2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: October, 2021

Information	**Southampton City Council**
Local Authority Officer	Simon Hartill, Sam Guppy, George O Ferrall
Department	Scientific Services
Address	Civic Centre
Telephone	0782 5823803
E-mail	simon.hartill@southampton.gov.uk
Report Reference Number	ASR2021
Date	1/10/21

Executive Summary: Air Quality in Our Area

Air Quality in Southampton

Southampton is a major coastal city located on the South Coast of England. It is the largest city in Hampshire, covering an area of 52 km^2. Southampton has a population of 269,781 (2018 estimate) and is the third most population dense city in England. The city is served by numerous transport infrastructure links, including a regional airport just outside the city's northern boundary, the M3 and M27 Motorways, a major cruise, container and vehicle port and a main line railway to London and along the south coast.

Air pollution is associated with various adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and respiratory disease including lung cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. [1,2], exacerbating issues of health outcome inequality, as well as those households who regularly use a domestic burner in their home. The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

As a result of identified local air quality issues through continued monitoring and assessment, Southampton has declared 10 Air Quality Management Areas (AQMAs) to date. The location of these AQMA's is shown in figure 1.

The AQMA's have been declared for exceedances of the UK objective for annual mean nitrogen dioxide (NO2) (40µg/m^3). Southampton also monitors particulate

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

matter (both PM10 and PM2.5), sulphur dioxide (SO2) and ozone (O3). Please see below a link to the SCC website which has maps of the AQMAs and descriptions.

Air quality management areas (southampton.gov.uk)

AQMAs are also discussed further in section 2.1 of this document.

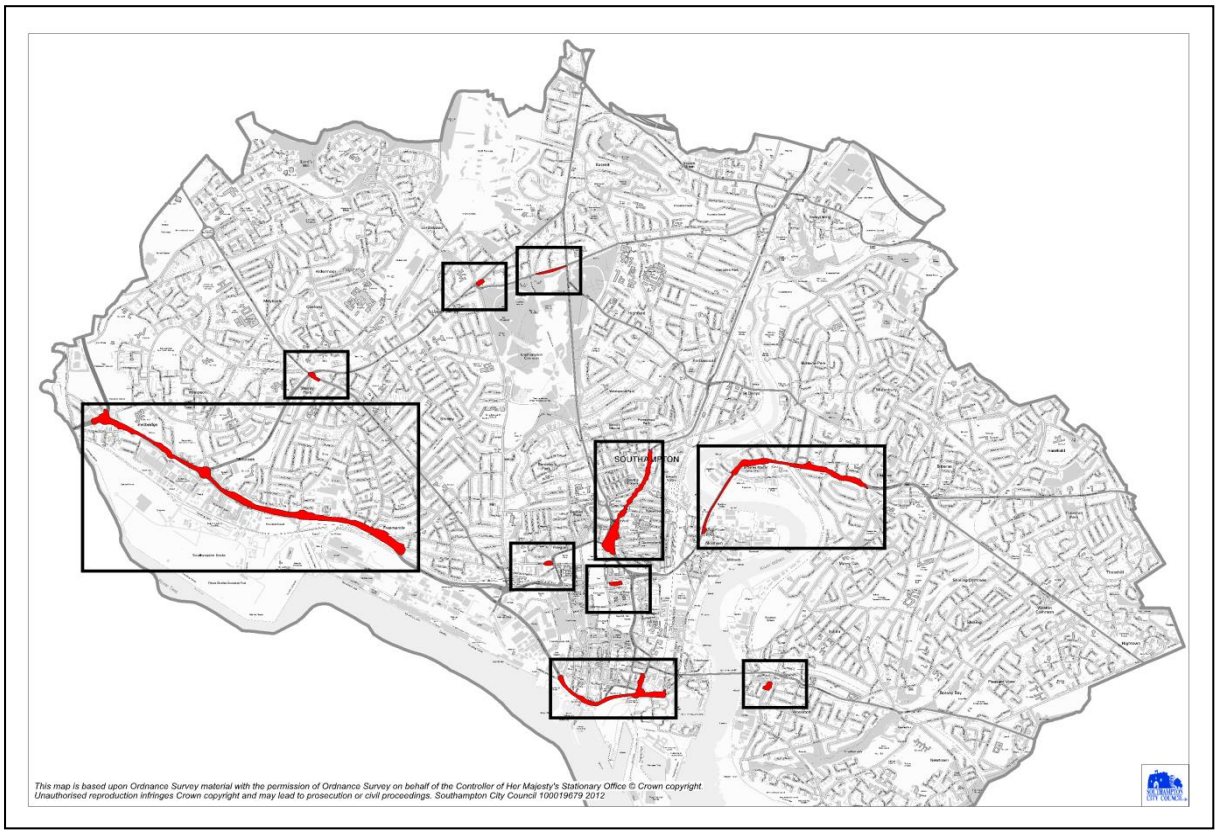


Figure 1 SCC Air Quality Management Areas

Air Quality Management in Southampton

Local Air Quality Management (LAQM) is overseen by SCC's Scientific Service and Green City team, including monitoring pollution, bidding for funds from Defra and other sources and implementing air quality improvement measures.

SCC is a unitary authority and therefore the local transport authority. SCC's Scientific Service works closely with the Strategic Transport department to ensure that actions to improve the local transport network considers improvements in air quality and to

identify opportunities to introduce new, innovative measures that will reduce emissions and promote active and sustainable travel.

Sources of Pollution

In 2018, SCC undertook a Clean Air Zone feasibility study which identified the sources that contribute to nitrogen oxide concentrations at various locations across the city. Figure 2 demonstrates how road transport contributions to NOX emissions, a precursor for the pollutant nitrogen dioxide (NO2), varies across the city; private diesel vehicles contribute most significantly. Therefore, measures to enable and encourage more people to walk and cycle, use public transport or drive low emission vehicles will contribute the most to improving local air quality in Southampton. While air quality management mainly focuses on reducing and preventing emissions from road vehicles, shipping, industry and rail sources also contribute and can be managed.

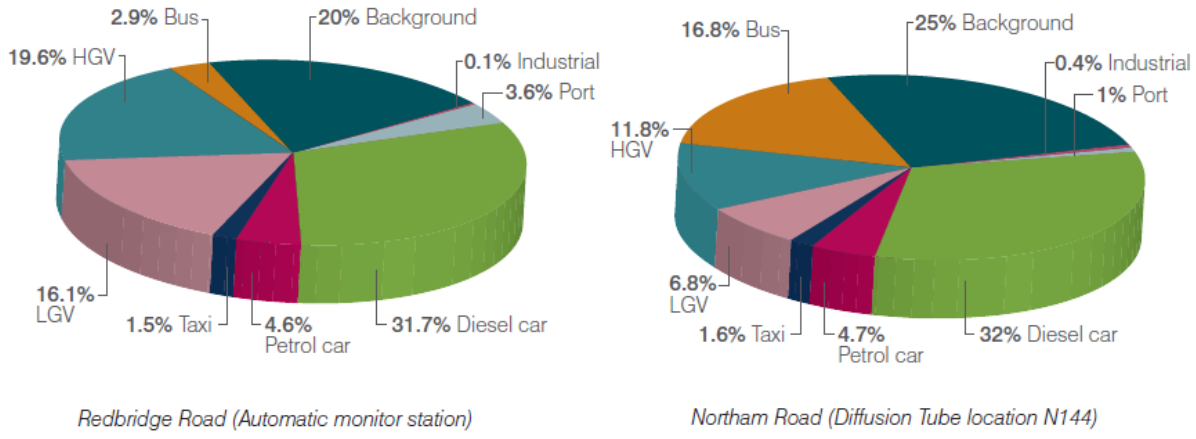


Figure 2 Modelled NOX source apportionment at two monitoring locations (% contribution, 2015)

Related Strategies and Plans

Clean Air Strategy

SCC introduced the Clean Air Strategy 2016-2025 in November 2016. The strategy details the ways SCC works together with partners including neighbouring local authorities, public transport operators and local businesses and organisations to

identify ways to improve air quality and support ongoing improvements in air quality across the city. This Strategy was updated in January 2019 to account for the completion of the Local NO2 Plan.

Cycling Strategy

In 2017, a ten-year strategy to improve cycling rates in Southampton was launched. The SCC Cycling Strategy 2017-2027. The strategy outlines the work that has already been undertaken, sets out a plan of proposed improvements to the cycle network and identifies initiatives to realise the benefits that cycling can bring to the city. This strategy is accompanied by a three-year delivery plan, this sets out how SCC intends to spend confirmed funds and resources on the activities and schemes in the Strategy.

Electric Vehicle Action Plan

SCC are implementing an electric vehicle action plan which will see a citywide network of electric vehicle charging infrastructure deployed at key locations to support and facilitate the use of electric vehicles by the public. Over 50 fast charge points are now in operation across 5 multi-story car parks. SCC are also introducing electric vans into the fleet as part of the plan with the aim for 90% of the fleet to consist of ultra-low emission vehicles by 2030. 27 charge points have been installed across 8 depot sites.

Figure 3 SCC fleet electric vehicle and two electric vehicle charge points at Grosvenor Square multi-storey car park

Local Transport Plan

Connected Southampton 2040 was published and adopted in March 2019. It sets out an ambitious long-term strategy supported by a short-term Implementation Plan. The Plan aims to ensure that our transport policies, strategy and delivery plans better reflects and support bold and ambitious goals for sustainable and clean growth over the next twenty years, including:

- A Zero Emission City
- The Southampton Mass Transit System
- A liveable city centre
- Active Travel Zones
- A network of Park and Ride sites
- Better connectivity.

The plan aspires to help in transforming public transport in the city and create active travel zones where short journeys made by walking and cycling will be the norm. More information can be found at the Southampton transport website[4].

Figure 4 shows the links between the council's strategies that support delivery of air quality improvements in the city.

[4] https://transport.southampton.gov.uk/

Figure 4 Relevant strategies and plans for managing air quality in Southampton

Transforming Cities Fund

As part of the 2020 Budget, the Chancellor announced the outcome of the Industrial Strategy's Transforming Cities Fund (TCF). The joint bid submitted in November 2019 by Southampton City Council and Hampshire County Council for Southampton and Hampshire was awarded £57m of Government funding towards the total £68.5m project and covers the three years to March 2023. The remainder of the funding is coming from local match contributions with the Council and its partners.

This will enable Southampton City Council and Hampshire County Council to deliver joint plans for sustainable and active travel in Southampton and Hampshire in a targeted way. This is a significant level of capital transport funding that will have a transformative impact on people's journeys by bus, walking and cycling.

Key areas in the plan include:

- Accelerating the delivery of the Southampton Cycle Network so that cycle routes are safe and convenient and we can become a true cycling city.
- Developing the Southampton Mass Transit System so we can encourage people to use public transport with priority for buses, new Park & Rides and reducing delays for everyone by using smart technology.

- Starting to change the city centre by making it a better place to walk and cycle, and by creating our gateways into the city at stations, the airport and ferry terminals. This will mean people can easily get between train, ferry, bus, plane, car and cycles.

Further information is available on Transforming Cities (southampton.gov.uk)

Green Transport Recovery Plan

Southampton City Council produced its Green Transport Recovery Plan to encourage safe and active travel throughout the Covid-19 pandemic. The plan aims to support and maintain the unexpected positive health and environmental benefits that residents have experienced during this time, including an increase in active travel and an improvement in local air quality, by putting measures in place to help people get around safely and sustainably both now and in the long term.

- Measures to **support social distancing** include making more space around bus stops, shops and other places where queueing may be necessary. Street closures around schools at the beginning and end of the day will create a safer and more spacious environment for walking, cycling and scooting, while spare road space will be used to create parklets for additional footway space and cycle parking.
- Measures to **support active travel** include reallocating road space and prioritising pedestrians and cyclists at pedestrian crossings. Improvements for cycling include temporary cycle lanes in various locations around the city; safer cycle access for those travelling to Southampton General Hospital and in Portswood; and plans for cycle parking in the city centre. The completion of the active travel zone in St Denys will include targeted road closures, priority changes and cycle parking. Bus lanes with cycling permitted have also been installed in each direction from Bitterne to Northam Road.

Further information is available on https://transport.southampton.gov.uk/keepactive

Actions to Improve Air Quality

Local NO2 Plan

SCC was one of the first five local authorities required by the Secretary State to submit a full business case[5] to assess the need for a charging Clean Air Zone to in order to achieve compliance with the EU (EU Ambient Air Quality Directive 2008) annual mean NO_2 legal limit of 40 µg/m^3 in the shortest possible time.

Air quality modelling demonstrated that NO_2 compliance would be achieved at all locations in Southampton in 2020. Without any intervention, the highest mean average concentration of NO_2 in Southampton is modelled to be 38 µg/m^3 on the A3024 Northam Bridge in 2020. This demonstrated a charging Clean Air Zone was not necessary.

Instead, a series of non-charging measures were presented to the Secretary of State as part of the full business case for achieving compliance in the shortest possible time. These measures are known collectively as 'The Local NO_2 Plan' and consist of:

- A framework agreement and subsidies for public authorities to use the Sustainable Distribution Centre to ensure fewer, fuller and cleaner Heavy Goods Vehicles (HGVs) move around the city. Supported by developing delivery and service plans for organisations so they can understand how to reduce vehicle journeys associated with their business.
- Introduction of citywide traffic regulation condition requiring a minimum Euro VI equivalent standard for all operational buses.
- The introduction of new taxi and private hire vehicle licensing conditions requiring a minimum euro 6 diesel/euro 4 petrol for newly licensed vehicles in 2020 and for all licensed taxis and private hire vehicles to meet this standard by 2023.
- Targeted promotion of active and sustainable travel on the A3024 (location of highest modelled NO2 concentrations in 2020) through the MyJourney programme.
- Expansion of low emission taxi incentive scheme for Southampton licensed taxi and private hire vehicles. Extension to include upgrades to cleaner wheelchair accessible vehicles.

[5] https://www.southampton.gov.uk/modernGov/documents/s39821/CAZ Full Business Case.pdf

- A free trial scheme for taxi and private hire operators which highlights the benefits of an electric vehicle.
- Introduction of rapid charging points to support uptake of electric vehicles within the taxi and private hire fleet.

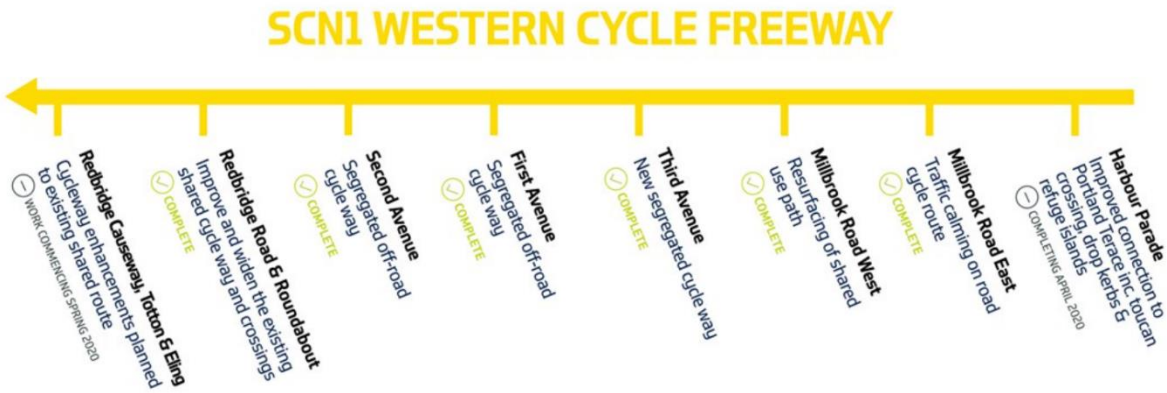
The Local NO2 Plan was approved by the Secretary of State in early 2019 and is now being delivered in accordance the full business case. It includes the requirement for further monitoring and evaluation of air quality data to ensure that the NO2 plan achieves the desired outcomes, and that any risks to the delivery of these outcomes are identified and mitigated. To date, The Local NO2 Plan has been delivered to specification and evaluation of the original model has been able to identify that the plan has had a demonstrable positive impact on local air quality.

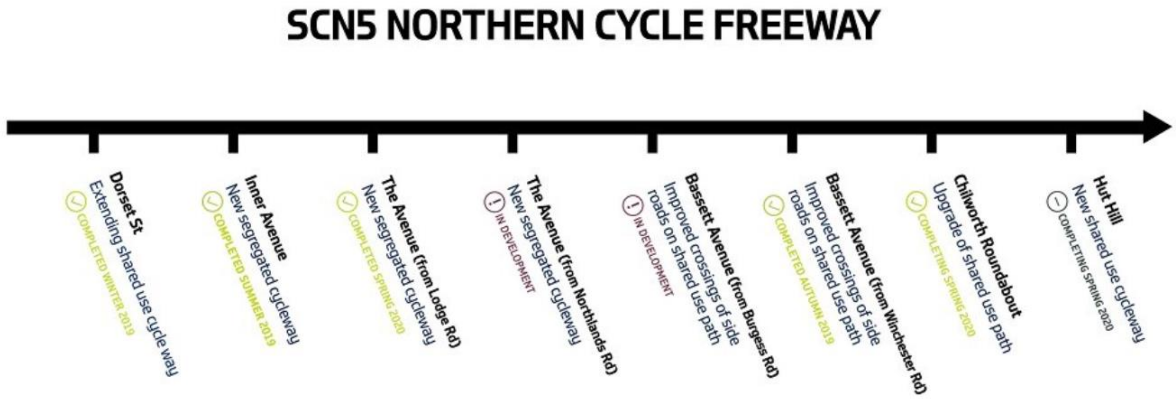
Other Measures

Alongside the Local NO2 Plan and current AQAP, SCC has implemented several other measures to improve air quality in the city, including:

Active travel

- Funding secured to deliver SCN 1, 3, 5 and 6 cycle routes. SCN 1 has been completed with 5, 3 and 6 well underway.





- Implementation of temporary cycle and bus lanes through the Green Transport Recovery Plan to encourage active and sustainable travel and social distancing during the pandemic.
- MyJourney engagement with communities, businesses and residents throughout 2019 to encourage active and sustainable travel.
- Implementation of the St. Denys Active Travel Zone, including filtered permeability and community engagement. Plans to implement further Active Travel Zones in other key areas across the city.

Public Transport

- Successfully secured £2.7m funding to retrofit Southampton's operational buses with Clean Vehicle Retrofit Accreditation Scheme (CVRAS) accredited technology. Bus operators in the city have match funded this work with £815,680. All 145 buses have been retrofitted to Euro VI diesel equivalent standards. All Southampton buses now meet at least Euro VI diesel equivalent standards.
- Continuing the Low Emission Taxi Incentive Scheme in partnership with Eastleigh Borough Council, replacing older, more polluting taxis with hybrid and electric vehicles. A total of 162 grants have been awarded to drivers licensed in

Southampton and 25 in Eastleigh. Over 40% of the taxi and private hire fleet in Southampton are now either hybrid or electric.

- Extending the age limit for hybrid private hire and hackney carriage vehicles licensed in Southampton from 9 years to 12.

Electric Vehicles

- Continued investment in our fleet feet of electric vehicles with 45 total expected by 2021 and an aim for 90% of the fleet to be ultra-low emission vehicles by 2030.
- Installing electric charge points for our electric fleet with 27 points active or being commissioned.
- Installing 50 new public EV charge points in city centre multi-storey car parks as well as a taxi and private hire vehicle exclusive rapid charger and additional fast chargers with another set due to be completed in early 2020.
- Offering charging for electric vehicles on the public network, currently free of charge.
- 90% discount on city centre parking season ticket.
- Free passage on the Itchen Toll Bridge for EVs.
- Allowing smaller electric vehicles to be licensed as private hire and hackney carriages to encourage uptake of EV's in the city's fleet.

Other

- Continuation of the air alert pollution forecasting and alert system.
- Network of about 90 diffusion tubes and 4 automatic monitoring stations including two AURN sites.
- Launching the Green City Charter and developing the Green City Plan which aims to go beyond statutory requirements and aim for long term goals in air quality and public health and other environmental topics including sustainable transport and climate change.

Conclusions and Priorities

Conclusion of ASR 2020 - Air Quality Monitoring

The 2021 Annual Status Report concludes that since embarking on the Review and Assessment Process, Southampton monitored no exceedances of the annual mean

NO_2 objective at any of our monitoring sites, anywhere in the city. This is unprecedented since embarking on the Review and Assessment Process and reflects the reduction in road vehicle movements caused by the COVID19 Pandemic, but also reflects trends over the last 5 years. Southampton City Council commissioned an Air Quality consultant to assess the impact of the covid pandemic lockdown in March-June 2020 on air quality in the city. The report can be viewed here [2020 COVID-19 Lockdown Period - Air Quality Analysis (southampton.gov.uk)]

The Council's NO_2 Plan and Air Quality Action Plan also contributed towards the emission reduction in NO_2. Previous air quality modelling undertaken for the charging Clean Air Zone demonstrated that NO_2 compliance would be achieved at all locations in Southampton in 2020. Without any intervention, the highest mean average concentration of NO_2 in Southampton was modelled to be 38 $\mu g/m^3$ on the A3024 Northam Bridge in 2020.

In fact, the highest monitored mean average concentration of NO_2 in Southampton was 34.2 $\mu g/m^3$ on the residential façade of 367A Millbrook Road. There were a couple of higher results monitored, but these were not at relevant receptors. For instance, Redbridge Causeway, and these were still below 40 $\mu g/m^3$.

2020 monitoring results showed a significant improvement on 2019. In 2019, there were 4 monitored exceedances of the annual mean NO_2 objective at relevant receptor locations., within 4 existing AQMAs. In 2020 there were none. Reductions of annual mean NO_2 concentrations of between 15 and 20% were experienced at roadside diffusion tube monitoring sites within most AQMAs in 2020 relative to 2019.

SCC will consider revoking all 10 of the AQMAs in the future once the medium to long-term trend of reducing NO_2 is confirmed by monitoring in future ASRs. It would be inappropriate to revoke them in this 2021 ASR until we can be certain that the downward trend is sustained over the medium-long term. The COVID19 pandemic and subsequent "lockdowns", played an important part in reducing vehicle movements in the city during 2020. Working from home has become the new normal for a lot of city workers, reducing the volume of commuter traffic at peak times. It remains to be seen if this trend continues in future years, but it seems likely that working from home and hybrid office/home working will be much more prevalent after 2020.

In summary, exceedances halved from 8 in 2018 to only 4 in 2019 at relevant receptors, with no monitored exceedances recorded in 2020.

Priorities for 2021

In 2020, an update to the AQAP was not possible, largely as a result of the impact of the COVID19 pandemic on officer time and progression of The Local NO2 Plan. Officers are planning to conduct a wholesale review of the plan in 2021 which will aim to:

- Link with the Local NO2 Plan which is due to conclude in March 2022.
- Link with The Green City charter in pushing beyond legal requirements under the LAQM and EU AAQD regimes.
- Help work towards a green recovery from the COVID19 pandemic

Implementing the remaining measures set in the Local NO2 Plan in 2021 will be key to ensure compliance with the EU Ambient Air Quality Directive is met within the shortest possible time. Evaluation will also be vital considering the new unknowns presented by the COVID19 pandemic, including its influence on public transport reluctance and changes to commuting resulting from uptake of home and flexible working.

Local Engagement and Public Involvement in Air Quality

As private vehicles contribute the most to poor air quality in the city, the most effective way for the public to get involved with improving air quality in Southampton is to choose active and sustainable travel where possible. More information on this can be found at the MyJourney website which gives information on public transport, walking, cycling and other opportunities. For specific air quality inquiries please contact air.quality@southampton.gov.uk.

You can also get in touch with the following groups that are actively promoting improvements in air quality and the environment more generally in the area:

- Southampton Travel Planners Network (via MyJourney) https://myjourneysouthampton.com/workplaces/travel-plan-networks-0
- The Environment Centre: http://www.environmentcentre.com/about-us/contact-us/
- Sustrans: https://www.sustrans.org.uk/
- Clean Air Southampton: https://cleanairsouthampton.com/

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.

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 Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

[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

Table of Contents

Figures

Tables

1 Local Air Quality Management

This report provides an overview of air quality in Southampton 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 Southampton City Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Southampton City Council can be found in Table 2.1. The table presents a description of the 10 AQMAs that are currently designated within Southampton City Council Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designation(s) are as follows:

- NO_2 annual mean;

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
No. 1 Bevois Valley	Declared July 2005	NO2 Annual Mean	An area including a number of properties from Charlotte Place Roundabout to Bevois Valley Road	NO	50	32.4	SCC AQAP - Adopted 2008	Link
No. 2 Bitterne Road West	Declared July 2005, extended in 2012	NO2 Annual Mean	An area including a number of properties from Northam Road and along Bitterne Road West	NO	37	31.6	SCC AQAP - Adopted 2008	Link
No 3. Winchester Road	Declared July 2005, reduced in size in 2006 after Further Assessment	NO2 Annual Mean	An area including residential properties at the Winchester Road/Hill Lane Junction	NO	35	24.2	SCC AQAP - Adopted 2008	Link
No. 4 Town Quay to Platform Road	Declared July 2005, increased in size in 2006 after Further Assessment	NO2 Annual Mean	An area including a number of properties from Town Quay to Platform Road	NO	48	26.8	SCC AQAP - Adopted 2008	Link
No. 5 Redbridge to Millbrook Road West	Declared July 2005, merged into one AQMA in 2012 after Further Assessment	NO2 Annual Mean	An area including a number of properties along Redbridge/ Millbrook Road	YES	45	34.2	SCC AQAP - Adopted 2008	Link

No. 6 Romsey Road	Declared July 2005, increased in size in 2012 after a Detailed Assessment	NO2 Annual Mean	An area including a number of properties along Romsey Road from Teboura Way to Shirley High Street	NO	44	33.5	SCC AQAP - Adopted 2008	Link
No. 8 Commercial Road	Declared July 2008	NO2 Annual Mean	An area including a number of properties along Commercial Road at the junction with Cumberland	NO	45	33.3	SCC AQAP - Adopted 2008	Link
No. 9 Burgess Road	Declared April 2012	NO2 Annual Mean	An area including a number of properties along Burgess Road at the junction with The Avenue	NO	47	33.6	SCC AQAP - Adopted 2012	Link
No. 10 New Road	Declared April 2012	NO2 Annual Mean	An area including a number of properties along New Road	NO	42	24.9	SCC AQAP - Adopted 2012	Link
No. 11 Victoria Road	Declared April 2012	NO2 Annual Mean	An area encompassing a number of properties along Victoria Road at the junction with Portsmouth Road	NO	43	27.3	SCC AQAP - Adopted 2012	Link

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

☒ **Southampton City Council confirm that all current AQAPs have been submitted to Defra**

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

Defra's appraisal of last year's ASR concluded:

Trends in pollutant concentrations are clearly presented and discussed. It is useful to distinguish trends within each AQMA.

1. Southampton City Council have clearly detailed actions undertaken to address air quality concerns and reported on progress made during 2019. The Council is also noted for having good measures to target $PM_{2.5}$ specifically, and have referred to Public Health Outcomes Frameworks, including the fraction of mortality attributable to particle pollution. This is a testament to the Councils commitment to tackling air pollution, and consideration of its impact on human health.

2. However, their AQAP has not been updated in the past five years. The Council is encouraged to formally update their action plan to guide and support their hard work in addressing air quality.

   SCC Response: The AQAP is being updated very soon in late 2021. In 2020, an update to the AQAP was not possible, largely as a result of the impact of the COVID19 pandemic on officer time and progression of The Local NO2 Plan. Officers are planning to conduct a wholesale review of the plan in 2021 which will aim to:

   - Link with the Local NO2 Plan which is due to conclude in March 2022.
   - Link with The Green City charter in pushing beyond legal requirements under the LAQM and EU AAQD regimes.
   - Help work towards a green recovery from the COVID19 pandemic

3. QA/QC procedures are outlined by Southampton City Council. However, the appendix refers to the WASP scheme. The WASP scheme was replaced by AIR-PT in 2015. This information should be updated.

   SCC Response: Duly noted, and updated to the AIR-PT Scheme.

4. The City Council is advised to include screenshots of both local and national bias adjustment factor calculation spreadsheets; this is to verify that the latest version of the tools have been utilised.

   SCC Response: SCC have used the new Defra Diffusion Tube Processing Tool excel spreadsheet in 2021. SCC used the March 2021 update of the national bias adjustment factor calculation spreadsheet for Gradko 20% TEA in water.

5. There remains some confusion regarding the Councils decisions regarding distance correction:

   a) The Council have only considered exceedances after distance correction and have excluded some exceedances which cannot be distance corrected. This is potentially misleading. This clarification is beneficial; however, the Council could elaborate on why these diffusion tubes are monitoring in these locations if they are not monitoring for human receptors.
   b) or confusing to the reader, thus the Council is recommended to explicitly state this.

   SCC Response: The Council monitors NO_2 at non residential kerbside locations for the national NO2 Plan to corroborate national air quality modelling undertaken by Ricardo on behalf of Defra.

   c, The Council have detailed which sites which are not at relevant exposure in the appendix, and where applicable, reasons why they have determined it would not be appropriate to perform distance correction (e.g. the distance between the receptor and the monitor is over 20m, and the tube and the receptor are at different elevations.

Southampton City Council 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. Details of all 46 measures are included within Table 2.2, with the type of measure and the progress Southampton City Council 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.

Key completed measures in 2020 are:

- Completed SCN 5 and 3 now complete with 4 near completion.
- All 145 non-Euro VI buses now retrofitted with Clean Vehicle Retrofit Accreditation Scheme (CVRAS) accredited technology to the equivalent of Euro VI standard.
- Continuing the Low Emission Taxi Incentive Scheme in partnership with Eastleigh Borough Council, replacing older, more polluting taxis with hybrid and electric vehicles. 44 grants were awarded to drivers in 2019. 40% of taxis and private hire vehicles in SCC's fleet are at least hybrids.
- Taxi licensing condition now in place - No diesel vehicle with an emissions standard of Euro 5 (European emission standard) or lower will be granted a licence. 67% of the fleet are now a minimum of Euro 6 diesel compliant.
- Addition of 45 new electric vehicles to the SCC fleet and 27 charge points now active or commissioned in 2020.
- 50 new public EV charge points in city-centre multi-storey and open car parks.
- Continued to offer other EV incentives including 90% discount on city centre parking season ticket and free passage on the Itchen Toll Bridge for EVs.
- Re-consulted on an alternative for bus lane authorisation for SCC taxis and private hire vehicles. Agreed an approach to mitigate impact on non-SCC drivers.
- Published Connected Southampton 2040, SCC's current Local Transport Plan which strives for a zero emission city.
- Delivering year one Green City Charter priorities including progressing a public health based public exposure exercise, supporting ongoing reductions from the Port of Southampton, and extending our monitoring network using low cost monitors.
- Successful in bid to deliver wood burning behaviour change campaign. Largely successful to date despite face-to-face engagement restrictions. Second bid submitted for £290,000 to extend campaign and introduce low cost monitors into Southampton and partnering local authorities to support the campaign with local data.
- ABP successful bid for Solent LEP funding to deliver shoreside power for the new Cruise Terminal 5. Implementation underway 2021/22.

