2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June, 2022

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

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 28,000 to 36,000 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 comprises 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 on 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, July 2021

[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 2021. In the wider district, NO_2 concentrations also remained well below the national air quality objective.

Between 2017-2021, 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.

In 2020, the monitoring of particulates (PM_{10} and $PM_{2.5}$) within Winchester was re-instated using a near-reference continuous monitor (AQMesh) which is located within the AQMA on Romsey Road. This monitoring location was decommissioned in December 2021.The Council has also installed a FIDAS 200 particulate monitor in the St George's Street air quality station that went live in February 2020. The results from both of these monitors for the 2020 and 2021 reporting years are presented within this report.

Actions to Improve Air Quality

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

The 2019 Clean Air Strategy[5] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[6] sets out 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.

[5] Defra. Clean Air Strategy, 2019

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

The current AQAP outlines nine high impact 'core' actions, and nine complimentary actions 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 NOx 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 concentrations.

The core actions for this action plan are:

1. Build on car parking pricing differential (Modelled 2% reduction in NO_x);
2. Review of enforcement of goods deliveries by time of day (Modelled 2% reduction in NO_x);
3. Introduce a Park and Ride Site to the north of Winchester (Modelled 3% reduction in NO_x);
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 or low emission vehicles. (Modelled 10% reduction in NO_x);
5. Investigate the feasibility of introducing a CAZ for heavy duty vehicles (Modelled 10% reduction in NO_x);
6. Ensure that all Council owned leased, contracted or influenced vehicles that enter the AQMA meet the Office for Low Emission Vehicles (OLEV) standards for Ultra Low Emission Vehicles (ULEVs) and are not diesel fuelled by 2020. (Modelled 2% reduction in NO_x);
7. Development of an Air Quality Supplementary Planning Document (AQ SPD);
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. Due to the COVID-19 pandemic however, some of the measures to tackle air quality unfortunately experienced some understandable delays. Drastic changes in the driving behaviour and

traffic flow caused by the pandemic meant that monitoring the performance of the Action Plan measures themselves was also not feasible. Despite this, Winchester City Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

There is also a range of complementary measures that mainly relate to the continued support for ongoing softer measures such as supporting walking, cycling and travel plan initiatives. A new electric vehicle charging strategy[7] was implemented within the city as part of Measure 11 and a full programme of electric charging points (mainly in council car parks across the district) has now been delivered.

Hampshire County Council is the lead local authority for transport in Winchester District. Policies to improve transport and encourage sustainable transport have been set out within the Local Transport Plan for Hampshire[8]. WCC is working with the County to deliver measures in their AQAP and conduct a Movement Study to gather the required data to monitor progress. Consultation on the study was completed in January 2019 but progress was delayed in 2020. In December 2021, a further public consultation exercise was performed on 10 proposed transport and travel schemes that have been developed as part of the Winchester Movement Strategy.

Conclusions and Priorities

The Council continued monitoring in 2021 with minor changes to the network, including decommissioning of the site at Lidl (Enhanced Whiteley Study 1) in 2021 due to ongoing compliance.

All monitoring locations met the annual mean air quality objective of 40 µg/m^3 in 2021. NO_2 concentrations along Romsey Road at all four diffusion tube locations (Site 23, 24, 25, and 26) are still comparitively high in relation to rest of the city, indicating a risk of exceedance, and these sites will therefore continue to be closely monitored in the coming years. NO_2

[7] Electric Vehicle Charging Infrastructure Study for Winchester City Centre and District (2018), Available at: https://www.winchester.gov.uk/environment/air-quality/air-quality-in-winchester

[8] Hampshire County Council LTP Implementation Plan 2014-2017 https://www.hants.gov.uk/transport/strategies/transportstrategies

concentrations increased slightly in 2021 at most of the monitoring locations compared to 2020.

The extent of the AQMA will be assessed in detail during 2022 to determine if there is a need to amend or revoke the existing AQMA.

In terms of AQAP implementation, WCC has since the last ASR report (2021) achieved the following:

- Completed and adopted the Supplementary Planning Document (SPD). Subject to the validations list consultation, this will be in use in Summer 2022;
- Rolled out a programme of electric vehicles charging points (EVCP) in car parks. 33 EVCPs were installed in public car parks across the whole of Winchester's District.
- Emissions based parking tariffs to be adopted in the Autumn of 2022 subject to a public consultation process in Spring/Summer 2022.
- Constructed (opened May 2022) a new multi-storey car park to significantly increase capacity to the popular East Park and Ride sites at Winchester. This provides 287 additional spaces including new EV charging points.

In spring of 2021, consultation on 'Active Travel Fund' for improvement to walking and cycling was carried out by Hampshire County Council. The fund includes a proposed signalised puffin pedestrian crossing on Romsey Road at Clifton Terrace which will make it easier for pedestrians to cross Romsey Road at this location. To accommodate the new crossing, Clifton Terrace would be made "No Entry" from Romsey Road and traffic would be only permitted to turn right when exiting from Clifton Terrace. More details on this fund are available at:

https://www.hants.gov.uk/transport/transportschemes/atfwinchesterimprovements.

WCC's priorities for the coming year include:

- Continued compliance with annual mean NO_2 objective across whole of the WCC region;
- Dispersion modelling assessment of NO_2 concentrations and review of the AQMA boundary in the town centre;
- Review of the current AQAP and consideration of updates to measures where required;

- Assessment of local $PM_{2.5}$ concentrations and the potential duty to comply with future objectives if set regarding this parameter (i.e. Environment Act 2021 and secondary regulations thereafter); and
- Implementing measures forthcoming from the City of Winchester Movement Strategy.

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:

Simon Finch, Corporate Head of Service Regulatory

Although consulted, the Director of Public Health did not provide any comment.

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

Winchester City Council

City Offices

Colebrook Street

Winchester

HANTS

SO23 9LJ

Email: dingram@winchester.gov.uk

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1 Local Air Quality Management

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

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether 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 pursuit of the objectives. 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 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

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 the AQMA and also the air quality monitoring locations in relation to the AQMA.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
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	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 that on the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants. The Council were commended on having presented a very detailed and insightful ASR, containing extensive discussion on current trends, status and future plans for their AQMA, in addition to their clear presentation of monitoring results and the impact of Covid-19. The appraisal additionally noted that Winchester City Council's AQAP was published in 2017 and is therefore due for renewal in line with the 5-year reporting process.

A number of direct measures have been taken forward during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 18 measures are included within Table 2.2, with the type of measure and the progress Winchester City Council have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

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

- Relocation of the automatic monitoring unit at Chesil Street to Romsey Road in December 2021; and
- Adoption of the Air Quality Supplementary Planning Document. This will be in use by Summer 2022 following the conclusion of a 'Planning Validation Lists' public consultation process.

Winchester City Council expects the following measures to be completed over the course of the next reporting year:

- Emissions-based parking. At the March 2022 Cabinet Meeting, Councillors agreed that changes to the parking tariff in Winchester Town be advertised and implemented in October 2022. A 6-week consultation will be undertaken in Summer 2022, which will be reported back to Cabinet in the Autumn. Full details of the Cabinet decision and associated documents can be found here; and
- Review of the Town Centre AQMA. An updated modelling assessment is being conducted in 2022 to determine if the AQMA boundary can be amended/reduced in

size. Following the review of the AQMA, considering whether any new measures are required as part of a new or updated AQAP.

In addition, other priorities include:

- Continue with the implementation of the City of Winchester Movement Strategy;
- Continue to liaise with the wider regional authorities regarding a Low Emission Strategy (LES);
- Work with other local authorities to promote a Domestic Clean Burn Project (targeting solid fuel combustion and bonfires) funded by Defra. This is led by Southampton City Council and includes neighbouring local authorities. Progress on this will be included in next year's reporting and
- Continuing to work on the emerging new Winchester Local Plan to strength both air quality and climate change policy commitments. Specifically, we will seek to identify a site on the north side of the city for a new Park and ride site. Regulation 18 (draft) Local Pan Consultation is planned autumn 2022.

