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: May 2023

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Executive Summary: Air Quality in Our Area

Air Quality in Winchester City Council

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

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

Winchester City Council (WCC)'s administrative area is comprised of the city of Winchester and wider district area. 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 (NO_2), 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 NO_2 objective and 24-hour mean PM_{10} objective. The 24-hour PM_{10} 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.

[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

WCC currently undertake NO_2 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 NO_2 within the AQMA at all monitoring locations in 2022, with the highest concentration being 38.1 µg/m^3 at City 25 (Romsey Road West End Terrace), which when corrected for relevant exposure falls to 33.1 µg/m^3. In the wider district, NO_2 concentrations also remained well below the national air quality objective, the highest concentration in the wider district was 23.7 µg/m^3 at District 3 (Martyr Worth Roads, Kings Worthy/Martyr Worthy), almost half of the national objective.

Between 2018-2022, a decreasing trend in NO_2 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. Concentrations increased slightly again in 2022 compared to 2021 at some sites, however all 2022 concentrations were below the pre-pandemic 2019 concentrations, excluding one location (City 5, 6, 7) which increased from 28.6 µg/m^3 in 2019 to 29.2 µg/m^3 in 2022.

The Council relocated the AQMesh near-reference continuous monitor, located on Romsey Road during 2021, to a site in Twyford on 23rd December 2021.

Actions to Improve Air Quality

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

The Environmental Improvement Plan[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and

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

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.

The current Air Quality Action Plan (AQAP) outlines nine 'core' actions and nine additional measures aimed at improving air quality and working towards meeting the relevant air quality objectives within Winchester District. The core measures were identified as directly influencing NO_2 concentrations through a combination of reducing traffic volumes, encouraging a lower NO_X emitting vehicle profile in the city, addressing future emissions through environmentally aware procurement practices and ensuring minimum development standards. Due to the main source of pollution within the AQMA being road traffic, some of the key actions in the AQAP aim to reduce congestion and vehicle emissions in the city centre, with the focus on improving NO_2.

The core actions for this action plan are:

1. Build on existing car park pricing differentiation strategy (modelled 2% reduction in NO_X emissions);
2. Review enforcement of goods deliveries by time of day and enforce (modelled 2% reduction in NO_X emissions);
3. Introduce a Park and Ride site in the north of Winchester (modelled 3% reduction in NO_X emissions);
4. Introduce new parking charges/incentives to reduce diesel car parking and high polluting petrol cars (older than Euro 4) from parking in central car parks in favour of low emission vehicles (modelled 10% reduction in NO_X emissions);
5. Investigate the feasibility of introducing a Clean Air Zone (CAZ) for heavy duty vehicles that enter the AQMA, which do not meet Euro VI Standards (modelled 2% reduction in NO_X emissions);
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 (modelled 2% reduction in NO_X emissions);
7. Development of air quality supplementary planning document (SPD);

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

8. Continue to work with and lobby Hampshire County Council to identify projects to improve air quality; and
9. Monitor the performance of the action plan and reassess whether additional measures are required to meet the objective.

Continuous progress has been made with these core actions since the 2017 AQAP. However, due to the COVID-19 pandemic, and more recently the cost of living crisis, some of the measures to tackle air quality unfortunately experienced some understandable delays or required modification. Despite this, WCC has taken forward a number of direct measures during the current reporting year of 2022 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

There is also a range of additional measures which mainly relate to the support and promotion of car sharing schemes, adoption of Travel Plans in schools and workplaces, cycling infrastructure and more sustainable travel for Council staff, as well as maintaining a programme of regular communication to encourage behavioural changes.

1. Work with authorities towards adoption of a regional Low Emisson Strategy (LES);
2. Ensure that air quality is a standard consideration as part of procurement practice and is reflected in the Council's Procurement Policy;
3. 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;
4. To continue to work on the delivery and promotion of car club schemes operating in the city;
5. Consider the introduction and promotion of additional cycle stands, in consultation with local cycling groups, as part of planned developments in the AQMA;
6. Work with stakeholder organisations and maintain a programme of regular communication to encourage behavioural change;
7. Review and refresh the Council Travel Plan to promote more sustainable travel for staff; and
8. Provide web based information and sign posting to resources that will assist and encourage workplaces and schools in the City to adopt Travel Plans.

Conclusions and Priorities

The Council continued monitoring in 2022 with minor changes to the network, including relocation of the automatic monitoring site at Romsey Road to a site in Twyford on 23rd December 2021.

All monitoring locations met the annual mean air quality objective of 40 µg/m^3 in 2022. NO_2 concentrations increased slightly in 2022 at most of the monitoring locations compared to 2021, however the majority of 2022 concentrations remain below pre-pandemic, 2019 levels.

Further to the conclusions of a modelling study undertaken in 2022, the 2023 air quality data will be reviewed in order to determine whether the Winchester Town Centre AQMA should be amended or fully revoked in Spring 2024. As a result, the AQAP has not yet been updated, an approach that has been agreed via the LAQM Helpdesk subject to final agreement from DEFRA which has not yet been confirmed.

Since the last ASR report (2022), WCC has achieved the following from the AQAP:

- Completion of an extension to the East Park and Ride site with a new multi-storey car park in May 2022.
- Employment of a dedicated Sustainable Travel Planning Officer; and
- Set up Winchester Travel Planners Forum to help inform policies to assist major employers in the development of sustainable travel policies.

WCC's priorities for the coming year include:

- Continued compliance with annual mean NO_2 objective across whole of the Winchester district;
- Assessment of local $PM_{2.5}$ and PM_{10} concentrations;
- Adoption of a replacement Air Quality Strategy for the whole District; and
- Carrying out a review of 2023 air quality data to inform whether the Winchester Town Centre AQMA could be revoked in Spring 2024.

Local Responsibilities and Commitment

This ASR was prepared by the Public Protection Service of WCC with the support and agreement of the following officers:

- David Ingram and Phil Tidridge, Public Protection

This ASR has been approved by:

Cllr Jackie Porter Cabinet Member for Place and Local Plan

Also consulted was the Director of Public Health at Hampshire County Council (no comments received)

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

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1 Local Air Quality Management

This report provides an overview of air quality in Winchester City Council 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 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

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 Winchester City Council can be found in Table 2.1. The table presents a description of the one AQMA that is currently designated within Winchester City Council. Appendix D: Map(s) of Monitoring Locations and AQMAs 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:

- 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 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	NO_2 >40 µg/m^3 at multiple locations.	No exceedances of the NO_2 Annual Mean AQO	3 (2020, 2021, 2022)	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.**

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

Defra's appraisal of last year's ASR concluded the 2022 ASR was clear and detailed and showed clear progress relating to measures and priorities. The Council was commended for potentially pursing a new AQMA. It was suggested that more care be taken when naming sites in figures. It was also requested that PM_{10} information be included when describing the AQMA and that more discussion in relation to the use of a Local Bias Adjustment Factor is included.

WCC has taken forward a number of direct measures during the current reporting year of 2022 in pursuit of improving local air quality. Details of all 18 measures completed, in progress or planned are set out in Table 2.2. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

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

- Completion of an extension to the East Park and Ride site with a new multi-storey car park in May 2022;
- Employment of a dedicated Sustainable Travel Planning Officer; and
- Set up Winchester Travel Planners Forum to help inform policies to assist major employers in the development of sustainable travel policies.

In addition, during 2022 WCC conducted a detailed modelling study to establish the potential need to amend or entirely revoke the current AQMA. The recommendations of this report were to amend the AQMA's extent to a reduced size. However, given the final 2022 concentrations monitored it was felt that the best approach would be to potentially revoke the AQMA, assuming a further year of compliance is achieved in 2023 (to account for the first of three years of compliance being 2020, which was heavily affected by COVID-19). Accordingly, the anticipated update to the AQAP has not yet been undertaken. Instead, it is likely that this will be replaced with an overarching Air Quality Strategy as per paragraph 4.12 of LAQM.PG(22), which will cover the whole District and also include a greater focus on $PM_{2.5}$. This approach has been agreed with the LAQM Helpdesk subject to final agreement by DEFRA (still pending)

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

- Review of travel plan to be carried out by the newly appointed Sustainable Travel Planning Officer;
- Adoption of a replacement Air Quality Strategy and/or making amendments to the AQAP if the AQMA remains; and
- New Council company vehicle procurement policy which prioritises the uptake of low emission vehicles.

WCC's priorities for the coming year are:

- Carry out a review of air quality data to inform whether the Winchester Town Centre AQMA could be revoked in Spring 2024;
- Adopting a replacement Air Quality Strategy covering the whole District and amending the AQAP; and
- Agreeing on city centre locations for cycle stands.

WCC have worked to implement these measures in partnership with the following stakeholders during 2022:

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

WCC anticipates that the measures stated above and in Table 2.2 will achieve continued compliance in Winchester Town Centre AQMA. A review will be carried out of the 2023 air quality data to inform whether the AQMA can be revoked in Spring 2024.