- Air quality informal guidance published for developers. To be integrated into Local Plan 2021/22.
- University Hospital Southampton awarded subsidy to trial the use of the Sustainable Distribution Centre to consolidate COVID PPE. Estimated halving in HGV trips to the hospital transporting COVID PPE.
- 2019 Local NO2 Plan evaluation complete. Identified that the original model may have been optimistic in improvements expected. COVID and lockdown assessment also complete, highlighting and discussing change due to lockdowns.
- Transforming Cities bid successful, over £50m awarded to undertake large scale improvements to sustainable travel infrastructure across the city.
- Green Transport Recovery plan introduced and delivered to facilitate social distancing and promote active travel during the pandemic. Includes a series of temporary cycle lanes and extended footpaths.
- The MyJourney active travel engagement programme has been impacted by COVID, although a similar level of engagement has been maintained using remote means.

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

- Updated Air Quality Action Plan
- Re-evaluation of The Local NO2 Plan
- Bus lane enforcement alternative implemented
- Quality bus partnership agreement adopted
- EVolve trials undertaken
- All delivery and Service Planning contracts signed and implemented

Southampton City Council's key priority for the coming year are to continue to deliver the Local NO2 Plan measures and ensure compliance with the Ministerial Direction issued by the Joint Air Quality Unit. Monitoring and evaluation of measures and data will be crucial in 2021 as many uncertainties have arisen as a result of COVID and the 2019 evaluation exercise.

While the development of the AQAP has been delayed due to priorities in the Local NO2 Plan and the impact of the pandemic. The Plan will progress in 2021 and will aim to

incorporate any new requirements from further NO2 Plan evaluation and requirements from the upcoming Environment Bill.

The principal challenges and barriers to implementation that Southampton City Council anticipates facing are delivering improvements in air quality with increasing demand on the local road network and continued development and regeneration of the city. The council is also mindful of increasing levels of housebuilding outside of the city and it is hoped to mitigate this through the Local NO_2 Plan, Air Quality Action Plan, Green City Charter and continued Access Fund/MyJourney delivery for sustainable and active travel in and around the city.

A further challenge is ensuring all residents and organisations in Southampton understand the role that they play in reducing air pollution. Whilst the council are able to influence air quality to some extent, it is important that the population seek active and sustainable travel options where possible to reduce their impact. Signatories to the Green City Charter will sign up to the vision of a greener city and, with support of the council, will be encouraged use their own control and influence to deliver improvements towards air quality.

Southampton City Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in all AQMAs by 2021-2023.

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	Clean Air Zone (Local NO_2 Plan)	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2019	2022	SCC, Defra, JAQU, DfT, New Forest District Council.	Clean Air Fund and Implementation Fund	NO	Fully funded	~$1.5 mil	Implementation	1. Achieve EU Directive 2. Accelerated uptake vehicles compliant with euro 6 emission standard	Compliance annual mean NO2 EU Ambient Air Quality Directive (40 µg/m3 at EU Directive locations)	Feasibility study and consultation complete. Full Business Case approved by Defra to implement a non-charging CAZ and Local NO_2 Plan measures. Plan has been delivered largely to specification and maintains compliance with central government's expectations.	Significant engagement with consultation aided finalisation of Full Business Case (FBC) and preferred option identification. Concentrations of NO2 lower in local model than national model predicted, difference likely due to localised assumptions used in feasibility study. FBC sets out implementation plan for non-charging measures (which are included individually as measures in this update where they did not already exist).
2	Quality bus partnership agreement and minimum emission standard for buses	Promoting Low Emission Transport	Low Emission Zone (LEZ)	2020	2021	SCC, Local bus operators, DfT	Implementation Fund, Transforming Cities Fund	NO	Fully funded	£1,000-10,000	Planning	"Compliant" operation buses (meeting minimum Euro VI engines or Clean Vehicle Retrofit Accredited equivalent)	Up to 99 % reduction in NOx and PM emissions. Source apportionment of bus/coach estimated up to 38% in some locations with the highest bus movements (based on CBTF upgrades to SCC vehicle fleets). Purpose of condition is to maintain these improvements beyond 2020.	The Quality bus partnership agreement will require vehicles to meet Euro VI equivalent diesel standards in order to use the bus priority network in the city. The agreement will be adopted and funded through SCC and Hampshire County Council's Transforming Cities work.	TRO funded through CAZ FBC. Informal consultation raised that implementing minimum emission standards through a TRO would be problematic. The agreement approach provides an opportunity to maintain the public transport service as alongside other routes for pollution reduction including the requirement for monitored anti-idling policies.
3	My Journey	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2017	2021	DfT, SCC, Hampshire County Council, Portsmouth City Council, Eastleigh Borough Council	Active Travel Fund, Access Fund, Transforming Cities Fund	NO	Fully funded to date	~£100,000-500,000	Implementation	Reduction in car journeys in the city	Indiscernible (note: work is underway to develop a method of estimating AQ improvement from Access Fund measures with the University of Southampton)	see details above	
4	Local planning policies (citywide)	Policy Guidance and Development	Air Quality Supplementary Planning Guidance	2017	2020/21	SCC	Internal	NO	Fully funded	N/A	Implementation	Impact of development on local air quality	Indiscernible (note: Aim to reduce emissions and concentrations from future development)	Funding received to implement. Draft air quality planning document complete.	Delayed publication due to CAZ feasibility work. Informal guidance implemented and now used by developers. Aspects of informal guidance to be adopted formally into

															upcoming Local Plan review.
5	Cycle Lane/ Routes Provision	Transport Planning and Infrastructure	Cycle network	2013	The Cycling Strategy spans 2017 to 2027 and is supported by 3-year Delivery Plans.	SCC	Early Measures Funding, Active Travel Funding	NO	Partially funded	£1mil +	Implementation	Use of cycle route, private vehicles removed from road	< 1µgm3	SCC has committed to building 9 Southampton Cycle Network (SCN) routes. To date:	A 10 year cycle strategy has been adopted identifying the investment required along the key cycle commuter routes into the city centre.
6	Freight consolidation and efficiency	Freight and Delivery Management	Freight Consolidation Centre	2014	2022-2029 (dependent on funding)	SCC, JAQU	Implementation Fund	NO	Fully funded	~£500,000	Implementation	Reduction in HGV movements in the city. Use of SDC. Reduction in emissions from HGVs operating in Southampton.	Approx. 0.68 tonnes of NOx and 0.18 tonnes of PM modelled in 2020.	Freight consolidation, delivery and service planning and fleet accreditation measures approved in FBC. Planning stages of freight consolidation centres and 5 delivery and service plans underway. Sustainable Distribution Centre contract awarded and signed, to commence operation Q1 2020.	Existing framework ends from 2019. A long term framework (up to 10 years) has been established to provide confidence to users that long term provision is available. University Hospital Southampton utilising subsidy and SDC to consolidate COVID PPE goods during pandemic. Estimated 50% reduction in flows to the hospital.
7	Shore power for cruise ships	Promoting Low Emission Transport	Other	2019	2020-21	SCC, ABP	Solent Local Enterprise Partnership	NO	Fully funded	£7.5m	Implementation	Number of cruise ships using facility. Pollutant emissions from cruise ships at berth.	If 20% cruise ships plug in by 2020, 12.1% reduction in NOx emissions estimated (based on 90% reduction in NOx emissions when ships accessing shore power), saving 8.34 tonnes of NOx and 0.31 tonnes of PM in 2020. ABP business case estimated 105 t/yr NOx, 4.8t PM2.5 savings.	Business case made as part of CAZ feasibility study for shore-side power facilities to be integrated into the port of Southampton.	Limited impact on EU relevant receptors for NO2 despite modelled improvements in emissions savings. Business case focuses on reduced exposure of Southampton population and therefore improve public health rather than NO2 EU compliance. Bid unsuccessful. ABP more recently successful bid for shoreside in new cruise terminal through the ‘Solent Local Enterprise Partnership’.

8	Electric Vehicle Action Plan (EVAP)	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2017	2019/20	SCC, DfT	Internal	NO	Partially funded	£100,000-500,000	Implementation	Number of new public charging points installed over life of programme. Number of electric vehicles in SCC Fleet	Private vehicle and SCC fleet NOx, PM emission reductions	To date, the council have installed 50 publicly accessible electric vehicle recharging points (EVCPs) since 2017. Phase 1 introduced six fast (7kW – 22kW, typical charge between 2 and 5 hours depending on utilisation of neighbouring EVCPs) New Motion units at 5 city centre car parks, totalling 30 EVCPs. Phase 2 installed 8 dual socketed Alfen fast (14kW – 22kW) charge points at 8 car parks in Woolston and Bitterne, providing 18 charging opportunities These were installed in phases and completed in early 2019. Two fast New Motion charge points are located at Townhill Park and installed during 2019. First fleet vehicles delivered and operational. 2 rapid charger installed, both with two co-located fast chargers Electric vehicles receive 90% discount in city centre car parks. Itchen Toll bridge	City wide Electric Vehicle Action Plan and strategy will see a network of charge points installed at city car parks, destinations and SCC properties. Currently identifying opportunities for on-street charging and further SCC depot charge points.

														free for electric vehicles.	
9	Taxi licensing conditions	Promoting Low Emission Transport	Taxi Licensing conditions	2019	2019/20 (phase 1), 2022/23 (phase 2)	SCC	Internal	NO	Fully funded	N/A	Implementation	Number of licensed taxi and private hire vehicles	Approx. 1.5 tonnes of NOx emissions reduced in 2021. Emission reductions would persist beyond.	Newly licensed vehicles must meet Euro 6 diesel/4 petrol by 2020 and relicensed vehicles will need to meet this standard from 2022. By 2023 all vehicles will meet the standard.	This will be supported by revised bus lane authorisations allowing only SCC licensed vehicles to access bus lanes. This will encourage operators to remain licensed in Southampton and meet the emission standards required rather than license elsewhere with no minimum emission standard. Bus lane authorisation measure amended as a compromise; implementation delayed, and some taxis known to have licensed elsewhere to circumvent conditions, although difficult to determine beneath COVID19 impacts. 67% taxi fleet meet Euro 6 diesel/ Euro 4 petrol standards.
10	Low emission taxi incentive scheme	Promoting Low Emission Transport	Taxi emission incentives	2016	2021	SCC, Eastleigh Borough Council, Defra AQ Grant	Clean Air fund, Defra AQ Grant	YES	Fully funded	~£200,000	Implementation	Alternatively fuelled vehicles in SCC and EBC fleet	The existing scheme has £254,880 of Defra Air Quality Grant funding which at the time of scheme inception was anticipated to deliver 1681.5 Kg of NOx per year across Southampton and Eastleigh (£151,624 per tonne NOx per year), a total of 19.2% reduction in estimated total taxi emissions. NO2 Plan additional award expected to achieve 1.08 tonnes of NOx	~50 grants issued in 2020 to SCC drivers for hybrid electric vehicles replacing euro 5 or older diesel vehicles. 6 grants issued in Eastleigh including 4 electric vehicles. Additional funding received through Clean Air Fund to expand the scheme and to allow vehicles carrying 5-8 passengers or wheel chair accessible to upgrade to Euro 6	Unable to licence smaller EVs in SCC due to space requirements. Licensing condition changed to allow vehicles that carry 3 passengers to be permitted only if EV. State aid considerations considered meaning incentives can only be offered for operating costs rather than to contribute toward the purchase cost of a vehicle. 40% of the

													per year reduced emissions.	diesel (SCC only). Approaching 40% hybrid fleet in 2020.	fleet are now at least hybrid vehicles.
11	Support ABP's Clean Air Strategy	Policy Guidance and Development Control	Low Emissions Strategy	2023	2023	Associated British Ports Southampton	Internal		Fully funded	N/A	Implementation	Emissions from activity within the Port (i.e. shipping, NRMM) and traffic accessing the Port (i.e. freight, cruise traffic).	Measures within strategy have significant potential to deliver emissions reductions for NOx and PM.	ABP supported in developing a port emissions inventory for the Clean Air Zone feasibility study. ABP have published their own Clean Air Strategy listing 19 measures that they aspire to implement by 2023.	National Clean Air Strategy consultation includes a potential need for all ports to undertake an Air Quality Strategy. This does not include any requirements or targets for emissions reductions. Implementing measures is beyond SCC's control and relies on partnership work with ABP. Several measures secured through new cruise terminal impact assessment. ABP secured funding through Solent LEP to install shoreside power in new cruise terminal.
12	Straddle Carrier to Trial and monitor hybrid power	Promoting Low Emission Plant	Other measure for low emission fuels for stationary and mobile sources	2021	Complete	SCC	Defra Grant	YES	Fully funded	£60,000	Complete	1 Straddle Carrier fitted with hybrid technology, report produced	Allows DP World to target fleet of straddle carriers for NOx, NO2, PM emission reductions. ~20% less fuel use with hybrid technology.	Study complete and has created an inventory of all straddle carriers operating at the Port for DP World. NOx emissions from this study for DP World which measured NOx and NO2 emissions for six types of non-road mobile machinery (NRMM) straddle carrier diesel engines in use at the port of Southampton has been used to inform.	We are continuing our investment program in Hybrid Straddle Carriers, with another 11 ordered for delivery late 2021. For future years we are investigating feasibility of full electric straddle carriers, however this still is in its early stages.
13	Cleaner Air Strategy publication	Policy Guidance and Development Control	Low Emissions Strategy	2016	2016	SCC	Internal	NO	Fully funded	N/A	Complete	Publication date	N/A	Clean Air Strategy adopted in November 2016 and	Published

														published on the council website.	
14	Port booking scheme to incentivise low emission trucks	Promoting Low Emission Transport	Priority parking for LEV's	2020	2020	ABP, DP world	N/A	NO	Fully funded	N/A	Complete	Emissions reductions from port related HGVs	CAZ feasibility study will establish concentrations attributable to HGV's associate with port activity.	Port booking system established including ANPR cameras, charging more polluting vehicles more for delivery slots.	As from 1 January 2020 trucks with a licence plate of '08' or older (EURO IV class) have been charged £ 5.00 per visit to promote the use of newer trucks. As from 1 January 2022 the £ 5 charge will also be levied on Euro V trucks.
15	Eastern Access Highway Scheme	Transport Planning and Infrastructure	Other	2020	Q4 2022	SCC, DfT. Highways England	National Productivity Investment Fund	NO	Fully funded	£2m+	Complete	Scheme complete	TBC	2019	
16	Millbrook Round about A33/ A35 Capacity	Transport Planning and Infrastructure	Other	2017	Complete.	SCC. DfT	DfT Maintenance Challenge Fund	NO	Fully funded	£8m+	Complete	Traffic flow/capacity in roundabout vicinity. Monitored NO2 levels.	TBC	Scheme to improve capacity at A33/A35 Millbrook roundabout at the Redbridge Road/Millbrook Road AQMA on the Western Approach with anticipated benefits for air quality was completed in April 2019.	Includes improved access to dock gate.
17	Bus Priority measures	Traffic Management	Bus route improvements	2015	2021	SCC	Transforming Cities Fund	NO	Fully funded	£10,000-50,000	Implementation	Bus time reliability/Bus patronage	Indiscernible	Bus priority programme in progress with 42 junction improvements identified continue to be delivered. Junction improvements and virtual priority measures along A3024 between Botley Road and Bitterne Road East were complete December 2019. Measures along Portswood Road to be developed as	Investment in measures on high frequency city corridors that reduce journey times for buses and design out delays including bus lanes, bus gates, changes to traffic signals and "virtual" priority measures. To be built upon by Transforming Cities work (see below).

														part of multi-modal study in 2020.	
19	Retrofit for buses: SCRT for older buses. Thermal management for Euro V	Vehicle Fleet Efficiency	Vehicle	2019	2020	SCC, DfT/JAQU	Clean Bus Technology Fund	NO	Fully funded	£2.5 mil	Complete	Trial result published, commitment from bus operators to retrofit	Up to 99 % reduction in NOx and PM emissions. Source apportionment of bus/coach estimated up to 38% in some locations with the highest bus movements.	Clean Bus Technology Fund successful. All 145 buses retrofitted to Euro VI equivalence.	All 145 buses now retrofitted to Euro VI diesel equivalence. Upcoming bus partnership agreement will ensure these standards are maintained by requiring all operational buses in Southampton to meet Euro VI standards in order to use the bus priority network.
20	Procure low emission vehicles in Council and partner fleets	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	2017	Ongoing replacement	SCC	Internal	NO	Partially funded	£100,000+	Implementation	Number of Low Emission Vehicles in council Fleet	Reduce NOx/PM emissions from SCC fleet vehicles	45 EV vans currently in SCC fleet. 33x EV charge points installed at depots for SCC EV Fleet vehicle use. Order for 25 more to be delivered early 2021.	SCC properties located across Southampton with differing power/capacity availability and requirements.
21	Low emission vehicles supported in DSP work	Freight and Delivery Management	Delivery and Service plans	2017	2018-21	SCC	Future Transport Zones fund	NO	Not funded	Unknown	Planning	Electric delivery vehicle in use	Dependent on uptake	Funding received for DSPs as part of CAZ FBC. 5 provided to two universities, cruise ship operator and NHS premises.	Funding secured through CAZ Full Business Case to deliver 10 DSPs per year for 3 years in combination freight consolidation. Many DSPs not possible during COVID19 pandemic as fleet movements unreliable. Cargo bikes, electric vans and Euro 6 diesel HGVs utilised in different plans.
22	Establish Clean Air Network	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2018	Completed. Continued promotion and activity throughout 2018/19.	SCC, The Port, business stakeholders, Southampton University, local air pollution pressure groups, Environment Centre	Internal	NO	Fully funded	N/A	Complete	Organisations signed-up to CAN and pledges made and delivered. Events held.	Indiscernible	Events held throughout 2019 including national Clean Air Day.	To be combined with an upcoming Green City Network which aims to meet the same outcomes across a broader set

															of environmental topics.
23	National Clean Air Day	Public Information	Other	2018	2017 (First NCAD), 2018 (Second), 2019 (Third)	SCC, Global Action Plan	Internal, Defra grant	YES	Fully funded	£300,000	Complete	Number of engagements during campaign	Private vehicle NOx, PM emission reductions	SCC hosted activities for the third National Clean Air Day in June 2019	Virtual Clean Air Day held 2020.
24	airAlert	Public Information	Other	2010	Complete. Ongoing promotion.	SCC, Sussex-air, Kings College London	Internal	NO	Fully funded	£10,000	Complete	Users, alerts issued, satisfaction survey.	Reduced exposure by susceptible and/or vulnerable service users	568 users subscribed to the service in November 2019 28 airAlerts issued in 2019, 1 "High", 27 "Moderate".	New combined monitoring and alert webpage available southamptonair.org.uk
25	M271 Redbridge junction capacity work	Traffic Management	Strategic highway improvements	2019	Complete	Highways England	Government's Roads Investment Strategy 2014	NO	Fully funded	£12-14 mil	Complete	Traffic flow improved		Scheme underway, due for completion Summer 2020	Includes improved capacity, shared paths, shrub planting and resurfacing with low-noise material. Complete.
26	EV parking discounts	Promoting Low Emission Transport	Other	2018	Ongoing	SCC	Internal	NO	Fully funded	N/A	Complete	Number of EV parking permits issued	Reduced emissions from private vehicles	Discounts launched in 2018. 14 permits issued by December 2018.	
27	Itchen Toll EV Concessions	Promoting Low Emission Transport	Other	2018	Ongoing	SCC	Internal	NO	Fully funded	N/A	Complete	Number of EV pass transactions and smart cities cards issued for EV use	Reduced emissions from private vehicles	65 smart cards were issued in 2020 for EVs (dedicated SCC smart card for transport). Total of 8941 crossings during 2019.	219 EV cards registered in 2020.
28	EV car clubs	Alternatives to private vehicle use	Car Clubs	2017	2019/20	SCC	Transforming Cities Fund	NO	Partially funded	£10,000-50,000	Planning	Usage of cars	Dependent on uptake	Discussion with Enterprise Car Rentals over the deployment of EV's as part of the existing car club fleet continue. SCC seeking opportunities to align EV car club with internal car rental requirements for staff.	On street infrastructure will need to be provided and managed. This is under review as part of EVAP for 2020/21 and as an element the Council's bid for Transforming Cities Funding
29	City Car Club	Alternatives to private vehicle use	Car Clubs	2015	Ongoing	SCC	Active Travel Fund	NO	Fully funded	N/A	Implementation	usage of car club	Indiscernible	Over the course of the My Journey programme, 3	

														separate direct mail promotional campaigns advertising the Car Club and offering discounted membership have been run. Workplace travel officer is working to promote car club to employers	
30	ULEV Trials for Taxi and Private Hire Vehicles	Promoting Low Emission Transport	Taxi emission incentives	2019	2019-21	SCC	Implementation Fund	NO	Fully funded	£36,000	Implementation	Number of ULEV trial participants	Reduced emissions from taxi and private hire vehicles	Funded through CAZ FBC. Two instillation days carried out with limited engagement with trade. To work with partner on an alternative approach in 2020.	Both rapid taxi only chargers installed with two collocated fast chargers each.
31	Anti-idling campaign / enforcement	Traffic Management	Anti-idling enforcement	2018	Ongoing (2018 Campaign complete). Partnership agreement Summer Q3 2020.	SCC, The Environment Centre, JAQU/Defra	Defra AQ fund, Internal	YES	Fully funded	£16,000	Complete, planning	Number of engagements during campaign	Emissions reduced at point of idling (indiscernible reduction)	Campaign held in February - May 2018. Proposed requirement for bus operators to maintain an anti-idling policy as part of the bus partnership agreement.	Exploring options to implement no idling policy and enforcement supported by additional communication campaign including signage focussed in AQMAs and key areas for idling.
32	Eco Driver Training and telematics for Council Fleet	Vehicle Fleet Efficiency	Driver training and ECO driving aids	2017	2020/21	SCC	Internal	NO	Fully funded	£100,000	Planning	reduce fuel usage by 10%	TBC following scheme design/planning	Eco driving measure to be delivered in 2020 as part of fleet management and modernisation plan.	SCC fleet upgrades will require drivers to operate electric vehicles. It is considered more effective to align this proposal with EV training rather than focus on diesel efficiency given this direction. Training has been given to new EV drivers. Use of telematics has been delayed due to concerns raised by trade unions. To be incorporated into

															wider fleet decarbonisation strategy.
33	Workplace and School Travel Plan	Promoting Travel Alternatives	School Travel Plans	2010	ongoing	SCC	Active travel Fund, Access Fund, Internal	NO	Fully funded	£100,000+	Implementation	100% of schools have travel plans in place	< 1µgm3	Workplaces engagement3.5 FTE Sustainable Workplace Travel Officers (workplaces) in post as of Dec 2020. 89 organisations with a reach of over 141,686 staff have been helped to review staff travel, write a Travel Action Plan (TAP) and deliver interventions which enable and encourage active travel. Workplace surveys show that the proportion of those using active travel (walking & cycling) for commuting has increased to 22.3% in 2020. In response to the pandemic and the freeze on delivering in-person events we adapted and continued our networking events online. On average 56 organisations attend each event. Our Love to Ride 'Cycle September' campaign achieved; 124 Organisations participating, involving 1716 Cyclists, 193 New Cyclists.We issued 17 Workplace Travel Grants, which benefited 11,707 staff.The workplace team now has a	**Workplaces engagement** COVID has affected our day-to-day engagement in the last 9 months (up to Dec 2020) in a significant way. Many businesses enabled staff to work from home during the 2 Lockdowns and introduced flexible working practices, but a number of our key contacts were Furloughed for a time. This slowed down our ability to engage. Also Public Transport and Car Sharing COVID/Social Distancing restrictions were in place which has not helped in the promotion of sustainable travel and encouraging less single occupancy car use. As a result of COVID people feel much safer in their own personal space (e.g. in their cars). It will take a while for people's confidence to grow. **Schools engagement** officers have delivered 263 events in schools including scooter training, assemblies, cycle training, competitions and lessons have been delivered by the team, engaging with 11,469

														robust engagement reporting tool to help monitor the teams work. Schools engagement1.6 FTE School Travel Plan Coordinators in post from July 2017 developing, monitoring and evaluating school travel plans using the STARS accreditation online toolkit.	individual pupils and 23029 engagements In Southampton, the proportion of pupils cycling and scooting to/from school has been increasing year-on-year over the last 3 years in engaged schools there has been a 9.4% increase in active travel to 78.5%.
34	Website and comms	Public Information	Other	2017	Ongoing	SCC	Internal	NO	Fully funded	N/A	Complete	Comms plan published	N/A	Ongoing website updates with information on CAZ consultation and local NO2 plan measures.	Air quality pages linked with a new Green City site which will also provide updates on wider sustainability initiatives across the city. Air quality pages updated.
35	City-wide fleet composition survey	Vehicle Fleet Efficiency	Other	2016	Complete (2017)	SCC	Implementation Fund, internal	NO	Fully funded	£60,000	Complete	Survey completion	N/A	ANPR camera survey completed in December 2016 to calculate emission standard of current vehicles using main roads	Survey has informed CAZ feasibility study. Repeated winter 2019, to be repeated 2021.
36	Domestic solid fuel burning engagement programme	Public information	Other	2021	2021	SCC, third party partner	Defra AQ fund	YES	Fully funded	£60,100	Implementation	Number of leaflet drops, number of face to face engagements,	Conservative estimate PM savings – PM2.5 = 8.6 tonnes a year, PM10 = 9 tonnes across partner LA boundaries. Assumes greater uptake of eco-label stoves as a result of the campaign.	Bid successful. The Environment Centre contracted to provide programme. Winter campaign underway.	Unable to carry out face-to-face engagement during pandemic. Resource re-allocated to remote engagement. Amber/ Green status in Defra return Q4 2020. ~8,000 engagements over social media for bonfire night launch and winter campaign. 7,500 posters delivered to target areas.
37	Green Wall Alongside A33	Other	Other	2018	2020	SCC, Freight Liner	Internal	NO	Fully funded	£100,000	Planning	Impact on cycle rates (due to improved aesthetics). NO2 concentrations.	Indiscernible	Options still being considered by SCC	Barrier to implementation: Land ownership issues.

														and adjacent land owner.	Resource dedicated to overcoming this issue. Green Grid plan committed to deliver city-wide green infrastructure.
38	Green City Charter (GCC) and Green City Plan	Other	Other	2020	2030	SCC, Green City signatories	Internal	NO	Fully funded	£5m+	Implementation	Implementation of Green City Plan. KPIs given in plan. Number of signatories.	Indiscernible. Series of projects.	GCC launch held during national clean air day 2019. Number of large businesses signed up to the charter. SCC's Green City Plan being drafted, to be published and adopted early 2020.	The GCC came about as a result of the CAZ consultation where a large appetite for collective action towards improving various aspects of the environment was identified. The Charter includes a series of commitments SCC has for air quality alongside wider sustainability/ environmental topics including sustainable transport and energy and climate change. The Green City Plan sets out further measures we will take to achieve them. Several new measures air quality measures have been committed under the plan; these are included in this table. The charter and plan also set out SCC's ambition to go further than statutory requirements and represents a refocussing on public health.
39	Transforming Cities	Traffic management, Promoting Low Emission Transport, Promoting alternatives to private vehicles	Strategic Highways improvement	2020	2023	SCC, Hampshire County Council	Transforming Cities Fund	NO	Fully funded	£50m+	Implementation	Implementation of measures as set out in bid.	TBC. Likely significant long term benefit	£5.7m awarded in January 2019 as part of Tranche 1 and a further £57m in March 2020 in Tranche 2.	The bid sets out our aims to improve sustainable and active travel infrastructure by creating four radial bus corridors, park and ride facilities, local mobility hubs,

															smart technology, improvements to the SCN, active travel zones and improved bus interchanges.
40	Air Quality Action Plan update	Traffic management, Promoting Low Emission Transport, Promoting alternatives to private vehicles etc.	Various	2022	2026	SCC, delivery partners	Internal	NO	Partially funded	~£500,000	Planning	Implementation of measures as set out in action plan.	To be determined.	Longlist prepared. Shortlisting process underway for publication end of 2021/ 2022.	Recent focus has been on The Local NO2 Plan and related commitments to central government. Adapting to COVID19 has limited progress.
41	Port Rail terminal extension	Freight and Delivery Management	Other	2019	2021	Network Rail, ABP	National Rail funds	NO	Fully funded	£17mil	Implementation	N/A	20% more goods transport by rail.	Partially complete – new sidings track installed to increase speed limit and improve efficiency.	
42	Low cost monitor trial bid	Monitoring and Modelling	Other	2021	2023	SCC, delivery partner, partnering local authorities	Defra AQ grant	YES	Not funded	£300,000	Planning	Implementation of low-cost monitors	Primary aim of the project is to enhance wood burning public engagement campaign which targets emissions of PM fractions.	Bid submitted to Defra, expected to be successful.	Monitors will capture PM fractions, O3 and NO2. Including modelling and mapping capabilities. £250k investment.
43	Future Transport Zone	Freight and Delivery Management, Promoting Low Emission Transport, Promoting alternatives to private vehicles	Freight consolidation, micro-mobility, Mobility as a Service	2021	2024	SCC and Solent Transport, Funded by DfT	Future Transport Zones	NO	Fully funded	£28mil	Planning	Included in related documents	Not determined	Bid successful, funding received and interim FTZ team being recruited to set up scheme governance	Covid-19 required review of projects with some on hold and/or delayed (bike share, DRT, lift share) until 2021 Innovative schemes require substantial conception and planning meaning short term benefits reduced, but long term benefits expected to be high
44	Active Travel Zones	Promoting alternatives to private vehicles, transport planning and infrastructure, Public information	Intensive active travel campaign and infrastructure	2020	2022	SCC – Transforming Cities Fund, Active Travel Fund 2	Transforming Cities Fund, Active Travel Fund	NO	Fully funded	£1.2mil	Implementation	Included in related documents	Estimated ~20% reduction of traffic within an ATZ	Implementation underway in first ATZ in St Denys. Consultation on St Mark's school ATZ now underway. Further planning for future zones dependent on	

														outcomes of previous.	
45	Green Transport Recovery Plan	Promoting alternatives to private vehicles, transport planning and infrastructure, Public information	Intensive active travel campaign and infrastructure	2020	2020	SCC – Emergency Active Travel Fund	Transforming Cities Fund, access Fund	NO	Fully funded	£4.3mil	Implementation	Included in related documents	Not determined	“Emerging” and “Restart” programmes complete. Entering “Recovery” phase.	
46	M27/M3 Travel Demand Management Project	Promoting alternatives to private vehicles, transport planning and infrastructure, Public information	Intensive active travel campaign and infrastructure	2019	2021/22	SCC, Portsmouth City Council, Hampshire County Council, Highways England	Highways England contribution	NO	Fully funded	£1.7mil	Implementation	Included in related documents	Not determined	£1.7 m funding awarded by Highways England to SCC and other partners.	Implementation limited due to COVID19 pandemic.

