



2024 Air Quality Annual Status Report (ASR) – Revised Version Sept 24

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

Date: June 2024

Information	Winchester City Council Details
Local Authority Officer	David Ingram
Department	Public Protection
Address	Winchester City Council City Offices Colebrook Street Winchester Hampshire SO23 9LJ
Telephone	01962 848479
E-mail	dingram@winchester.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in Winchester City Council

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year¹. The total estimated healthcare cost to the NHS and social care was £157 million in 2017².

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution^{3,4}.

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

Table ES 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO ₂)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO ₂)	Sulphur dioxide (SO ₂) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter	Particulate matter is everything in the air that is not a gas.

¹ UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

² Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

³ Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

⁴ Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

(PM ₁₀ and PM _{2.5})	<p>Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes.</p> <p>PM₁₀ refers to particles under 10 micrometres. Fine particulate matter or PM_{2.5} are particles under 2.5 micrometres.</p>
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Winchester City Council (WCC)'s administrative area is comprised of the city of Winchester. The main source of air pollution in the borough is road traffic emissions from major roads, including the M3, A34, A31 and A303. Other pollution sources, including commercial, industrial and domestic sources, also make a contribution to background pollution concentrations.

The main pollutant of concern in Winchester is nitrogen dioxide (NO₂), which has historically exceeded the annual mean air quality objective near to the city centre. In 2003, an Air Quality Management Area (AQMA) was declared for exceedances of the annual mean NO₂ objective and 24-hour mean PM₁₀ objective. The 24-hour PM₁₀ AQMA was later revoked in 2013 after measured concentrations demonstrated consistent compliance with the objective. Details of the current AQMA are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=314.

WCC currently undertake NO₂ monitoring via a network of automatic (continuous) monitoring units, and non-automatic (passive) diffusion tubes. Monitoring results across the network have demonstrated compliance with the annual mean objective for NO₂ within the AQMA at all monitoring locations in 2023, with the highest concentration being 34.7 µg/m³ at Site 23, Romsey Road Uphill (Opp Clifton Rd).

Between 2019-2023, a decreasing trend in NO₂ concentrations has generally been observed at all monitoring locations. There are some year-to-year variations in concentrations, which are likely due to meteorological influences. Due largely to the COVID-19 pandemic and the associated lockdowns, a significant decrease was observed in 2020. In 2021, concentrations typically slightly increased compared to 2020 levels (albeit not back to pre-pandemic levels) largely due to the phased easing of national and local travel restrictions. All 2023 concentrations remain below the pre-pandemic 2019 concentrations. At most sites, concentrations decreased between 2022 and 2023 with the exception of Site 11 (Southgate St -Hotel Du Vin) and Site 23, Romsey Road Uphill (Opp Clifton Rd).

Actions to Improve Air Quality

Compliance with the annual mean nitrogen dioxide annual mean objective across the AQMA has been achieved since 2020 but traffic patterns were potentially unrepresentative of longer-term trends due to Covid lockdowns of 2020 and 2021. Before pursuing the revocation of the Winchester AQMA, 2024 data will be analysed to ensure there is compliance of 5 years. This is planned on being implemented in early 2025.

The Air Quality Action Plan (AQAP) for the AQMA was updated in 2017, which is more than five years ago. However, following correspondence with Defra, it is not intended that the AQAP is updated, due to the upcoming anticipated revocation in the AQMA, as described above. Work has instead concentrated on the development of a detailed Air Quality Strategy (AQS) for the entirety of the District of Winchester. This AQS will look to adopt aspirational air quality targets for 2030 for both PM_{2.5} and NO₂ and will commit to the development of further work programmes in identified strategic areas.

WCC has also taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. This includes the maintenance of ongoing measures described in the AQAP. Details of all measures completed, in progress or planned are set out in Table 2. WCC has also continued its involvement in the Burn Better Defra air quality grant funded project.

Defra's Environmental Improvement Plan⁵ sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter (PM_{2.5}), the pollutant of most harmful to human health. The Air Quality Strategy⁶ provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero⁷ details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of

⁵ Defra. Environmental Improvement Plan 2023, January 2023

⁶ Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

⁷ DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

personal travel and the majority of AQMAs are designated due to elevated concentrations heavily influenced by transport emissions.

Conclusions and Priorities

All monitoring locations met the annual mean air quality objective of 40 µg/m³ in 2023. NO₂ concentrations decreased slightly in 2023 at most of the monitoring locations compared to 2022. As already noted, the only two sites showing an increase were Site 11 and Site 23. Only Site 23 showed a significant increase from 27.8 to 34.7 µg/m³, although this site was subject to significant tube theft and the data had to be annualised.

Since the last ASR report (2023), WCC has worked on the following actions to improve air quality:

- Development of the AQS,
- Maintenance of ongoing AQAP measures,
- Ongoing work on the Burn Better project.

WCC's priorities for the coming year include:

- Continued compliance with annual mean NO₂ objective across whole of the Winchester district,
- Assessment of local PM_{2.5} and PM₁₀ concentrations,
- Adoption of a AQS for the whole District,
- Carrying out a review of 2024 air quality data to inform whether the Winchester Town Centre AQMA could be revoked in Spring 2025.

Local Engagement and How to get Involved

WCC is committed to continued improvements in local air quality by adopting an AQS by the end of 2024. Over the summer months of 2024 we will be consulting on a draft version of this AQS. This will detail the action it proposes to take to achieve aspirational local air quality targets for both NO₂ and PM_{2.5} by the year 2030. It will identify a series of work programmes that will be developed and implemented at differing timeframes within this period. This will include a revised public engagement strategy that will build upon engagement work already ongoing through implementation of the 2017 AQAP.

Local Responsibilities and Commitment

This ASR was prepared by the Public Protection/Environmental Health Department of Winchester City Council with the support and agreement of the following officers and departments:

David Ingram and Phil Tidridge, Public Protection

This ASR has been approved by:

Cllr Jackie Porter, Cabinet Member for Place and Local Plan

This ASR has been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to:

Winchester City Council,

City Offices,

Colebrook Street,

Winchester,

SO23 9LJ

Email: EH@winchester.gov.uk

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1 Local Air Quality Management

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

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

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by WCC can be found in Table 1. The table presents a description of the one AQMA that is currently designated within WCC. Appendix D provides maps of 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:

- NO₂ annual mean

The initial Winchester Town Centre AQMA was declared on 14 November 2003 for both annual mean NO₂ and 24 hour mean PM₁₀. However, the PM₁₀ element was revoked on 1 December 2013, following a detailed assessment submitted and accepted by Defra. Compliance with the annual mean NO₂ annual mean objective across the AQMA has been achieved since 2020 but traffic patterns were potentially unrepresentative of longer-term trends due to Covid lockdowns of 2020 and 2021 (Defra guidance). We are therefore awaiting the data from 2024 before ensuring there is 5 years of acceptable compliance data before pursuing the revocation of this AQMA, if appropriate, early 2025.

Table 1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Winchester Town Centre AQMA	14/11/2003	NO ₂ Annual Mean	Area surrounded by the town centre one way system and the town centre end of the major roads feeding into it.	NO	Level of Exceedance was 58.4 µg/m ³ in 2003	No exceedances. Highest level is 34.7 µg/m ³	4 (2020, 2021, 2022,2023)	Winchester City Council Air Quality Action Plan, May 2017	https://www.winchester.gov.uk/environment/air-quality/historical-air-quality-reports-for-government

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

2.2 Progress and Impact of Measures to address Air Quality in Winchester City Council

Defra's appraisal of last year's ASR concluded the below points; comment on how these have been addressed this year is detailed below:

- The current AQAP is out of date by one year. It is understood that the AQMA is intended to be revoked and an Air Quality Strategy presented upon revocation, this is accepted providing suitable evidence is provided for revocation. The Local Authority are advised that the AQAP should be uploaded to the LAQM portal.
 - *The AQAP was last updated in 2017, although this is more than 5 years it has been accepted in email correspondence with Defra that updating an AQAP for a AQMA that is likely to be revoked early 2025 is not a matter they would pursue from a non-compliance perspective. Work has instead concentrated on the development of a detailed Air Quality Strategy for the entirety of Winchester's District.*
- Table 2.1 only states that the AQMA is for NO₂ but the LAQM portal states that the declaration is for both NO₂ and PM₁₀ 24 hour mean. Please update in future ASRs as required inclusive of the level of exceedance at declaration.
 - *WCC has notified the LAQM that the information they have is incorrect. The information provided in this ASR is up to date and correct.*
- Level of exceedance at declaration stated as 'NO₂ >40 µg/m³ at multiple locations.' It would be helpful to include the actual concentration at declaration within the table.
 - *This recommendation has been taken on board in the 2024 ASR.*
- Minimal Funding Status and costing information is included within Table 2.2 besides AQ Grant measures. Please add more information in future ASRs where possible.
 - *Details about Funding Status and costing information have been provided, where possible, in Table 2.*
- The Council monitors using a 'Low Cost Sensor' AQMesh at site ID 'Twyford'. While these low cost sensors provide a useful indication of pollutant concentrations, as they are not MCERTs certified, they cannot be used to inform LAQM decisions. It is recommended that results from this monitor are included as a separate appendix rather than reported in the Table within Appendix A. Further information on the use

of Low Cost Sensors is included within this FAQ:

<https://laqm.defra.gov.uk/faqs/faq140/>

- *This recommendation has been taken on board in the 2024 ASR, and the results from the AQMesh monitor has been included in Appendix F.*
- The Local Authority are encouraged to include details of Local Engagement and how the public can get involved with managing air quality in future ASRs.
 - *This recommendation has been taken on board in the 2024 ASR.*
- It is not clearly stated whether diffusion tubes have been deployed in line with the Defra Calendar. Please clearly state this in future ASRs.
 - *This recommendation has been taken on board in the 2024 ASR.*
- Distance correction has been carried out for all sites. It should only be carried out for sites within 10% of the AQO in line with the guidance within the ASR template.
 - *This recommendation has been taken on board in the 2024 ASR.*
- Please include a summary of comments from this year's appraisal and how they have been addressed in future ASRs.
 - *This recommendation has been taken on board in the 2024 ASR.*

WCC has taken forward a number of direct measures during the current reporting year of 2024 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2. Eighteen measures are included within Table 2, with the type of measure and the progress WCC has made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.

More detail on these measures can be found in the AQAP. Key completed measures are:

- Continued employment of a dedicated Sustainable Travel Planning Officer;
- Continuation of the Winchester Travel Planners Forum to help inform policies to assist major employers in the development of sustainable travel policies; and
- Continued use of differential car parking charges based on zoning.

