2023 Air Quality Annual Status Report (ASR)

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

Date: June 2023

Information	Swindon Borough Council Details
Local Authority Officer	Head of Environmental Health, Damon Green
Department	Environmental Health, Public Health
Address	Wat Tyler House West 5th Floor, Beckhampton Street, Swindon, SN1 2JG
Telephone	01793 445500
E-mail	dgreen@swindon.gov.uk
Report Reference Number	SBC2023ASR
Date	June 2023

Director of Public Health	Professor Steve Maddern
Signature:	

Executive Summary: Air Quality in Our Area

Air Quality in Swindon

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

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

Traffic derived Nitrogen Dioxide (NO_2) is the main pollutant of concern in Swindon, and the Council runs a monitoring network of 42 diffusion tubes at 38 sites to monitor levels and to inform the need to declare any new Air Quality Management Areas. All the diffusion tubes are situated close to roads and monitor levels monthly over time.

At the roadside, 4 sites (S15, S29, S30, S42) returned values above the limit value that would apply at the receptor, and 1 further site returned just within 10% of that limit value of 40µg/m^3 as an annual average. 1 of those sites (S29, within the AQMA) returned an annual average value above 60µg/m^3, a level which might indicate potential non-compliance with the 1-hour limit value of 200µg/m^3. This site is at a location where members of the public would be very unlikely to spend significant amounts of time however, and so it is considered there is no relevant exposure there.

5 of the 38 sites therefore returned measured levels sufficiently large to require assessing for fall-off over distance to a relevant receptor, compared to 6 such sites in 2021.

---

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

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

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

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

Following adjustment for fall-off distance, 1 site returned a NO_2 level marginally outside of compliance at 41.7μg/m³; at site S15 within the Air Quality Management Area (AQMA). 2 sites (S29 and S30), both also within the AQMA, returned figures within 10% of the limit level, at 38.8 and 38.2μg/m³ respectively. All other sites within the Borough returned measured levels below the limit level when adjusted for distance.

The results from the 2022 monitoring year as a whole show no significant change from 2021; the average across our monitoring network showed a less than 1% increase in NO_2 levels. The 2 monitoring sites showing the biggest increase over 2021 levels (S13, +46% and S32, +26%) were significantly disrupted by major roadworks during 2021, and were also annualised to account for several missing months' data. Last year's results for these locations were thus likely not representative, and the 2022 results likely represent the new normal here. Excluding the large apparent changes at these two locations; our network showed a slight average improvement of 1%. 19 sites showed improved results, and 19 sites show slightly worsened results. The Automatic Urban and Rural Network node for Walcot, operated by DEFRA returned similar minor change for 2022 over 2021, and this helps to provide confidence in our results.

15 monthly diffusion tubes were found missing from their locations during the year, out of a possible 456 for the year as a whole. In addition, after a review of the data identified apparently anomalous results; all of the data (38 points) from November 2022 were discarded. No cause could be identified for this apparent issue, and this will be discussed in Appendix C. Notwithstanding, data capture remained good, and only 1 location (S1) needed to be annualised.

Swindon has one Air Quality Management Area (AQMA), declared in 2018; that of a stretch of Kingshill Road where a 'street canyon' is formed by houses close to the kerb, tall trees, and a topography somewhat sheltered from prevailing winds. Since declaration the air quality has improved within the AQMA across the seven monitoring locations within (S7, S11, S15, S18, S19, S29, & S30) such that, in 2022 only 1 monitoring location remains just outside of the limit level at 41.7 μg/m³. Measured NO_2 levels within the AQMA very slightly reduced in 2022, in line with the rest of the Borough, by around 1%.

As in most locations in England, especially in the South; Fine Particulate Matter ($PM_{2.5}$) is also a concern. The Environment Act 2021 led to a new national $PM_{2.5}$ target value of 10μg/m³ by 2040, and Swindon is in a relatively good position with regard to this target. Alongside it, a Population Exposure Reduction Target of 35% by 2040 was also introduced, and this may be more difficult to achieve without real behaviour change. Due

to PM2.5's transboundary nature, these are principally central government's targets to meet, and we wait to see how local authorities will be expected to help meet it.

Whilst most $PM_{2.5}$ originates outside of our boundary and so is not under our direct influence, $PM_{2.5}$ has arguably a greater health impact than NO_2, and we will fully engage in any centrally led effort to reduce $PM_{2.5}$ locally.

We have recently been fortunate enough to win a DEFRA Air Quality Grant, which includes for more outreach and communications resource for campaigns around $PM_{2.5}$ generation in Swindon. The 2021 Census confirmed that solid fuel burning in Swindon as the primary heat source is extremely low, and so behaviour change around elective burning both in and out of the home will be a key focus for us.

Swindon's Joint Strategic Needs Assessment (JSNA) with regard to air quality describes the problem and identifies those areas, both by Ward and Lower Super Output Area, which are most vulnerable to both NO_2 and $PM_{2.5}$ pollution according to the UK Health Security Agency produced vulnerability indicators.

No new major emission sources were identified in this period in Swindon. Honda Motor Company closed its large vehicle and engine manufacturing plant in Swindon in mid-2021, and this has led to assumed reductions in Volatile Organic Compounds and Particulates from the paint and engine casting processes there. The site is currently being developed into a commercial and distribution hub.

We will continue to monitor NO_2 through our extensive diffusion tube network in 2023, and continue working to identify any further local actions which may have a meaningful impact on ambient $PM_{2.5}$ levels, with regard to the recently updated national Air Quality Strategy.

Actions to Improve Air Quality

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

The Environmental Improvement Plan[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$

---

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

targets. The National Air Quality Strategy will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[6] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Swindon continues to work through its Air Quality Action Plan for the Kingshill Air Quality Management Area. Progress has been slower than we would like in 2021, principally due to a reorganisation within the Transport department, but the Traffic Regulation Order (TRO) to remove most heavy vehicles from Kingshill is now at preferred route detailed design stage.

A new Local Logistics Partnership has been set up, and consultation on the Traffic Regulation Order will now take place in that forum. Our Public Transport lead is also engaged with the local bus companies on routes and emissions. A Bus Service Improvement Plan is now in place, and an Enhanced Bus Partnership Plan.

We have recently also run a 'Transport Conversation' survey, which gained 1500 responses and is currently being analysed. The results from this survey will identify any change in post Covid-19 travel habits to inform our future work in this area.

We have successfully bid for a DEFRA Air Quality Grant to support local action on both NO_2 and $PM_{2.5}$. The grant will fund 2 Variable Message Sign (VMS) units to provide travel and environmental messaging to drivers and others, and will be placed at either end of our AQMA. It also funds additional campaign resource on this topic; to focus on changing travel habits and lowering domestic $PM_{2.5}$ generation through burning by way of communications and outreach programmes in schools, community groups, and with the wider public.

A large portion of locally emitted primary $PM_{2.5}$ is assumed to stem from domestic solid fuel use. We are enforcing the ban on the sale of the most polluting fuels, including wet wood whilst undertaking petroleum and industrial emissions inspections. The 2021 Census

---

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

confirmed that the level of solid fuel use for home heating where there is no alternative is extremely low, and so our focus has switched to targeting elective burning.

We use the results from our monitoring network and national models to work closely with Planning and Highways colleagues when considering new development, and also closely monitor our emitting industries through the Local Air Pollution and Control (LAPPC) regime. We maintain our Covid-19 advice to residents to avoid bonfires where there is an alternative, and we respond quickly to reports of large smoky burns.

Swindon Borough Council's 'Be the Change' campaign principally targets climate change, but in seeking to reduce fossil fuel use, this will also have important benefits for air quality too. The Solar Together Wiltshire group buy scheme, in partnership with Wiltshire Council, is to run for a further year.

Conclusions and Priorities

This Annual Status Report notes a year of relative stasis in NO_2 levels in Swindon when compared to 2021. Traffic levels within our AQMA reflected this stasis, remaining around 5% lower than the 2019 peak of 16,789 vehicles per day; in line with wider trends in vehicle numbers since the Covid-19 pandemic.

Measured NO_2 levels in Swindon continue their trend of annual improvement and, aside from, still, within the AQMA, do not raise concerns. This mild improvement applies within our Kingshill AQMA too, where only one monitoring site of 7 remains just above limit levels, and 2 remain within 10%. The expected impact of the to-be-introduced Traffic Regulation Order will sustainably return levels in the AQMA to within limit levels, and this is our clear focus. This is now moving forward apace again.

We remain committed to the remaining actions within our Action Plan, which will help offset the expected uplift in vehicle numbers as the Wichelstowe and other developments are built out, and ensure that we can remain below limit levels in the future. In this regard we are also focused on delivering actions under the DEFRA grant, which will have an impact both on NO_2 and $PM_{2.5}$ levels.

There is insufficient evidence to revoke the Kingshill AQMA at this time. The existing AQMA boundaries remain relevant for our Action Plan, with all exceedances, and sites within 10% of the objectives, contained within it. A revised Air Quality Action Plan for Kingshill will be published before the end of 2023, and the boundaries of the AQMA will be reconsidered again there.

Local Engagement and How to get Involved

The Head of Environmental Health contributed to the recent updated JSNA on air quality in Swindon, and works closely with the Consultant in Public Health, Health Protection on the topic. The Environmental Health team is a consultee for all large developments in the Borough, and works with Highways colleagues to provide an air quality input to transport decisions.

Members of the public who would like to help improve Swindon's air quality are encouraged to:

- Avoid burning garden or other waste where possible.
- Avoid the use of solid fuel heating such as wood or coal burners where alternatives such as central heating are available and healthy indoor temperatures can be maintained without.
- Choose active modes of travel; walking and cycling, or public transport for local journeys.
- Choose greener vehicles when replacing existing vehicles; alternative fuel over petrol, petrol over diesel, smaller over larger.
- Consider renewable technologies to supplement or replace home energy use. Use a renewable supplier for grid energy.

