be considered following three consecutive years of compliance with the relevant objective as evidenced through monitoring. Because the pandemic impacted levels of NO<sub>2</sub> in the past two years, and it cannot be ascertained if this will lead to a change in behaviour or if concentrations will be back to pre-pandemic levels. It was decided that meanwhile the Cowfold AQMA is still required.

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<sup>15</sup> <https://laqm.defra.gov.uk/documents/LAQM-TG16-April-21-v1.pdf>

## Remaining Sites

The monitoring sites in the towns of Billingshurst, Henfield, Pulborough, Southwater and Steyning have remained below the objective in the past five years.

The concentrations measured in Billingshurst have remained relatively stable at approximately  $30\mu\text{g}/\text{m}^3$  over the monitoring period from 2013 to 2018, to reduce to  $25\mu\text{g}/\text{m}^3$  over 2019-2020. The site showed a further reduction of 12% in 2021.

The Pulborough and Steyning sites have remained below  $22\mu\text{g}/\text{m}^3$  over the last five years.

The Henfield and Southwater site registered an increase of 5% and 3% respectively in relation to 2020, but a decrease of 6% and 8% respectively in relation to 2019.

### 3.2.2 Particulate Matter (PM<sub>10</sub>)

An automatic TEOM particulate monitor has been permanently located at Park Way in Horsham town centre for the past twenty years, giving 15-minute measurements of particulate matter concentrations. Information on the correction applied to the TEOM results is presented in Appendix C:. Data capture was above 75% in 2021 and as such no annualisation has been required.

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past five years with the air quality objective of  $40\mu\text{g}/\text{m}^3$ .

Table A.7 in Appendix A compares the ratified continuous monitored PM<sub>10</sub> daily mean concentrations for the past five years with the air quality objective of  $50\mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times per year.

Figure A.7 shows the trend in PM<sub>10</sub> concentrations at HO2.

Automatic monitoring of PM<sub>10</sub> at the Horsham Park Way site indicated that both the annual and daily mean objectives for PM<sub>10</sub> were complied with in 2021 and in the previous five years of monitoring. The annual mean PM<sub>10</sub> concentration recorded in 2021 showed an increase of 11% in relation to the previous year, but a decrease of 9% in relation to 2019. The site shows a continuing overall downward trend in measured concentrations of PM<sub>10</sub> over

the last five years. However, in the past 5 years, the site has exceeded the  $15\mu\text{g}/\text{m}^3$  annual mean for coarse particulate matter ( $\text{PM}_{10}$ ) recommended by WHO<sup>16</sup>.

### 3.2.3 Particulate Matter ( $\text{PM}_{2.5}$ )

The annual mean concentrations of  $\text{PM}_{2.5}$  were estimated from the  $\text{PM}_{10}$  measurements at site HO2 (Horsham Park Way) using a local ratio of  $\text{PM}_{2.5}$  to  $\text{PM}_{10}$ , as per method described in Box 7.7 of Technical Guidance TG (16). The estimated concentrations and trend of  $\text{PM}_{2.5}$  presented in Table A.8 and Figure A.8 in Appendix A indicate that concentrations have been well below the national target value of  $25\mu\text{g}/\text{m}^3$  in 2021, and previous years at the Horsham Park Way site. The site shows a continuing overall downward trend in measured concentrations of  $\text{PM}_{2.5}$  over the last five years. However, the results have remained above the WHO-recommended guideline value of  $5\mu\text{g}/\text{m}^3$  taken as annual mean.

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<sup>16</sup><https://apps.who.int/iris/handle/10665/345329>

## Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
HO2	Horsham Park Way	Roadside	517485	130590	NO <sub>2</sub> , PM <sub>10</sub>	No	Chemiluminescence (APNA-370); TEOM	7.0	1.5	3.0
HO4	Storrington AURN	Roadside	509083	114198	NO <sub>2</sub>	No	Chemiluminescence (Thermo 32i)	9.6	4.6	3.3
HO5	Cowfold	Roadside	521356	122553	NO <sub>2</sub>	Yes. Cowfold AQMA	Chemiluminescence (ML9841B)	4.0	6.5	2.0

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube located with a Co-located with a Continuous Analyser?	Tube Height (m)
<b>Billingshurst Sites</b>										
28	Billingshurst 1	Roadside	508649	125857	NO <sub>2</sub>	No	1.0	1.5	No	2.2
<b>Cowfold Sites</b>										
14	Cowfold 9	Roadside	521584	122457	NO <sub>2</sub>	No	4.5	1.0	No	2.0
12, 20	Cowfold 1,2	Roadside	521324	122610	NO <sub>2</sub>	Yes, Cowfold AQMA	2.5	1.7	No	2.7
21	Cowfold 3	Roadside	521267	122677	NO <sub>2</sub>	Yes, Cowfold AQMA	9.7	2.0	No	2.7
22	Cowfold 4	Roadside	521311	122704	NO <sub>2</sub>	No	9.3	2.0	No	2.4
35	Cowfold 5n	Roadside	521070	122706	NO <sub>2</sub>	Yes, Cowfold AQMA	23.0	3.6	No	2.5
36	Cowfold 6n	Roadside	521309	122248	NO <sub>2</sub>	No	3.0	1.8	No	2.2
37	Cowfold 7n	Roadside	521460	122473	NO <sub>2</sub>	Yes, Cowfold AQMA	2.0	1.1	No	2.2
43	Cowfold 8n	Urban Background	521411	122667	NO <sub>2</sub>	No	7.0	0.3	No	2.0
44, 45, 46	Cowfold AU A/B/C	Roadside	521356	122552	NO <sub>2</sub>	Yes, Cowfold AQMA	20.0	6.5	Yes	2.0
<b>Henfield Sites</b>										
2	Henfield 1n	Roadside	521492	115907	NO <sub>2</sub>	No	0.0	2.0	No	2.0
<b>Horsham Sites</b>										
1	Horsham 1N	Roadside	517489	130607	NO <sub>2</sub>	No	3.5	2.0	No	2.2
3	Horsham 3N	Urban Background	516008	130480	NO <sub>2</sub>	No	7.6	1.5	No	2.9
4	Horsham 4N	Urban Background	517680	130069	NO <sub>2</sub>	No	9.8	1.2	No	2.5
5, 6, 7	Park Way	Roadside	517489	130580	NO <sub>2</sub>	No	8.9	2.1	Yes	2.8
8	Horsham 5N	Roadside	518239	131137	NO <sub>2</sub>	No	9.6	1.4	No	2.4
9	Horsham 6N	Roadside	518654	132482	NO <sub>2</sub>	No	11.2	1.5	No	2.6
10	Horsham 7N	Roadside	516952	132215	NO <sub>2</sub>	No	12.0	2.0	No	2.2
11	Horsham 8N	Roadside	516646	130221	NO <sub>2</sub>	No	8.0	1.6	No	3.0
23	N. Horsham 1N	Roadside	517702	133570	NO <sub>2</sub>	No	4.9	1.9	No	2.4
24	N. Horsham 2N	Roadside	517476	134013	NO <sub>2</sub>	No	5.5	1.0	No	2.8

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
26	Horsham 12	Roadside	516909	130755	NO <sub>2</sub>	No	3.5	1.5	No	2.0
48	Horsham 9N	Roadside	518054	131155	NO <sub>2</sub>	No	1.0	1.5	No	2.0
<b>Pulborough Sites</b>										
27	Pulborough 2	Roadside	505288	118630	NO <sub>2</sub>	No	1.8	1.5	No	3.0
<b>Southwater Sites</b>										
49	Southwater 1	Roadside	515639	126599	NO <sub>2</sub>	No	1.0	1.5	No	2.0
<b>Steyning Sites</b>										
25	Steyning 4N	Kerbside	517642	111169	NO <sub>2</sub>	No	1.5	0.9	No	2.7
<b>Storrington Sites</b>										
13	Storrington 1	Roadside	508960	114270	NO <sub>2</sub>	Yes, Storrington AQMA	2.5	1.1	No	3.0
15	Storrington 3	Roadside	508935	114297	NO <sub>2</sub>	Yes, Storrington AQMA	0.0	1.2	No	2.0
16	Storrington 4	Roadside	508832	114272	NO <sub>2</sub>	Yes, Storrington AQMA	2.8	2.2	No	3.0
17	Storrington 5	Roadside	508742	114288	NO <sub>2</sub>	Yes, Storrington AQMA	1.9	1.9	No	3.5
18	Storrington 6	Roadside	508396	114449	NO <sub>2</sub>	No	7.7	1.9	No	2.4
19	Storrington 7	Roadside	508338	114374	NO <sub>2</sub>	No	6.7	1.6	No	3.0
29, 30, 31	Storrington 8, 9,10 AURN	Roadside	509083	114198	NO <sub>2</sub>	No	9.6	4.6	Yes	3.3
32	Storrington 13n	Roadside	508675	114306	NO <sub>2</sub>	Yes, Storrington AQMA	0.5	3.0	No	2.2
33	Storrington 12n	Roadside	508598	114323	NO <sub>2</sub>	Yes, Storrington AQMA	7.0	2.3	No	2.6
34	Storrington 11n	Roadside	508511	114365	NO <sub>2</sub>	Yes, Storrington AQMA	1.0	3.0	No	3.0
38	Storrington 14n	Roadside	509319	114160	NO <sub>2</sub>	No	20.0	0.9	No	2.6

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube Co-located with a Continuous Analyser?	Tube Height (m)
39	Storrington 16n	Roadside	508966	114356	NO <sub>2</sub>	No	0.0	1.3	No	2.6
40	Storrington 15n	Roadside	509103	114532	NO <sub>2</sub>	No	12.0	1.7	No	2.2
41	Storrington 17n	Urban Background	508677	114149	NO <sub>2</sub>	No	1.0	1.5	No	2.2
42	Storrington 18n	Roadside	508215	114348	NO <sub>2</sub>	No	5.0	1.9	No	2.2
47	Storrington 19n	Roadside	508945	114268	NO <sub>2</sub>	Yes, Storrington AQMA	0.0	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).