WCC does not expect further measures to be completed over the course of the next reporting year. WCC's main priority for the coming year is developing an AQS for the whole of the district that will build upon measures within the current AQAP. This will look to widen actions already undertaken and found to be beneficial within the AQMA, whilst also

committing to investigate/develop new potential actions. It is anticipated that a draft AQS will be available for public consultation late summer 2024 for adoption by the end of 2024. This AQS will look to adopt aspirational air quality targets for 2030 for both PM_{2.5} and NO₂ and will commit to the development of further work programmes in identified strategic areas. This AQS will be developed by the Air Quality Steering group involved in the development and implementation of the current AQAP and includes membership from business, environmental charities, public health and both tiers of local government. Other priorities for the coming year are:

- Continued compliance with annual mean NO₂ objective across the whole of the Winchester district;
- Assessment of local PM_{2.5} and PM₁₀ concentrations; and
- Carrying out a review of 2024 air quality data to inform whether the Winchester Town Centre AQMA could be revoked in Spring 2025.

WCC worked to implement these measures in partnership with the following stakeholders during 2023:

- Hampshire County Council; and
- Neighbouring local authorities, including: Southampton, New Forest and Eastleigh.

The principal challenges and barriers to implementation that Winchester City Council anticipates facing are concerns around reduced funding and resources due to the withdrawal of current Defra air quality grants.

WCC anticipates that the measures stated above and in Table 2 will achieve compliance in Winchester Town Centre AQMA. Compliance with the annual mean NO₂ annual mean objective across the AQMA has been achieved since 2020 but traffic patterns were potentially unrepresentative of longer-term trends due to Covid lockdowns of 2020 and 2021 (Defra guidance). We are therefore awaiting the data from 2024 before ensuring there is 3 years of acceptable compliance data (5 years in total but 2020 and 2021 excluded) before pursuing the revocation of this AQMA, if appropriate, in early 2025.

Table 2 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Build on existing car park pricing differentiation strategy	Traffic Management	Other	2017	Ongoing	WCC - Engineering & Transport & Parking Services	Local Authority	N	N/A	NA	Planning	2% reduction in NOx emissions	Annual Mean NO ₂ ; Car park patronage; preferential responses	This measure has already been implemented since April 2018 and have since demonstrated strong trend toward an uptake in use of the P&R sites and a consequential freeing up of city centre parking capacity. All P&R sites are now at operating at near capacity during the week. Since Covid there has been a shift in parking patterns away from commuter traffic, affecting P&R and Park & Walk (P&W) occupancy rates, which are no longer at capacity. Conversely city centre car parks remain at or near capacity from short stay visitors accessing city amenities. In order to discourage parking within the AQMA, the Council has adopted a more robust differential pricing approach between the City Centre Car parks and the outer lying P&R and Park & Walk sites. The cost of parking in city centre car parks was increased in 2021 and will again be increased in July of 2023, whilst the P&R and P&W sites have had no corresponding increase in charges. Further, in October 2022, the first hour of parking in the P&W sites was made free, whilst the first 30 mins of city centre 'on street' parking now attracts a fee, when previously it was free. Sunday charges now reflect the same tariffs as the other days of the week, but some P&R and all P&W sites will be free all day.	This policy of differential car parking charges based on zoning continues to be enforced as detailed Progress to Date.
2	Review enforcement of goods deliveries by time of day and enforce	Freight and Delivery Management	Quiet & out of hours delivery	2017	Ongoing	WCC - Parking services	Local Authority	N	N/A	NA	Planning	2% reduction in NOx emissions	Annual mean NO ₂ ; PCNs issued; Change in delivery hours	Adopted to encourage a smooth traffic flow through the one-way system during peak periods. After an initial targeted data gathering and enforcement programme by the CEOs several parking tickets have been served. These waiting restrictions are actively enforced by the Council's Civil Parking Enforcement Officers. In 2019 we issued 56 Penalty Charge Notices (PCNs) to all class of vehicles contravening the loading/unloading restrictions in the city centre. In 2020 it was 48. 2021/22 data shows an increase in PCN's being issued, between 1/4/2021 and 31/3/2022 we issued 68 PCNs.	Enforcement using PCNs continues but transfer of some parking functions back to Hampshire County Council has complicated the reporting of this measure.
3	Introduce a Park and Ride site in the north of Winchester	Alternatives to private vehicle use	Bus based Park & Ride	2017	TBC	WCC but informed by City of Winchester Movement Strategy	Local Authority	N	N/A	NA	Planning	3% reduction in NOx emissions	Bus patronage; Traffic flow; Use and satisfaction of P&R	The Winchester Movement Strategy was adopted by WCC on 25 March 2019 see: https://www.hants.gov.uk/transport/transportchemes/winchester-movement-strategy . The opportunity to implement such a scheme is currently being assessed as part of a proposed major redevelopment to the North of the City. The developing local plan is looking to provide potential policy support for a park and ride site to the North of Winchester. Consultation on the draft Regulation 18 Local Plan was carried out in November 2022 – January 2023. Meanwhile, the City Council has completed an extension to the East Park and ride site having opened a new multi-storey car park in May 2022, providing an additional 287 spaces and additional 16 EV charging points	This policy continues to be pursued with delivery through the Winchester Movement Strategy
4	Introduce new parking charges/incentives to reduce diesel car parking and high pollution petrol cars (older than Euro 4) from parking in central car parks in favour of low emission vehicles	Traffic Management	Emission based parking or permit charges	2017/18	N/A	WCC – Parking Services Engineering & Transport	Local Authority	N	N/A	NA	Planning	10% reduction in NOx emissions	Traffic flow and speed; Increase in petrol/ULE Vs using car parks; Preferential responses	The Council has now introduced the 'Electric Vehicle Charging Strategy' as part of Measure 11 below but it also supports Measure 4. At the March 2022 Cabinet Meeting, Councillors agreed that changes to parking tariffs in Winchester Town be advertised and implemented in October 2022. The project seeks to adopt 'smart' ticket machine technology to implement differential charging tariffs for higher polluting vehicles, primarily diesels has been temporarily put on hold, with new parking tariffs being adopted to discourage parking within the AQMA. A 6-week consultation was undertaken in Summer 2022. Full details of the Cabinet decision and associated documents can be found here . However, since the advent of the 'Cost of Living Crisis' members have decided not to action this measure and have instead pursued a different pricing strategy of increasing the pricing	In 2023, it was decided that this measure will not now be actioned.

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation									
														differential between city centre car parks and outer P&R/P&W parking as cited in Measure 1, above.										
5	'Investigate the feasibility of introducing a CAZ for heavy duty vehicles that enter the AQMA, which do not meet Euro VI Standards (amended)	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2017	Ongoing, unlikely to be a CAZ option pursued	WCC	Local Authority	N	N/A	NA	Planning	10% reduction in NOx emissions	Annual mean NO ₂ ; Number of Euro VI entering AQMA; PCNs issued	It has now been determined that the WCC cannot 'ban' non Euro VI heavy duty vehicles from entering the city. Thus, the measure has been reworded from 'ensure' to 'investigate the feasibility of introducing a CAZ'. The feasibility of alternative measures, such as bus retrofitting, freight consolidation centres, restrictions on last mile HGV deliveries and the use of bus gates, are to be investigated as part of the Movement Strategy.	The Winchester Movement Strategy is not currently pursuing the CAZ option. Alternative measures are currently being assessed within identified study options. See https://www.hants.gov.uk/transport/transportchemes/winchester-movement-strategy									
6	Ensure that all Council-owned, leased, contracted or influence vehicles that enter the AQMA meet the OLEV standards for ULEVs and are not diesel fuelled by 2020	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2017	Completed	WCC	Local Authority	N	N/A	NA	Planning	2% reduction in NOx emissions	Low emission vehicles in fleet; Number of trips entering AQMAs	<p>A new procurement policy is in place, which includes a requirement to consider environmental criteria.</p> <p>The taxi licensing regime differs age limits between conventional fuelled and plug in taxis as below. These apply to both Hackney and Private Hire vehicles.</p> <table border="1"> <thead> <tr> <th>Vehicle type</th> <th>Age on first licence</th> <th>Max end of life age</th> </tr> </thead> <tbody> <tr> <td>Conventional</td> <td><5 years</td> <td>12 years</td> </tr> <tr> <td>EV and Hybrid</td> <td><8 years</td> <td>15 years</td> </tr> </tbody> </table> <p>The Council no longer operates a staff car leasing scheme.</p>	Vehicle type	Age on first licence	Max end of life age	Conventional	<5 years	12 years	EV and Hybrid	<8 years	15 years	
Vehicle type	Age on first licence	Max end of life age																						
Conventional	<5 years	12 years																						
EV and Hybrid	<8 years	15 years																						
7	Development of air quality supplementary planning document (SPD)	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2017	Completed	WCC	Local Authority	N	N/A	NA	Planning	N/A	Annual Mean NO ₂ ; Planning applications showing regard for SPG	The Air Quality Supplementary Planning Document has now been adopted and is in use by the Planning Department. Key elements of this document are likely to be rolled out within the proposed air quality planning guidance as part of the proposed AQS and new local plan.										
8	Continue to work with and lobby Hampshire County Council to identify projects to improve air quality	Policy Guidance and Development Control	Regional Groups Coordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2017	Ongoing	WCC/HCC	Local and County Authority	N	N/A	NA	Planning	N/A	Annual Mean NO ₂	The Winchester Movement Strategy was adopted by WCC on 25 March 2019 see: https://www.hants.gov.uk/transport/transportchemes/winchester-movement-strategy . Which consider air quality and a regional SPD (if appropriate. This action is ongoing through the Winchester Movement Strategy mechanism. Improvement to walking and cycling have been consulted on – see https://www.hants.gov.uk/transport/transportchemes/atfwinchesterimprovements	Funding for any measures identified needs to be secured.									
9	Monitor the performance of the action plan and reassess whether additional measures are required to meet the objective	Public Information	Other	2017	Ongoing	WCC	Local Authority	N	N/A	NA	Planning	See Core Actions	Annual mean NO ₂ ; Modelling of actual emissions reductions	To be undertaken as part of annual reporting requirements and data from monitoring at static monitoring sites Although the 2017 AQAP is now beyond its 5 Year term, the 2020 – 2023 air quality data sets strongly indicate full compliance with national standards across the AQMA. Winchester has sought Defra's approval to defer its decision to Spring of 2025, on whether to revoke the AQMA or adopt a new AQAP, after having another year's worth of data. Work continuing on the adoption of a replacement Air Quality Strategy.	Expected Review of 2024 air quality data to inform whether to revoke AQMA in Spring of 2025.									
Additional Measures																								