Watch Swindon Borough Council's Be the Change campaign for ways to get involved in reducing fossil fuel use in Swindon.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Swindon Borough Council.

This ASR has been approved by the Director of Public Health as the chair of the Air Quality Steering Group.

This ASR has been signed off by the Director of Public Health; Professor Steve Maddern

If you have any comments on this ASR please send them to the Head of Environmental Health, Damon Green, at: dgreen@swindon.gov.uk.

Table of Contents

Figures

Tables

1 Local Air Quality Management

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

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

2 Actions to Improve Air Quality

Air Quality Management Areas

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

A summary of AQMAs declared by Swindon Borough Council can be found in Table 2.1. The table presents a description of the AQMA that is currently designated within Swindon. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of the AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO_2 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
Kingshill	02/05/2018	NO_2 Annual Mean	An area encompassing 14 properties on Kingshill Road west of the junction of Clifton Road	No	56µg/m3	41.7µg/m^3	DRAFT Air Quality Action Plan, March 2019	<u>Air Quality Action Plan, March 2019</u>

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

☒ **Swindon Borough Council confirm that all current AQAPs have been submitted to Defra.**

Progress and Impact of Measures to address Air Quality in Swindon

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed, concise, generally followed the latest template, and satisfied the relevant standards. Annualisation of data was considered correct, and data trends well presented.

It was noted however that a number of minor typographical and/or layout errors survived proof reading reviews. This has been considered in this report.

The presence of an Automatic Urban and Rural Network monitoring node operated by DEFRA in Swindon was noted, and it was advised that data from this could and should be included in our reports going forward. This has been included for this report.

It was further suggested that a colocation study could usefully be undertaken at this node site, in order to provide a local bias adjustment factor. It has not yet been possible to action this, but discussions are underway.

It was suggested that a review or consideration of the AQMA boundaries could be undertaken in the light of changing pollution levels within and without the AQMA. This has not been accounted for to date, but forms part of our ongoing review of the Kingshill AQMA. Our 2019 draft AQAP is currently being reviewed, which was a further appraisal suggestion, with a view to providing an updated and final AQAP soon after submission of this status report.

In 2022 we have been working to move forward the remaining Action Plan measures for Kingshill. A reorganisation of the Highways team and a lack of expert resource meant that we have not moved forward with our principal measure of the Traffic Regulation Order (TRO) to impose a weight limit on the road as quickly as we have liked. That has now settled and we have recently moved to detailed design of the infrastructure needed to support the TRO. The Highways reorganisation, under new leadership, has also provided for a tighter focus on sustainable and active transport, including additional resource.

A Local Logistics Partnership has been set up, and formal consultation on the TRO will be undertaken there imminently.

A Bus Service Improvement Plan is now in place, and an Enhanced Bus Partnership Plan.

We have also recently run a 'Transport Conversation' survey in Swindon; the results of which will feed into our sustainable transport plans going forward.

An application for DEFRA Air Quality grant funding was ultimately successful towards the end of the year, and this will fund nudge signage around the AQMA, and outreach and campaign work around active travel and $PM_{2.5}$ generation.

We have now moved measures 4,5,6,7 and 8 to fully funded status as a result, and will be pushing these through during 2023 and 2024.

Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in their Kingshill Action Plan.

In summary, our key achievements in 2022 have been to line up organisational and funding capacity to move forward with the remaining Action Plan measures and other measures which will benefit Swindon residents more widely.

Swindon expects the following measures to be completed over the course of the next reporting year:

- A Traffic Regulation Order (TRO) restricting heavy vehicles on Kingshill Road.
    - This measure could remove 1.5% of total vehicles from the road, and reduce NO_2 by 10% as a result ($4\mu g/m^3$).
- Installation of nudge and informational Variable Message Signs around the Kingshill AQMA.
    - We estimate that, by fostering environmentally sensitive driving and alternative route selection, this measure could reduce NO_2 levels by $0.5\mu g/m^3$.
- Conduct outreach and campaigns in Swindon around active travel and sustainable transport; working with public transport companies and employers in Swindon around staff travel arrangements.
    - We estimate that this activity, which spans measures 5,6,7 and 8, could reduce NO_2 levels by around $1.7\mu g/m^3$.

Swindon has faced a number of organisational and financial challenges which have held up progress on the Kingshill Air Quality Action Plan in recent months. Funding and other resources are now in place to push through the remaining measures however, and to return the Kingshill road area to full compliance with limit values based on recent monitoring results.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Seek to Implement Restrictions (Traffic Regulation Order) on Kingshill Road for certain vehicle classes.	Traffic Management	UTC, Congestion management, traffic reduction	2019	2023	Highways, Local Authority, Local Authority Transport,	Public Health	NO	**Fully Funded**	£175k	Implementation	3.6µg	12% reduction in road NO$_2$	Consultation stalled in 2022. Freight partnership now being set up to progress TRO consultation.	This measure stalled in 2022 due to resource constraints and a reorganisation. Logistics partnership now been set up as the consultation mechanism to progress further. Detailed infrastructure design is now being undertaken. ANPR study confirms previous estimations of volume of heavy vehicles on road.
2	Upgrade the Old Town Railway cycle path and	Transport Planning and Infrastructure	Cycle network	2019	2023	Highways, Local Authority, Local Authority Transport,	Highways	NO	Partially Funded	£500k - £1 million	Implementation	0.5µg	A surfaced and useable route from Wichelstowe to Old Town	Drainage and some surfacing works completed. Seeking addition	The Old Town Railway cycle path could provide an attractive alternative route into and out of Old Town, especially for Wichelstowe residents, and those in West Swindon. Still seeking funding opportunities to progress.

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	connect it to existing paths.													al funding to progress.	This remains a priority for funding when suitable opportunities appear.
3	~~Improve emissions from Private Hire and Hackney Carriages through the licensing regime.~~	~~Promoting Low Emission Transport~~	~~Taxi Licensing conditions~~	~~2019~~	~~2020~~	~~Local Authority - Licensing~~	~~Licensing~~	~~NO~~	~~Funded~~	~~< £10k~~	~~Completed~~	~~0.5µg~~	~~All Private Hire at least Euro 6 by 2024. All Hackney Carriages Euro 6, EV, or alternative fuel by 2024.~~	~~Policy now in place. Phased implementation with age of vehicles.~~	~~1000 Licensed Private Hire, and 104 licensed Hackney Carriages in Swindon. Private Hire may be first licensed at no more than 5 years old, and may not be licensed after 10 years of age. Hackney Carriages may be licensed up to 15 years old. There are no current conditions around cleaner propulsion Cost: Normal Business~~
4	Investigate options for the installation of 'nudge'	Public Information	Via other mechanisms	2019	2024	Highways, Public Health	Highways, Public Health	YES	**Fully Funded**	£63k	Implementation	0.5µg	Reduction in road vehicles using Kingshill Road, and reduced emissions.	Succesful DEFRA AQ Grant Bid for 2023. VMS packages	Seeking to encourage drivers to use alternative routes where practicable, and to drive appropriately in the AQMA.

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	signage on approaches to the AQMA; to divert traffic and encourage good driver behaviour.													preparing for commissioning.	
5	Promote active travel (walking, cycling and public transport) through travel plans and the	Promoting Travel Alternatives	Encourage / Facilitate home - working	2019	2024	Highways	Highways	YES	**Fully Funded**	£10k - 50k	Implementation	1.0µg	Greening of company vehicle fleets. Reduction in business miles	Funding gained to recruit a dedicated FTC PH Specialist for 18months to focus on engagement and outreach	Active modes of transport are part of the Town Centre plan and the Swindon Transport Strategy. Travel Plan Officer actively engages schools, communities and workplaces, particularly for new developments. Promote Swindon Travel Choices for active journey planning http://www.swindontravelchoices.co.uk/ Cost: Normal Business Dedicated Public Health Specialist recruitment commenced.

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	Swindon Travel Choices campaign.													around several measures.	
6	Support and collaborate with local bus companies to minimise emissions and maximise usability of the bus network in Swindon,	Alternatives to private vehicle use	Bus based Park & Ride	2019	2024	Bus companies, Planning, Public Health	Bus companies, Planning, Public Health	YES	**Fully Funded**	£1 million - £10 million	Implementation	0.1µg	Substantial increase in efficiency and reduction in emissions from buses. Increasing bus use.	Funding gained to recruit a dedicated FTC PH Specialist for 18months to focus on engagement and outreach around several measures.	Bus companies operating in Swindon are Thamesdown Transport and Stagecoach. Across that fleet; 53% of vehicles are EuroIII or EuroIV, and only 47% EuroV or EuroVI. Swindon's bus routes are radial; in and out from the centre, and there are comparatively few connections between the spokes. Improving routes offers the potential to displace car journeys. Park and Ride schemes have not taken off in Swindon. Bus Improvement Plan and Enhanced Bus Partnership Plan now in place.

