2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: November, 2022

Information	Southampton City Council
Local Authority Officer	Simon Hartill
Department	Environmental Health
Address	Civic Centre, Civic Centre Road, Southampton, SO14 7LY
Telephone	0782 5823803
E-mail	simon.hartill@southampton.gov.uk
Report Reference Number	ASR 2022
Date	30-11-22

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 major transport 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 (NO_2) (40µg/m^3). Southampton also monitors particulate matter (both PM_{10} and $PM_{2.5}$),

[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

sulphur dioxide (SO_2) and ozone (O_3). Please see below a link to the SCC website which has maps of the AQMAs and descriptions.

Air quality management areas (southampton.gov.uk)

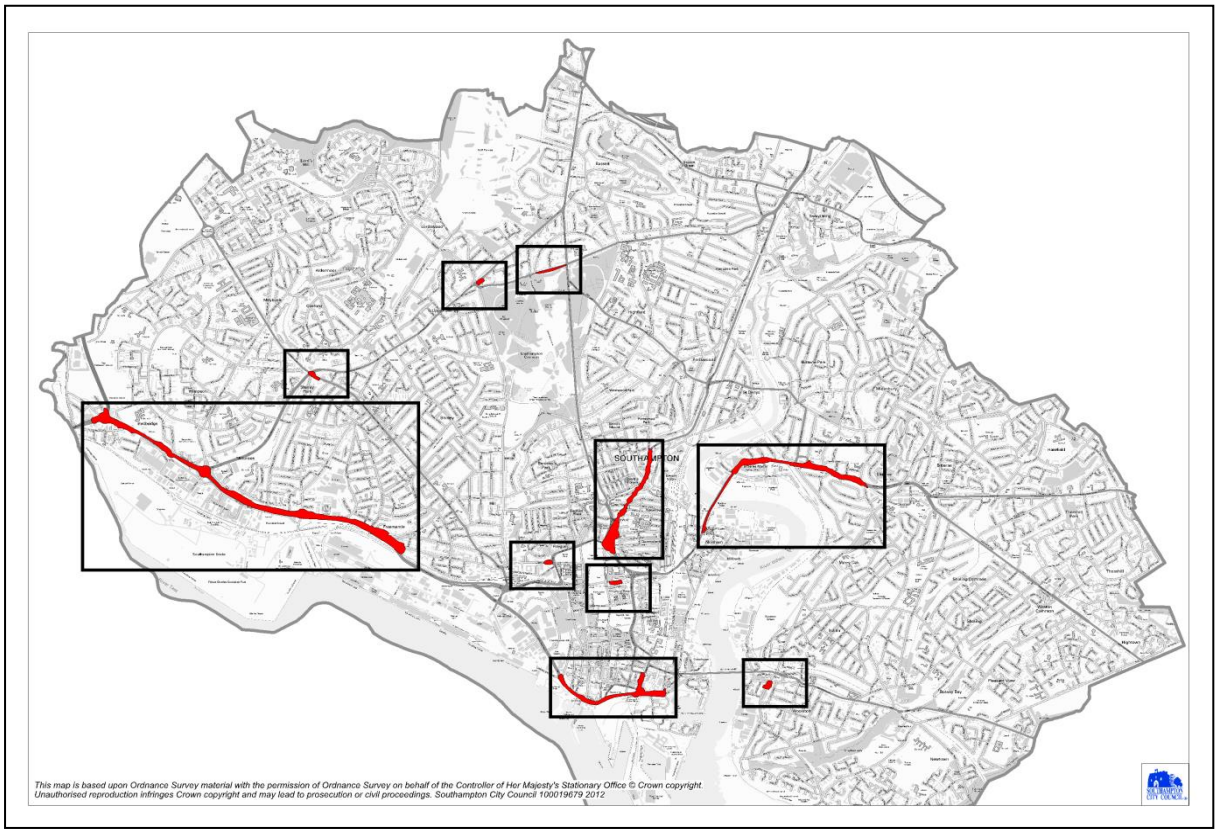


Figure 1 SCC Air Quality Management Areas

Air Quality Management in Southampton

Local Air Quality Management (LAQM) duties are shared between SCC's Scientific Service and Sustainability team. These include monitoring, reporting and evaluating air quality data, implementing AQAP measures, and developing new measures funded by Defra and other organisations.

SCC is a unitary authority and therefore the local transport authority. SCC's air quality officers work closely with the Strategic Transport department to ensure that actions to improve the local transport network considers improvements in air quality and identifies opportunities to introduce new, innovative measures that will reduce emissions and promote active and sustainable travel.

Sources of Pollution

In 2018, SCC undertook a feasibility study to determine whether a charging Clean Air Zone was necessary. This estimated the contribution of different sources towards levels of nitrogen oxides (NOx) at several locations in the city. The results shown in Figure 2 demonstrate that while lots of different sources contribute towards poor air quality, including industry, the port, and sources from outside the city (background sources), road vehicles contribute the most towards levels of NOx in these locations.

As such, action to improve air quality principally focus on reducing emissions from road transport. These include measures which encourage more people to walk and cycle, use public transport, or drive low emission vehicles.