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
10	Work with authorities towards adoption of a regional LES	Policy Guidance and Development Control	Regional Groups Coordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2017	Ongoing, but unlikely to be implemented	WCC with SCC, EBC	Local Authority	Y - Clean Burn project	Phase 1 - In Place	Clean Burn Project approx. £200,000 - across the 4 local authorities	Planning	N/A	Adoption of strategy	WCC currently chairs the Hampshire Air Quality Group a collective of air quality regulators across the County, including PHE, Local authorities and Hampshire County Council (health, transport and travel planning). WCC continues to work with other local authorities on the promotion of a Domestic Clean Burn Project (targeting solid fuel combustion and bonfires) funded by Defra. This is led by Southampton City Council but involves partners in Eastleigh, New Forest and Winchester Councils and is being delivered by the Southampton Environment Centre. See https://environmentcentre.com/wood-burning-engagement-launch/	Regional LES will not be developed but new regional air quality group currently being proposed for Hampshire or "Wessex". Winchester City Council is currently taking a leading role in the development of such a group that will include a wider range of members than the Hampshire Air Quality group that was air quality regulator based. Importantly this will include public health, academic and business representatives. Continued support for the development of this group is currently proposed within the developing AQS.
11	Seek to commit to introduce more electric vehicle charging points within car parks	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2017	Completed	Local Authority	Number of points installed	N	N/A	N/a	Implemented	N/A	Number of points installed	In March 2020, Winchester City Council allocated a budget of £120k to implement in the part JoJu's feasibility study to part fund 30 fast 22kW chargers and for JoJu to fully fund 2 rapid 50kW chargers. Full programme of electric charging points (mainly in council car parks across the district) has now been delivered. To date, 33 EVCPs across WCC Public Car Parks, including 1 Rapid charger have been installed. Work is proposed as part of the Carbon reduction programme to apply for Government LEVI funding for EVCPs in Parish Council and Community Hall car parks in the rural parishes.	This action was completed in 2022. The continued development of local charging infrastructure has now been moved away from delivery via the AQAP to a new working group set up under the road to zero carbon agenda.
12	Ensure that air quality is a standard consideration as part of procurement practice and is reflected in the Council's Procurement Policy	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2017	Completed	WCC	Local Authority	N	N/A	N/a	Planning	See Core Action 6	Adoption of procurement policy; Uptake of LEVs (as per core action)	A new 2020-2025 Procurement Strategy has been adopted to include Social and Environmental considerations when procuring services. In response to the Climate Emergency declaration in June 2019, one of the aims of the strategy will be to require social and environmental factors to be considered in all procurements.	
13	Continue to improve public access to live parking information and signage and better signage to encourage drivers to use the car park best suited to their journey.	Public Information	Via other mechanisms	2017	Ongoing	WCC/HCC	Local Authority	N	N/A	NA	Planning	N/A	Utilisation of central car parks	Currently in Winchester city centre, Hampshire County Council manages the ROMANSE system (https://www.romanse.org.uk/winchester.htm) which also includes digital signs which denote specific car parks and the number of available spaces therein. Due to technological improvements, further measures could include the introduction of individual bay sensors which are available from multiple suppliers such as: https://www.clearview-intelligence.com/products/m300-bay-occupancy-system .	WCC has been working with Parking colleagues to promote parking sensors to better inform drivers looking for spaces, but so far this hasn't been fulfilled. No further update in 2023
14	To continue to work on the delivery and promotion of car club schemes operating in the city	Alternatives to private vehicle use	Car Clubs	Completed	Completed	WCC	Local Authority	N	N/A	NA	Implemented	N/A	Number of car club members	WCC now has a Car Club Scheme in city centre provided by Enterprise Car Club.	
15	Consider the introduction and promotion of additional cycle stands, in	Promoting Travel Alternatives	Promotion of cycling	Ongoing	Ongoing	WCC	Local Authority	N	N/A	NA	Planning	N/A	Number of cycle parking; Number of cyclists as	This measure is part of the Parking and Access Strategy for the city centre. Measure has been impacted by potential road infrastructure changes coming out of detailed studies driven by the Winchester Movement Strategy.	

Measure No.	Measure Title	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	consultation with local cycling groups, as part of planned developments in the AQMA												a modal share (through surveys)	WCC has ordered lockers for the leisure park, and agreement is sought for the city centre locations. Trying to get a range of provision including secure /sheltered / can accommodate cycle trailer etc.	
16	Work with stakeholder organisations and maintain a programme of regular communication to encourage behavioural change	Promoting Travel Alternatives	Other	Ongoing	Ongoing	WCC	Local Authority	N	N/A	NA	Planning	N/A	TBC	The City Council's Lead for Public protection currently organises and chairs the Hampshire Air Quality Action Group, which consists of various air quality officers from across the County and two Unitaries, as well as representatives from Public Health England, HCC Public Health Team, HCC Highways, HCC School Travel Planners.	COVID-19 has previously prevented public engagement.
17	Review and refresh the Council Travel Plan to promote more sustainable travel for staff	Promoting Travel Alternatives	Workplace Travel Planning	2017	2024	WCC	Local Authority	N	N/A	NA	Planning	N/A	Number of staff travelling to work by car (surveys)	WCC has set up a new Winchester Travel Planners Forum initially targeted at the major employers within Winchester, which includes WCC, HCC, Winchester University, Winchester Hospital and the Prison all of whom have members on the forum. In addition, we have members from Southampton University and links with the Southampton Travel Planners Network for a cross regional approach. The group has a Terms of Reference and is working towards a consistent collation of staff travel data to inform policies to assist major employers in the development of sustainable travel policies. Proposed to review Winchester's travel plan in 2023 as the legacy impacts of COVID driven changes in work practices become clearer (in particular level of home working). WCC has employed a new Travel Planning Officer and this review will form part of their remit.	A 2022 Annual Staff Travel Survey has now been performed to provide a data update to inform strategy going forwards. Resourcing for this piece of work has been a challenge, however WCC has recently employed a dedicated Sustainable Travel Planning Officer who has taken this piece of work forward in development during 2023.
18	Provide web based information and sign posting to resources that will assist and encourage workplaces and schools in the City to adopt Travel Plans	Promoting Travel Alternatives	Workplace Travel Planning	2017	Completed	WCC	Local Authority	N	N/A	NA	Planning	N/A	Number of travel plans adopted	My Journey Hampshire has already been established and provides a body of useful information. The Winchester Travel Planners Forum will work with this site to ensure that it provides the right advice for travel planning for individuals and businesses in Winchester and wider district. WCC employed a Sustainable Transport Officer in 2022.	

2.3 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.

Between 2011-2022, Winchester was below or equal to the national average for the Public Health Framework Indicator, 'Fraction of mortality attributable to particulate air pollution'. Between 2021 and 2022, the fraction for Winchester increased from 5.3% to 5.6%, which was below the national average of 5.5% in 2021 and 5.8% in 2022. Between 2011 and 2022, Winchester's indicator remained below the national average expect for the years 2016 and 2017, using the old method. Using the new method, between 2018 and 2022, Winchester's indicator again remained below the national average expect for the years 2018 and 2020.

WCC is taking the following measures to address PM_{2.5}:

Measures include working with Public Health colleagues, adopting transport initiatives included in The Local Transport Plan for Hampshire and local planning policies supporting the implementation of the Winchester AQAP.

WCC is also involved in the Defra grant funded Better Burn project that is led by Southampton City Council but includes Eastleigh, Winchester, and New Forest Councils. As part of the Better Burn campaign, WCC has engaged with Southampton University air quality experts, led by Dr Christina Vanderwel, to analyse the data sets obtained from low-cost sensors, such as Earthsense Zephyrs©, to establish robust scientific learnings and public engagement messaging (ongoing until end of summer 2024).

WCC is working with the Director of Public Health and representatives from some Local Authorities to look to implement a Hampshire (and potentially Wessex) wide air quality group to tackle air quality on a more regional basis with specific reference to transboundary pollutants such as PM_{2.5}.

Development of an AQS is currently in a final pre consultation draft which subject to final Cabinet approval will look to an aspirational PM_{2.5} target for 2030 with associated work

programmes to be developed to support this. Public consultation is scheduled to take place in the summer of 2024.

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

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

WCC undertook automatic (continuous) monitoring at two sites during 2023. Both sites included NO₂ monitoring, with St George's Street additionally monitoring for PM₁₀ and PM_{2.5}. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The <https://www.ukairquality.net> page presents automatic monitoring results for WCC, with automatic monitoring results also available through the UK-Air website at <https://uk-air.defra.gov.uk/data/>.

WCC also commissioned an indicative AQMesh monitor on 23rd December 2021, see Appendix F: Indicative Monitoring for more details on indicative monitoring completed in WCC.

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

3.1.2 Non-Automatic Monitoring Sites

WCC undertook non- automatic (i.e. passive) monitoring of NO₂ at 32 sites during 2023 in line with the Defra's 2023 Diffusion Tube Monitoring Calendar⁸. Table A.2 in Appendix A presents the details of the non-automatic sites.

⁸ <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/diffusion-tube-monitoring-calendar/>

Seven Winchester District tubes were discontinued at the end of 2022 as they were all showing prolonged compliance with the annual mean NO₂ objective level. The only exception to this was the site located at Kings Worthy (District 3), which is now site 32 in this year's data set. In addition, three new diffusion tube locations have been commissioned in 2023.

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 adjustment and any other adjustments applied (e.g. annualisation and 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 (NO₂)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40 µg/m³. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

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

Table A.5 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past five years with the air quality objective of 200 µg/m³, not to be exceeded more than 18 times per year.

Across both continuous and passive monitoring sites, all locations met the annual mean objective of 40 µg/m³. The highest monitored concentration in 2023 was 34.7 µg/m³ at Site 23, Romsey Road (opp Clifton Rd) Uphill. Data capture at this site was below the required 75% (due to theft) so annualisation was carried out. This site is within the existing AQMA

as shown in Appendix D The elevated concentrations in this location are thought to be related to the geometry of the road which is enclosed by structures (including some domestic premises) and trees, forming a 'canyon' which limits the dispersion of pollutants emitted by road traffic. The road is also on a gradient meaning vehicles are under load when travelling uphill, which affects the fuel burn and consequent emissions from traffic, particularly when congested.

Generally, across the City studies over the last five years, concentrations are declining overall, as demonstrated in Figure A.1. This tends to indicate that the actions and measures within the City's AQAP are having a positive effect, alongside behavioural change associated with the pandemic. At all of the monitoring locations the 2023 concentrations were below the pre-pandemic 2019 concentrations, indicating there is a long-term declining trend in concentrations.

At most sites, concentrations decreased between 2022 and 2023 with the exception of Site 11 (Southgate St (Hotel Du Vin)) where concentrations increased marginally by 0.3 $\mu\text{g}/\text{m}^3$ from 2022 to 2023, and at Site 23, Romsey Road (opp Clifton Rd) Uphill, where an increase of 6.9 $\mu\text{g}/\text{m}^3$ from 27.8 $\mu\text{g}/\text{m}^3$ to 34.7 $\mu\text{g}/\text{m}^3$ was recorded.

There were no recorded instances at diffusion tube monitoring sites of annual means greater than 60 $\mu\text{g}/\text{m}^3$, which according to the empirical relationship stated in LAQM.TG(22) indicates that an exceedance of the 1-hour mean objective is also unlikely at these sites. Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 18 times per year. There were no instances where the 1-hour mean was greater than 200 $\mu\text{g}/\text{m}^3$, and so this objective was therefore not exceeded.

