2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June, 2021

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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 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 designated for exceedances of the annual mean NO_2 objective and 24-hour PM_{10} objective. The 24-hour PM_{10} AQMA was later revoked in 2013 after a number of years of measured concentrations remaining below objective levels. 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 2020

[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 monitors NO_2 concentrations at various locations throughout Winchester. Results from the monitoring network of diffusion tubes show that all locations within the AQMA met the annual mean NO_2 objective in 2020. In the wider district, NO_2 concentrations were also all below the national air quality objective.

Between the years 2016-2020, 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 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. The annual results of the particulate monitoring in 2020 are reported within this ASR. 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 this monitor are presented within this report.

In late 2018, 3 additional diffusion tubes were also added in Martyr Worthy, as part of the 'Enhanced Kings Worthy Study', to further investigate elevated NO_2 concentrations seen at Site 3 - Martyr Worthy, though this study has demonstrated that the exceedance has not persisted. Therefore, in early 2020, these sites were discontinued. Three additional sites were added in Romsey Road in 2020 to investigate the elevated NO_2 concentration in the area.

In May 2017, Winchester City Council issued a new Air Quality Action Plan (AQAP)[5], with the aim of tackling the remaining hotspots in the city centre. This action plan replaced the previous action plan which ran from 2006 to 2016. This action plan has been kept relevant through an update before Cabinet in January 2020.

Actions to Improve Air Quality

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

[5] Winchester City Council Air Quality Action Plan (2017) Available at: https://www.winchester.gov.uk/environment/air-quality/historical-air-quality-reports-for-government

The 2019 Clean Air Strategy[6] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[7] 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 AQMAs are designated due to elevated concentrations heavily influenced by transport emissions.

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 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 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

[6] Defra. Clean Air Strategy, 2019

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

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, most of the measures to tackle air quality were unfortunately delayed or put on hold in 2020. 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. Detailed comments on the impact of COVID-19 on these actions have been presented 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[8] 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[9]. 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, this is being reassessed in 2021.

[8] 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

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

Conclusions and Priorities

The Council continued undertaking monitoring in 2020, though one diffusion tube change-over was missed during the first lockdown in April, so the tubes were left out for two months, but were still collected and analysed within the stability period. There were three additional diffusion tube sites added to the monitoring network in 2020. These new sites are in close proximity to the Clifton Hill diffusion tube site (Site 24), which had been continuously exceeding the air quality objective in the preceding five years.

All monitoring location met the annual mean air quality objective of 40 µg/m^3 in 2020. Site 25 monitored a concentration in excess of the objective value, but when distance corrected to the location of relevant exposure, this was compliant with the objective. NO_2 concentrations along Romsey Road at all four diffusion tube locations 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 concentrations were markedly lower in 2020 at all monitoring locations, which it is considered was mainly due to COVID-19 pandemic. These lower annual mean results together with the real time indicative sensor data from the AQMesh show it is extremely unlikely that there was an exceedance of the hourly mean objective. The AQMA is due to be assessed in detail in early 2022, though currently there is not considered to be the need to declare a new AQMA, nor amend or revoke the existing AQMA, due to the unusual nature of events in 2020. Also taking into consideration the likelihood that concentrations may increase again in 2021 with a return to more 'normal' circumstances. 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). Similarly, monitored concentrations of PM_{10} and $PM_{2.5}$ remain below the relevant objectives.

Generally, concentrations of NO_2 are steadily declining year on year. This tends to indicate that the actions and measures within the City's AQAP are having a positive effect, though there is still more work to do, particularly on Romsey Road, where a return to elevated NO_2 concentrations in exceedance of the annual mean objective could yet be observed after the easing of pandemic restrictions.

WCC carried out an enhanced diffusion tube study in Whiteley and Kings Worthy in 2019 and into 2020. Both of these studies have now been ceased following compliance from all monitoring locations within these two study areas. The enhanced Whiteley study was initially commissioned following local concerns regarding traffic congestion at peak times. Whiteley was previously a one way in and out location, but with further recent major development (Whiteley North) an additional access road has been constructed and the existing M27

access has also been improved, which appears to have improved NO_2 concentrations in the area.

In terms of AQAP implementation, WCC has to date achieved the following:

- Completed the Supplementary Planning Document (SPD) which is currently out to public consultation and potential adoption is anticipated in September 2021;
- Rolled out a programme of electric vehicles charging points (EVCP) in car parks. 33 EVCPs were installed across WCC public car parks, including 1 rapid charger;
- 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. Winchester City Council have requested that Hampshire County Council ensure air quality impacts of the proposed changes are assessed as part of this project. More details on this fund is available at: https://www.hants.gov.uk/transport/transportschemes/atfwinchesterimprovements; and
- The new FIDAS 200 monitor which was installed in 2020 which now monitors particulates (PM_{10} and $PM_{2.5}$), the results of which are presented in Table A.3, Table A.6, Table A.7 and Table A.8

WCC's priorities for the coming year include:

- Continued compliance with annual mean NO_2 objective across whole of the WCC region;
- Assessment of local $PM_{2.5}$ concentrations and the potential duty to comply with future objectives if set regarding this parameter (i.e. pending Environment Bill and secondary regulations thereafter);
- Implementing the City of Winchester Movement Strategy; and
- Commissioning a new air quality monitoring cabinet on Romsey Road with plans to complete it by August 2021. This will involve moving the real time Chesil Street monitor to Romsey Road to better capture elevated concentrations, which will free

up the AQMesh instrument on Romsey Road to be relocated to other potential areas of concern.

These actions will be progressed in 2021 and beyond, with the aim of achieving further improvement in air quality to the point where it is hoped that in early 2022, a review of the current AQMA can be undertaken with a view to revoking the AQMA or considering its revision to a smaller AQMA if the data supports this. This will also then provide opportunity to consider a new AQAP to address the new, smaller AQMA, if required.

It will also be necessary to manage the impact of the COVID-19 pandemic, as in the short term this has been positive for air quality, but in the long term could continue to divert Council resources. In addition, some of the air quality messaging, such as use of public transport and car sharing, is currently problematic.

Local Engagement and How to get Involved

Members of the public can take simple measures to help improve air quality, the main ones being, where possible, making short trips and journeys on foot or by bike instead of by car. Traffic congestion can further be reduced by the general public through car sharing or by using public transport including the park and ride buses to access the city centre, although these are currently subject to social distancing rules. A car share club was launched in 2017 and is being actively promoted. In 2017, Winchester hosted its first National Clean Air Day event where members of the public were encouraged to get involved. This was carried on into 2018 and 2019, however it was cancelled for 2020 due to the pandemic.

During 2021, there are plans to improve walking and cycling amenities through Hampshire County Council's Active Travel Fund. WCC is also involved in Defra's 'Clean Burn Project'. This project is led by Southampton City Council but includes Eastleigh, Winchester and New Forest Councils as well. 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.

WCC provides information on air quality on their website http://www.winchester.gov.uk/environment/air-quality/ and air quality monitoring data in Winchester can be viewed on UK Air Quality net: http://www.ukairquality.net/.

Further information on air quality can be found on Defra's Local Air Quality Management (LAQM) website[10].

[10] Defra LAQM website: http://laqm.defra.gov.uk/

Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Winchester City Council during 2020. 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 WCC can be found in Table 2.1. The table presents a description of the one AQMA that is currently designated within WCC. Appendix D: Map(s) of Monitoring Locations and AQMAs and also the air quality monitoring locations in relation to the AQMA. The air quality objective pertinent to the current AQMA designation is the 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	Name and Date of AQAP Publication	Web Link to AQAP
Winchester Town Centre AQMA	Declared 14/11/2003	NO_2 Annual Mean	Winchester Town Centre AQMA	Declared 14/11/2003	>40 µg/m^3 at multiple locations	No exceedance in 2020	Winchester City Council Air Quality Action Plan- 2017	https://winchester.citizenspace.com/licensing/air-quality/supporting_documents/Winchester%20AQAP_Final%20Draft_16012017.pdf

☒ **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 the conclusions reached were acceptable for all sources and pollutants. It suggested using the national diffusion tube monitoring calendar for diffusion tube monitoring. Although best efforts were taken to adhere to the monitoring calendar, these efforts were overturned by the lockdown and COVID-19 restrictions.

WCC has taken forward a number of direct measures during the current reporting year of 2020 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 WCC have made during the reporting year of 2020 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 their Action Plan. Key completed measures are:

- Final draft of Supplementary Planning Guidance (SPD) has been completed and a consultation exercise was performed in early 2021. Final assessment and recommendations are to be made to the Council in September 2021 with a view for potential adoption; and
- The new 'Electric Vehicle Charging Strategy' has been adopted. Full programme of electric vehicle charging points (mainly in council car parks across the district) has now been delivered.

WCC's priorities for the coming year are:

- 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);
- It is hoped that in early 2022, a review of the current AQMA can be undertaken with a view to revoking the AQMA or considering the need for revision to a smaller AQMA if the data supports this. This will also provide the opportunity to consider a new AQAP to address the new, smaller AQMA, if required;

- Improvement to walking and cycling is anticipated, having recently (spring 2021) been consulted on Hampshire County Council's Active Travel Fund; and
- WCC 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 and includes neighbouring local authorities. Progress on this will be included in next year's reporting.

Progress on the following measures has been slower than expected due to restrictions caused by COVID-19 pandemic:

- 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. This measure is expected to result in a 2% reduction in NO_x emissions;
- Progress the outcomes of the WCC Staff Travel survey completed in early 2020. It is 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; and
- Continue to work with stakeholder organisations and maintain a programme of regular communication to encourage behavioural change. COVID-19 prevented public engagement in 2020.

The principal challenges and barriers to implementation that WCC anticipates facing are likely to be related to the long term effects of the COVID-19 pandemic, which are anticipated to divert resources for a significant period within 2021 and potentially beyond, which may detract from focus from the AQAP measures. This has already impacted on progress with some measures during 2020.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, WCC anticipates that further additional measures not yet prescribed may be required in subsequent years to achieve compliance and enable the full revocation of the AQMA.

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.
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 possess 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 and, in 2019 (November), we have issued 55 Penalty Charge Notices for loading ban contraventions in various locations in the city centre. Of these: 47 paid; 1 cancelled; 7 cases still live. No further enforcement during 2020 due to COVID pandemic resulting in limited retail for much of year so this was not observed to be an issue needing any enforcement in 2020.
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	Should the study identify the need for additional P&R facilities at the northern approaches or in other locations on the edge of the city, this will inevitably be subject to a capital investment programme and will not be realistically delivered in accordance with the relatively short time scales set out in the AQAP. The City Council has recently completed the clearance of the Vaultex site at Bar End and is progressing work to provide an estimated 130 additional Park & Ride spaces, which should be operational by the end of 2020 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	Unlikely to be completed, but reviewed annually	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 AQAP modelled the impact of diesel cars at contributing 58% of the NOx emissions from all vehicles entering the AQMA, many of which will elect to use the City Centre car parks. Parking Services continues to closely monitor developments and will, present a further new report setting out proposals to introduce an emissions based charging regime as part of the wider parking strategy for the city. The Council have now introduced the 'Electric Vehicle Charging Strategy' as part of Measure 11 below but it also supports Measure 4	This measure seeks to adopt 'smart' ticket machine technology to implement differential charging tariffs for higher polluting vehicles, primarily diesels. Having reviewed the options currently available and costs it has been decided in the current parking review to not pursue this option at this stage. This decision will be reassessed as part of the annual car parking review. The implementation of this measure is now being addressed through the new Parking Strategy, which seeks to procure 'equipment and/ or technology to allow differential charging for cleaner vehicles (Emission Based Pricing) and smart payment options. No further review conducted in 2020 due to resourcing constraints.
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.	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 2020 –position remains as above
6	Ensure that all Council-owned, leased,	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising	2017	TBC	WCC	Local Authority	N	N/A	NA	Planning	2% reduction in NOx emissions	Low emission vehicles in fleet; Number of trips	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	A new procurement policy is in place, which includes a requirement to consider environmental criteria.