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	including their vehicle fleet renewal plans.														
7	Raise awareness of Air Quality Issues with local residents, schools and businesses to encourage behaviour change	Public Information	Via leaflets	2019	2024	Public Health, Localities, LEP	Public Health, Localities, LEP	YES	**Fully Funded**	£10k - 50k	Implentation	0.3µg	Substantial increase in public transport use and active travel.	Funding gained to recruit a dedicated FTC PH Specialist for 18months to focus on engagement and outreach around several measures.	Influencing behaviour change through health education and promotion. Cost: Normal Business Dedicated Public Health Specialist recruitment commenced.
8	Engage and	Promoting Trave	Encourage /	2019	2024	Highways, Public Health	Highways,	YES	**Fully Funded**	< £10k	Planning	0.3µg	Greening of company	Funding gained to	Active modes of transport are part of the Town Centre plan and the Swindon Transport

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	work with employers to promote greener fleets and staff transport arrangements.	I Alternatives	Facilitate home-working				Public Health						vehicle fleets. Reduction in business miles	recruit a dedicated FTC PH Specialist for 18months to focus on engagement and outreach around several measures.	Strategy. Travel Plan Officer actively engages schools, communities and workplaces, particularly for new developments. Promote Swindon Travel Choices for active journey planning http://www.swindontravelchoices.co.uk/ Dedicated Public Health Specialist recruitment commenced.
~~9~~	~~Review and, if necessary, update Local Development Orders relating to~~	~~Policy Guidance and Development Control~~	~~Air Quality Planning and Policy Guidance~~	~~2019~~	~~2020~~	~~Planning~~	~~Planning~~	~~NO~~	~~Funded~~	~~< £10k~~	**~~Completed~~**	~~0.1µg~~	~~Reviewed LDOs in place.~~	~~LDOs in place for parking and EV charging. Will be reviewed ongoing to identify further opportunities; in line with~~	~~Local development Order is already in place, but constantly reviewed to ensure that it provides appropriate planning guidance.~~ https://www.swindon.gov.uk/info/20113/local_plan_and_planning_policy/648/local_development_orders/2

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	~~electric vehicle charging requirements and alternative fueled vehicle fueling stations across the borough.~~ ~~Review Parking Standards for new developments to~~													~~planning cycle.~~	

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	~~mandate vehicle charging provision.~~														
10	Pursue the Transport Vision 2026 for Swindon & Wiltshire LEP with regard to sustainable transport outcomes.	Transport Planning and Infrastructure	Other	2019	2024	Planning, Highways	Planning, Highways	NO	Funded	< £10k	Implementation	1.0µg	NA	Actively pursuing all parts of the Vision.	Wiltshire and Swindon LEP Local Energy Strategy – draft. https://swlep.co.uk/docs/default-source/board-meetings/2018/28-nov.2018/agenda-for-board-meeting-28th-nov-2018.pdf?sfvrsn=15645c74_2 . Cost: Normal Business
~~11~~	~~Review and enhance the~~	~~Policy Guidance~~	~~Air Quality Plann~~	~~2019~~	~~2021~~	~~Planning, Highways, Public Health~~	~~Planning, Highways~~	~~NO~~	~~Funded~~	~~< £10k~~	**~~Completed~~**	~~0~~	~~Local Plan review adopted~~	~~Plan review now~~	~~Swindon Borough Local Plan 2026 available at: https://www.swindon.gov.uk/info/20113/local_plan_and_plan~~

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	~~Swindon Borough Local Plan (2026) to prioritise sustainable transport and ensure that policies relating to, and impacting upon air quality, are fit for purpose and serve~~	~~and Development Control~~	~~ing and Policy Guidance~~				~~, Public Health~~							~~adopted .~~	[ning_policy/635/swindon_borough_local_plan_2026](https://www.swindon.gov.uk). ~~Cost: Normal Business~~

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	~~to reduce emissions where possible.~~														
~~12~~	~~Review and enhance the developing Town Centre Movement Strategy with air quality improvements a central theme.~~	~~Policy Guidance and Development Control~~	~~Air Quality Planning and Policy Guidance~~	~~2019~~	~~TBC~~	~~Planning, Localities, Public Health, Highways~~	~~Planning, Localities, Public Health, Highways~~	~~NO~~	~~Not Funded~~	~~< £10k~~	**Completed**	~~1µg~~	~~New Town Centre Movement Strategy targeting air quality improvements as a central theme~~	~~Reviewed plan now adopted, but priorities unfunded to date~~	~~Cost: Normal Business.~~ https://www.swindon.gov.uk/info/20136/transport_strategy/910/integrated_transport_schemes/6

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
13	Review and enhance the Swindon Local Transport Plan 2011-2026	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2019	2020	Air Quality Planning and Policy Guidance Other policy	Air Quality Planning and Policy Guidance Other policy	NO	Funded	£10k - 50k	Implementation	0.25µg	Revised Swindon Local Transport Plan	In progress	Normal business. https://www.swindon.gov.uk/downloads/download/1006/swindon_local_transport_plan_2011_to_2026
~~14~~	~~Review the Park and Ride Strategy for Swindon to minimise the need for vehicular journeys into~~	~~Alternatives to private vehicle use~~	~~Bus based Park & Ride~~	~~2019~~	~~2020~~	~~Highways, Planning, Localities, Highways~~	~~Highways, Planning, Localities, Highways~~	~~NO~~	~~Not Funded~~	~~< £10k~~	~~Aborted~~	~~0~~		~~No progress on review. Unclear if need for park and rides as previous iterations not well used.~~	~~Cost: Normal Business~~

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	the town centre.														
15	Amend purchasing policy for Council owned vehicles to prioritise greener fuels and efficiency where viable.	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2019	2023	Highways, Waste, Housing	Highways, Waste, Housing	NO	Funded	< £10k	**Completed**	0.5µg	All Council vehicles to be low emission where viable.	New purchasing policy in place. 4 replacement EV vans, and 35 ULEV vans ordered, awaiting delivery. Investigating replacement of bin lifts on refuse lorries with electric lifts.	Housing fleet renewed on a 1/3 replacement every year. Cost: Normal Business
16	Installation of vehicl	Promoting Low Emis	Procuring alternative	2019	2021	Highways, Waste, Housing	Highways, Waste	NO	Funded	£50k - £100k	Completed	0	Alternative fuel points installed	Delivered initial quota, more to	Charging Infrastructure in place for current fleet.

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	~~e charging points at Council depot~~	~~sion Transport~~	~~Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging~~				~~e, Housing~~						~~and in use at depot~~	~~follow as EV fleet increases~~	
~~17~~	~~Change the schedule for recycling and waste collection to out of peak times on~~	~~Traffic Management~~	~~UTC, Congestion management, traffic reduction~~	~~2019~~	~~2019~~	~~Waste management~~	~~Waste management~~	~~NO~~	~~Funded~~	~~< £10k~~	**Completed**	~~0~~	~~No peak time collections of Kingshill Road~~	~~Delivered. Collections now take place in middle of day. Periodic acute congestion much reduced~~	~~Potential to move slots to middle of the day. Reduce queuing on Kingshill Road and create smoother traffic flow. Cost: Normal Business~~

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	~~Kings hill Road(7am - 9am)~~													~~as a result.~~	
18	Engage with local bus companies to increase the number and frequency of services to foster	Alternatives to private vehicle use	Other	2019	2020	Public Health	Public Health	YES	FUNDED	< £10k	Implementation	0	N/A	Funding gained to recruit a dedicated FTC PH Specialist for 18months to focus on engagement and outreach around several measures.	Potential to assist modal shift
~~19~~	~~ANPR & Emissions Survey of~~	~~Other~~	~~Other~~	~~2021~~	~~2021~~	~~Public Health~~	~~Public Health~~	~~NO~~	~~Funded~~	~~£10k - 50k~~	~~Completed~~	~~0~~	~~Survey output report received and assessed for TRO.~~	~~AQAP review in progress. ANPR confirms~~	~~To inform estimates of measures impact, and to inform development of existing and new measures. Traffic flows now returned to pre-Covid levels and stable.~~

Me asu re No.	Measur e	Catego ry	Classifi cation	Yea r Mea sure Intro duc ed in AQ AP	Esti mate d / Actu al Com pleti on Date	Organisatio ns Involved	Fundin g Sourc e	Defr a AQ Gra nt Fun ding	Fundin g Status	Estimate d Cost of Measure	Measure Status	Reductio n in Pollutant / Emissio n from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	~~Kings hill~~												~~Will feed into AQAP.~~	~~assumpt ions on heavy vehicle use.~~	

PM$_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

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

The Public Health Outcomes Framework identifies that the fraction of mortality attributable to particulate air pollution (new method, 2020) in Swindon is 5.9% for 2021; the latest available, which is higher than both the regional (SW) average and the England average. With reference to Swindon's CIPFA nearest neighbours; Swindon lies at the top of that range.

Swindon notes the World Health Organisation's recently tightened PM$_{2.5}$ guidelines, which reduce the aspirational annual mean target to 5µg/m^{3,} from 10µg, along with a suite of interim targets for nations unable to immediately achieve the ultimate guideline. This reflects the very low threshold for health impacts from PM$_{2.5}$ and will serve to drive regional and global reduction of this pollutant.

Swindon further notes the recently made Environment Act 2021, and the more recent Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, which sets two PM$_{2.5}$ targets in law which must be met by the end of 2040, and is expected to drive national reductions. The Regulations set both an annual mean target of 10µg/m3, commensurate with WHO interim target four, and a Population Exposure Reduction Target (PERT) of 35% by the same date.

The new national PM$_{2.5}$ legal limits will not be assessed at local scale, but it is useful to compare Swindon's local levels to the new future annual mean limits, to inform and motivate progress. Current models extend only to 2030, but by that time only 2 of Swindon's 1km grid squares are forecast to exceed the new legal limit (marginally) at that time.

Swindon relies on the DEFRA background mapping resource to estimate maximum ambient PM$_{2.5}$ in Swindon, by 1km grid square (whilst noting that the models used to produce it are based on the pre-Covid period and may not accurately predict local PM$_{2.5}$ now). DEFRA's AURN node at Walcot in Swindon has measured Urban Background

$PM_{2.5}$ to reference standard since June 2022 however, and a further roadside background node is expected to be installed at Penhill on the A4311 in 2023. Part year, annualised, results for the Walcot node are reported in Appendix A.

For 2022, background mapping suggests that, of Swindon's 232 grid squares; 11 exceeded a $PM_{2.5}$ level of 10 $\mu g/m^3$ (14 in 2021) the highest at 10.59$\mu g/m^3$, the lowest 7.73. The highest levels are, expectedly, seen around the urban centre of Swindon, bounded by the M4 motorway to the South, the A419 to the East and North, and the Borough boundary to the West.

The Mean modelled level of $PM_{2.5}$ across Swindon Borough in 2022 was 8.77$\mu g/m^3$ (2021: 8.89μg), and the Median was 8.52 (2021: 8.64μg).