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	Build on existing car park pricing differentiation strategy	Traffic Management	Other	2017	Charges introduced and will be reviewed after one year	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.	Drastic Changes in car parking during COVID pandemic means changes in parking patterns and numbers made meaningful reassessment unfeasible for 2020 and 2021. Emission based tariff charging has been temporarily placed on hold in favour of the alternative charging regime to potentially be introduced in 2022/23.
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. Further data collection is expected to better inform on whether targeted enforcement gives a demonstrable improvement on traffic flow.	Adopted to encourage a smooth traffic flow through the one way system during peak periods. 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.
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/aboutthecouncil/haveyoursay/consultations/winchestermovementstrategy The strategy is now embarking on developing a detailed set of identified study options Regulation 18 draft local plan due for public consultation in 2022/23 which includes potential for planning policy support for a north park and ride site	The developing local plan is looking to provide potential policy support for a park and ride site to the North of Winchester with the draft due for regulation 18 public consultation 2022/23. 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. Work on the detailed delivery of the Winchester Movement strategy is

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															still ongoing – see https://www.hants.gov.uk/transport/strategies/transportstrategies for latest updates.
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	2022	WCC – Parking Services Engineering & Transport	Local Authority	N	N/A	NA	Planning	10% reduction in NOx emissions	Traffic flow and speed; Increase in petrol/ULEVs using car parks; Preferential responses	The Council have 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 emissions based the parking tariffs in Winchester Town be advertised and implemented in October 2022. 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 to put this project temporarily on hold and have instead pursued a different pricing strategy of increasing the pricing differential between city centre car parks and outer P&R/P&W parking as cited in Measure 1, above.	The project to adopt emissions based is measure 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.
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)	Ongoing	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/abouthecouncil/haveyoursay/consultations/winchestermovementstrategy No update in 2022 – position remains as above.
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	TBC	WCC	Local Authority	N	N/A	NA	Planning	2% reduction in NOx emissions	Low emission vehicles in fleet; Number of trips entering AQMAs	WCC is currently reviewing the Council's procurement policy and a new policy is expected by the end of the year. This includes ensuring that the refuse fleet deployed to serve the district utilizes lower emission Euro VI engines and that the City Council's 'grey fleet' uses electric or hybrid vehicles where possible. The taxi licensing regime has been reviewed and phase 2 of this project now underway. The Council no longer operates a staff car leasing scheme.	A new procurement policy is in place, which includes a requirement to consider environmental criteria. 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. **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 supplementa	Policy Guidance and	Air Quality Planning and	2017	TBC	WCC	Local Authority	N	N/A	NA	Planning	N/A	Annual Mean NO_2; Planning applications	The Air Quality Supplementary Planning Document has now been adopted and is in use by the Planning Department.	Initial 2019 draft version was too complex and had to be redrafted. Final revised version has now been

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	ry planning document (SPD)	Development Control	Policy Guidance										showing regard for SPG		adopted following the conclusion of the public consultation process.
8	Continue to work with and lobby Hampshire County Council to identify projects to improve air quality	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2017	Detailed studies that have air quality impacts currently underway	WCC/HCC	Local and County Authority	N	N/A	NA	Planning	N/A	Annual Mean NO_2	WCC is currently working with HCC on the detailed delivery of the Movement Strategy for Winchester (adopted April 2019) which will consider air quality and a regional SPD (if appropriate).	Funding for any measures identified needs to be secured. Work on the detailed delivery of the Winchester Movement strategy is still ongoing – see https://www.hants.gov.uk/transport/strategies/transportstrategies for latest updates. Improvement to walking and cycling have been consulted on – see https://www.hants.gov.uk/transport/transportschemes/atfwinchesterimprovements
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 – 2022 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 2024, on whether to revoke the AQMA or adopt a new AQAP, after having another year's worth of data.	Expected Review of 2023 air quality data to inform whether to revoke AQMA in Spring of 2024. Work to be commenced on the adoption of a replacement Air Quality Strategy and need to amend the AQAP is being considered..
Additional Measures															
10	Work with authorities towards adoption of a regional LES	Policy Guidance and Development Control	Regional Groups Co-ordinating 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). A programme of measures is proposed for 2023, including a Hampshire wide no idling campaign, the development of Hampshire wide air quality planning guidance and work regarding domestic solid fuel combustion	Following initial meetings to explore this option it is unlikely that a regional LES will be adopted. WCC is however, through the Hampshire Air Quality Steering Group, promoting joint approaches on air quality planning guidance and shared objectives in support of the AQS regime going forward. initiative and mitigation measures. This appears to be work in progress and may well be usurped by the new regulations on $PM_{2.5}$. 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/

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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	Ongoing	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	Studies now underway as part of potential programmes of work identified within the Hampshire Movement Study	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 2022.
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	2017	Completed in 2018	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.	Action already completed.
15	Consider the introduction and promotion of additional cycle stands, in consultation with local cycling groups, as part of planned development	Promoting Travel Alternatives	Promotion of cycling	2017	Ongoing	WCC	Local Authority	N	N/A	NA	Planning	N/A	Number of cycle parking; Number of cyclists as a modal share (through surveys)	Some progress has been made in previous year. It's 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	WCC has ordered the lockers for the leisure park, and we are just agreeing on the city centre locations. Trying to get a range of provision including secure /sheltered / can accommodate cycle trailer etc.

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	s in the AQMA														
16	Work with stakeholder organisations and maintain a programme of regular communication to encourage behavioural change	Promoting Travel Alternatives	Other	2017	Ongoing	WCC	Local Authority	N	N/A	NA	Planning	N/A	TBC	Ongoing	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	2022	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 have employed a new Travel Planning Officer and this review will form part of their remit.	WCC complete Annual Staff Travel Surveys. A 2022 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 will take 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	TBC	WCC	Local Authority	N	N/A	NA	Planning	N/A	Number of travel plans adopted	Little progress on this measure beyond sign posting to existing resources. It is expected that once the Travel Planners Forum gains traction that a shared-on line resource can be hosted on Winchester's Web Pages. WCC recruited for role of Sustainable Transport Officer in 2022.	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.

$PM_{2.5}$ – 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 2011-16, Winchester had below the national average for the Public Health Framework Indicator, 'Fraction of mortality attributable to particulate air pollution'. However, in 2017, the fraction value increased marginally from 5% to 5.1% which was the same as the national average[7]. In 2018, Winchester's indicator remained at 5.1%, but the national average increased to 5.2% and in 2019, Winchester's indicator decreased to 4.2%, and the national average also decreased to 5.1%, indicating Winchester is again now below the national average. In 2020, the calculation method changed, and Winchester's indicator increased to 5.6%, which was the same as the national average. In 2021 (latest available), Winchester's indicator was 5.3%, just below the national average of 5.5%.

WCC is taking several measures to address $PM_{2.5}$. Measures include working with Public Heath colleagues, adopting transport initiatives included in The Local Transport Plan for Hampshire and local planning policies supporting the implementation of the Winchester Air Quality Action Plan. WCC is also involved in a Defra Clean Burn project that is led by Southampton City Council but includes Eastleigh, Winchester and New Forest Councils. This is seeking to promote good practice for domestic fuel combustion in the winter months and bonfires in the summer months. The project is being coordinated by the Southampton Environment Centre and aims to tackle $PM_{2.5}$ emissions.

In 2022, the Twyford (AQMesh) and St Georges Street (FIDAS 200) automatic monitoring stations that monitor $PM_{2.5}$ concentrations both recorded a $PM_{2.5}$ annual mean concentration below the air quality limit value of 20 µg/m^3.

[7] Public Health Outcome Framework (2019), 'Health Protection'. Available at: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/0/gid/1000043/pat/6/par/E12000008/ati/101/are/E07000094

Discussions are being held with Public Health to devise policies that will specifically target the reduction of $PM_{2.5}$, which the Council intends to tie in with the time frames for further central government guidance on $PM_{2.5}$ (as per the Environment Act 2021) and potentially a more stringent objective in line with World Health Organisation guidelines. Given the situation with the AQMA, it is likely that these will be brought forward through a new overarching Air Quality Strategy, expected for publication in 2024.

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

This section sets out the monitoring undertaken within 2022 by WCC 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

WCC undertook automatic (continuous) monitoring at three sites during 2022. All sites included NO_2 monitoring, with two sites (St George's Street and Twyford) additionally monitoring for PM_{10} 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/.

The following changes to WCC's automatic monitoring network occurred during 2021:

- The Twyford AQMesh was commissioned on 23rd December 2021

The Twyford AQMesh is a relocated instrument that was previously located on Romsey Road. There was a complete sensor replacement (with Ozone monitoring discontinued) before the sensor was reinstalled at its current location on 23rd December 2021.

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 NO_2 at 32 sites during 2022, including two triplicate sites. The monitoring network is split into a city wide network within the AQMA, and a district wide network covering other areas of potentially elevated concentrations across the wider district.

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

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

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 in these tables 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, as this was carried out for all diffusion tube monitoring sites for additional information.

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.

Across both continuous and passive monitoring sites, all locations met the annual mean objective of 40 µg/m^3. The highest monitored concentration in 2022 was 38.1 µg/m^3 at Site 25, Romsey Road (West End Terrace) in the City Study. When distance corrected for relevant exposure, as is required when comparing to the AQS objective, this concentration falls to 33.1 µg/m^3 predicted at the receptor. This site is within the existing AQMA as shown in Appendix D: Map(s) of Monitoring Locations and AQMAs. 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.

There remains little risk of exceedances of the objectives for NO_2 at the locations monitored across the district (i.e. outside of Winchester city centre). The highest concentration measured among these monitoring locations was 23.7 µg/m^3 at District 3, Martyr Worthy Road, Kings Worthy/Martyr Worthy. There was a slight increasing trend observed across most of the monitoring sites in 2022 compared to 2021.