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
	contracted or influence vehicles that enter the AQMA meet the OLEV standards for ULEVs and are not diesel fuelled by 2020		uptake of low emission vehicles										entering AQMAs	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 is currently under review and phase 2 of this project now underway, to be completed by June 2020 The Council no longer operates a staff car leasing scheme	
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	Initial 2019 draft version was too complex and had to be redrafted. Final version is currently out for consultation	Final draft completed and consultation exercise performed early 2021 – Final assessment and recommendations to be made to Council September 2021 with a view to potential for adoption thereafter – See https://winchester.citizenspace.com/licensing/winchester-city-council-air-quality-supplementary/
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 recently (spring 2021) 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 delayed to 2022 due to COVID-19 pandemic – both in terms of resources and data not being representative of long term trends. All air quality data was still collected in 2020
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. 2020 programme had to be cancelled due to ongoing COVID-19 pandemic. Unlikely this will be fully progressed again until 2022. 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 recharging, Gas fuel recharging	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.	Full programme of electric charging points (mainly in council car parks across the district) has now been delivered. Installation of 33 EVCPs across WCC Public Car Parks, including 1 Rapid charger. More EVCPs to follow.
12	Ensure that air quality is a standard consideration	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising	2017	Ongoing	WCC	Local Authority	N	N/A	N/a	Planning	See Core Action 6	Adoption of procurement policy; Uptake of LEVs (as	WCC is updating its Procurement Strategy and will ensure air quality is a material consideration in contracts.	In response to the Climate Emergency declaration in June 2019, one of the aims of the strategy will be to require social and

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
	as part of procurement practice and is reflected in the Council's Procurement Policy		uptake of low emission vehicles										per core action)		environmental factors to be considered in all procurements. No further update in 2020.
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. No further update in 2020.
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)	No progress from previous year. Measure has been impacted by potential road infrastructure changes coming out of detailed studies driven by the Winchester Movement Strategy	No further update in 2020
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 2020.
17	Review and refresh the Council Travel Plan to promote more sustainable travel for staff	Promoting Travel Alternatives	Workplace Travel Planning	2017	2021	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.	WCC Staff Travel survey completed early 2020. No further progress in 2020 due to COVID-19. 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). A second survey was undertaken by Carbon Reduction Team in Spring of 2021.

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
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.	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. No further update in 2020.

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[11]. In 2018, Winchester's indicator remained at 5.1%, but the national average increased to 5.2%. In 2019 (latest available data), 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. Winchester also compares favourably with nearby authorities (Southampton at 5%, Basingstoke & Deane at 4.6%, and Eastleigh at 4.7%) and the South Eastern region as a whole (5.2%).

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.

There are now two continuous monitors in Romsey Road (AQMesh, near reference sensor) and St Georges Street (FIDAS 200) that monitor $PM_{2.5}$ concentrations, both of which recorded a $PM_{2.5}$ annual mean concentration below the air quality objective of 25 µg/m^3.

[11] 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

Although there are no specific measures targeting the reduction of $PM_{2.5}$ currently, it is expected that the combination of actions and that are currently in force or coming into force will help to bring about a reduction of $PM_{2.5}$. However, 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 Bill 2020) and potentially a more stringent objective in line with World Health Organisation guidelines.

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

This section sets out the monitoring undertaken within 2020 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 2016 and 2020 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

WCC undertook automatic (continuous) monitoring at 3 sites during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The http://www.ukairquality.net/home/map page presents automatic monitoring results for WCC with automatic monitoring results also available through the UK-Air website.

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.

The Council has recently been commissioned to install an air quality cabinet on Romsey Road and is planning to move the automatic monitor at Chesil Street site to Romsey Road to better capture elevated concentrations, which will free up the AQMesh instrument currently located on Romsey Road. The Council can therefore obtain some indicative real time data from 2020/21 to ensure compliance in this area.

The Council has also recently (27 February 2020) installed a FIDAS 200 Particulate monitor in the St George's Street air quality station to monitor $PM_{2.5}$ and PM_{10}.

3.1.2 Non-Automatic Monitoring Sites

WCC undertook non-automatic (i.e. passive) monitoring of NO_2 at 33 sites (37 diffusion tubes, with two triplicate sites) during 2020. The monitoring network is split into 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.

There were three new diffusion tube locations on Romsey Road in 2020 (Sites 23, 25 and 26). As Romsey Road showed elevated NO_2 concentrations in previous reports, additional locations at this hotspot was setup to better understand the issues around this area.

Shepherds Lane (District Site 9) was discontinued after only one month in 2018. The enhanced study sites at Whiteley and Kings Worthy were also ceased in 2020 after these sites showed compliance with the objective. Two of the sites from the Whiteley enhanced study (Site 13, Lidl and site 14, Whiteley Waywere monitored from April 2019 to April 2020 but theft of tubes at site 14 meant only one result was obtained at this location within 2020. This ollowed concerns over traffic congestion at peak times and potential exposures (hourly mean) by persons walking to work/school through Whiteley. The four months of data from 2020 has been included in this report to show compliance in the area as there are a lot of residential development occurring in Whiteley, with a North Whiteley major development area underway and as part of the project new roads have been built.

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 2020 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. Site 25 in the City Study, a new site located on Romsey Road, recorded a concentration of 40.8 µg/m^3, however, after being distance corrected to the nearest relevant exposure, the estimated concentration was 35.5 µg/m^3. Previously, the existing site on Romsey Road, Site 24, had been the highest monitored concentration for the last four years.

The trend in concentrations, however, has shown a steady decrease over the years. Romsey Road 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 Romsey 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 an overall downward trend observed across all monitoring sites in 2020, it is likely that 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, though there is still more work to do, particularly on Romsey Road. Large reductions in monitored concentrations compared to 2019 were seen at the majority of sites in 2020. The maximum change between 2019 and 2020 was recorded at Site 24 at Clifton Hill, Romsey Road, where a reduction from 46.5 µg/m^3 to 30.9 µg/m^3 was recorded. The Romsey Road automatic monitoring site did not see a change in 2020, with the concentration staying the same at 32 µg/m^3. Although the NO_2 annual average mean stayed the same, the monthly average mean were lower during the months of April, May and June in 2020 compared to 2019.

There were no recorded instances 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 Georges Street are presented within Table A.5 in Appendix A for the past 5 years although the monitor has only recorded full data since 2019 as it was installed in late 2018. The annual mean concentration in 2020 at Romsey Road was 20 µg/m^3 and 14.2 µg/m^3 at St Georges Street, both were below the objective of 40 µg/m^3. Data capture rate was 100% at Romsey Road and 84.1% at St Georges Street.

The 24-hour mean data is presented within Table A.6 and shows that in 2020, the 24-hour mean was greater than 50 µg/m^3 four times at Romsey Road, and no times on St Georges Street, therefore neither of the sites exceeded the objective of 24-hour means greater than 50 µg/m^3 more than 35 times per year. Romsey Road will continue to be closely monitored, as it is considered likely that post-pandemic PM_{10} levels are likely to rise.

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.

A new continuous monitor (FIDAS 200) was installed on St Georges Street in 2020 in that measures $PM_{2.5}$. There are now two continuous monitors for $PM_{2.5}$, the AQMesh at Romsey Road being the other site, though this is a near reference sensor so can be considered indicative data only.

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 2020, which Table A.8 indicates is being achieved presently within Winchester.

Both monitors show $PM_{2.5}$ concentrations below 25 µg/m^3, St Georges Street recorded 9 µg/m^3 and Romsey Road recorded 11.3 µg/m^3 in 2020.

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 (from March 2017); $PM_{2.5}$ and PM_{10} from 2020	YES	Chemiluminescent and FIDAS 200	0	2.25	2.2
Chesil Street	Station Approach (Chesil Street)	Roadside	448664	129257	NO_2 (from March 2017)	YES	Chemiluminescent	0	4.6	2.2
Romsey Road	Romsey Road	Roadside	447544	129543	PM_{10},$PM_{2.5}$, NO_2	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)
Site 1 (City Study)	10 Eastgate St	Roadside	448563	129391	NO_2	YES	0	5.55	NO	1.7
Site 2 (City Study)	Greyfriars	Roadside	448566	129560	NO_2	YES	0	9.7	NO	1.75
Site 3 (City Study)	Friarsgate	Roadside	448426	129523	NO_2	YES	4.6	4.25	NO	2.4
Site 4 (City Study)	Upper Brook St (Echo)	Roadside	448227	129504	NO_2	YES	9.2	8	NO	2.45
Site 5 (City Study)	Co-located Roadside Monitor	Roadside	448062	129537	NO_2	YES	0	3.1	YES	1.7
Site 6 (City Study)	Co-located Roadside Monitor	Roadside	448062	129537	NO_2	YES	0	3.1	YES	1.7
Site 7 (City Study)	Co-located Roadside Monitor	Roadside	448062	129537	NO_2	YES	0	3.1	YES	1.7
Site 8 (City Study)	St Georges St Bed	Roadside	448106	129541	NO_2	YES	0	4.05	NO	2.45
Site 9 (City Study)	St Georges St Lad	Roadside	448163	129512	NO_2	YES	0	3.6	NO	2.4
Site 10 (City Study)	Jewry St	Roadside	448046	129692	NO_2	YES	0	4.05	NO	2.4
Site 11 (City Study)	Southgate St DV	Roadside	447918	129413	NO_2	YES	0	3.65	NO	2.6
Site 12 (City Study)	Sussex St	Roadside	447804	129741	NO_2	YES	2.4	3.6	NO	2.6
Site 13 (City Study)	City Road	Roadside	447963	129875	NO_2	YES	0	6.55	NO	3
Site 14 (City Study)	74 Northwalls	Roadside	448297	129789	NO_2	YES	10.2	3.7	NO	2.3
Site 15 (City Study)	Wales St	Roadside	448842	129820	NO_2	YES	0	1.7	NO	2.45
Site 16 (City Study)	Alresford Rd (M3)	Other	449563	129439	NO_2	NO	24	N/A (M3)	NO	1.5
Site 17 (City Study)	Chesil St	Roadside	448679	129068	NO_2	YES	0	1.3	NO	2.6
Site 18 (City Study)	Stockbridge Rd	Roadside	447534	130006	NO_2	YES	10	5.4	NO	2
Site 19 (City Study)	Worthy Rd 1	Roadside	448092	130411	NO_2	YES	3.7	2,2	NO	2.5
Site 20 (City Study)	Worthy Rd 2	Roadside	448092	130411	NO_2	YES	3.7	2.2	NO	2.5
Site 21 (City Study)	Worthy Rd 3	Roadside	448092	130411	NO_2	YES	3.7	2.2	NO	2.5
Site 22 (City Study)	St Cross Rd	Roadside	447842	129050	NO_2	YES	6	2.4	NO	2.2
Site 23 (City Study)	Romsey Road (Clifton Road)	Roadside	447605	129545	NO_2	YES	0	1.7	No	2.2
Site 24 (City Study)	Romsey Road (Clifton Hill)	Roadside	447495	129511	NO_2	YES	0	1.1	NO	2.5
Site 25 (City Study)	Romsey Road (West End Terrace)	Roadside	447444	129495	NO_2	YES	2.3	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)
Site 26 (City Study)	Romsey Road (Knights Quarter)	Roadside	447315	129454	NO_2	YES	2.4	2.0	No	2.2
Site 27 (City Study)	Andover Rd	Roadside	447898	130065	NO_2	YES	0	4.2	NO	2.15
Site 28 (City Study)	Bus Station	Other	448427	129401	NO_2	YES	N/A*	N/A	NO	2.4
Site 1 (District Study)	High St, Twyford	Roadside	448063	124371	NO_2	NO	0	1.4	NO	N/A
Site 2 (District Study)	Southdown Road, Otterbourne	Other	446680	124644	NO_2	NO	N/A**	N/A	NO	N/A
Site 3 (District Study)	Martyr Worthy Rd, Kings Worthy	Other	449647	132669	NO_2	NO	0	0.5	NO	N/A
Site 4 (District Study)	West St/Broad St, New Alresford	Roadside	458826	132719	NO_2	NO	N/A**	N/A	NO	N/A
Site 5 (District Study)	Hambledon Rd, Denmead	Roadside	465917	112046	NO_2	NO	N/A**	N/A	NO	N/A
Site 6 (District Study)	Winchester Rd, Wickham	Roadside	457203	111380	NO_2	NO	N/A**	N/A	NO	N/A
Site 7 (District Study)	Winchester Rd, Bishops Waltham	Roadside	455176	117476	NO_2	NO	N/A**	1	NO	N/A
Site 8 (District Study)	Whiteley Lane, Whiteley	Other	453645	108261	NO_2	NO	N/A**	1.3	NO	N/A
Lidl (Enhanced Whiteley Study 1)	-	Kerbside	452831	109130	NO_2	NO	N/A***	N/A	NO	N/A

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.