$PM_{2.5}$ – 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.

Southampton City Council is taking the following measures to address $PM_{2.5}$:

- The air pollution alert service that warns registered users of predicted moderate/high air pollution alerts helps Southampton residents with respiratory disease to reduce their exposure to pollution, including particulates. The service was developed with AQDM, our data manager, with the support of our public health colleagues and the NHS. The service sends a warning email message the day before predicted moderate or high pollution is forecast by the Met Office. Residents of Southampton can register for free to receive the email alerts on our bespoke monitoring website: https://www.southamptonair.org.uk/
- Southampton also works closely with the Port operator and its customers to identify and support initiatives that will reduce emissions. The Clean Air Network will develop over the coming years to engage with the key stakeholders in the city, including the port.
- The Clean Air Zone feasibility study will include estimated emissions for larger particulates (PM_{10}) from activity in the city which can be used as a proxy for determining the scale of $PM_{2.5}$ emissions.
- The Domestic solid fuel burning engagement programme commenced in 2020 after a successful Defra Air Quality Grant application to finance the work. A number of leaflet drops and posters were put up in 2020. However, Southampton City Council were unable to carry out face-to-face engagement during the pandemic. Resource was re-allocated to remote engagement. 8,000 engagements were logged over social media for the bonfire night launch and winter campaign. 7,500 posters delivered to target areas.

- A conservative estimate of particulate matter savings – $PM_{2.5}$ = 8.6 tonnes a year, PM_{10} = 9 tonnes across partner LA boundaries. This estimate assumes greater uptake of eco-label stoves as a result of the campaign.
- $PM_{2.5}$ is monitored in Southampton at the City Centre AURN Urban Centre station. $PM_{2.5}$ decreased substantially in 2020 compared to previous years. In 2011 it was 16 µg/m^3 but it has decreased steadily to 9.0 µg/m^3 in 2020. In 2019 it was 9.6 µg/m^3

$PM_{2.5}$ and Health

Based on national estimates, exposure to particulate matter in Southampton is estimated to contribute to 110 early deaths each year. Public Health England provide a Public health Indicator for $PM_{2.5}$ at a local authority level as a fraction of the mortality attributable to particulate air pollution. This enables local authorities to assess their local figure and take appropriate action to try to reduce it.

In Southampton Public Health England estimated the fraction of mortality at 6.2% attributable to particulate air pollution. This was slightly higher than the South East England figure of 5.2% and Hampshire at 5%. As a regional city the slightly higher figure is to be expected, compared to rural Hampshire.

Local hot-spots

Background pollutant maps provided electronically by Defra also give a basic local background concentration for $PM_{2.5}$. This information may show areas of higher $PM_{2.5}$ concentrations which Southampton City Council could assess to determine if there are local particulate issues where specific measures could be implemented to reduce particulate emissions.

The above noted methods will be used to establish local $PM_{2.5}$ annual mean concentrations, identify the local health burden of particulate matter and identify any local hot spot areas for particulate matter that have not been identified to date. This will enable Southampton City Council to establish baseline figures for $PM_{2.5}$ with the aim to improve on the established baseline, including the possibility of setting targets for a measured reduction in the near future, and to target resources to assess and improve any identified hot spot areas for $PM_{2.5}$. This data will be updated on an annual basis, and therefore provide some guidance of whether implemented measures are reducing local $PM_{2.5}$ concentrations.

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

This section sets out the monitoring undertaken within 2020 by Southampton 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.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Southampton City Council undertook automatic (continuous) monitoring at 4 sites during 2020. Table A.1 in Appendix A shows the details of the automatic monitoring sites. NB. *Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem.* The Air Quality in Southampton (southamptonair.org.uk) page presents automatic monitoring results for Southampton City Council 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.

3.1.2 Non-Automatic Monitoring Sites

Southampton City Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 83 sites during 2020 Table A.2 in Appendix A presents the details of the non-automatic sites.

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

Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater

than 33%), and distance correction. Further details on adjustments are provided in Appendix C.

3.1.3 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 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.

Southampton monitored no exceedances of the annual mean NO_2 objective and 1 hour objective at any of our monitoring sites, anywhere in the city. This is unprecedented since embarking on the Review and Assessment Process and reflects the reduction in road vehicle movements caused by the COVID19 Pandemic.

The highest monitored mean average concentration of NO_2 in Southampton was 34.2 µg/m^3 on the residential façade of 367A Millbrook Road. There were a couple of higher results monitored, but these were not at relevant receptors.

For instance, Redbridge Causeway, which crosses the River Test on the western boundary of the City. The 2 NOx tubes located on the kerb of Redbridge Causeway were still below 40 µg/m^3 . Both NOx tubes are a considerable distance and at a different elevation to the nearest residential receptors.

2020 monitoring results showed a significant improvement compared to 2019. In 2019, there were 4 monitored exceedances of the annual mean NO_2 objective at relevant receptor locations., within 4 existing AQMAs. In 2020 there were none.

Reductions of annual mean NO_2 concentrations of between 15 and 20% were experienced at roadside diffusion tube monitoring sites within most AQMAs in 2020 relative to 2019.

SCC will consider revoking all 10 of the AQMAs in the future once the medium to long-term trend of reducing NO_2 is confirmed by monitoring in future ASRs. It would be inappropriate to revoke them in this 2021 ASR until we can be certain that the downward trend is sustained over the medium-long term. The COVID19 pandemic and subsequent "lockdowns", played an important part in reducing vehicle movements in the city during 2020. Working from home has become the new normal for a lot of city workers, reducing the volume of commuter traffic at peak times. It remains to be seen if this trend continues in future years, but it seems likely that working from home and hybrid office/home working will be much more prevalent after 2020.

In summary, exceedances halved from 8 in 2018 to only 4 in 2019 at relevant receptors, with no monitored exceedances recorded in 2020.

Southampton City Council commissioned an air quality consultant to assess the impact of the covid pandemic lockdown 16th March- 15th May 2020 on air quality in the city. The report can be viewed here 2020 COVID-19 Lockdown Period - Air Quality Analysis (southampton.gov.uk) During this limited time period of the first lockdown, air pollution did not reduce as markedly as expected. Despite the large reduction in vehicle movements, the unusually hot, dry Spring weather attenuated the expected air pollution improvement

3.1.4 Particulate Matter (PM_{10})

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

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

There were no exceedances of the UK objective for the PM_{10} annual mean concentration or daily mean PM_{10} in 2020. PM_{10} did not show a significant reduction relative to previous years. In fact, at CM7 Redbridge AURN Automatic Monitoring Station, the annual average for PM_{10} increased slightly compared to 2019. The hot dry Spring and the location of the CM7 monitoring station on the roadside of the main HGV route into the Container Port can account for the slight increase in PM_{10}.

The 2 Automatic AURN Monitoring Stations will continue monitoring PM_{10} in future years, dependent upon national government funding. In addition, Southampton City Council is

hoping to acquire some small, relatively cheap, easily deployable particulate monitors for Schools and residential areas to monitor particulates for the domestic solid fuel burning engagement programme.

3.1.5 Particulate Matter ($PM_{2.5}$)

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

$PM_{2.5}$ annual mean continued to reduce slightly in 2020. 9ug/m^3 was monitored in 2020, compared to 9.6ug/m^3 in 2019.

3.1.6 Sulphur Dioxide (SO_2)

Table A.9 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2020 with the air quality objectives for SO_2.

There were no exceedances of the UK objectives for SO_2 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)
CM1	Southampton Centre AURN	Urban Background	442579	112248	NO2, PM10 (FDMS), PM2.5 (FDMS), SO2, Benzene, O3	NO	Chemiluminescence (NO2), FDMS//Optical light-scattering (PM10 and PM2.5), ultra-violet fluorescence (SO2), pumped diffusion tube sampler (benzene)	27	20.7	2.5
CM4	Onslow Road	Roadside	442304	112771	NO2	YES	Chemiluminescence	n/a	2	1.3
CM6	Victoria Road	Roadside	443751	111123	NO2	YES	Chemiluminescence	1	3	1.3
CM7	A33 AURN	Roadside	437809	113560	NO2, PM10	NO	Chemiluminescence, BAM	14.8	5.1	2.5

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)
N100	6 Sandringham Road	Urban Background	444387	114453	NO2	No	N/A	N/A	No	1.0
N101	Redbridge School Fence	Roadside	437548	113719	NO2	No	0.0	6.3	No	2.3
N103	485 Millbrook Road	Roadside	438808	112903	NO2	5	0.0	12.1	No	1.6
N104	Regents Park Junction	Roadside	439222	112850	NO2	5	2.4	12.0	No	3.0
N106	2 Romsey Road, Oakhill	Roadside	439752	113984	NO2	No	0.0	4.4	No	2.6
N107	Cranbury Place	Roadside	442364	112890	NO2	1	0.5	1.8	No	2.1
N109	72 Bevois Valley	Roadside	442585	113248	NO2	1	0.5	3.6	No	2.4
N110, N111, N112	Brintons Road 3	Urban Background	442579	112248	NO2	No	27.0	20.7	Yes	3.2
N113	206 Bitterne Road	Roadside	444124	113288	NO2	2	0.7	5.1	No	2.2
N114	Bitterne Library	Roadside	444131	113322	NO2	2	1.9	3.2	No	3.2
N115	54 Redbridge Road	Roadside	437939	113474	NO2	5	0.0	8.7	No	1.7
N116	57 Redbridge Road	Roadside	437952	113407	NO2	5	0.0	12.9	No	1.8

N117	Victoria Road (Lamp Post)	Roadside	443752	111121	NO2	11	0.8	2.8	No	2.7
N118	3 Rockstone Lane	Roadside	442472	113065	NO2	1	3.7	3.8	No	2.4
N120	6-9 Canute Road	Roadside	442716	111019	NO2	4	0.0	3.8	No	2.6
N122	151 Paynes Road	Roadside	440000	112633	NO2	5	0.0	12.7	No	1.7
N123	102 St Andrews Road	Roadside	442348	112305	NO2	No	0.0	3.5	No	3.3
N124	305 Millbrook Road	Roadside	439741	112753	NO2	5	0.0	9.5	No	2.0
N125	Princes Court	Roadside	443125	112641	NO2	2	0.0	5.7	No	2.5
N126	107 St Andrews Road	Roadside	442365	112286	NO2	No	1.7	2.0	No	2.7
N129	South West House	Roadside	442554	111021	NO2	4	0.0	2.5	No	2.9
N130	367A Millbrook Road	Roadside	439346	112821	NO2	5	0.0	8.1	No	2.3
N131	142 Romsey Road	Roadside	439378	114185	NO2	6	0.0	4.8	No	2.1
N133	539 Millbrook Road	Roadside	438609	113020	NO2	5	0.0	33.0	No	1.8
N134	435 Millbrook Road West Ladbrokes	Roadside	438980	112861	NO2	5	0.0	11.5	No	3.2
N138	66 Burgess Road	Roadside	441697	115288	NO2	9	0.0	2.3	No	1.5
N140	5 Commercial Road	Roadside	441628	112332	NO2	8	2.4	2.2	No	3.2

N141	Town Quay Road	Roadside	441923	110990	NO2	4	0.0	3.2	No	2.6
N143	102 Romsey Road	Roadside	439457	114150	NO2	No	0.0	5.8	No	1.9
N144	208 Northam Road	Roadside	443147	112709	NO2	No	0.0	5.0	No	2.5
N146	222 Northam Road	Roadside	443164	112741	NO2	No	0.0	11.5	No	1.8
N149	44B Burgess Road	Roadside	441552	115247	NO2	9	0.0	2.6	No	2.2
N151	134 Romsey Road	Roadside	439394	114176	NO2	6	0.0	5.0	No	1.8
N152	M271	Roadside	437327	113848	NO2	5	18.0	4.8	No	2.5
N158	24 Portsmouth Road	Roadside	443807	111123	NO2	No	0.0	4.7	No	2.6
N159	35 Portsmouth Road	Roadside	443740	111147	NO2	No	0.0	3.2	No	2.7
N161	30 Addis Square	Roadside	442705	114129	NO2	No	0.0	6.0	No	2.7
N162	263A Portswood Road	Roadside	442872	114336	NO2	No	0.0	3.7	No	2.6
N164	168 Portswood Road(Int.Food)	Roadside	442809	114241	NO2	No	0.0	5.3	No	2.9
N165	8 The Broadway	Roadside	442766	114181	NO2	No	0.0	5.5	No	2.6
N166	14 New Road	Roadside	442251	112129	NO2	10	0.0	1.5	No	2.8
N167	13 Romsey Road	Roadside	439759	114011	NO2	No	0.0	5.8	No	2.5

N168	23 Romsey Road	Roadside	439737	114025	NO2	No	0.0	4.5	No	1.8
N169	150 Romsey Road	Roadside	439361	114195	NO2	6	0.0	4.4	No	0.9
N170	Union Castle House (2)	Roadside	442482	111003	NO2	4	NA	2.6	No	2.5
N172	4 New Road	Roadside	442207	112126	NO2	No	0.0	2.0	No	2.9
N174	166A Bitterne Road West	Roadside	443959	113315	NO2	2	0.0	6.7	No	2.7
N175	38 Shirley High Street	Roadside	439959	113737	NO2	No	0.0	8.8	No	2.6
N176	Salisbury Arms, Shirley High Street	Roadside	439772	113952	NO2	No	0.0	13.3	No	2.2
N177	95 Shirley High Street (Windsor Castle Pub)	Roadside	439844	113907	NO2	No	0.0	4.5	No	2.6
N178	2 Gover Road	Roadside	437265	113682	NO2	No	0.0	8.8	No	2.1
N180	Opposite 5 Commercial Road	Kerbside	441633	112318	NO2	8	1.0	2.9	No	2.4
N184A, N184B, N184C	Redbridge AMS (C)	Roadside	437811	113557	NO2	No	16.0	14.6	Yes	2.7
N185	Redbridge Causeway 1	Roadside	437167	113713	NO2	No	29.2	2.4	No	2.5
N186	Redbridge Causeway 2	Roadside	437126	113701	NO2	No	7.5	2.9	No	2.3
N187	Cobden Avenue	Roadside	444102	113872	NO2	No	0.0	7.0	No	0.8

N188	Blechynden Terrace, Taxi	Roadside	441300	112233	NO2	No	NA	4.0	No	2.4
N189	Cumberland House	Roadside	441790	112465	NO2	No	0.0	2.1	No	2.5
N190	Brunswick Apartments	Roadside	442024	112553	NO2	No	0.0	5.1	No	2.5
N191	Marlands House	Roadside	441915	112097	NO2	No	2.0	1.3	No	2.6
N192	Above Bar Street Bus Stop	Roadside	441961	112029	NO2	No	NA	1.3	No	2.6
N193	Above Bar Street Taxi Rank	Roadside	441975	112031	NO2	No	NA	4.3	No	2.6
N194	Vincents Walk Bus Stop	Roadside	442090	111775	NO2	No	NA	4.0	No	2.7
N195	Bargate Street	Roadside	441945	111655	NO2	No	NA	0.7	No	2.5
N197	351 Winchester Road	Roadside	440957	115151	NO2	3	0.0	5.5	No	2.7
N198A, N198B, N198C	Onslow Road (C)	Roadside	442304	112771	NO2	1	NA	2.6	Yes	1.8
N199	Dorset Street/Charlottes Place Crossing	Roadside	442210	112583	NO2	1	16.5	3.5	No	2.0
N200	Northam Bridge South	Roadside	443160	112765	NO2	No	13.9	4.0	No	2.0
N201	289 Millbrook Road West	Roadside	439759	112738	NO2	No	6.8	1.2	No	2.0
N202	Redbridge Causeway North	Roadside	437166	113755	NO2	No	NA	1.2	No	2.2
N204	6 Lodge Road	Roadside	442542	113261	NO2	No	2.2	2.1	No	2.6

N205	Stags Gate, Lodge Road	Roadside	442101	113438	NO2	No	4.1	2.0	No	2.4
N206	Charlottes Place	Kerbside	442265	112516	NO2	No	5.0	2.2	No	2.0
N207	205 Waterhouse Lane	Roadside	439698	112806	NO2	No	3.5	4.0	No	2.5
N208	Sherwood Close	Roadside	441365	115202	NO2	No	11.7	1.9	No	1.5
N209	40 Burgess Road	Roadside	441246	115138	NO2	No	2.2	1.6	No	2.5
N210	18 Burgess Road	Roadside	441122	115118	NO2	No	4.0	1.7	No	4.5
N211	4 Coniston Road	Roadside	437332	113873	NO2	No	0.0	4.2	No	1.5
N213	277 Portswood Road	Roadside	442935	114374	NO2	No	0.0	9.5	No	2.2
N214	64 Burgess Road 2019	Roadside	441677	115280	NO2	No	0.0	5.2	No	2.1
N216	73 Lodge Road	Roadside	442352	113486	NO2	No	1.4	4.3	No	2.5
N217	11 Saxon Road	Roadside	440751	112188	NO2	No	3.0	1.3	No	2.0
N218	112 St Denys Road	Roadside	443547	114101	NO2	No	0.5	1.2	No	2.4

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CM1	Urban Background	Automatic	Urban Background	Automatic	77.5	33	29.6	28.9	27.8	22.5
CM4	Roadside	Automatic	Roadside	Automatic	94.6	**45.7**	**43**	39.9	**41.4**	31.0
CM6	Roadside	Automatic	Roadside	Automatic	96.3	**43.4**	**42.2**	37	36	27.3
CM7	Roadside	Automatic	Roadside	Automatic	99.2	**43**	39.9	35	32.5	26.8

☒ **Annualisation has been conducted where data capture is <75% and >33% 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
N100	444387	114453	Urban Background	100	100.0	18.6	16.7	17.1	18.1	13.3
N101	437548	113719	Roadside	100	100.0	**54.3**	**48.2**	**42.4**	39.2	30.6
N103	438808	112903	Roadside	100	100.0	33.7	31.5	32.0	29.8	23.5
N104	439222	112850	Roadside	100	100.0	**40.3**	35.6	36.4	34.0	30.4
N106	439752	113984	Roadside	100	100.0	39.9	36.3	37.0	35.4	27.7
N107	442364	112890	Roadside	100	100.0	**52.7**	**45.3**	**48.0**	**46.5**	32.4
N109	442585	113248	Roadside	84.6	84.6	**40.0**	36.6	39.3	38.0	25.9
N110, N111, N112	442579	112248	Urban Background	100	100.0	26.6	27.7	29.3	28.2	21.9
N113	444124	113288	Roadside	100	100.0	38.2	35.2	32.9	32.7	25.9
N114	444131	113322	Roadside	100	100.0	35.9	34.4	33.7	32.8	25.0
N115	437939	113474	Roadside	100	100.0	38.4	35.9	34.4	32.8	26.0
N116	437952	113407	Roadside	100	100.0	**40.5**	34.3	34.3	32.5	25.9
N117	443752	111121	Roadside	100	100.0	36.1	34.2	33.3	33.7	27.0

N118	442472	113065	Roadside	92.3	92.3	37.1	34.1	36.2	35.0	25.2
N120	442716	111019	Roadside	100	100.0	**40.3**	**40.0**	37.2	35.8	26.4
N122	440000	112633	Roadside	100	100.0	32.8	31.6	28.2	31.2	23.8
N123	442348	112305	Roadside	92.3	92.3	35.5	30.3	34.2	32.7	24.2
N124	439741	112753	Roadside	100	100.0	**40.2**	35.5	34.8	34.7	27.5
N125	443125	112641	Roadside	100	100.0	38.7	34.5	36.2	37.0	26.9
N126	442365	112286	Roadside	100	100.0	36.4	32.3	35.9	32.4	25.0
N129	442554	111021	Roadside	100	100.0	30.7	30.2	28.9	29.5	22.0
N130	439346	112821	Roadside	100	100.0	**44.9**	**40.8**	**42.3**	39.2	34.2
N131	439378	114185	Roadside	100	100.0	38.2	35.2	37.8	36.5	28.7
N133	438609	113020	Roadside	100	100.0	31.4	29.4	27.7	28.0	23.2
N134	438980	112861	Roadside	100	100.0	**41.2**	36.1	38.0	33.8	27.4
N138	441697	115288	Roadside	100	100.0	**46.8**	**40.4**	**47.3**	**43.1**	33.6
N140	441628	112332	Roadside	92.3	92.3	**49.0**	**45.4**	**45.2**	**44.5**	33.3
N141	441923	110990	Roadside	100	100.0	36.8	33.0	35.2	33.2	25.0

N143	439457	114150	Roadside	100	100.0	37.3	36.2	35.5	35.0	27.6
N144	443147	112709	Roadside	100	100.0	36.4	36.4	32.5	30.3	23.7
N146	443164	112741	Roadside	100	100.0	30.5	30.2	27.8	28.1	21.8
N149	441552	115247	Roadside	100	100.0	31.4	28.5	31.5	29.7	26.5
N151	439394	114176	Roadside	100	100.0	**40.0**	37.6	37.0	36.7	29.2
N152	437327	113848	Roadside	100	100.0	**52.2**	**45.8**	**42.2**	39.9	34.1
N158	443807	111123	Roadside	100	100.0	**40.4**	36.6	34.8	34.6	29.3
N159	443740	111147	Roadside	100	100.0	32.7	31.9	32.1	32.1	27.5
N161	442705	114129	Roadside	100	100.0	35.4	30.4	33.0	28.5	24.1
N162	442872	114336	Roadside	92.3	92.3	37.1	37.4	37.5	35.1	26.3
N164	442809	114241	Roadside	100	100.0	35.7	32.4	34.2	29.5	23.8
N165	442766	114181	Roadside	100	100.0	34.0	31.4	32.6	30.9	25.3
N166	442251	112129	Roadside	63.5	63.5	39.8	36.0	35.9	33.7	24.9
N167	439759	114011	Roadside	82.7	82.7	36.3	34.5	35.1	35.0	27.7
N168	439737	114025	Roadside	82.7	82.7	**40.6**	35.9	36.5	35.1	26.5

N169	439361	114195	Roadside	100	100.0	**42.5**	**43.0**	**42.8**	38.9	33.5
N170	442482	111003	Roadside	75	75.0	**41.7**	**40.1**	39.0	37.0	26.8
N172	442207	112126	Roadside	100	100.0	**45.1**	**42.1**	**41.3**	**40.2**	30.8
N174	443959	113315	Roadside	100	100.0	**42.8**	**41.2**	**41.5**	**40.7**	31.6
N175	439959	113737	Roadside	92.3	92.3		38.9	38.3	35.5	29.5
N176	439772	113952	Roadside	100	100.0	**43.1**	35.5	35.6	32.1	25.5
N177	439844	113907	Roadside	100	100.0	38.8	37.5	38.6	35.2	26.6
N178	437265	113682	Roadside	100	100.0	27.0	24.5	24.3	24.0	19.2
N180	441633	112318	Kerbside	84.6	84.6	39.0	39.7	**40.5**	39.3	29.3
N184A, N184B, N184C	437811	113557	Roadside	100	100.0				34.7	29.6
N185	437167	113713	Roadside	100	100.0		**50.2**	**53.9**	**43.0**	37.7
N186	437126	113701	Roadside	57.7	57.7	39.4	39.0	39.0	35.2	28.5
N187	444102	113872	Roadside	100	100.0				32.7	26.4
N188	441300	112233	Roadside	100	100.0				32.6	27.1
N189	441790	112465	Roadside	92.3	92.3				36.3	27.6

N190	442024	112553	Roadside	100	100.0				39.0	30.4
N191	441915	112097	Roadside	100	100.0				**42.5**	33.5
N192	441961	112029	Roadside	100	100.0				**41.9**	32.9
N193	441975	112031	Roadside	90.4	90.4				35.3	26.3
N194	442090	111775	Roadside	100	100.0				**43.6**	38.4
N195	441945	111655	Roadside	100	100.0				37.7	31.8
N197	440957	115151	Roadside	100	100.0				37.5	24.2
N198A, N198B, N198C	442304	112771	Roadside	100	100.0				33.4	26.2
N199	442210	112583	Roadside	90.4	90.4				35.8	30.9
N200	443160	112765	Roadside	92.3	92.3				30.2	26.9
N201	439759	112738	Roadside	48	48.1				**55.9**	39.6
N202	437166	113755	Roadside	75	75.0				**46.5**	37.8
N204	442542	113261	Roadside	82.7	82.7				35.6	25.2
N205	442101	113438	Roadside	100	100.0				38.4	26.5
N206	442265	112516	Kerbside	100	100.0				39.4	30.8

N207	439698	112806	Roadside	100	100.0				33.5	27.8
N208	441365	115202	Roadside	90	90.4				32.6	23.8
N209	441246	115138	Roadside	82	82.7				31.7	25.2
N210	441122	115118	Roadside	100	100.0				38.1	27.7
N211	437332	113873	Roadside	100	100.0				26.5	21.4
N213	442935	114374	Roadside	100	100.0				28.8	22.7
N214	441677	115280	Roadside	100	100.0				33.0	25.5
N216	442352	113486	Roadside	100	100.0				37.8	25.1
N217	440751	112188	Roadside	100	100.0				33.6	28.2
N218	443547	114101	Roadside	84.6	84.6				36.4	26.9

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16**

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

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

Notes:

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

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

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

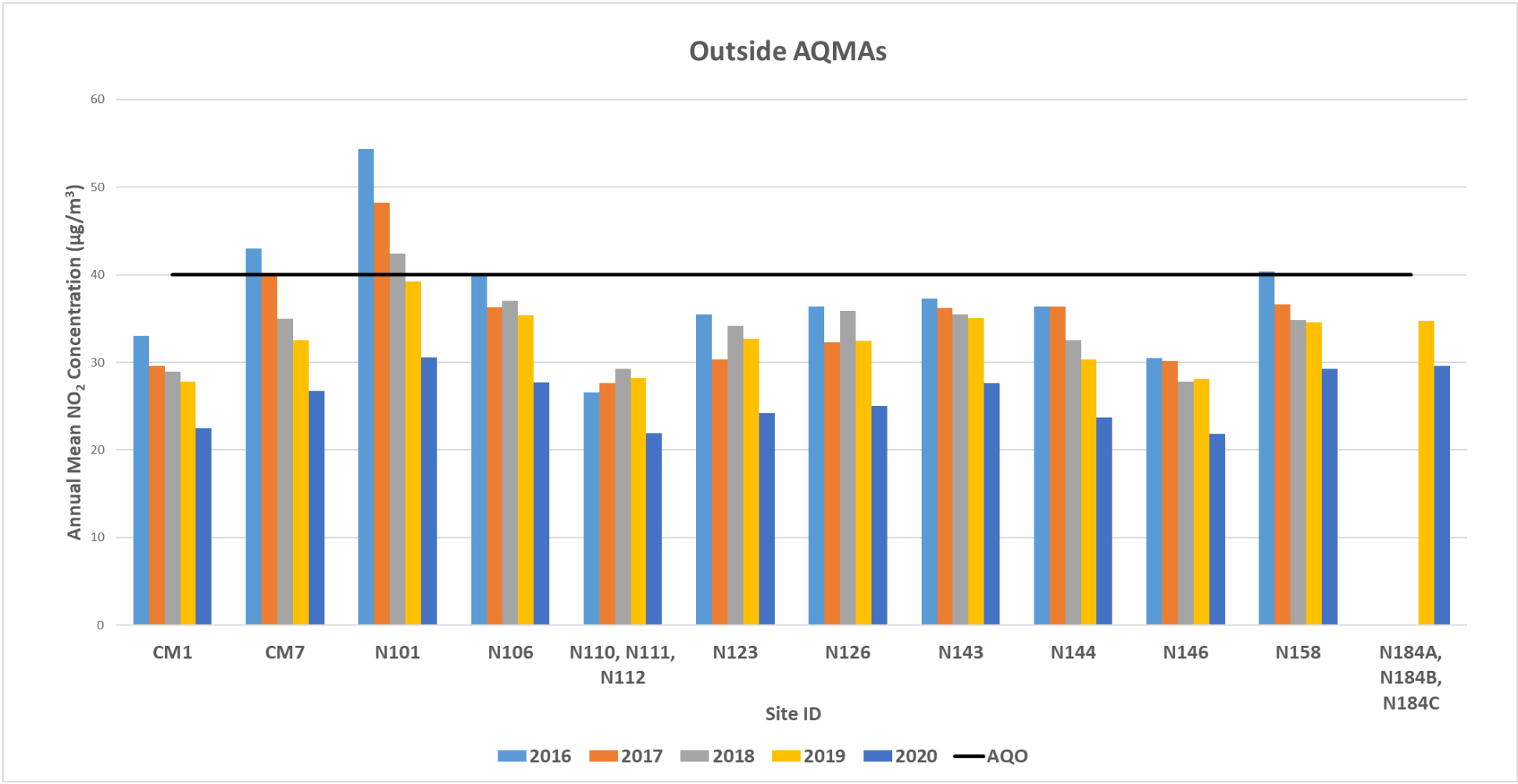
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