Along with local traffic, domestic solid fuel burning had previously been thought to be the likely biggest local contributor to $PM_{2.5}$ levels that is under any potential local influence. Census 2021 identified, however, that there are very low numbers relying on solid fuel as their primary home heat source. Overall, 0.0% of homes in Swindon rely on solid fuel, and the worst Middle Super Output Area returns only 0.1%. This is significantly lower than neighbouring local authority areas, which have larger rural populations that may not benefit from good gas connections. This might indicate that Swindon may not be in a position to influence locally generated $PM_{2.5}$ to any great degree, other than by reducing elective and top up heating burning.

Notwithstanding; Swindon has recently been fortunate to receive DEFRA AQ Grant funding to include outreach and campaign work around $PM_{2.5}$ generation, and will seek to influence behaviours mostly around elective burning, where this is not needed for home heating, and also fugitive and incidental $PM_{2.5}$ generation via bonfires etc.

With regard to traffic derived $PM_{2.5}$ pollution; actions 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, & 15 in the Air Quality Action Plan could also be expected to exert downward pressure on local $PM_{2.5}$ emissions. It is noted that the greatest primary $PM_{2.5}$ contribution from traffic is now brake, tyre and road surface erosion, and that work is underway nationally and beyond to reduce this through product standards.

In addition; Swindon's 'Be the Change' campaign and Solar Group Buying project is expected to reduce energy produced through fossil fuels demand, so decreasing $PM_{2.5}$ emissions more widely.

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

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

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Swindon undertook no automatic (continuous) monitoring during 2022.

Swindon benefits from a DEFRA AURN Urban Background Node at Walcot however, and presents data from that node in this report. The node measures Nitrogen Dioxide (NO_2), Nitric Oxide (NO), Nitrogen Oxides as Nitrogen Dioxide, all since 2018, and PM_{10} and $PM_{2.5}$ since mid 2022. Monitoring for Ozone (O_3) also commenced during 2023.

Table A.1 in Appendix A shows the details of the DEFRA AURN automatic monitoring sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. The DEFRA UK Air web page presents automatic monitoring results for Swindon here: https://uk-air.defra.gov.uk/data/flat_files?site_id=SWHO.

Maps showing the location of the monitoring sites are provided in Appendix D.

3.1.2 Non-Automatic Monitoring Sites

Swindon undertook non- automatic (i.e. passive) monitoring of NO_2 at 38 sites during 2022, as in 2021. 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.

Individual Pollutants

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

3.1.3 Nitrogen Dioxide (NO$_2$)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO$_2$ annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

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

Table A.5 in Appendix A compares the ratified continuous monitored NO$_2$ hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Swindon's 2022 results do not differ significantly from the 2021 dataset, remaining lower that the pre-Covid-19 period. One diffusion tube site, within the AQMA, returned levels (after distance correction) above the limit value of 40µg/m^3; this was site S15, which is in the narrowest and most canyon-like section of the AQMA. All other sites within the AQMA returned levels below the limit value, although 2 of these lie within 10% of it.

No changes are planned to the monitoring network for 2023. Our Action Plan for Kingshill is being reviewed and will be published shortly after the drafting of this document. Given that we know the current boundaries of the AQMA match the area which is under threat from non-compliance, and encloses the relevant part of the road, it is unlikely that the boundaries will change in the following version.

We conclude that the gradual improvement of the air quality in Swindon continues, but that we have one remaining monitoring location which does not meet legal limits. Our focus is to return this single monitoring site to compliance, assure ourselves that it is sustainably so, and then look to revoke the Air Quality Management Area. We believe that the

measures already identified in the Kingshill Action Plan can return the road to compliance, and we are pleased that we have been able to fully fund those measures during 2022. Our focus is now on completing those measures in 2023 and 2024.

Outside of the Kingshill AQMA, the picture is mixed, and we maintain a watching brief as the town continues to grow and develop. Our clearer focus on sustainable transport now should ensure that those areas that are currently well below limit values remain so.

3.1.4 Particulate Matter (PM$_{10}$)

Swindon undertakes no PM$_{10}$ monitoring on its own account, but DEFRA operate a reference equivalent urban background monitor in Swindon (UKA00650a , East 416341, North 184379). For 2022 (annualised), this monitor returned a value of 12.9µg/m3.

Swindon also relies on the background mapping provided by DEFRA for an indication of wider levels and trends over time, whilst acknowledging that the model which informs the mapping is based on the pre-Covid-19 period (2018). This model predicts an ambient PM$_{10}$ value at the location of the Swindon Walcot AURN monitor of 15.0µg/m3; the predicted 25th highest PM$_{10}$ level in Swindon. In 2022, none of the 232 1km2 grid squares in Swindon were predicted to exceed the 40µg/m^3 limit level.

The average of all of Swindon's grid squares is predicted to be 13.8µg/m3 in 2022, and 13.3µg/m3 in 2030.

In mid-July 2022, Swindon was affected by an incident on Salisbury Plain which led to relatively large wild fires. These could not be effectively tackled do to their locations. As a result, PM$_{10}$ and PM$_{2.5}$ levels, as recorded by the AURN node at Swindon Walcot, were elevated for a time as the plume moved across Swindon. It was during this period that Swindon experienced its only recorded exceedance of the daily limit value for PM$_{10}$; at 85.5µg/m^3. The highest hourly values occurred during the very early hours of the 12th July 2022, between 0000 and 0500, and led to the high daily average.

Modelled background maps for Swindon up to 2030 may be found here: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018 .

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

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

3.1.5 Particulate Matter (PM2.5)

Swindon undertakes no $PM_{2.5}$ monitoring on its own account, but DEFRA operate a reference equivalent urban background monitor in Swindon (UKA00650, East 416341, North 184379). For 2022 (annualised), this monitor returned value of 7.8µg/m^3.

Swindon also relies on the background mapping provided by DEFRA for an indication of wider levels and trends over time, whilst acknowledging that the model which informs the mapping is based on the pre-Covid-19 period (2018). This model predicts an ambient $PM_{2.5}$ value at the location of the Swindon Walcot AURN monitor of 10.2µg/m^3; the predicted 7th highest $PM_{2.5}$ level in Swindon. In 2022, 11 of the 232 1km^2 grid squares in Swindon were predicted to exceed the 10µg/m^3 limit level, with this number predicted to reduce to 2 grid squares by 2030.

The average of all of Swindon's grid squares is modelled to be 8.8µg/m^3 in 2022, and 8.4µg/m^3 in 2030.

During July of 2022, the Salisbury Plain wild fires led to elevated $PM_{2.5}$ levels also. Very high levels during the 0000 to 0500 period on 12th July led to a single daily average of 72.6µg/m^3 at Swindon Walcot, the worst of the year. $PM_{2.5}$ levels were periodically elevated between the 11th and 20th of July 2022 as a result, and the 4 highest measured daily values for the year fall within that period.

Modelled background maps for Swindon up to 2030 may be found here: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018 .

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations from the DEFRA AURN node at Swindon Walcot.

3.1.6 Sulphur Dioxide (SO2)

No Sulphur Dioxide monitoring is undertaken in Swindon.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Inlet Height (m)
UKA00650	Swindon Walcot AURN node	Urban Background	416341	184379	O_3, NO, NO_2, PM_{10}, $PM_{2.5}$	No	Various (DEFRA UARN)	>40m	40.5	1.8

Notes:

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

(2) N/A if not applicable

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
S1	GWR Museum	Roadside	414629.34	184736.82	NO2	No	0.3	2.0	No	2.5
S3	S4, 8 Okus Road	Roadside	414758.67	183718.55	NO2	No	4.8	2.3	No	2.5
S4	186 Kingshill Rd	Roadside	414257.86	183972.1	NO2	No	2.3	2.0	No	2.6
S5	Chalet School, Queens Drive	Roadside	416088.78	184906.88	NO2	No	0.0	7.5	No	2.8
S6	Swindon 8 - 102 Bath Road	Roadside	414925.19	183741.49	NO2	No	6.9	3.0	No	2.7
S7	No. 81 Kingshill Road	Roadside	414625.93	183848.04	NO2	Yes, Kingshill	6.0	1.6	No	2.3
S8	Aylesbury Street	Roadside	415108.27	185157.98	NO2	No	1.6	1.1	No	2.4
S9	Manchester Rd	Roadside	415156.96	185100.84	NO2	No	0.2	2.6	No	2.8
S10	Meadow Way Badbury	Roadside	419347.33	180974.53	NO2	No	6.5	36.7	No	1.8
S11	Kingshill Rd/Clifton St	Roadside	414733.29	183782.89	NO2	Yes, Kingshill	3.2	1.3	No	2.9
S12	Westcott Place	Roadside	414075.8	184040.99	NO2	No	11.6	1.2	No	2.8
S13	Cricklade Rd (Moonraker)	Roadside	415677.18	187335.48	NO2	No	4.4	1.3	No	2.9
S14	Iffley Rd from 10.05.2017	Roadside	413893.07	185621.33	NO2	No	0.7	7.7	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
S15	102 Kingshill Road	Roadside	414698.37	183800.27	NO2	Yes, Kingshill	0.1	1.3	No	2.5
S16	86 Clifton Road	Roadside	414755.79	183788.58	NO2	No	10.0	8.6	No	2.6
S17	A420 South Marston	Roadside	419437.78	186764.67	NO2	No	8.2	12.5	No	2.7
S18	63 Kingshill Rd	Roadside	414552.28	183884.71	NO2	Yes, Kingshill	6.0	2.0	No	2.8
S19	No. 85 Kingshill Road	Roadside	414654.35	183833.97	NO2	Yes, Kingshill	1.8	1.4	No	2.4
S20, S21, S22	37 Devizes Rd	Roadside	415547	183552.03	NO2	No	4.5	1.8	No	2.4
S23	30 Devizes Road	Roadside	415554.74	183494.78	NO2	No	3.5	2.0	No	2.4
S24	68 Cheney Manor Rd (Rodbourne Rd)	Roadside	415532	183666	NO2	No	2.6	2.4	No	2.3
S25	Tadpole Lane	Roadside	411973.26	189625.23	NO2	No	16.0	0.7	No	2.3
S26	66 Ermin St	Roadside	417398.65	187353.88	NO2	No	0.7	1.9	No	2.5
S2, S27, S28	Bath Rd Car Park	Roadside	415289.6	183789.81	NO2	No	3.3	5.3	No	2.6
S29	Opp 101 Kingshill Road	Roadside	414707.53	183806.25	NO2	Yes, Kingshill	7.9	1.8	No	2.5
S30	Corner of Kingshill/ Clifton Street	Roadside	414756.8	183782.97	NO2	Yes, Kingshill	15.7	1.4	No	2.3