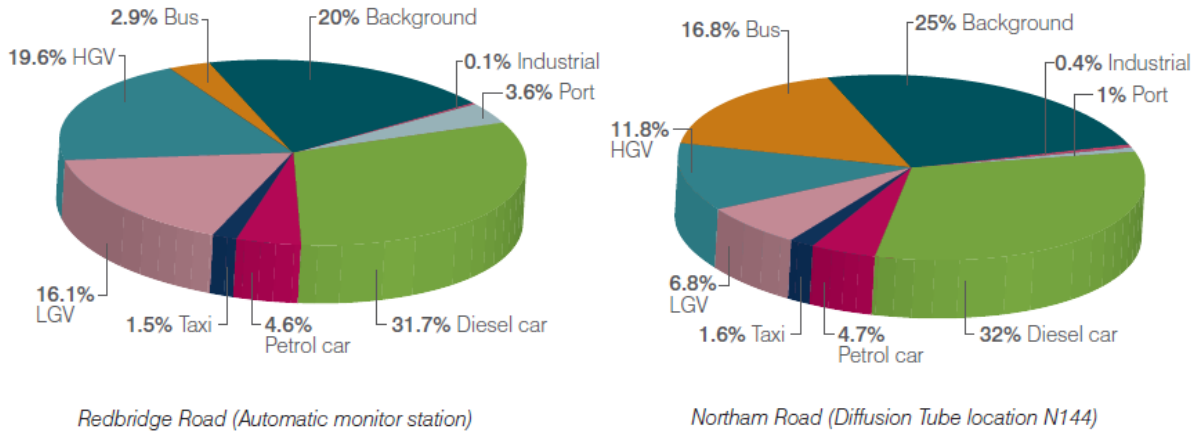
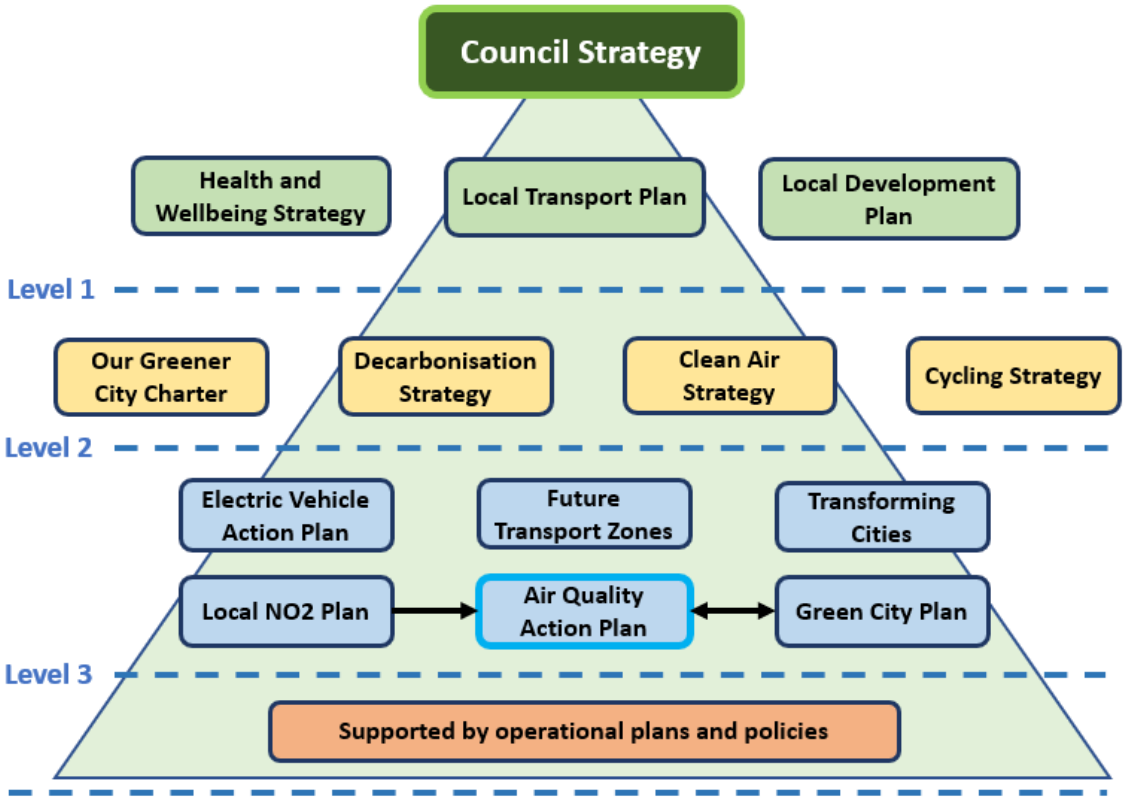


Figure 2 Modelled NOx source apportionment at two monitoring locations (% contribution, 2015)

Related Strategies and Plans



Clean Air Strategy

SCC has adopted a Clean Air Strategy which sets out the council's high level goals and priorities for improving air quality. 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.

Local NO_2 PlanSCC was one of the first five local authorities required by the Secretary State to submit a full business case[4] to assess whether a charging Clean Air Zone was necessary 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 compliance with NO_2 limits would be achieved at all locations in Southampton in 2020 without a charging Clean Air Zone. 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.

While a charging Clean Air Zone was not needed, a series of non-charging measures were presented to and approved by 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 (highest European standard of diesel emissions) 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.

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

- Targeted promotion of active and sustainable travel on the A3024 (location of highest modelled NO_2 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.
- A free trial scheme for taxi and private hire operators which highlights the benefits of an electric vehicle.
- Two new taxi-only rapid charging points to support uptake of electric vehicles within the taxi and private hire fleet.

The Local NO_2 Plan was approved by the Secretary of State in early 2019 and is now being delivered in accordance the full business case. It includes a series of further monitoring and evaluation exercises which will identify if the NO_2 plan achieves the desired outcomes, and whether any risks to the delivery of these outcomes are identified and mitigated.