Winchester City Council worked to implement measures in partnership with the following stakeholders during 2021:

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

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Winchester City Council anticipates that further additional measures not yet prescribed may be required in subsequent years to achieve compliance and enable the revocation of the AQMA. The Council's review of the current AQAP will help them identify if and what further measures may be required.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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.	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 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 regualtion18 public consultation late 2022. 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 EV charging points 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
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 the parking tariff in Winchester Town be advertised and implemented in October 2022. A 6-week consultation will be undertaken in Summer 2022, which will be reported back to Cabinet in the Autumn. Full details of the Cabinet decision and associated documents can be found here.	This measure seeks to adopt 'smart' ticket machine technology to implement differential charging tariffs for higher polluting vehicles, primarily diesels.
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/aboutthecouncil/haveyoursay/consultations/winchestermovementstrategy No update in 2021 – 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 current 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

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
7	Development of air quality supplementary planning document (SPD)	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2017	TBC	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 will be in use by Summer 2022 following the conclusion of a 'Planning Validation Lists' public consultation process.	Initial 2019 draft version was too complex and had to be redrafted. Final revised version has now been adopted and will be in use 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	Review of AQMA and need to amend the AQAP is currently in progress and will be complete in 2022. The work will consider recent air quality data including data from 2020 and 2021 and will model NO_2 concentrations within the centre.
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	Winchester City Council 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 2020, 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. Winchester City Council is however, through the Hampshire Air Quality Steering Group promoting joint approaches on air quality initiative and mitigation measures. This appears to be work in progress and may well be usurped by the new regulations on $PM_{2.5}$ expected later this year. Winchester City Council is working 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/
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 rechargin g, Gas fuel rechargin g	2017	2020/2021	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 22kWh chargers and for JoJu to fully fund 2 rapid 50kWh chargers. 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.	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.
12	Ensure that air quality is a standard consideration as part of procurement practice and is reflected in the	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low	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.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
	Council's Procurement Policy		emission vehicles												
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. Winchester City Council 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 2021.
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 developments in the AQMA	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	Winchester City council 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.
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 prevented public engagement in 2021.
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 2022 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
18	Provide web based information and sign	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.	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

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
	posting to resources that will assist and encourage workplaces and schools in the City to adopt Travel Plans														the right advice for travel planning for individuals and businesses in Winchester and wider district. Despite recent efforts Winchester Council has not yet successfully recruited to the role for Sustainable transport Officer.

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (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[9]. 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 (latest available data), the calculation method changed, and Winchester's indicator increased to 5.6%, which is the same as the national average. Winchester also compares favourably with nearby authorities in 2020 (Southampton at 6.3%, Basingstoke & Deane at 5.9%, and Eastleigh at 6.0%) and the South Eastern region as a whole (6.0%).

WCC is taking a number of 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.

[9] 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

In 2021, the Romsey Road (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 objective of 20 µg/m^3.

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.

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

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Winchester City Council undertook automatic (continuous) monitoring at three sites during 2021. All sites included NO_2 monitoring, with two sites (St George's Street and Romsey Road) additionally monitoring for PM_{10} and $PM_{2.5}$. Table A.1 in Appendix A shows the details of the automatic monitoring sites. These are available at https://www.ukairquality.net and through the UK-Air website at https://uk-air.defra.gov.uk/data/.

The following changes to Winchester City Council's automatic monitoring network occurred during 2021:

- Romsey Road AQMesh decommissioned on 3rd December 2021; and
- Chesil Street continuous monitoring site (CMS) relocated to Romsey Road on 22nd December 2021.

Data for the Romsey Road AQMesh and Chesil Street CMS are available for the reporting year of 2021 and are presented and discussed in this report. Due to the installation of the Romsey Road CMS on 22nd December 2021, data capture rates fall below the minimum 25% required for calculation of an annual mean, and therefore data for this site are not presented for the 2021 reporting year. Data for the 2022 reporting year will be presented in Winchester City Council's 2023 ASR. The relocation of this monitor enables the Council to obtain some indicative real time data to ensure compliance in this area. The reallocation of resources has additionally made available the AQMesh instrument previously installed at Romsey Road for redeployment as the Council sees fit.

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

Winchester City Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 32 sites during 2021, including at two triplicate sites. The monitoring network is split into a city wide network and a district wide network. The district wide locations are all well within the compliant range prior to 2020. However, this is being continued for engagement purposes, apart from the enhanced study sites at Whiteley and Kings Worthy which were ceased in 2020 after these sites showed compliance with the objective. The diffusion tube at Lidl (Enhanced Whiteley Study 1) was also decommissioned in 2021.

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

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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

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

Table A.5 in Appendix A compares the ratified continuous monitored NO_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 2021 was 32.2 µg/m^3 at Site 23, Romsey Road in the City Study. This site is within the existing AQMA as shown in Appendix DAppendix 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, which affects the 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). There was a slight increasing trend observed across most of the monitoring sites in 2021, it is likely that the ease of the travel restrictions due to the pandemic had an impact on the NO_2 concentrations.

Generally, across both the City and District-wide studies, concentrations are steadily declining year on year, 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. Slight increases in monitored concentrations compared to 2020 were seen at the majority of sites in 2021. The maximum increase between 2020 and 2021 was recorded at Site 17 at Chesil Street, where an increase from 23.7 µg/m^3 to 29.5 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(16) 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 5 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.

3.2.2 Particulate Matter (PM_{10})

Ratified and adjusted annual mean monitored PM_{10} concentrations from the AQMesh at Romsey Road and from the newly installed FIDAS 200 at St George's Street are presented within Table A.6 in Appendix A: Monitoring Resultslast five years have met the air quality objective of 40 µg/m^3. The annual mean concentrations in 2021 were 15 µg/m^3 at both Romsey Road and St George's Street. Data capture rate was 92.2% at Romsey Road and 100% at St George's Street in 2021.

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 50 µg/m^3, not to be exceeded more than 35 times per year. In 2021, the daily mean was greater than 50 µg/m^3 four times at Romsey Road and once at St George's Street, both below the objective.

3.2.3 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 Strategy does contain an air quality objective of 25 µg/m^3 for achievement by 2021, which Table A.8 indicates is being achieved presently within Winchester.

Both monitors show $PM_{2.5}$ concentrations below 25 µg/m^3, St George's Street recorded 9 µg/m^3 and Romsey Road recorded 10 µg/m^3 in 2021.

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
Chesil Street	Station Approach (Chesil Street)	Roadside	448664	129257	NO_2	YES	Chemiluminescent	0	4.6	2.2
Romsey Road	Romsey Road	Roadside	447544	129543	NO_2, PM_{10}, $PM_{2.5}$, O_3	YES	Electrochemical and Optical (AQMesh)	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)
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

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 15	Wales Street	Roadside	448842	129820	NO_2	YES	0.0	1.7	No	2.5
City 16	AlresfoRoad 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
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

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)
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 2021 (%) (2)	2017	2018	2019	2020	2021
St George's Street	448062	129537	Roadside	98.9	98.9	38.5	**41.0**	37.0	26.9	27.0
Chesil Street	448664	129257	Roadside	99.6	97.2	29.7	30.0	28.0	20.7	22.0
Romsey Road	447544	129543	Roadside	99.8	92.2	-	-	32.0	32.0	32.0

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

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

Notes:

The annual mean concentrations are presented as µg/m^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.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

(1) Data capture for the 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 2021 (%) [2]	2017	2018	2019	2020	2021
City 1	448563	129391	Roadside	91.7	90.4	30.9	28.9	27.9	19.6	20.0
City 2	448566	129560	Roadside	91.7	90.4	27.5	26.2	24.6	18.8	18.9
City 3	448426	129523	Roadside	100.0	100.0	23.9	23.8	22.2	15.8	17.1
City 4	448227	129504	Roadside	91.7	90.4	33.0	30.6	27.9	20.6	21.3
City 5, City 6, City 7	448666	129258	Roadside	100.0	100.0	31.9	30.4	28.6	25.9	27.2
City 8	448106	129541	Roadside	100.0	100.0	**46.8**	39.5	39.3	29.2	30.8
City 9	448163	129512	Roadside	91.7	90.4	**46.5**	**41.4**	38.5	29.3	28.5
City 10	448046	129692	Roadside	91.7	90.4	38.7	35.9	31.0	22.7	24.2
City 11	447918	129413	Roadside	100.0	100.0	31.6	28.8	28.3	21.2	20.1
City 12	447804	129741	Roadside	100.0	100.0	28.0	29.0	29.0	18.9	21.7
City 13	447963	129875	Roadside	100.0	100.0	31.6	28.8	28.2	21.0	21.0
City 14	448297	129789	Roadside	100.0	100.0	28.2	25.7	24.1	17.8	17.6
City 15	448842	129820	Roadside	83.3	82.7	29.8	26.1	23.4	18.7	18.3