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
S31	Wanborough Road - Merlin Way	Roadside	418426.51	186275.44	NO2	No	2.9	0.6	No	2.4
S32	516A Cricklade Road	Roadside	415666.52	187458.47	NO2	No	10.7	0.8	No	2.2
S33	Whitworth Road/ Moonrakers	Roadside	415591.43	187366.75	NO2	No	8.4	1.3	No	2.3
S34	Beechcroft Road/ Moonrakers	Roadside	415720.84	187414.25	NO2	No	6.1	0.4	No	2.5
S35	32 Swindon Street Highworth	Roadside	420029.62	192366.81	NO2	No	2.1	2.5	No	2.1
S36	Highworth - Cricklade Road	Roadside	419987.18	192409.43	NO2	No	2.1	1.6	No	2.3
S37	St Michaels Avenue Corner/ Highworth	Roadside	420036.74	192478.9	NO2	No	3.2	1.2	No	2.5
S38	Hanleys, High Street - Highworth	Roadside	420078.36	192450.06	NO2	No	2.1	1.8	No	2.3
S39	Goddard Arms - Cricklade Street	Roadside	415711.69	183817.45	NO2	No	1.1	1.7	No	2.6
S40	10 Marlborough Road - Wroughton	Roadside	414879.63	180586.08	NO2	No	3.8	0.9	No	2.9
S41	No.88 High Street - Wroughton	Roadside	414408.83	180472.53	NO2	No	2.8	0.2	No	2.5
S42	Nythe Farm A419	Roadside	419050.23	185658.12	NO2	No	6.0	2.1	No	1.5

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results: Automatic Monitoring (µg/m³) (DEFRA AURN data.)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
UKA00650	416341	184379	Urban Background	99	99	13.3	13.5	9.9	10.3	10.2

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

☒ **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/m³.

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

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

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

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

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

Table A.4 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
S1	414629.34	184736.82	Roadside	75	67.3	34.0	30.0	24.3	27.2	25.6
S3	414758.67	183718.55	Roadside	100	92.3	19.4	17.8	14.1	15.3	14.9
S4	414257.86	183972.1	Roadside	100	92.3	30.0	30.5	23.8	25.6	27.1
S5	416088.78	184906.88	Roadside	100	92.3	28.0	28.5	22.2	19.5	21.5
S6	414925.19	183741.49	Roadside	92.3	84.6	34.3	32.4	28.1	29.4	26.0
S7	414625.93	183848.04	Roadside	73.1	73.1		**44.8**	38.3	**40.5**	36.5
S8	415108.27	185157.98	Roadside	100	92.3		22.8	17.8	18.0	19.5
S9	415156.96	185100.84	Roadside	92.3	84.6	38.9	35.6	27.6	29.7	32.5
S10	419347.33	180974.53	Roadside	100	92.3	24.6	24.7	18.1	15.6	14.7
S11	414733.29	183782.89	Roadside	100	92.3	38.4	39.3	32.4	35.1	33.0
S12	414075.8	184040.99	Roadside	84.6	76.9	29.8	28.1	22.9	25.0	24.6
S13	415677.18	187335.48	Roadside	92.3	84.6	35.3	30.6	28.0	19.8	28.9
S14	413893.07	185621.33	Roadside	100	92.3	31.7	32.5	27.0	29.1	25.2
S15	414698.37	183800.27	Roadside	100	92.3	**49.1**	**46.7**	**40.6**	**45.0**	**42.2**

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
S16	414755.79	183788.58	Roadside	100	92.3	26.2	25.8	21.1	21.7	21.9
S17	419437.78	186764.67	Roadside	100	92.3	20.7	17.6	14.7	15.9	15.8
S18	414552.28	183884.71	Roadside	100	92.3	30.4	29.5	24.4	26.7	25.2
S19	414654.35	183833.97	Roadside	84.6	76.9		38.5	32.7	33.1	35.9
S20, S21, S22	415547	183552.03	Roadside	100	92.3	**40.7**	**40.1**	31.8	33.8	33.8
S23	415554.74	183494.78	Roadside	100	92.3	37.2	36.4	28.6	29.6	30.3
S24	415532	183666	Roadside	100	92.3	38.1	38.2	31.3	36.2	34.7
S25	411973.26	189625.23	Roadside	100	92.3	16.2	16.2	12.8	13.6	13.4
S26	417398.65	187353.88	Roadside	100	92.3	27.8	26.4	22.4	23.7	22.0
S2, S27, S28	415289.6	183789.81	Roadside	100	92.3	22.0	21.2	16.0	16.5	16.8
S29	414707.53	183806.25	Roadside	100	92.3	<u>**66.3**</u>	<u>**60.1**</u>	**51.8**	**53.1**	**56.0**
S30	414756.8	183782.97	Roadside	92.3	84.6		<u>**75.9**</u>	<u>**62.2**</u>	<u>**67.0**</u>	<u>**69.4**</u>
S31	418426.51	186275.44	Roadside	100	92.3		16.5	14.1	14.3	13.9
S32	415666.52	187458.47	Roadside	80.8	73.1		30.1	26.1	24.4	30.6

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
S33	415591.43	187366.75	Roadside	100	92.3		30.5	25.4	28.6	29.0
S34	415720.84	187414.25	Roadside	100	92.3		30.5	26.3	28.1	30.1
S35	420029.62	192366.81	Roadside	100	92.3		20.9	16.4	17.5	17.7
S36	419987.18	192409.43	Roadside	100	92.3		20.6	16.3	17.5	18.0
S37	420036.74	192478.9	Roadside	100	92.3		33.1	27.7	29.8	28.8
S38	420078.36	192450.06	Roadside	92.3	84.6		16.7	13.7	13.6	13.7
S39	415711.69	183817.45	Roadside	100	92.3		32.9	24.0	28.6	29.7
S40	414879.63	180586.08	Roadside	100	92.3		20.5	16.5	17.6	14.7
S41	414408.83	180472.53	Roadside	100	92.3		20.7	17.1	18.1	16.5
S42	419050.23	185658.12	Roadside	100	92.3		**52.3**	37.8	**42.3**	**43.3**

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

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

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

Notes:

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

Exceedances of the NO$_2$ annual mean objective of 40µg/m^3 are shown in **bold**.

NO$_2$ annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO$_2$ 1-hour mean objective are shown in **bold and underlined**.

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

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

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

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

Figure A.1 – Trends in Annual Mean NO₂ Concentrations

5 year trend of roadside NO$_2$ levels (µg/m³) for monitoring sites within or adjacent to the Kingshill AQMA

5 year trend of roadside NO$_2$ levels (µg/m³) for monitoring sites North of the railway line, excluding Highworth

5 year Trend of Roadside NO$_2$ levels (µg/m³) for monitoring sites South of the railway line, excluding Wroughton sites, and sites within the AQMA

2 year trend (all available) of roadside NO$_2$ levels (µg/m^3) in Highworth

2 year trend (all available) of roadside NO$_2$ levels (µg/m^3) in Wroughton

Table A.5 – 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³. (DEFRA AURN data.)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
UKA00650	416341	184379	Urban Background	99	99	0	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m³ have been recorded.