See Table F.2 and Table F.3 for details on the NO_2 results at the indicative monitor, Twyford AQMesh.

3.1.4 Particulate Matter (PM_{10})

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 40 $\mu\text{g}/\text{m}^3$, with results indicating this objective has consistently been met. The annual mean concentrations for 2023 were 15.1 $\mu\text{g}/\text{m}^3$ at St George's Street and data capture rates were 99.9%.

Table A.7 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past five years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year. In 2023, the daily mean was greater than 50 µg/m³ zero times at Twyford and zero times at St George's Street, which is below the objective.

See Table F4 and F5 for details on the PM₁₀ results at the indicative monitor, Twyford AQMesh.

3.1.5 Particulate Matter (PM_{2.5})

Table A.8 in Appendix A presents the ratified and adjusted monitored PM_{2.5} annual mean concentrations for the past five years.

Whilst no objective is presented for PM_{2.5} in Table E.1, the Air Quality Limit Value for PM_{2.5} is 20 µg/m³, Table A.8 indicates this is being achieved within Winchester district. The annual mean concentrations for 2023 were 8.8 µg/m³ at St George's Street and the data capture rates were 99.9%.

The data captured would indicate that the new Environmental Target for PM_{2.5} of 10 µg/m³ is already being met at St George's Street, against the target date of 2040.

See Table F6 for details on the PM_{2.5} results at the indicative monitor, Twyford AQMesh.

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)
St George's Street	St George's Street	Roadside	448063	129537	NO ₂ , PM ₁₀ , PM _{2.5}	YES	Chemiluminescent	0	2.25	2.2
Romsey Road	Romsey Road	Roadside	447544	129543	NO ₂	YES	Electrochemical	0	2.5	2.1

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)
Site 1	10 Eastgate St	Roadside	448563	129391	NO ₂	Yes	0.0	5.6	No	1.7
Site 2	Greyfriars	Roadside	448566	129560	NO ₂	Yes	0.0	9.7	No	1.8
Site 3	Friarsgate	Roadside	448426	129523	NO ₂	Yes	4.6	4.3	No	2.4
Site 4	Upper Brook St (Echo Office)	Roadside	448227	129504	NO ₂	Yes	9.2	8.0	No	2.5
Site 5, Site 6, Site 7	Roadside Monitor (St Georges St)	Roadside	448063	129537	NO ₂	Yes	0.0	3.0	Yes	1.6
Site 8	St Georges St (Bedshop)	Roadside	448106	129541	NO ₂	Yes	0.0	4.1	No	2.5
Site 9	St Georges St (Bet Fred)	Roadside	448163	129512	NO ₂	Yes	0.0	3.6	No	2.4
Site 10	Jewry St	Roadside	448046	129692	NO ₂	Yes	0.0	4.1	No	2.4
Site 11	Southgate St (Hotel Du Vin)	Roadside	447918	129413	NO ₂	Yes	0.0	3.7	No	2.6
Site 12	Sussex St	Roadside	447804	129741	NO ₂	Yes	2.4	3.6	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) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube Co-located with a Continuous Analyser?	Tube Height (m)
Site 13	City Road	Roadside	447963	129875	NO ₂	Yes	0.0	6.6	No	3.0
Site 14	74 Northwalls	Roadside	448297	129789	NO ₂	Yes	10.2	3.7	No	2.3
Site 15	Wales St	Roadside	448842	129820	NO ₂	Yes	0.0	1.7	No	2.5
Site 16	Alresford Rd (M3)	Other	449563	129439	NO ₂	Yes	24.0	NA (M3)	No	1.5
Site 17	Chesil St	Roadside	448679	129068	NO ₂	Yes	0.0	1.3	No	2.6
Site 18	Stockbridge Rd	Roadside	447534	130006	NO ₂	Yes	10.0	5.4	No	2.0
Site 19, Site 20, Site 21	Worthy Rd 3	Roadside	448092	130411	NO ₂	Yes	3.7	2.2	No	2.5
Site 22	St Cross Rd	Roadside	447847	129053	NO ₂	Yes	6.0	2.4	No	2.1
Site 23	Romsey Road (opp Clifton Rd) Uphill	Roadside	447605	129545	NO ₂	Yes	0.0	1.7	No	2.2
Site 24	Romsey Road (opp Clifton Hill - Old site) Uphill	Roadside	447495	129511	NO ₂	Yes	0.0	1.1	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube Co-located with a Continuous Analyser?	Tube Height (m)
Site 25	Romsey Road (Opp West End Terrace) Uphill	Roadside	447444	129495	NO ₂	Yes	2.3	1.7	No	2.2
Site 26	Romsey Road (opp Knights Quarter) Uphill	Roadside	447315	129454	NO ₂	Yes	2.4	2.0	No	2.2
Site 27	Andover Rd	Roadside	447898	130065	NO ₂	Yes	0.0	4.2	No	2.2
Site 28	Bus Station	Other	448427	129401	NO ₂	Yes	NA	NA	No	2.4
Site 29	Romsey Rd (Air Quality Station) Downhill	Roadside	447519	129531	NO ₂	Yes	NA	NA	No	-
Site 30	Romsey Road (Clifton Terrace) Downhill	Roadside	447635	129565	NO ₂	Yes	NA	NA	No	-
Site 31	Romsey Road (Knights Quarter) Downhill	Roadside	447344	129476	NO ₂	Yes	NA	NA	No	-
Site 32	Kingsworthy (old district site)	Roadside	449653	132670	NO ₂	Yes	NA	NA	No	-

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
St George's Street	448062	129537	Roadside	99.6	99.6	37.0	26.9	27.0	28.5	27.0
Romsey Road	447544	129543	Roadside	99.8	99.8	32.0	32.0	32.0	21.0	19.0

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 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
Site 1	448563	129391	Roadside	84.6	84.6	27.9	19.6	20.0	20.3	18.4
Site 2	448566	129560	Roadside	100	100.0	24.6	18.8	18.9	19.0	16.5
Site 3	448426	129523	Roadside	100	100.0	22.2	15.8	17.1	16.7	15.1
Site 4	448227	129504	Roadside	100	100.0	27.9	20.6	21.3	26.0	19.9
Site 5, Site 6, Site 7	448666	129258	Roadside	100	100.0	28.6	25.9	27.2	29.2	26.9
Site 8	448106	129541	Roadside	100	100.0	39.3	29.2	30.8	30.7	28.5
Site 9	448163	129512	Roadside	100	100.0	38.5	29.3	28.5	28.7	27.6
Site 10	448046	129692	Roadside	92.3	92.3	31.0	22.7	24.2	24.8	18.1
Site 11	447918	129413	Roadside	90.4	90.4	28.3	21.2	20.1	21.7	22.0
Site 12	447804	129741	Roadside	100	100.0	29.0	18.9	21.7	22.3	19.9

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 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
Site 13	447963	129875	Roadside	100	100.0	28.2	21.0	21.0	21.9	19.6
Site 14	448297	129789	Roadside	100	100.0	24.1	17.8	17.6	17.6	16.7
Site 15	448842	129820	Roadside	59.6	59.6	23.4	18.7	18.3	20.8	18.0
Site 16	449563	129439	Other	100	100.0	30.0	21.5	22.8	23.8	18.9
Site 17	448679	129068	Roadside	92.3	92.3	35.3	23.7	29.5	28.2	23.8
Site 18	447534	130006	Roadside	100	100.0	18.7	13.1	13.2	13.7	12.2
Site 19, Site 20, Site 21	448092	130411	Roadside	100	100.0	21.1	15.4	15.5	15.9	14.4
Site 22	447847	129053	Roadside	100	100.0	20.2	14.4	16.4	18.9	18.8
Site 23	447605	129545	Roadside	65.4	65.4	-	33.6	32.2	27.8	34.7
Site 24	447495	129511	Roadside	92.3	92.3	46.5	30.9	30.9	33.0	27.8
Site 25	447444	129495	Roadside	82.7	82.7	-	40.8	36.5	38.1	33.0

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 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
Site 26	447315	129454	Roadside	90.4	90.4	-	30.3	30.4	31.2	29.3
Site 27	447898	130065	Roadside	100	100.0	26.5	20.8	22.0	21.1	19.2
Site 28	448427	129401	Other	50	50.0	21.7	15.2	15.6	15.1	13.0
Site 29	447519	129531	Roadside	100	100.0	-	-	-	-	17.7
Site 30	447635	129565	Roadside	100	100.0	-	-	-	-	20.4
Site 31	447344	129476	Roadside	100	100.0	-	-	-	-	18.7
Site 32	449653	132670	Roadside	100	100.0	-	-	-	-	22.8

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

Diffusion tube data has been bias adjusted.

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

Notes:

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

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

NO₂ annual means exceeding $60\mu\text{g}/\text{m}^3$, indicating a potential exceedance of the NO₂ 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