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture 2021 (%) <sup>(1)</sup>	2017	2018	2019	2020	2021
HO2	517485	130590	Roadside	97.3	26.2	25.4	24.4	18.8	21.1
HO4	509083	114198	Roadside	97.1	22.7	23.0	22.0	17.4	20.1
HO5	521356	122553	Roadside	76.6	29.5	28.4	23.6	23.4	20.3

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

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

**Notes:**

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

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

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

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

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

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture 2021 (%) <sup>(1)</sup>	2017	2018	2019	2020	2021
<b>Billingshurst Sites</b>									
28	508649	125857	Roadside	100.0	30.6	27.0	26.2	23.8	22.2
<b>Cowfold Sites</b>									
14	521584	122457	Roadside	100.0				19.3	18.3
12, 20	521324	122610	Roadside	100.0	37.6	35.4	31.6	26.8	26.5
21	521267	122677	Roadside	100.0	33.1	31.8	30.7	24.6	26.5
22	521311	122704	Roadside	100.0	29.5	31.4	26.8	22.5	22.2
35	521070	122706	Roadside	100.0	29.7	24.9	22.5	20.4	21.3
36	521309	122248	Roadside	100.0	26.4	25.1	23.5	21.7	20.5
37	521460	122473	Roadside	100.0	<b>43.8</b>	<b>42.4</b>	36.1	30.2	31.2
43	521411	122667	Urban Background	100.0	13.9	13.5	11.6	10.9	10.5
44, 45, 46	521356	122552	Roadside	100.0	27.0	26.6	23.6	19.2	19.9
<b>Henfield Sites</b>									
2	521492	115907	Roadside	100.0	26.3	25.2	22.2	19.9	20.9
<b>Horsham Sites</b>									
1	517489	130607	Roadside	100.0	31.6	31.2	26.4	21.6	23.2
3	516008	130480	Urban Background	92.5	11.4	12.2	12.5	9.5	9.9
4	517680	130069	Urban Background	100.0	11.0	11.6	10.2	9.1	9.0
5, 6, 7	517489	130580	Roadside	100.0	24.4	24.3	22.1	18.4	19.9
8	518239	131137	Roadside	100.0	27.8	28.5	25.2	21.0	22.7
9	518654	132482	Roadside	100.0	23.8	23.2	21.5	18.2	19.5
10	516952	132215	Roadside	100.0	27.2	27.4	23.0	18.6	19.4
11	516646	130221	Roadside	100.0	23.6	24.8	21.9	19.1	20.7
23	517702	133570	Roadside	73.7	24.6	21.8	19.3	16.8	17.6
24	517476	134013	Roadside	82.3	19.4	18.3	17.3	15.8	14.6
26	516909	130755	Roadside	90.6				30.5	33.4
48	518054	131155	Roadside	100.0	31.0	31.3	26.5	22.1	23.3
<b>Pulborough Sites</b>									
27	505288	118630	Roadside	100.0	21.1	20.7	17.9	15.7	16.7
<b>Southwater Sites</b>									
49	515639	126599	Roadside	100.0	24.5	27.3	23.5	21.1	21.7
<b>Steyping Sites</b>									
25	517642	111169	Kerbside	100.0	20.0	21.3	20.1	16.2	19.0
<b>Storrington Sites</b>									
13	508960	114270	Roadside	100.0	<b>40.7</b>	<b>44.7</b>	38.9	31.6	34.3

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture 2021 (%) <sup>(1)</sup>	2017	2018	2019	2020	2021
15	508935	114297	Roadside	100.0	31.6	32.9	28.3	23.3	24.8
16	508832	114272	Roadside	100.0	37.5	35.8	29.7	25.5	25.9
17	508742	114288	Roadside	100.0	27.4	26.4	23.3	18.7	19.9
18	508396	114449	Roadside	100.0	24.3	22.3	18.8	14.8	17.1
19	508338	114374	Roadside	100.0	21.5	20.9	18.4	15.6	17.6
29, 30, 31	509083	114198	Roadside	100.0	25.5	26.6	22.9	20.5	21.7
32	508675	114306	Roadside	100.0	31.1	29.9	25.6	21.4	23.1
33	508598	114323	Roadside	100.0	29.0	28.6	26.0	20.0	23.0
34	508511	114365	Roadside	100.0	37.5	37.8	29.8	25.0	26.5
38	509319	114160	Roadside	100.0	<b>43.0</b>	38.5	33.4	27.8	25.8
39	508966	114356	Roadside	100.0	23.5	24.0	21.6	18.9	19.2
40	509103	114532	Roadside	100.0	20.3	18.9	16.9	14.9	15.4
41	508677	114149	Urban Background	100.0	12.9	13.3	11.2	9.8	10.0
42	508215	114348	Roadside	91.7	20.4	19.1	16.0	13.4	18.1
47	508945	114268	Roadside	100.0	<b>56.4</b>	<b>50.6</b>	<b>47.7</b>	38.4	39.6

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

☒ Diffusion tube data has been bias adjusted.

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

#### Notes:

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

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

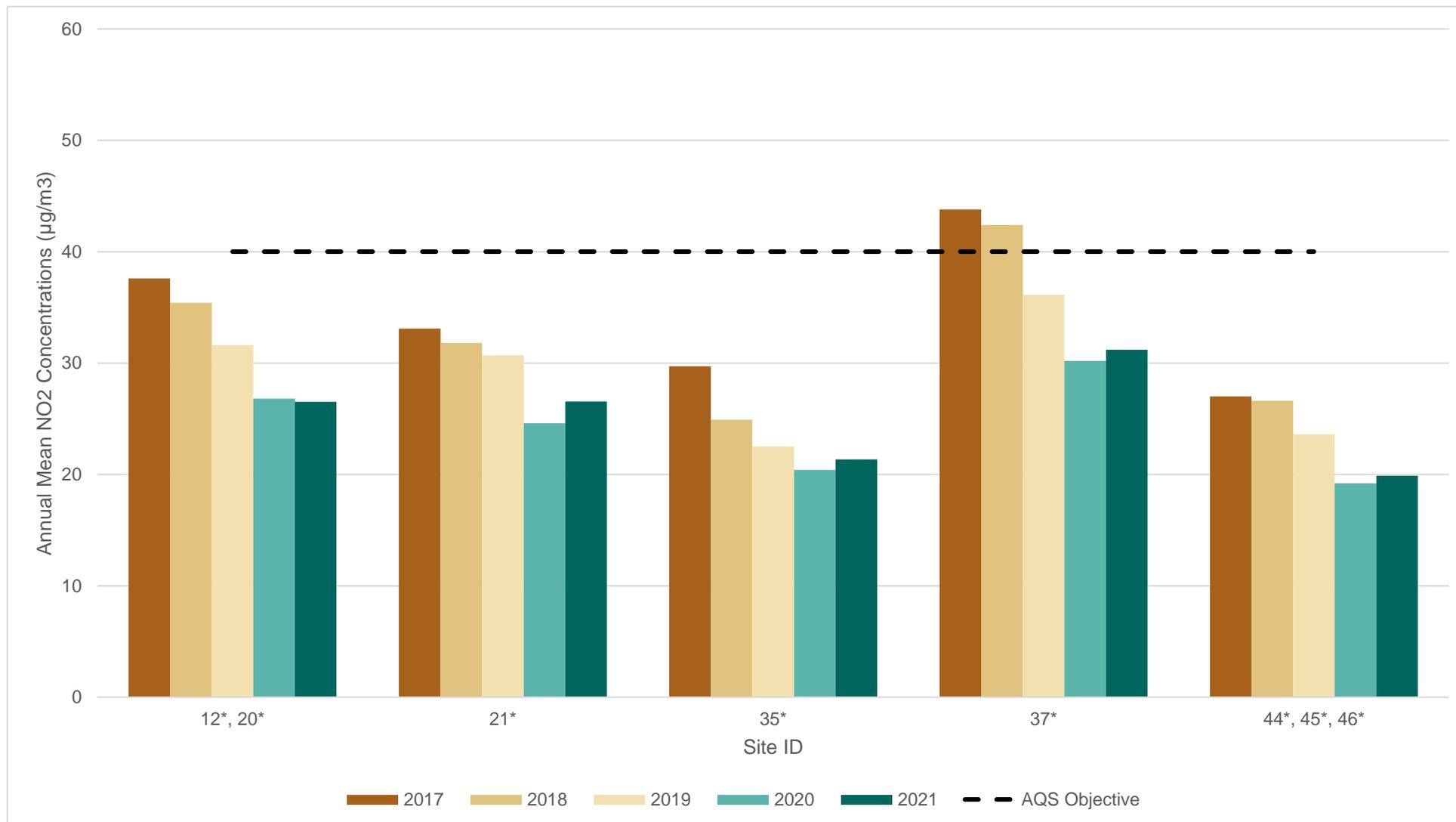
NO<sub>2</sub> annual means exceeding  $60\mu\text{g}/\text{m}^3$ , indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

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

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

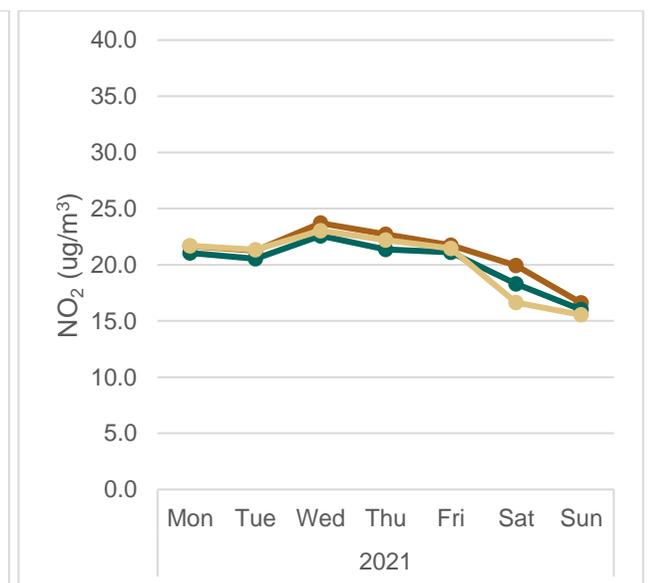
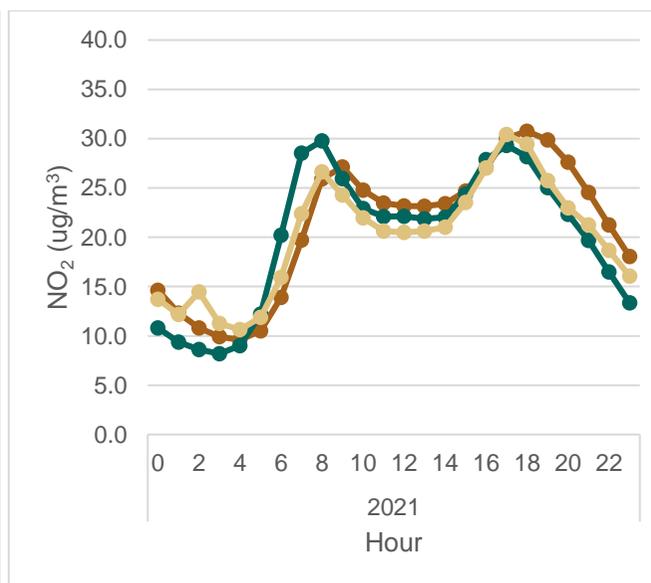
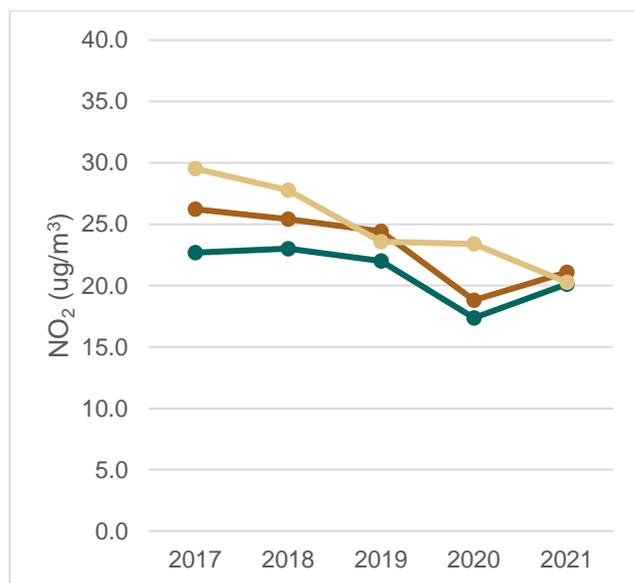
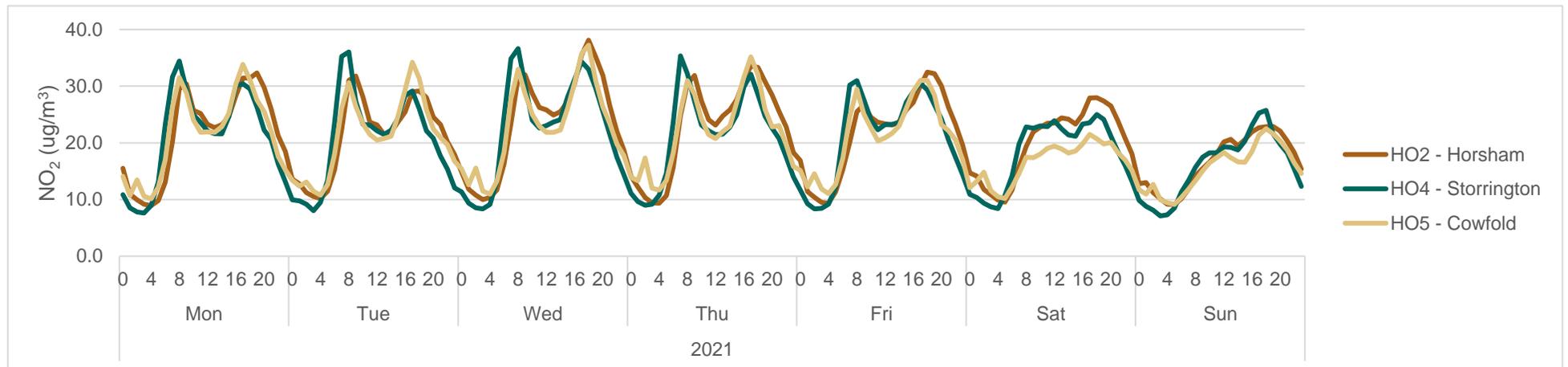
(1) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