* - used for an indication of hourly mean exposure at the bus station

** - Worst case sites immediately adjacent to road sources or on traffic islands

*** - These sites are on pavements used by commuters so are only relevant exposure locations for 1 hour mean - these tubes are being used to see if over 60ug/m^3 to see if more detailed equipment required for hourly mean assessment

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 2020 (%) (2)	2016	2017	2018	2019	2020
St George's Street	448062	129537	Roadside	95.3	95.3	-	38.5	**41**	37	26.9
Chesil Street	448664	129257	Roadside	99.8	99.8	-	29.7	30	28	20.7
Romsey Road	447544	129543	Roadside	100	100	-	-	-	32	32

☒ **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 2020 (%) (2)	2016	2017	2018	2019	2020
Site 1 (City Study)	448563	129391	Roadside	83.3	83.3	36.8	30.9	28.9	27.9	19.6
Site 2 (City Study)	448566	129560	Roadside	91.7	91.7	30.0	27.5	26.2	24.6	18.8
Site 3 (City Study)	448426	129523	Roadside	91.7	91.7	26.9	23.9	23.8	22.2	15.8
Site 4 (City Study)	448227	129504	Roadside	91.7	91.7	37.1	33.0	30.6	27.9	20.6
Site 5 (City Study)	448666	129258	Roadside	91.7	91.7	37.2	32.1	29.8	28.4	26.1
Site 6 (City Study)	448666	129258	Roadside	91.7	91.7	38.6	31.7	30.8	28.4	26.5
Site 7 (City Study)	448666	129258	Roadside	75	75	37.7	31.9	30.6	29.0	25.2
Site 8 (City Study)	448106	129541	Roadside	91.7	91.7	**49.8**	**46.8**	39.5	39.3	29.2
Site 9 (City Study)	448163	129512	Roadside	91.7	91.7	**48.9**	**46.5**	**41.4**	38.5	29.3
Site 10 (City Study)	448046	129692	Roadside	83.3	83.3	**41.7**	38.7	35.9	31.0	22.7
Site 11 (City Study)	447918	129413	Roadside	83.3	83.3	37.0	31.6	28.8	28.3	21.2
Site 12 (City Study)	447804	129741	Roadside	91.7	91.7	37.3	28.0	29.0	29.0	18.9
Site 13 (City Study)	447963	129875	Roadside	91.7	91.7	33.8	31.6	28.8	28.2	21.0
Site 14 (City Study)	448297	129789	Roadside	91.7	91.7	29.7	28.2	25.7	24.1	17.8
Site 15 (City Study)	448842	129820	Roadside	75	75	31.5	29.8	26.1	23.4	18.7
Site 16 (City Study)	449563	129439	Other	83.3	83.3	38.4	33.0	34.6	30.0	21.5
Site 17 (City Study)	448679	129068	Roadside	66.7	66.7	39.9	37.6	34.7	35.3	23.7
Site 18 (City Study)	447534	130006	Roadside	91.7	91.7	24.8	23.7	20.0	18.7	13.1

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 2020 (%) [2]	2016	2017	2018	2019	2020
Site 19 (City Study)	448092	130411	Roadside	91.7	91.7	22.8	20.0	23.3	20.8	15.3
Site 20 (City Study)	448092	130411	Roadside	91.7	91.7	23.8	22.2	23.8	21.0	15.4
Site 21 (City Study)	448092	130411	Roadside	91.7	91.7	22.9	20.4	23.7	21.6	15.6
Site 22 (City Study)	447847	129053	Roadside	91.7	91.7	33.4	32.5	19.3	20.2	14.4
Site 23 (City Study)	447605	129545	Roadside	75	75	-	-	-	-	33.6
Site 24 (City Study)	447495	129511	Roadside	91.7	91.7	**56.6**	**50.8**	**47.6**	**46.5**	30.9
Site 25 (City Study)	447444	129495	Roadside	66.7	66.7	-	-	-	-	**40.8**
Site 26 (City Study)	447315	129454	Roadside	58.3	58.3	-	-	-	-	30.3
Site 27 (City Study)	447898	130065	Roadside	83.3	83.3	32.9	32.4	30.6	26.5	20.8
Site 28 (City Study)	448427	129401	Other	58.3	58.3	30.4	28.0	22.7	21.7	15.2
Site 1 (District Study)	448063	124371	Roadside	83.3	83.3	28.4	24.0	24.1	21.4	16.6
Site 2 (District Study)	446680	124644	Other	91.7	91.7	29.4	27.1	25.2	22.2	17.3
Site 3 (District Study)	449647	132669	Other	83.3	83.3	-	**56.0**	**40.5**	34.6	25.0
Site 4 (District Study)	458826	132719	Roadside	83.3	83.3	33.8	28.9	26.6	27.5	18.4
Site 5 (District Study)	465917	112046	Roadside	75	75	19.9	17.9	18.1	17.7	12.9
Site 6 (District Study)	457203	111380	Roadside	91.7	91.7	30.6	27.5	29.8	26.8	21.6
Site 7 (District Study)	455176	117476	Roadside	91.7	91.7	32.5	29.8	29.6	27.0	20.5
Site 8 (District Study)	453645	108261	Other	83.3	83.3	22.6	22.8	20.3	18.1	12.7

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 2020 (%) (2)	2016	2017	2018	2019	2020
Lidl (Enhanced Whiteley Study 1)	452831	109130	Kerbside	33.3	33.3	-	-	-	24.9	15.3

☒ **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%).

(3)In 2020, the diffusion tubes were exposed for two months, 04/03/2020 to 01/05/2020, due to COVID-19 pandemic. The tubes were collected and stored in a fridge and analysed by Gradko within the stability period. The result from these tubes have been used for March 2020 only, resulting in a gap in monitoring in April 2020.