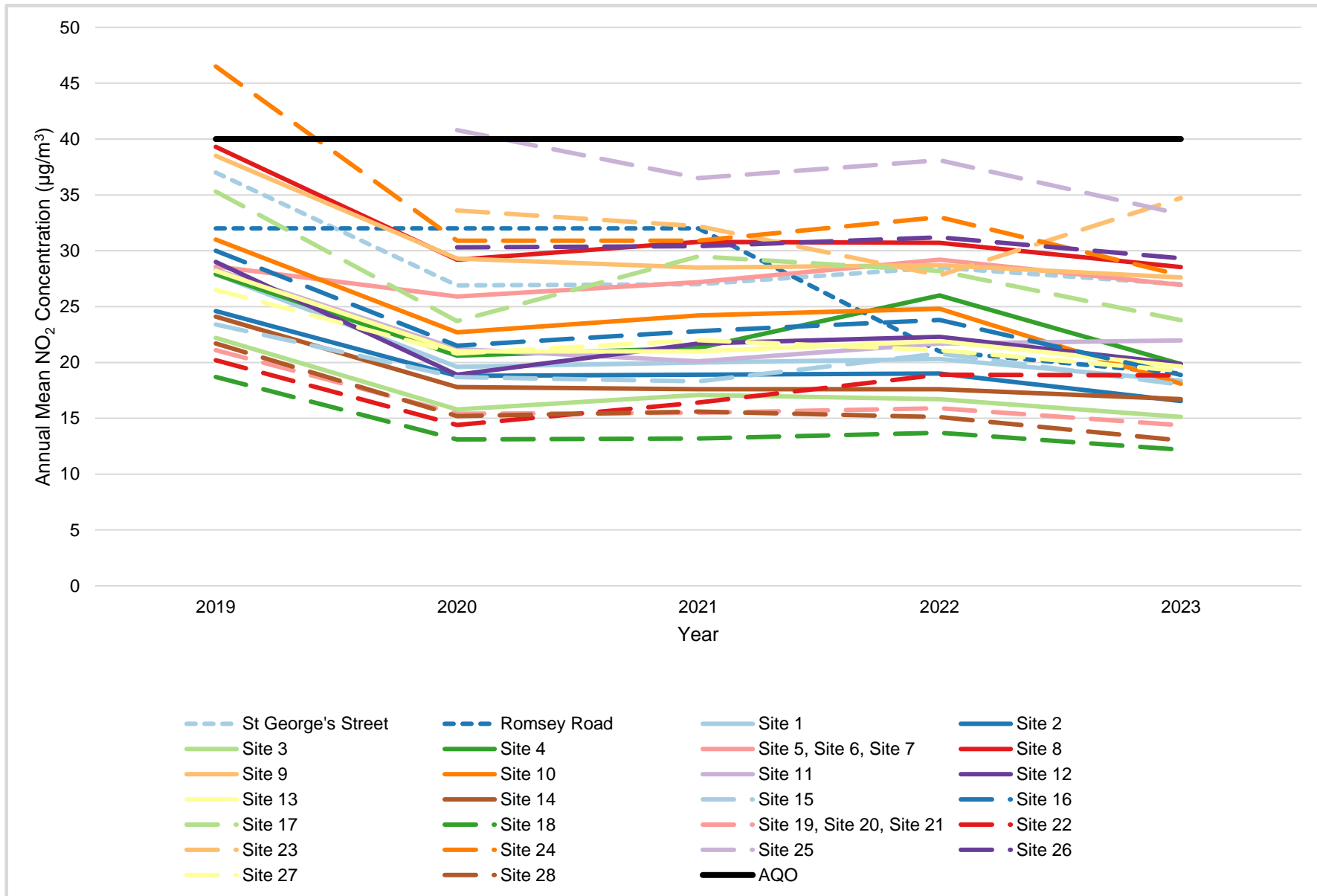


Table A.5 – 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
St George's Street	448062	129537	Roadside	99.6	99.6	0	0	0	0	0
Romsey Road	447544	129543	Roadside	99.8	99.8	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%).

Table A.6 – Annual Mean PM₁₀ Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
St George's Street	448062	129537	Roadside	99.9	99.9	-	14.2	15.0	16.3	15.1

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.

Exceedances of the PM₁₀ 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.

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

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

Figure A.2 – Trends in Annual Mean PM₁₀ Concentrations

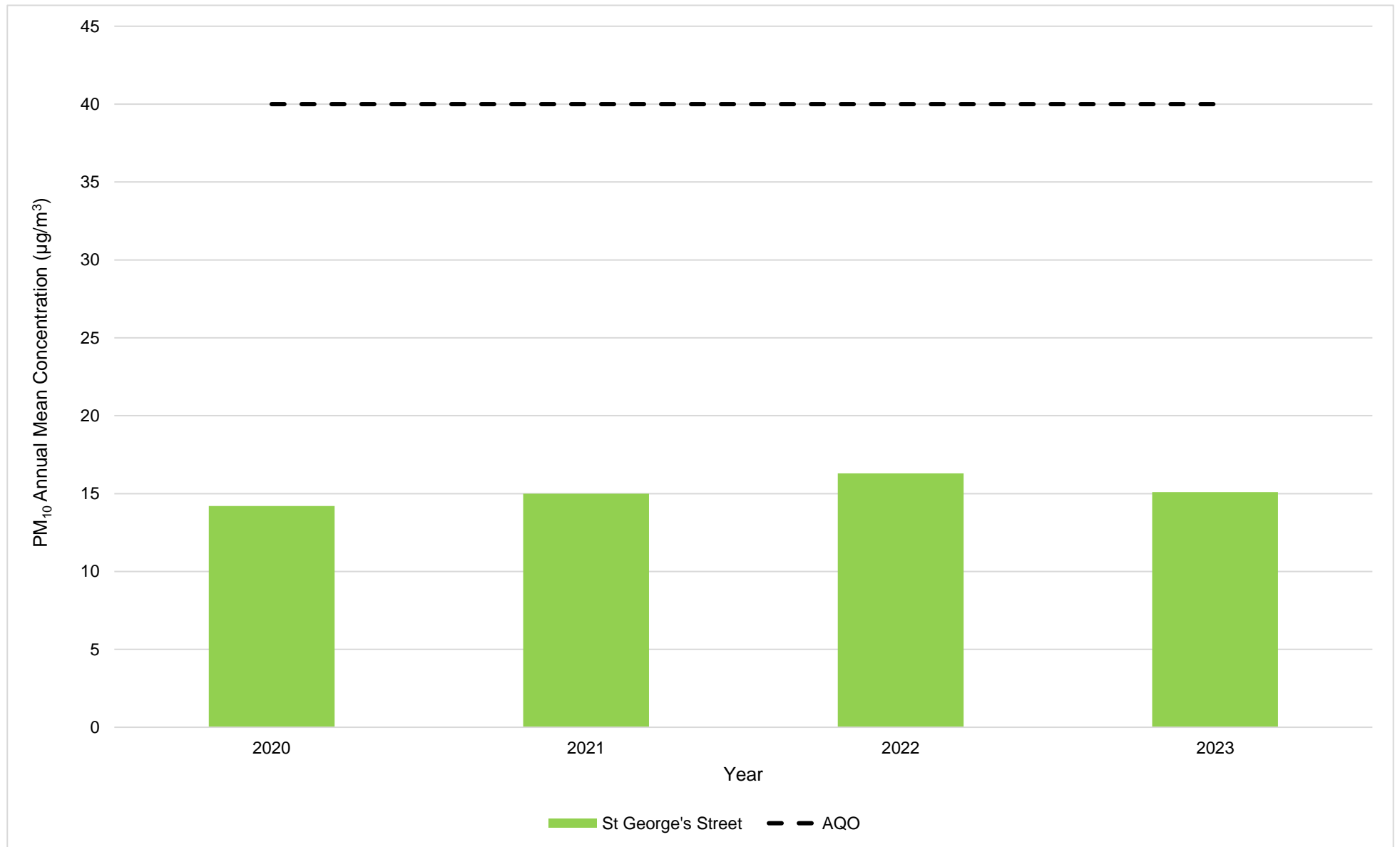


Table A.7 – 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means > 50µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
St George's Street	448062	129537	Roadside	99.9	99.9	-	0	1	0	0

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m³ have been recorded.

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ 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%).

Figure A.3 – Trends in Number of 24-Hour Mean PM₁₀ Results > 50µg/m³

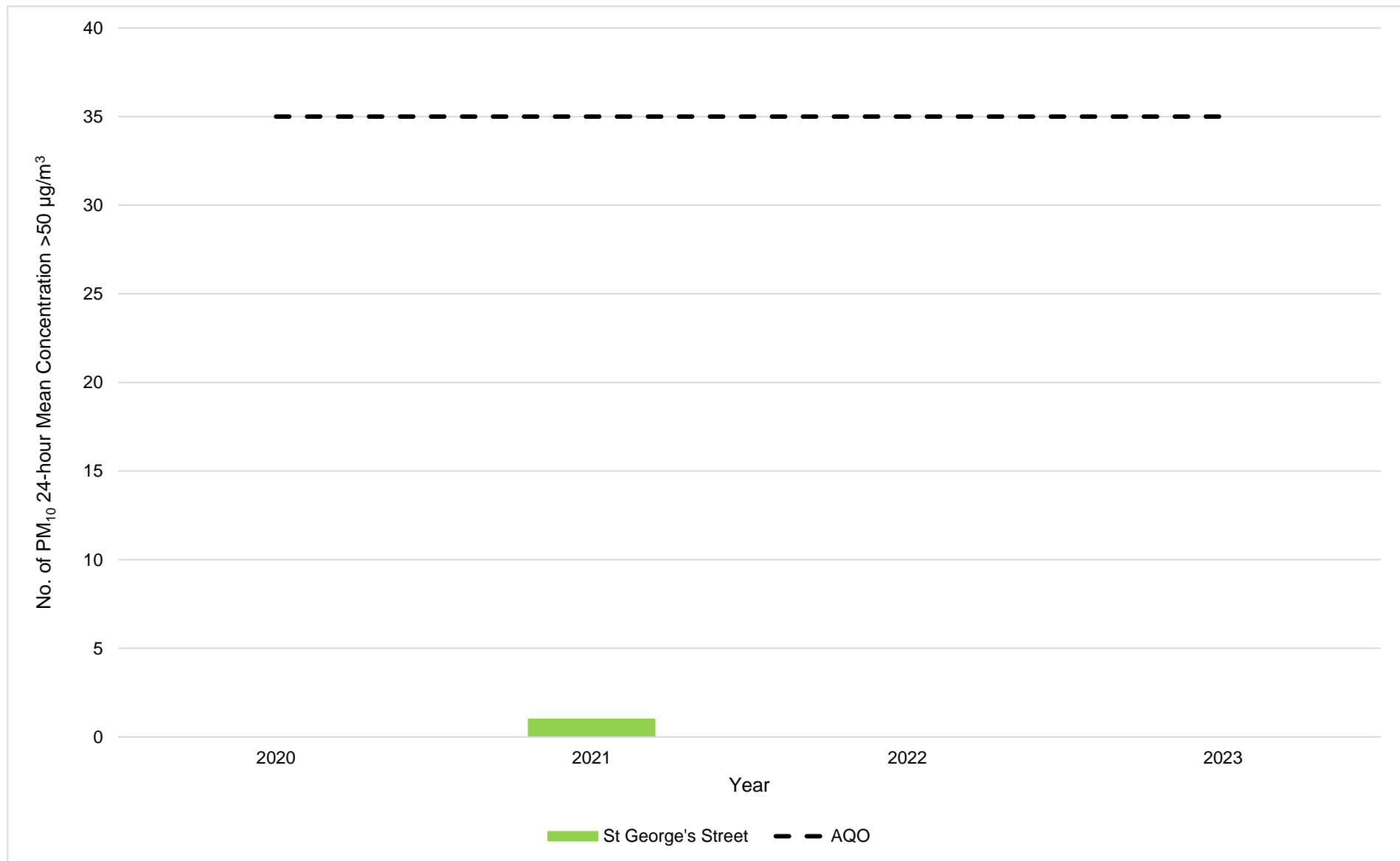


Table A.8 – Annual Mean PM_{2.5} Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
St George's Street	448062	129537	Roadside	99.9	99.9	-	9.0	9.0	10.3	8.8

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

Notes:

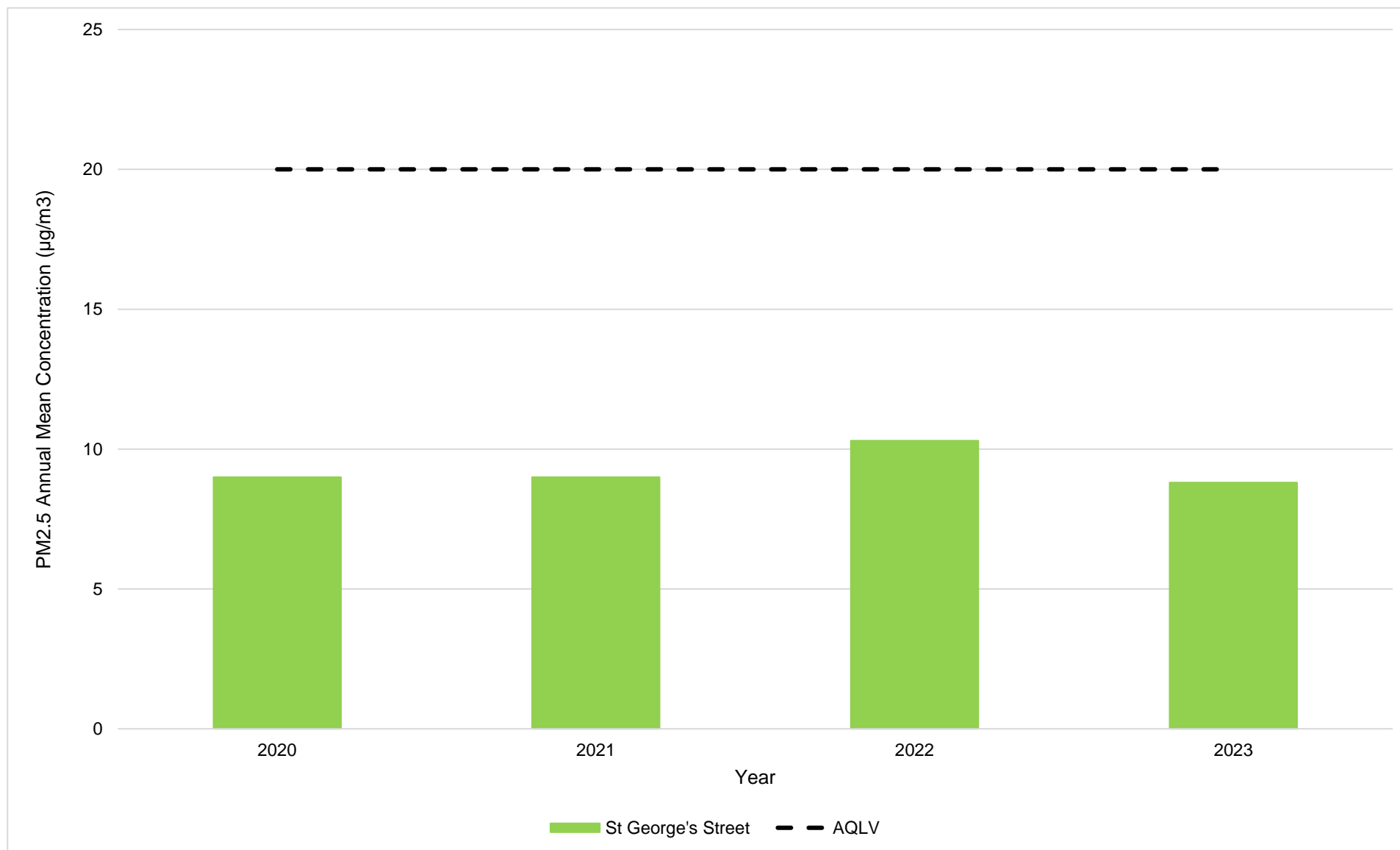
The annual mean concentrations are presented as µg/m³.

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%).

Figure A.4 – Trends in Annual Mean PM_{2.5} Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO₂ 2023 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 (0.77)	Annual Mean : Distance Corrected to Nearest Exposure	Comment
Site 1	448563	129391	30.2		24.3	25.3	23.6	20.2		20.4	26.1	15.4	29.6	23.4	23.9	18.4		
Site 2	448566	129560	27.4	26.2	22.0	19.9	17.2	17.2	16.5	18.5	24.1	23.3	23.7	21.8	21.5	16.5		
Site 3	448426	129523	23.9	23.9	18.6	20.1	14.1	17.1	14.1	17.3	23.1	23.0	22.1	18.4	19.6	15.1		
Site 4	448227	129504	30.3	31.8	24.6	26.4	23.3	22.6	19.4	22.0	28.6	27.6	28.8	24.1	25.8	19.9		

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 (0.77)	Annual Mean : Distance Corrected to Nearest Exposure	Comment
Site 5, Site 6, Site 7	448666	129258	35.5	37.1	36.7	39.2	28.4	32.7	30.0	31.1	41.2	39.6	36.4	33.0	35.0	26.9		
Site 8	448106	129541	41.7	46.8	33.9	43.3	38.4	35.4	26.5	32.2	38.1	38.4	38.7	31.5	37.1	28.5		
Site 9	448163	129512	39.9	38.5	38.2	37.5	28.4	31.9	32.3	31.7	39.6	39.3	37.7	35.1	35.9	27.6		
Site 10	448046	129692		35.4	30.5	31.1	26.7	23.5	21.2	22.3	18.0	12.9	9.5	27.2	23.5	18.1		
Site 11	447918	129413	35.0	30.8	27.6	24.4	23.2		23.6	25.6	35.3	33.7	29.1	25.5	28.5	22.0		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean : Raw Data	Annual Mean : Annualised and Bias Adjusted (0.77)	Annual Mean : Distance Corrected to Nearest Exposure	Comment
Site 12	447804	129741	30.8	32.9	23.6	25.5	24.3	22.7	18.9	22.1	29.6	27.9	29.1	22.3	25.8	19.9		
Site 13	447963	129875	29.6	30.1	26.8	25.1	17.0	21.2	23.1	21.5	29.3	29.2	26.5	26.7	25.5	19.6		
Site 14	448297	129789	26.9	25.4	21.4	21.8	13.7	18.3	17.5	18.1	24.8	25.3	24.6	22.7	21.7	16.7		
Site 15	448842	129820		30.4	22.1	25.1				19.3	25.6	27.0	26.8		25.2	18.0		
Site 16	449563	129439	26.7	29.8	23.9	25.1	16.4	24.3	18.8	24.6	29.7	30.2	24.9	19.8	24.5	18.9		

DT ID	X OS Grid Ref (East ing)	Y OS Grid Ref (Nort hing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annua l Mean : Raw Data	Annua l Mean : Annua lise d and Bias Adjus ted (0.77)	Annua l Mean : Dista nce Corre cted to Near est Expo sure	Com ment
Site 17	448679	129068	36.2	37.9	31.2	30.7	27.6	27.5	25.2	25.2		33.9	35.2	29.3	30.9	23.8		
Site 18	447534	130006	19.5	22.8	15.3	15.7	13.8	13.3	9.1	12.4	17.2	18.9	19.1	12.9	15.8	12.2		
Site 19, Site 20, Site 21	448092	130411	25.1	24.1	17.2	16.3	13.2	14.6	15.2	14.8	20.3	22.6	22.3	19.2	18.7	14.4		
Site 22	447847	129053	29.4	30.9	24.8	26.4	23.1	21.8	16.7	21.1	27.4	24.5	26.6	20.9	24.5	18.8		
Site 23	447605	129545	47.3			45.0		43.2	35.4	33.7	44.8	44.1		37.3	41.4	34.7		

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 (0.77)	Annual Mean : Distance Corrected to Nearest Exposure	Comment	
Site 24	447495	129511	38.1	43.8	36.7	25.2		38.8	29.4	35.1	40.3	41.4	37.4	31.1	36.1	27.8			
Site 25	447444	129495	48.5	49.3		48.2	34.8	42.0	38.9	37.6		44.9	43.4	44.8	43.2	33.3			
Site 26	447315	129454	42.8	46.8	38.5	43.1	33.4		31.2	31.1	40.5	38.7	37.5	35.2	38.1	29.3			
Site 27	447898	130065	28.8	29.5	25.2	25.3	18.5	23.3	19.4	21.2	29.7	27.5	27.9	23.7	25.0	19.2			
Site 28	448427	129401		23.1		19.9		18.3					8.2	20.6	22.2	18.7	13.0		

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean : Raw Data	Annual Mean : Annualised and Bias Adjusted (0.77)	Annual Mean : Distance Corrected to Nearest Exposure	Comment
Site 29	447519	129531	30.5	30.6	18.6	24.3	16.8	20.5	17.3	18.4	25.6	25.4	24.8	22.3	22.9	17.7		
Site 30	447635	129565	31.4	35.4	26.4	28.5	23.5	24.2	19.4	23.2	27.6	28.2	26.5	23.0	26.4	20.4		
Site 31	447344	129476	27.6	34.3	23.6	28.1	26.5	23.8	13.7	19.5	25.5	25.3	24.9	18.9	24.3	18.7		
Site 32	449653	132670	31.4	33.3	27.8	29.3	26.7	33.5	25.9	26.8	33.4	32.0	27.8	26.9	29.6	22.8		

- 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.
- ☒ Winchester City Council confirm that all 2023 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 Winchester City Council During 2023

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

Additional Air Quality Works Undertaken Winchester City Council During 2023

WCC decommissioned seven diffusion tubes in the reporting year and commissioned a further three diffusion tubes. WCC has not completed any additional works within the reporting year of 2023, except from development work on the new AQS.

QA/QC of Diffusion Tube Monitoring

All diffusion tubes were from Gradko and used a mixture of 20% TEA in water preparation method. Gradko International Ltd is a UKAS accredited laboratory. Gradko participates in the AIR Proficiency Testing (PT) scheme for diffusion tubes, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL), which provides a Quality Assurance / Quality Control (QA/QC) framework for local authorities carrying out diffusion tube monitoring as a part of their local air quality management process. The latest AIR-PT results were as follows:

- AIR-PT AR055 (January – February 2023) – 100%
- AIR-PT AR056 (May – June 2023) – 100%
- AIR-PT AR058 (July – August 2023) – 100%
- AIR-PT AR059 (September – October 2023) – 100%

All tubes were collected and stored in a fridge and subsequently analysed by Gradko within the advised shelf life of the tube.

Diffusion Tube Annualisation

Data capture for the majority of relevant diffusion tube sites was greater than 75%. The only sites with less than nine months' data capture were Site 15, 23 and 28. The data for these

sites was therefore subsequently annualised using Defra's 'Diffusion Tube Data Processing Tool V4.0', in accordance with the methodology stipulated in LAQM.TG(22).

The AURN background sites considered for annualisation were Bournemouth (Urban Background), Southampton Centre (Urban Background), Portsmouth (Urban Background) Swindon Walcot (Urban Background), all sites had annual data capture of >85% and are within a 40 miles radius of Winchester.