**Figure A.1 – Trends in Annual Mean NO2 Concentrations Measured at Automatic Monitoring Sites**



\* Within the AQMA

**Figure A.2 – Monitoring Results: NO<sub>2</sub> Concentrations trends at HO2 Horsham Park Way, HO4 Storrington AURN & HO5 Cowfold in 2021**



**Figure A.3 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Horsham**

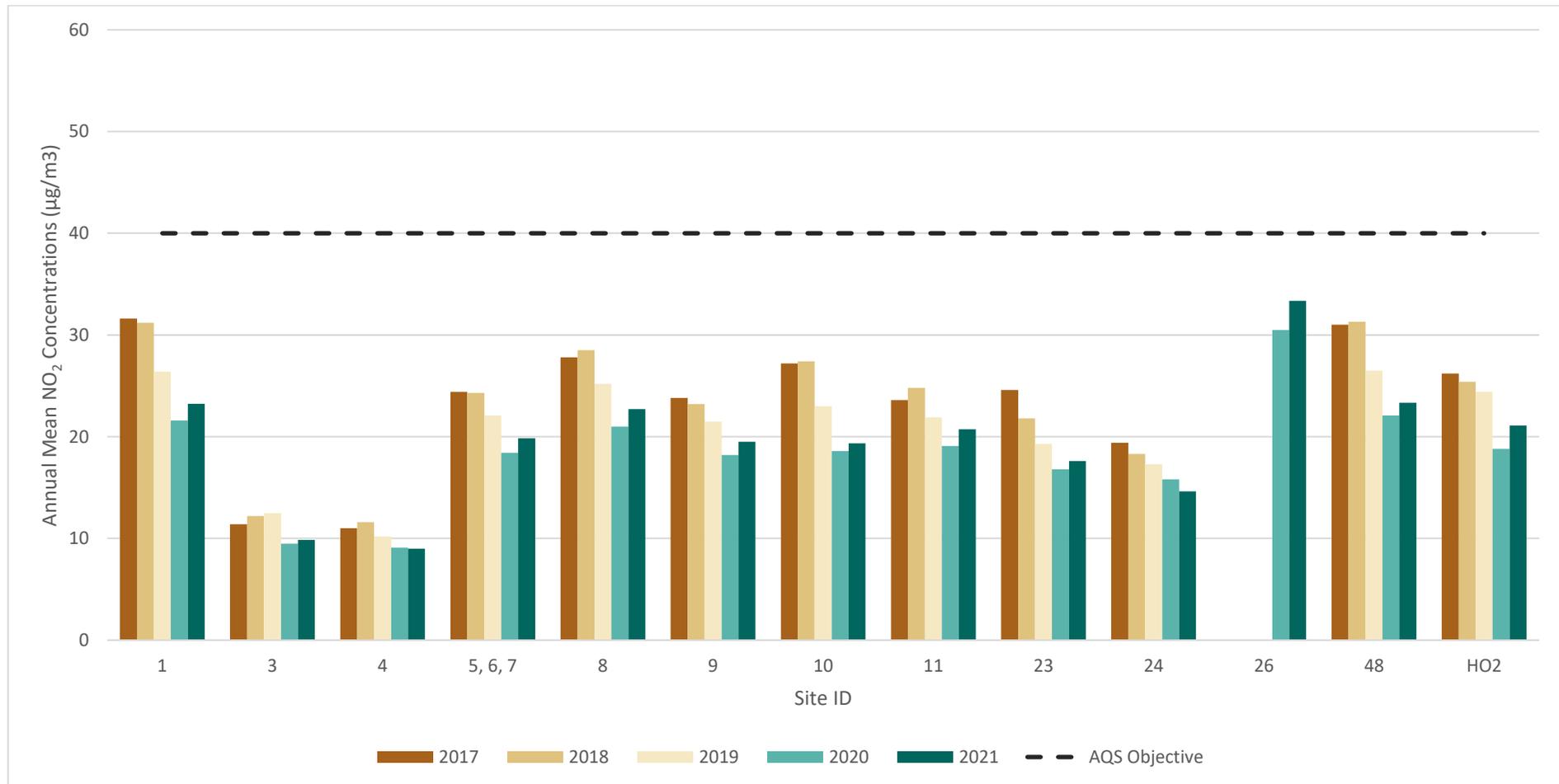
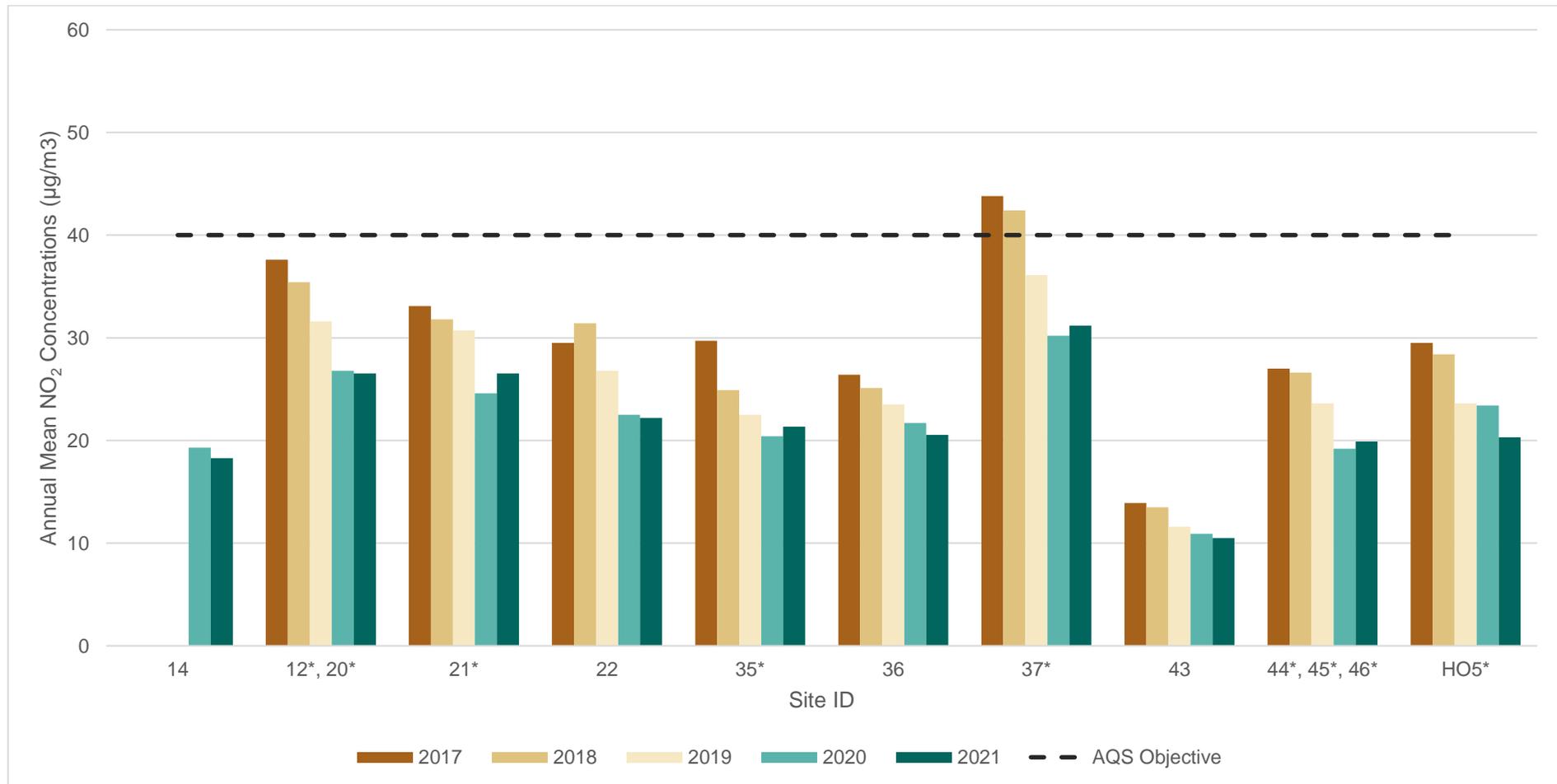
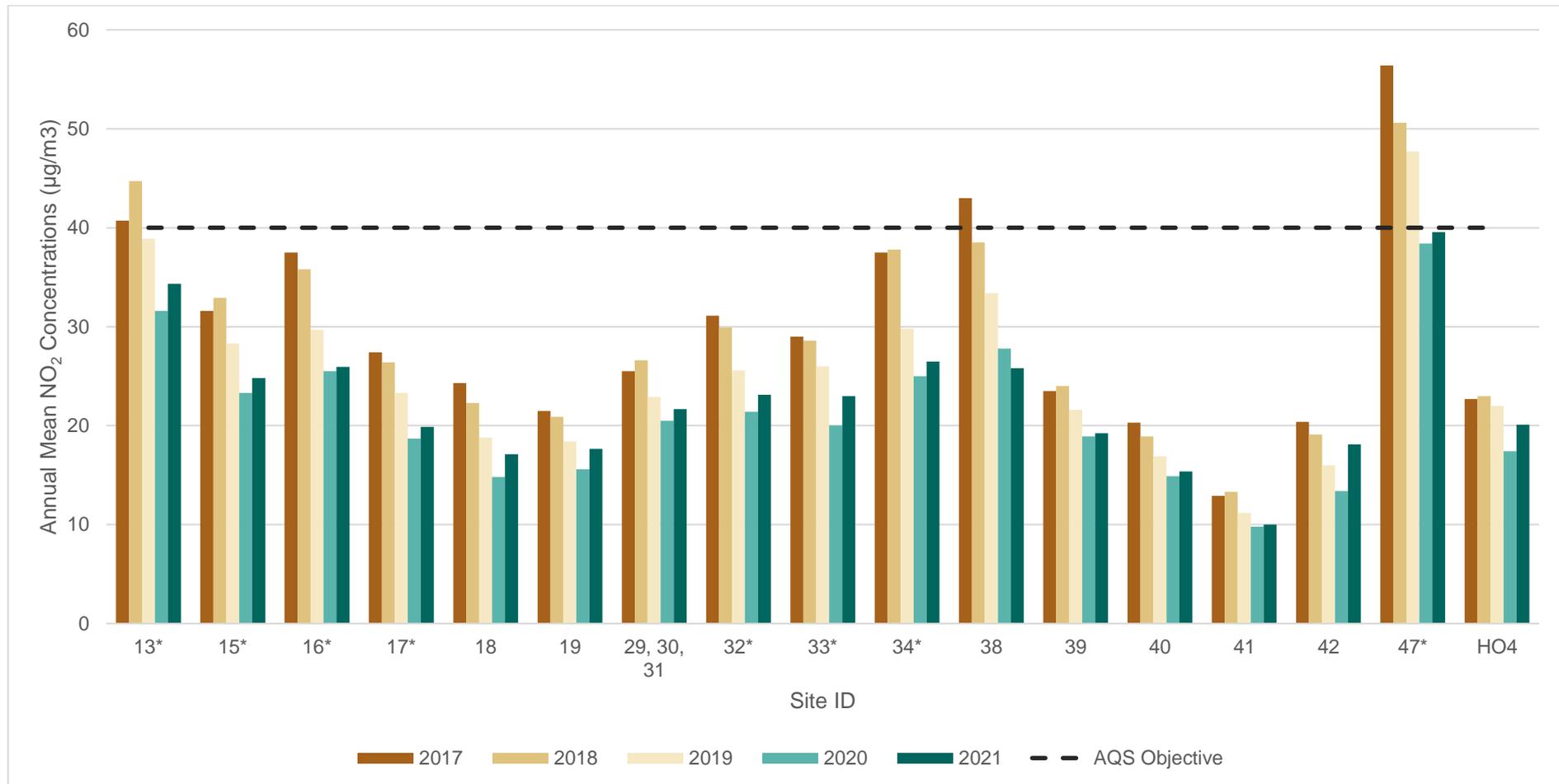