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 2021 (%) [2]	2017	2018	2019	2020	2021
City 16	449563	129439	Other	100.0	100.0	33.0	34.6	30.0	21.5	22.8
City 17	448679	129068	Roadside	66.7	64.7	37.6	34.7	35.3	23.7	29.5
City 18	447534	130006	Roadside	100.0	100.0	23.7	20.0	18.7	13.1	13.2
City 19, City 20, City 21	448092	130411	Roadside	100.0	100.0	20.9	23.6	21.1	15.4	15.5
City 22	447847	129053	Roadside	100.0	100.0	32.5	19.3	20.2	14.4	16.4
City 23	447605	129545	Roadside	100.0	100.0	-	-	-	33.6	32.2
City 24	447495	129511	Roadside	58.3	61.6	**50.8**	**47.6**	**46.5**	30.9	30.9
City 25	447444	129495	Roadside	100.0	100.0	-	-	-	**40.8**	36.5
City 26	447315	129454	Roadside	100.0	100.0	-	-	-	30.3	30.4
City 27	447898	130065	Roadside	100.0	100.0	32.4	30.6	26.5	20.8	22.0
City 28	448427	129401	Other	83.3	84.7	28.0	22.7	21.7	15.2	15.6
District 1	448063	124371	Roadside	100.0	100.0	24.0	24.1	21.4	16.6	18.0
District 2	446680	124644	Other	91.7	92.3	27.1	25.2	22.2	17.3	17.5
District 3	449647	132669	Roadside	100.0	100.0	**56.0**	**40.5**	34.6	25.0	25.0

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 2021 (%) (2)	2017	2018	2019	2020	2021
District 4	458826	132719	Roadside	100.0	100.0	28.9	26.6	27.5	18.4	18.3
District 5	465917	112046	Roadside	91.7	89.6	17.9	18.1	17.7	12.9	12.5
District 6	457203	111380	Roadside	91.7	91.8	27.5	29.8	26.8	21.6	21.5
District 7	455176	117476	Roadside	100.0	100.0	29.8	29.6	27.0	20.5	21.6
District 8	453645	108261	Other	100.0	100.0	22.8	20.3	18.1	12.7	13.1

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

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

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

Notes:

The annual mean concentrations are presented as 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.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

(1) Data capture for the 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 NO_2 Concentrations- City Study Locations