Generally, across both the City and District-wide 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. That said, slight increases in monitored concentrations compared to 2021 were seen at the majority of sites in 2022. However at all of the monitoring locations, except City 5-7, the 2022 concentrations were below the pre-pandemic 2019 concentrations, indicating there is still a long-term declining trend in concentrations. The maximum increase between 2021 and 2022 was recorded at City 4, Upper Brook Street, where an increase of 4.7 µg/m^3 from 21.3 µg/m^3 to 26.0 µg/m^3 was recorded.

There were no recorded instances at diffusion tube monitoring sites of annual means greater than 60 µg/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 µg/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 µg/m^3, and so this objective was therefore not exceeded.

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 40µg/m^3, with results indicating this objective has consistently been met. The annual mean concentrations for 2022 were 16.3 µg/m^3 at St George's Street and 11 µg/m^3 at Twyford. Data capture rates were 99.9% at St George's Street and 90% at Twyford.

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. In 2022, the daily mean was greater than 50 µg/m^3 once at Twyford and zero times at St George's Street, which is below the objective.

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/m^3, Table A.8 indicates this is being achieved within Winchester district. The annual mean concentrations for 2022 were 10.3 µg/m^3 at St George's Street and 8 µg/m^3 at Twyford. Data capture rates were 99.9% at St George's Street and 90% at Twyford.

The data captured would indicate a marginal exceedance (prior to rounding) of the new Environmental Target for $PM_{2.5}$ of 10 µg/m^3 at St George's Street, though this is to be achieved by 2040, and once the data are rounded (as required by Article 5 of the legislation[8]) the site is meeting the target already.

[8] HMSO (2023) The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, Available at: https://www.legislation.gov.uk/uksi/2023/96/contents/made

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	448062	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
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 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)
City 1	10 Eastgate Street	Roadside	448563	129391	NO_2	YES	0.0	5.6	No	1.7
City 2	Greyfriars	Roadside	448566	129560	NO_2	YES	0.0	9.7	No	1.8
City 3	Friarsgate	Roadside	448426	129523	NO_2	YES	4.6	4.3	No	2.4
City 4	Upper Brook Street (Echo)	Roadside	448227	129504	NO_2	YES	9.2	8.0	No	2.5
City 5, City 6, City 7	NEW Roadside Monitor (St Georges Street)	Roadside	448666	129258	NO_2	YES	0.0	3.0	Yes	1.6
City 8	St Georges St Bed	Roadside	448106	129541	NO_2	YES	0.0	4.1	No	2.5
City 9	St Georges St Lad	Roadside	448163	129512	NO_2	YES	0.0	3.6	No	2.4
City 10	Jewry Street	Roadside	448046	129692	NO_2	YES	0.0	4.1	No	2.4
City 11	Southgate Street DV	Roadside	447918	129413	NO_2	YES	0.0	3.7	No	2.6
City 12	Sussex Street	Roadside	447804	129741	NO_2	YES	2.4	3.6	No	2.6
City 13	City Road	Roadside	447963	129875	NO_2	YES	0.0	6.6	No	3.0
City 14	74 Northwalls	Roadside	448297	129789	NO_2	YES	10.2	3.7	No	2.3
City 15	Wales Street	Roadside	448842	129820	NO_2	YES	0.0	1.7	No	2.5
City 16	Alresford Road Road (M3)	Other	449563	129439	NO_2	NO	24.0	NA (M3)	No	1.5
City 17	Chesil Street	Roadside	448679	129068	NO_2	YES	0.0	1.3	No	2.6
City 18	Stockbridge Road	Roadside	447534	130006	NO_2	YES	10.0	5.4	No	2.0
City 19, City 20, City 21	Worthy Road 3	Roadside	448092	130411	NO_2	YES	3.7	2.2	No	2.5
City 22	St Cross Road	Roadside	447847	129053	NO_2	YES	6.0	2.4	No	2.1
City 23	Romsey Road (Clifton Road)	Roadside	447605	129545	NO_2	YES	0.0	1.7	No	2.2

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)
City 24	Romsey Road (Clifton Hill - Old site)	Roadside	447495	129511	NO_2	YES	0.0	1.1	No	2.5
City 25	Romsey Road (West End Terrace)	Roadside	447444	129495	NO_2	YES	2.3	1.7	No	2.2
City 26	Romsey Road (Knights Quarter)	Roadside	447315	129454	NO_2	YES	2.4	2.0	No	2.2
City 27	Andover Road	Roadside	447898	130065	NO_2	YES	0.0	4.2	No	2.2
City 28	Bus Station	Other	448427	129401	NO_2	YES	NA	NA	No	2.4
District 1	High Street, Twyford	Roadside	448063	124371	NO_2	NO	0.0	1.4	No	2.2
District 2	Southdown Road, Otterbourne	Other	446680	124644	NO_2	NO	NA	NA	No	2.4
District 3	Martyr Worthy Road, Kings Worthy / Martyr Worthy	Roadside	449647	132669	NO_2	NO	0.0	0.5	No	NA
District 4	West Street/Broad Street, New Alresford	Roadside	458826	132719	NO_2	NO	NA	NA	No	NA
District 5	Hambledon Road, Denmead	Roadside	465917	112046	NO_2	NO	NA	NA	No	NA
District 6	Winchester Road, Wickham	Roadside	457203	111380	NO_2	NO	NA	NA	No	NA
District 7	Winchester Road, Bishops Waltham	Roadside	455176	117476	NO_2	NO	NA	1.0	No	NA
District 8	Whiteley Lane, Whiteley	Other	453645	108261	NO_2	NO	NA	1.3	No	NA

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
St George's Street	448062	129537	Roadside	99.7	99.7	41.0	37.0	26.9	27.0	28.5
Romsey Road	447544	129543	Roadside	99.9	99.9	-	32.0	32.0	32.0	21.0
Twyford	448161	124619	Roadside	89.7	89.7	-	-	-	-	25.0

☒ **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/m^3.

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

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

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

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

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

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
City 1	448563	129391	Roadside	76.0	76.0	28.9	27.9	19.6	20.0	20.3
City 2	448566	129560	Roadside	100.0	100.0	26.2	24.6	18.8	18.9	19.0
City 3	448426	129523	Roadside	100.0	100.0	23.8	22.2	15.8	17.1	16.7
City 4	448227	129504	Roadside	100.0	100.0	30.6	27.9	20.6	21.3	26.0
City 5, City 6, City 7	448666	129258	Roadside	92.8	92.8	30.4	28.6	25.9	27.2	29.2
City 8	448106	129541	Roadside	100.0	100.0	39.5	39.3	29.2	30.8	30.7
City 9	448163	129512	Roadside	100.0	100.0	**41.4**	38.5	29.3	28.5	28.7
City 10	448046	129692	Roadside	100.0	100.0	35.9	31.0	22.7	24.2	24.8
City 11	447918	129413	Roadside	92.0	92.0	28.8	28.3	21.2	20.1	21.7
City 12	447804	129741	Roadside	92.3	92.3	29.0	29.0	18.9	21.7	22.3
City 13	447963	129875	Roadside	100.0	100.0	28.8	28.2	21.0	21.0	21.9
City 14	448297	129789	Roadside	100.0	100.0	25.7	24.1	17.8	17.6	17.6
City 15	448842	129820	Roadside	81.5	81.5	26.1	23.4	18.7	18.3	20.8
City 16	449563	129439	Other	100.0	100.0	34.6	30.0	21.5	22.8	23.8
City 17	448679	129068	Roadside	73.2	73.2	34.7	35.3	23.7	29.5	28.2
City 18	447534	130006	Roadside	100.0	100.0	20.0	18.7	13.1	13.2	13.7
City 19, City 20, City 21	448092	130411	Roadside	100.0	100.0	23.6	21.1	15.4	15.5	15.9
City 22	447847	129053	Roadside	90.3	90.3	19.3	20.2	14.4	16.4	18.9
City 23	447605	129545	Roadside	74.9	74.9	-	-	33.6	32.2	27.8
City 24	447495	129511	Roadside	100.0	100.0	**47.6**	**46.5**	30.9	30.9	33.0
City 25	447444	129495	Roadside	73.5	73.5	-	-	**40.8**	36.5	38.1
City 26	447315	129454	Roadside	92.3	92.3	-	-	30.3	30.4	31.2
City 27	447898	130065	Roadside	92.8	92.8	30.6	26.5	20.8	22.0	21.1
City 28	448427	129401	Other	47.2	47.2	22.7	21.7	15.2	15.6	15.1
District 1	448063	124371	Roadside	90.3	90.3	24.1	21.4	16.6	18.0	17.8

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
District 2	446680	124644	Other	100.0	100.0	25.2	22.2	17.3	17.5	17.2
District 3	449647	132669	Roadside	100.0	100.0	**40.5**	34.6	25.0	25.0	23.7
District 4	458826	132719	District 4	82.6	82.6	26.6	27.5	18.4	18.3	18.5
District 5	465917	112046	District 5	73.5	73.5	18.1	17.7	12.9	12.5	12.4
District 6	457203	111380	District 6	90.3	90.3	29.8	26.8	21.6	21.5	21.3
District 7	455176	117476	District 7	100.0	100.0	29.6	27.0	20.5	21.6	21.1
District 8	453645	108261	District 8	75.7	75.7	20.3	18.1	12.7	13.1	15.6

☒ **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% (or in this case, less than 9 months' data capture). 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%).