To date, while there has been the need for some changes, largely due to COVID19, The Local NO_2 Plan has been delivered to specification. Evaluation of the original model has identified that the plan has had a demonstrably positive impact on local air quality. The Plan is due to conclude at the end of March 2022. Following this, it is anticipated that monitoring and evaluation will continue to ensure The Plan has delivered the expected outcomes and that uncertainties introduced by COVID19 can be addressed.

Our Greener City Plan

The Greener City Plan sets out how we'll work towards our goals set under our Green City Charger. These span the wider sustainability agenda including energy, sustainable travel, waste and ecology, as well as air quality. The Plan further highlights the council's commitment to clean air and includes further projects to reduce the burden of pollution on public health while maximising benefits across other themes including carbon reduction.

Cycling Strategy

SCC Cycling Strategy 2017-2027 was launched in 2017 which sets out The Council's plan for improving cycling rates in Southampton over the following 10 years. 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. The Council currently has 38 electric vehicles in the fleet supported by 18 charge points.

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

Connected Southampton 2040 - Our 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.

The Council will adopt a three-year Implementation Plan in 2022 which set out in further detail how The Council will help people move more sustainably around the city as the city recovers from the pandemic.

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 bicycles.

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

Future Transport Zones

Southampton City Council alongside other organisations in the wider 'Solent Transport' group were awarded £29m from the Department for Transport (DfT) to implement innovative future transport solutions around personal mobility and freight movements. The funding means the Solent area will benefit from several innovative transport solutions including smartphone apps for planning and paying for sustainable journeys, e-bike and e-scooter share scheme, and new approaches to freight distribution including drone freight trials for NHS deliveries across the Solent to the Isle of Wight.

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[5] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

We've seen steady improvements in air quality over the last 10 years due to the measures we've implemented, national improvements, and more sudden reductions since 2020 as a result of the COVID19 pandemic. Despite this improvement and relevant objectives being achieved in recent years, The Council remains committed to seeing further improvements in air quality.

In 2021 Southampton City Council continued the air quality programme which now includes a series of new projects. Details of all measures completed, in progress or planned are set out in Table 2.2. Details of all 54 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 2021 presented. Both historical and present barriers restricting the implementation of measures are also presented within Table 2.2.

Key measures undertaken in 2021 include:

- Finalised the Low Emission Taxi Incentive Scheme in partnership with Eastleigh Borough Council, replacing older, more polluting taxis with hybrid and electric vehicles. 85 grants were awarded to drivers in 2021. 52% of taxis and private hire vehicles in SCC's fleet are hybrids or electrics.
- Second phase of taxi licensing conditions now in place – no newly licensed vehicle with an emissions standard of Euro 5 or lower will be granted a licence. 79% of the

[5] Defra. Clean Air Strategy, 2019

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

fleet are now effectively Clean Air Zone Compliant (Above Euro 3 petrol and Euro 5 diesel standards).

- EVolve trials complete with 52 vehicles fitted with telematics, helping drivers better understand how they could benefit from an electric taxi.
- 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.
- Adopted an enhanced partnership to ensure buses operating in Southampton remain compliant with Euro VI standards.
- Bid submitted for European Regional Development Funding to implement £1.5m project providing subsidised leases of electric taxis and vans to drivers in Southampton, and providing 8 new rapid charge points.
- Secured Future Transport Zone funding and began delivering a series of large-scale innovative transport projects in Southampton including an e-scooter hire trial.
- Delivering year two of Our Greener City Plan 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.
- University Hospital Southampton continuing to utilise subsidy for consolidating COVID19 PPE in the sustainable distribution centre. Delivery and service plan being drafted to analyse benefits of consolidation.
- All other Delivery and Service Plans contracted and implemented. Beginning to identify routes for implementing suggestions from plans in businesses.
- Successful in bid to deliver wood burning behaviour change campaign despite face-to-face engagement restrictions.
- Successful in bid for £290,000 to extend the wood burning campaign campaign and introduce low-cost monitors into Southampton and partnering local authorities to support the campaign with local data.
- Bid submitted to Defra air quality grant for £350,000 to deliver a schools engagement project to spread awareness of air quality and empower them to reduce the impact of pollution on students.

- Associated British Ports received funding from the Solent Local Enterprise Partnership to begin construction of shore side power infrastructure at two cruise ship terminals: both to be operational early 2022.
- Local NO_2 Plan re-evaluation underway to understand if the plan has achieved the required outcomes.
- Beginning to implement projects under the Transforming Cities Fund including the city's first Active Travel Zones. Plans developed for city centre and transport hub re-design to improve highways efficiency and encourage active and sustainable transport around the city.
- Future Transport Zones programme underway in Southampton and wider Solent region including the introduction of an e-scooter trial.
- The MyJourney active travel engagement programme continues to be 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 an adopted Air Quality Action Plan
- Finalising The Local NO_2 Plan
- Re-evaluation of The Local NO_2 Plan

Southampton City Council's key priority for the coming year is to continue to deliver the Local NO_2 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 2022 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 NO_2 Plan and the impact of the pandemic. The Plan will progress in 2022 and will aim to incorporate any new requirements from further NO_2 Plan evaluation and requirements from the Environment Act which received royal ascent at the end of 2021.

The principal challenges and barriers to implementation that Southampton City Council anticipates facing are delivering improvements in air quality commensurate 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 this can be mitigated 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. This is now further supported through the Transforming Cities Fund and Future Transport Zone programmes, each of which represent significant investments in more sustainable road transport.