Figure A.4 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Cowfold



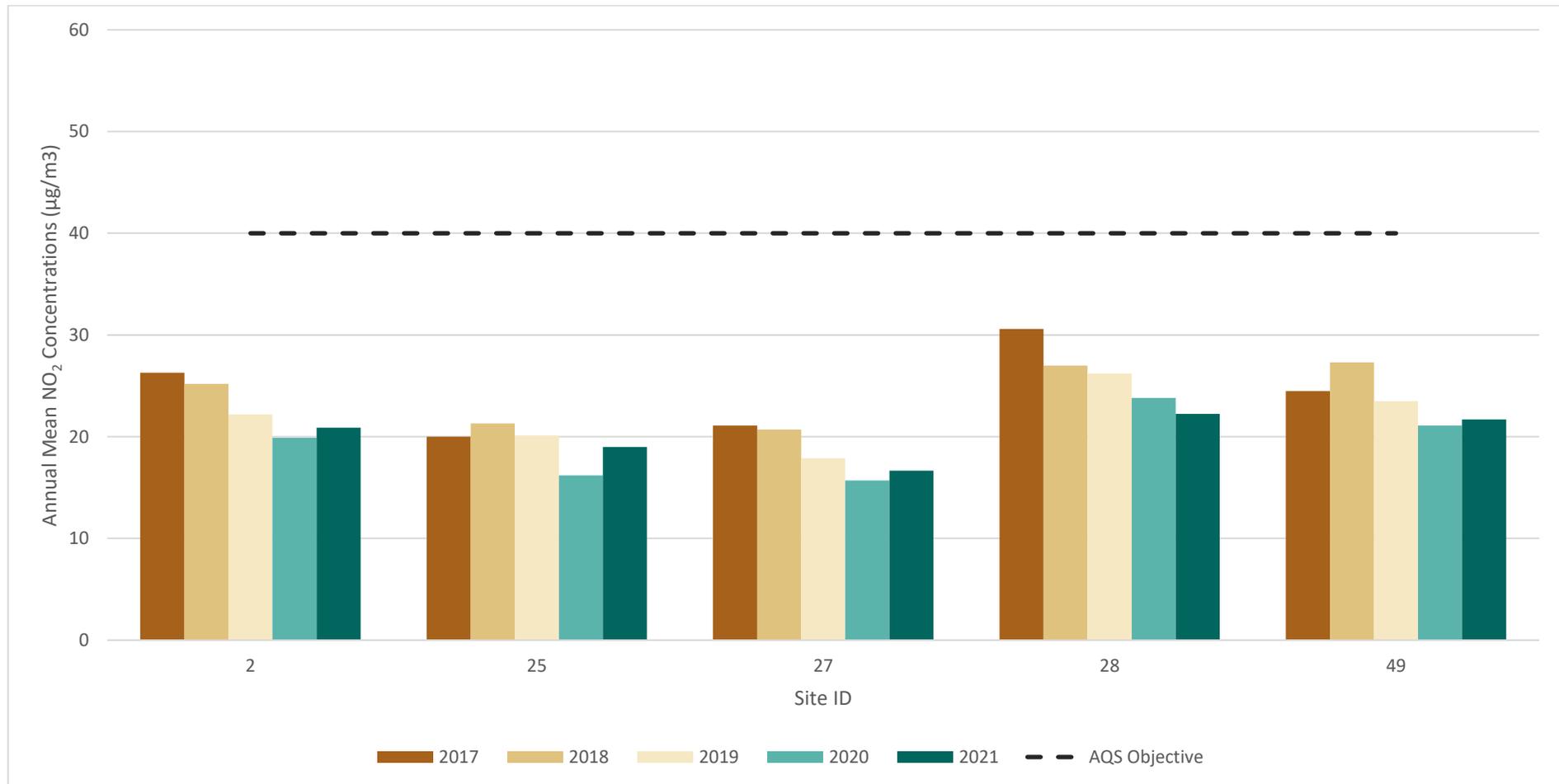
\* Within the AQMA

Figure A.5 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Storrington



\* Within the AQMA

**Figure A.6 – Trends in Annual Mean NO<sub>2</sub> Concentrations: Henfield, Steyning, Pulborough, Billingshurst, Southwater**



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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture 2021 (%) <sup>(1)</sup>	2017	2018	2019	2020	2021
HO2	517485	130590	Roadside	97.3	0	0	0	0	0
HO4	509083	114198	Roadside	97.1	0	0	0	0	0
HO5	521356	122553	Roadside	76.6	0	0	0	0	0

**Notes:**

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

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

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

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

**Table A.6 – Annual Mean PM<sub>10</sub> Monitoring Results (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture 2021 (%) <sup>(1)</sup>	2017	2018	2019	2020	2021
HO2	517485	130590	Roadside	79.4	18.2	19.6	19.3	15.7	17.5

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

**Notes:**

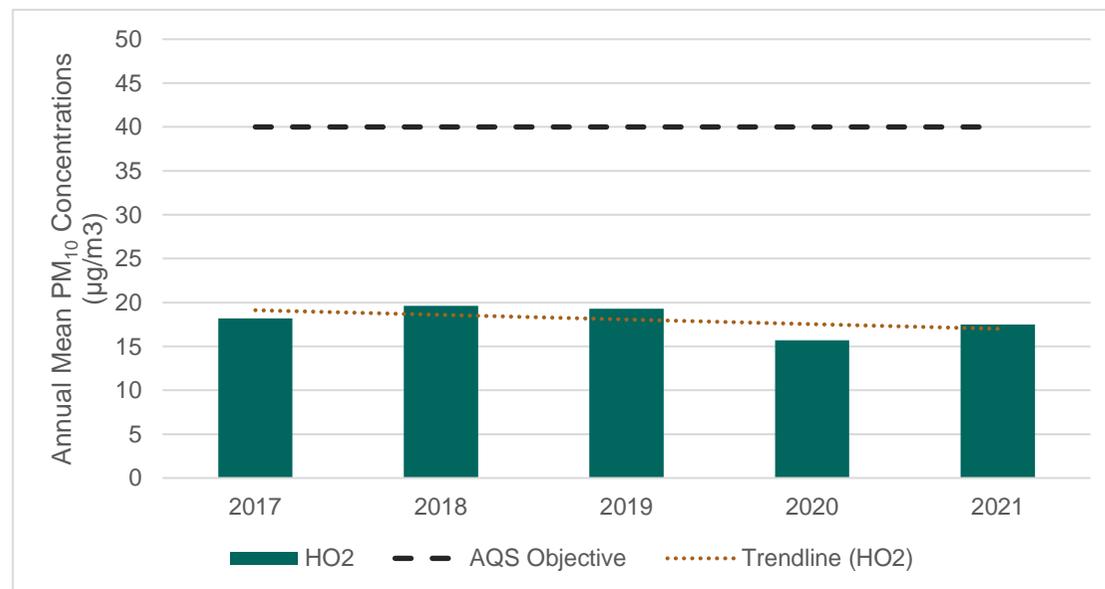
The annual mean concentrations are presented as µg/m<sup>3</sup>.

Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

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

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

**Figure A.7 – Trends in Annual Mean PM<sub>10</sub> Concentrations**



**Table A.7 – 24-Hour Mean PM<sub>10</sub> Monitoring Results, Number of PM<sub>10</sub> 24-Hour Means > 50µg/m<sup>3</sup>**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture 2021 (%) <sup>(1)</sup>	2017	2018	2019	2020	2021
HO2	517485	130590	Roadside	79.4	2	0	5	0	0

**Notes:**

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

Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

**Table A.8 – Annual Mean PM<sub>2.5</sub> Monitoring Results (µg/m<sup>3</sup>)**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture 2021 (%) <sup>(1)</sup>	2017	2018	2019	2020	2021
HO2	517485	130590	Roadside	79.4	12.7	13.7	13.5	11.0	12.3

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

**Notes:**

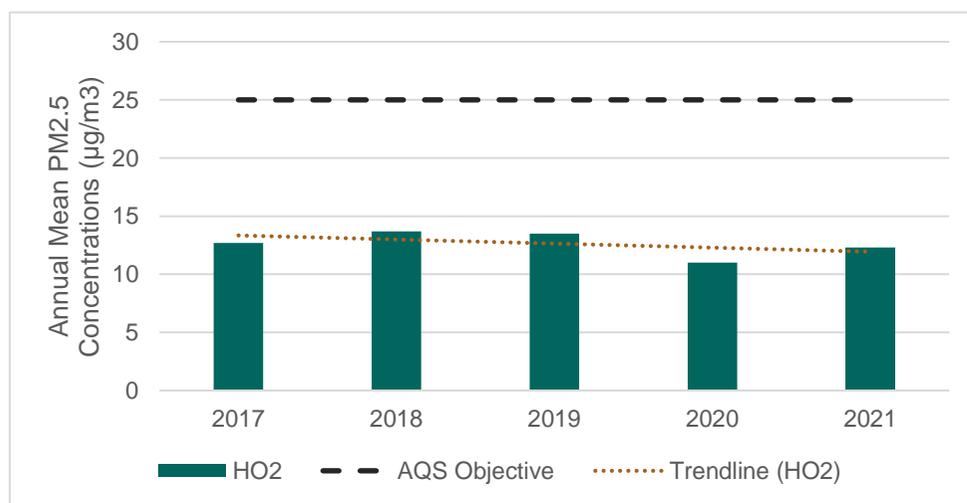
The annual mean concentrations are presented as µg/m<sup>3</sup>.

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

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

PM<sub>2.5</sub> values were estimated from the PM<sub>10</sub> data using a nationally derived correction ratio of 0.7.