Some sites have 9 months' data, but less than 75% data capture, but have not been annualised, as directed by Data Processing Tool v3.0.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations – City Study Locations

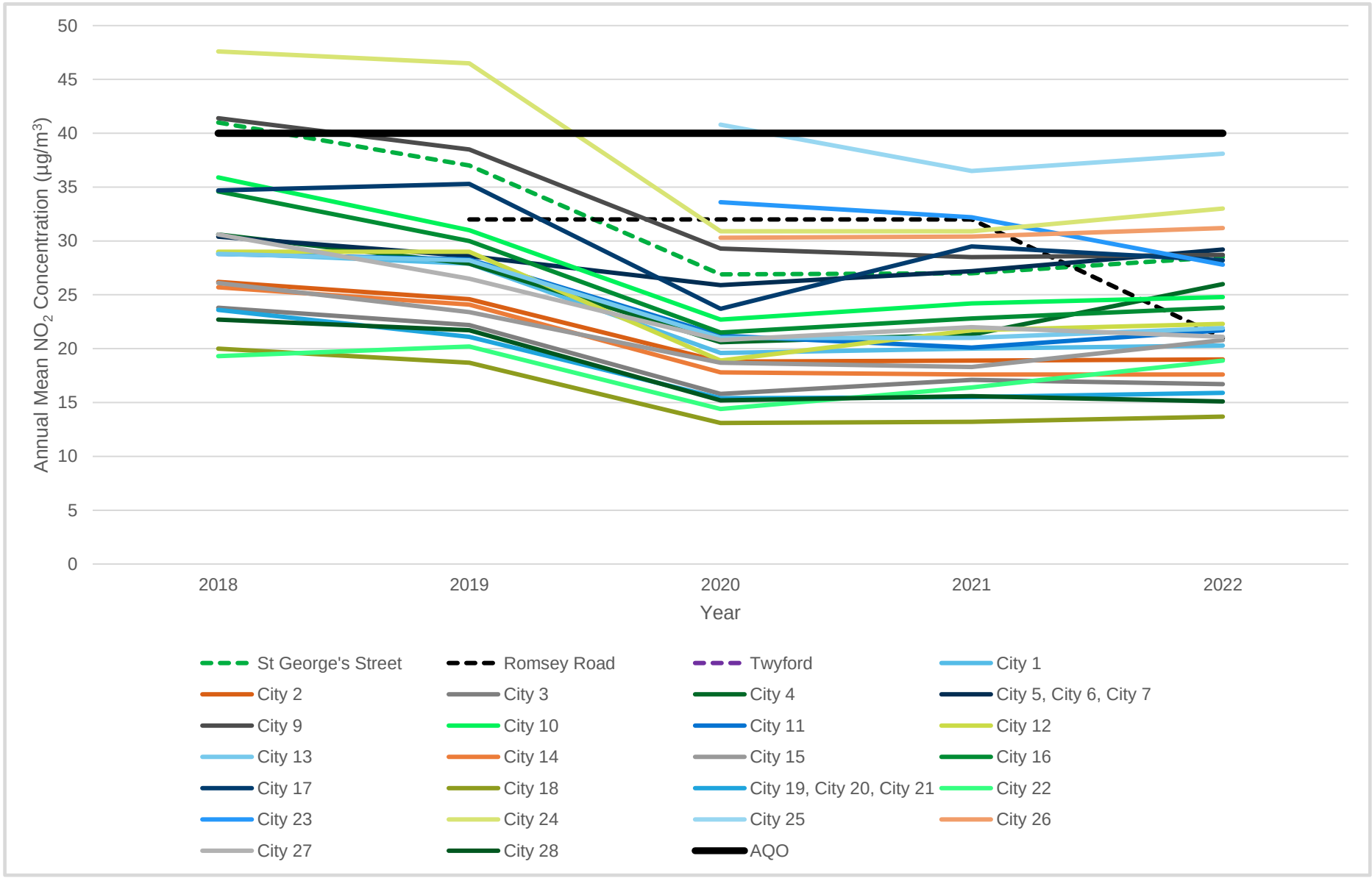


Figure A.2 – Trends in Annual Mean NO_2 Concentrations – District Study Locations

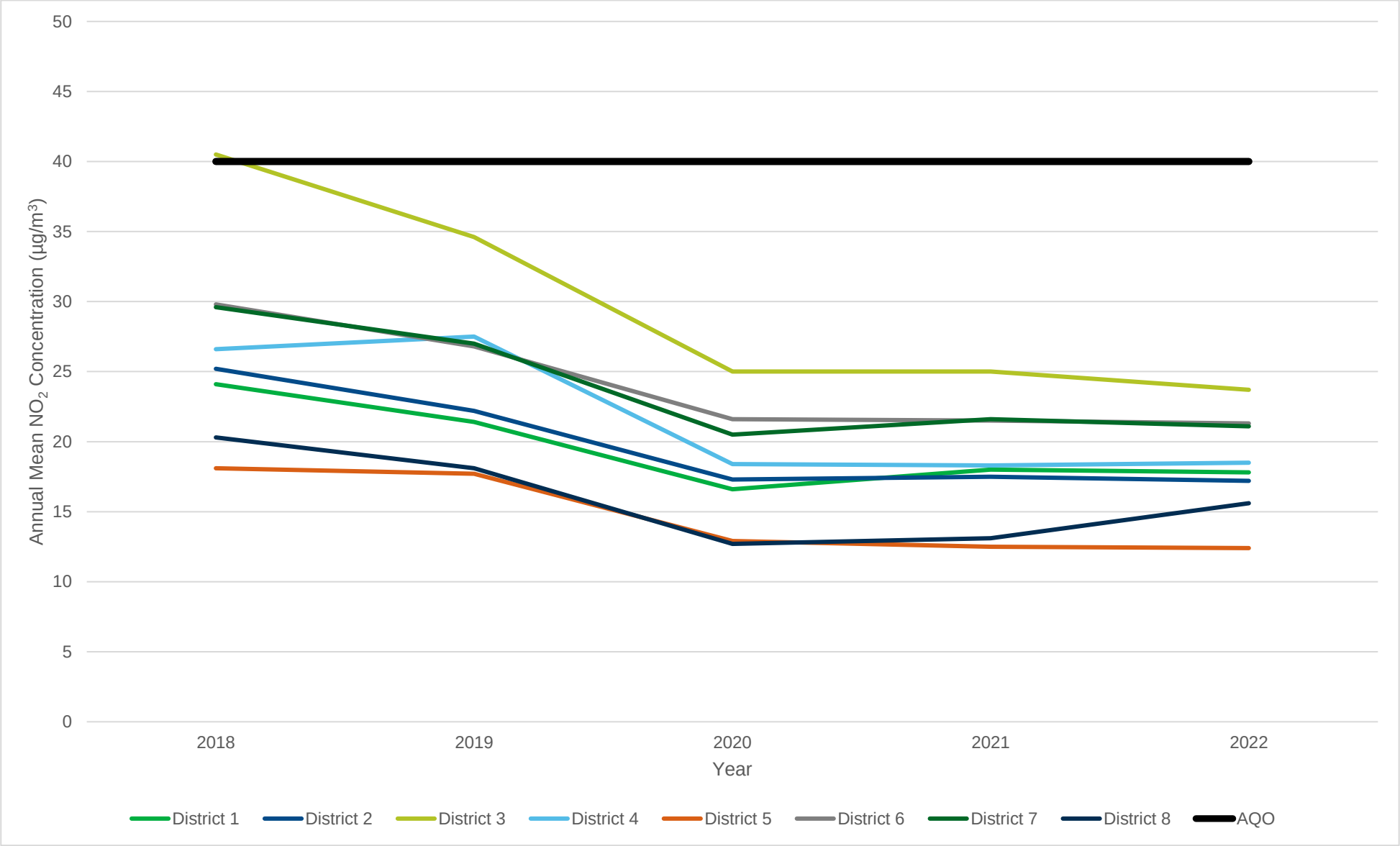


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
St George's Street	448062	129537	Roadside	99.7	99.7	0	0	0	0	0
Romsey Road	447544	129543	Roadside	99.9	99.9	-	0	0	0	0
Twyford	448161	124619	Roadside	89.7	89.7	-	-	-	-	0

Notes:

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

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

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

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

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

Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
St George's Street	448062	129537	Roadside	99.9	99.9	-	-	14.2	15.0	16.3
Twyford	448161	124619	Roadside	90	90	-	-	-	-	11.0

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

Notes:

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

Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ 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%).