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

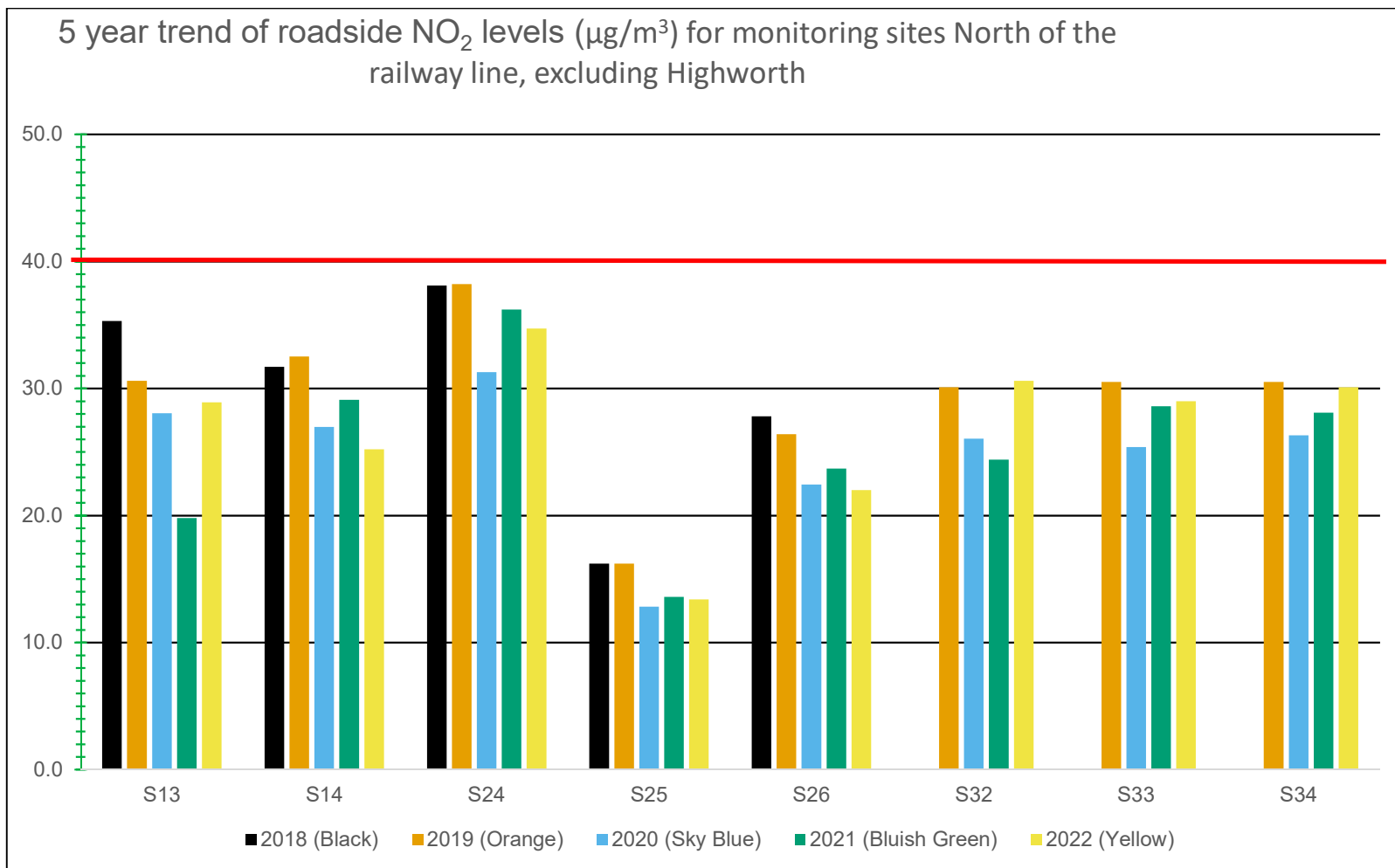If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
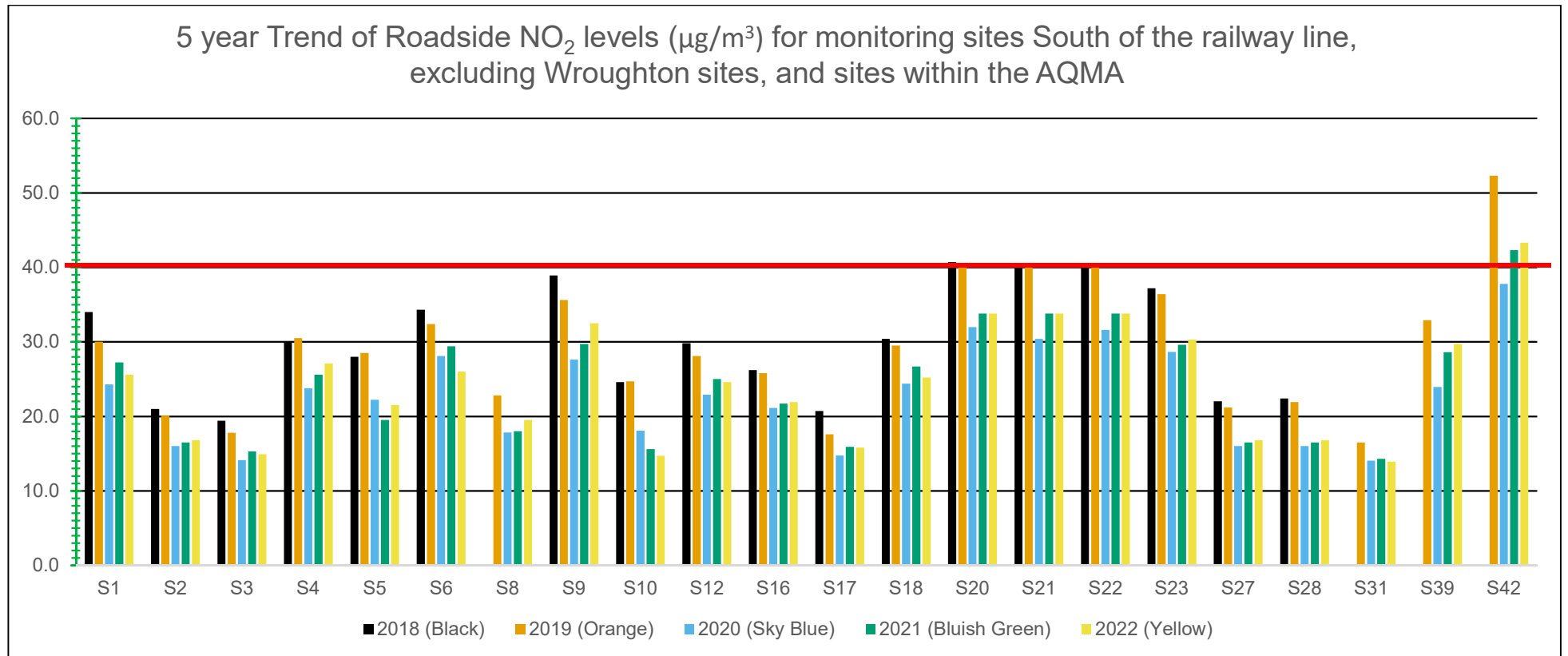
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
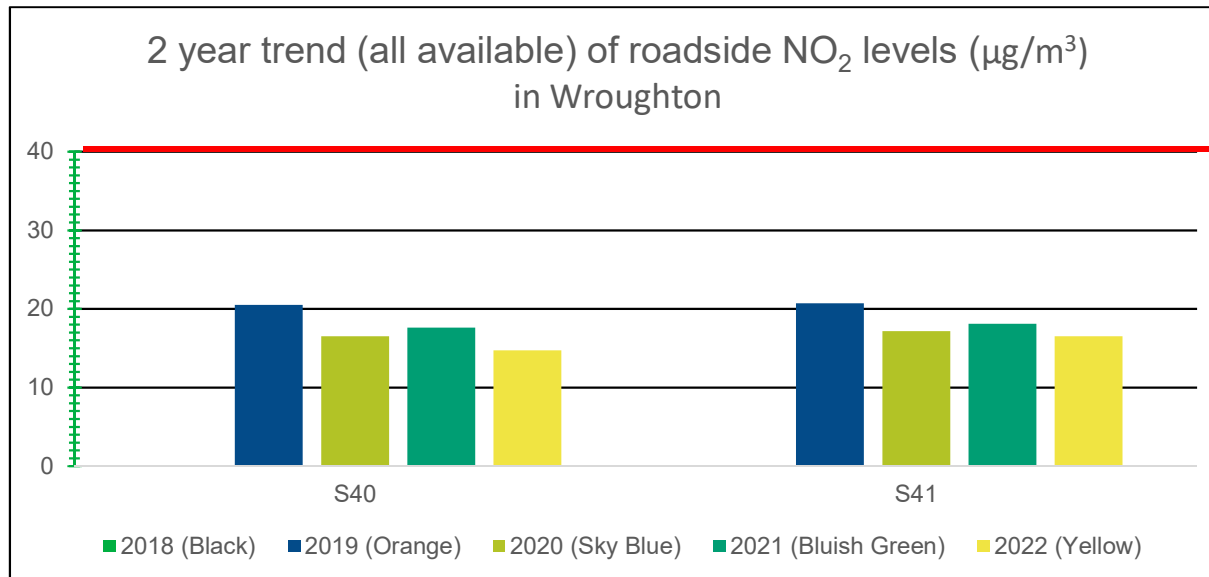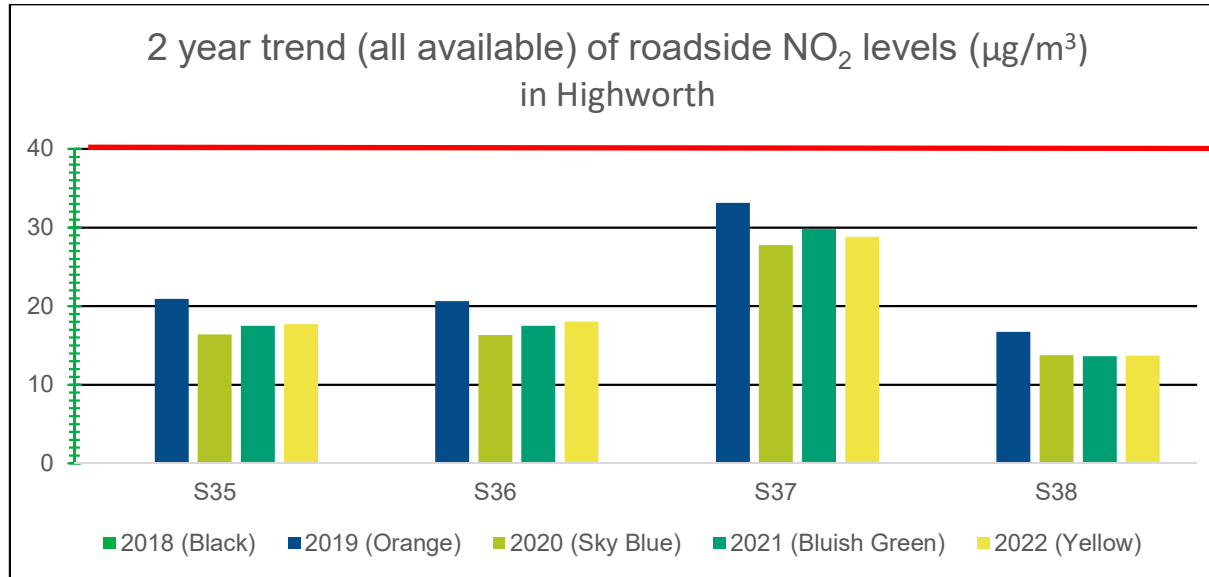
(3) All Automatic Monitoring results are courtesy of the DEFRA AURN Urban Background Node at Swindon Walcot. Annual monitoring results for all pollutants, by the hour, may be found here: https://uk-air.defra.gov.uk/data/flat_files?site_id=SWHO

Figure A.2 – Trends in Number of NO$_2$ 1-Hour Means > 200µg/m^3

Not Applicable.