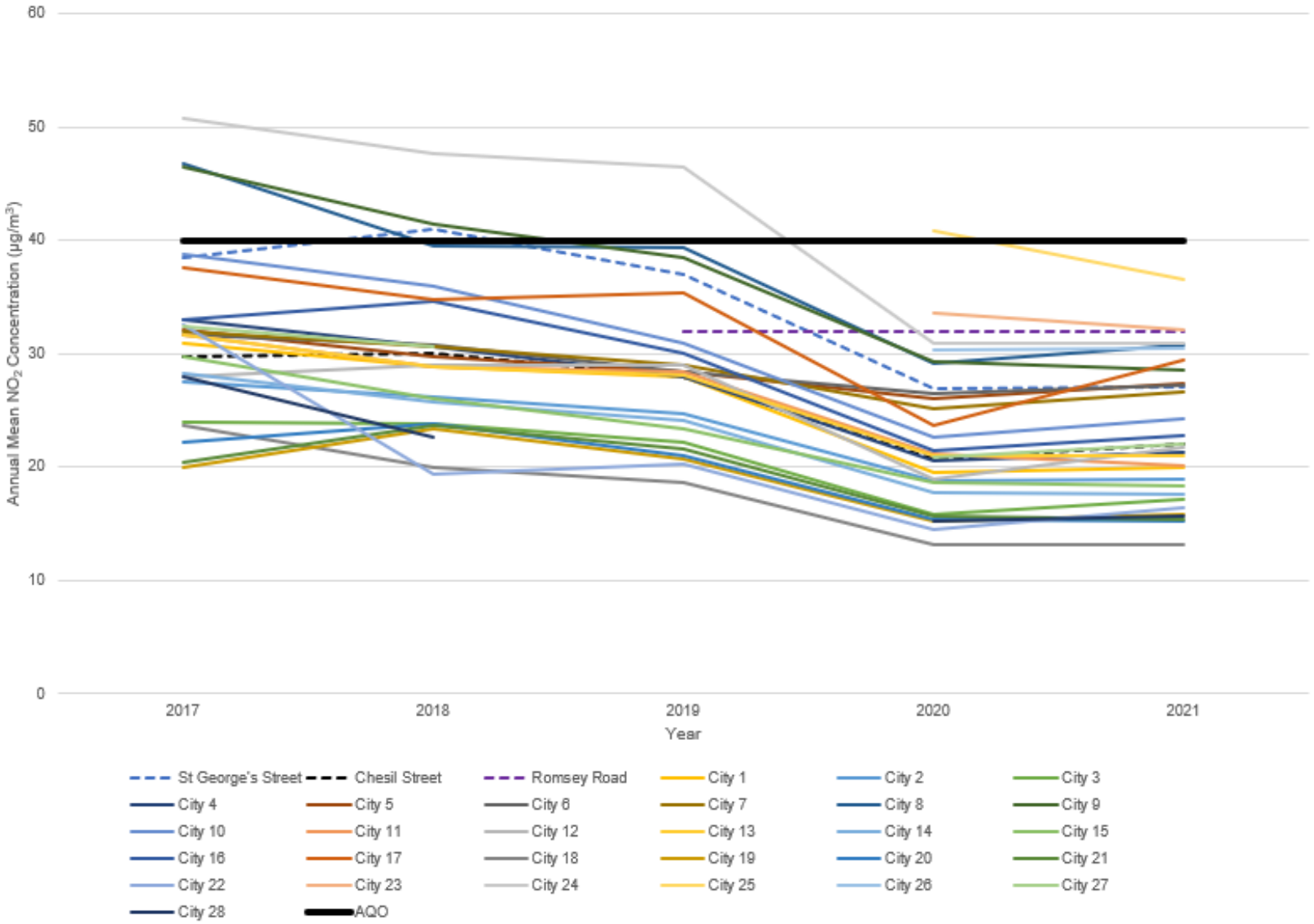


Figure A.2 – Trends in Annual Mean NO_2 Concentrations- District Study Locations

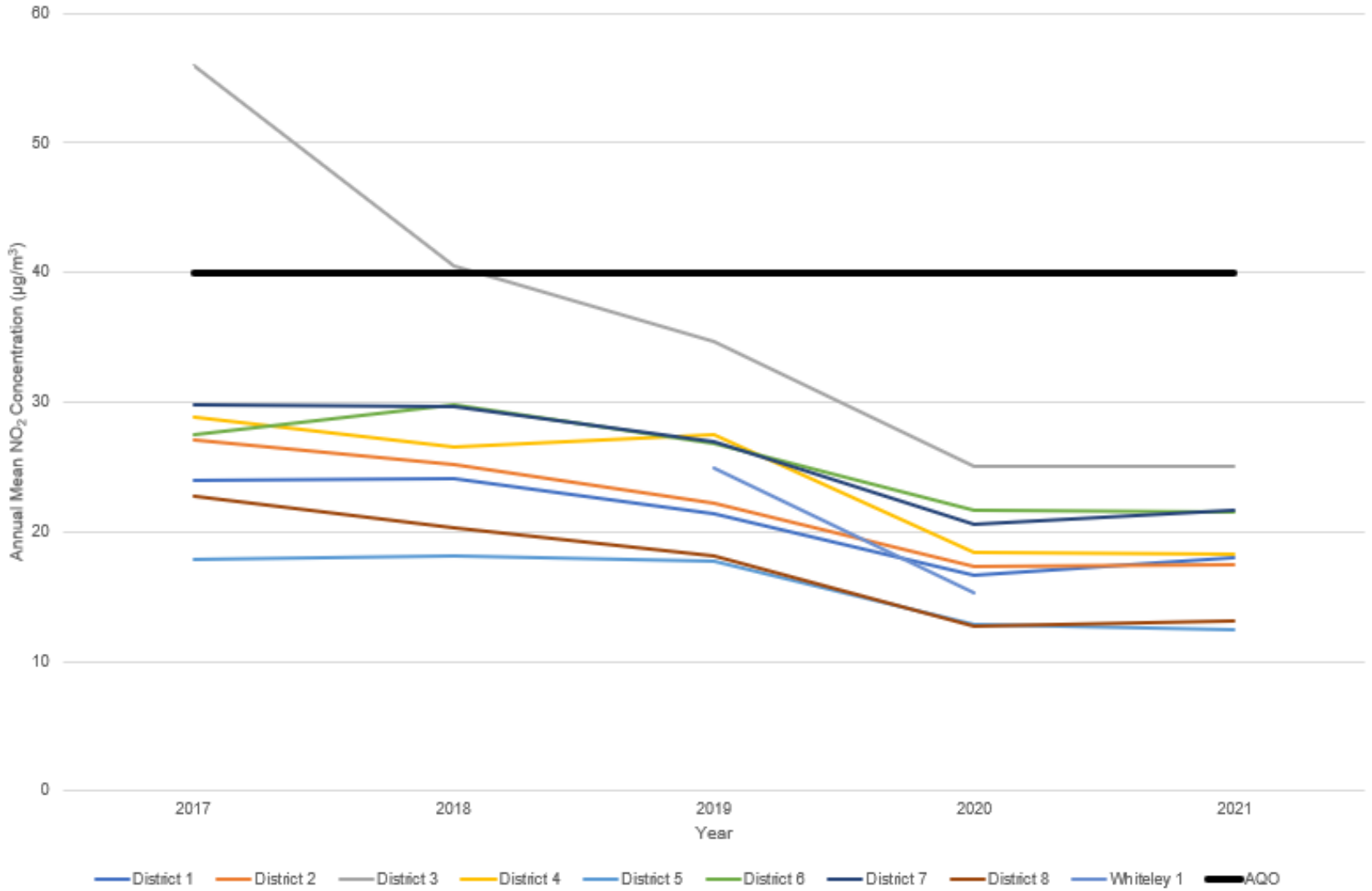


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
St George's Street	448062	129537	Roadside	98.9	98.9	-	0	0	0	0
Chesil Street	448664	129257	Roadside	99.6	97.2	-	0	0	0	0
Romsey Road	447544	129543	Roadside	99.8	92.2	-	-	0	0	0

Notes:

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

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

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

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

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

Table A.6 – Annual Mean PM_{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 2021 (%) (2)	2017	2018	2019	2020	2021
St George's Street	448062	129537	Roadside	100	100	-	-	-	14.2	15.0
Romsey Road	447544	129543	Roadside	99.8	92.2	-	-	29.5	20.0	15.0

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

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.TG16 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.3 – Trends in Annual Mean PM_{10} Concentrations

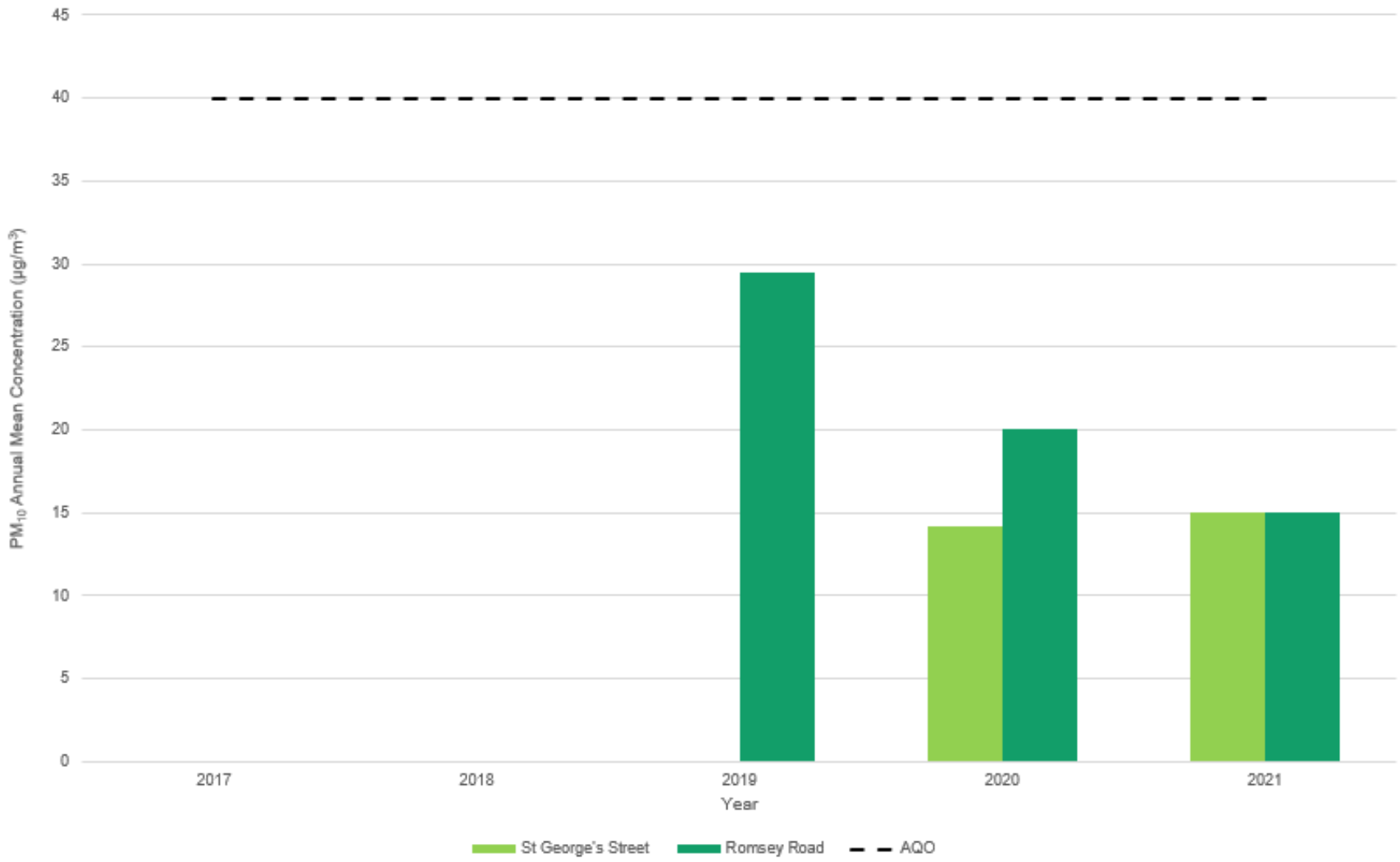


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
St George's Street	448062	129537	Roadside	100	100	-	-	-	0	1
Romsey Road	447544	129543	Roadside	99.8	92.2	-	-	34	4	4

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.4 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