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations

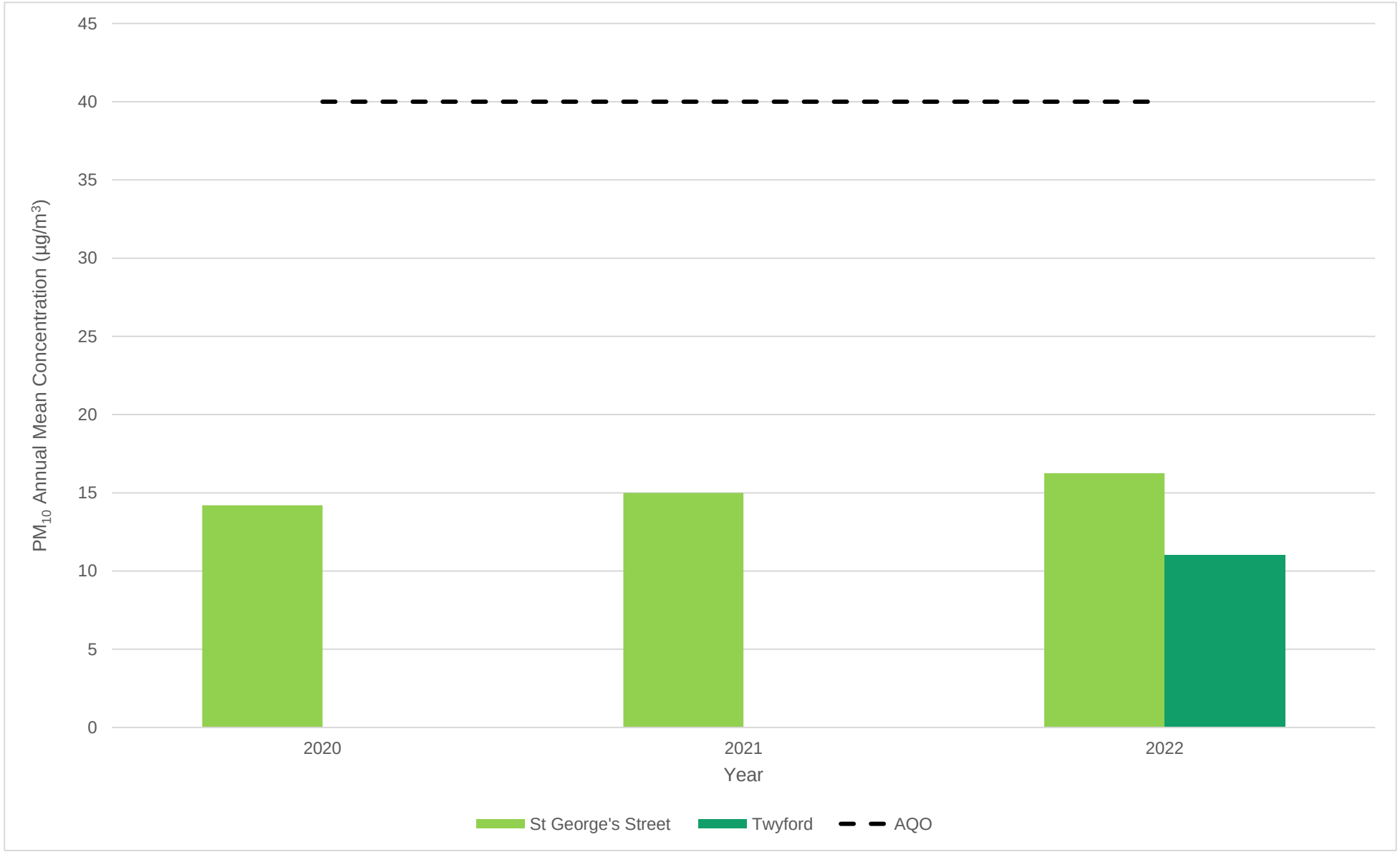


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
St George's Street	448062	129537	Roadside	99.9	99.9	-	-	0	1	0
Twyford	448161	124619	Roadside	90	90	-	-	-	-	1

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%).

Figure A.3 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m³

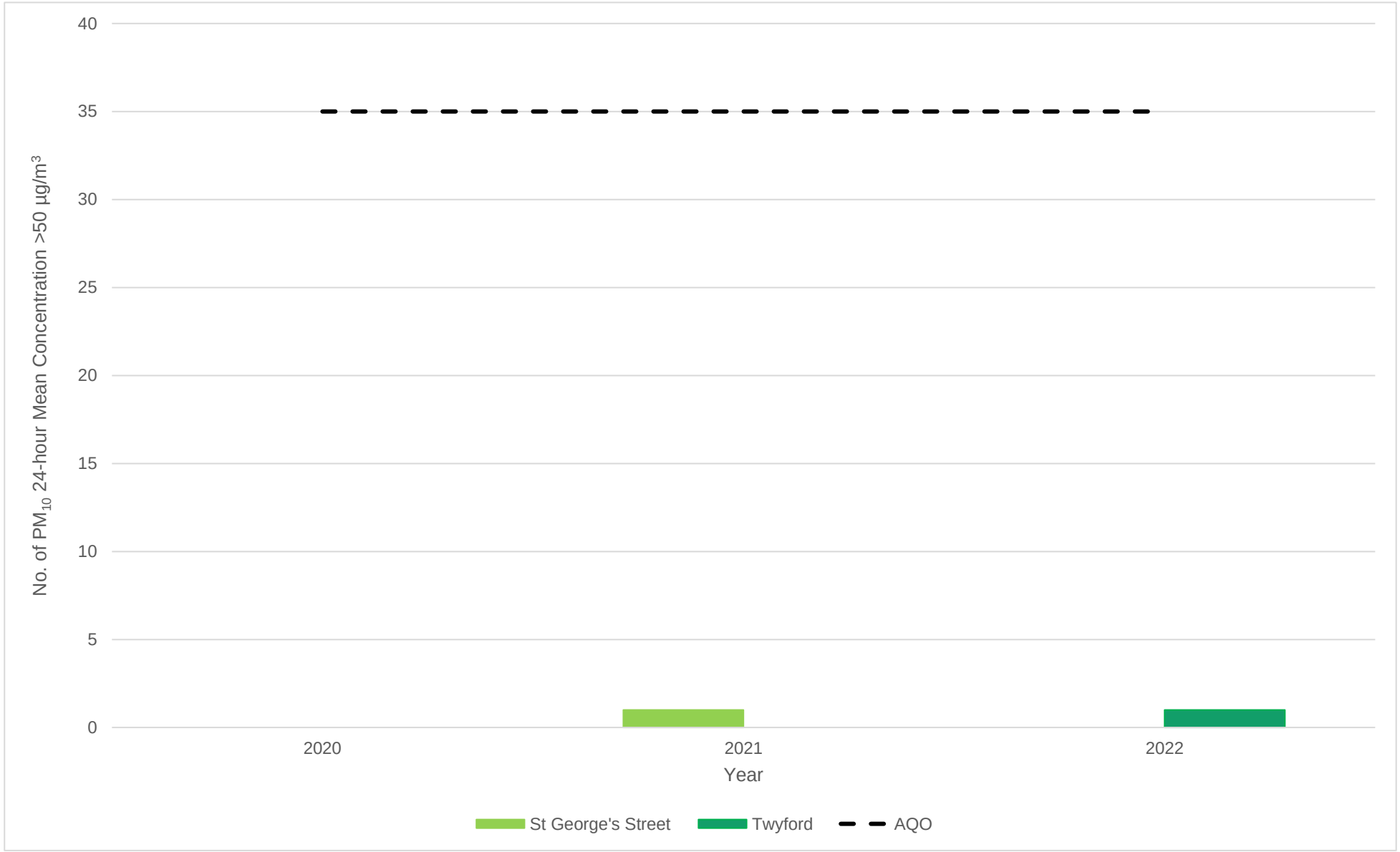


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
St George's Street	448062	129537	Roadside	99.9	99.9	-	-	9.0	9.0	10.3
Twyford	448161	124619	Roadside	90	90	-	-	-	-	8.0

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

Notes:

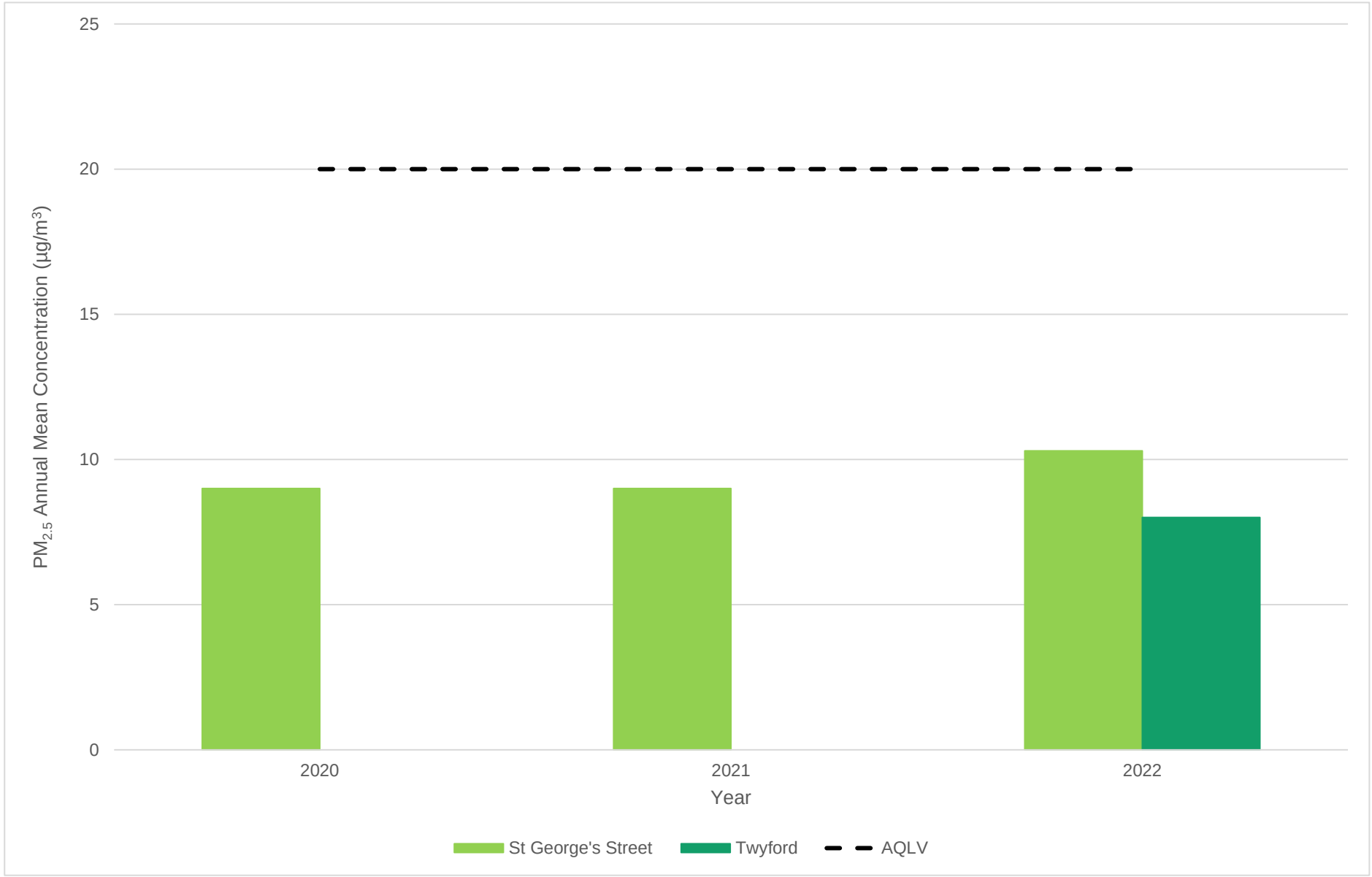
The annual mean concentrations are presented as $\mu g/m^3$.