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

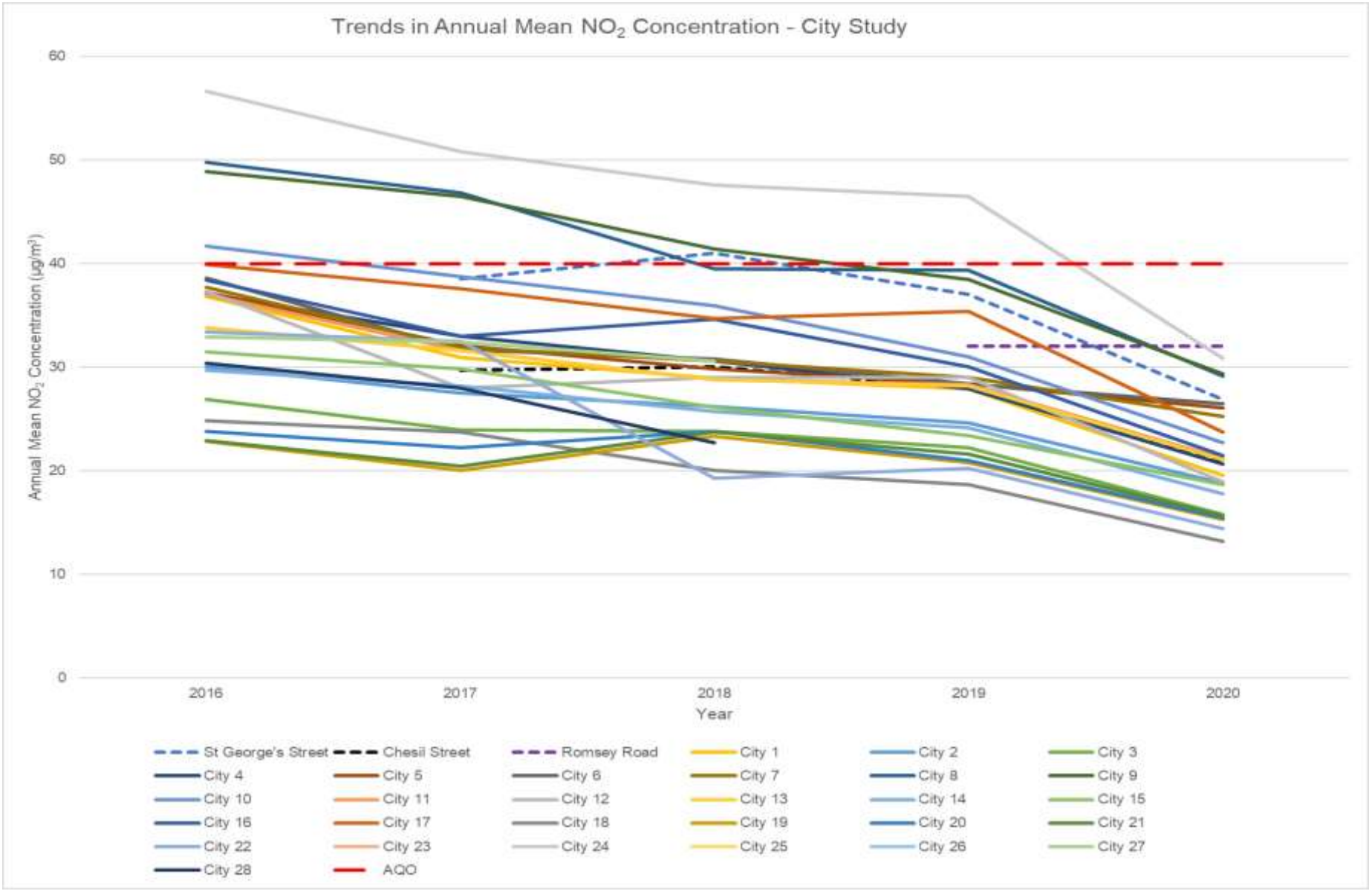


Figure A.2 – Trends in Annual Mean NO_2 Concentrations- District Study Locations

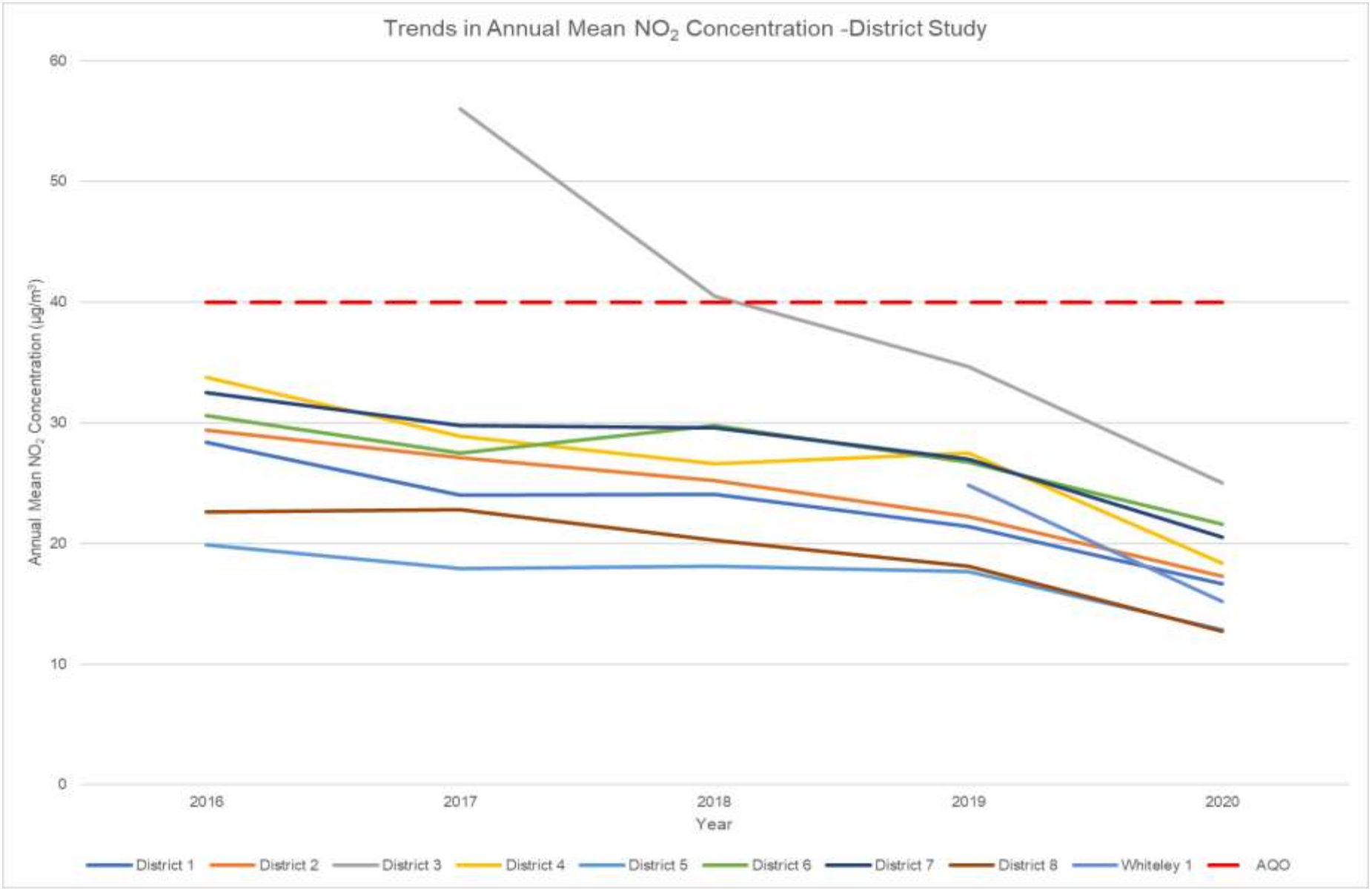


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
St Georges Street	448062	129537	Roadside	95.3	95.3	-	-	0	0	0
Chesil Street	448664	129257	Roadside	99.8	99.8	-	-	0	0	0
Romsey Road	447544	129543	Roadside	100	100	-	-	-	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 (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 2020 (%) (2)	2016	2017	2018	2019	2020
St Georges Street	448062	129537	Roadside	84.1	84.1	-	-	-	-	14.2
Romsey Road	447544	129543	Roadside	100	100	-	-	-	29.5	20.0

☒ **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.

Exceedances of the PM_{10} 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.

(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

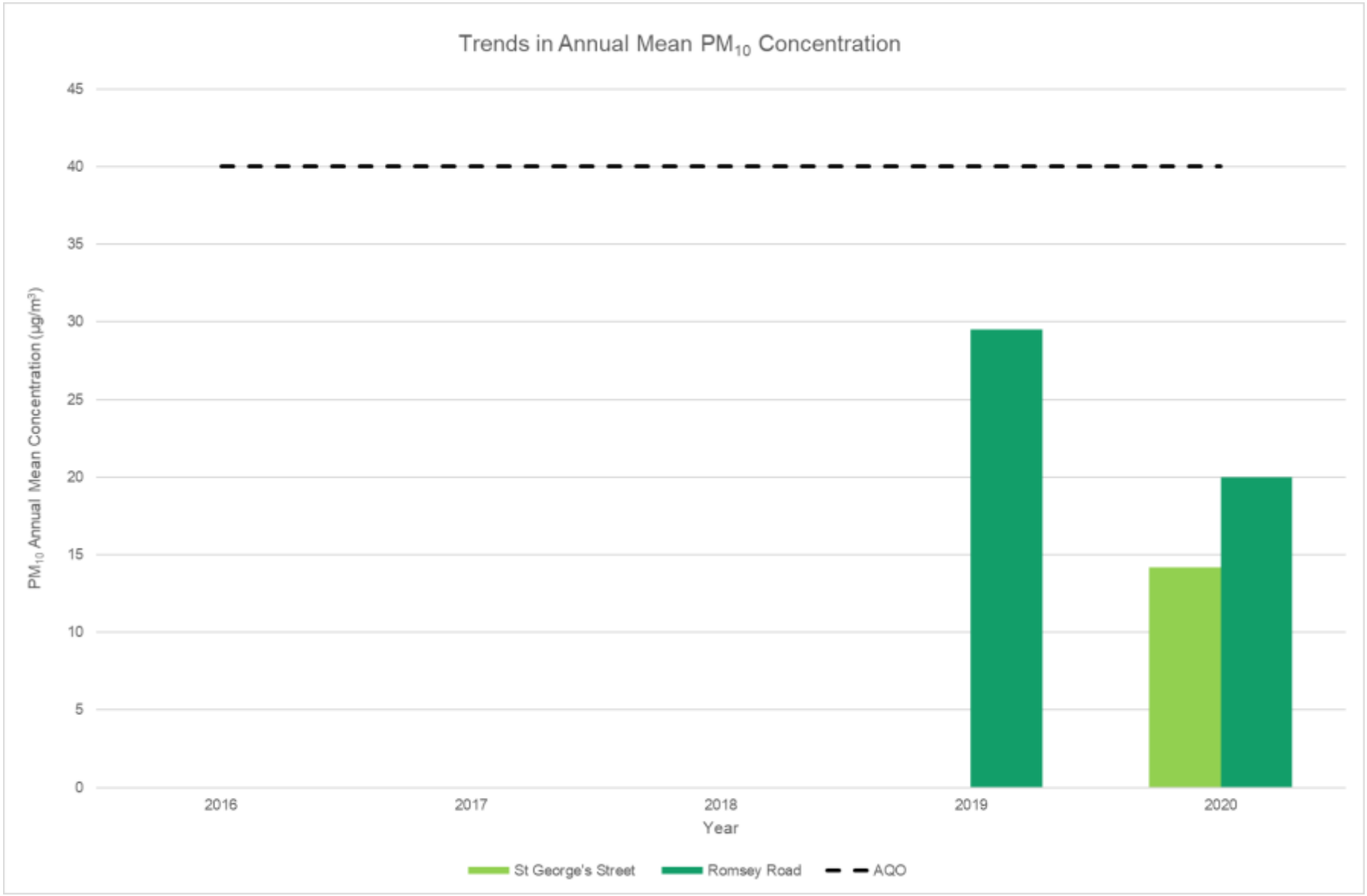


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
St Georges Street	448062	129537	Roadside	83.3	83.3	-	-	-	-	0
Romsey Road	447544	129543	Roadside	100	100	-	-	-	34	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

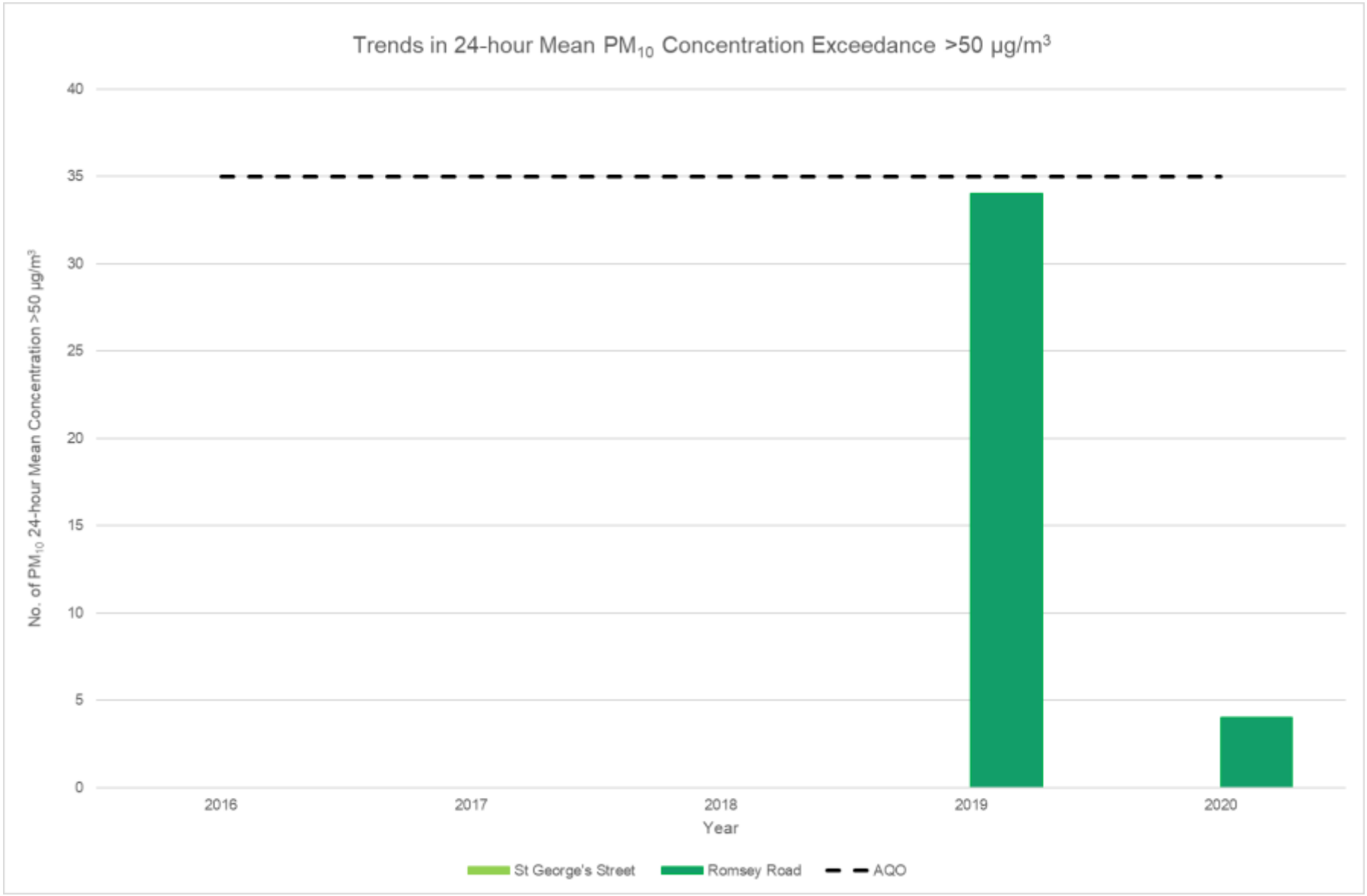


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
St Georges Street	448062	129537	Roadside	84.1	84.1	-	-	-	-	9
Romsey Road	447544	129543	Roadside	100	100	-	-	-	15	11.3