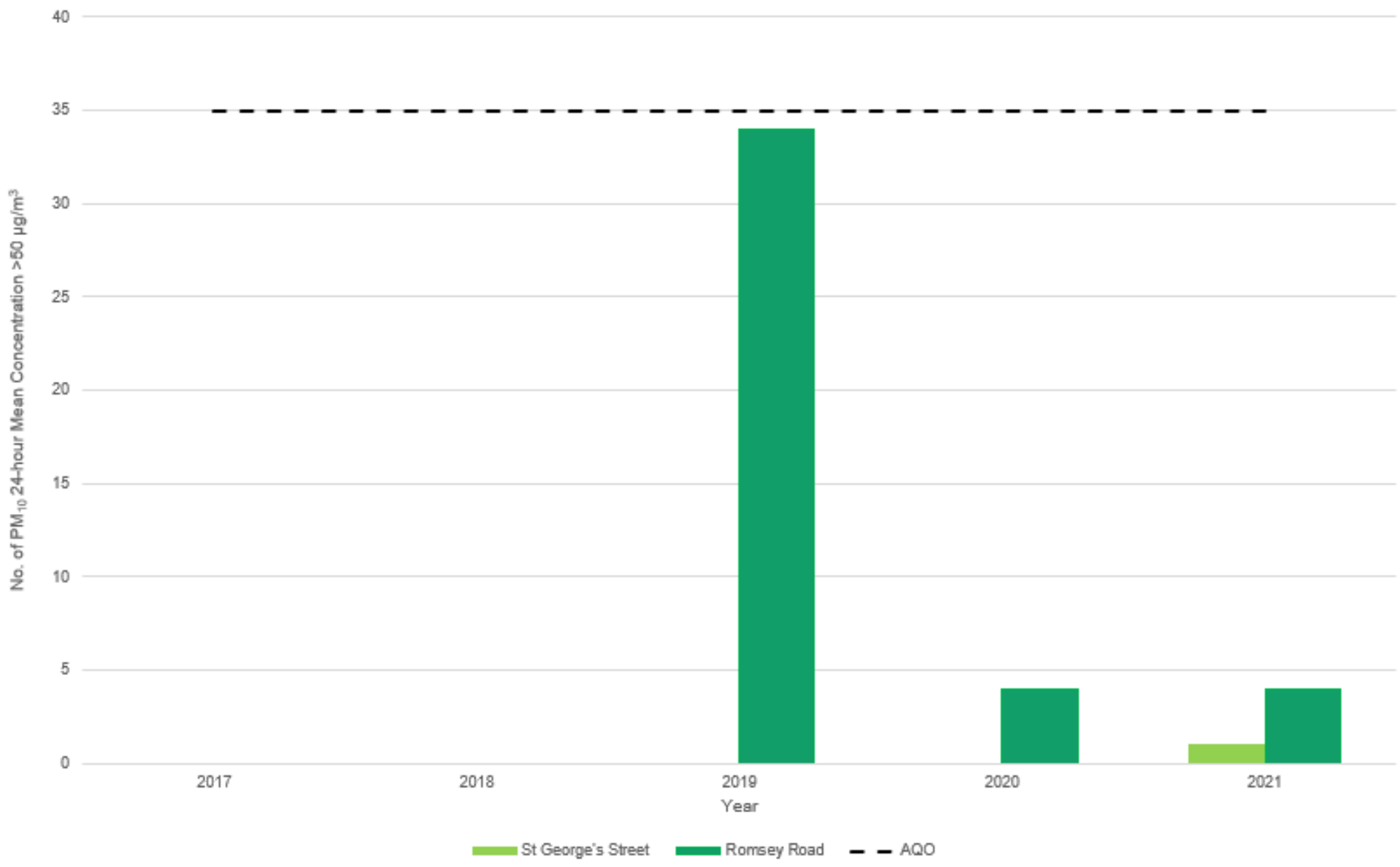


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
St George's Street	448062	129537	Roadside	100	100	-	-	-	9.0	9.0
Romsey Road	447544	129543	Roadside	99.8	92.2	-	-	15.0	11.3	10.0

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

Notes:

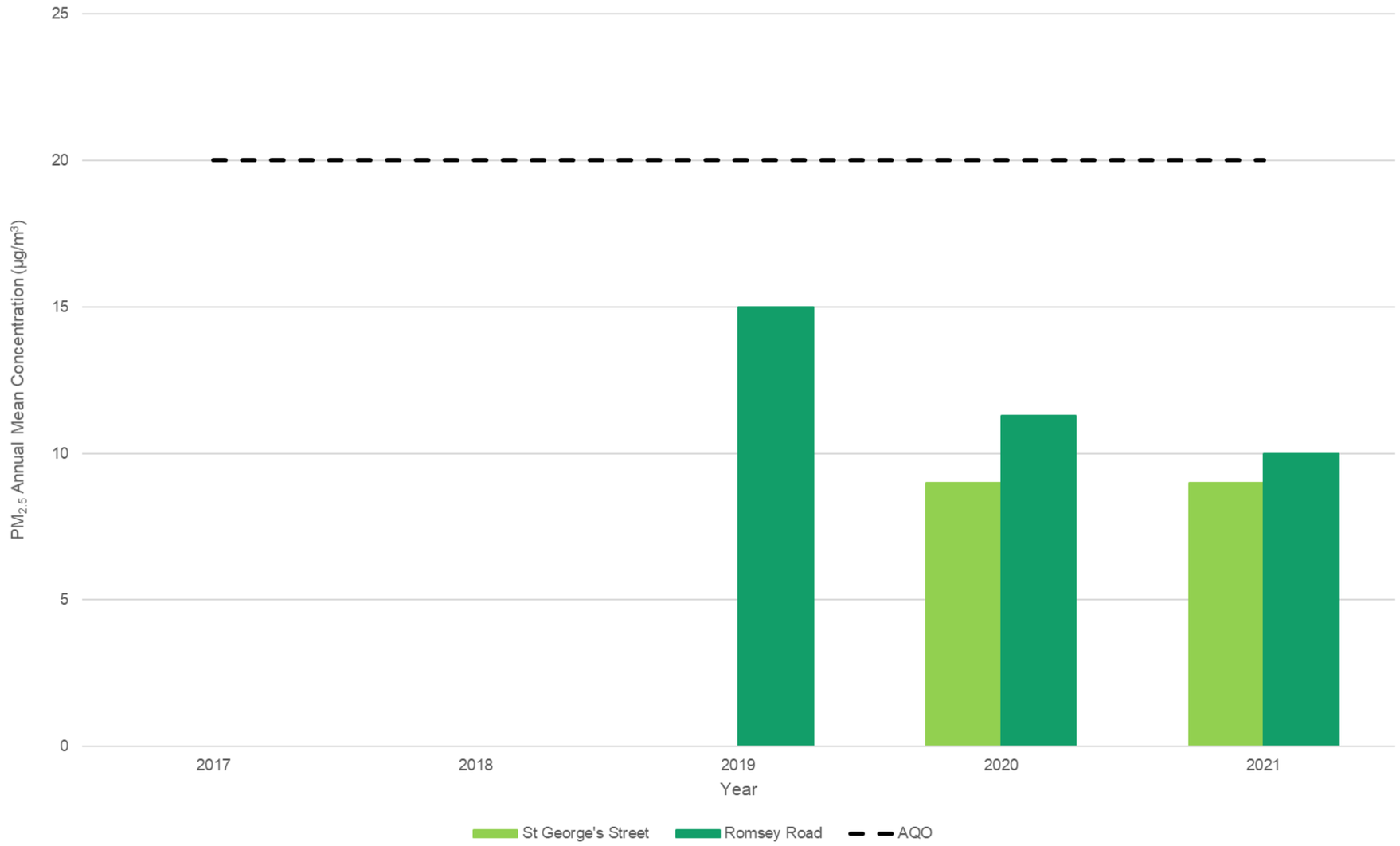
The annual mean concentrations are presented as µg/m^3.