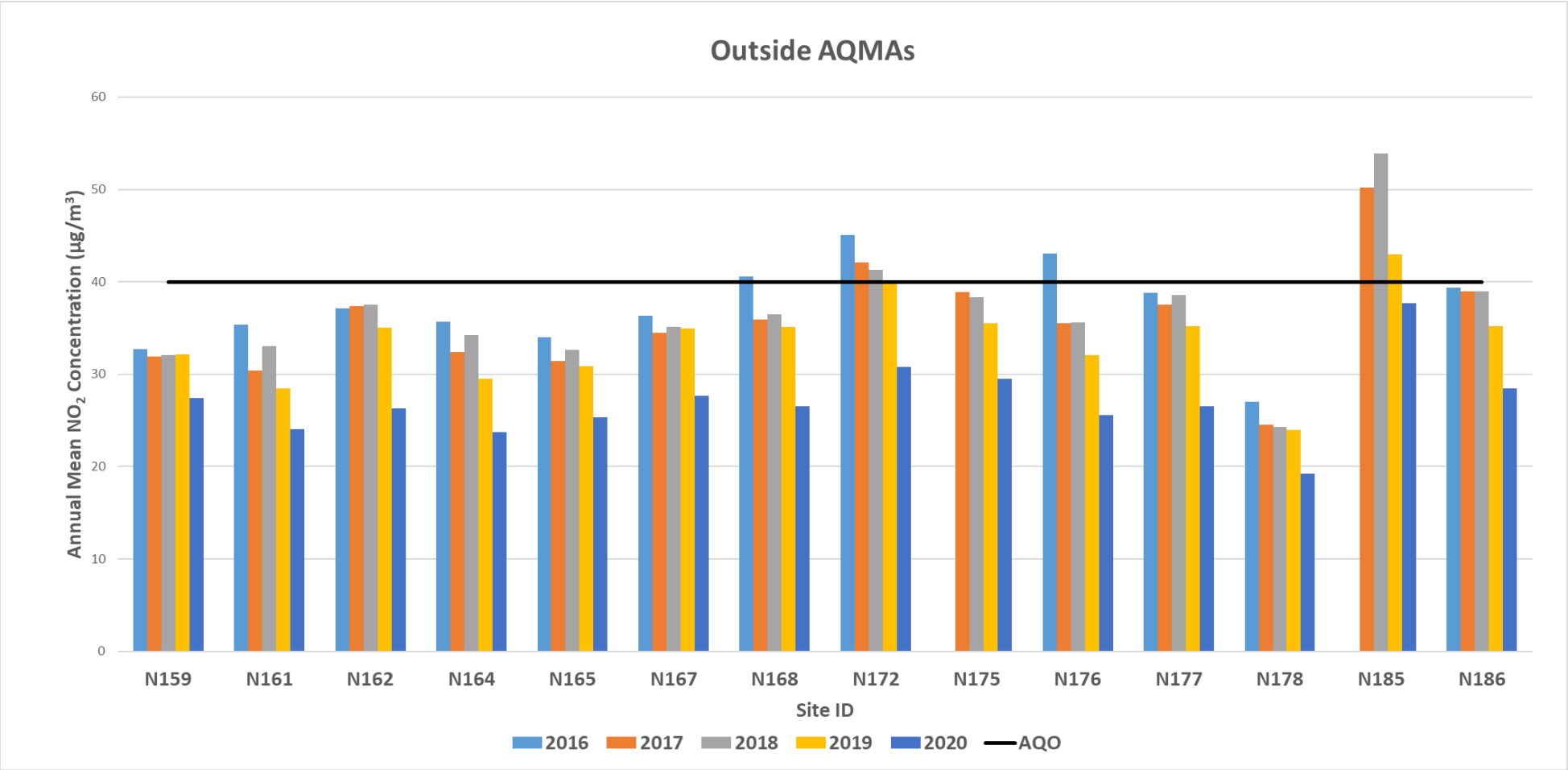
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

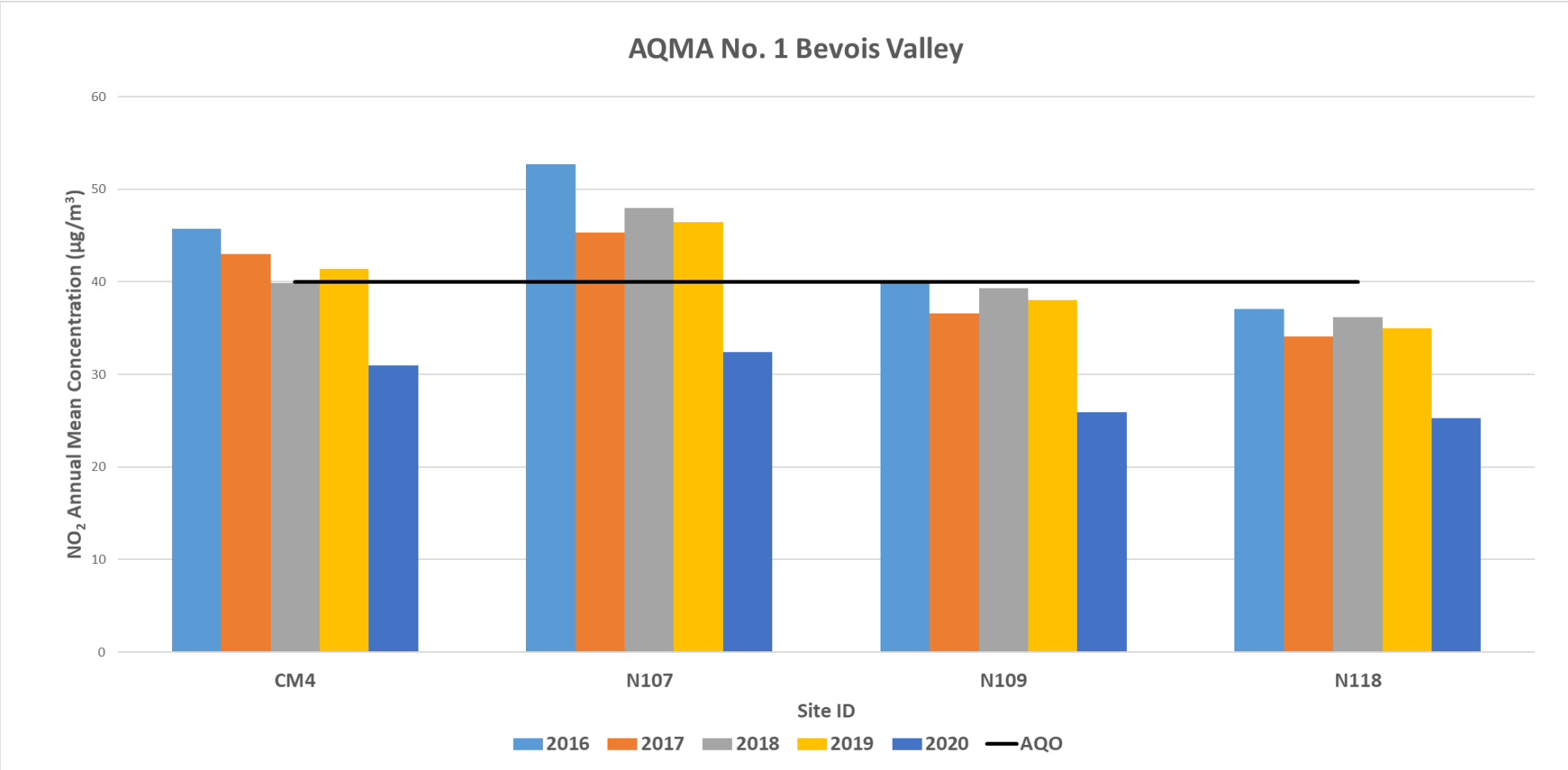
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

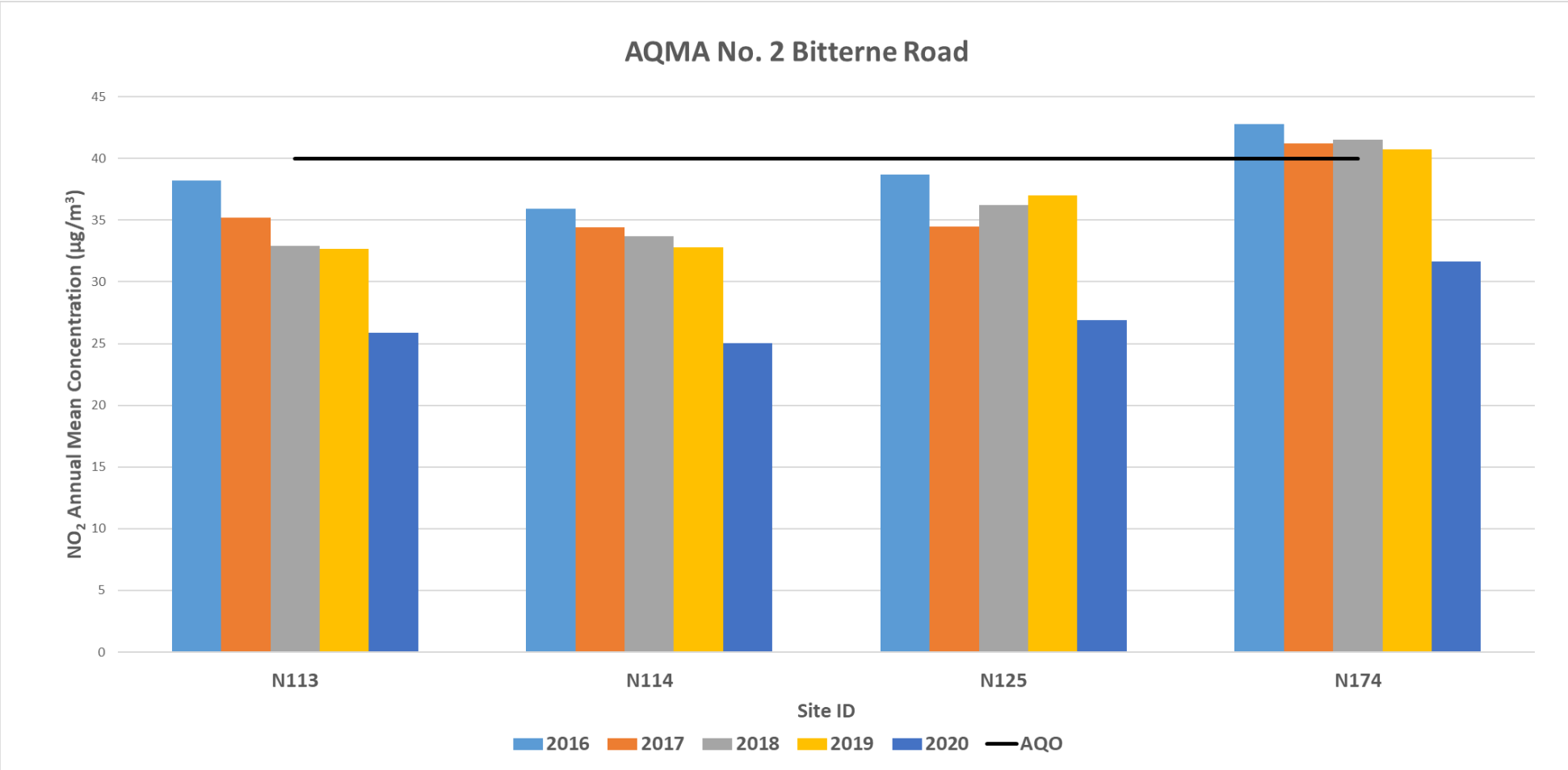
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

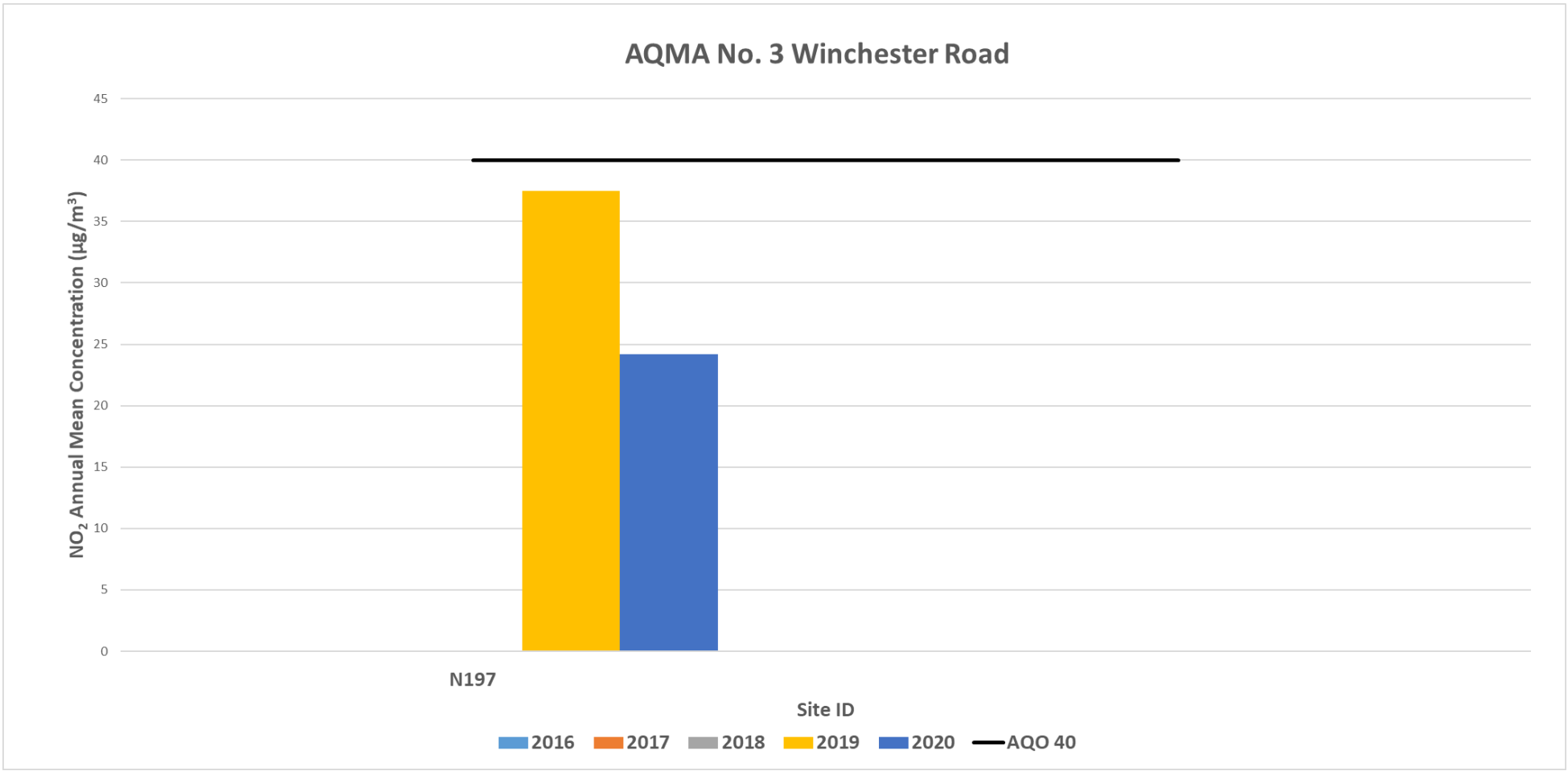
Figure A.1 – Trends in Annual Mean NO_2 Concentrations

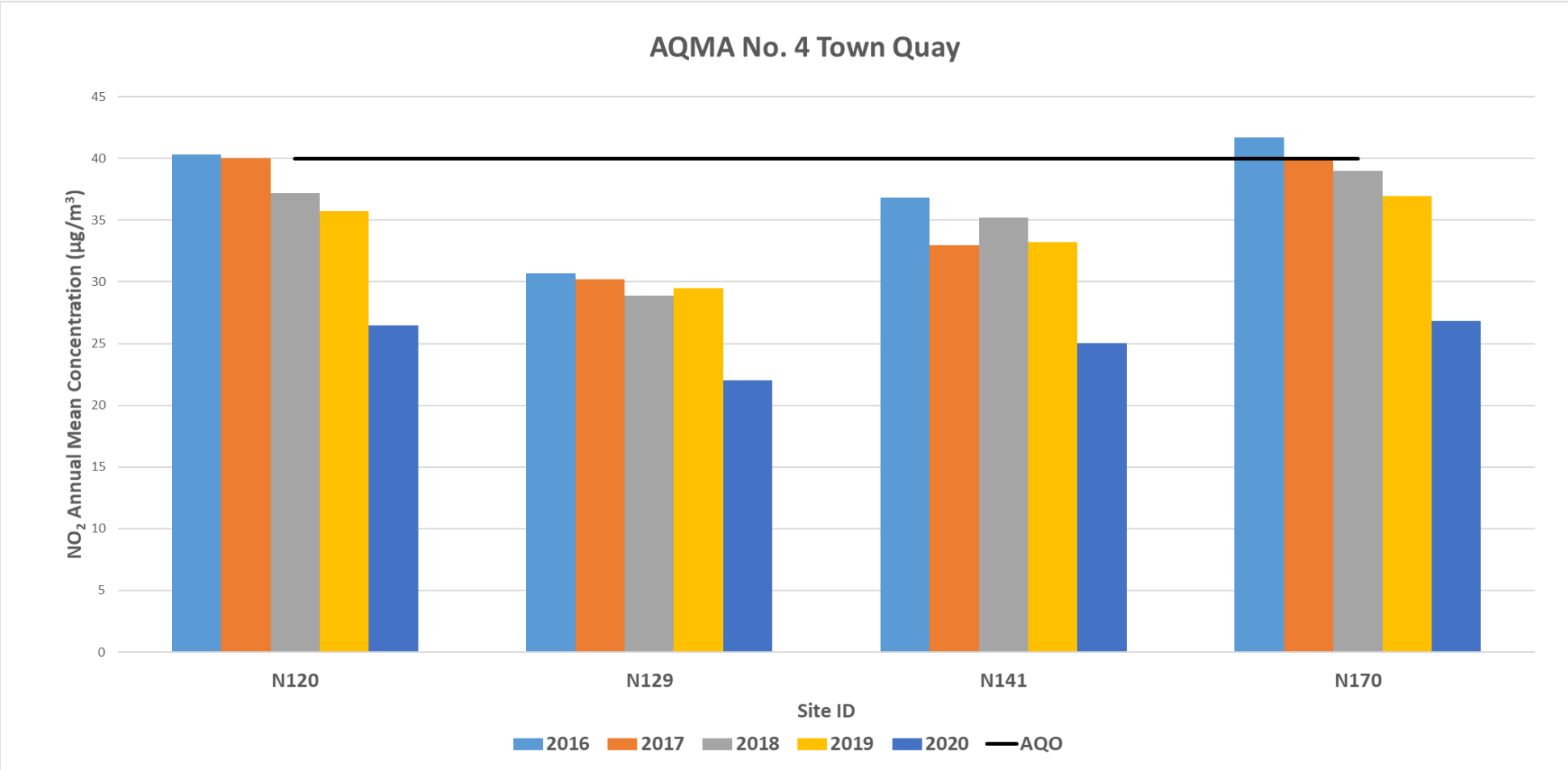


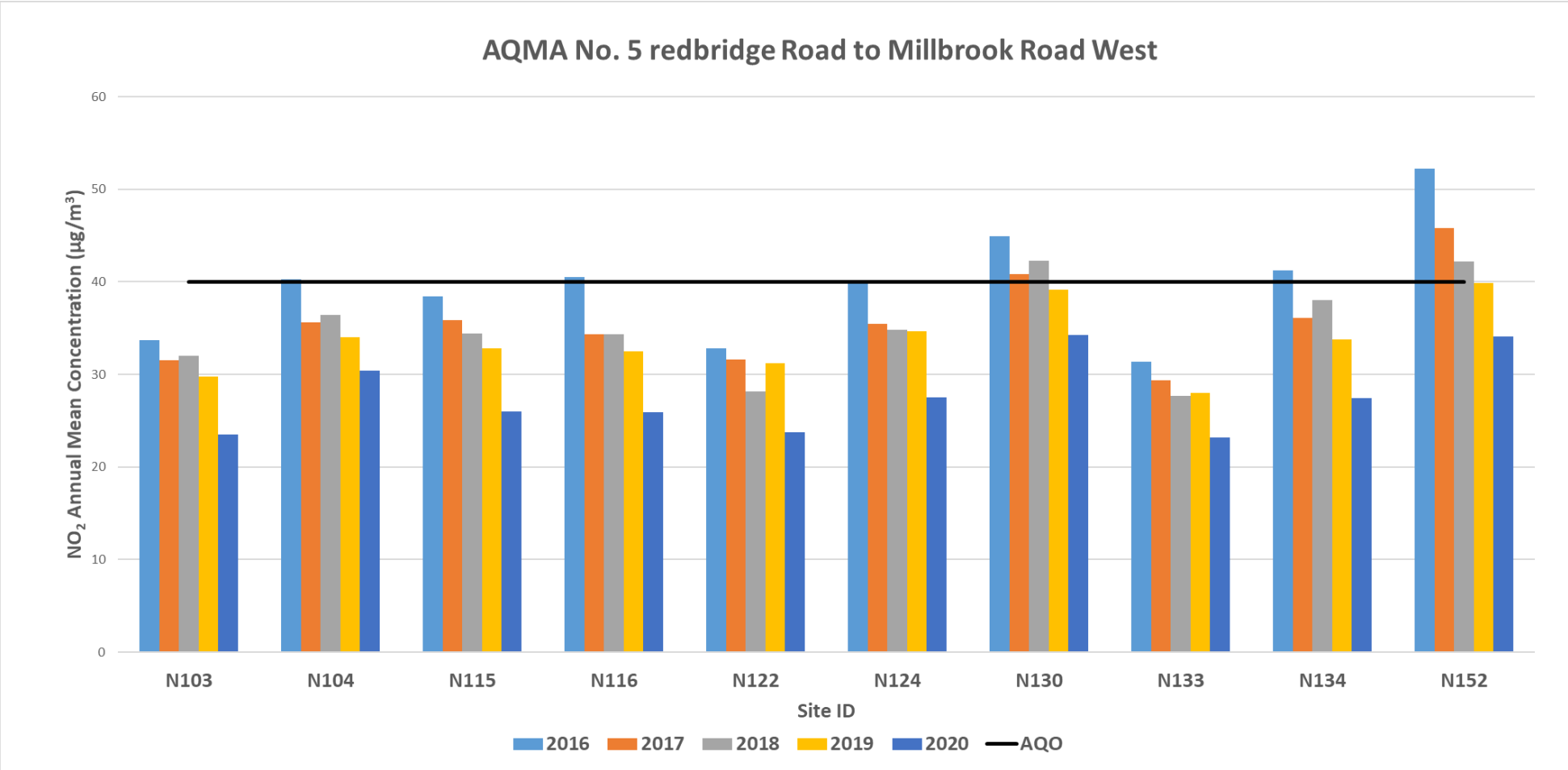

Outside AQMAs
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
N159
N161
N162
N164
N165
N167
N168
N172
N175
N176
N177
N178
N185
N186
Site ID
2016
2017
2018
2019
2020
AQO

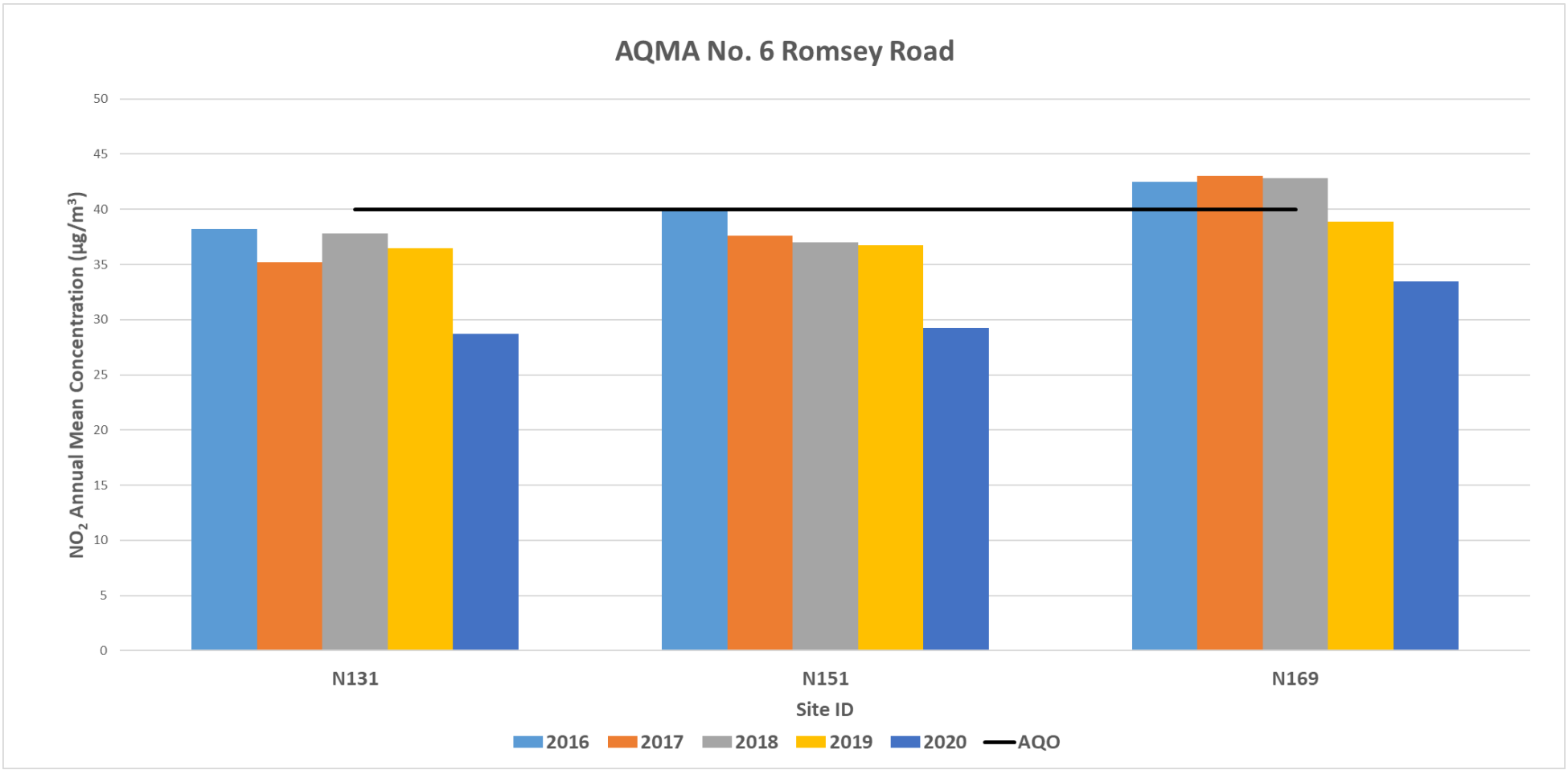

AQMA No. 1 Bevois Valley
60
50
40
30
20
10
0
NO2 Annual Mean Concentration (µg/m3)
CM4
N107
N109
N118
Site ID
2016
2017
2018
2019
2020
AQO

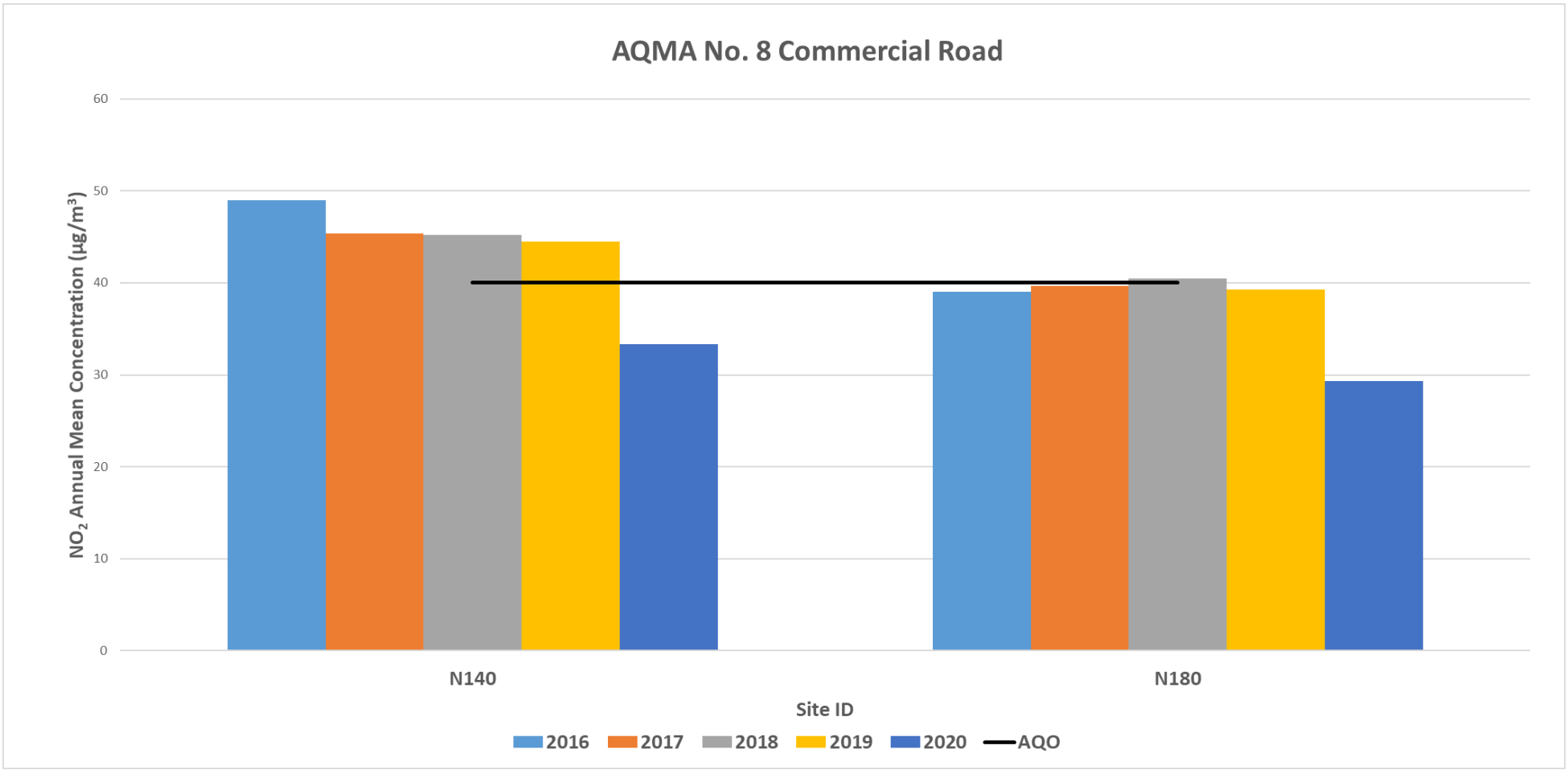

AQMA No. 2 Bitterne Road
45
40
35
30
25
20
15
10
5
0
NO2 Annual Mean Concentration (µg/m3)
N113
N114
N125
N174
Site ID
2016
2017
2018
2019
2020
AQO