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

Site ID	Annualisati on Factor Bournemou th	Annualisati on Factor Southhampt on Centre	Annualisati on Factor Portsmouth	Annualisati on Factor Swindon Walcot	Average Annualisati on Factor	Raw Data Annual Mean	Annualised Annual Mean
Site 15	0.9407	0.9314	0.9219	0.9200	0.9285	25.2	23.4
Site 23	1.1051	1.0323	1.0676	1.1556	1.0902	41.4	45.1
Site 28	0.8877	0.9163	0.9251	0.8817	0.9027	18.7	16.9

Diffusion Tube Bias Adjustment Factors

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

WCC has applied a local bias adjustment factor of 0.77 to the 2023 monitoring data. This is because this ensures a consistent approach to previous ASRs, despite being slightly less conservative than the national bias adjustment factor of 0.81. A summary of bias adjustment factors used by Winchester City Council over the past five years is presented in Table C.2. Following initially submittal of this ASR DEFRA requested further clarification and justification as to this approach. This is now provided below:

Detailed discussion on the adoption of the local bias correction for 2023 data

It is our understanding the current guidance from TG (22) when considering the appropriate choice of local versus national basis correction is detailed in the following tables (pages 142 to 143):

Box 7-13 – Choice of NO₂ Bias Adjustment Factor

The most important factors to be considered when deciding which bias-adjustment factor to use are:

- Tube exposure time (one week, two weeks, one month)
- Length of the monitoring study
- QA/QC of the chemiluminescence analyser
- QA/QC of diffusion tubes
- Siting of the co-location study
- Siting of other tubes in the survey

Local Authorities using diffusion tubes as part of their Review and Assessment are advised to report both the adjustment factor from their local study, and the bias adjustment factor from the national database. However, the decision of which to use will depend upon a number of factors that will need to be considered. Ultimately it will be up to each local authority to take account of these factors and set out the reasons for the choice made. Specific factors that should be addressed are:

Cases where the locally obtained bias adjustment factor may be more representative:

- Where the diffusion tube exposure periods are weekly or fortnightly (or anything other than monthly – the national database of co-location results only covers monthly exposure.)
- If the co-location site is unusual in some way: for example, affected by specific large NO_x sources other than road traffic, such as local industrial installations. (This is a strong indication in favour of using a locally-derived factor).
- For tubes exposed in a similar setting to the co-location site (open/shelter, height, etc).
- Where the duration of the whole diffusion tube study is less than one year, especially if it is less than nine months in line with the Defra Calendar⁴⁹ (when adjustment is best made for a matched time period, rather than using an annual factor).
- Where the Review and Assessment Helpdesk spreadsheet contains data from fewer than five other studies using the same laboratory and preparation.
- Where the co-location study is spread across more than one calendar year, e.g. October 2014 to September 2015 – especially where there is evidence of different bias-adjustment factors for different calendar years.
- For co-location sites with "good" precision for the diffusion tubes and with high quality chemiluminescence results, i.e. to national AURN standards.

Cases where the combined bias adjustment factor may be more representative:

- Where the survey consists of tubes exposed over a range of settings, which differ from the co-location site, e.g. the co-location site is in a very exposed setting and the tubes being assessed are on a building façade in a canyon-like street.
- Where the co-location study is for less than nine months in line with the Defra Calendar⁴⁹, although the diffusion tube monitoring is for a longer period.
- Where the automatic analyser has been operated using local, rather than national, QA/QC procedures.
- Where data capture from the automatic analyser is less than 90%, or there have been problems with data quality.
- For co-location sites with "poor" precision or laboratories with predominately "poor" precision, as set out on the LAQM Support Helpdesk website.

In referencing the above, we consider there are two key criteria from the local bias considerations, which are very relevant to Winchester City Councils selection of the local bias correction:

Tubes in a similar setting to the colocation site (open/shelter, height etc) – The local bias correction has been derived from a site in the middle of the AQMA, in which most of the tubes are located. Being near to other such tubes it is affected by comparable sources and in particular comparable road traffic types/ages. Further the AQMA in Winchester City

is on a hill with narrow roads providing an urban street canyon effect. This is considered a good site to represent such geographic and spatial impacts.

For co-location sites with good precision for the diffusion tubes and with high quality chemiluminescence results i.e. to national AURN standards. There was excellent data capture for the chemiluminescent real time data used and the diffusion tubes returned excellent precision. All individual data periods had a coefficient of variation of less than 5 percent. In addition, each data period had a matching automatic analyser data capture of greater than 98 percent. This by far exceeds the minimum requirement. There is also an additional triplicate site (tubes 19 to 21) used to check tube variance slightly outside the AQMA and this provided additional confidence returning excellent coefficient of variation results (although these are not routinely reported as they are not used directly in the bias correction calculation). For these tubes the coefficients of variation were less than 5 percent for all but one sampling period at 6.3. The Air Quality Station is also run to AURN standards with a third party (AQDM Ltd) being used to audit and ratify the final data sets.

Looking at the criteria for when a combined bias (National?) adjustment may be more representative, there is no relevant criteria. Addressing these (in the order of the above table):

- The vast majority of the tubes are within or close to the AQMA in an old small city environment– namely narrow roads with a street canyon effect.
- The collocation study ran for the 12 months – 11 data periods were used as on one occasion two of the tubes were stolen (although looking at the one result for this 12th period this in line with the 11 periods used).
- The automatic analyser had excellent data capture (as already outlined).
- The tubes had good precision (as already outlined).

We have also considered the following additional factors not addressed specifically in the above guidance:

- The national 2023 data (version June 2024) set for Gradko (20 percent TEA in water) has considerable variance in the individual result obtained for BIAS correction which in our view suggests there is considerable variability in the physical and chemical response depending on localised factors. We have referenced this dataset to be certain Winchesters' result was not a significant outlier. It was noted of the 25 bias corrections with reported good precision there are 7 sites with equal or lower bias corrections reported.

- There have been no changes in the last 4 years to the instrument/tubes used in terms of either operational methodology or location. The triplicate sample used to be located on the Chesil Street real time site, but this was decommissioned at the end of 2019 with the triplicate colocation site relocated to the St Georges site for 2020 onwards. It has just been noted that the map in Appendix D3 has never been altered to reflect this change. The 3 tubes are located on the St George's St instrument caging (within 50cm of the sample inlet) at the same inlet height and at the same distance from the roadside.
- As Gradko are based in Winchester the tubes are taken immediately to their Labs avoiding any possible affects during postal transit.

Additional Comment

The helpdesk comment that the use of the national bias causing one result to exceed 36 ugmm3 is noted but is not considered with referencing to the TG22 guidance to be a relevant factor in the choice of the most appropriate bias correction factor. It is appreciated that a precautionary approach to ensuring compliance is important but equally an overestimate of results and the continuation of AQMAs when not required is equally important based on DEFRA guidance on AQMA revocation. Further it is noted there is already a sampling error built in by adopting the precautionary 36ug/m3 annual mean Nitrogen dioxide target rather than the 40 ug/m3 objective.

We will be taking on board the comment on the use of a single site for bias correction and for 2025 we will be relocating triplicate diffusion tubes 19 to 21 to the Romsey Rd real time site (there is currently one tube at this site but it is not located at the same height as the sample inlet). This will allow for a second bias correction to be derived to provide further confidence for the 2025 datasets onwards.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	Local	-	0.77
2022	Local	-	0.82
2021	Local	-	0.81
2020	Local	-	0.84
2019	Local	-	0.93

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	11
Bias Factor A	0.77 (0.73 - 0.82)
Bias Factor B	30% (23% - 37%)
Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	34.8
Mean CV (Precision)	2.4%
Automatic Mean ($\mu\text{g}/\text{m}^3$)	26.9
Data Capture	99%
Adjusted Tube Mean ($\mu\text{g}/\text{m}^3$)	27 (25 - 29)

NO₂ Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within WCC required distance correction during 2023.

QA/QC of Automatic Monitoring

All results at reference analysers have been zero and span corrected with readings taken approximately every 2 weeks in accordance with Defra guidance for roadside locations. All gases used for calibration have been independently certified. All instruments were fully serviced every six months by external contractors (Matts Monitors). All real-time data was polled and ratified by an external air quality consultant (AQDM).

PM₁₀ and PM_{2.5} Monitoring Adjustment

The data reported for the Palas Fidas 200 is in accordance with paragraph 7.174 of TG22 using the inbuilt method 11 approved algorithm. It does not require the application of a correction factor.

Automatic Monitoring Annualisation

The data capture percentage for the roadside NO₂ automatic monitoring stations in 2023 was greater than the required 75%. The data capture percentage for PM_{2.5} and PM₁₀ at 99.9% at St George's Street. Therefore, no annualisation of data was required. See Table F.1 for details about Twyford AQMesh.

NO₂ Fall-off with Distance from the Road

No automatic monitoring locations within WCC required distance correction during 2023.

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

Figure D. 1 – Map of Winchester Town Centre AQMA and Continuous Monitors within the City