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

(1) Data capture for the 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.5 – Trends in Annual Mean $PM_{2.5}$ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted	Annual Mean: Distance Corrected to Nearest Exposure	Comment
City 1	448563	129391	25.2	24.1	28.9	25.0	21.3	24.6	21.2	21.0	27.6	28.2	24.1	-	24.7	20.0	-	
City 2	448566	129560	22.6	25.1	26.7	21.1	19.1	20.7	21.4	16.0	26.0	-	32.6	25.3	23.3	18.9	-	
City 3	448426	129523	19.2	21.9	21.3	19.1	17.5	18.4	18.1	20.1	23.2	22.2	28.3	24.1	21.1	17.1	-	
City 4	448227	129504	21.3	23.3	29.8	28.9	23.9	24.3	22.1	22.4	29.2	29.6	34.0	-	26.2	21.3	-	
City 5	448666	129258	30.0	32.3	34.4	28.0	31.5	34.4	31.2	30.0	40.6	38.4	39.8	35.5	-	-	-	Triplicate Site with City 5, City 6 and City 7 - Annual data provided for City 7 only
City 6	448666	129258	24.5	33.8	34.1	33.5	32.7	33.2	33.0	28.5	41.3	35.9	39.6	-	-	-	-	Triplicate Site with City 5, City 6 and City 7 - Annual data provided for City 7 only
City 7	448666	129258	20.6	32.5	33.6	30.5	31.7	34.5	32.6	28.1	39.9	39.1	34.4	37.5	33.6	27.2	-	Triplicate Site with City 5, City 6 and City 7 - Annual data provided for City 7 only
City 8	448106	129541	33.2	33.4	38.9	44.3	33.5	41.4	34.2	33.6	43.5	39.2	46.4	34.9	38.1	30.8	-	
City 9	448163	129512	31.2	35.2	37.1	30.6	35.3	33.8	33.8	30.5	42.0	-	38.5	38.7	35.2	28.5	-	
City 10	448046	129692	28.7	28.1	28.7	25.1	27.3	30.1	30.5	25.5	36.4	33.4	34.9	-	29.9	24.2	-	
City 11	447918	129413	23.4	28.4	27.0	24.5	21.2	25.9	21.6	22.1	28.9	33.8	30.3	11.2	24.9	20.1	-	
City 12	447804	129741	25.5	27.6	28.1	27.4	23.4	26.6	23.8	22.7	29.5	28.9	32.9	25.7	26.8	21.7	-	
City 13	447963	129875	23.0	26.1	29.6	24.3	26.8	26.0	26.2	19.8	30.2	28.9	28.5	22.4	26.0	21.0	-	
City 14	448297	129789	19.8	22.6	24.0	18.0	21.5	18.7	20.0	14.0	23.3	23.2	27.6	28.7	21.8	17.6	-	
City 15	448842	129820	23.3	23.6	26.4	23.3	20.3	22.7	21.3	19.5	23.2	22.3	-	-	22.6	18.3	-	
City 16	449563	129439	20.9	25.6	28.1	29.7	25.5	31.5	30.3	25.3	34.0	31.9	27.6	27.1	28.1	22.8	-	
City 17	448679	129068	31.4	30.4	-	-	27.4	34.3	30.6	28.3	37.2	-	-	37.2	32.1	29.5	-	
City 18	447534	130006	15.1	18.5	18.1	18.5	14.2	14.4	14.4	12.8	17.8	19.4	16.3	16.2	16.3	13.2	-	
City 19	448092	130411	19.1	20.7	20.5	17.8	16.8	15.1	17.0	13.1	20.6	24.0	24.4	24.4	-	-	-	Triplicate Site with City 19, City 20 and City 21 - Annual data provided for City 21 only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted	Annual Mean: Distance Corrected to Nearest Exposure	Comment
City 20	448092	130411	17.1	20.9	19.8	16.6	15.6	15.6	16.7	14.7	21.4	22.6	22.3	22.6	-	-	-	Triplicate Site with City 19, City 20 and City 21 - Annual data provided for City 21 only
City 21	448092	130411	20.7	21.3	21.2	16.8	14.9	15.1	16.2	14.5	20.6	20.6	24.2	22.8	19.1	15.5	-	Triplicate Site with City 19, City 20 and City 21 - Annual data provided for City 21 only
City 22	447847	129053	20.0	20.3	23.6	18.0	15.3	15.8	14.6	13.5	18.4	20.7	24.5	39.0	20.3	16.4	-	
City 23	447605	129545	35.4	41.6	38.2	39.0	40.9	45.8	37.7	32.7	49.1	41.4	42.9	31.6	39.7	32.2	-	
City 24	447495	129511	35.2	38.4	-	40.6	-	-	37.2	34.2	-	44.4	-	39.5	38.5	30.9	-	
City 25	447444	129495	43.0	41.3	48.2	42.3	45.7	37.2	41.1	37.1	56.0	51.6	51.9	45.1	45.1	36.5	31.9	
City 26	447315	129454	38.4	39.2	37.0	32.0	39.5	38.1	33.5	29.5	44.6	41.0	41.4	36.2	37.5	30.4	-	
City 27	447898	130065	24.1	27.7	27.5	27.1	27.1	27.2	25.5	19.6	30.7	27.7	31.6	29.6	27.1	22.0	-	
City 28	448427	129401	17.5	20.9	-	18.7	16.2	20.2	16.9	17.8	21.4	21.3	-	21.8	19.3	15.6	-	
District 1	448063	124371	22.4	24.2	26.9	20.0	19.7	22.0	18.7	21.0	22.5	23.5	24.8	21.4	22.2	18.0	-	
District 2	446680	124644	20.5	20.8	-	23.7	19.5	20.8	18.6	19.7	22.5	22.4	30.2	19.1	21.6	17.5	-	
District 3	449647	132669	29.1	28.9	33.2	27.7	28.9	32.2	31.8	27.0	34.0	32.9	34.7	30.2	30.9	25.0	-	
District 4	458826	132719	20.5	22.0	25.4	20.6	21.3	21.9	19.5	17.5	24.6	24.5	29.0	24.8	22.6	18.3	-	
District 5	465917	112046	16.2	17.9	18.0	-	12.6	14.0	13.0	10.1	14.6	16.4	20.3	15.9	15.4	12.5	-	
District 6	457203	111380	26.1	27.1	28.5	22.9	22.6	-	24.0	22.7	29.7	27.3	32.0	28.7	26.5	21.5	-	
District 7	455176	117476	26.0	25.3	28.3	22.1	25.9	26.5	25.2	21.4	30.5	30.5	31.5	27.5	26.7	21.6	-	
District 8	453645	108261	17.5	18.4	19.6	14.3	12.4	14.4	14.0	11.9	16.3	17.4	21.1	17.2	16.2	13.1	-	

☒ **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.TG16.**

☒ **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 2021 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 2021

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

Additional Air Quality Works Undertaken by Winchester City Council During 2021

WCC has not completed any additional works within the reporting year of 2021.

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 percentage of results submitted by Gradko International Ltd that were subsequently determined to be satisfactory was only 25% for tests in AIR-PT Round 42 (January -March 2021). No results are available since then. The data should therefore be treated with caution.

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 a majority of relevant diffusion tube sites was greater than 75%. The sites with data capture less than 75% are City Sites 17 and 24. The data for these sites were therefore subsequently annualised using Defra's 'Diffusion Tube Data Processing Tool V1.1', in accordance with the methodology stipulated in LAQM.TG(16).

The AURN background sites considered for annualisation were Bournemouth (Urban Background), Reading New Town (Urban Background), Swindon Walcot (Urban Background) and Chilbolton Observatory (Rural Background), all sites had annual data capture of >85% and are within a 50 miles radius of Winchester. However, Bournemouth had missing data correlating to periods of no diffusion tube data, so could not be used.

Annualisation summary is presented in Table C.2.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented for the 2021 reporting year have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance 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.

Winchester City Council have applied a local bias adjustment factor of 0.81 to the 2021 monitoring data. A summary of bias adjustment factors used by Winchester City Council over the past five years is presented in Table C.1.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	-	0.81
2020	Local	-	0.84
2019	Local	-	0.93
2018	Local	-	0.94
2017	Local	-	0.94

Figure C.1 – DEFRA Local Bias Adjustment Output

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	07/01/2021	02/02/2021	30.0	24.5	20.6	25	4.7	19	11.7	26.2	99.68	Good	Good
2	02/02/2021	02/03/2021	32.3	33.8	32.5	33	0.8	2	2.0	27.0	98.96	Good	Good
3	02/03/2021	30/03/2021	34.4	34.1	33.6	34	0.4	1	1.1	27.4	98.36	Good	Good
4	30/03/2021	07/05/2021	28.0	33.5	30.5	31	2.8	9	6.9	28.3	99.01	Good	Good
5	07/05/2021	02/06/2021	31.5	32.7	31.7	32	0.6	2	1.6	26.2	100.00	Good	Good
6	02/06/2021	02/07/2021	34.4	33.2	34.5	34	0.7	2	1.8	23.5	99.31	Good	Good
7	02/07/2021	06/08/2021	31.2	33.0	32.6	32	1.0	3	2.4	23.6	98.69	Good	Good
8	06/08/2021	03/09/2021	30.0	28.5	28.1	29	1.0	3	2.5	19.0	97.92	Good	Good
9	03/09/2021	01/10/2021	40.6	41.3	39.9	41	0.7	2	1.7	30.3	99.26	Good	Good
10	01/10/2021	05/11/2021	38.4	35.9	39.1	38	1.7	5	4.2	29.6	99.88	Good	Good
11	05/11/2021	03/12/2021	39.8	39.6	34.4	38	3.1	8	7.6	32.9	99.85	Good	Good
12	03/12/2021	07/01/2022	35.5		37.5	36	1.4	4	12.5	30.7	99.88	Good	Good
13													
										Overall survey -->		Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

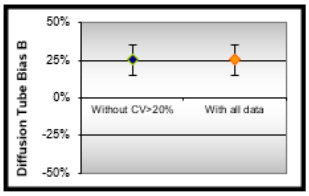
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	

Precision	12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.81 (0.75 - 0.88)
Bias B	24% (14% - 34%)
Diffusion Tubes Mean:	34 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	27 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	27 (25 - 30) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.81 (0.75 - 0.88)
Bias B	24% (14% - 34%)
Diffusion Tubes Mean:	34 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	27 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	27 (25 - 30) μgm^{-3}



Jaume Targa, for AEA

The national bias adjustment factor was also calculated in accordance with LAQM TG(16)14. The factor for 2021 was found to be 0.84, giving confidence in the local calculation derived, presented in Figure 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 previous years.