**Figure A.8 – Trends in Annual Mean PM<sub>2.5</sub> Concentrations**



## Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO<sub>2</sub> 2021 Diffusion Tube Results (µg/m<sup>3</sup>)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Raw Data Mean:	Annual Mean: Annualised and Bias Adjusted (0.80)	Comment
<b>Billingshurst Sites</b>																	
28	508649	125857	31.3	28.7	24.8	27.9	21.2	25.0	23.1	23.2	27.3	31.9	34.2	34.4	27.8	22.2	
<b>Cowfold Sites</b>																	
12	521324	122610	32.1	35.8	31.0	32.0	29.3	32.3	32.5	32.0	33.8	32.2	33.2	35.5	-	-	Duplicate Site with 12 and 20 - Annual data provided for 20 only
14	521584	122457	24.0	20.5	20.4	21.9	22.2	23.0	17.6	20.3	23.8	26.1	29.9	25.4	22.8	18.3	
20	521324	122610	31.6	36.1	32.0	33.4	32.5	31.3	31.5	30.7	37.4	36.9	35.2	35.3	33.2	26.5	Duplicate Site with 12 and 20 - Annual data provided for 20 only
21	521267	122677	36.0	26.2	32.2	33.2	31.1	34.0	31.3	32.2	33.0	36.4	41.2	32.2	33.2	26.5	
22	521311	122704	32.0	28.8	28.2	27.3	24.1	26.4	23.9	27.6	28.1	28.7	28.5	29.1	27.7	22.2	
35	521070	122706	31.6	20.5	25.5	22.2	26.8	23.9	25.0	22.7	30.2	30.7	32.9	28.4	26.7	21.3	
36	521309	122248	29.1	25.7	26.4	25.8	22.1	23.7	22.3	22.7	27.8	25.2	32.0	26.3	25.7	20.5	
37	521460	122473	35.2	33.7	35.2	40.1	36.2	42.3	33.4	35.9	43.7	42.8	50.8	40.5	39.0	31.2	
43	521411	122667	17.8	16.0	14.1	9.7	9.3	10.8	10.6	9.2	12.7	14.8	17.4	15.7	13.1	10.5	
44	521356	122552	23.3	27.6	25.7	22.5	22.3	25.1	23.1	21.7	27.2	32.0	25.2	23.9	-	-	Triplicate Site with 44, 45 and 46 - Annual data provided for 46 only
45	521356	122552	25.0	28.8	23.9	24.6	21.8	23.2	23.7	21.4	24.7	30.7	27.0	24.8	-	-	Triplicate Site with 44, 45 and 46 - Annual data provided for 46 only
46	521356	122552	24.9	28.3	24.3	20.2	22.4	22.3	21.2	22.6	26.8	28.8	30.9	27.2	24.9	19.9	Triplicate Site with 44, 45 and 46 - Annual data provided for 46 only
<b>Henfield Sites</b>																	
2	521492	115907	31.6	25.0	22.8	25.0	18.1	23.1	21.8	20.7	24.3	29.9	40.5	31.6	26.1	20.9	
<b>Horsham Sites</b>																	
1	517489	130607	32.8	30.3	26.2	27.6	26.7	25.7	25.7	26.6	28.9	29.0	39.8	31.2	29.1	23.2	
3	516008	130480	15.6	18.1	9.5	12.8		8.1	7.9	14.8	9.8	11.2	14.7	14.1	12.3	9.9	
4	517680	130069	16.3	18.9	12.2	9.7	7.6	8.1	8.4	8.9	8.0	9.0	15.8	13.2	11.2	9.0	
5	517489	130580	28.1	25.6	23.4	24.0	21.4	21.6	21.0	22.8	24.0	27.2	32.9	27.9	-	-	Triplicate Site with 5, 6 and 7 - Annual data provided for 7 only
6	517489	130580	28.0	26.3	22.6	23.8	18.5	21.8	12.4	22.0	24.9	25.5	33.5	26.6	-	-	Triplicate Site with 5, 6 and 7 - Annual data provided for 7 only
7	517489	130580	26.7	26.4	21.9	22.9	21.9	20.5	21.9	22.8	24.1	25.6	33.5	40.3	24.8	19.9	Triplicate Site with 5, 6 and 7 - Annual data provided for 7 only
8	518239	131137	25.7	29.4	23.0	32.4	23.1	25.2	23.8	30.5	28.8	29.4	39.6	31.0	28.4	22.7	
9	518654	132482	28.9	26.8	21.6	21.1	16.4	20.8	20.3	19.8	25.0	27.2	32.8	31.8	24.4	19.5	
10	516952	132215	33.0	30.6	24.6	23.4	18.6	22.3	17.8	19.4	19.8	25.3	28.6	27.9	24.2	19.4	
11	516646	130221	28.4	31.0	22.0	22.4	21.5	25.2	19.6	24.7	25.4	27.4	34.2	31.1	25.9	20.7	
23	517702	133570	28.6	23.4			13.1	15.0	15.2	30.2		22.1	24.0	25.3	22.0	17.6	
24	517476	134013	24.3		19.3	17.4	11.9	15.5	15.8	13.5	18.5	22.2	25.4		18.3	14.6	
26	516909	130755	41.3	37.2	35.2	43.1	34.0	41.6		43.9	44.8	43.5	52.6	42.2	41.7	33.4	
48	518054	131155	16.6	27.1	27.7	31.4	23.1	24.7	27.4	33.3	33.6	35.1	38.7	31.4	29.2	23.3	
<b>Pulborough Sites</b>																	
27	505288	118630	26.1	23.5	20.4	20.5	16.1	17.9	15.4	19.9	20.6	21.1	27.5	22.4	20.8	16.7	
<b>Southwater Sites</b>																	
49	515639	126599	31.3	30.7	26.7	25.3	24.1	27.7	23.8	24.1	29.5	22.3	31.1	29.8	27.1	21.7	
<b>Steyning Sites</b>																	
25	517642	111169	28.8	25.1	24.0	21.9	21.9	20.8	16.0	16.9	24.4	25.8	31.3	28.7	23.7	19.0	
<b>Storrington Sites</b>																	
13	508960	114270	38.7	43.5	38.1	44.8	40.8	45.4	39.0	47.1	43.4	46.5	49.7	40.7	42.9	34.3	
15	508935	114297	33.9	29.5	31.1	32.3	28.8	27.4	28.3	29.1	33.3	33.4	38.5	28.2	31.0	24.8	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.80)	Comment
16	508832	114272	35.9	31.8	29.3	30.1	27.0	31.6	29.0	29.4	35.5	36.1	37.4	36.1	32.4	25.9	
17	508742	114288	26.4	25.5	25.0	27.6	20.9	23.6	22.1	22.6	24.4	25.4	31.8	24.1	24.8	19.9	
18	508396	114449	19.5	21.5	21.0	22.0	20.6	20.8	19.7	15.9	22.2	22.7	26.4	24.6	21.4	17.1	
19	508338	114374	24.9	22.8	19.5	22.6	17.9	20.1	19.0	20.3	22.9	25.0	29.1	22.1	22.1	17.6	
29	509083	114198	26.6	26.7	24.3	24.2	26.2	31.3	21.9	29.7	29.5	29.2	30.5	26.3	-	-	Triplicate Site with 29, 30 and 31 - Annual data provided for 31 only
30	509083	114198	24.5	28.2	27.5	27.8	27.4	28.6	28.1	28.8	27.0	29.7	27.0	26.4	-	-	Triplicate Site with 29, 30 and 31 - Annual data provided for 31 only
31	509083	114198	20.6	27.0	24.9	26.6	25.6	28.6	25.4	29.2	30.1	29.1	28.5	26.4	27.1	21.7	Triplicate Site with 29, 30 and 31 - Annual data provided for 31 only
32	508675	114306	31.2	31.2	27.3	32.1	25.3	27.8	24.3	29.6	28.4	28.7	33.5	28.6	28.9	23.1	
33	508598	114323	31.8	32.0	28.5	27.4	23.2	29.0	24.9	24.4	30.4	31.9	34.0	29.1	28.7	23.0	
34	508511	114365	29.8	36.2	34.7	29.4	22.1	35.8	34.6	32.8	33.7	33.7	38.3	36.0	33.1	26.5	
38	509319	114160	33.5	28.8	33.4	34.4	31.3	27.7	25.3	27.5	37.3	36.9	37.3	33.7	32.2	25.8	
39	508966	114356	27.1	28.3	20.6	23.3	22.6	23.6	22.3	24.5	25.1	26.1	22.3	23.7	24.1	19.2	
40	509103	114532	23.4	21.5	18.5	14.9	15.4	17.8	17.2	14.8	20.8	23.0	21.8	21.8	19.2	15.4	
41	508677	114149	15.1	18.9	12.7	11.3	8.6	10.6	11.1	10.0	11.3	12.3	14.4	14.3	12.5	10.0	
42	508215	114348	20.3	23.1	19.7	18.2	17.2	18.5	19.7	42.7		23.0	23.6	23.1	22.6	18.1	
47	508945	114268	44.1	40.6	45.7	47.9	55.5	43.3	54.1	43.9	60.3	58.2	45.6	51.6	49.5	39.6	

All erroneous data has been removed from the NO<sub>2</sub> diffusion tube dataset presented in Table B.1.

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

Local bias adjustment factor used.

National bias adjustment factor used.

Horsham District Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

#### Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

### **New or Changed Sources Identified Within Horsham District Council During 2021**

Horsham District Council has not identified any new sources relating to air quality within the reporting year of 2021.

### **Additional Air Quality Works Undertaken by Horsham District Council During 2021**

Horsham District Council has not completed any additional works within the reporting year of 2021.

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

The diffusion tubes are sourced from Sototec in Didcot using the 50% TEA in acetone preparation method. The national bias adjustment factor was obtained from Defra national bias adjustment factor database (spreadsheet version number 03/22 published in April 2022) based on 23 co-location studies. The bias adjustment factor given for this methodology was 0.78.

Laboratories participate in two QA/QC schemes. The new AIR-PT Scheme (a continuation of the Workplace Analysis Scheme for Proficiency (WASP)) is run by LGC and supported by the Health & Safety Laboratory. The other scheme is a monthly field intercomparison Exercise operated by the National Physics Laboratory (NPL). Defra advises that local authorities should use diffusion tubes supplied by laboratories that have demonstrated satisfactory performance under the QA/QC schemes.

Socotec is a UKAS accredited laboratory and participates in both QA/QC schemes described above. The list of those laboratories which have performed satisfactorily in the

AIR-PT scheme is provided to local authorities on the LAQM Support website<sup>17</sup>. In the latest available AIR-PT results Socotec have scored 100% in round AR042 (January to March 2021). The percentage score reflects the results deemed to be satisfactory based upon the z-score of  $< \pm 2$ .

### Diffusion Tube Annualisation

Annualisation (short to long term data adjustment) is required for any site with data capture less than 75% but greater than 25%. But, although Diffusion Tube 23 (N. Horsham 1N) presented 73.7% of data capture, it has 9 months' worth of data.

The Annualisation Tool v1.0 has been developed to assist local authorities to annualise NO<sub>2</sub> diffusion tube monitoring data at sites with less than 9 months' usable data. Therefore, no annualisation was calculated for Horsham District for the monitoring period.

### Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance regarding the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO<sub>x</sub>/NO<sub>2</sub> continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Horsham District Council have applied a local bias adjustment factor of 0.80 to the 2021 monitoring data. The use of bias adjustment factors over the past five years has varied but generally fluctuates around 0.8. A summary of bias adjustment factors used by Horsham District Council over the past five years is presented in Table C.1. The co-location study has been completed at Storrington, Cowfold and Horsham, using the Diffusion Tube Data Processing Tool (v.1.2), and presented a good overall precision. Details are presented in Table C.2.

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<sup>17</sup> <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/qa-qc-framework/>

**Table C.1 – Bias Adjustment Factor**

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	-	0.80
2020	Local	-	0.83
2019	Local	-	0.74
2018	Local	-	0.81
2017	Local	-	0.78

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

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO<sub>2</sub> concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO<sub>2</sub> fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO<sub>2</sub> concentrations corrected for distance are presented in Table B.1.

No diffusion tubes NO<sub>2</sub> monitoring locations within Horsham District Council required distance correction during 2021.

### QA/QC of Automatic Monitoring

Data collection and ratification for the HO2 Horsham Park Way and HO5 Cowfold monitoring stations is undertaken by the Environmental Research Group, Kings College, through a contract with Sussex Air Partnership. For more information, please visit the Sussex Air Quality Partnership website at <http://www.sussex-air.net>. The operation and data management for both stations are carried out to the AURN standards, however, the data quality could be further improved if independent inter calibrations site audits were carried out (which are requirement for AURN sites).