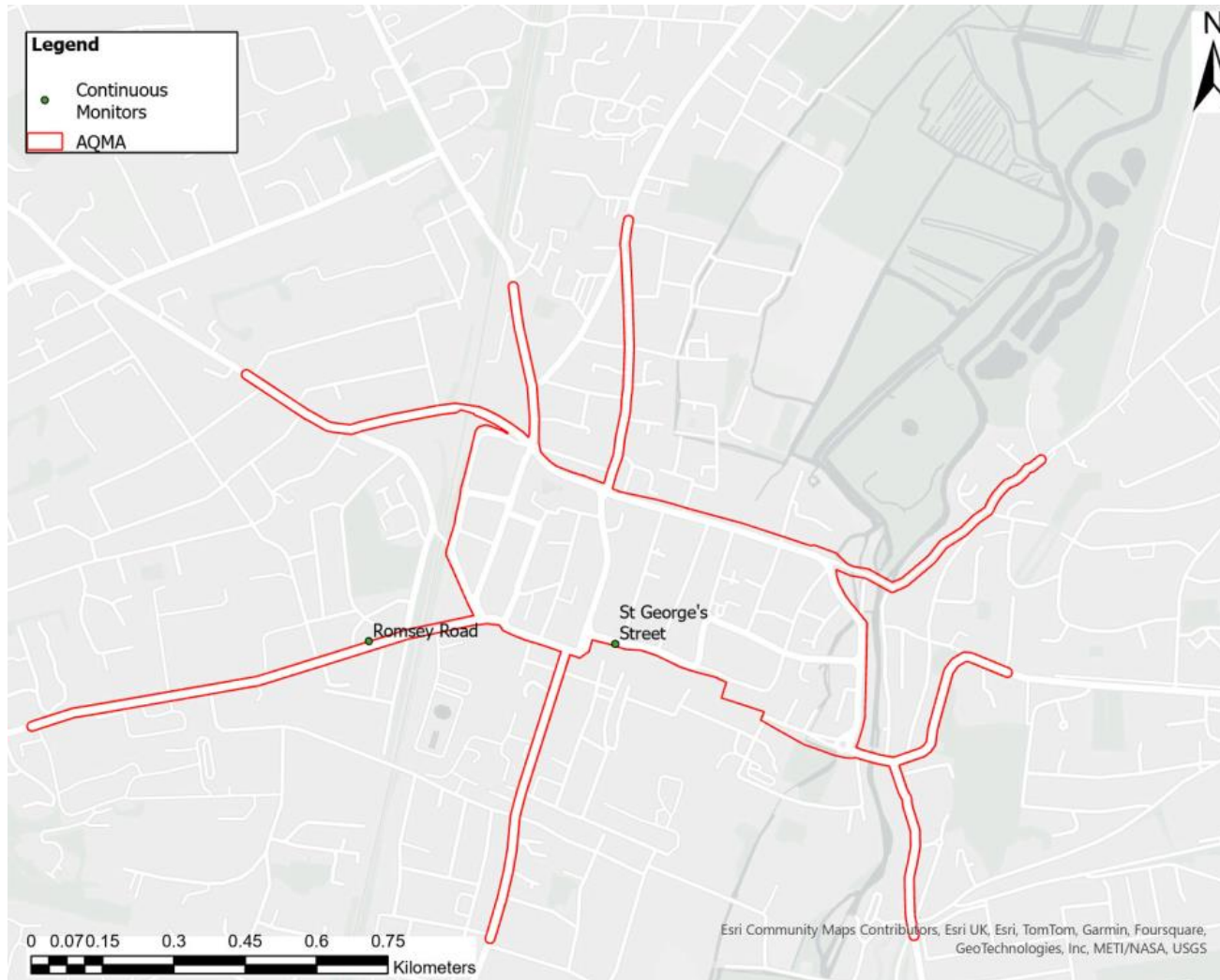


Figure D.2 – Map of Winchester Town Centre AQMA and Continuous Monitoring Sites

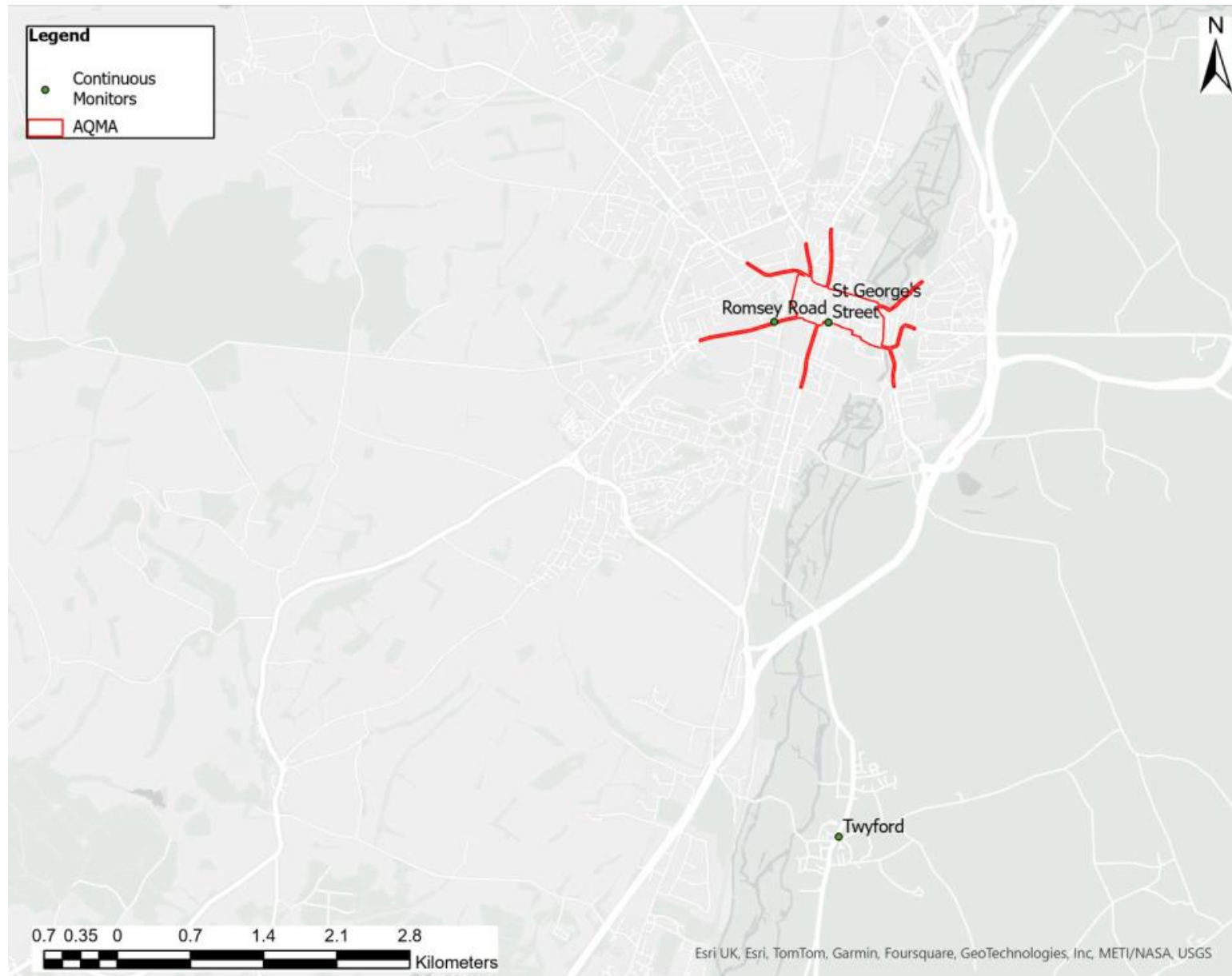
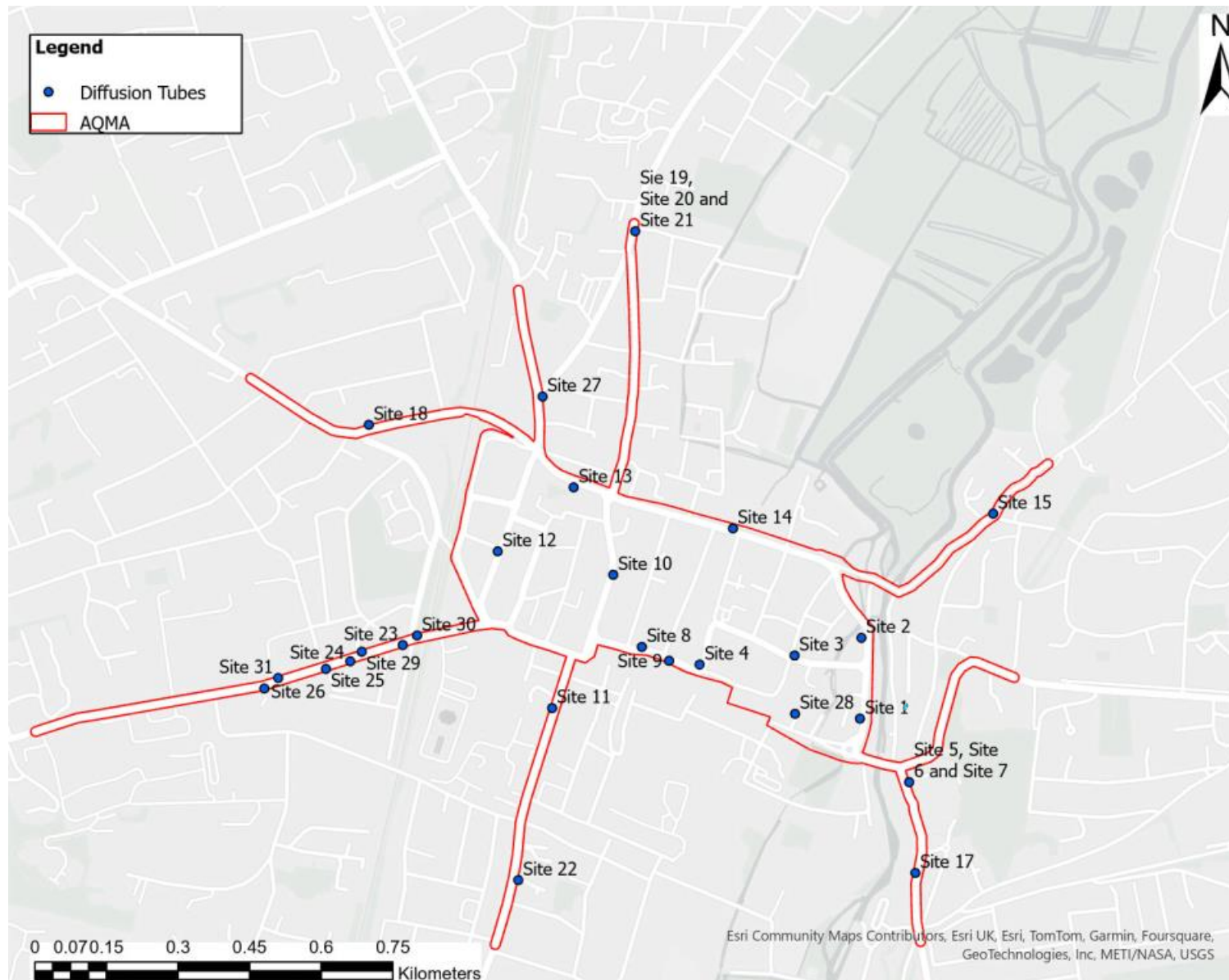


Figure D.3 – Map of Winchester Town Centre AQMA and Diffusion Tubes within the City



Revision Note - Sites 5, 6 and 7 shown incorrectly, they have been located at the St Georges St air quality station (See map D1) since 2020. Map will be corrected in next ASR submission.

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁹

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

⁹ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Appendix F: Indicative Monitoring

WCC commissioned an AQMesh monitor on 23rd December 2021. This monitor is not MCerts certified and is therefore considered to provide indicative data only. Results of this monitoring is presented below.

The AQMESH “raw” data is automatically adjusted by the service provider (Acoem Ltd) using algorithms based on the analysers performance against the service providers own collocated sites and overall network performance. As part of data ratification, a contractor (AQDM) checks these values against comparable reference sites. No further corrections were deemed necessary in 2023.

Table F.1– Details of Indicative 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)
Twyford	Twyford	Roadside	448161	124619	NO ₂ , PM ₁₀ , PM _{2.5}	NO	Optical (AQMesh)	7	4.4	1.9

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 F.2– Annual Mean NO₂ Monitoring Results: Automatic Monitoring (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
Twyford	448161	124619	Roadside	99.3	99.3	-	-	-	25.0	28.3

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**.

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

Table F.3– 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
Twyford	448161	124619	Roadside	99.3	99.3	-	-	-	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.

Table F.4– Annual Mean PM₁₀ Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
Twyford	448161	124619	Roadside	99.3	99.3	-	-	-	11.0	9.7

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

Notes:

The annual mean concentrations are presented as µg/m³.

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ are shown in **bold**.

Table F.5– 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means > 50µg/m³

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
Twyford	448161	124619	Roadside	99.3	99.3	-	-	-	1	0

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m³ have been recorded. Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ 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.

Table F.6– Annual Mean PM_{2.5} Monitoring Results (µg/m³)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
Twyford	448161	124619	Roadside	99.3	99.3	-	-	-	8.0	6.3

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.

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
AQS	Air Quality Strategy
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
EV	Electric Vehicle
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
WCC	Winchester City Council

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