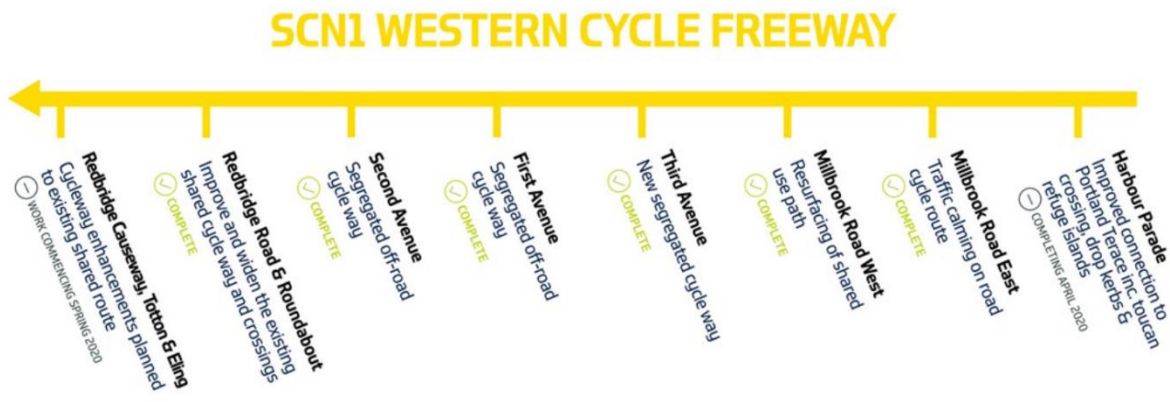
A further challenge is ensuring all residents and organisations in Southampton understand the role that they play in reducing air pollution. Whilst the council are able to influence air quality to some extent, it is important that residents and businesses are engaged with and supported so that they can reduce their own impact.

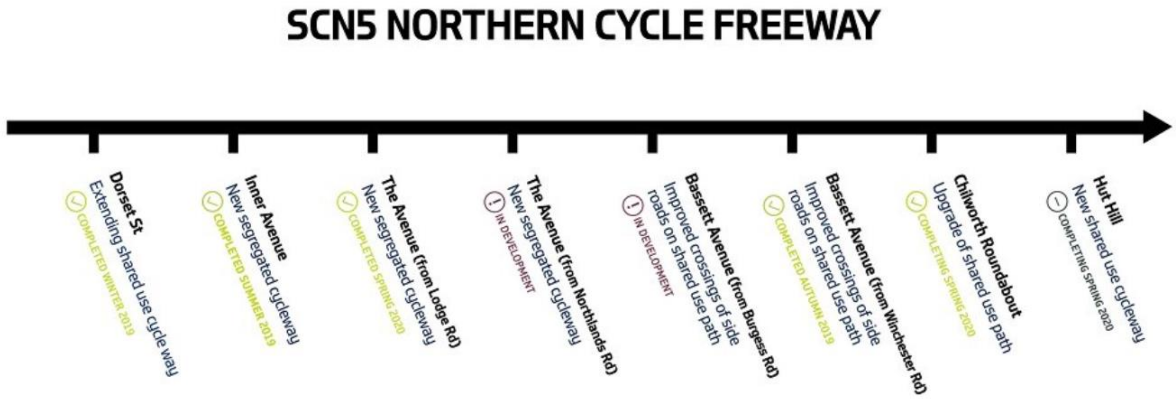
Other Measures

Alongside the Local NO_2 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 2021 to encourage active and sustainable trave, although face to face engagement continues to be fairly limited.
- 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. Of the 145 buses operating in Southampton which did not meet Euro VI standard, all are now retrofitted to Euro VI 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 238 grants have been awarded to drivers licensed in Southampton and 29 in Eastleigh. Over 50% of the taxi and private hire fleet in Southampton are now either hybrid or electric.
- Working with taxi operators and using telematics to help drivers understand the financial and environmental benefits of switching to an electric vehicle.
- Implementing licensing conditions so that by 2023 all taxis and private hire vehicles will be at least Euro 6 diesel standard.

- Extending the age limit for hybrid private hire and hackney carriage vehicles licensed in Southampton from 9 years to 12 allowing cleaner vehicles to stay in the fleet for longer.
- Working with the wider Hampshire region to develop an enhanced partnership agreement with bus operators to ensure buses maintain Euro VI requirements and supporting electric buses.
- Bidding for funding through the Zero Emission Bus Regional Areas (ZEBRA) scheme to procure 32 electric buses.

Electric Vehicles

- Continued investment in The Council's fleet with 38 vehicles currently in place and an aim for 90% of the fleet to be electric by 2030.
- Installing 50 new and currently free to use public EV charge points in the city centre. Over 80 total charging points are currently publicly available in Southampton.
- Offering a 90% discount on city centre parking season ticket and free passage on the Itchen Toll Bridge for EVs.

Other

- Continuation of the air alert pollution forecasting and alert system.
- Network of about 88 diffusion tubes and 4 automatic monitoring stations including two AURN sites.
- Implementing measures in our Greener 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.
- Launch of a wood burning engagement project with a local charity and in collaboration with neighbouring local authorities funded by Defra to encourage people to burn better and less, tackling a key source of PM pollution.

Conclusions and Priorities

Conclusion of ASR 2022 - Air Quality Monitoring

The 2022 ASR concludes there were no exceedances of the annual mean NO_2 objective monitored in 2021, the second time this has happened since Review and Assessment began. This was in part due to the impact of COVID19 on the way people travel around the city. Southampton City Council commissioned a study to assess the impact of the COVID19 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 contributed towards reduced emissions 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 µg/m^3 on the A3024 Northam Bridge in 2020.