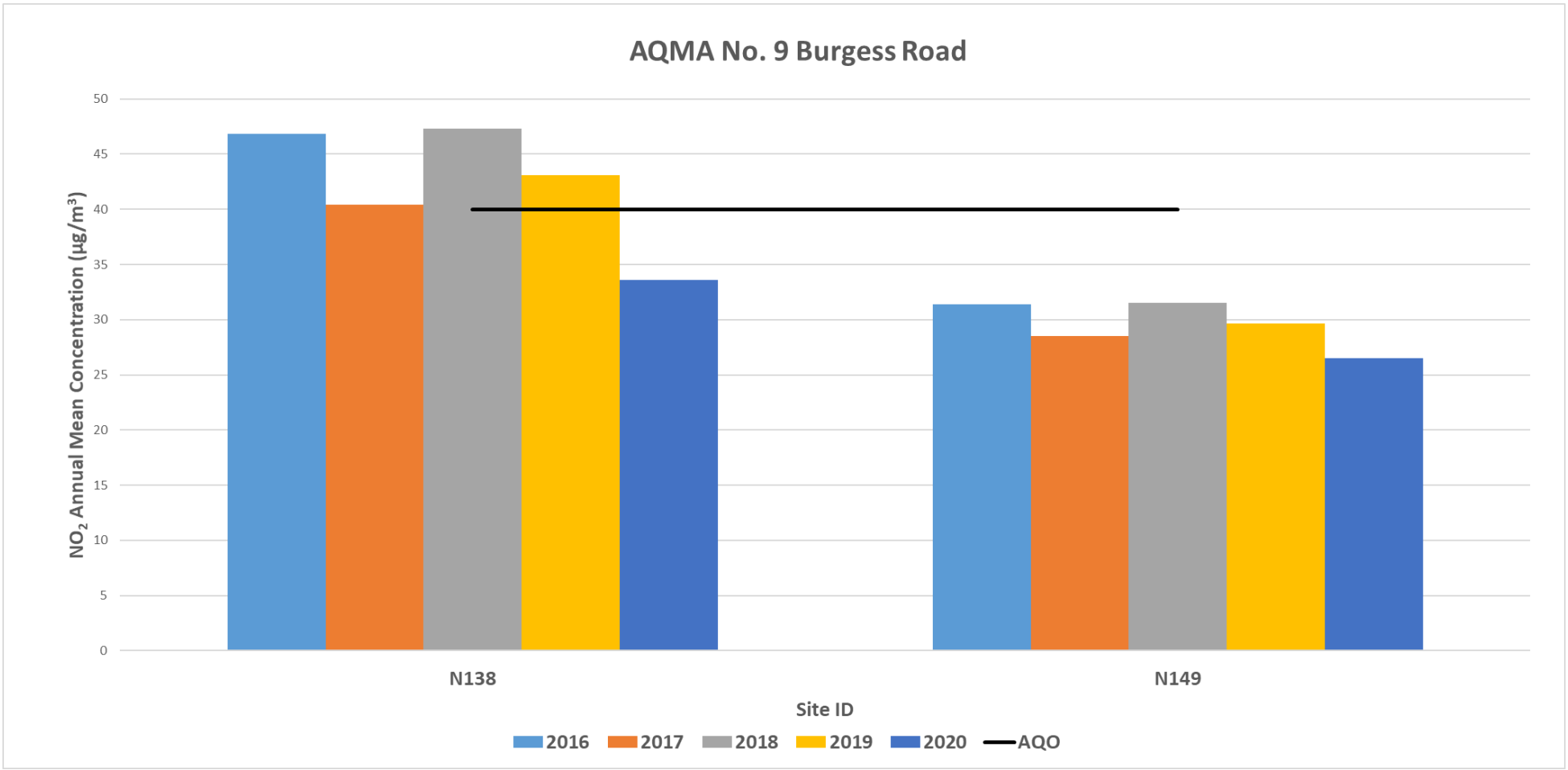

AQMA No. 3 Winchester Road
45
40
35
30
25
20
15
10
5
0
NO2 Annual Mean Concentration (µg/m3)
N197
Site ID
2016
2017
2018
2019
2020
AQO 40


AQMA No. 4 Town Quay
45
40
35
30
25
20
15
10
5
0
NO2 Annual Mean Concentration (µg/m3)
N120
N129
N141
N170
Site ID
2016
2017
2018
2019
2020
AQO


AQMA No. 5 redbridge Road to Millbrook Road West
60
50
40
30
20
10
0
NO2 Annual Mean Concentration (µg/m3)
N103
N104
N115
N116
N122
N124
N130
N133
N134
N152
Site ID
2016
2017
2018
2019
2020
AQO


AQMA No. 6 Romsey Road
50
45
40
35
30
25
20
15
10
5
0
NO2 Annual Mean Concentration (µg/m3)
N131
N151
N169
Site ID
2016
2017
2018
2019
2020
AQO


AQMA No. 8 Commercial Road
60
50
40
30
20
10
0
NO2 Annual Mean Concentration (µg/m3)
N140
N180
Site ID
2016
2017
2018
2019
2020
AQO


AQMA No. 9 Burgess Road
50
45
40
35
30
25
20
15
10
5
0
NO2 Annual Mean Concentration (µg/m3)
N138
N149
Site ID
2016
2017
2018
2019
2020
AQO

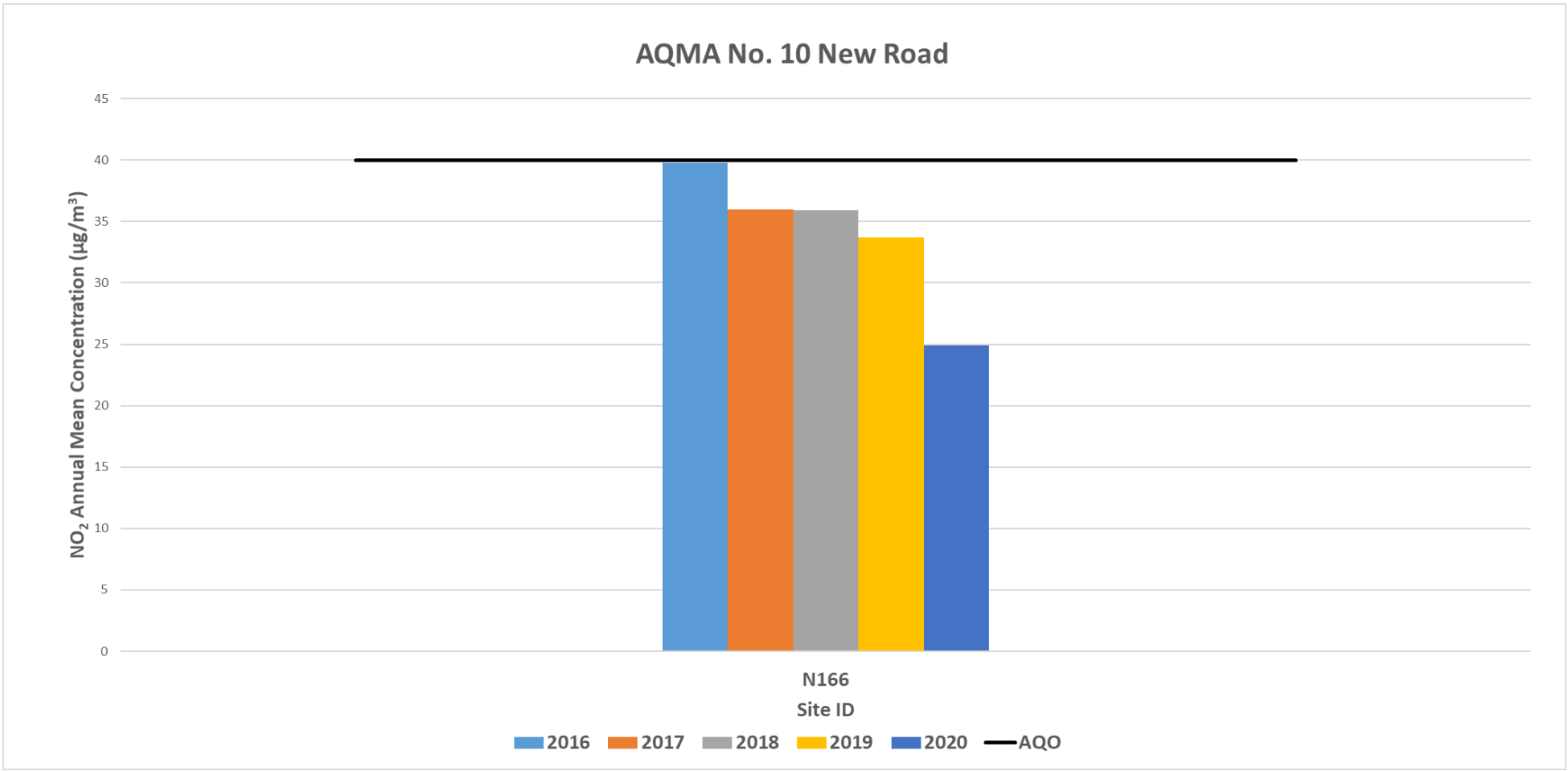

AQMA No. 10 New Road
45
40
35
30
25
20
15
10
5
0
NO2 Annual Mean Concentration (µg/m3)
N166
Site ID
2016
2017
2018
2019
2020
AQO

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
CM1	Urban Background	Automatic	Urban Background	Automatic	79.2	**0 (111)**	0	0	0	**0(96)**
CM4	Roadside	Automatic	Roadside	Automatic	94.6	6	0	0	0	0
CM6	Roadside	Automatic	Roadside	Automatic	96.3	**8 (185)**	**9 (178)**	0	**0(133)**	0
CM7	Roadside	Automatic	Roadside	Automatic	99.2	0	0	0	0	0

Notes:

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

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

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

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

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

Figure A.2 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

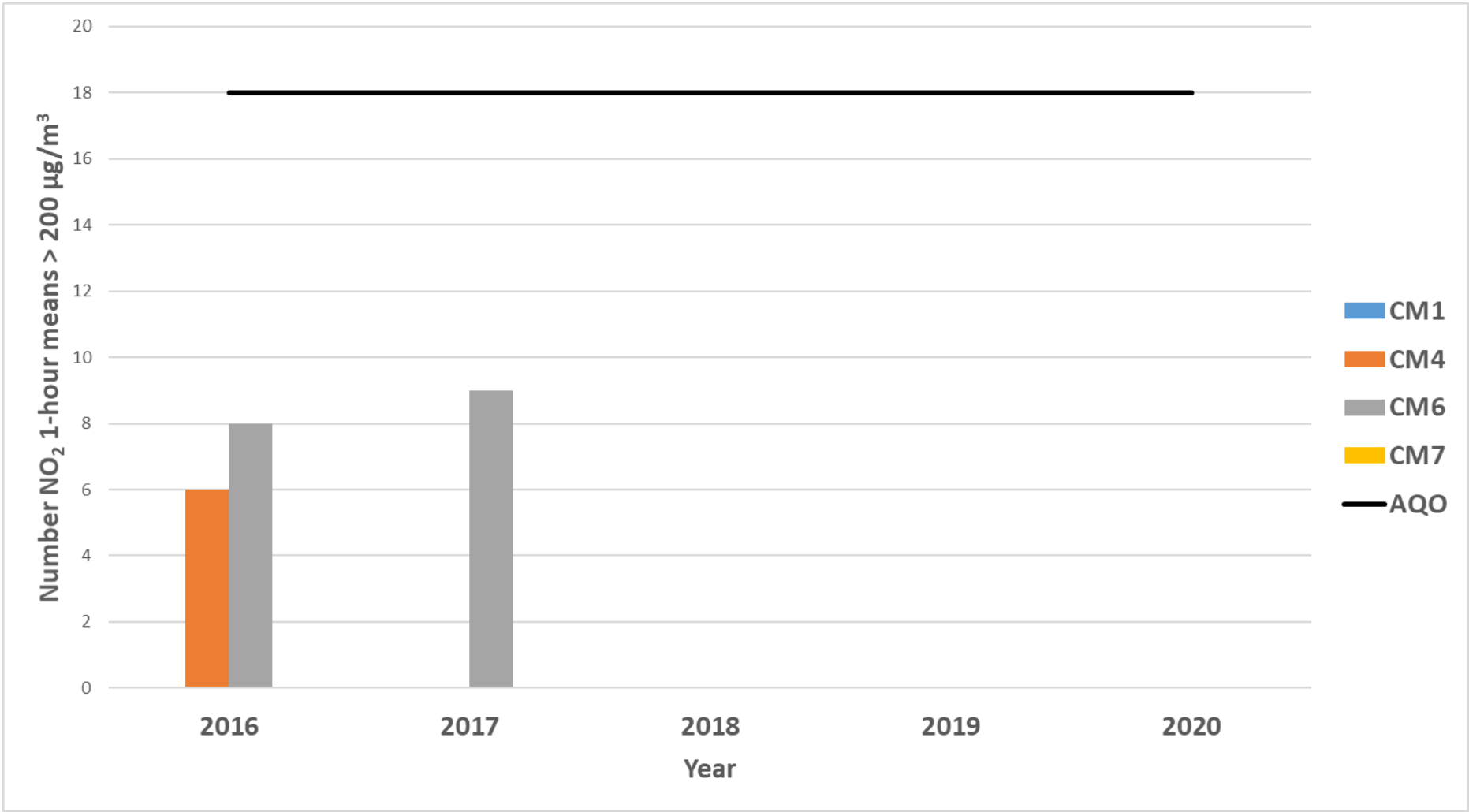


Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

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
CM1	442579	112248	Urban Background	99	99		**16.8**	**19.5**	**17.1**	**15**
CM7	437809	113560	Roadside	90	90	21.7	19.4	17.4	16.6	17

☒ **Annualisation has been conducted where data capture is <75% and >33% 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

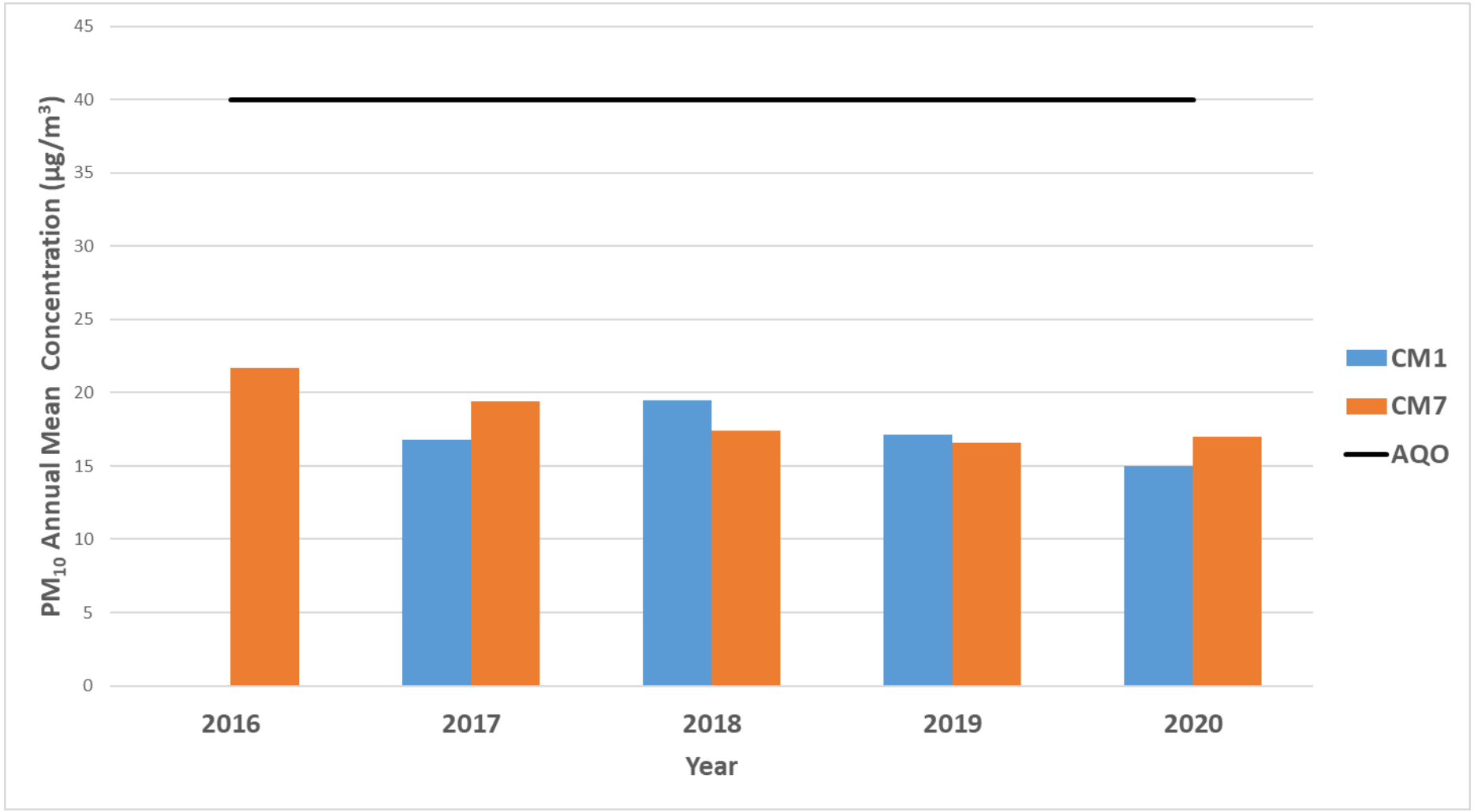


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

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
CM1	442579	112248	Urban Background	99	99	**0 (26.6)**	1	**1 (31.0)**	2	1
CM7	437809	113560	Roadside	90	90	**2 (33.2)**	2	**0 (27.8)**	2	2

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/m³

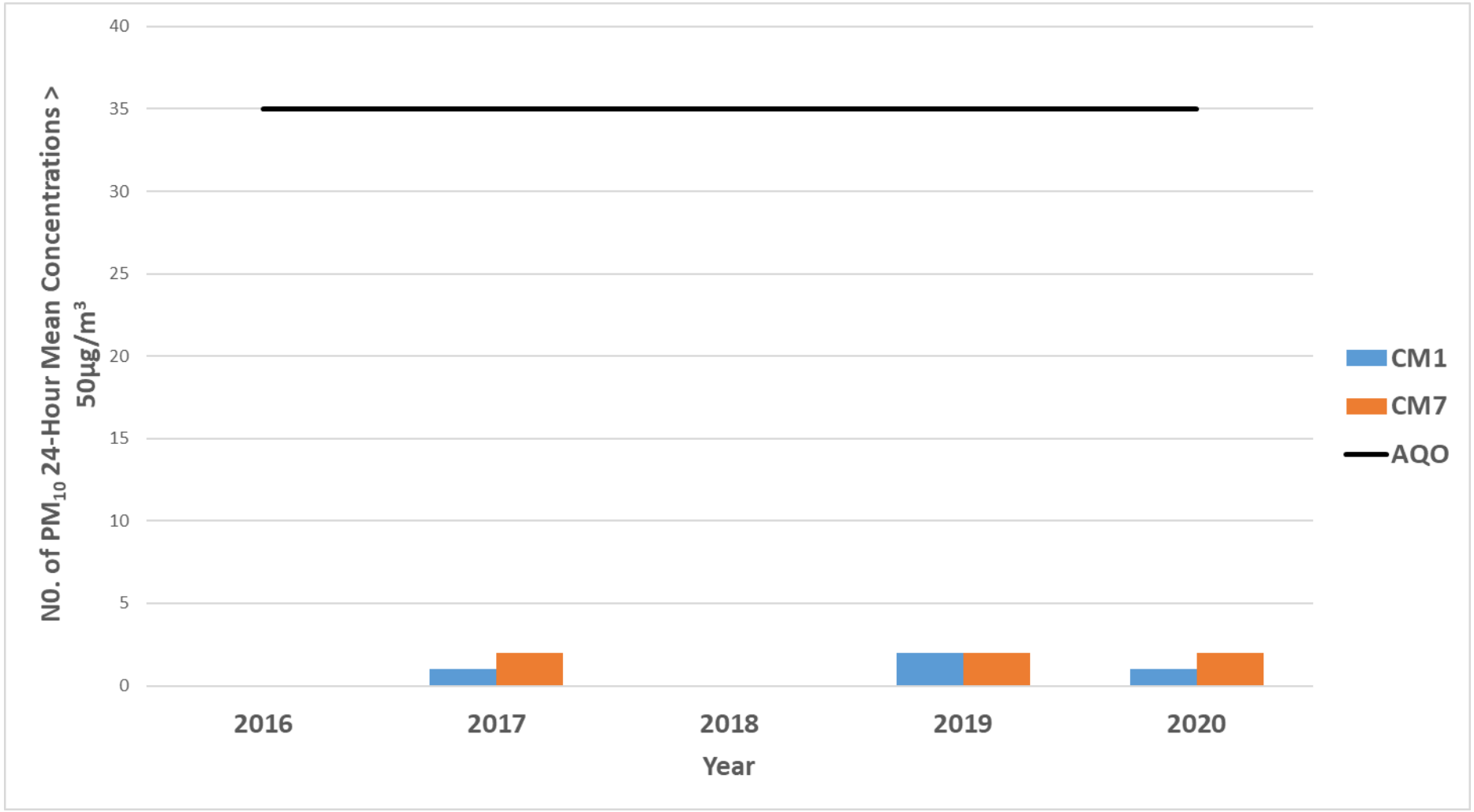


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

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
CM1	442579	112248	Urban Background	99	99		11.2	13.3	9.6	9

☒ **Annualisation has been conducted where data capture is <75% and >33% 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

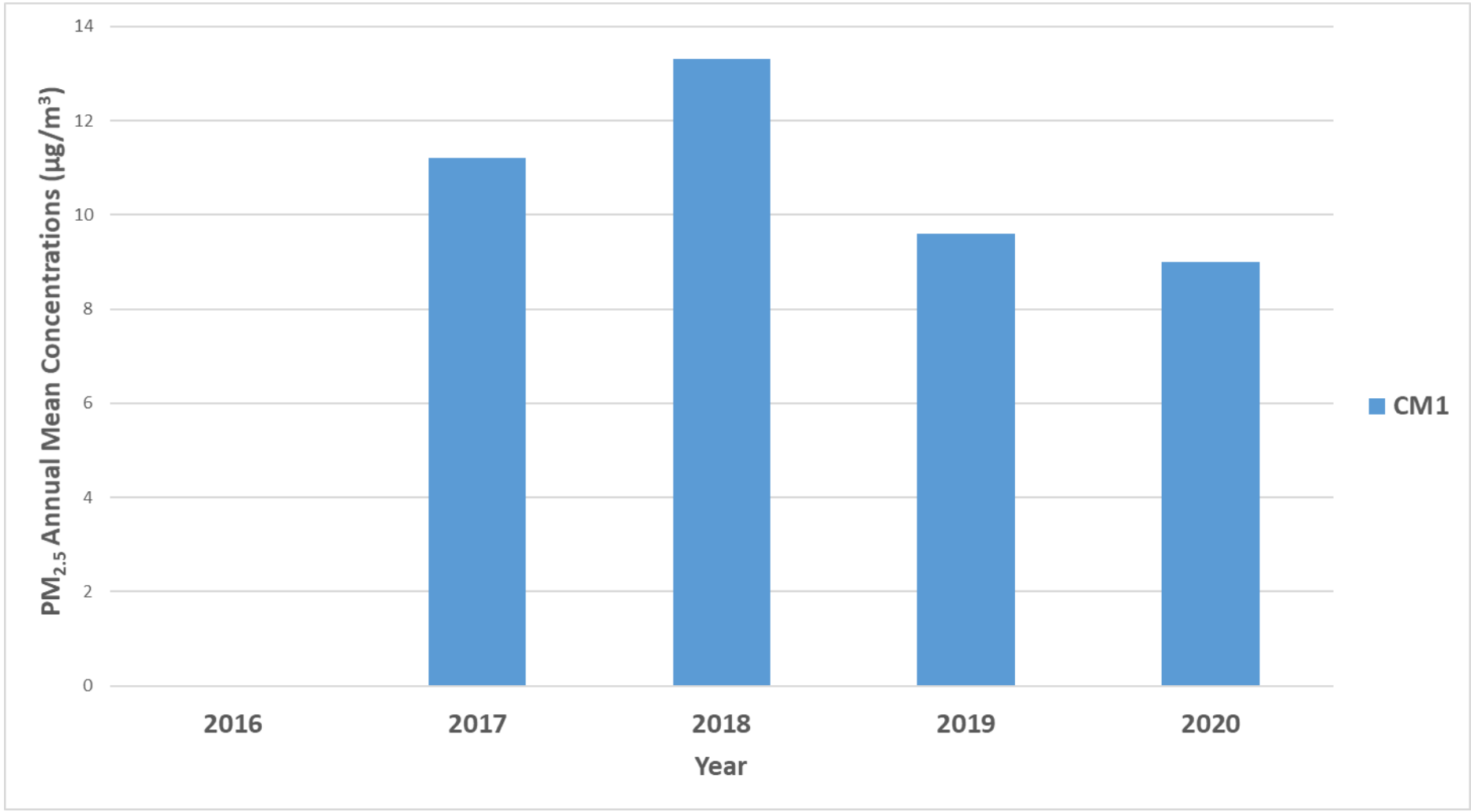


Table A.9 – SO_2 2020 Monitoring Results, Number of Relevant Instances

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)	Number of 15-minute Means > 266µg/m^3	Number of 1-hour Means > 350µg/m^3	Number of 24-hour Means > 125µg/m^3
CM1	442579	112248	Urban Background	94	94	0	0	0

Notes:

Results are presented as the number of instances where monitored concentrations are greater than the objective concentration.

Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year).

If the period of valid data is less than 85%, the relevant percentiles are 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%).

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 (0.81)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
N100	444387	114453	12.4	17.4	16.9	16.3	11.8	11.2	11.8	13.9	14.5	20.7	23.7	26.1	16.4	13.3	-	
N101	437548	113719	39.7	44.2	32.3	36.0	31.2	32.9	26.6	34.7	40.2	44.2	46.0	45.2	37.8	30.6	-	
N103	438808	112903	38.9	28.2	26.9	32.5	24.9	27.8	19.7	26.0	26.5	31.5	32.8	32.8	29.1	23.5	-	
N104	439222	112850	48.1	39.9	37.8	42.0	35.5	37.7	23.6	31.6	33.7	38.0	42.1	40.7	37.6	30.4	-	
N106	439752	113984	42.1	36.0	29.3	35.3	28.5	35.6	26.4	32.7	35.4	37.2	35.3	36.7	34.2	27.7	-	
N107	442364	112890	40.1	53.3	39.7	36.0	32.4	34.2	38.0	33.3	34.4	40.7	52.3	45.9	40.0	32.4	-	
N109	442585	113248		28.2		30.5	26.4	27.8	25.0	29.7	31.6	38.1	44.4	38.2	32.0	25.9	-	
N110	442579	112248	18.2	30.1	24.7	26.0	20.7	24.0	21.3	25.8	27.8	32.9	37.8	33.4	-	-	-	Triplicate Site with N110, N111 and N112 - Annual data provided for N112 only
N111	442579	112248	28.6	30.5	25.4	25.2	21.6	21.9	20.8	27.0	28.1	35.5	34.6	33.5	-	-	-	Triplicate Site with N110, N111 and N112 - Annual data provided for N112 only
N112	442579	112248	15.3	28.0	25.0	24.9	22.2	23.1	22.7	26.5	27.1	34.2	34.5	34.6	27.0	21.9	-	Triplicate Site with N110, N111 and N112 - Annual data provided for N112 only
N113	444124	113288	24.0	36.5	32.9	27.3	26.0	26.9	29.6	33.9	37.7	35.8	36.3	36.6	31.9	25.9	-	
N114	444131	113322	26.7	34.3	32.0	27.9	25.9	30.6	23.2	33.2	31.4	35.7	35.1	34.6	30.9	25.0	-	
N115	437939	113474	33.1	36.2	29.6	35.0	28.9	28.3	28.3	28.3	28.3	35.2	35.5	38.4	32.1	26.0	-	
N116	437952	113407	39.0	31.7	31.6	35.2	32.4	28.9	22.5	30.1	30.3	30.8	38.0	33.0	31.9	25.9	-	
N117	443752	111121	34.4	31.8	31.9	30.7	28.2	31.4	30.1	31.8	33.5	37.8	43.8	34.1	33.3	27.0	-	
N118	442472	113065	23.9	37.2	32.9	31.4	25.9	24.8		27.5	29.4	30.8	41.3	37.7	31.2	25.2	-	
N120	442716	111019	31.2	36.0	35.5	30.4	26.1	28.8	28.2	34.3	36.1	33.8	34.2	37.2	32.7	26.4	-	
N122	440000	112633	36.2	34.8	25.4	36.0	28.7	28.8	19.1	25.5	29.4	31.3	32.7	24.5	29.4	23.8	-	

N123	442348	112305	28.6	32.1	20.8		26.0	25.0	24.5	30.2	28.8	37.1	38.8	36.5	29.9	24.2	-	
N124	439741	112753	39.7	35.8	29.8	38.7	31.8	32.3	23.6	30.6	33.7	38.2	37.0	36.2	33.9	27.5	-	
N125	443125	112641	31.7	32.6	32.6	31.8	29.9	30.5	22.6	35.6	34.7	39.1	39.5	37.9	33.2	26.9	-	
N126	442365	112286	24.7	32.0	28.1	27.8	27.0	25.1	25.4	32.2	32.1	37.9	40.0	38.0	30.9	25.0	-	
N129	442554	111021	24.9	28.1	27.5	28.2	23.2	24.9	21.3	26.6	30.2	26.7	33.3	31.5	27.2	22.0	-	
N130	439346	112821	46.4	43.7	33.6	41.4	43.8	41.5	34.3	45.1	42.0	46.6	44.2	44.6	42.3	34.2	-	
N131	439378	114185	41.8	36.5	34.5	38.1	30.0	36.1	27.7	34.5	34.8	36.2	37.5	37.4	35.4	28.7	-	
N133	438609	113020	36.7	31.1	26.1	36.4	23.7	24.4	19.9	24.4	26.3	29.9	33.2	31.8	28.7	23.2	-	
N134	438980	112861	37.6	34.1	32.2	38.3	33.8	32.1	22.9	31.4	32.0	35.1	38.7	37.9	33.8	27.4	-	
N138	441697	115288	28.1	41.9	39.9	41.4	42.7	35.3	37.2	46.5	46.7	43.5	46.6	47.9	41.5	33.6	-	
N140	441628	112332	55.5	40.8	40.4	39.8	30.2	38.4	30.8	36.4		43.8	51.5	44.8	41.1	33.3	-	
N141	441923	110990	24.4	25.6	33.3	44.0	35.7	28.0	21.4	35.0	33.1	28.2	30.1	31.9	30.9	25.0	-	
N143	439457	114150	40.9	43.3	32.9	34.0	26.2	31.7	27.2	29.1	34.3	38.3	35.8	35.9	34.1	27.6	-	
N144	443147	112709	32.9	31.4	27.9	24.5	23.4	26.1	22.6	30.4	31.0	35.6	33.6	32.3	29.3	23.7	-	
N146	443164	112741	32.7	30.4	26.0	24.1	21.1	23.4	19.9	27.1	27.4	32.8	30.9	27.6	26.9	21.8	-	
N149	441552	115247	29.9	35.6	29.7	29.0	25.1	26.8	32.3	32.7	34.6	41.3	40.6	34.9	32.7	26.5	-	
N151	439394	114176	38.6	41.2	35.0	37.3	29.9	38.4	28.9	34.1	36.1	34.1	41.5	37.8	36.1	29.2	-	
N152	437327	113848	50.8	44.5	39.3	42.7	38.9	37.2	28.8	41.2	40.5	44.0	47.6	49.1	42.1	34.1	-	
N158	443807	111123	38.6	36.9	33.7	34.7	33.1	34.9	32.5	38.1	35.3	38.0	40.8	37.3	36.1	29.3	-	
N159	443740	111147	37.7	29.4	30.3	33.7	31.5	28.8	31.5	33.3	35.6	37.0	39.7	38.2	33.9	27.5	-	
N161	442705	114129	29.9	30.2	27.2	27.6	24.0	21.9	24.4	28.0	36.3	34.5	39.6	33.1	29.7	24.1	-	
N162	442872	114336	16.2	39.3	34.4	28.7	25.6	28.3	37.8	30.4		39.9	40.7	35.9	32.5	26.3	-	
N164	442809	114241	28.3	29.3	29.0	28.5	21.1	26.4	22.7	31.0	29.5	33.0	40.4	32.8	29.3	23.8	-	