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

Notes:

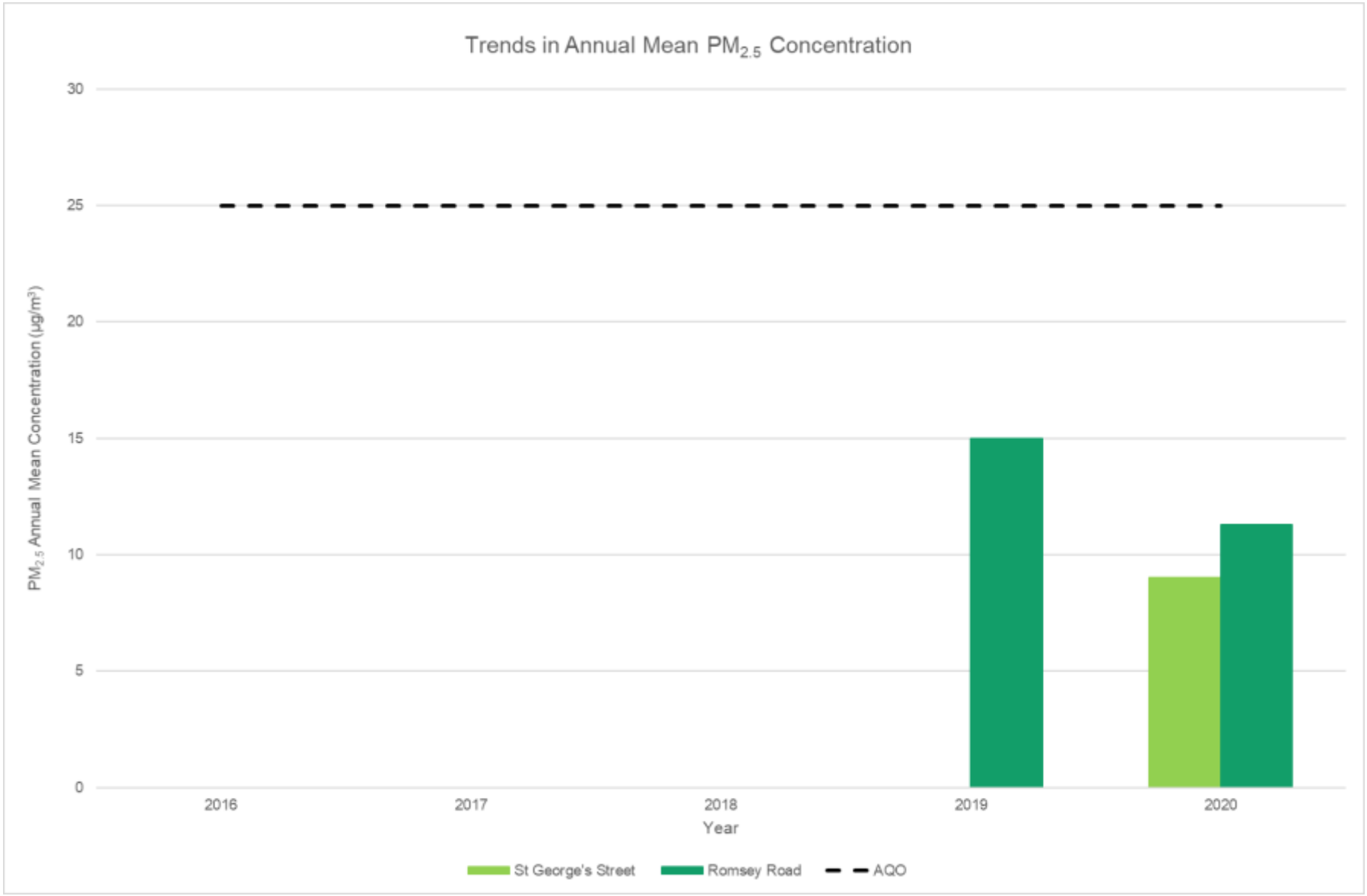
The annual mean concentrations are presented as µg/m^3.

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 2020

Table B.1 – NO_2 2020 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 (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
Site 1 (City Study)	448563	129391	33.9	-	18.1	-	13.9	16.9	17.6	23.8	28.6	24.1	32.2	27.5	23.3	19.6	-	-
Site 2 (City Study)	448566	129560	30.4	24.9	17.6	-	13.6	19.0	16.5		25.0	25.0	28.2	27.0	22.3	18.8	-	-
Site 3 (City Study)	448426	129523	24.7	17.7	15.3	-	11.8	15.6	12.1	18.8	22.5	21.4	26.3	23.1	18.8	15.8	-	-
Site 4 (City Study)	448227	129504	28.7	27.4	20.7	-	17.6	17.7	18.6	25.1	29.0	27.1	33.1	27.8	24.5	20.6	-	-
Site 5 (City Study)	448666	129258	34.5	38.2	26.0	-	19.3	29.8	21.6	34.0	34.0	35.1	37.6	37.4	31.0	26.1	-	-
Site 6 (City Study)	448666	129258	33.0	40.4	27.3	-	20.3	29.9	22.1	33.4	35.6	34.4	39.7	37.1	31.5	26.5	-	-
Site 7 (City Study)	448666	129258	33.8	-	26.0	-	19.5	29.8	21.9		36.0	34.0	38.0	35.8	30.0	25.2	-	-
Site 8 (City Study)	448106	129541	46.9	39.2	28.7	-	27.5	27.8	26.3	33.6	43.2	31.8	44.2	37.7	34.7	29.2	-	-
Site 9 (City Study)	448163	129512	44.1	45.8	26.5	-	23.3	33.7	25.9	37.9	38.0	40.4	40.9	37.1	34.9	29.3	-	-
Site 10 (City Study)	448046	129692	37.4	27.2	21.9	-	16.3	25.7	17.3		29.2	29.7	36.8	33.1	27.0	22.7	-	-
Site 11 (City Study)	447918	129413	32.9	28.9	19.6	-		16.8	16.9	22.2	26.9	27.9	32.9	28.8	25.2	21.2	-	-
Site 12 (City Study)	447804	129741	30.4	4.7	19.9	-	16.7	19.4	15.5	23.9	27.4	26.1	32.7	29.0	22.5	18.9	-	-
Site 13 (City Study)	447963	129875	22.1	35.5	21.1	-	12.8	22.3	19.1	27.6	28.9	30.0	32.9	30.1	25.0	21.0	-	-
Site 14 (City Study)	448297	129789	29.8	26.0	16.2	-	11.6	17.3	15.0	19.3	23.8	23.9	28.4	25.9	21.1	17.8	-	-
Site 15 (City Study)	448842	129820	28.5	25.1	20.9	-	15.6	19.6	15.4	22.8	26.2	26.8	-	-	22.2	18.7	-	-
Site 16 (City Study)	449563	129439	-	25.4	21.3	-	21.3	25.3	19.5	30.2	29.0	25.1	31.2	30.6	25.6	21.5	-	-
Site 17 (City Study)	448679	129068	-	-	24.9	-	19.1	25.9	22.0	35.5	30.7	-	36.7	34.3	28.2	23.7	-	-
Site 18 (City Study)	447534	130006	19.4	14.0	13.8	-	11.4	11.3	9.4	14.5	17.0	16.7	23.2	21.3	15.6	13.1	-	-
Site 19 (City Study)	448092	130411	26.9	21.6	16.5	-	10.2	15.1	11.0	14.1	18.5	20.3	25.0	22.3	18.2	15.3	-	-
Site 20 (City Study)	448092	130411	28.3	20.5	14.9	-	10.5	14.8	11.1	16.7	18.4	20.8	23.3	24.5	18.4	15.4	-	-
Site 21 (City Study)	448092	130411	29.3	21.7	15.6	-	10.8	15.1	10.6	17.3	18.6	20.6	22.5	23.8	18.6	15.6	-	-
Site 22 (City Study)	447847	129053	21.2	18.4	15.7	-	11.1	13.1	11.3	16.1	18.1	18.1	23.8	22.7	17.2	14.4	-	-
Site 23 (City Study)	447605	129545	-	51.2	-	-	26.5	34.7	30.3	43.9	45.1	43.0	46.7	41.2	39.9	33.6	-	-
Site 24 (City Study)	447495	129511	42.6	41.9	32.2	-	26.3	36.3	24.9	40.4	43.0	41.0	44.1	37.1	36.7	30.9	-	-

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr*	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
Site 25 (City Study)	447444	129495	-	64.5	37.8	-	-	40.6	32.1	45.7	51.4	51.6	50.2	-	45.8	**40.8**	35.5	-
Site 26 (City Study)	447315	129454	-	-	34.4	-	23.9	32.3	24.1	37.2	-	44.6	-	35.7	33.4	30.3	-	-
Site 27 (City Study)	447898	130065	36.6	29.8	18.5	-	13.3	21.3	15.5	26.5	28.1	29.4	-	32.4	24.7	20.8	-	-
Site 28 (City Study)	448427	129401	-	-	16.9	-	-	13.2	12.0	17.1	-	21.0	26.4	22.4	18.6	15.2	-	-
Site 1 (District Study)	448063	124371	21.9	-	16.7	13.1	-	18.2	14.5	19.9	22.7	22.5	27.1	25.0	19.8	16.6	-	-
Site 2 (District Study)	446680	124644	22.7	23.1	19.7	18.0	-	14.6	18.7	19.7	22.8	19.9	25.6	22.0	20.6	17.3	-	-
Site 3 (District Study)	449647	132669	26.4	34.4	24.2	-	-	28.2	25.7	32.0	34.0	31.5	34.7	31.5	29.8	25.0	-	-
Site 4 (District Study)	458826	132719	22.0	25.4	19.0	13.7	-	18.1	18.3	-	26.5	26.3	26.4	27.1	21.9	18.4	-	-
Site 5 (District Study)	465917	112046	18.7	17.1	13.5	10.6	-	12.9	10.8	-	-	15.0	21.9	19.6	15.3	12.9	-	-
Site 6 (District Study)	457203	111380	31.9	-	20.3	17.6	-	20.3	20.8	26.6	33.1	28.3	32.2	30.6	25.7	21.6	-	-
Site 7 (District Study)	455176	117476	31.4	28.0	19.1	15.0	-	25.1	21.1	25.4	28.2	25.6	29.4	28.0	24.4	20.5	-	-
Site 8 (District Study)	453645	108261	20.7	15.5	13.0	10.2	-	12.6	10.7	-	15.9	15.4	21.4	18.3	15.2	12.7	-	-
Lidl (Enhanced Whiteley Study 1)	452831	109130	24.2	25.0	16.3	13.3	-	-	-	-	-	-	-	-	18.6	15.3	-	-

☒ **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.**

☒ **WCC confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

*Due to COVID-19 restrictions, in the City study March tubes were exposed over two months so represent both March and April

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 2020

WCC has not identified any new sources relating to air quality within the reporting year of 2020.