In fact, the highest monitored mean average concentration of NO2 in Southampton was 36.9 µg/m^3 on the residential façade of 66 Burgess Road in 2021. Very close behind this was the second highest, 36.7 µg/m^3 on the residential façade of 367A Millbrook Road in 2021. 367A Millbrook Road monitored the highest NO_2 in the city in 2020 as well.

There were a couple of higher results monitored, but these were not at relevant receptors. For instance, Redbridge Causeway at 38.9 µg/m^3 and Vincents Walk Bus Stop at 36.6 µg/m^3,but these were still below 40 µg/m^3 .

2021 monitoring results showed a small increase of NO_2 levels, compared 2020. This was to be expected, as the severe lockdowns of 2020 were more muted and less rigorous in 2021. People became used to living with COVID. The rapid deployment of life saving vaccines in early 2021 facilitated everyday life returning to some semblance of normality.

The COVID19 pandemic and subsequent “lockdowns”, played an important part in reducing vehicle movements in the city during 2020 and to a lesser extent in 2021. 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 2020/21.

In summary, exceedances halved from 8 in 2018 to only 4 in 2019 at relevant receptors, with no monitored exceedances recorded in 2020 and 2021. SCC will consider revoking all 10 of the AQMAs in the future once the medium to long-term trend of NO_2 concentrations is confirmed in future ASRs, including the impact COVID19 has had on trends. SCC will follow the LAQM TG 22 Guidance on when to revoke the AQMAs, see below. As the highest NO_2 annual means are monitored with diffusion tubes at residential facades, SCC need to achieve NO_2 means below 36 µg/m^3 for a minimum of 3 consecutive years.

For the revocation of AQMAs, the latest LAQM.TG(22) suggests:

3.57 *The revocation of an AQMA should be considered following three consecutive years of compliance with the relevant objective as evidenced through monitoring. Where NO2 monitoring is completed using* ***diffusion tubes****, to account for the inherent uncertainty associated with the monitoring method, it is recommended that revocation of an AQMA should be considered following three consecutive years of annual mean NO2 concentrations being lower than* ***36µg/m3*** *(i.e. within 10% of the annual mean NO2 objective). There should not be any declared AQMAs for which compliance with the relevant objective has been achieved for a consecutive five-year period.*

Therefore, 36µg/m3 should be used to decide whether the concentration is compliant with the objective if diffusion tubes are used for monitoring.

According to LAQM.TG(22) ***3.54*** *It is not advisable for the revocation of an AQMA to be based solely upon compliance in a year not representative of long-term trends. For example, compliance being reached in 2020 may not be representative of long-term trends in pollutant concentrations due to the change in activity observed across the UK as a result of COVID-19 and associated lock down measures. Where 2020 is one of many consecutive years of compliance, this may be considered for revocation.*

If the AQMA has shown a long term trend of compliance of the relevant objective, it is advisable for the revocation of this AQMA. If the AMQA only reached compliance in 2020 and 2021, it may not be representative enough for the long-term trends and need to be monitored for further years.

Priorities for 2022

In 2021, 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 NO_2 Plan. In addition to implementing remaining measures from The Local NO_2 Plan, the Joint Air Quality Unit now require SCC to conduct a full re-evaluation of its NO_2 Plan modelling subsequent to uncertainties introduced through COVID19, and those raised through previous evaluation.

A decision was made by the new administration to delay implementation of the Local NO_2 Plan until 2022 to align with the end of The Local NO_2 Plan and any outcomes from the re-evaluation exercise, as well as new requirements from The Environment Act 2021 which received royal ascent at the end of 2021.

Finalising the remaining measures set in the Local NO_2 Plan and evaluating the success of The Plan in 2022 will be key to ensure compliance with the EU Ambient Air Quality Directive is met within the shortest possible time. The first wave of AQAP measures will also need to be implemented in 2022 alongside development of further projects in line with the timescales of the plan.

Local Engagement and How to get Involved

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/

Local Responsibilities and Commitment

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

Simon Hartill, Environmental Health Team

George O'Ferrall, Sustainability

Sam Guppy, Environmental Health Team

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

Address Civic Centre, Southampton, SO14 7LY

Telephone 0782 5823803

Email simon.hartill@southampton.gov.uk

Table of Contents

Figures

Tables

1 Local Air Quality Management

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

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by 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 National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
No. 1 Bevois Valley	Declared August 2005	NO2 Annual Mean	An area including a number of properties from Charlotte Place Roundabout to Bevois Valley Road	NO	50	35.7	SCC AQAP - Adopted 2008	Link
No. 2 Bitterne Road West	Declared August 2005, extended in 2012	NO2 Annual Mean	An area including a number of properties from Northam Road and along Bitterne Road West	NO	37	33.5	SCC AQAP - Adopted 2008	Link
No 3. Winchester Road	Declared August 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	27.1	SCC AQAP - Adopted 2008	Link
No. 4 Town Quay to Platform Road	Declared August 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	32.6	SCC AQAP - Adopted 2008	Link
No. 5 Redbridge to Millbrook Road West	Declared August 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	36.7	SCC AQAP - Adopted 2008	Link
No. 6 Romsey Road	Declared August 2005, increased in size in 202	NO2 Annual Mean	An area including a number of properties along Romsey Road from Teboura Way to Shirley High Street	NO	44	32.8	SCC AQAP - Adopted 2008	Link