Table A.6 – Annual Mean PM$_{10}$ Monitoring Results (μg/m^3). (DEFRA AURN data.)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
UKA00650	416341	184379	Urban Background	99	56	NA	NA	NA	NA	12.9

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

Notes:

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

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

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

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

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

(3) All Automatic Monitoring results are courtesy of the DEFRA AURN Urban Background Node at Swindon Walcot. Annual monitoring results for all pollutants, by the hour, may be found here: https://uk-air.defra.gov.uk/data/flat_files?site_id=SWHO

(4) Monitoring for PM10 at this site commenced on 10/06/2022, and so the data was annualised with reference to DEFRA AURN Nodes at Bristol St Pauls and Reading New Town urban background monitors.

Figure A.3 – Trends in Annual Mean PM$_{10}$ Concentrations

Not applicable. Data available only from mid 2022.

Table A.7 – 24-Hour Mean PM$_{10}$ Monitoring Results, Number of PM$_{10}$ 24-Hour Means > 50µg/m^3. (DEFRA AURN data.)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
UKA00650	416341	184379	Urban Background	100	56	<->	<->	<->	<->	1 (18.8)

Notes:

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

Exceedances of the PM$_{10}$ 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

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

(3) Automatic Monitoring results are courtesy of the DEFRA AURN Urban Background Node at Swindon Walcot. Annual monitoring results for all pollutants, by the hour, may be found here: https://uk-air.defra.gov.uk/data/flat_files?site_id=SWHO

(4) PM$_{10}$ began to be monitored on 10th June 2022, in hourly periods.

(5) Hourly values have been averaged for each 24-hour period. One 24-hour value was greater than 50, at 85.5µg, and this is likely due to the plume from the Salisbury Plain wildfires moving across Swindon during that period.

Figure A.4 – Trends in Number of 24-Hour Mean PM$_{10}$ Results > 50µg/m^3

Not applicable. Data available only from mid 2022.

Table A.8 – Annual Mean PM₂.₅ Monitoring Results (µg/m³) (DEFRA AURN data.)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
UKA00650	416341	184379	Urban Background	100	56	NA	NA	NA	NA	7.8

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

Notes:

The annual mean concentrations are presented as µg/m³.

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

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

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

(3) All Automatic Monitoring results are courtesy of the DEFRA AURN Urban Background Node at Swindon Walcot. Annual monitoring results for all pollutants, by the hour, may be found here: https://uk-air.defra.gov.uk/data/flat_files?site_id=SWHO

(4) Monitoring for PM10 at this site commenced on 10/06/2022, and so the data was annualised with reference to DEFRA AURN Nodes at Bristol St Pauls and Reading New Town urban background monitors.

Figure A.5 – Trends in Annual Mean PM$_{2.5}$ Concentrations

Not applicable. Data available only from mid 2022

Table A.9 – SO₂ 2022 Monitoring Results, Number of Relevant Instances.

No SO₂ monitoring undertaken.

Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO₂ 2022 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
S1	414629	184737	49.8		38.1		30.2	28.4	33.5	33.4		31.2		37.8	35.3	25.6	-	
S2	415290	183790	38.6	20.4	28.3	19.3	14.4	17.0	17.0	18.5	19.9	22.0		27.1	-	-	-	Triplicate Site with S2, S27 and S28 - Annual data provided for S28 only
S3	414759	183719	34.2	16.5	25.6	22.6	14.4	9.6	16.5	17.9	19.4	13.9		24.5	19.6	14.9	-	
S4	414258	183972	57.7	37.9	42.7	31.0	26.7	30.0	30.0	27.1	32.4	36.1		41.0	35.7	27.1	-	
S5	416089	184907	44.7	22.1	30.0	23.7	26.8	28.1	27.1	21.5	27.2	28.2		31.3	28.2	21.5	-	
S6	414925	183741	52.3	40.0	35.1	31.8	30.1	30.1	24.9	29.3		29.1		39.4	34.2	26.0	-	
S7	414626	183848	61.4	35.9	55.1		46.3	43.6	48.6	48.2	49.2			43.7	48.0	36.5	27.9	
S8	415108	185158	40.4	23.7	33.5	24.4	19.2	16.0	20.0	19.5	25.8	26.1		33.0	25.6	19.5	-	
S9	415157	185101	53.4		50.9	40.9	34.3	33.9	38.9	41.4	46.1	40.9		46.9	42.8	32.5	-	
S10	419347	180975	29.7	22.9	22.6	15.2	11.7	18.9	18.4	15.5	17.0	19.2		21.0	19.3	14.7	-	
S11	414733	183783	55.0	35.3	36.8	39.4	34.4	44.0	45.7	38.5	53.0	47.9		47.3	43.4	33.0	-	
S12	414076	184041			40.5	33.6	28.3	28.3	29.5	32.5	32.3	28.5		37.5	32.3	24.6	-	
S13	415677	187335	52.7		36.9	39.0	36.8	31.2	34.6	37.8	38.7	31.0		41.9	38.1	28.9	-	
S14	413893	185621	62.1	28.5	16.4	27.0	25.8	32.0	35.8	30.3	35.4	37.9		34.0	33.2	25.2	-	
S15	414698	183800	69.4	60.1	54.8	53.4	48.5	52.7	56.4	51.2	55.3	56.3		52.9	55.5	**42.2**	**41.7**	
S16	414756	183789	42.0	29.0	32.3	26.0	27.5	25.2	26.4	26.0	24.7	28.6		29.0	28.8	21.9	-	
S17	419438	186765	37.5	21.7	21.8	22.7	16.8	15.3	16.3	21.1	18.6	14.6		23.0	20.9	15.8	-	
S18	414552	183885	55.2	30.5	38.8	36.7	25.3	23.8	31.0	31.4	30.1	26.1		35.5	33.1	25.2	-	
S19	414654	183834			62.5	54.5	43.4	39.8	46.5	51.2	46.8	36.6		44.4	47.3	35.9	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
S20	415547	183552	66.9	46.6	38.1	37.8	42.6	41.5	44.3	37.7	44.3	42.5		44.9	-	-	-	Triplicate Site with S20, S21 and S22 - Annual data provided for S22 only
S21	415547	183552	58.5	46.1	37.1	39.5	41.6	43.2	48.7	37.6	46.3	46.0		43.1	-	-	-	Triplicate Site with S20, S21 and S22 - Annual data provided for S22 only
S22	415547	183552	64.5	44.8	40.3	38.4	40.2	47.2	45.6	38.3	44.0	42.2		45.1	44.4	33.8	-	Triplicate Site with S20, S21 and S22 - Annual data provided for S22 only
S23	415555	183495	56.3	46.0	34.4	37.4	33.9	36.3	39.5	36.6	40.6	37.4		40.5	39.9	30.3	-	
S24	415532	183666	60.1	35.4	56.9	46.7	32.8	38.3	43.7	53.5	45.4	41.0		48.4	45.7	34.7	-	
S25	411973	189625	32.2	16.1	19.3	13.8	13.0	13.7	14.6	15.6	17.2	15.5		23.0	17.6	13.4	-	
S26	417399	187354	44.0	23.3	35.7	26.1	26.2	25.3	24.0	28.1	28.3	28.5		29.1	29.0	22.0	-	
S27	415290	183790	39.2	23.3	27.1	22.7	16.7	16.3	15.8	17.6	18.1	19.0		25.4	-	-	-	Triplicate Site with S2, S27 and S28 - Annual data provided for S28 only
S28	415290	183790	37.5	23.6	26.5	21.4	18.4	15.3	16.0	17.5	19.9	20.2		30.0	22.1	16.8	-	Triplicate Site with S2, S27 and S28 - Annual data provided for S28 only
S29	414708	183806	79.2	58.8	74.0	72.3	58.9	62.1	92.4	86.9	83.1	71.1		71.7	73.7	**56.0**	38.8	
S30	414757	183783	108.5	80.7	91.2	86.1	88.0	97.9	98.4		89.9	86.6		85.6	91.3	<u>**69.4**</u>	38.2	
S31	418427	186275	34.9	17.5	18.8	17.6	12.4	11.0	14.1	18.2	16.7	15.0		24.4	18.2	13.9	-	
S32	415667	187458	52.3	40.7	48.4		35.3	35.8	36.2	35.3	37.5	41.4			40.3	30.6	-	
S33	415591	187367	59.2	38.1	41.8	33.4	34.0	35.0	38.5	31.8	36.1	34.7		37.4	38.2	29.0	-	
S34	415721	187414	60.8	44.1	47.5	38.1	32.3	34.2	35.2	32.8	33.6	35.6		42.1	39.7	30.1	-	
S35	420030	192367	34.9	22.5	22.8	20.1	21.2	22.0	22.3	20.9	21.9	23.1		23.8	23.2	17.7	-	
S36	419987	192409	34.7	19.6	30.1	19.9	17.7	20.7	22.8	23.0	22.8	25.1		24.5	23.7	18.0	-	
S37	420037	192479	51.8	25.6	45.7	35.7	32.5	35.4	33.7	42.4	37.9	34.0		42.4	37.9	28.8	-	
S38	420078	192450	31.5	20.7	17.3	13.5	15.1	15.2	14.5		13.5	15.2		24.2	18.1	13.7	-	
S39	415712	183817	47.0	29.0	55.4	45.8	29.2	28.9	36.4	46.2	43.3	31.1		37.1	39.0	29.7	-	
S40	414880	180586	27.3	13.7	17.2	20.1	15.4	18.0	17.8	18.1	20.5	18.6		26.4	19.4	14.7	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
S41	414409	180473	33.1	18.0	22.2	16.5	18.1	19.7	20.9	23.4	23.4	17.9		25.1	21.7	16.5	-	
S42	419050	185658	82.5	51.9	45.4	55.0	51.7	54.6	54.4	58.4	59.8	52.7		60.3	57.0	**43.3**	33.3	

☒ **All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1**.