HO4 Storrington AURN monitoring station is an AURN affiliated site managed primarily by AEA Technology in accordance with the 'QA/QC Procedures for the UK Automatic Urban and Rural Air Quality Monitoring Network (AURN)'.

Calibrations and checks at all stations are undertaken every four weeks by an in-house Local Site Operator and the analysers are maintained under contract with instrument suppliers/manufacturers for all three stations.

Data presented within this ASR have been previously ratified.

Live and historic data is available at Sussex-Air and UK-Air website.

### **PM<sub>10</sub> Monitoring Adjustment**

The PM<sub>10</sub> monitoring data from the HO2 Horsham Parkway analyser has been corrected by Imperial College London in accordance with the Volatile Correction Model (VCM)<sup>18</sup>.

### **Automatic Monitoring Annualisation**

All automatic monitoring locations within Horsham District Council 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<sub>2</sub> Fall-off with Distance from the Road**

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO<sub>2</sub> concentration at the nearest location relevant for exposure has been estimated using the NO<sub>2</sub> fall-off with distance calculator available on the LAQM Support website. Where appropriate, automatic annual mean NO<sub>2</sub> concentrations corrected for distance are presented in Table B.1.

No automatic NO<sub>2</sub> monitoring locations within Horsham District Council required distance correction during 2021.

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<sup>18</sup> <http://www.volatile-correction-model.info/Default.aspx>

**Table C.2 – Local Bias Adjustment Calculation**

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3
<b>Periods used to calculate bias</b>	8	12	12
<b>Bias Factor A</b>	0.84 (0.79 - 0.91)	0.74 (0.69 - 0.8)	0.83 (0.78 - 0.88)
<b>Bias Factor B</b>	19% (10% - 27%)	35% (25% - 44%)	21% (13% - 29%)
<b>Diffusion Tube Mean (<math>\mu\text{g}/\text{m}^3</math>)</b>	25.2	27.2	25.0
<b>Mean CV (Precision)</b>	3.4%	5.4%	5.3%
<b>Automatic Mean (<math>\mu\text{g}/\text{m}^3</math>)</b>	21.2	20.2	20.6
<b>Data Capture</b>	98%	100%	100%
<b>Adjusted Tube Mean (<math>\mu\text{g}/\text{m}^3</math>)</b>	21 (20 - 23)	20 (19 - 22)	21 (19 - 22)

**Notes:**

A combined local bias adjustment factor of 0.80 has been used to bias adjust the 2021 diffusion tube results.