Additional Air Quality Works Undertaken by Winchester City Council During 2020

Analysis of the March 2020 lockdown on local air quality at Winchester was carried out by Air Quality Data Management (AQDM). It estimates the effect of the first lockdown by comparing the change between March and April 2020, when the lockdown was most effective. The estimated NO_2 change was as high as -27.2% at St Georges Street and -21.1% at Chesil Street. The analysis report is presented in Appendix G: Analysis of Impact of COVID-19 on Winchester.

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 100% for tests in AIR-PT Rounds 31, 33 and 34 (April 2019 – November 2019). For AIR-PT Rounds 30 (January-February 2019), 36 (January-February 2020) and 40 (September-October 2020), 75% of results were submitted which were subsequently determined to be satisfactory. No results were reported for AIR-PT Rounds 37 (May-June 2020) and 39 (July-August 2020).

The lockdown restrictions prevented WCC from adhering with the 2020 Diffusion Tube Monitoring Calendar. For the diffusion tubes in the city area, tubes were left out for 2 months from 04/03/2021- 01/05/2021, the data from this tube has been used for March 2020. For the diffusion tubes in the district area, tubes were left out for 2 months from 04/03/2021-29/04/2021, the data from this tube has been used for March 2020. 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%, diffusion tubes in March 2020 were exposed for two months due to the lockdown from 04/03/2020 to 01/05/2020, these tubes were collected and stored in a fridge and analysed by Gradko within the stability period. The result from these tubes have been used for March 2020 only, resulting in a gap in monitoring in April 2020. The sites with data capture less than 75% are City Sites 17, 25, 26 and 28, and District Site 13. 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 used 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 were within 50 miles radius of Winchester.

Annualisation summary is presented in Table C.2.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance 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.

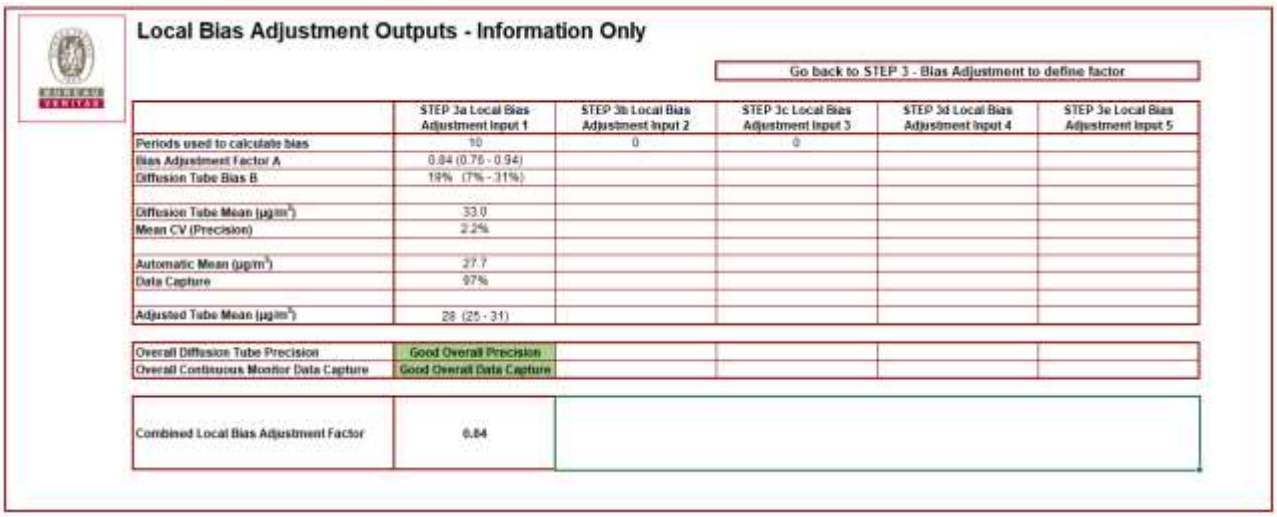
WCC have applied a local bias adjustment factor of 0.84 to the 2020 monitoring data. A summary of bias adjustment factors used by WCC over the past five years is presented in Table C.1.

The local bias adjustment factor was calculated using three diffusion tubes (Sites 5,6 and 7 at St Georges Street) adjacent to the roadside automatic analyser at St Georges Street and comparing results, the output is shown in Figure C.1.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	Local	-	0.84
2019	Local	-	0.93
2018	Local	-	0.94
2017	Local	-	0.94
2016	Local	-	0.95

Figure C.1 – DEFRA Local Bias Adjustment Output



Local Bias Adjustment Outputs - Information Only

Go back to STEP 3 - Bias Adjustment to define factor

	STEP 3a Local Bias Adjustment Input 1	STEP 3b Local Bias Adjustment Input 2	STEP 3c Local Bias Adjustment Input 3	STEP 3d Local Bias Adjustment Input 4	STEP 3e Local Bias Adjustment Input 5
Periods used to calculate bias	10	0	0		
Bias Adjustment Factor A	0.84 (0.76 - 0.94)				
Diffusion Tube Bias B	19% (7% - 31%)				
Diffusion Tube Mean (µg/m³)	33.0				
Mean CV (Precision)	2.2%				
Automatic Mean (µg/m³)	27.7				
Data Capture	97%				
Adjusted Tube Mean (µg/m³)	28 (25 - 31)				

Overall Diffusion Tube Precision	Good Overall Precision
Overall Continuous Monitor Data Capture	Good Overall Data Capture

Combined Local Bias Adjustment Factor	0.84

The national bias adjustment factor was also calculated in accordance with LAQM TG(16)14. The factor for 2020 was found to be 0.81, marginally lower than the local adjustment factor, 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. This approach also presents a more conservative estimate of NO_2 concentrations.

Figure C.2 – National Diffusion Tube Bias Adjustment Factor

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/21

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 spreadsheet 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 2021

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

Step 2: Select a Preparation Method from the Drop-Down List

Step 3: Select a Year from the Drop-Down List

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 shown in blue at the foot of the final column.

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

Analysed By	Method	Year	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	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2020	R	Gateshead Council	12	22	17	28.1%	G	0.78
Gradko	20% TEA in water	2020	R	Gateshead Council	12	23	21	11.6%	G	0.90
Gradko	20% TEA in water	2020	R	Gateshead Council	10	26	25	6.5%	G	0.94
Gradko	20% TEA in water	2020	R	Gateshead Council	12	28	21	30.5%	G	0.77
Gradko	20% TEA in water	2020	R	Gateshead Council	12	31	32	-3.4%	G	1.03
Gradko	20% TEA in water	2020	R	Luton Borough Council	9	38	28	33.6%	G	0.75
Gradko	20% TEA in water	2020	R	Nottingham City Council	12	31	34	-8.5%	G	1.09
Gradko	20% TEA in water	2020	R	Dudley MBC	13	33	28	19.9%	G	0.83
Gradko	20% TEA in water	2020	UB	Dudley MBC	13	23	14	61.2%	G	0.62
Gradko	20% TEA in water	2020	R	Dudley MBC	13	44	34	30.6%	G	0.77
Gradko	20% TEA in water	2020		Overall Factor (18 studies)				Use		0.81

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be 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 (40.8 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% (95.3% for St. George's Street, 99.8% for Chesil Street and 100% for Romsey Road). Therefore, no annualisation of data was required.

The Council installed AQMesh monitor on Romsey Road in 2019 and also installed a FIDAS 200 particulate monitor at the St George's Street air quality station which began monitoring in late February 2020, both of which measure NO_2, PM_{10} and $PM_{2.5}$ concentrations. The data capture percentage for $PM_{2.5}$ and PM_{10} at Romsey road was 100% and 84.1% at St Georges Street.

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 2020.

Automatic Monitoring Annualisation

All automatic monitoring locations within WCC recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data.

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be 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 2020.

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

Site ID	Annualisation Factor Bournemouth	Annualisation Factor Reading New Town	Annualisation Factor Swindon Walcot	Annualisation Factor Chilbolton Observatory	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
Site 17 (City Study)	0.9931	1.0446	1.0379	0.9204	0.9990	28.2	28.2	-
Site 25 (City Study)	1.0644	1.0646	1.0985	1.0133	1.0602	45.8	48.6	-
Site 26 (City Study)	1.0559	1.1015	1.1407	1.0234	1.0804	33.4	36.1	-
Site 28 (City Study)	0.9590	1.0144	0.9822	0.9402	0.9740	18.6	18.1	-
Lidl (Enhanced Whiteley Study 1)	1.0098	0.9276	1.0054	0.9716	0.9786	18.6	18.2	-

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	10
Bias Factor A	0.84 (0.76 - 0.94)
Bias Factor B	19% (7% - 31%)
Diffusion Tube Mean (µg/m^3)	33.0
Mean CV (Precision)	2.2%
Automatic Mean (µg/m^3)	27.7
Data Capture	97%
Adjusted Tube Mean (µg/m^3)	28 (25 - 31)

Notes:

A single local bias adjustment factor has been used to bias adjust the 2020 diffusion tube results.

Overall Diffusion Tube Precision: Good Overall Precision

Overall Continuous Monitor Data Capture: Good Overall Data Capture

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
Site 25 (City Study)	1.7	4.0	40.8	13.5	35.5	-