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
	after a Detailed Assessment							
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	35.7	SCC AQAP - Adopted 2008	Link
No. 9 Burgess Road	Declared March 2013	NO2 Annual Mean	An area including a number of properties along Burgess Road at the junction with The Avenue	NO	47	36.9	SCC AQAP - Adopted 2012	Link
No. 10 New Road	Declared March 2013	NO2 Annual Mean	An area including a number of properties along New Road	NO	42	29	SCC AQAP - Adopted 2012	Link
No. 11 Victoria Road	Declared March 2013	NO2 Annual Mean	An area encompassing a number of properties along Victoria Road at the junction with Portsmouth Road	NO	43	33	SCC AQAP - Adopted 2012	Link

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

☒ **Southampton City Council confirm that all current AQAPs have been submitted to Defra (confirm by selecting in box).**

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

Defra's appraisal of last year's ASR concluded

1. AQMA declaration dates stated within Table 2.1 do not match the LAQM Portal or UK-AIR. Please amend. SCC Response: This was amended as requested and resubmitted
2. Table 2.2 has not been completed in the corresponding Excel spreadsheet. Whilst this table has been completed within the ASR, it is important that all tables (with the exception of DT monitoring tables, which are now to be completed on the DTDES) be completed in both the report and excel template. SCC Response: This was completed and resubmitted as requested
3. PM_{10} data for CM1 has been presented in bold in Table A.6, despite no exceedance of the AQO. Please amend and ensure bold is only used in data tables to depict exceedances of AQOs. SCC Response: This was amended and resubmitted as requested

Southampton City Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 54 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 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

Key measures undertaken in 2021 include:

- Finalised the Low Emission Taxi Incentive Scheme in partnership with Eastleigh Borough Council, replacing older, more polluting taxis with hybrid and electric vehicles. 85 grants were awarded to drivers in 2021. 52% of taxis and private hire vehicles in SCC's fleet are hybrids or electrics.
- Second phase of taxi licensing conditions now in place – no newly licensed vehicle with an emissions standard of Euro 5 or lower will be granted a licence. 79% of the fleet are now effectively Clean Air Zone Compliant (Above Euro 3 petrol and Euro 5 diesel standards).
- EVolve trials complete with 52 vehicles fitted with telematics, helping drivers better understand how they could benefit from an electric taxi.

- 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.
- Adopted an enhanced partnership to ensure buses operating in Southampton remain compliant with Euro VI standards.
- Bid submitted for European Regional Development Funding to implement £1.5m project providing subsidised leases of electric taxis and vans to drivers in Southampton, and providing 8 new rapid charge points.
- Secured Future Transport Zone funding and began delivering a series of large-scale innovative transport projects in Southampton including an e-scooter hire trial.
- Delivering year two of Our Greener City Plan 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.
- University Hospital Southampton continuing to utilise subsidy for consolidating COVID19 PPE in the sustainable distribution centre. Delivery and service plan being drafted to analyse benefits of consolidation.
- All other Delivery and Service Plans contracted and implemented. Beginning to identify routes for implementing suggestions from plans in businesses.
- Successful in bid to deliver wood burning behaviour change campaign despite face-to-face engagement restrictions.
- Successful in bid for £290,000 to extend the wood burning campaign campaign and introduce low-cost monitors into Southampton and partnering local authorities to support the campaign with local data.
- Bid submitted to Defra air quality grant for £350,000 to deliver a schools engagement project to spread awareness of air quality and empower them to reduce the impact of pollution on students.
- Associated British Ports received funding from the Solent Local Enterprise Partnership to begin construction of shore side power infrastructure at two cruise ship terminals: both to be operational early 2022.
- Local NO_2 Plan re-evaluation underway to understand if the plan has achieved the required outcomes.

- Beginning to implement projects under the Transforming Cities Fund including the city's first Active Travel Zones. Plans developed for city centre and transport hub re-design to improve highways efficiency and encourage active and sustainable transport around the city.
- Future Transport Zones programme underway in Southampton and wider Solent region including the introduction of an e-scooter trial.
- The MyJourney active travel engagement programme continues to be 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 an adopted Air Quality Action Plan
- Finalising The Local NO_2 Plan
- Re-evaluation of The Local NO_2 Plan

Southampton City Council's priorities for the coming year is to continue to deliver the Local NO_2 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 2022 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 NO_2 Plan and the impact of the pandemic. The Plan will progress in 2022/23 and will aim to incorporate any new requirements from further NO_2 Plan evaluation and requirements from the Environment Act which received royal ascent at the end of 2021.

The principal challenges and barriers to implementation that Southampton City Council anticipates facing are delivering improvements in air quality commensurate 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 this can be mitigated 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 residents and businesses are engaged with and supported so that they can reduce their own impact.

We anticipate that the general long term trends are expected to continue and that it is likely that AQMAs will retain compliance, to the extent that they could be revoked within the next 3-4 years, subject to monitoring data.

This is evidenced by the monitoring data in 2020/2021 which did not record any NO_2 annual means above the standard at relevant receptors in the city.

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

- The Highways Agency
- Associated British Ports
- DP World
- Eastleigh and New Forest District Councils
- The Environment Centre : http://www.environmentcentre.com/about-us/contact-us/
- Sustrans https://www.sustrans.org.uk/
- Clean Air Southampton: https://cleanairsouthampton.com/
- Chamber of Commerce
- West Quay Shopping Centre
- Southampton Hospital Trusts
- Southampton University

The principal challenges and barriers to implementation that Southampton City Council anticipates facing are delivering improvements in air quality commensurate 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 this can be mitigated 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. This is now further supported through the Transforming Cities Fund and Future Transport Zone programmes, each of which represent significant investments in more sustainable road transport both of which form part of a wider Local Transport Plan.