N165	442766	114181	30.0	32.9	30.5	30.9	26.9	27.8	25.7	32.4	30.8	31.3	40.4	35.8	31.3	25.3	-	
N166	442251	112129	18.8		31.2	29.2	28.3	28.4	26.1		34.3		44.3		30.1	24.9	-	
N167	439759	114011	39.6	26.5	29.0	37.9	28.3	27.0	21.6			57.9	35.0	38.9	34.2	27.7	-	
N168	439737	114025	37.5	28.4	30.9			26.5	22.5	30.2	36.5	35.5	40.6	39.1	32.8	26.5	-	
N169	439361	114195	46.9	48.9	38.2	42.4	35.8	44.3	30.6	41.1	38.4	44.7	44.1	40.5	41.3	33.5	-	
N170	442482	111003			32.2	32.2	30.3	30.4	27.4	36.0	38.5	35.1	35.9		33.1	26.8	-	
N172	442207	112126	38.6	46.6	34.8	29.2	27.2	34.9	35.2	38.3	41.4	43.7	41.4	44.2	38.0	30.8	-	
N174	443959	113315	34.8	43.8	40.8	30.9	32.0	35.3	30.6	43.0	41.3	45.8	43.3	47.3	39.1	31.6	-	
N175	439959	113737	43.2	38.5		58.0	27.2	30.5	24.6	30.9	32.3	38.3	38.8	38.5	36.4	29.5	-	
N176	439772	113952	38.8	26.8	29.3	35.6	27.5	31.0	22.3	30.9	29.7	30.7	38.4	37.4	31.5	25.5	-	
N177	439844	113907	39.0	32.3	28.9	40.4	30.8	32.6	22.2	28.1	30.1	35.0	41.7	32.6	32.8	26.6	-	
N178	437265	113682	27.0	23.3	21.9	29.1	23.0	24.6	11.8	24.4	20.2	23.4	28.6	27.6	23.7	19.2	-	
N180	441633	112318	51.1	40.4	32.8	36.4	26.5	35.6	23.2	32.3		41.6		42.3	36.2	29.3	-	
N184A	437811	113557	48.6	45.7	31.9	42.0	29.4	36.5	24.5	33.2	32.4	40.2	38.9	45.1	-	-	-	Triplicate Site with N184A, N184B and N184C - Annual data provided for N184C only
N184B	437811	113557	46.4	42.0	34.1	36.8	22.8	34.0	23.6	32.0	32.1	36.5	42.4	43.7	-	-	-	Triplicate Site with N184A, N184B and N184C - Annual data provided for N184C only
N184C	437811	113557	45.9	47.7	34.1	37.3	32.3	33.7	22.8	31.1	32.3	36.8	43.0	44.4	36.6	29.6	-	Triplicate Site with N184A, N184B and N184C - Annual data provided for N184C only
N185	437167	113713	54.5	53.1	44.7	41.5	43.4	38.8	36.8	38.9	45.7	51.7	54.5	54.3	46.5	37.7	22.3	
N186	437126	113701	41.1	36.7		30.4	38.0	26.9	29.6			35.9			34.1	28.5	-	
N187	444102	113872	19.2	40.1	32.0	31.0	23.1	25.8	29.5	35.3	32.1	42.0	40.8	40.7	32.6	26.4	-	
N188	441300	112233	42.8	35.9	31.1	40.0	28.3	28.8	21.7	27.8	32.4	34.1	39.6	38.6	33.4	27.1	-	
N189	441790	112465	44.3	35.6		31.7	24.5	26.9	24.9	30.9	36.4	39.1	40.7	39.5	34.0	27.6	-	
N190	442024	112553	49.1	38.3	38.2	34.7	24.6	31.0	30.6	32.7	40.2	45.5	44.5	41.1	37.5	30.4	-	
N191	441915	112097	39.5	50.6	40.9	35.3	31.3	38.6	44.5	40.3	38.0	45.7	45.9	46.3	41.4	33.5	-	

N192	441961	112029	28.8	51.3	38.6	32.3	30.8	32.9	40.3	41.0	49.2	49.3	45.5	47.3	40.6	32.9	-	
N193	441975	112031	27.2	39.7	32.8	30.9	25.5	26.2	28.7	33.2	32.2		42.1	39.1	32.5	26.3	-	
N194	442090	111775	47.2	54.0	43.6	34.4	36.6	47.3	49.4	44.9	49.9	59.4	55.9	46.4	47.4	38.4	-	
N195	441945	111655	40.7	35.3	38.3	34.9	33.5	30.9	35.2	36.2	43.3	43.3	52.0	47.7	39.3	31.8	-	
N197	440957	115151	24.0	35.6	30.5	27.7	25.9	27.1	22.7	30.8	25.0	36.9	38.3	33.6	29.9	24.2	-	
N198A	442304	112771	33.2	38.2	33.2	29.6	25.1	27.2	28.6	29.4	32.9	35.3	40.2	37.2	-	-	-	Triplicate Site with N198A, N198B and N198C - Annual data provided for N198C only
N198B	442304	112771	33.4	41.4	31.6	29.1	25.7	24.5	28.4	27.7	31.4	38.1	42.6	34.1	-	-	-	Triplicate Site with N198A, N198B and N198C - Annual data provided for N198C only
N198C	442304	112771	24.4	40.6	34.2	28.7	25.4	27.3	26.7	28.3	31.1	38.1	45.9	36.8	32.4	26.2	-	Triplicate Site with N198A, N198B and N198C - Annual data provided for N198C only
N199	442210	112583	23.2	40.4	42.7	37.9		34.1	28.9	35.6	38.0	46.9	50.3	42.4	38.2	30.9	-	
N200	443160	112765	30.4	38.9	33.1	27.1	24.3	29.8	25.0	34.7		40.7	39.6	41.7	33.2	26.9	-	
N201	439759	112738			42.6	53.6	44.6	42.1	36.6				56.9		46.1	39.6	29.2	
N202	437166	113755		55.3	41.8	40.2			32.7	48.0	46.0	53.4	53.4	49.2	46.7	37.8	-	
N204	442542	113261	18.7	29.8	31.5	29.9	26.4	28.2	29.4			37.0	44.3	35.3	31.1	25.2	-	
N205	442101	113438	19.3	32.3	31.4	30.9	24.8	30.1	29.9	36.1	38.2	38.8	43.7	37.9	32.8	26.5	-	
N206	442265	112516	41.8	39.9	36.0	33.3	35.5	27.2	32.9	43.4	34.2	43.9	41.1	46.4	38.0	30.8	-	
N207	439698	112806	47.5	41.6	31.3	42.7	29.3	32.9	23.0	28.7	28.6	35.3	34.6	36.9	34.4	27.8	-	
N208	441365	115202	25.5	38.9	30.5	29.8	25.9	25.8	20.6	31.6	34.9		33.4	25.9	29.3	23.8	-	
N209	441246	115138	22.9	48.9	30.4	27.4	21.8	23.6	25.2			35.0	38.9	37.6	31.2	25.2	-	
N210	441122	115118	39.0	35.5	35.2	26.2	26.4	27.4	28.8	33.2	32.8	39.7	48.6	38.1	34.2	27.7	-	
N211	437332	113873	32.9	26.1	25.4	31.0	22.4	26.6	13.7	26.0	22.1	28.1	31.2	31.3	26.4	21.4	-	
N213	442935	114374	25.0	30.9	26.1	24.9	21.7	22.1	23.8	26.9	29.6	33.8	40.4	30.7	28.0	22.7	-	
N214	441677	115280	29.4	35.6	31.7	31.4	26.4	26.5	23.5	32.2	34.0	37.3	36.3	33.8	31.5	25.5	-	
N216	442352	113486	26.1	31.8	31.8	28.8	24.2	28.3	26.3	33.7	24.4	36.3	44.2	36.4	31.0	25.1	-	

N217	440751	112188	39.5	32.2	33.1	46.2	32.1	31.1	21.5	29.7	32.3	40.9	41.8	37.7	34.9	28.2	-	
N218	443547	114101			33.4	25.3	30.6	26.9	31.2	38.0	35.3	38.4	39.8	33.3	33.2	26.9	-	

☒ **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 >33% in line with LAQM.TG16**

☐ **Local bias adjustment factor used (confirm by selecting in box).**

☒ **National bias adjustment factor used**

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

☒ **Southampton City Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Southampton City Council During 2020

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

Additional Air Quality Works Undertaken by Southampton City Council During 2020

Southampton City Council has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

The determination of NO_2 diffusion tube precision is obtained from the triplicate sites on the sample inlet roof of the CM1 Brintons Road AURN Station and CM7 Redbridge AURN Station.

Southampton use Gradko International Ltd for the supply and analysis of diffusion tubes. They are a UKAS accredited

Gradko is accredited to ISO 17025:2017 They follow the procedures set out by the DEFRA Harmonisation Practical Guidance and participate in the AIR PT scheme for NO2 diffusion tube analysis and annual Inter-Comparison Exercise. The laboratory carried out internal blind testing in September 2020 as Air PT samples could not be provided due to Covid-19. This cannot be considered the same as proficiency testing but is included to provide reassurance of laboratory performance during this period.

Gradko International Ltd (Trading as Gradko Environmental)

Testing Laboratory No. 2187

Is accredited in accordance with International Standard ISO/IEC 17025:2017

– General Requirements for the competence of testing and calibration laboratories.

Initial Accreditation: 31 January 2001

Certificate Issued: 15 April 2020

This accreditation demonstrates technical competence for a defined scope specified in the schedule to this certificate, and the operation of a management system (refer joint ISO-ILAC-IAF Communiqué dated April 2017). The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued.

The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from www.ukas.com. This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements.

Locations, distances from nearest receptors and distances to relevant receptors for diffusion tubes are annually reviewed to ensure that GIS locations and measurements are accurate and up-to-date.

QA/QC of Automatic Monitoring

CM1 and CM7 are part of the Automatic Urban and Rural Network (AURN). Details of quality assurance/control at AURN sites can be found at Defra's webpages[8].

CM4 and CM6 are supported by Air Quality Data Management (AQDM) and Envitech Europe Ltd which includes six-monthly UKAS-accredited, to ISO 17025, independent equipment audits by NPL which exceed AURN standards. Audit results used extensively in measurement ratification. AQDM sub-contracts this specialist work to The National Physical Laboratory (NPL), the national measurement standards laboratory for the UK. NPL currently carries out around 180 audits per year under King's contracts. NPL is a world-leading centre of excellence in developing and applying accurate measurement standards. In addition to fulfilling the recommendations of LAQM TG16, NPL's audits meet the testing requirements for air quality measurement methods stipulated in the CEN standards (for example, NO_2 and NO_x: EN 14211:2005) which are specified for compliance with the EU ambient air quality directive (2008/50/EC). This arrangement also ensures equipment testing that is completely independent of the data management unit, the Local Site Operators and the Equipment Support Unit. NPL is accredited by UKAS to ISO 17025

[8] https://uk-air.defra.gov.uk/assets/documents/Data_Validation_and_Ratification_Process_Apr_2017.pdf

for these measurements (Certificate 0478). The accredited activities at NPL are also covered by the lab-wide Quality Management System which has been certified by Lloyds Register Quality Assurance as conforming to ISO 9001:1994 since June 1996 (Certificate 938168). Their UKAS certificate for this work can be found at the following link:

https://www.ukas.com/wp-content/uploads/schedule_uploads/00001/0478Calibration%20Multiple.pdf

NPL audits comprise:

- Single-point zero and span tests using scrubbed zero air, certified gas cylinders, an ozone generator and reference photometer.
- Multi-point assessment of analyser linearity using diluted high concentration gases, an ozone generator and reference photometer.
- Measurement of NO_X converter efficiency using gas phase titration. NPL is the only UK organisation to hold UKAS accreditation for this test.
- Assessment of analyser zero and span noise.
- Hydrocarbon interference test for SO_2 analysers.
- Drift tests and certification of on-site gas standards. NPL is the only UK organisation to hold UKAS accreditation for this test.
- Leak tests.
- Multi-point verification of micro-balances for TEOMs and FDMSs using four pre-weighed filters.
- Flow checks for particulate analysers.
- Sampling system testing to assess any ambient sample loss in manifolds and inlet lines, as necessitated by recent revisions to CEN standards. NPL is the only UK organisation to hold UKAS accreditation for this test.

AQDM also carry out measurement ratification where measurements collected over a long time period are subject to additional checks; previous validation decisions are reviewed with the benefit of hindsight and using a greater pool of information such as service records, calibration records and the results of intercalibration/audit. Measurement ratification is in accordance with LAQM TG16.

Local Site Operation (LSO) duties are undertaken by trained SCC staff including fortnightly site visits to perform calibrations and onsite fault investigation.

Servicing and maintenance of the 2 NOx Analysers was contracted to ESU1 in 2020.

Data is disseminated via. Air Quality in Southampton (southamptonair.org.uk)

AURN data and information can be found here: https://uk-air.defra.gov.uk/networks/network-info?view=aurn.

Diffusion Tube Annualisation

Sites where there is less than 75% data capture require annualization.

Annualisation has been undertaken in accordance with LAQM TG box 7.9 and 7.10

The Defra Diffusion tube Data Processing Tool was used for the calculation.

Please see Table below

Diffusion Tube ID	Annualisation Factor Southampton Centre AURN	Annualisation Factor A33 AURN	Annualisation Factor Onslow Road AMS	Annualisation Factor Victoria Road AMS	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)
N166		1.0122	1.0301	1.0225	1.0216	30.1	30.7
N186		0.9997	1.0341	1.0584	1.0307	34.1	35.1
N201		1.0543	1.1017	1.0310	1.0623	46.1	48.9

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.

Southampton City Council have applied a national bias adjustment factor of 0.81 to the 2020 monitoring data. A summary of bias adjustment factors used by Southampton City Council over the past five years is presented in Table C.1.

The nitrogen dioxide diffusion tubes were supplied and analysed by Gradko International Ltd. The preparation method used for the diffusion tubes was 20% TEA (triethanolamine) in water. The national bias adjustment factor for Gradko using the preparation method of 20% TEA in water (2020) was 0.81. March 2020 Update, average of 18 co-location studies. The use of the national bias adjustment was chosen as it is consistent with previous Southampton City Council ASR reporting. The 18 Studies include 2 of Southampton's studies.

The average local bias adjustment factor calculated using the CM1 AURN Brintons Road Automatic Station, CM7 Redbridge AURN and CM4 Onslow Road Station Co-Location Triplicate Tube Studies was 0.82, very similar to the National Factor.

The national factor did have less studies than in a normal year with only 18, the previous year had 32 studies. Accuracy may have been affected by this reduction in studies due to the Covid Pandemic.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.81
2019	National	03/20	0.93
2018	National	03/19	0.92
2017	National	06/18	0.87
2016	National	06/17	0.95

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.

2 NO_2 diffusion tubes were estimated using the fall-off distance from the Road. N185 and N201, although N185 result must be treated with caution as the receptor is more than 20m from the kerb than the monitor.

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

CM1 AURN Station uses a new Fidas Particulate Monitor

CM7 AURN Station uses a BAM Instrument

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

Site ID	Annualisation Factor Southampton Centre AURN	Annualisation Factor A33 AURN	Annualisation Factor Onslow Road AMS		Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
N166	1.0122	1.0301	1.0225		1.0216	30.1	30.7	
N186	0.9997	1.0341	1.0584		1.0307	34.1	35.1	
N201	1.0543	1.1017	1.0310		1.0623	46.1	48.9	

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	9	12	10		
Bias Factor A	0.82 (0.75 - 0.91)	0.73 (0.69 - 0.77)	0.94 (0.86 - 1.05)		
Bias Factor B	21% (10% - 33%)	37% (29% - 44%)	6% (-4% - 16%)		
Diffusion Tube Mean (µg/m^3)					
Mean CV (Precision)	26.0	36.6	32.6		
Automatic Mean (µg/m^3)	3.2%	5.2%	5.4%		
Data Capture					
Adjusted Tube Mean (µg/m^3)	21.4	26.7	30.8		

Notes:

Southampton City Council used the National Factor of 0.81 for bias adjusting (18 studies) , the local factor (3 Studies) was 0.82

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
N185	2.4	31.6	37.7	13.3	22.3	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution. Redbridge Causeway 1, by traffic lights, receptor also at a different elevation to the tube*
N194	4.0		38.4	13.3	-	*Vincents Walk Bus Stops in city centre, more than 50m from a receptor, established to monitor Idling buses after complaints from the public*
N201	1.2	8.0	39.6	13.3	29.2	*289 Millbrook Road on kerb post, 8m from house, established for national modelling comparison for Defra*
N202	1.2		37.8	13.3	-	*Redbridge Causeway North more than 50m from a receptor on a Road Bridge across River Test, established for national modelling comparison for Defra*