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

Figure D.1 – Map of Horsham Air Quality Monitoring Stations

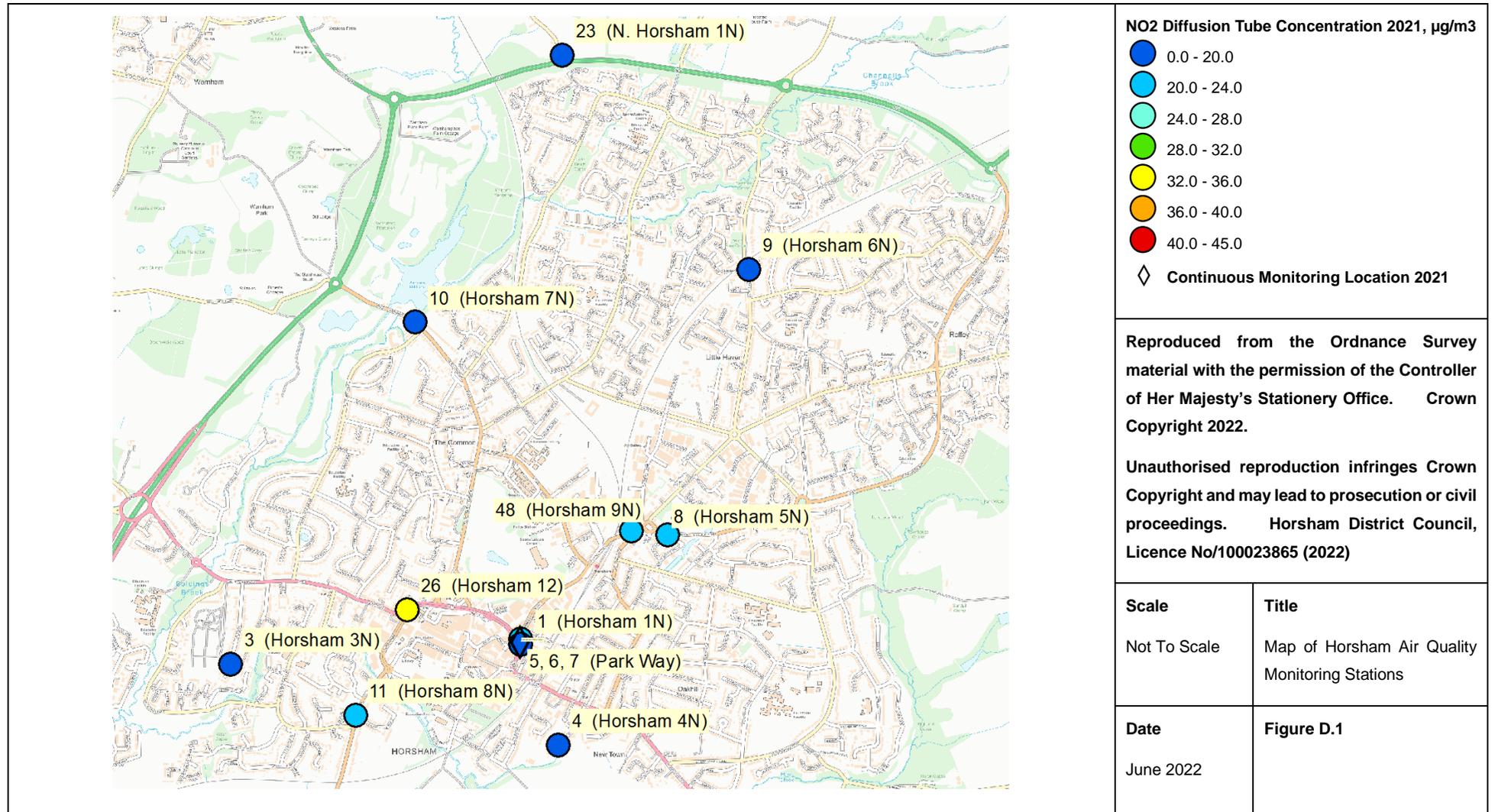


Figure D.2 – Map of Storrington Air Quality Monitoring Stations

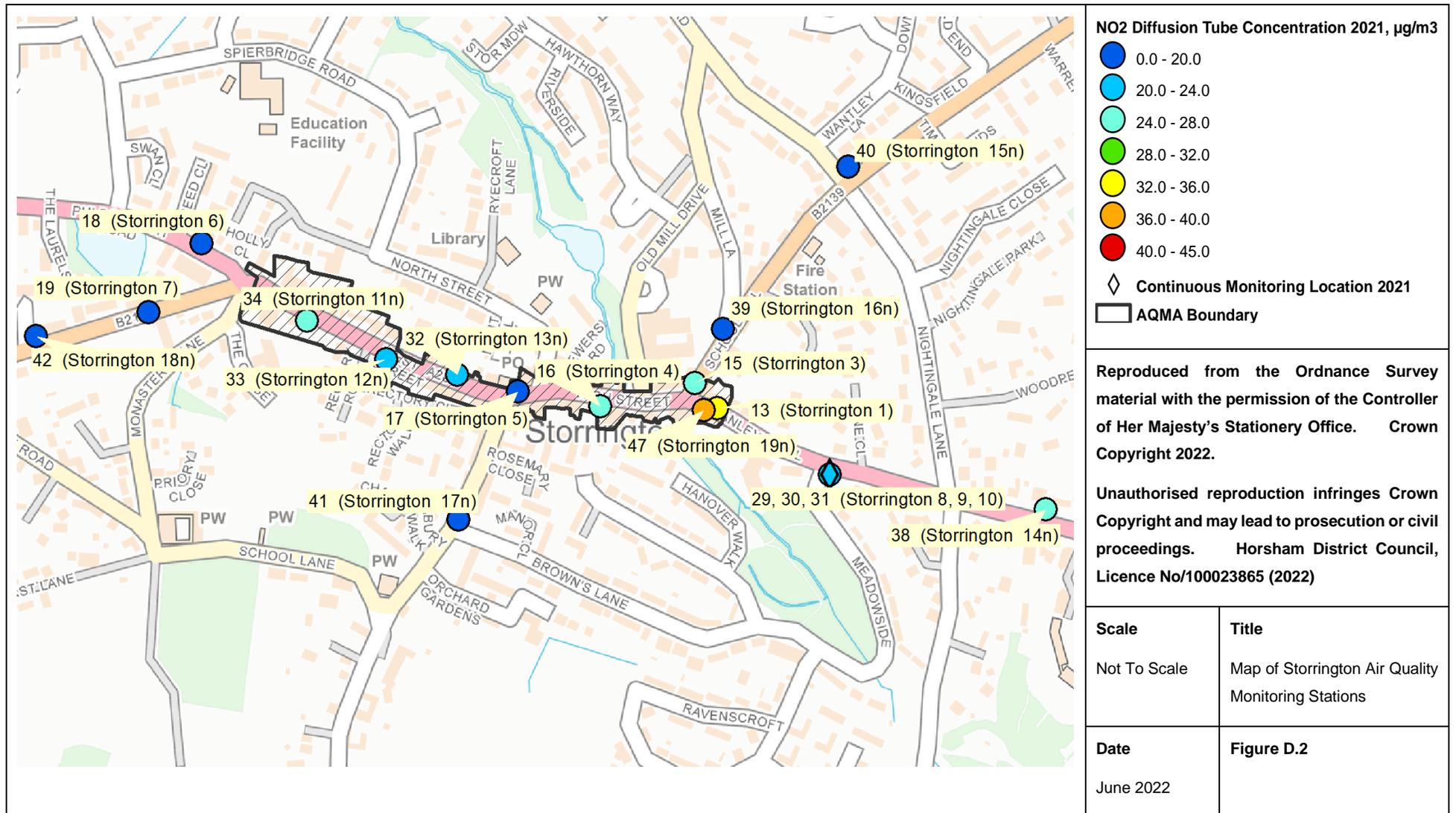


Figure D.3 – Map of Cowfold Air Quality Monitoring Stations

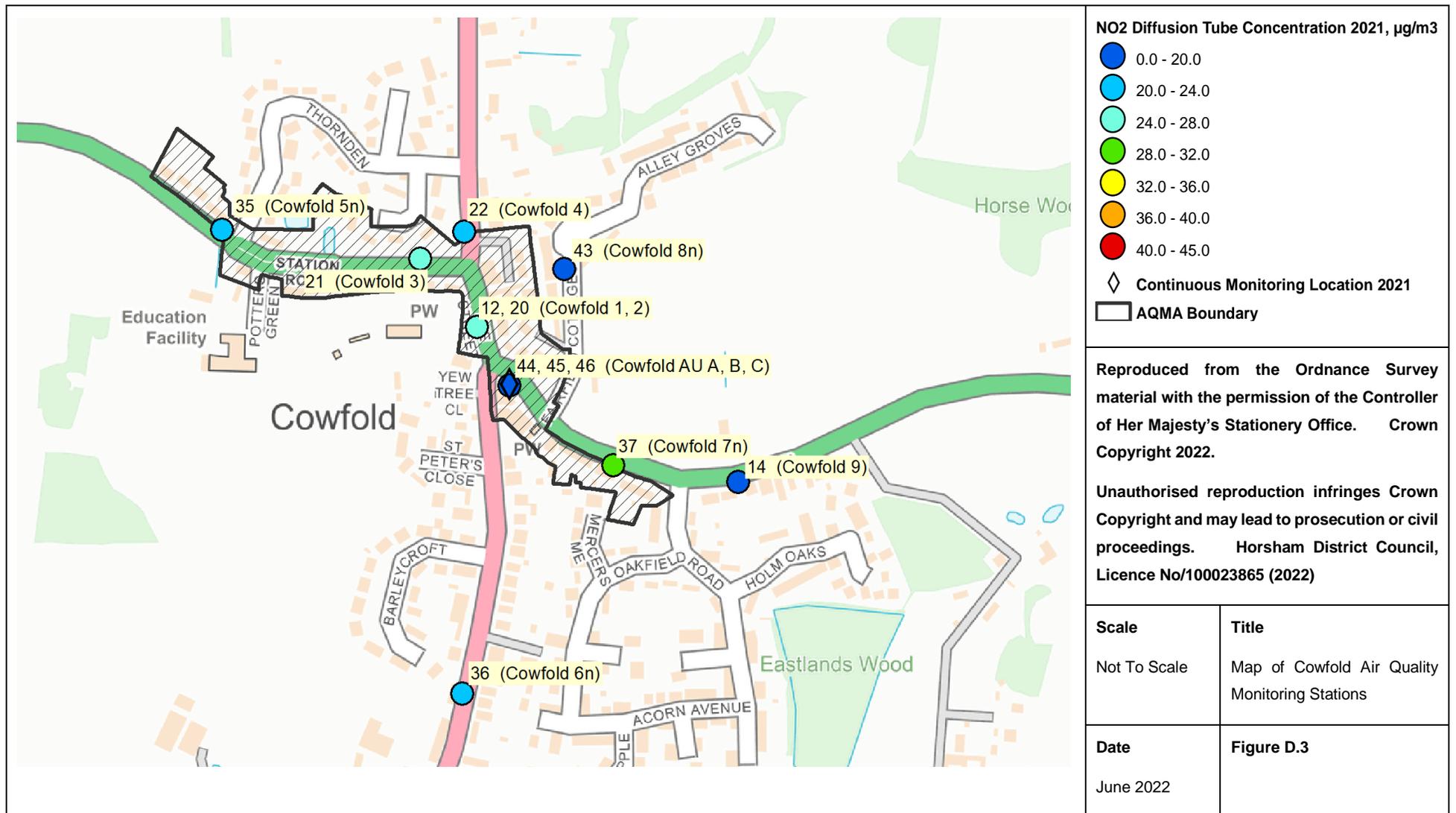


Figure D.4 – Map of Henfield Air Quality Monitoring Station

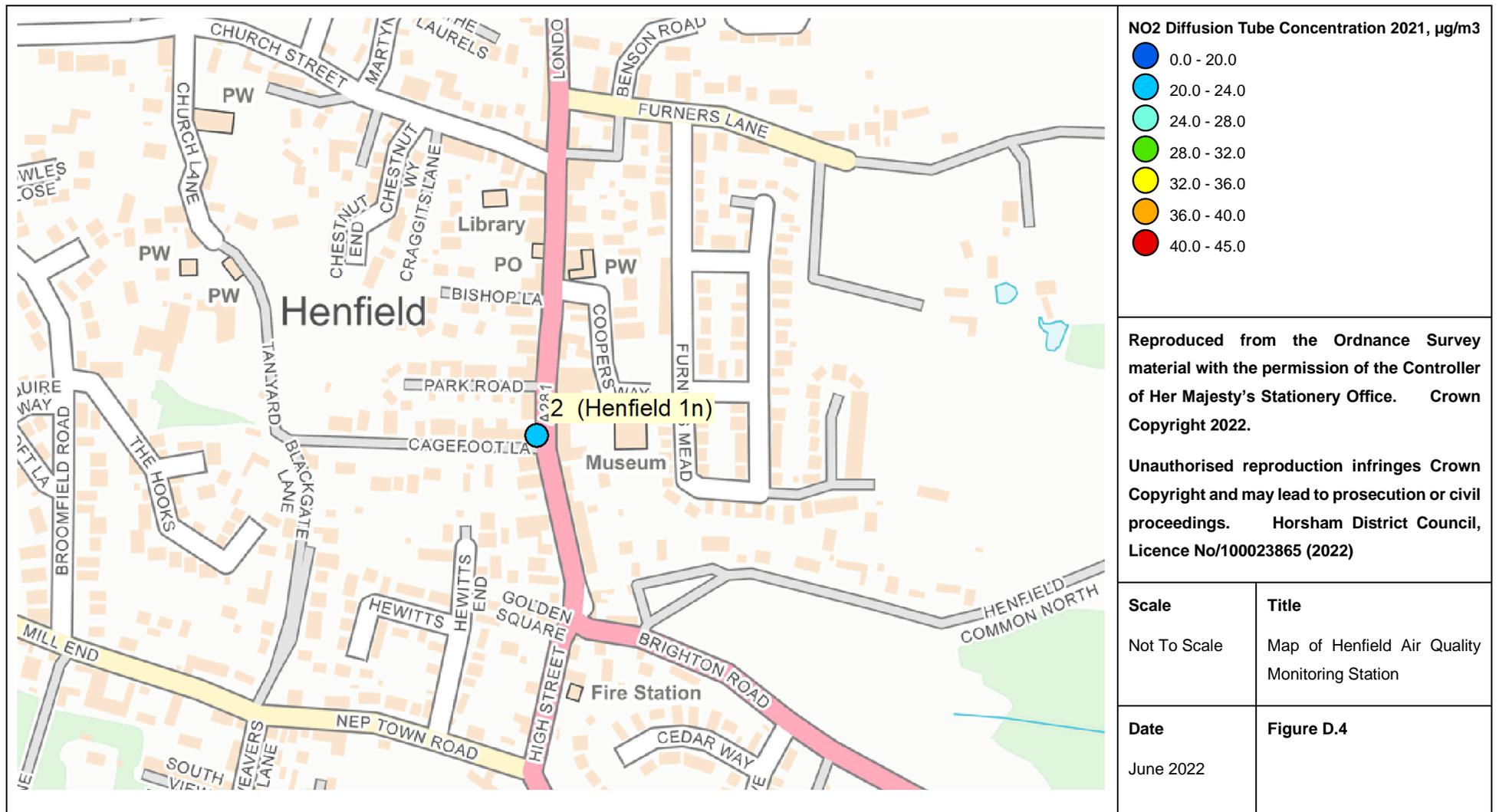


Figure D.5 – Map of Pulborough Air Quality Monitoring Station

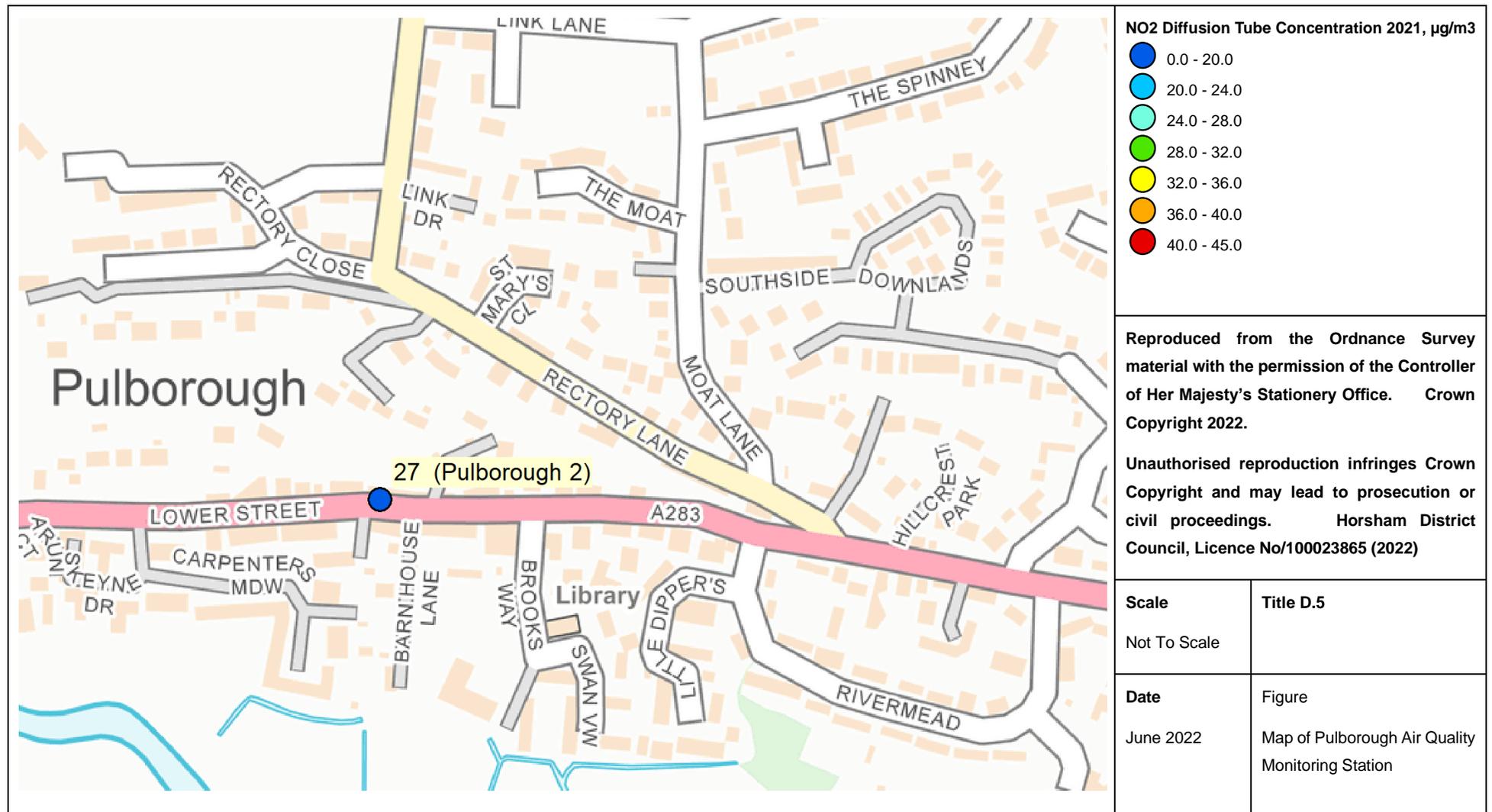


Figure D.6 – Map of Billingshurst Air Quality Monitoring Station

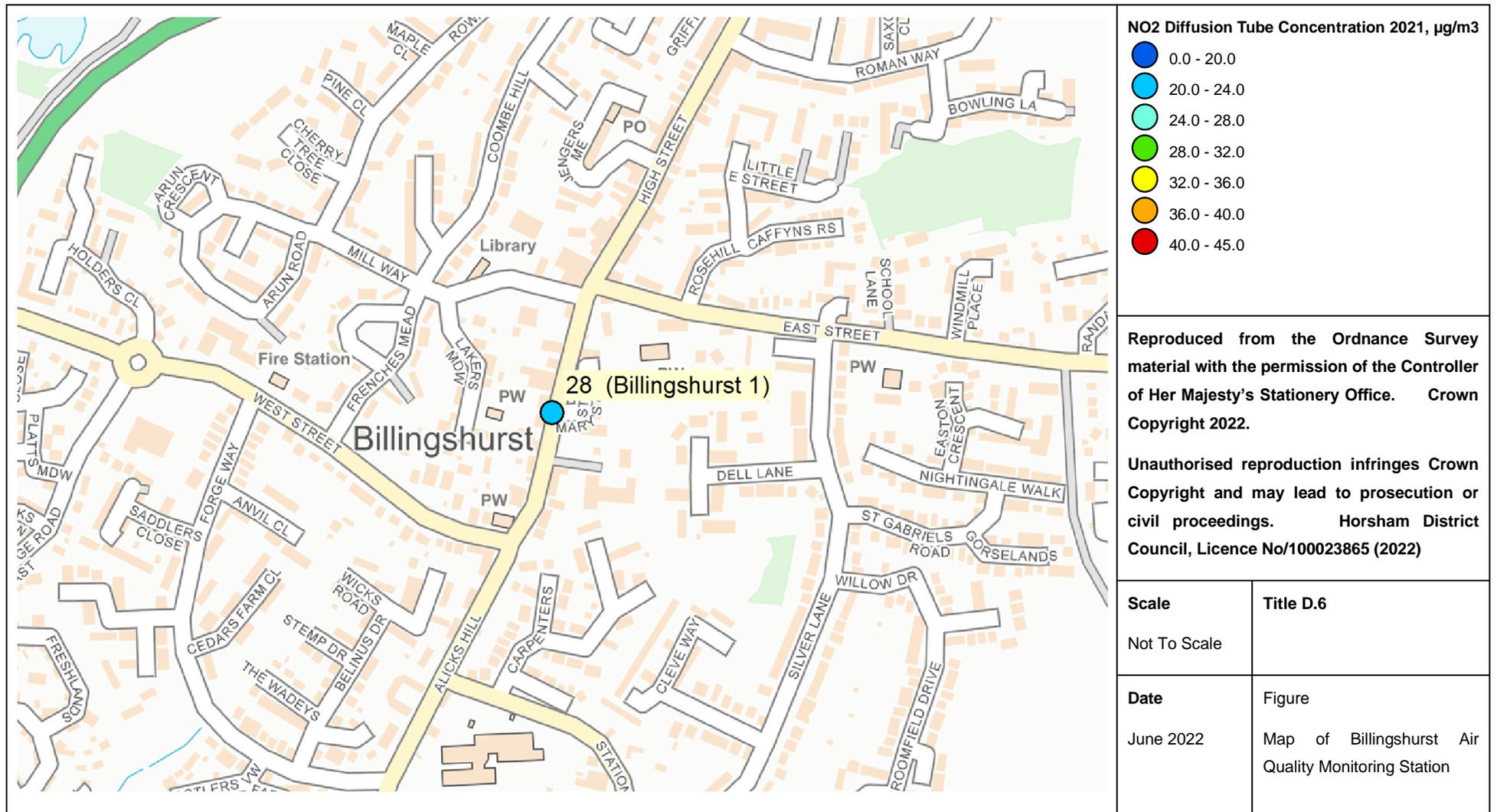


Figure D.7 – Map of Southwater Air Quality Monitoring Station

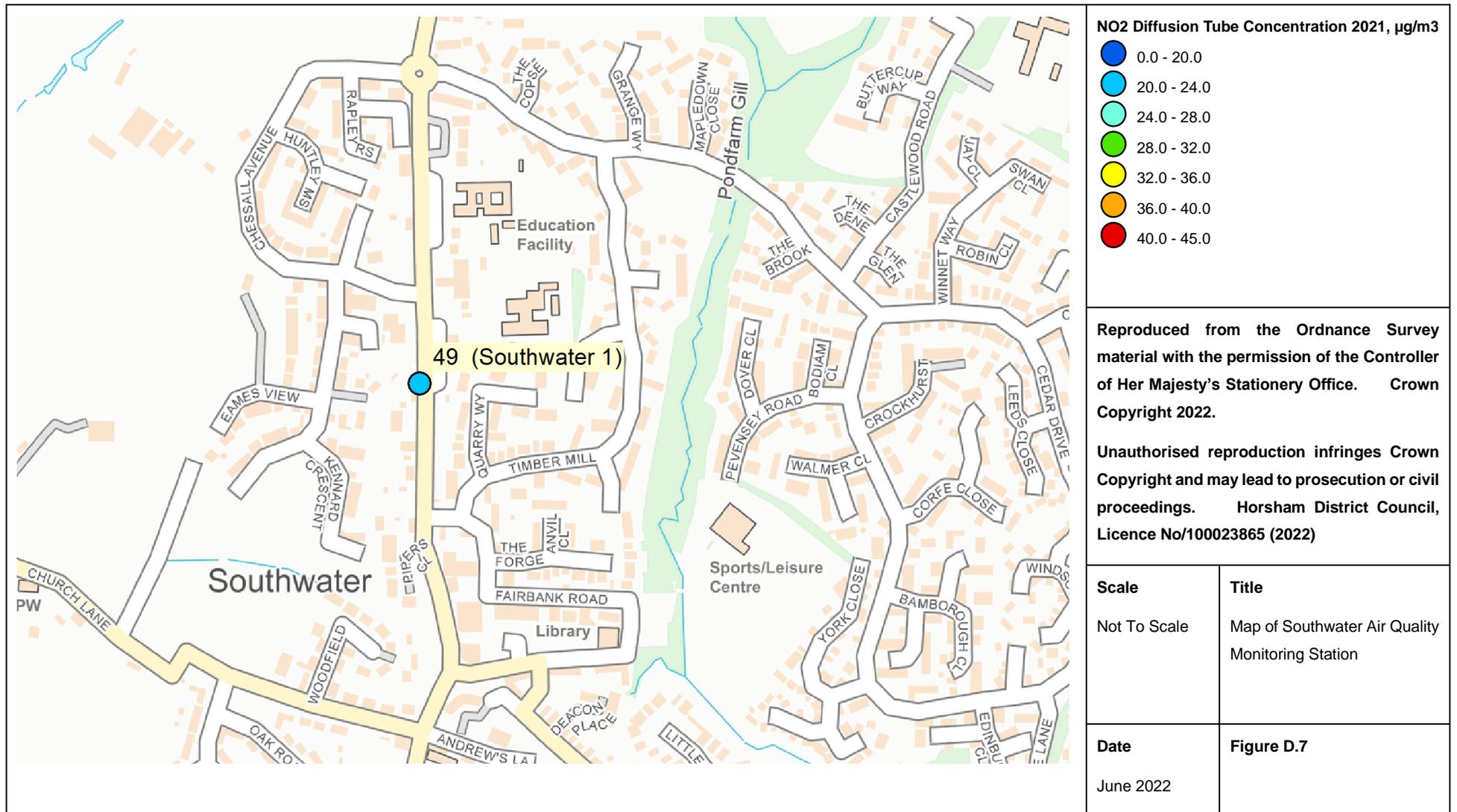
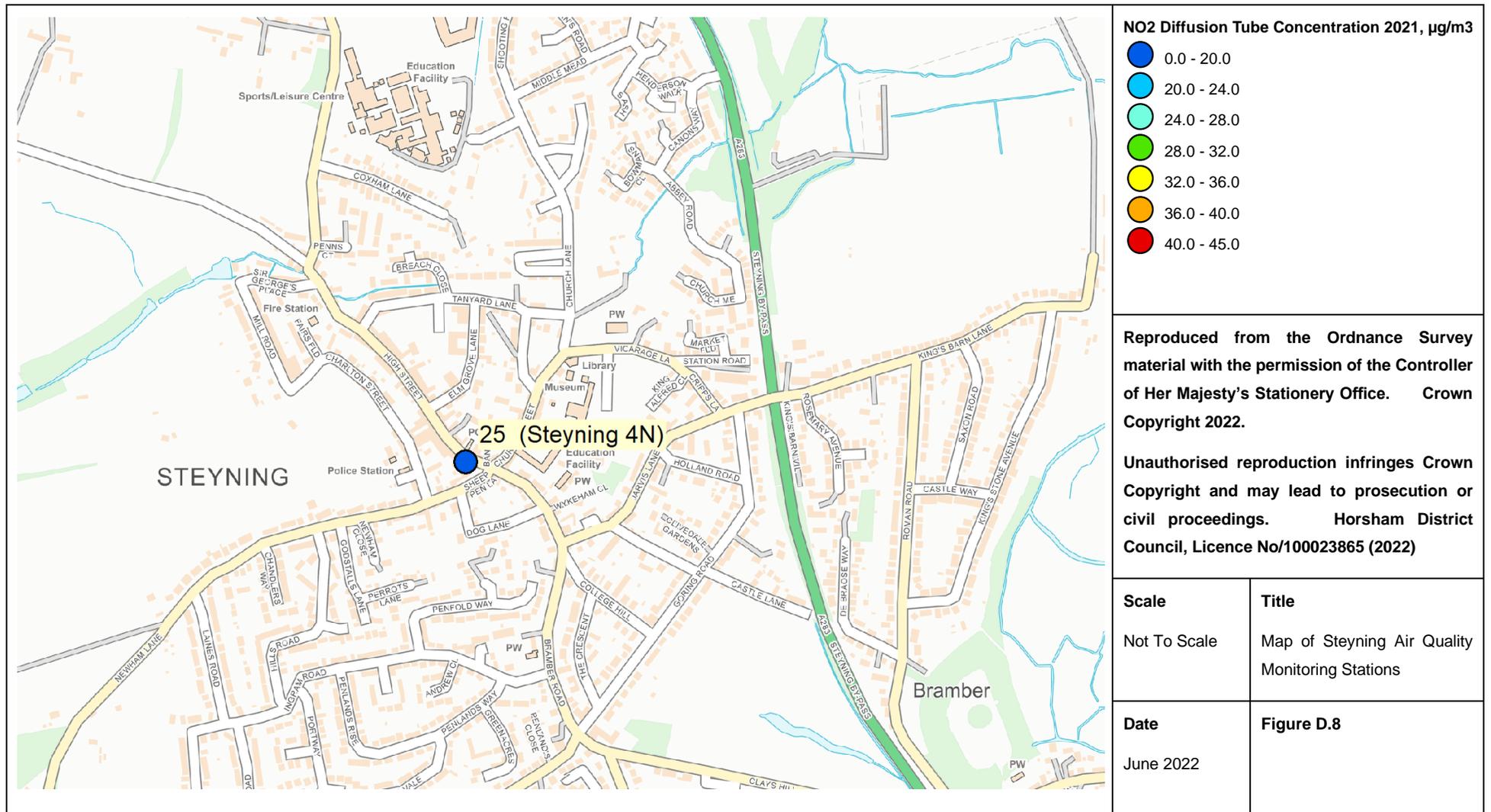


Figure D.8 – Map of Steyning Air Quality Monitoring Stations



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

**Table E.1 – Air Quality Objectives in England<sup>19</sup>**

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

<sup>19</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## Glossary of Terms

Abbreviation	Description
AIR-PT	Proficiency Testing scheme for laboratories involved in air quality analysis
AQAP	Air Quality Action Plan – A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air Quality Annual Status Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
CLC	County Local Committee
CYC	Charge-Your-Car eV charge point network
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EH	Environmental Health
EU	European Union
EV	Electric Vehicle
FDMS	Filter Dynamics Measurement System
HDC	Horsham District Council
HDPF	Horsham District Planning Framework
HE	Highways England
IWP	Integrated Works Programme
LAQM	Local Air Quality Management
LE	Low Emission
LEV	Low Emission Vehicle
LSTF	Local Sustainable Transport Fund
LTIP	Local Transport Investment Programme
NO <sub>2</sub>	Nitrogen dioxide

Abbreviation	Description
NO <sub>x</sub>	Nitrogen oxides
OLEV	Office for Low Emission Vehicles
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance/Quality Control
STIP	Strategic Transport Investment Programme
TRO	Traffic Regulation Order
ULEV	Ultra-Low Emission Vehicles
WASP	Workplace Analysis Scheme for Proficiency
WSCC	West Sussex County Council
TEA	Triethanolamine

## References

- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.

**REPORT ENDS**