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

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

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

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



Appendix B: Full Monthly Diffusion Tube Results for 2022

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

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted	Annual Mean: Distance Corrected to Nearest Exposure	Comment
City 1	448563	129391	32.9	21.6	28.8	22.6	21.6	19.8	22.3	-	-	23.2	-	29.9	24.8	20.3	20.3	
City 2	448566	129560	28.9	23.2	27.1	20.8	18.5	19.6	19.4	22.7	22.8	23.0	27.4	25.4	23.2	19.0	19.0	
City 3	448426	129523	26.9	16.2	26.4	18.1	14.8	16.8	16.8	20.6	19.3	21.1	24.3	22.8	20.3	16.7	15.9	
City 4	448227	129504	96.6	22.6	30.7	26.8	22.2	20.7	23.1	27.5	27.7	25.1	27.0	30.0	31.7	26.0	22.6	
City 5, City 6, City 7	448666	129258	39.4	33.0	42.2	29.9	29.7	-	31.3	37.9	35.0	36.1	41.0	36.4	35.6	29.2	29.2	
City 8	448106	129541	47.5	36.5	45.0	35.8	32.2	27.7	33.6	36.1	43.0	32.7	40.7	38.7	37.5	30.7	30.7	
City 9	448163	129512	37.8	27.5	39.0	32.1	30.6	31.7	31.7	36.7	34.7	36.9	43.9	37.9	35.0	28.7	28.7	
City 10	448046	129692	31.4	23.2	30.6	28.6	23.8	28.6	26.6	32.9	31.2	33.2	37.1	35.9	30.3	24.8	24.8	
City 11	447918	129413	36.0	24.2	27.1	25.5	20.2	20.8	21.9	26.2	27.4	29.6	-	31.8	26.4	21.7	21.7	
City 12	447804	129741	33.5	-	31.3	27.4	21.6	20.7	22.3	28.8	25.9	26.1	27.2	33.9	27.1	22.3	21.0	
City 13	447963	129875	32.1	28.2	29.8	21.5	23.2	24.3	22.9	24.5	23.9	27.5	32.6	29.5	26.7	21.9	21.9	
City 14	448297	129789	27.3	23.0	25.4	17.0	18.0	17.4	18.9	19.5	18.4	22.0	27.1	23.1	21.4	17.6	15.9	
City 15	448842	129820	32.8	20.8	29.6	-	19.6	20.2	20.2	25.6	-	24.4	28.3	31.7	25.3	20.8	20.8	
City 16	449563	129439	33.3	22.4	33.0	27.6	24.9	29.1	28.9	33.5	31.5	27.1	28.2	28.4	29.0	23.8	18.3	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
City 17	448679	129068	37.6	29.9	31.0	-	28.5	27.3	-	33.3	-	36.2	47.1	38.5	34.4	28.2	28.2	
City 18	447534	130006	22.8	12.1	23.5	16.5	11.6	12.3	12.2	15.7	16.6	16.7	18.2	22.1	16.7	13.7	12.8	
City 19, City 20, City 21	448092	130411	25.6	18.3	23.0	17.0	15.1	16.2	14.7	16.8	17.5	20.8	24.0	24.3	19.4	15.9	14.7	
City 22	447847	129053	25.2	16.4	22.6	17.4	-	22.5	20.8	25.4	24.4	17.8	30.0	30.8	23.0	18.9	17.0	
City 23	447605	129545	41.6	-	-	33.4	-	26.7	29.1	35.8	35.0	31.2	36.5	36.0	33.9	27.8	27.8	
City 24	447495	129511	47.9	37.2	46.6	37.7	38.2	35.2	37.1	42.6	43.0	38.6	39.1	39.7	40.2	33.0	33.0	
City 25	447444	129495	51.0	49.7	46.7	-	45.0	-	41.3	42.0	45.6	46.0	50.6	-	46.4	38.1	33.1	

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	Annual Mean: Distance Corrected to Nearest Exposure	Comment
City 26	447315	129454	44.4	-	43.1	37.0	35.1	34.5	29.6	37.1	38.0	42.2	35.1	43.0	38.1	31.2	27.8	
City 27	447898	130065	32.3	23.2	32.3	22.1	21.2	-	20.0	23.7	24.0	26.5	29.1	29.1	25.8	21.1	21.1	
City 28	448427	129401	-	17.1	24.2	-	-	16.0	-	5.2	-	19.0	21.2	-	17.1	15.1	15.1	
District 1	448063	124371	25.9	17.2	24.2	18.8	-	17.6	18.4	21.6	22.4	21.6	22.8	27.7	21.7	17.8	17.8	
District 2	446680	124644	33.6	22.6	21.5	20.8	17.2	15.9	18.5	19.1	21.4	16.1	19.4	25.7	21.0	17.2	17.2	
District 3	449647	132669	34.3	24.0	28.9	26.0	27.4	29.6	27.6	31.2	30.5	27.9	29.0	30.5	28.9	23.7	23.7	
District 4	458826	132719	31.1	20.5	-	21.0	-	17.8	19.3	21.5	20.5	20.8	25.8	27.8	22.6	18.5	18.5	
District 5	465917	112046	21.2	16.2	17.2	-	12.2	11.6	11.2	-	13.3	-	13.7	19.4	15.1	12.4	12.4	
District 6	457203	111380	35.4	22.2	27.5	24.8	-	21.1	23.6	26.4	25.5	24.7	24.5	29.4	25.9	21.3	21.3	
District 7	455176	117476	35.0	24.1	26.4	21.8	24.1	23.0	21.9	25.5	25.3	27.7	32.8	21.8	25.8	21.1	21.1	
District 8	453645	108261	22.8	16.6	20.2	15.4	-	-	13.6	-	16.7	17.7	19.4	29.0	19.0	15.6	NA	Error: Measured concentration below background concentration.

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

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

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

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Winchester City Council During 2022

WCC has not identified any new sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by Winchester City Council During 2022

In 2022, WCC undertook a modelling assessment to achieve two key objectives. Firstly, to review the existing AQMA and inform the decision-making process around whether this should be retained, revoked or amended, and subsequently whether the AQAP needs to be updated. Secondly, a feasibility study on locally set Air Quality Targets.

The AQMA review concluded that the AQMA did not need to be amended to include the 1-hour mean NO_2, either PM_{10} or $PM_{2.5}$ objectives, the existing AQMA could be amended, i.e. revoked for some roads with modelled concentrations less than 36 µg/m^3 but remain for some areas close to or above the objective in 2019. However, this assessment was undertaken based on 2019 traffic data and monitoring data and therefore, may be conservative as concentrations likely to have decreased since due to the Covid-19 pandemic and measures put in place by WCC. If improvements continue, the AQMA could be revoked entirely in the near future, assuming continuous compliance.

The AQAP review concluded that the majority of existing measures can be retained and refined and some additional measures could be considered in any revision. An additional measure of upgrading the bus fleet would bring about the most cost-effective benefits for NO_2. These additional measures may be required to achieve more aspirational WHO-based targets.

Finally, the feasibility study suggested two levels of potential local targets for 2027. Firstly, the Probable Targets which are considered likely to be achieved based on current trends and assumptive intervention scenarios modelled, these targets are 30 µg/m^3 for NO_2, 20

µg/m^3 for PM_{10} and 15 µg/m^3 for $PM_{2.5}$. Secondly, the Aspirational Targets which are likely to require further intervention than considered in this assessment, these targets are 20 µg/m^3 for NO_2, 15 µg/m^3 for PM_{10} and 10 µg/m^3 for $PM_{2.5}$.

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 AR049 (January – February 2022) – 100%
- AIR-PT AR050 (May – June 2022) – 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 site with less than nine months' data capture was City 28. The data for this site was therefore subsequently annualised using Defra's 'Diffusion Tube Data Processing Tool V3.0', in accordance with the methodology stipulated in LAQM.TG(22).

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

Annualisation summary is presented in Table C.1.

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

Site ID	Annualisation Factor Chilbolton Observatory	Annualisation Factor Bournemouth	Annualisation Factor Portsmouth	Annualisation Factor Swindon Walcott	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
City 28	1.1003	1.0023	1.0468	1.1435	1.0134	17.1	18.4

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.