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

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

☒ **Swindon confirm that all 2022 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**.

Notes:

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

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 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 Swindon During 2022

We have identified no new significant sources this year.

Additional Air Quality Works Undertaken by Swindon During 2022

Swindon has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

Swindon uses Socotec UK Ltd's Environmental Chemistry laboratory at Didcot to supply and analyse the 50%TEA in Acetone diffusion tubes used in its air quality monitoring work. Socotec UK Ltd are accredited by UKAS for such work, and a copy of their current accreditation may be found here: https://www.ukas.com/wp-content/uploads/schedule_uploads/00002/1252Testing-Multiple.pdf

In the AIR PT inter-comparison scheme for comparing spiked Nitrogen Dioxide diffusion tubes; Socotec holds the highest rank of Satisfactory, and the national bias calculation scheme notes the laboratory as having Good precision.

Exposure of the diffusion tubes was completed according to the 2022 Diffusion Tube Monitoring Calendar.

Prior to drafting of this report, it became clear that there were some apparently anomalous results in the year's data. These seemed to be centred around February and November's laboratory results. Enquiries with the laboratory identified no known issues in the processing, and we identified no issues with the deployment or handling of the diffusion tubes prior to the laboratory analysis. Further consideration concluded that, on balance, February's results were defensible. February was an extremely windy month, and the 5th

warmest in a series back to 1884. Although February's results seemed low in comparison to both January's and March's, they were consistently so, including between our 2 sets of triplicate sites, and so are included in the report.

November's results were more concerning, with some extremely low results, close to background levels, and large disparity even between a triplicate site. Other Authorities have similar concerns with November data too. The decision was therefore taken to discard all results for the month on the basis that there was sufficient doubt over enough of the results as to cast doubt on the whole batch.

The effect of discarding November 2022's data is that results from 31 of 38 diffusion tube results in our network (ignoring triplicates, which are averaged) worsened slightly, by an average of 1.4%, without November's data. The omission of November's data led to a need to annualise only 1 site, S1, but no other sites required annualisation as a result, and so we consider that the omission of the batch does not compromise this report's accuracy or conclusions.

Diffusion Tube Annualisation

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

Site ID	Annualisation Factor <Site 1 Name>	Annualisation Factor <Site 2 Name>	Annualisation Factor <Site 3 Name>	Annualisation Factor <Site 4 Name>	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
S1	0.9695	0.9389	-	-	0.9542	35.3	33.7

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.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Swindon have applied a national bias adjustment factor of 0.76 to the 2022 monitoring data. A summary of bias adjustment factors used by Swindon over the past five years is presented in Table C.2.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	03/23	0.76
2021	National	06/22	0.78
2020	National	03/21	0.77
2019	National	03/20	0.75
2018	National	03/19	0.77

Table C.3 – Local Bias Adjustment Calculation

No Local Bias Factor used in 2022.

NO$_2$ Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO$_2$ concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO$_2$ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO$_2$ concentrations corrected for distance are presented in Table B.1.

Table C.4 – NO$_2$ Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
S7	1.6	7.6	36.5	11.7	27.9	
S15	1.3	1.4	42.2	11.7	**41.7**	*Predicted concentration at Receptor above AQS objective.*
S29	1.8	9.6	56.0	11.7	*38.8*	*Predicted concentration at Receptor within 10% the AQS objective.*
S30	1.4	17.1	69.4	11.7	*38.2*	*Predicted concentration at Receptor within 10% the AQS objective.*
S42	2.1	8.1	43.3	12.1	33.3	

QA/QC of Automatic Monitoring

PM10 and PM2.5 Monitoring Adjustment

Where results from Automatic PM10 and PM2.5 monitoring are presented in this report, they are obtained courtesy of DEFRA's Automatic Urban and Rural Network node at Swindon Walcot. These monitors are owned and operated by DEFRA and are designed and operated to reference quality standards.

Automatic Monitoring Annualisation

Where PM10 and PM2.5 results are presented in this report, they have been annualised according to the guidance within TG22 at page 127. The DEFRA AURN node at Swindon Walcot began monitoring both PM10 and PM2.5 on June the 10th 2022, and the annualisation of this part-year data is presented here.

DEFRA AURN results are presented by calendar year, rather than in line with the monitoring year for diffusion tubes, and so the Annual Mean (A_m) refers to the period from 01/01/2022 to 31/12/2022, and the Period Mean (P_m) relates to the period from 10/06/2022 to 31/12/2022.

The data for Bristol St Pauls may be found here: https://uk-air.defra.gov.uk/data/flat_files?site_id=BRS8

The data for Reading New Town may be found here: https://uk-air.defra.gov.uk/data/flat_files?site_id=REA1

PM$_{10}$ Annualisation

Background Site	Annual Mean (A$_m$)	Period Mean (P$_m$)	Ratio (R) (A$_m$/P$_m$)
Bristol St Pauls, UKA00494.	17.22297	15.77505	1.09179
Reading New Town, UKA00462.	15.76324	14.72349	1.07062
PM$_{10}$ AVERAGE RATIO (R$_a$)			**1.08120**
Swindon Period Mean (M)			**11.91035**
Annualised Swindon PM$_{10}$ Result (µg/m^3)			**12.87749**

PM$_{2.5}$ Annualisation

Background Site	Annual Mean (A$_m$)	Period Mean (P$_m$)	Ratio (R) (A$_m$/P$_m$)
Bristol St Pauls, UKA00494.	8.45479	7.51118	1.12563
Reading New Town, UKA00462.	8.34400	7.31678	1.14039
PM$_{2.5}$ AVERAGE RATIO (R$_a$)			**1.13301**
Swindon Period Mean (M)			**6.86729**
Annualised Swindon PM$_{2.5}$ Result (µg/m^3)			**7.78071**

NO₂ Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure has been estimated using the NO₂ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO₂ concentrations corrected for distance are presented in Table B.1.

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

Figure D.1 – Map of All Non-Automatic Monitoring Sites
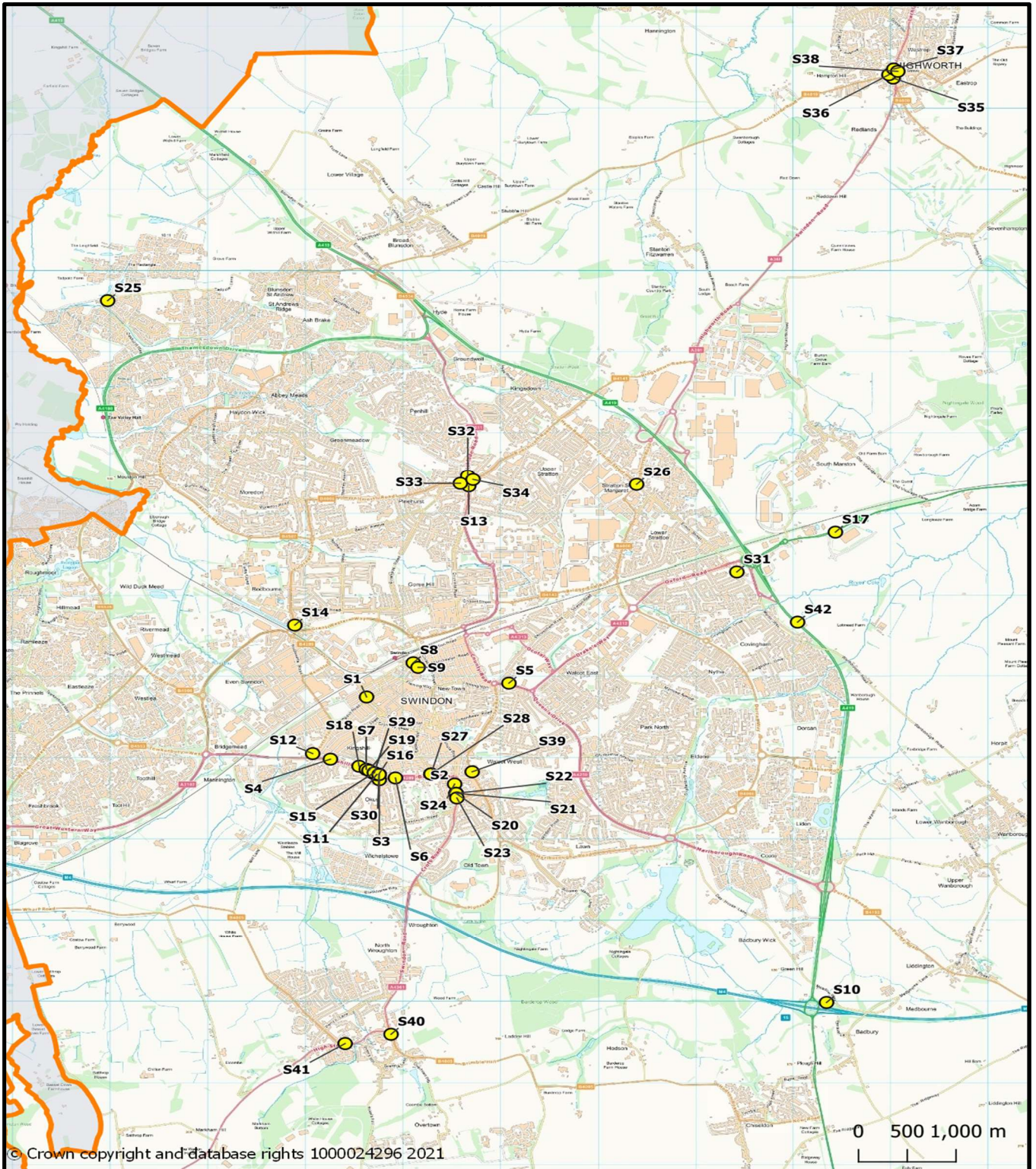
Figure D.2 – Non-Automatic Monitoring Sites around Kingshill AQMA

Figure D.3 – DEFRA Automatic Monitoring Site at Swindon Walcot (UKA00650)

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

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

---

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.