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	Helps ensure compliance with annual mean NO2 EU Ambient Air Quality Directive (40 µg/m3 at EU Directive locations)	1. Achieve EU Directive 2. Accelerated uptake vehicles compliant with euro 6 emission standard	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	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.	"Compliant" operation buses (meeting minimum Euro VI engines or Clean Vehicle Retrofit Accredited equivalent)	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	Indiscernible (note: work is underway to develop a method of estimating AQ improvement from Access Fund measures with the University of Southampton)	Reduction in car journeys in the city	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	Indiscernible (note: Aim to reduce emissions and concentrations from future development)	Impact of development on local air quality	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	< 1µgm3	Use of cycle route, private vehicles removed from road	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.

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
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	Approx. 0.68 tonnes of NOx and 0.18 tonnes of PM modelled in 2020.	Reduction in HGV movements in the city. Use of SDC. Reduction in emissions from HGVs operating in Southampton.	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	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.	Number of cruise ships using facility. Pollutant emissions from cruise ships at berth.	Solent LEP funding received to install two shoreside connections in 2022.	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.
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	Private vehicle and SCC fleet NOx, PM emission reductions	Number of new public charging points installed over life of programme. Number of electric vehicles in SCC Fleet	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	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.

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
														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 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	Approx. 1.5 tonnes of NOx emissions reduced in 2021. Emission reductions would persist beyond.	Number of licensed taxi and private hire vehicles	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	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	Alternatively fuelled vehicles in SCC and EBC fleet	~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 wheelchair accessible to	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

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
												Plan additional award expected to achieve 1.08 tonnes of NOx per year reduced emissions.		upgrade to Euro 6 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	Measures within strategy have significant potential to deliver emissions reductions for NOx and PM.	Emissions from activity within the Port (i.e. shipping, NRMM) and traffic accessing the Port (i.e. freight, cruise traffic).	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	Allows DP World to target fleet of straddle carriers for NOx, NO2, PM emission reductions. ~20% less fuel use with hybrid technology.	1 Straddle Carrier fitted with hybrid technology, report produced	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	N/A	Publication date	Clean Air Strategy adopted in November 2016 and published on the council website.	Published
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	CAZ feasibility study will establish concentrations attributable to HGV's associate with port activity.	Emissions reductions from port related HGVs	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	TBC	Scheme complete		
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	TBC	Traffic flow/capacity in roundabout vicinity. Monitored NO2 levels.	Scheme to improve capacity at A33/A35 Millbrook roundabout at the Redbridge	Includes improved access to dock gate.

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
														Road/Millbrook Road AQMA on the Western Approach with anticipated benefits for air quality was completed in April 2019.	
17	Bus Priority measures	Traffic Management	Bus route improvements	2015	2021	SCC	Transforming Cities Fund	NO	Fully funded	£10,000-50,000	Implementation	Indiscernible	Bus time reliability/Bus patronage	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 part of multi-modal study in 2020.	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).
18	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	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.	Trial result published, commitment from bus operators to retrofit	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.
19	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	Reduce NOx/PM emissions from SCC fleet vehicles	Number of Low Emission Vehicles in council Fleet	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.
20	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	Dependent on uptake	Electric delivery vehicle in use	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.
21	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	Internal	NO	Fully funded	N/A	Complete	Indiscernible	Organisations signed-up to CAN and pledges made and delivered. Events held.	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

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
						groups, Environment Centre									of environmental topics.
22	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	Private vehicle NOx, PM emission reductions	Number of engagements during campaign	SCC hosted activities for the third National Clean Air Day in June 2019	Virtual Clean Air Day held 2020.
23	airAlert	Public Information	Other	2010	Complete. Ongoing promotion.	SCC, Sussex-air, Kings College London	Internal	NO	Fully funded	£10,000	Complete	Reduced exposure by susceptible and/or vulnerable service users	Users, alerts issued, satisfaction survey.	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
24	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.
25	EV parking discounts	Promoting Low Emission Transport	Other	2018	Ongoing	SCC	Internal	NO	Fully funded	N/A	Complete	Reduced emissions from private vehicles	Number of EV parking permits issued	Discounts launched in 2018. 14 permits issued by December 2018.	
26	Itchen Toll EV Concessions	Promoting Low Emission Transport	Other	2018	Ongoing	SCC	Internal	NO	Fully funded	N/A	Complete	Reduced emissions from private vehicles	Number of EV pass transactions and smart cities cards issued for EV use	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.
27	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	Dependent on uptake	Usage of cars	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
28	City Car Club	Alternatives to private vehicle use	Car Clubs	2015	Ongoing	SCC	Active Travel Fund	NO	Fully funded	N/A	Implementation	Indiscernible	usage of car club	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	Reduced emissions from taxi and private hire vehicles	Number of ULEV trial participants	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	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	TBC following scheme design/planning	reduce fuel usage by 10%	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

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
															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.
32	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	< 1µgm3	100% of schools have travel plans in place	3.5 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. 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 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.	Programme affected significantly by COVID19 and changes to travel behaviours. Since COVID19 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 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%.