Figure C.2 – National Diffusion Tube Bias Adjustment Factor

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/22

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 2022
LAQM Helpdesk Website

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

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

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

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

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

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

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

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[5]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2021	R	Bedford Borough Council	11	34	31	7.6%	G	**0.93**
Gradko	20% TEA in water	2021	R	Bedford Borough Council	11	19	17	11.7%	G	**0.90**
Gradko	20% TEA in water	2021	R	Blackburn with Darwen Borough Council	12	27	20	32.3%	G	**0.76**
Gradko	20% TEA in water	2021	R	Brent Council	12	51	46	9.9%	G	**0.91**
Gradko	20% TEA in water	2021	R	Gateshead Council	10	23	19	23.8%	G	**0.81**
Gradko	20% TEA in water	2021	R	Gateshead Council	12	25	22	13.7%	G	**0.88**
Gradko	20% TEA in water	2021	R	Gateshead Council	11	27	25	9.8%	G	**0.91**
Gradko	20% TEA in water	2021	R	Gateshead Council	12	31	25	26.6%	G	**0.79**
Gradko	20% TEA in water	2021	R	Gateshead Council	12	32	34	-4.1%	G	**1.04**
Gradko	20% TEA in water	2021	KS	Marylebone Road Intercomparison	11	53	42	25.0%	G	**0.80**
Gradko	20% TEA in Water	2021	R	Monmouthshire County Concil	11	35	29	21.6%	G	**0.82**
Gradko	20% TEA in water	2021	R	Belfast City Council	12	25	20	24.3%	G	**0.80**
Gradko	20% TEA in water	2021	UC	Belfast City Council	12	25	20	28.5%	G	**0.78**
Gradko	20% TEA in water	2021	R	Belfast City Council	12	42	35	19.8%	G	**0.84**
Gradko	20% TEA in water	2021	R	Belfast City Council	12	38	27	39.4%	G	**0.72**
Gradko	20% TEA in water	2021	UB	Dudley MBC	12	20	15	36.0%	G	**0.74**
Gradko	20% TEA in water	2021	R	Dudley MBC	12	30	29	4.2%	G	**0.96**
Gradko	20% TEA in water	2021	R	Dudley MBC	12	42	40	5.5%	G	**0.95**
Gradko	20% TEA in Water	2021	R	Lambeth	10	91	62	46.6%	G	**0.68**
Gradko	20% TEA in water	2021	R	Lancaster City Council	13	38	32	18.4%	G	**0.84**
Gradko	20% TEA in water	2021	R	Lancaster City Council	13	28	27	4.9%	G	**0.95**
Gradko	20% TEA in water	2021		**Overall Factor[3] (32 studies)**				**Use**		**0.84**

NO_2 Fall-off with Distance from the Road

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

Only one site, Site 25, required fall-off-with-distance calculations as the bias adjusted and annualised annual mean concentration (36.5 µg/m^3) was greater than 36 µg/m^3 and the monitoring site was not located at a point of relevant exposure (taking the limitations of the calculator into account). The output data from the Diffusion Tube Data Processing Tool is presented in Table C.4 and a copy of the tool has been submitted along with this report.

QA/QC of Automatic Monitoring

The data capture percentage for the roadside NO_2 automatic monitoring stations in 2020 was greater than the required 75% (98.9% for St. George's Street, 97.2% for Chesil Street and 92.2% for Romsey Road). The data capture percentage for $PM_{2.5}$ and PM_{10} at Romsey

road was 92.2% and 100% at St George's Street. Therefore, no annualisation of data was required.

All results 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).

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

The data reported for the Palas Fidas 200 is in accordance with paragraph 7.162 of TG16 using the inbuilt method 11 approved algorithm with no further correction being applied to the reported results for either PM_{10} or $PM_{2.5}$.

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 the services of our data ratification contractor (AQDM) provides, these values are rechecked against comparable reference sites. No further corrections were deemed necessary in 2021.

Automatic Monitoring Annualisation

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

NO_2 Fall-off with Distance from the Road

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

No automatic NO_2 monitoring locations within WCC required distance correction during 2021.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Chilbolton Observatory	Annualisation Factor Reading New Town	Annualisation Factor Swindon Walcott	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
City 17	1.0947	1.1437	1.1638	1.1341	32.1	36.4	Bournemouth had missing data correlating to periods of no diffusion tube data, so could not be used.
City 24	0.9888	0.9798	1.0031	0.9906	38.5	38.1	Bournemouth had missing data correlating to periods of no diffusion tube data, so could not be used.

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	12				
Bias Factor A	0.81 (0.75 - 0.88)				
Bias Factor B	24% (14% - 34%)				
Diffusion Tube Mean (µg/m^3)	33.6				
Mean CV (Precision)	5.0%				
Automatic Mean (µg/m^3)	27.1				
Data Capture	100%				
Adjusted Tube Mean (µg/m^3)	27 (25 - 30)				

Notes:

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

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 25	1.7	4.0	36.5	13.0	31.9	

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

Figure D.1 – Winchester City Centre AQMA & Continuous Monitors

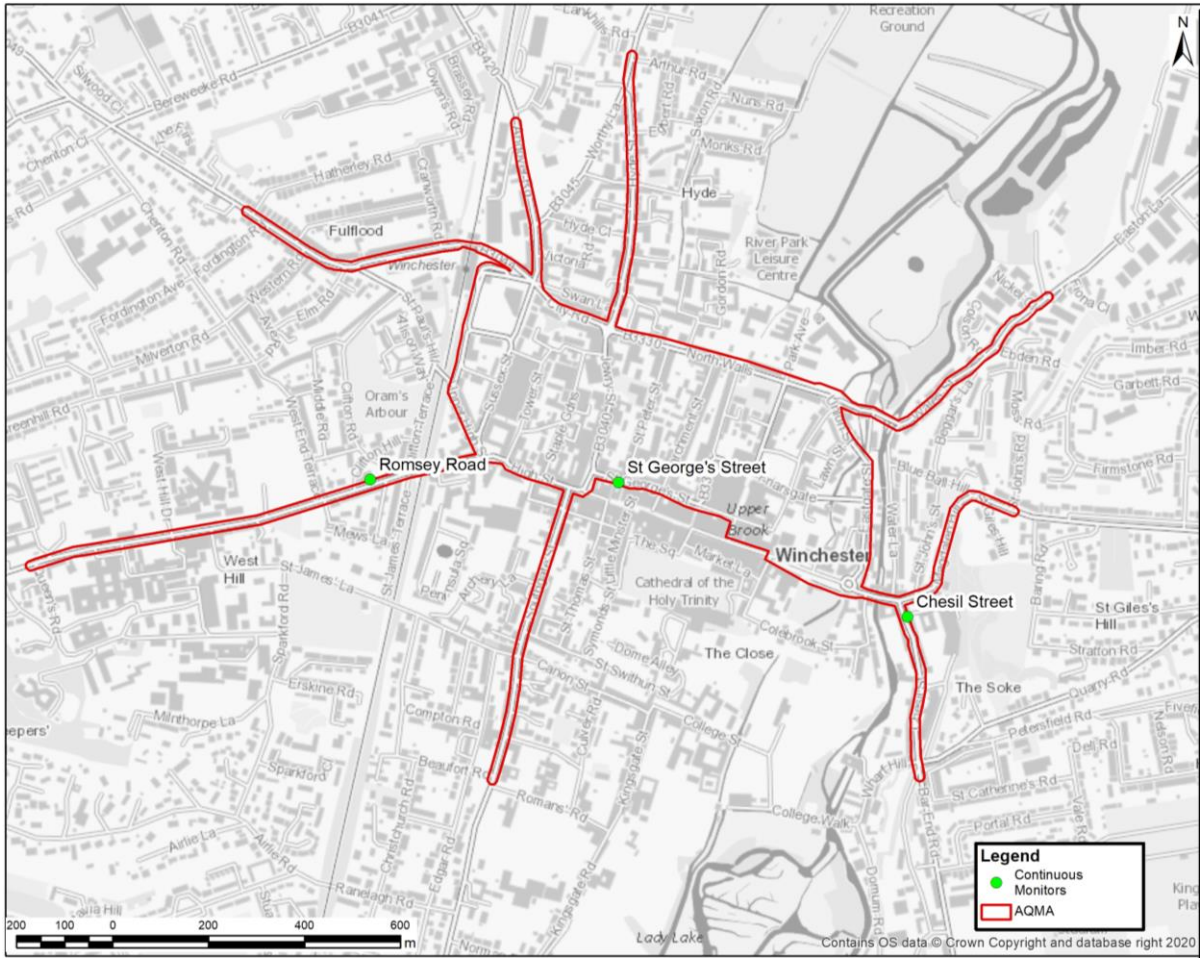


Figure D. 2 - Winchester City Centre AQMA & Diffusion Tube City Study

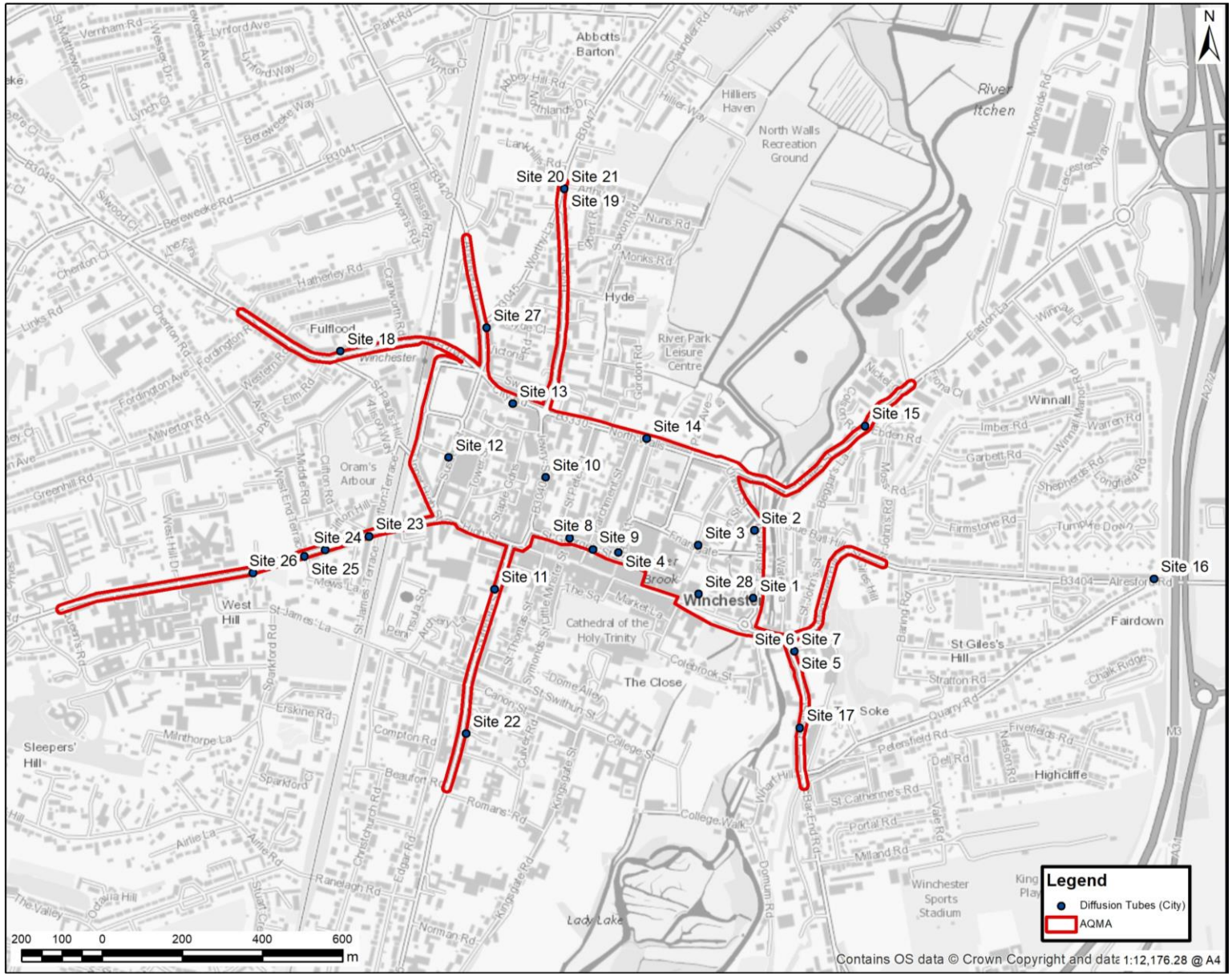
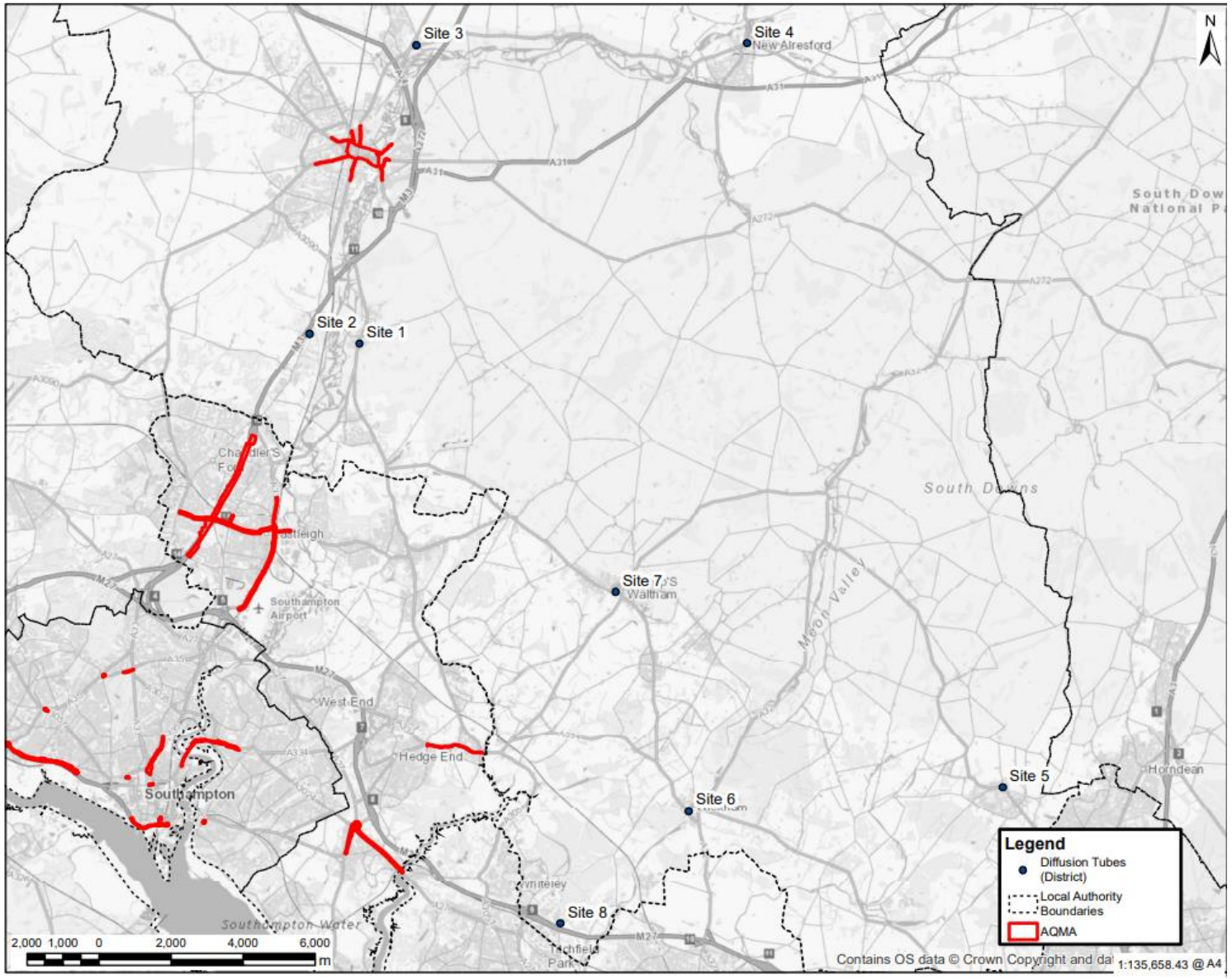


Figure D. 3 – Winchester City Council Diffusion Tube District Wide Study



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[10]

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EVCP	Electric Vehicle Charging Point
EU	European Union
FDMS	Filter Dynamics Measurement System
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
P&R	Park and Ride
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
SPD	Supplementary Planning Document

Abbreviation	Description
ULEV	Ultra-Low Emission Vehicles
WCC	Winchester City Council

References

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- Winchester City Council Air Quality Website. Available at: https://www.winchester.gov.uk/environment/air-quality/