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

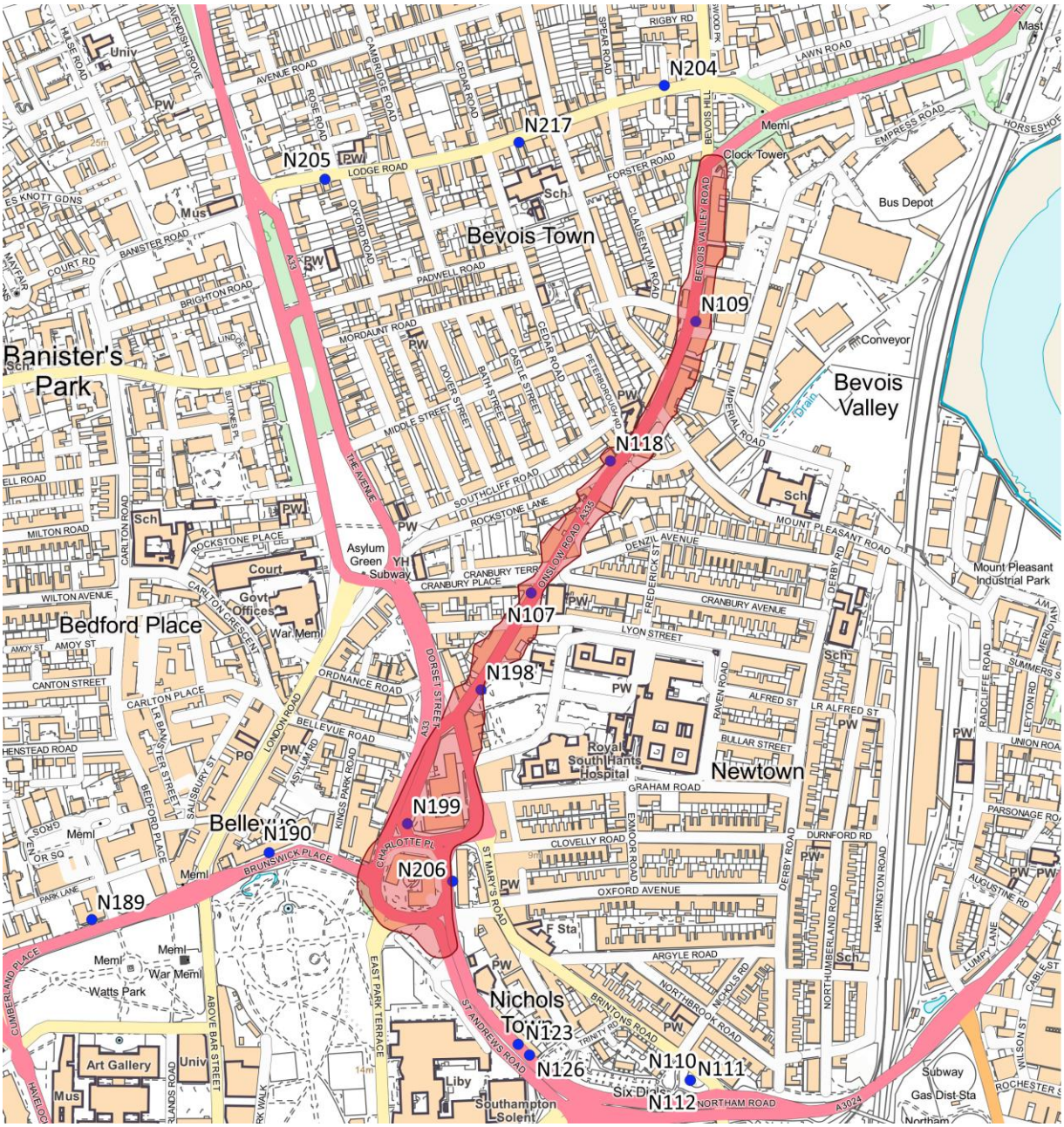


Figure D.1 – AQMA 1 Bevois Valley and NO2 diffusion tube monitoring locations

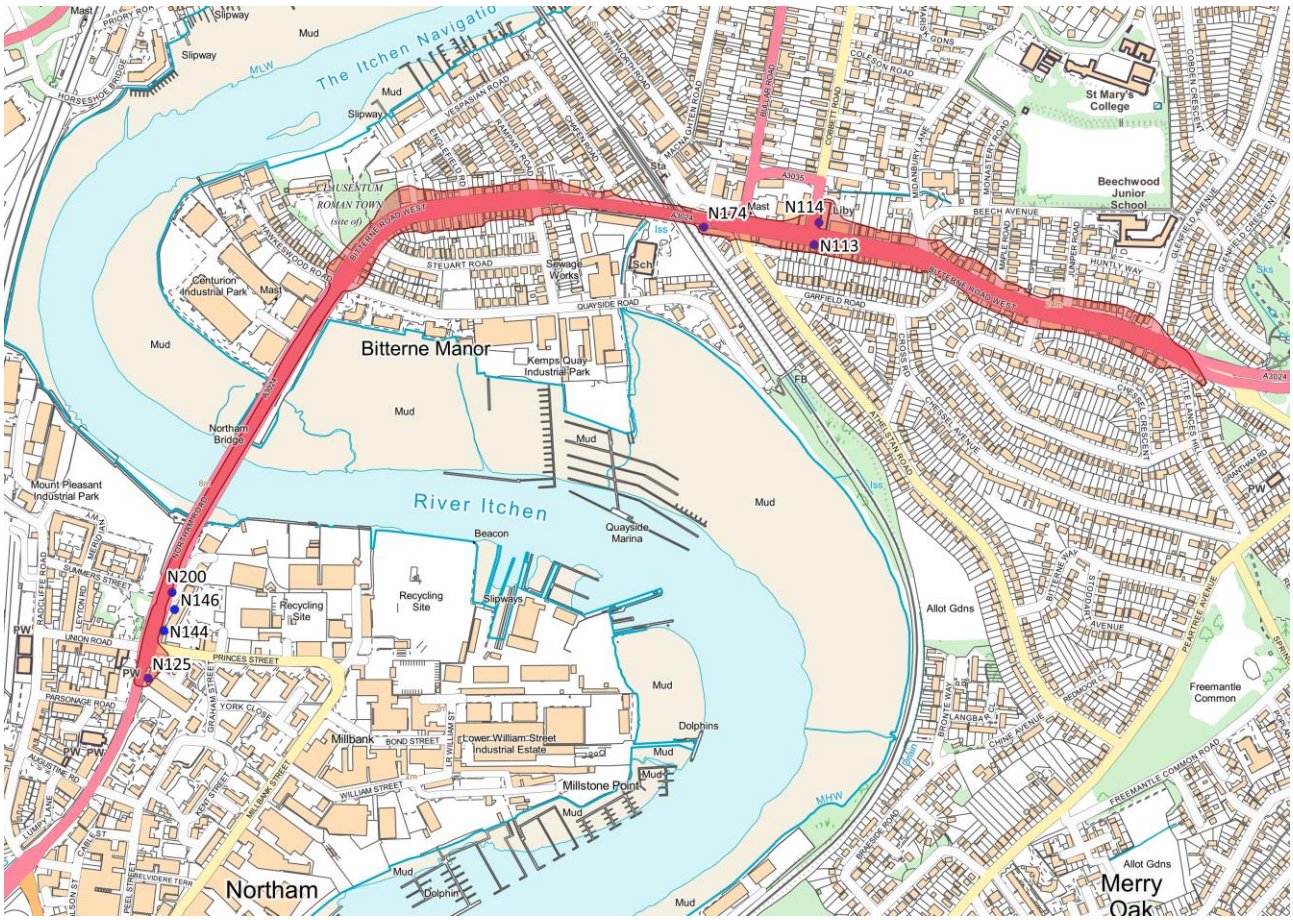


Figure D.2 – AQMA 2 Bitterne Road and NO2 diffusion tube monitoring locations

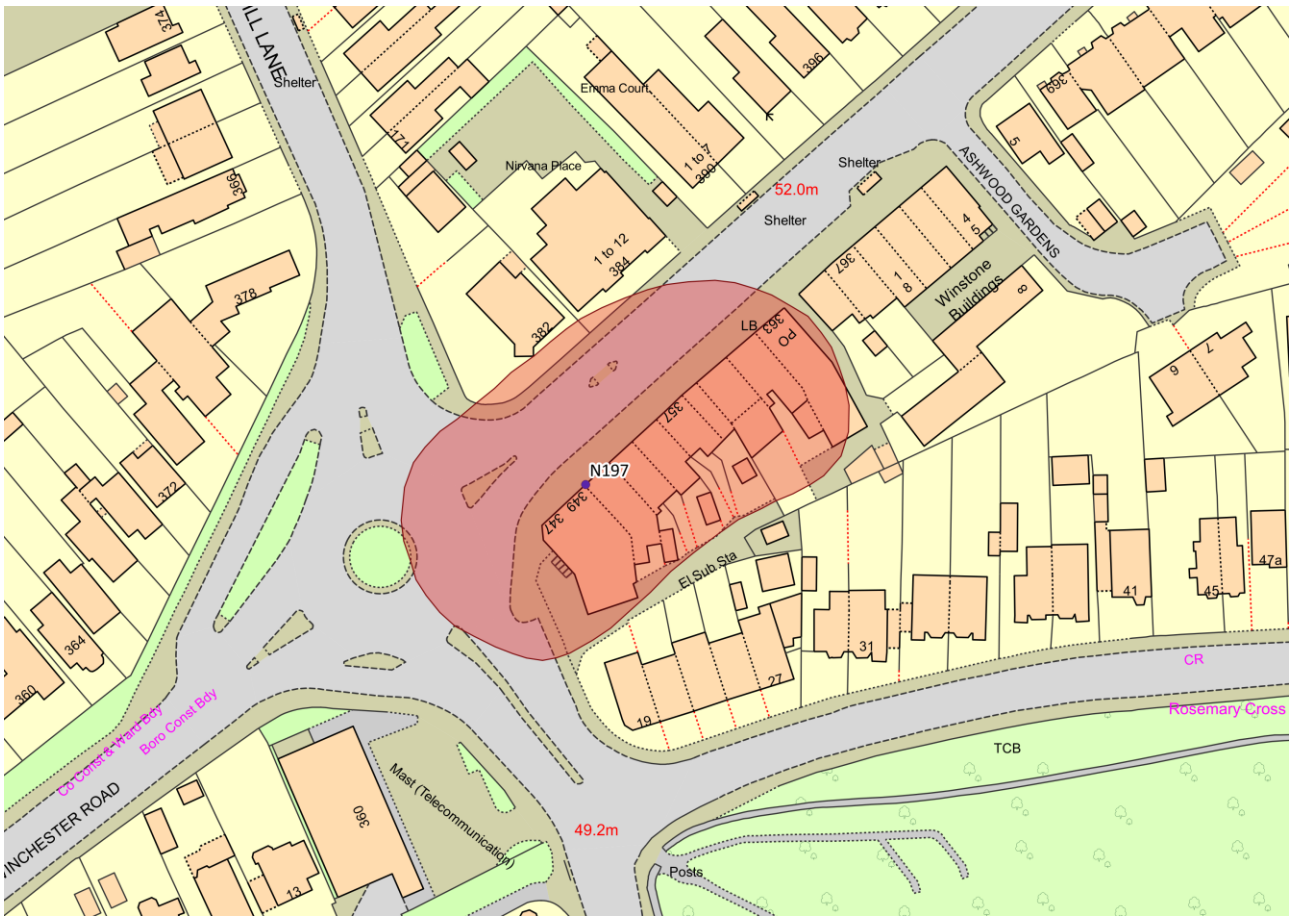


Figure D.3 – AQMA 3 Winchester Road and NO2 diffusion tube monitoring locations

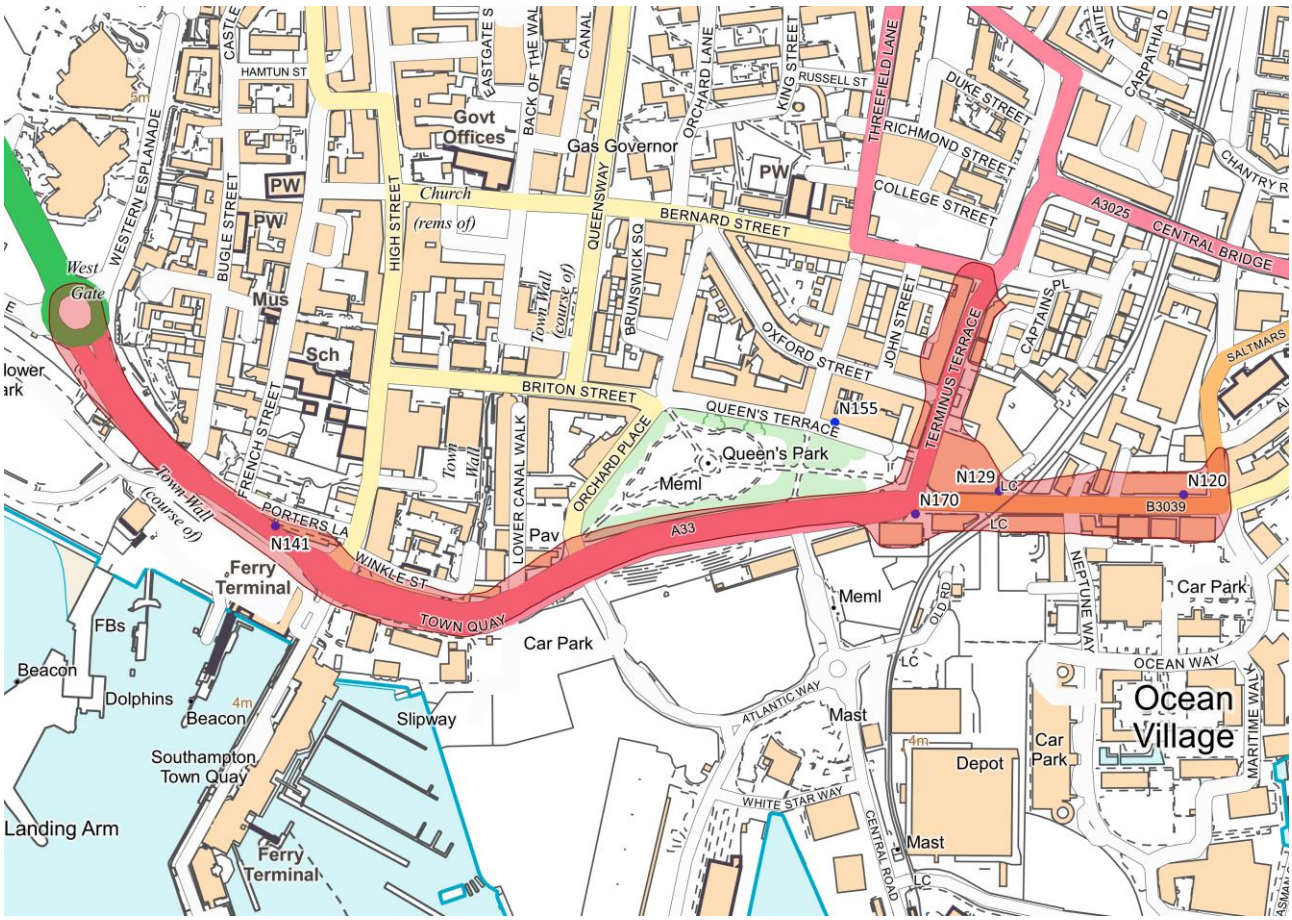


Figure D.4 – AQMA 4 Town Quay Road and NO2 diffusion tube monitoring locations

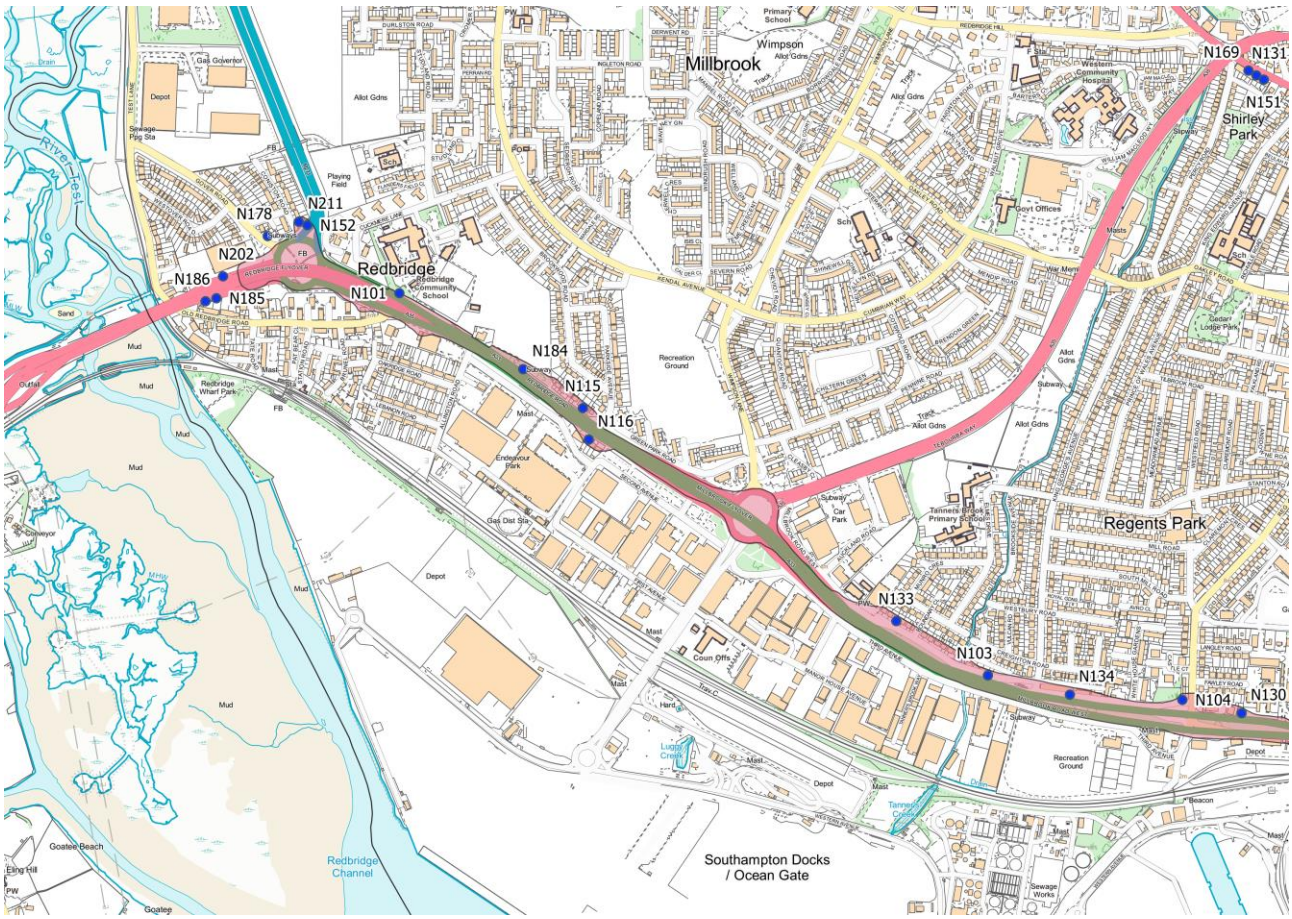


Figure D.5 – AQMA 5a (western section) Redbridge Road and NO2 diffusion tube monitoring locations

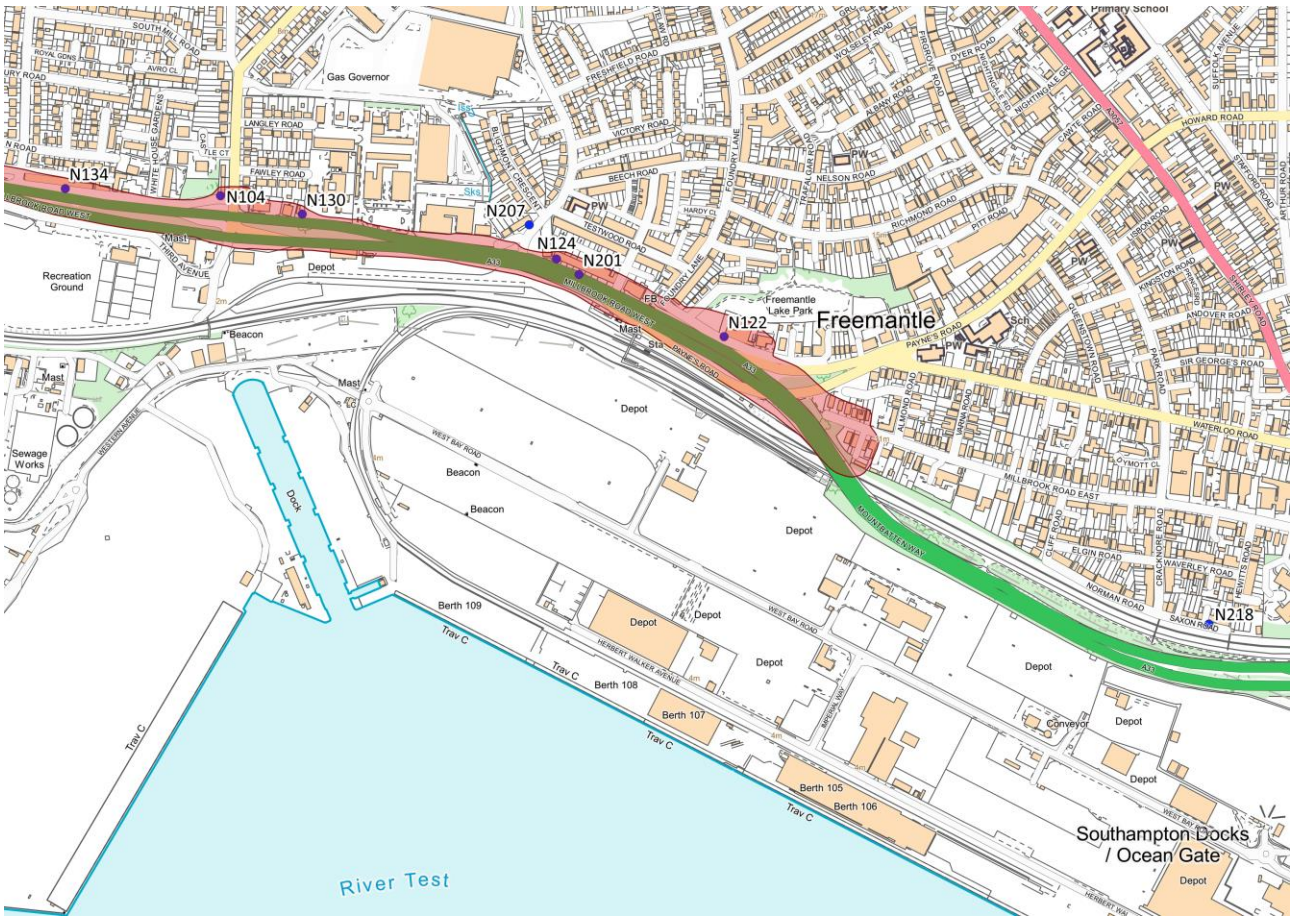


Figure D.6 – AQMA 5b (eastern section) Redbridge Road and NO2 diffusion tube monitoring locations