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

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

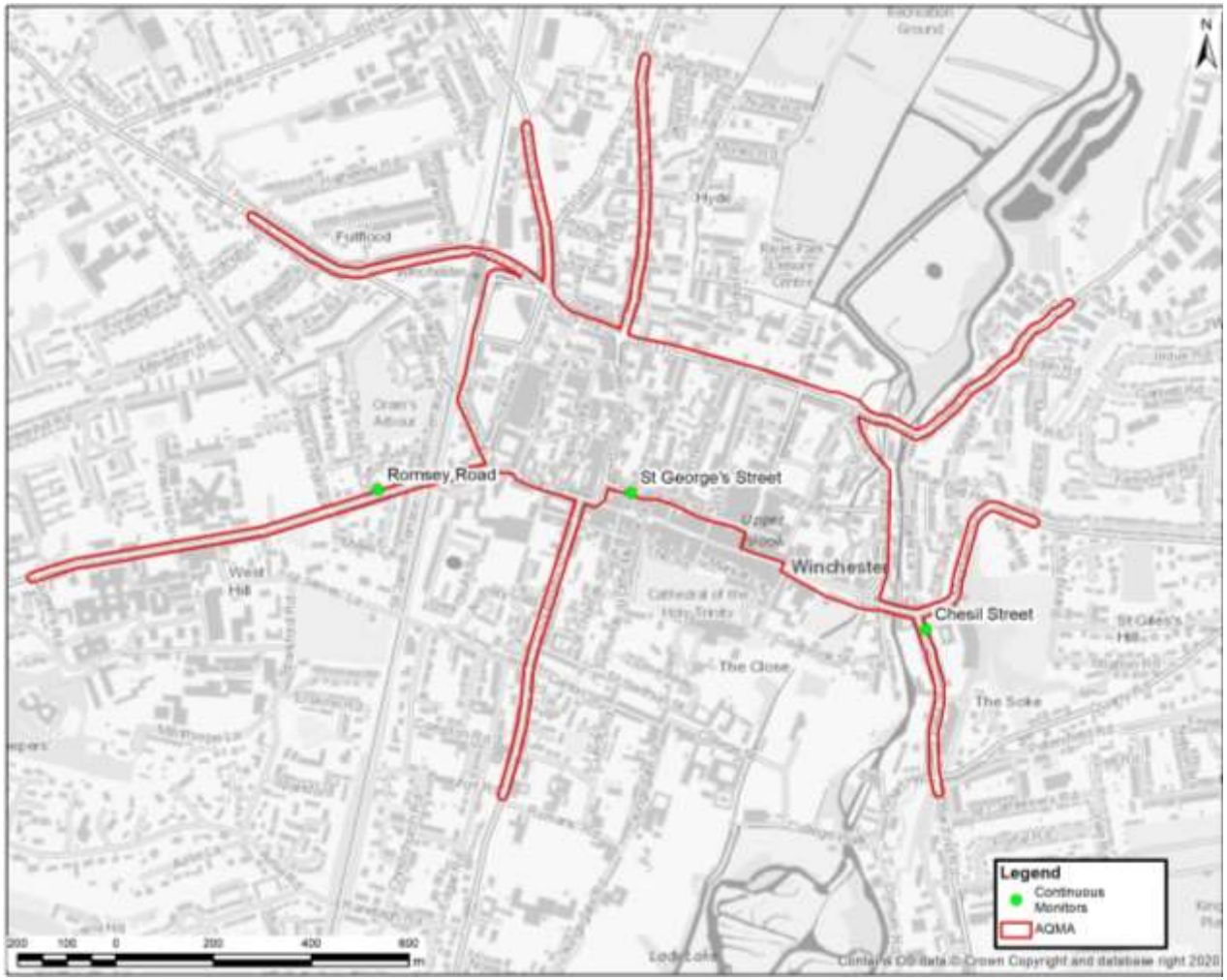


Figure D. 2 - Winchester City Centre AQMA & Diffusion Tube City Study

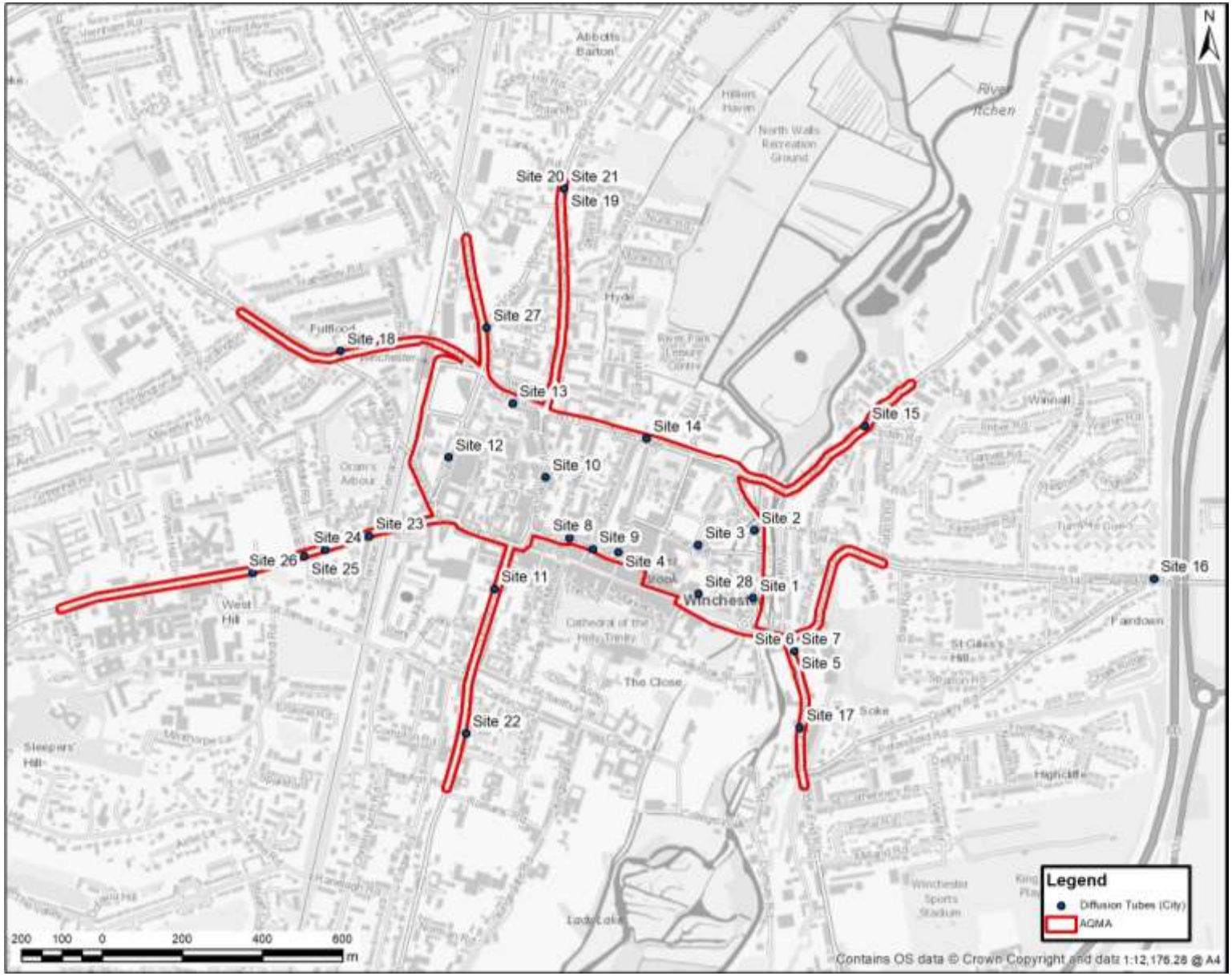
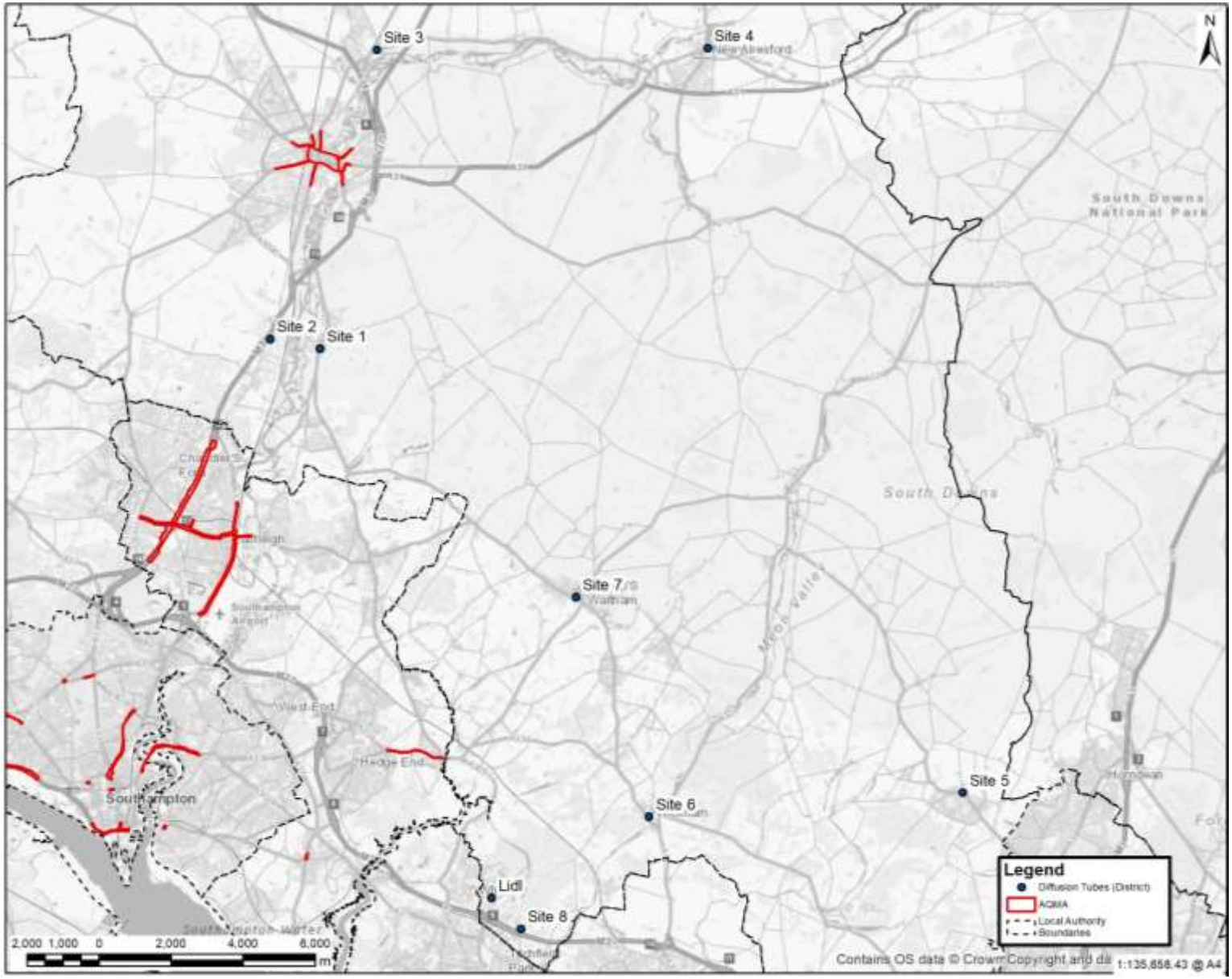


Figure D. 3 – Winchester City Council Diffusion Tube District Wide Study



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[12]

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of AQAPs and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[13] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[14] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which represents an absolute

[13] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[14] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Winchester City Council

Impacts of COVID-19 on Winchester's local air quality includes:

- The pandemic has provided data on lowered traffic flows and impact this has on NO_2 levels. Analysis by AQDM on impacts of COVID-19 during the first lockdown in March 2020 estimates the NO_2 change was as high as -27.2% at St Georges Street and -21.1% at Chesil Street compared to comparable time periods in preceding years. The analysis report is presented in Appendix G.
- April DEFRA exposure calendar date was missed so tubes exposed for two months from 04/03/2020 - 01/05/2020, all tubes were collected and stored in fridge and subsequently analysed within the advised shelf life of the tube.

Opportunities Presented by COVID-19 upon LAQM within Winchester City Council

Details of a measure developed within 2020 that can be attributed to the pandemic are the potential to reassess Workplace travel plans (especially WCC's own plan) due to legacy long-term increases in working from home. A second survey was undertaken by Carbon Reduction Team in Spring of 2022 based on the year-long home working pattern.

Challenges and Constraints Imposed by COVID-19 upon LAQM within Winchester City Council

Details on any challenges and/or constraints that have been experienced in relation to LAQM within 2020 that can be attributed to the pandemic are shown below:

- Tubes left out for two exposure periods. **Small Impact**;
- The implementation of action plan measure 16: Air Quality Engagement with public health professionals (PHE in particular) has been delayed due to COVID related priority work. **Small Impact**;
- Roll out of electric vehicle charge points in City Council owned premises (mainly car parks) was delayed but has now been completed**. Small Impact**;
- Unable to support any work on Clean air day in 2020. **Small Impact**;
- Review of AQMA delayed to early 2022 due to other works priorities and data for 2020 not being representative of long-term trends. **Medium Impact**; and
- Production and consultation on an air Quality Strategic Planning Document (SPD) delayed by COVID related work. Document and consultation now complete and final decision on adoption now scheduled for Summer/Autumn 21**. Small Impact.**

The impacts as presented above are aligned with the criteria as defined in Table F 1, with professional judgement considered as part of their application.

Appendix G: Analysis of Impact of COVID-19 on Winchester

This is an analysis of the 2020 lockdown effect on local air quality at the Winchester. This may be reflected in the results from the NO2 diffusion tube network. There has been no correction due to meteorology since seasonal records have been regularly broken in recent years. For instance, February 2020 was the wettest on record in England and the spring was the sunniest.