WCC have calculated a local bias adjustment factor of 0.82 from the 2022 monitoring data. A summary of bias adjustment factors used by WCC over the past five years is presented in Table C.2. For comparison, the national bias adjustment factor was also derived in accordance with LAQM.TG(22). The factor for 2022 was found to be 0.83 (see Figure C.1), giving confidence in the local calculation derived, presented in Table C.2.

As the co-location site was found to have 'good' precision for the diffusion tubes, the local bias adjustment factor was deemed suitable for all tubes in Winchester as for the previous years.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	Local	-	0.82
2021	Local	-	0.81
2020	Local	-	0.84
2019	Local	-	0.93
2018	Local	-	0.94

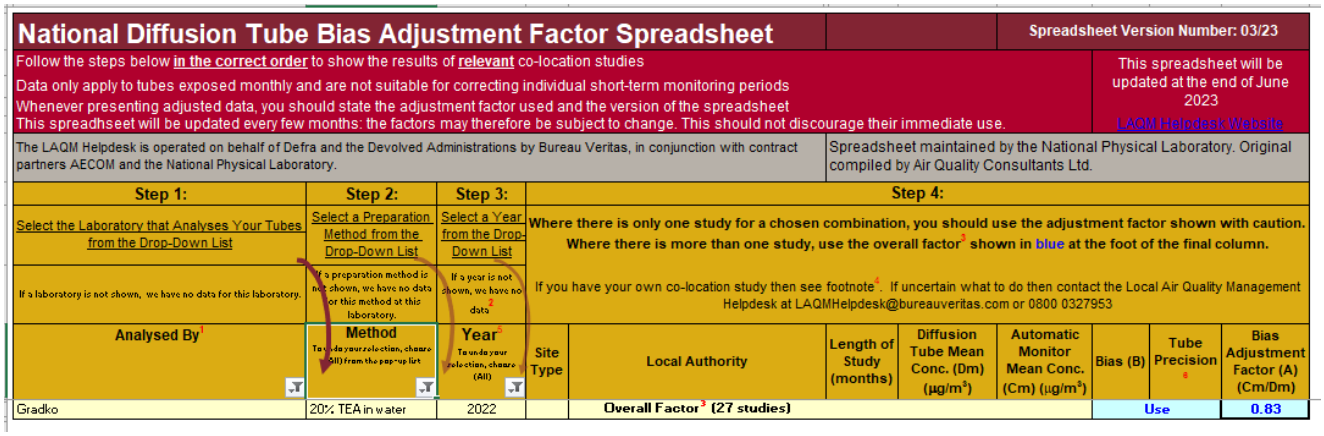
Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	11
Bias Factor A	0.82 (0.77 - 0.88)
Bias Factor B	22% (14% - 30%)

	Local Bias Adjustment Input 1
Diffusion Tube Mean (µg/m^3)	35.6
Mean CV (Precision)	3.7%
Automatic Mean (µg/m^3)	29.2
Data Capture	99%
Adjusted Tube Mean (µg/m^3)	29

Notes: A single local bias adjustment factor has been used to bias adjust the 2022 diffusion tube results.

Figure C.1 - National Bias Adjustment Factor



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

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

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

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

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

Step 1:	Step 2:	Step 3:	Step 4:								
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.								
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953								
Analysed By[1]	Method To update your selection, choose (All) from the pop-up list	Year[5] To update your selection, choose (All)	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m^3)	Automatic Monitor Mean Conc. (Cm) (µg/m^3)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2022		Overall Factor[3] (27 studies)				Use		0.83

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. Non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1. Whilst it is recognised that this is only required where sites are within 10% of the objective, distance corrections were calculated for all diffusion tubes for additional information.

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
City 1	5.6	5.6	20.3	13.0	20.3	
City 2	9.7	9.7	19.0	13.0	19.0	

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
City 3	4.3	8.9	16.7	13.0	15.9	
City 4	8.0	17.2	26.0	13.0	22.6	
City 5	3.0	3.0	29.2	13.0	29.2	
City 6	3.0	3.0	29.2	13.0	29.2	
City 7	3.0	3.0	29.2	13.0	29.2	
City 8	4.1	4.1	30.7	13.0	30.7	
City 9	3.6	3.6	28.7	13.0	28.7	
City 10	4.1	4.1	24.8	13.0	24.8	
City 11	3.7	3.7	21.7	12.6	21.7	
City 12	3.6	6.0	22.3	12.6	21.0	
City 13	6.6	6.6	21.9	12.6	21.9	
City 14	3.7	13.9	17.6	13.0	15.9	
City 15	1.7	1.7	20.8	13.0	20.8	
City 16	1.0	24.0	23.8	15.3	18.3	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
City 17	1.3	1.3	28.2	13.0	28.2	
City 18	5.4	15.4	13.7	10.9	12.8	
City 19	2.2	5.9	15.9	11.0	14.7	
City 20	2.2	5.9	15.9	11.0	14.7	
City 21	2.2	5.9	15.9	11.0	14.7	
City 22	2.4	8.4	18.9	12.6	17.0	
City 23	1.7	1.7	27.8	12.6	27.8	
City 24	1.1	1.1	33.0	12.6	33.0	
City 25	1.7	4.0	38.1	12.6	33.1	
City 26	2.0	4.4	31.2	12.6	27.8	
City 27	4.2	4.2	21.1	10.9	21.1	
City 28	1.0	1.0	15.1	13.0	15.1	
District 1	1.4	1.4	17.8	10.3	17.8	
District 2	1.0	1.0	17.2	16.6	17.2	
District 3	0.5	0.5	23.7	11.4	23.7	
District 4	1.0	1.0	18.5	8.6	18.5	
District 5	1.0	1.0	12.4	9.1	12.4	
District 6	1.0	1.0	21.3	11.6	21.3	
District 7	1.0	1.0	21.1	10.7	21.1	
District 8	1.3	1.3	15.6	19.0	N/A	Background Concentration > Monitored Value

Notes:
A 1.0 m distance from monitoring site to kerb was assumed for all monitoring sites without a reported distance to allow a predicted concentration to be calculated.

QA/QC of Automatic Monitoring

The data capture percentage for the roadside NO_2 automatic monitoring stations in 2022 was greater than the required 75% (99.7% for St. George's Street, 99.9% for Romsey Road and 89.7% for Twyford). The data capture percentage for $PM_{2.5}$ and PM_{10} at 99.9% at St George's Street and 90% at Twyford. Therefore, no annualisation of data was required.

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).

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 2022.

PM_{10} 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 with no further correction being applied to the reported results for either PM_{10} or $PM_{2.5}$.

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

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

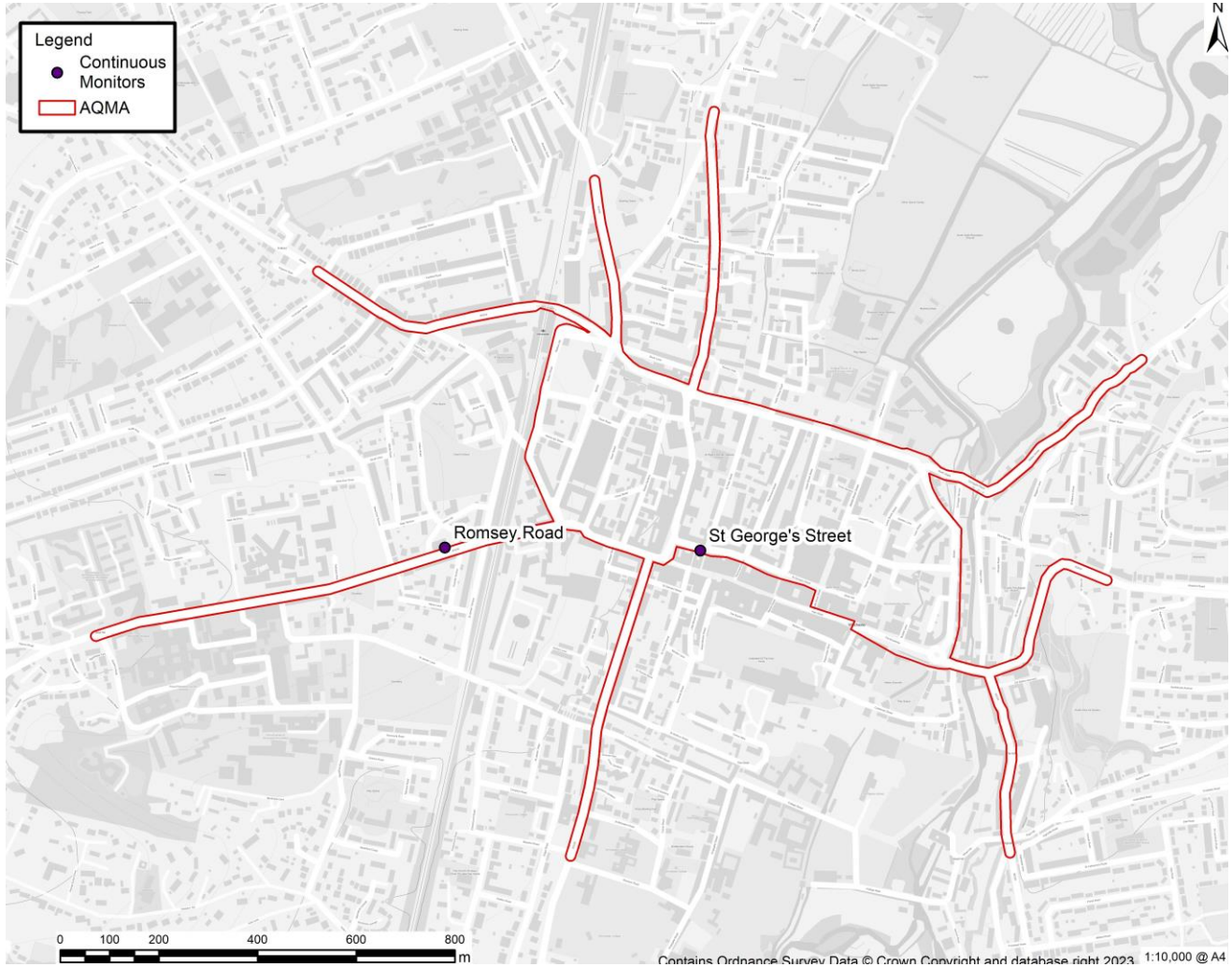


Figure D.2 – Map of Winchester Town Centre AQMA and Diffusion Tubes within the City