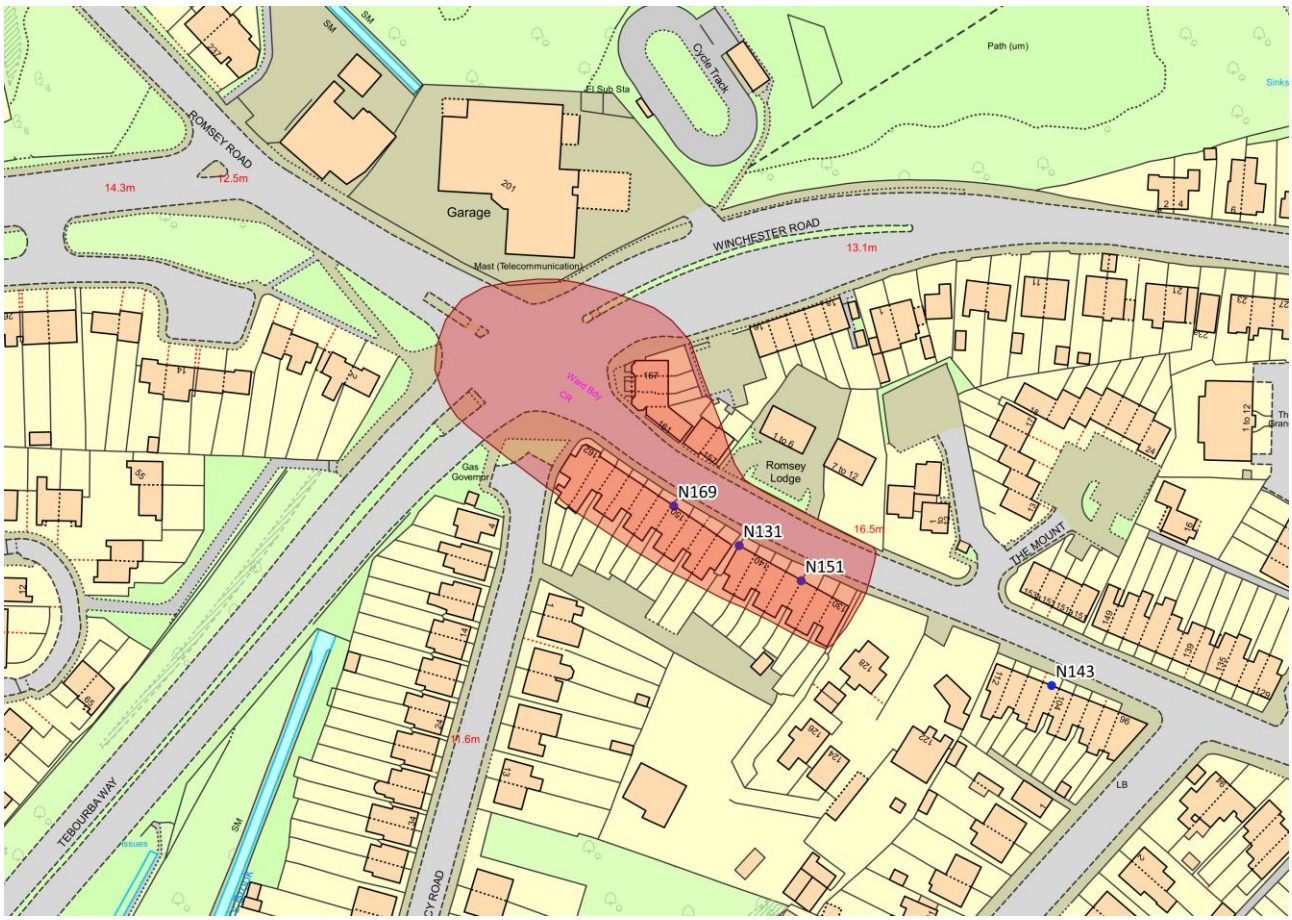


Figure D.7 – AQMA 6 Romsey Road and NO2 diffusion tube monitoring locations

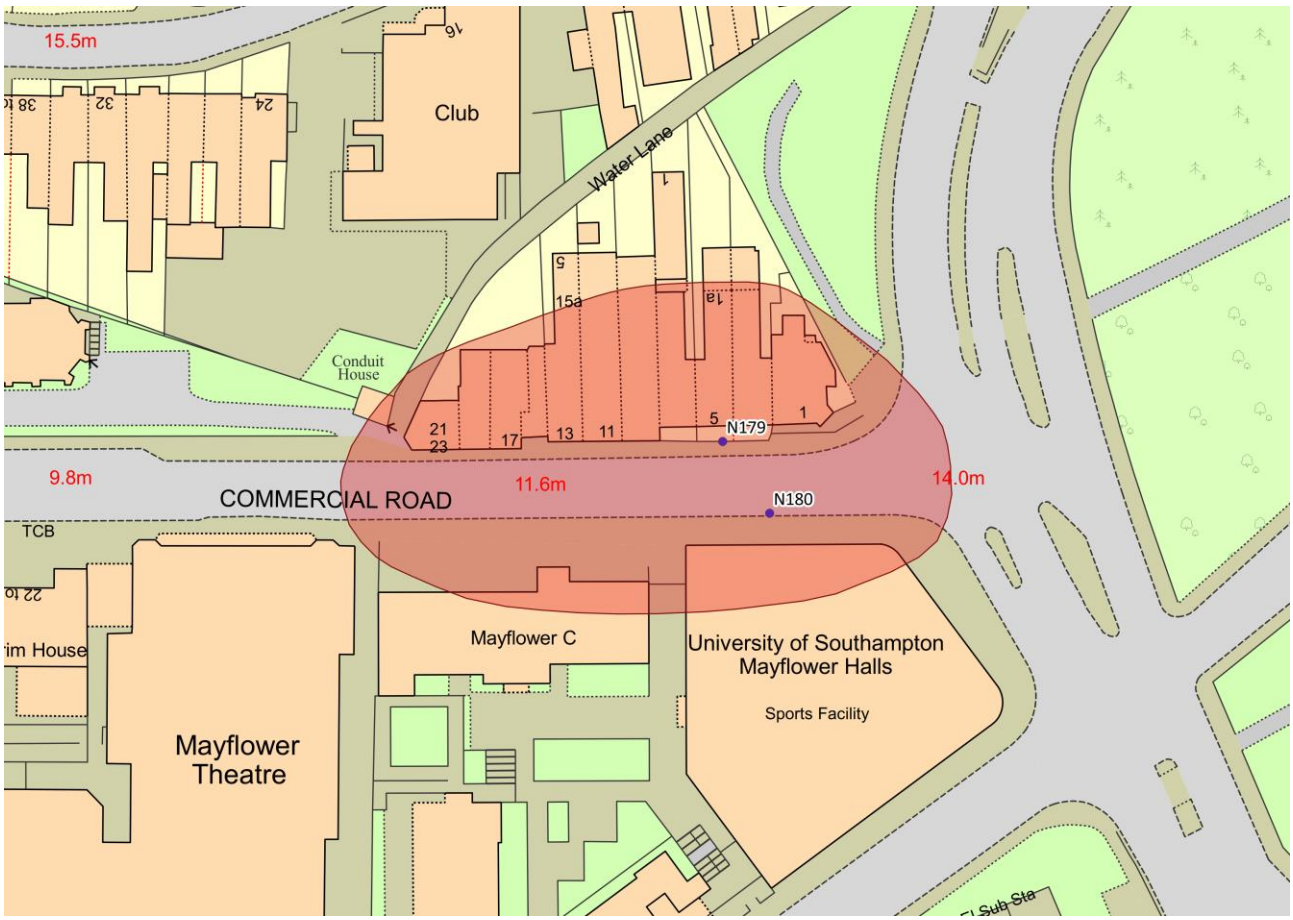


Figure D.8 – AQMA 8 Commercial Road and NO2 diffusion tube monitoring locations

Figure D.9 – AQMA 9 Burgess Road and NO2 diffusion tube monitoring locations

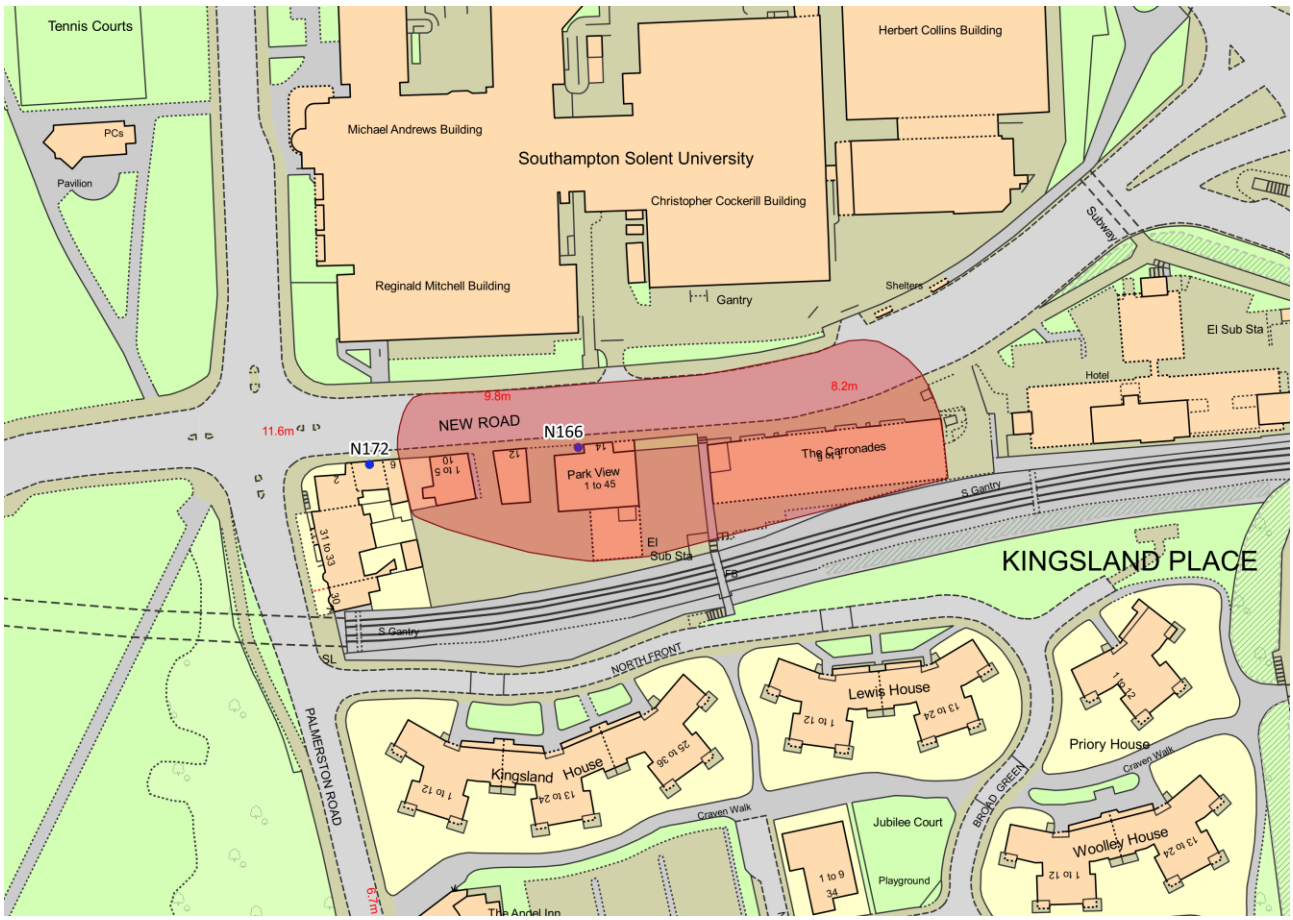


Figure D.10 – AQMA 10 New Road and NO2 diffusion tube monitoring locations

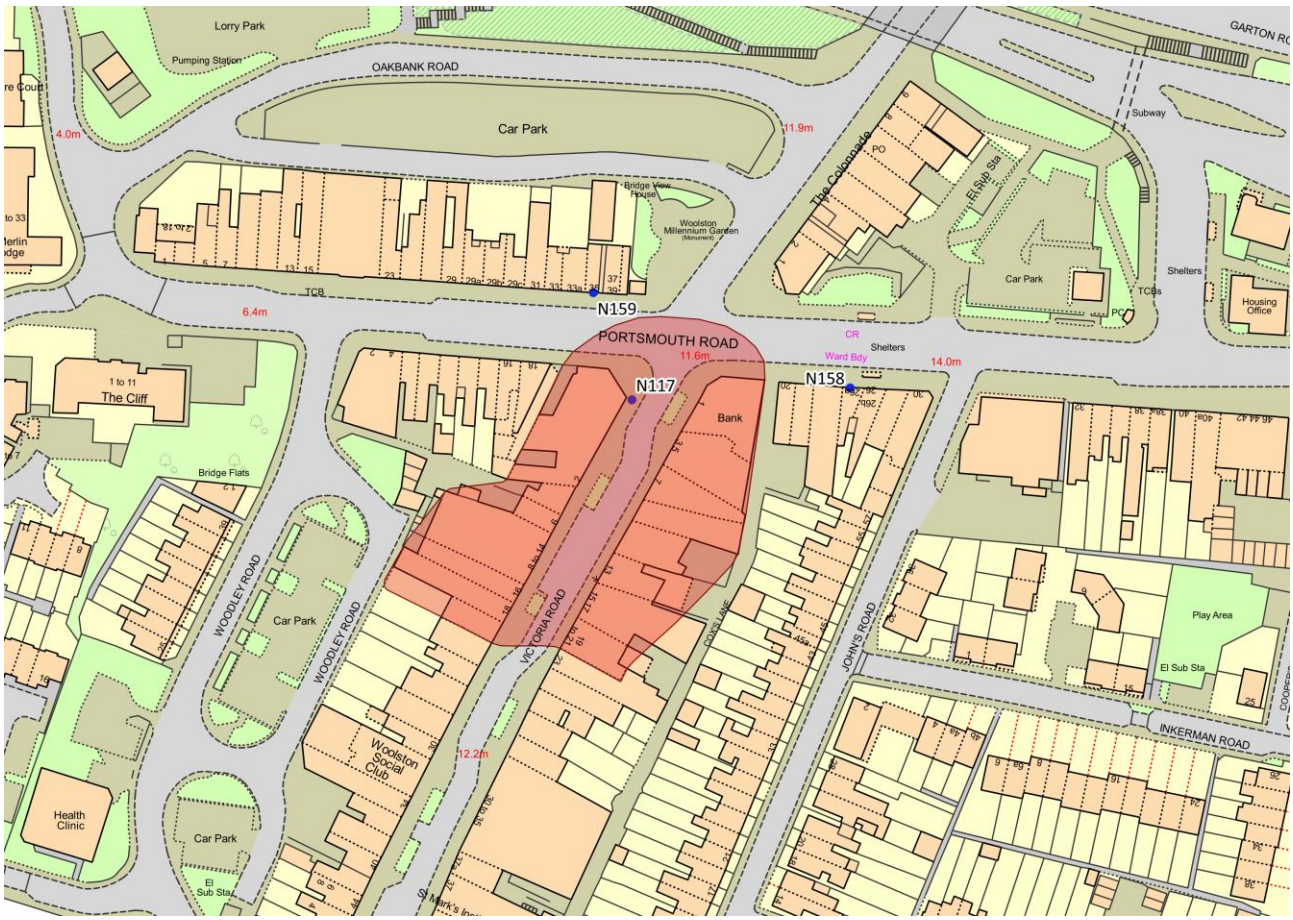


Figure D.11 – AQMA 11 Victoria Road and NO2 diffusion tube monitoring locations

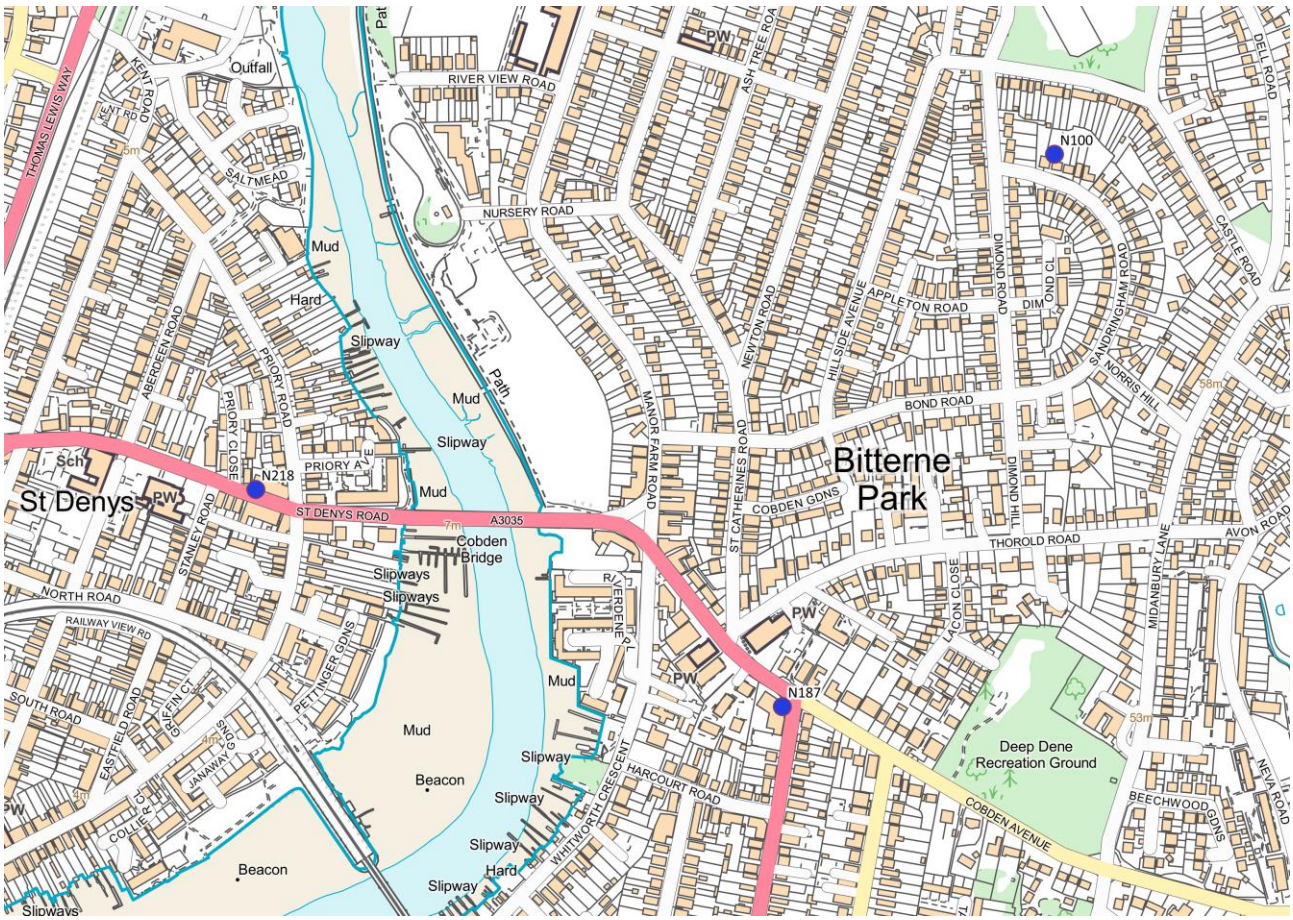


Figure D.12 – Bitterne Park and NO2 diffusion tube monitoring locations

Figure D.13 – City Centre and NO2 diffusion tube monitoring locations

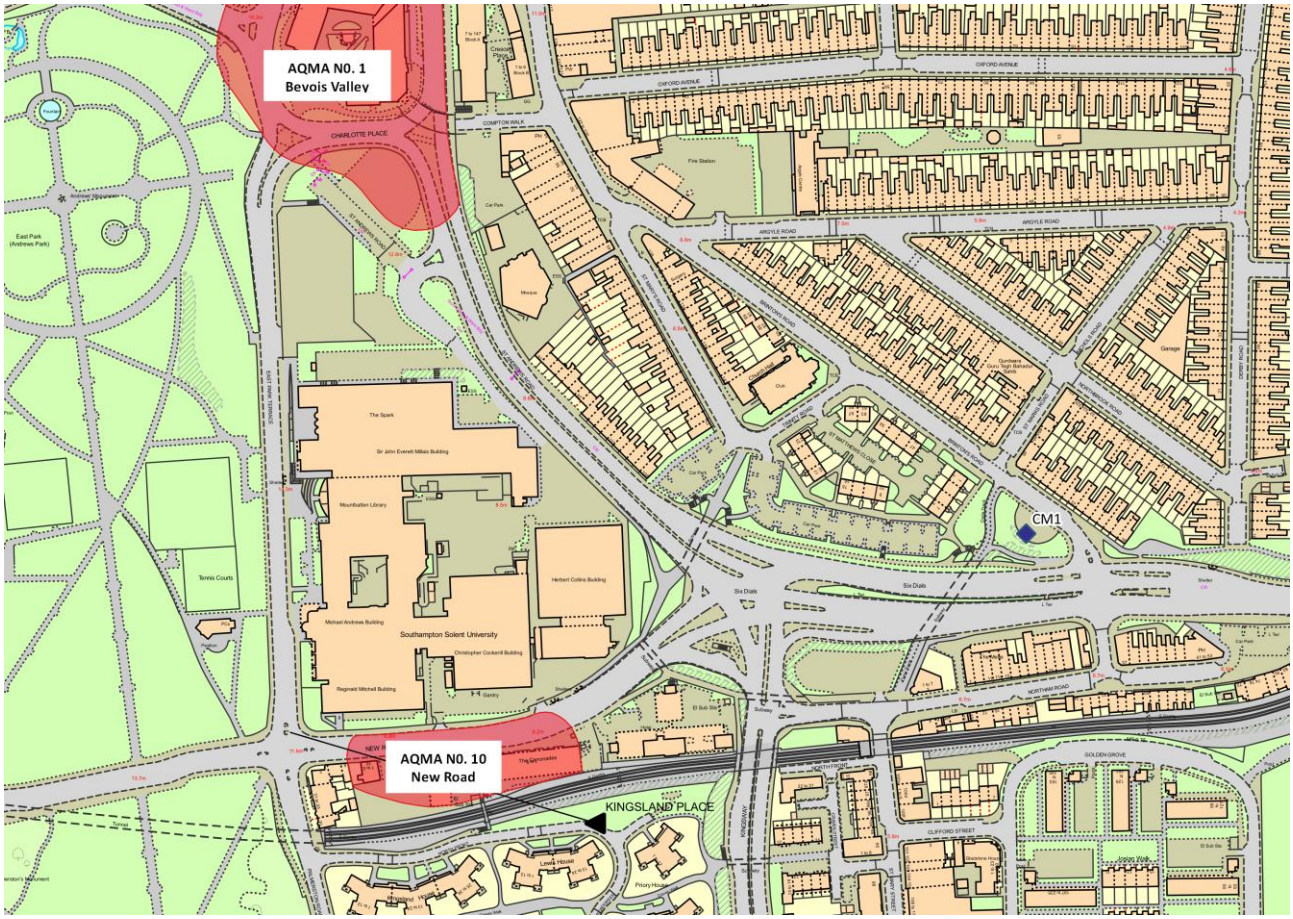


Figure D.14 – City Centre and Continuous Monitoring Station (CM1) location

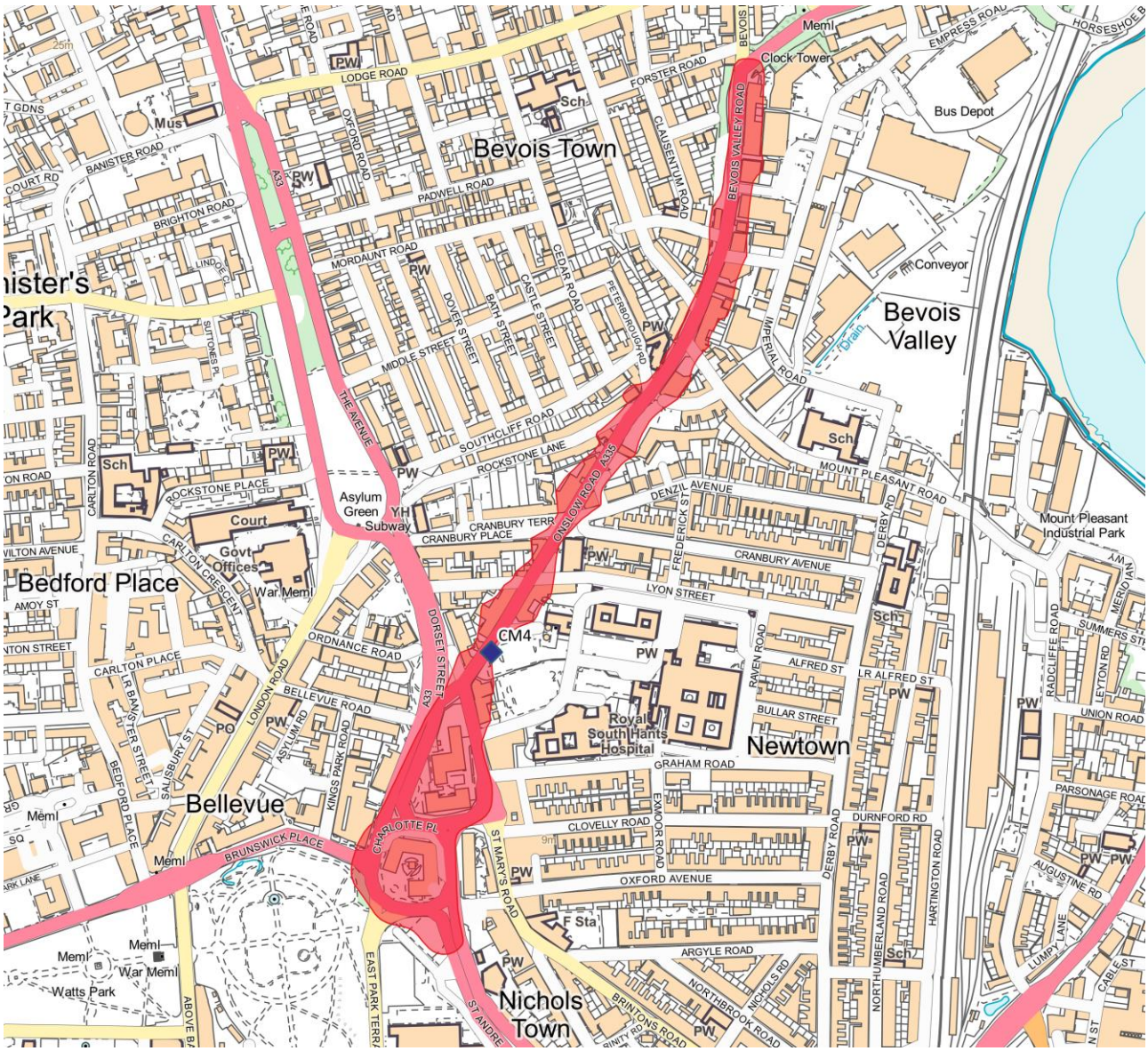


Figure D.15 – Bevois Valley and Continuous Monitoring Station (CM4) location

Figure D.16 – Victoria Road and Continuous Monitoring Station (CM6) location

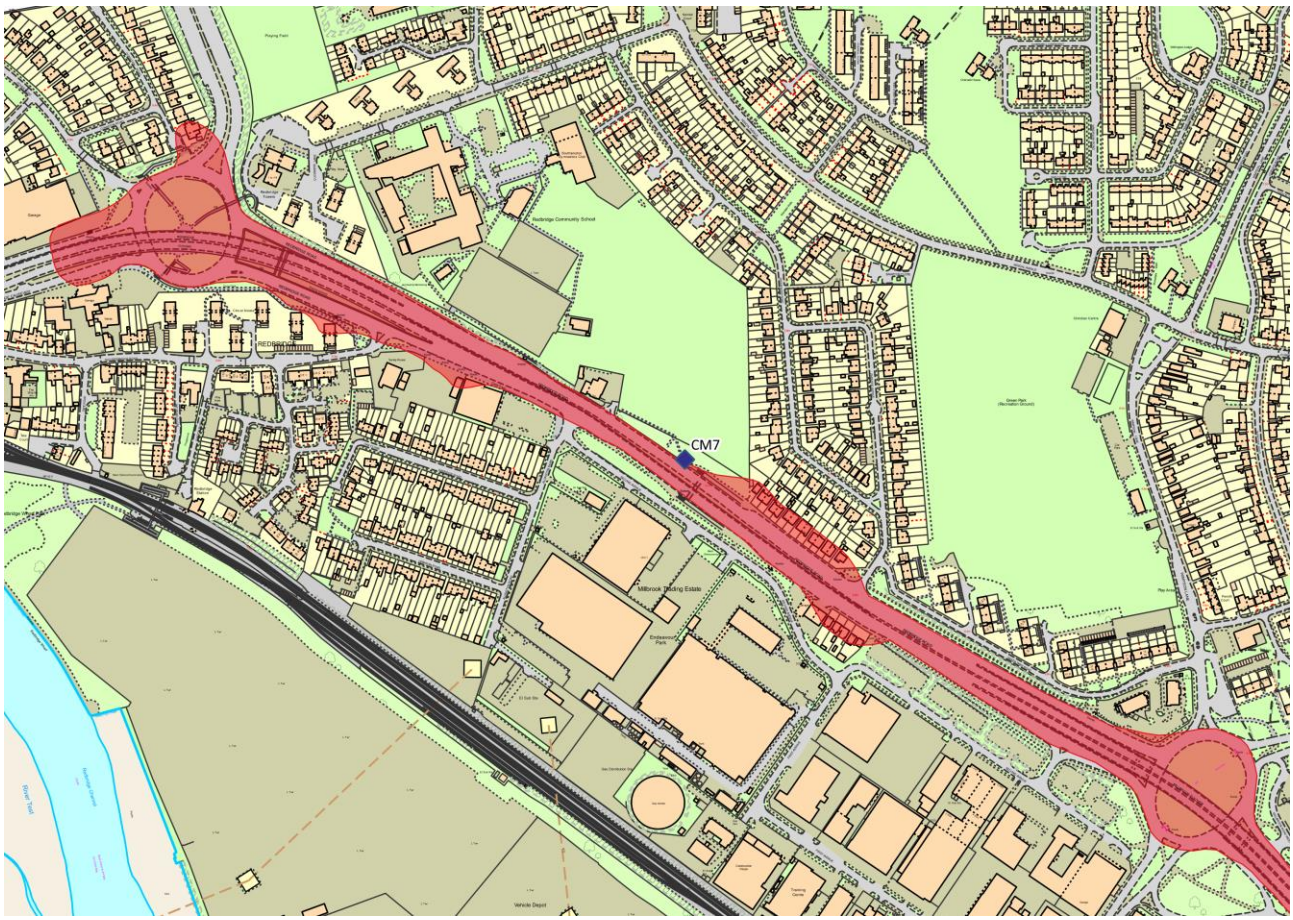


Figure D.17 – Redbridge Road and Continuous Monitoring Station (CM7) location

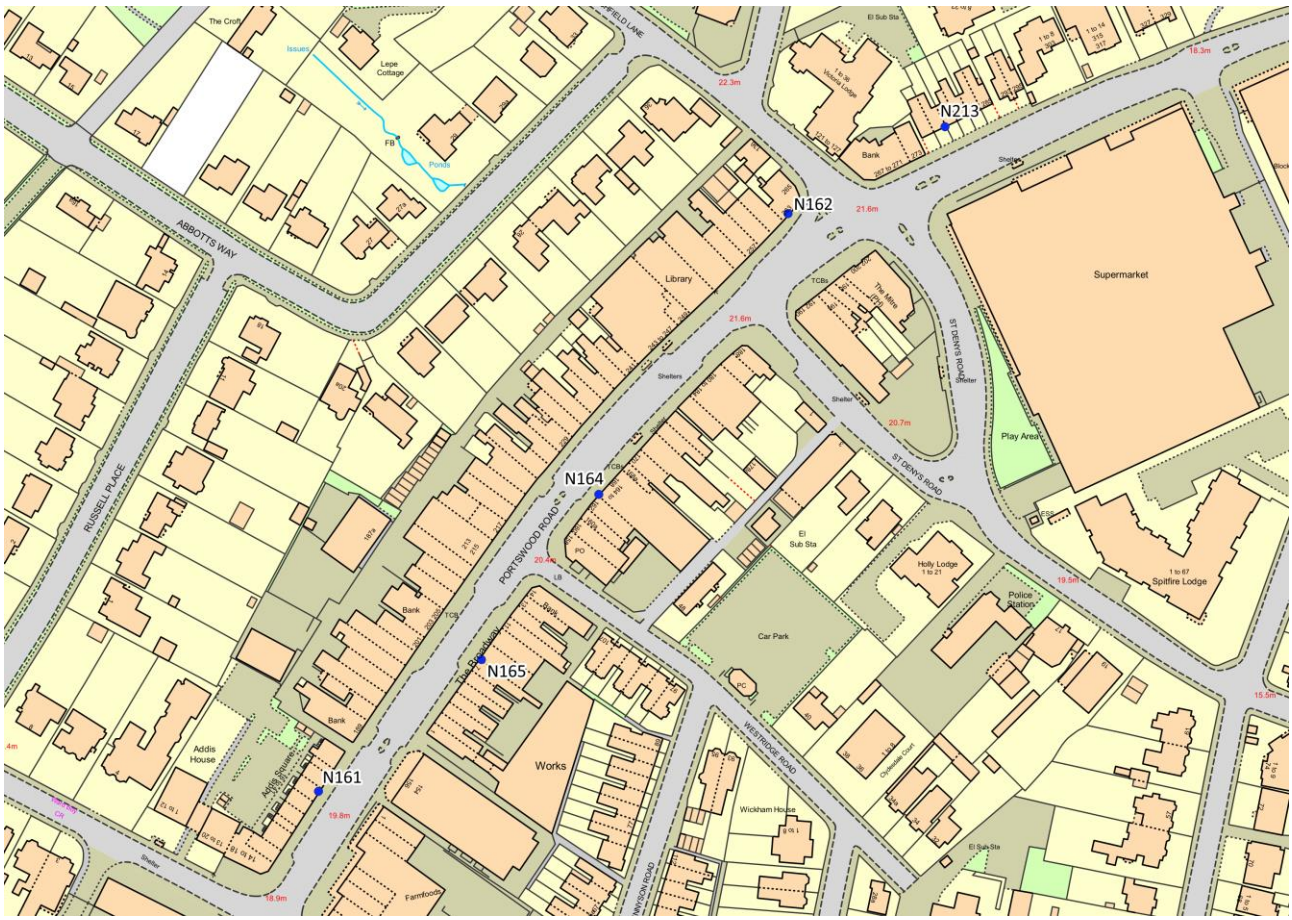


Figure D.18 – Portswood Road NO2 diffusion tube monitoring locations

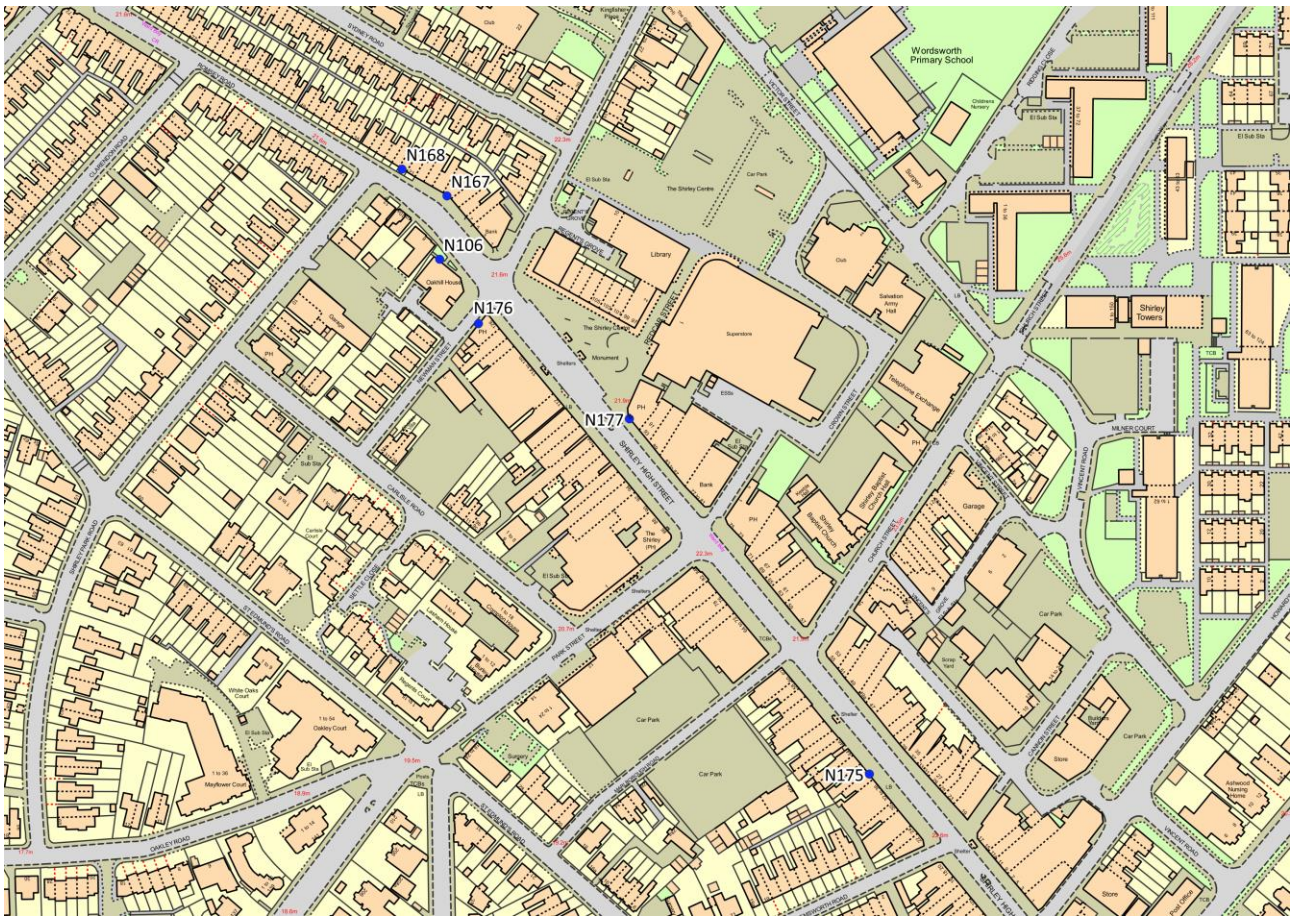


Figure D.19 – Shirley High Street/Romsey Road NO2 diffusion tube monitoring locations

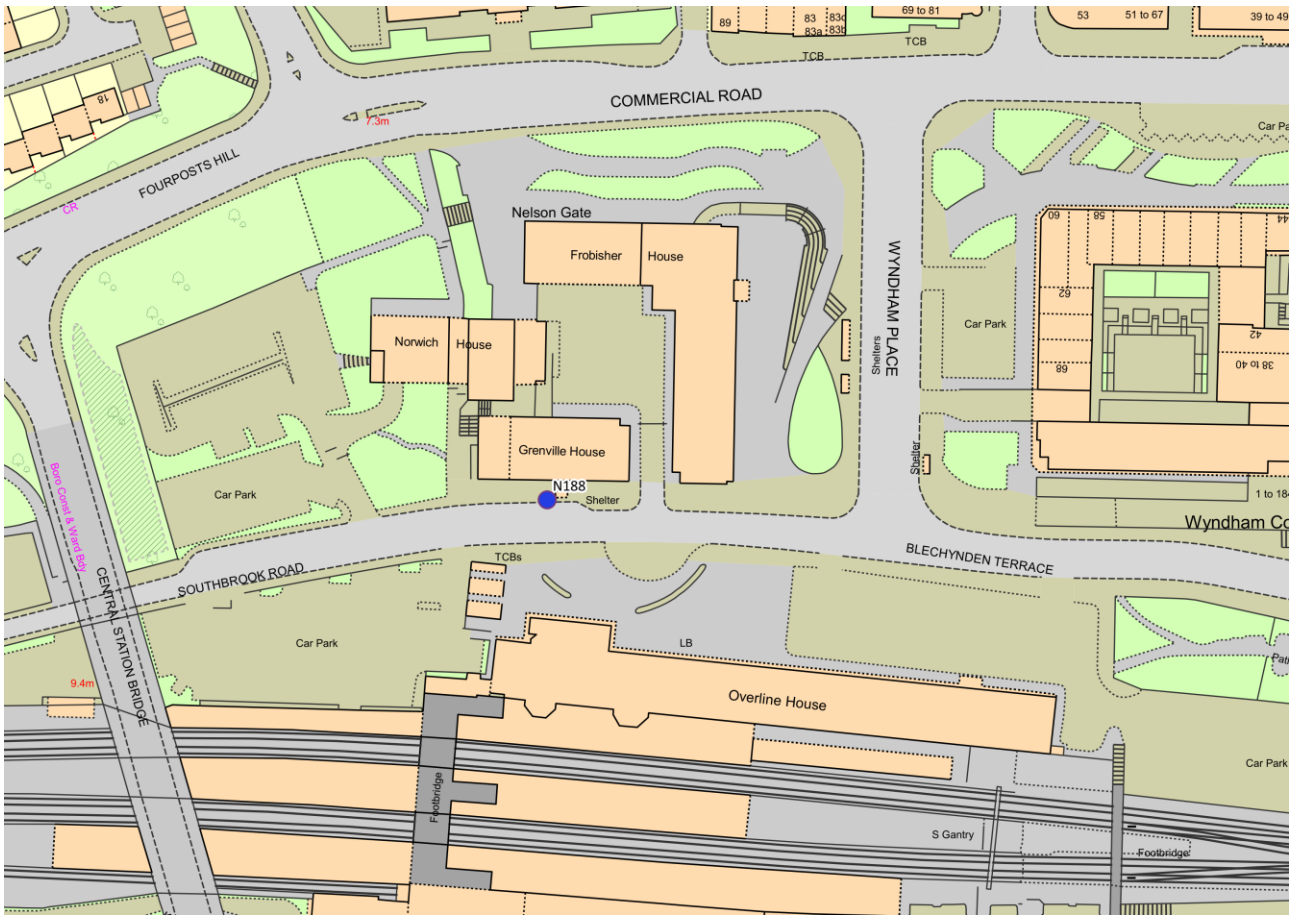


Figure D.20 – Blechynden Terrace (Central Train Station) NO2 diffusion tube monitoring locations

Appendix E: Summary of Air Quality Objectives in England

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

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

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

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 Air Quality Action Plans (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[10] 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)[11] 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

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

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

represents an absolute 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 Southampton

COVID19 Air Quality analysis – Study commissioned to analyse air quality and traffic trends pre and during lockdown, from March-June 2020 in the city. The report can be viewed here 2020 COVID-19 Lockdown Period - Air Quality Analysis (southampton.gov.uk)

Southampton Airport (just outside the Unitary city boundary) experienced a drastic, more than 90% reduction in flights over the city. However, most of this large reduction occurred before the Pandemic began. The main Airline Flybe, which used the airport went into administration in 2019.

Southampton monitored no exceedances of the annual mean NO_2 objective and 1 hour objective at any of our monitoring sites, anywhere in the city. This is unprecedented since embarking on the Review and Assessment Process and reflects the reduction in road vehicle movements caused by the COVID19 Pandemic.

Reductions of annual mean NO_2 concentrations of between 15 and 20% were experienced at roadside diffusion tube monitoring sites within most AQMAs in 2020 relative to 2019. The highest monitored mean average concentration of NO_2 in Southampton was 34.2 µg/m^3 on the residential façade of 367A Millbrook Road.

PM_{10} did not show such a marked reduction. In fact, at CM7 Redbridge AURN Automatic Monitoring Station, the annual average of for PM_{10} increased slightly compared to 2019.

The hot dry Spring and the location of the monitoring station on the roadside of the main route into the Container Port can explain the slight increase in PM_{10}.

Traffic Data Analysis

12-hour weekday traffic flows fell by around 62% on main routes into and out of the city in April 2020 compared to April 2019.

By August 2020 weekday traffic flows had returned to 90% of 2019 levels.

Overall weekday traffic flows for 2020 were down 19% on 2019 levels.

AM peak traffic (8-9am) was 66% down in April 2020 compared to April 2019. AM peak traffic levels were at 78% in September 2020. Overall AM peak traffic was 27% lower in 2020 than 2019.

PM peak traffic (4-5PM) were 64% down in April 2020 compared to April 2019.

PM peak traffic levels were at 79% in September 2020.

Overall PM peak traffic was 25% lower in 2020 than 2019.

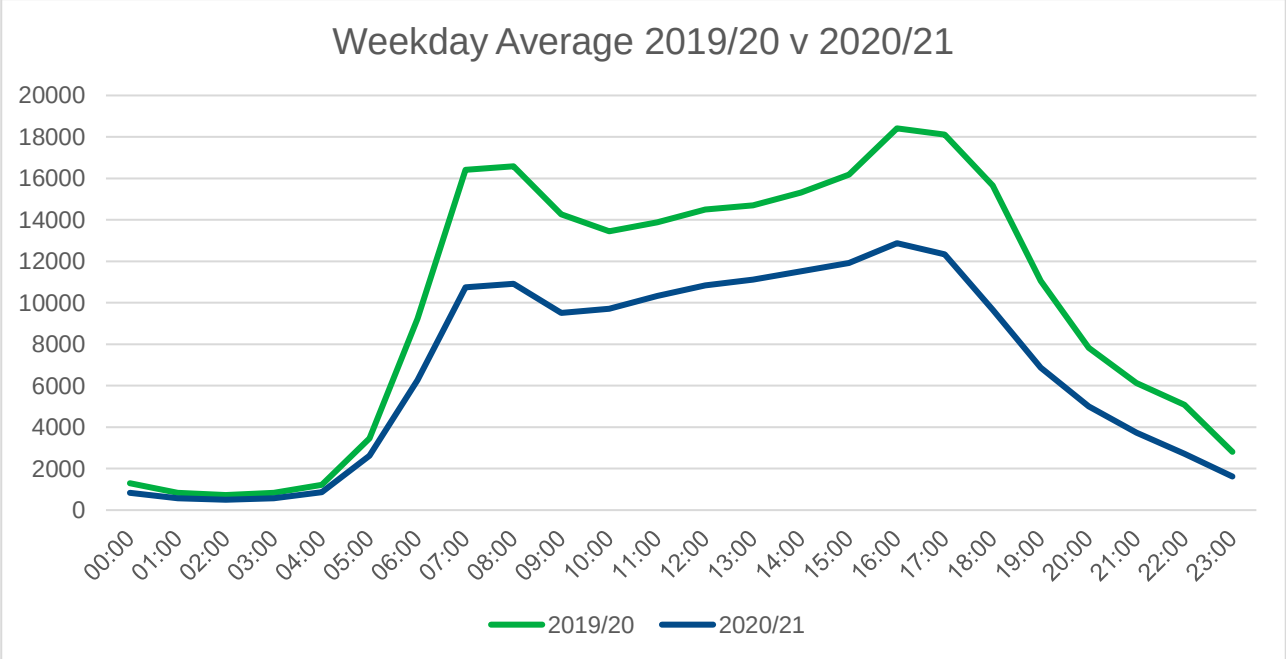


Figure F.1 Weekday Traffic Flow 2019/20 v 202/21

Opportunities Presented by COVID-19 upon LAQM within Southampton

Green Transport Recovery Plan – A series of measures implemented to support social distancing and encourage active travel during the pandemic. Funded through Active Travel Fund, Local Transport Plan, Transforming Cities Fund, Access Fund etc. Measures include

- Series of temporary cycle lanes along key corridors including Hill Lane and The Avenue.
- Temporary bus lanes along Eastern Approach.
- Temporary street closure in Bedford Place.
- Extending footpaths by bus stops to facilitate social distancing.
- Enhanced demand management through MyJourney programme – continuing to engage with businesses and schools remotely.

COVID19 Air Quality analysis – Study commissioned to analyse air quality and traffic trends pre and during lockdown, from March-June 2020 in the city. The report can be viewed here 2020 COVID-19 Lockdown Period - Air Quality Analysis (southampton.gov.uk) Outcomes from this report have helped validate the air quality programme of work

Shift to home and flexible working – As seen across the UK, COVID19 has fast tracked emerging working concepts which are likely to change the way many work and commute, likely easing peak hour congestion and subsequent poor air quality.

NHS COVID19 PPE consolidation – SCC worked with the NHS to trial consolidation of COVID19 PPE goods during the pandemic, and has subsequently almost halved the movements of these vehicles to the hospital.

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

Implementation and delivery of several measures were impacts by COVID19. These include:

- **Delivery and Service Plans** – Extremely difficult to identify how to improve operations when there is no BAU. **Medium impact**
- **Sustainable Distribution Centre usage –** Diminished usage by businesses. **Low impact**
- **Public engagement and behaviour change campaigns** - Face-to-face engagement impacted throughout the pandemic, however all schemes being maintained through remote means. **Medium impact**
- **Local NO2 Plan evaluation** – Extremely difficult to validate progress made through The Local NO2 Plan in 2020. Many unknowns now exist in the medium to long-term as a result of the recovery from COVID19. **Medium impact**
- **Taxi measures** – Adjustments have had to be made to Taxi Licensing Conditions and the Low Emission Taxi Incentive Scheme to account for the impact of COVID19 and lockdowns on taxi drivers. These have both been approved and implemented through the Local NO2 Plan change request process where required.
- Development of the updated Air Quality Action Plan has been delayed due to resource pressures. There is an opportunity to carry out a full-scale review of the AQAP later in 2021, however, as this could align well with outcomes of the Environment Bill and the end of The Local NO2 Plan.
- Southampton's air quality monitoring programme of diffusion tubes and 4 automatic stations was mostly unaffected by the Pandemic. Monitoring continued as per normal, except at the AURN Redbridge A33 Monitoring Station, where calibration site visits were reduced from every 2 weeks to 4 weeks as instructed by the Environment Agency. Southampton City Council is the LSO for this site. A very marginal reduction in data quality may have occurred due to this change in frequency. Our contractor NOx Tube Laboratory, Gradko, did close down for a limited period, resulting in Southampton's collected NOx tubes being stored in the office fridge for longer than normal. **Small impact**

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: High
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
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Previous Southampton City Council ASR Reports Southampton's statutory air quality reports
- Southampton City Council commissioned Ricardo Consultants 2020 COVID-19 Lockdown Period - Air Quality Analysis (southampton.gov.uk)
- Full Business Case for Achieving EU Nitrogen Dioxide Compliance in Southampton in the Shortest Possible Time Full Business Case v0.1 (southampton.gov.uk)
- Sustainable Distribution Centre (southampton.gov.uk)