The plot below compares the Winchester running 7-day NO_2 concentration during 2020 (red line) with nearby stations. The second plot is for NOx. The first lockdown began on 23rd March 2020 and was most effective during April 2020. The effect of the first lockdown can be estimated by comparing the change between March and April 2020.

Figure G. 1 Running 7-Day NO_2 at Winchester compared with local stations

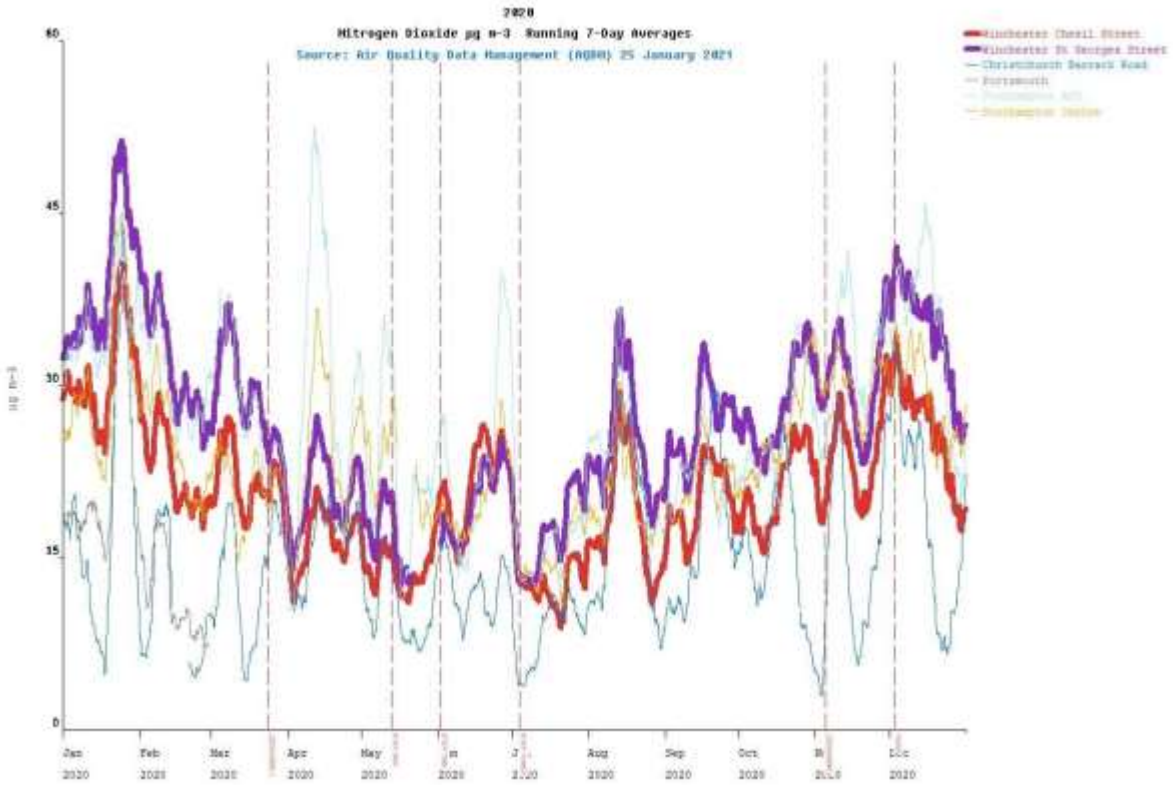


Figure G. 2 Running 7-Day NO_x at Winchester compared with local stations

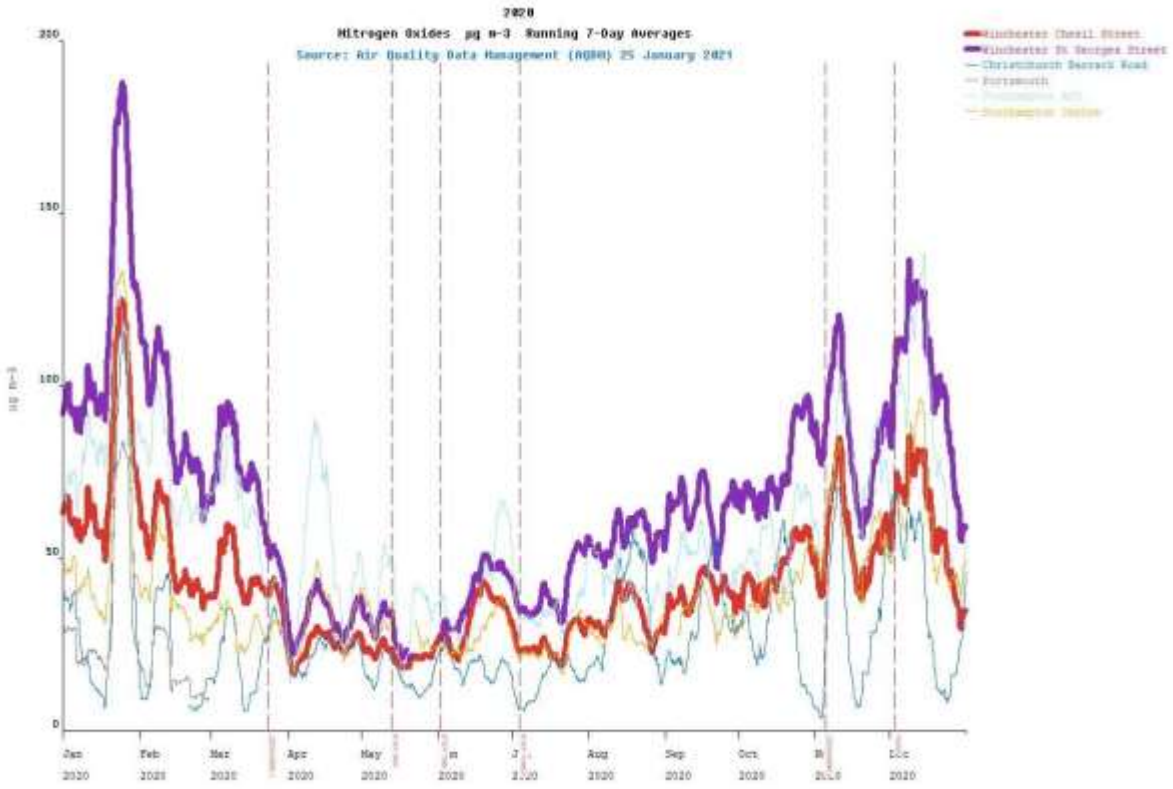


Table G. 1 Estimated change due to the March 2020 lockdown

Station(s)	Pollutant	µg m^{-3}	%
Chesil Street	**NO2 NOx**	- 4.5 µg m^{-3} - 19.4 µg m^{-3}	- 21.1 % - 43.3 %
St Georges Street	**NO2 NOx**	- 8.0 µg m^{-3} - 39.2 µg m^{-3}	- 27.2 % - 52.7 %

- There were large **<u>decreases</u>** in NO_2 and NOx concentrations in Winchester due to the March 2020 lockdown.

There is usually a large change between March and April at the start of spring. This change in the seasons coincided with the start of the first lockdown. The effect of the first lockdown can, therefore, be estimated by comparing the change between March and April 2020 with the expected change (2015 to 2019).

Table G. 2 Estimated change due to the March 2020 lockdown compared to 2015-2019 Urban Traffic Stations

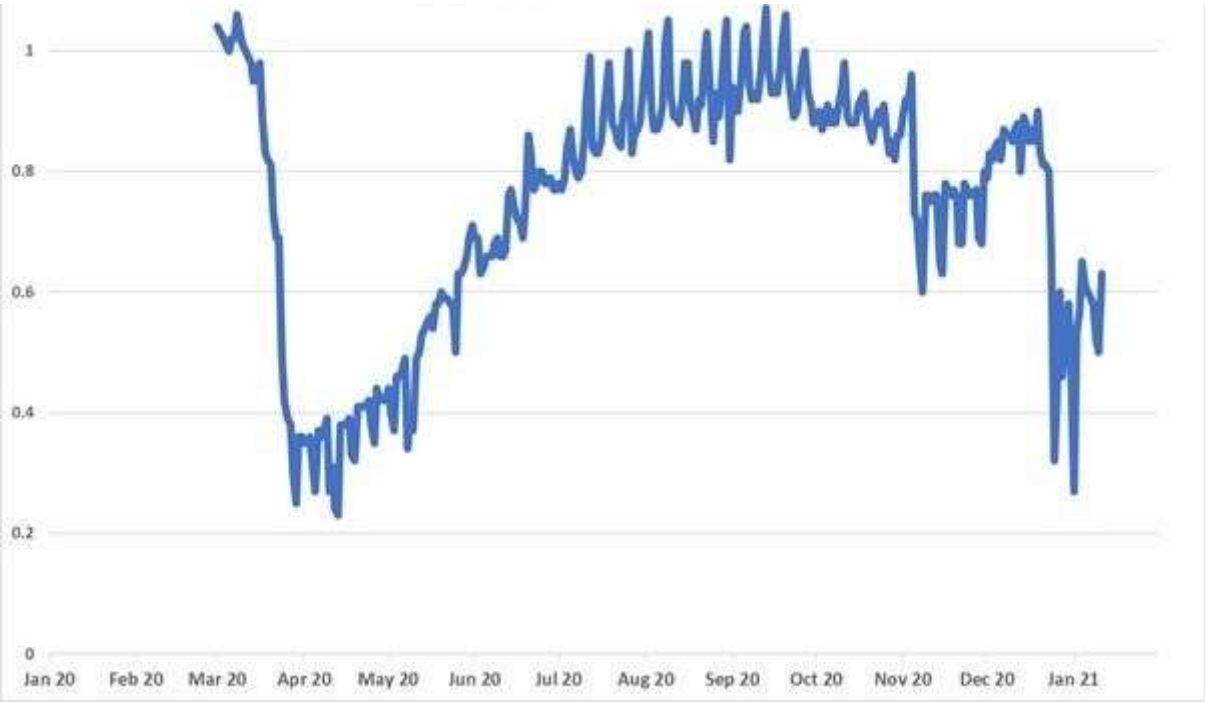
Station(s)	Pollutant	µg m^{-3}	%
SE England	**NO2 NOx**	- 2.4 µg m^{-3} - 11.5 µg m^{-3}	- 11.2 % - 25.7 %
England	**NO2 NOx**	- 5.5 µg m^{-3} - 15.2 µg m^{-3}	- 20.0 % - 26.8 %

After correcting for the expected change between March and April.

- The decreases measured in Winchester were consistent with the decreases in the region and across England.

NOx concentrations at roadside locations are closely related to primary emissions from motor vehicles. The plot below shows the change in traffic flow in Great Britain since March 2020. The start of the lockdown on 23rd March 2020 and subsequent restrictions are very clear. The NOx concentrations at the monitoring stations resemble the local traffic pattern. NO_2 concentrations are a mixture of primary emissions and secondary chemical reactions over a longer time scale. The NO_2 concentrations should relate to the local traffic patterns.

Figure G. 3 Great Britain – All Motor Vehicles – Change from 1st March 2020



Analyses that attempt to remove the effect of weather assumes 2020 would have been a normal year. Except 2020 had the wettest February on record and the spring smashed the previous record for hours of sunshine in England. Isolating the lockdown effect from the exceptional meteorology and the long-term downward trend in concentrations is beyond this analysis.

24th January 2021

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Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

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 Highways England
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
PHOF	Public Health Outcomes Framework
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 and Ride
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

Abbreviation	Description
SPD	Supplementary Planning Document
ULEV	Ultra-Low Emission Vehicles
WCC	Winchester City Council

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