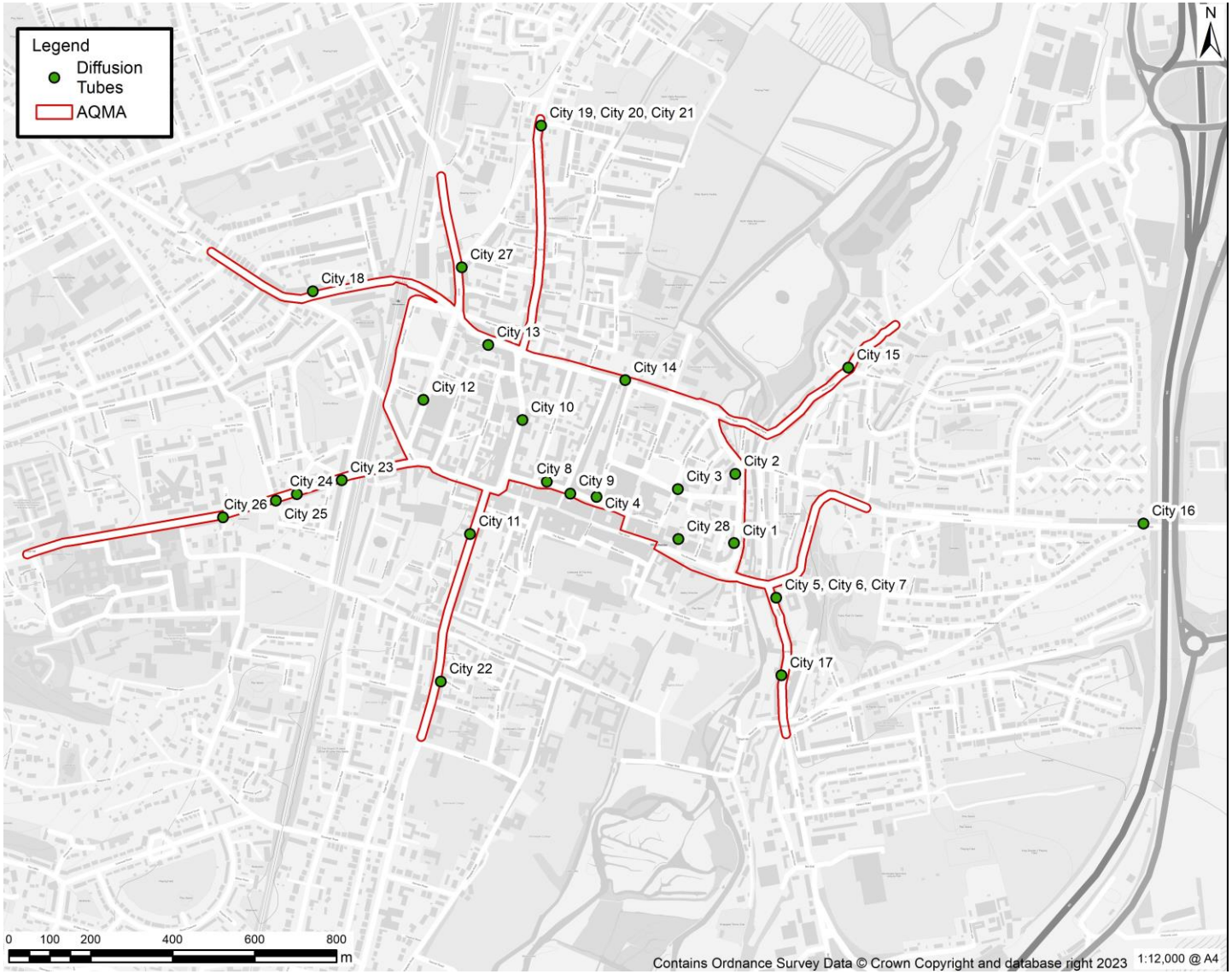


Figure D.3 – Map of Winchester District Continuous Monitors and Diffusion Tubes

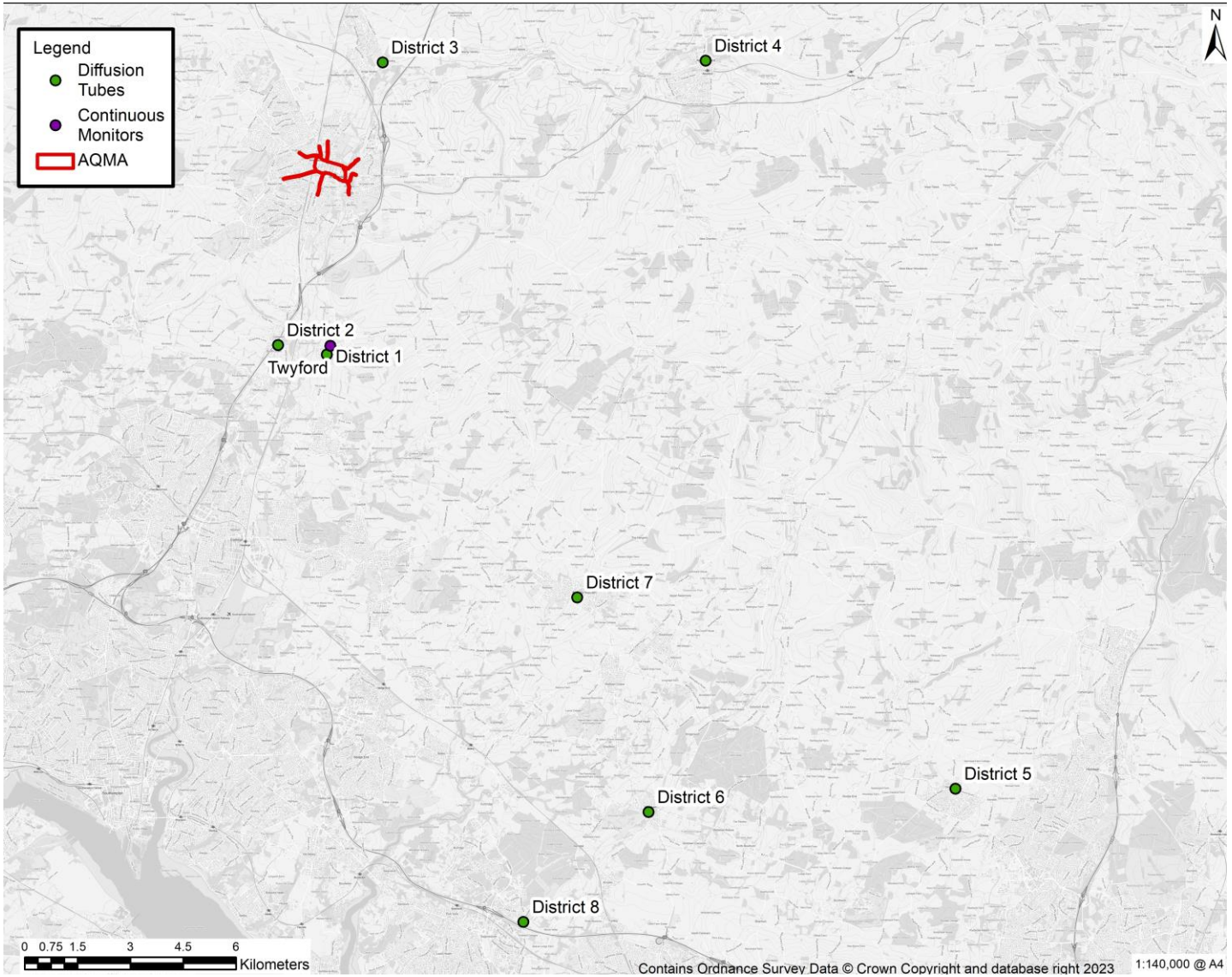


Figure D.4 – Map of Winchester District Continuous Monitors and Diffusion Tubes

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[9]

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/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
AQS	Air Quality Strategy
ASR	Annual Status Report
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
HCC	Hampshire County Council
HGV	Heavy Goods Vehicle
LAQM	Local Air Quality Management
LES	Low Emission Strategy
LEV	Low Emission Vehicle
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
OLEV	Office for Low Emission Vehicles
PCN	Penalty Charge Notice
PHE	Public Health England
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
P&R	Park & Ride
P&W	Park & Walk
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
SPD	Supplementary Planning Document

Abbreviation	Description
TEA	Triethanolamine
ULEV	Ultra-Low Emission Vehicle
WCC	Winchester City Council

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