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
33	Website and comms	Public Information	Other	2017	Ongoing	SCC	Internal	NO	Fully funded	N/A	Complete	N/A	Comms plan published	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.
34	City-wide fleet composition survey	Vehicle Fleet Efficiency	Other	2016	Complete (2017)	SCC	Implementation Fund, internal	NO	Fully funded	£60,000	Complete	N/A	Survey completion	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.
35	Domestic solid fuel burning engagement programme	Public information	Other	2021	2021	SCC, third party partner	Defra AQ fund	YES	Fully funded	£60,100	Implementation	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.	Number of leaflet drops, number of face to face engagements,	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.
36	Green Wall Alongside A33	Other	Other	2018	2020	SCC, Freight Liner	Internal	NO	Fully funded	£100,000	Planning	Indiscernible	Impact on cycle rates (due to improved aesthetics). NO2 concentrations.	Options still being considered by SCC and adjacent land owner.	Barrier to implementation: Land ownership issues. Resource dedicated to overcoming this issue. Green Grid plan committed to deliver city-wide green infrastructure.
37	Green City Charter (GCC) and Green City Plan	Other	Other	2020	2030	SCC, Green City signatories	Internal	NO	Fully funded	£5m+	Implementation	Indiscernible. Series of projects.	Implementation of Green City Plan. KPIs given in plan. Number of signatories.	GCC launch held during national clean air day 2019. Number of large businesses signed	The GCC came about as a result of the CAZ consultation where a large appetite for collective action

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
														up to the charter. SCC's Green City Plan being drafted, to be published and adopted early 2020.	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.
38	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	TBC. Likely significant long term benefit	Implementation of measures as set out in bid.	£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.

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
39	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	To be determined.	Implementation of measures as set out in action plan.	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.
40	Port Rail terminal extension	Freight and Delivery Management	Other	2019	2021	Network Rail, ABP	National Rail funds	NO	Fully funded	£17mil	Implementation	20% more goods transport by rail.	N/A	Partially complete – new sidings track installed to increase speed limit and improve efficiency.	
41	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	Primary aim of the project is to enhance wood burning public engagement campaign which targets emissions of PM fractions.	Implementation of low-cost monitors	Bid submitted to Defra, expected to be successful.	Monitors will capture PM fractions, O3 and NO2. Including modelling and mapping capabilities. £250k investment.
42	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	Not determined	Included in related documents	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

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
43	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	Estimated ~20% reduction of traffic within an ATZ	Included in related documents	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.	
44	Local Mobility Hubs	Promoting alternatives to private vehicles, Transport Planning and Infrastructure	Car Clubs, Other	2024	2026	SCC	Transforming Cities Fund	NO	Fully funded	£500k-1m	Planning	Not determined	Included in related documents	Woolston Interchange and Local Mobility Hub as well as Portswood Local Mobility Hub currently in planning phase. Consultation to launch early 2023. Options include car and bike and scooter sharing, EV charge points and connections to nearby public transport links.	Long term viability being reviewed.
45	Transforming Cities Fund corridor improvements	Promoting alternatives to private vehicles, Transport Planning and Infrastructure	Strategic highway improvements, Re-prioritising road space away from cars, inc. Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2021	2016	SCC	Transforming Cities Fund	NO	Fully funded	£1m+	Implementation	Not determined	Included in related documents	Improvements complete at Northam Road, West Quay Road and Bevois Valley. Further schemes planned and underway on key transport corridors including Western approach, Avenue, Swaythling-Portswood and Woolston.	DfT Change Control approved for Avenue and Woolston with schemes now going ahead.

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
46	City Centre Transformation	Traffic management, Transport Planning and Infrastructure	Strategic highway improvements, Re-prioritising road space away from cars, inc Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2022	2026	SCC	Transforming Cities Fund	NO	Fully Funded	£10m+	Initiation	Not determined	Included in related documents	£18.5m investment in city centre. Northern Ring Road Phase 1 improvements complete (except for EV charging infrastructure). Central Station South Side scheme progressing into detailed design.	All City Centre schemes (except for central station scheme) are subject to DfT Change Control. Work is ongoing to ensure a satisfactory package of measures / schemes is submitted to DfT to unlock the total funding amount.
47	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	Not determined	Included in related documents	£1.7 m funding awarded by Highways England to SCC and other partners.	Implementation limited due to COVID19 pandemic.
48	Hants 2025 e-taxi and van trial	Public information, promoting low emission transport	Taxi incentives	2022	2023	SCC, Department for Levelling Up, Housing and Communities, ERDF funding	European Regional Development Fund	NO	Fully funded	£1.5m	Implementation	To be determined 2023	GHG savings, vouchers provided, number of charge points installed	Bid submitted for £750,000 ERDF funding to deliver a series of projects to encourage the update of Electric Taxis and LCV's in Southampton and the wider Hampshire region including subsidised leasing, 6 new rapid charge points and supporting engagement. Bid successful and Grant Funding Agreement signed for implementation 2022.	Project planning and inception.

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
49	E-Scooter hire scheme	Promoting Low Emission Transport, Promoting alternatives to private vehicles	Micro-mobility	2021	2022	SCC and Solent Transport	Future Transport Zones	No	Fully funded	£1m+	Implementation	To be determined	Service use	E-Scooter hire scheme established. Between March 2021 - November 2022 : 1300 scooters available across 200 parking zones, 40,000 unique users identified, ~126t CO2e saved	Short term trial - reliant on extensions through funding
50	E-Bike hire scheme	Promoting Low Emission Transport, Promoting alternatives to private vehicles	Micro-mobility	2022	2023	SCC and Solent Transport	Future Transport Zones	No	Fully funded	£1m+	Planning	To be determined	Service use	Procurement estimated for early 2022	Impact of COVID19 and supply chain issues have delayed procurement.
51	Autonomous and electric distribution vehicles	Promoting Low Emission Transport, Freight and Delivery Management	Freight consolidation	2026	2026	SCC and Solent Transport	Future Transport Zones	No	Fully funded	£1m+	Planning	To be determined	Number of vehicles	Planning phase	

$PM_{2.5}$ – 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 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 2021 compared to previous years. In 2011 it was 16 µg/m^3 but it has decreased steadily to 9.0 µg/m^3 in 2021.
  In 2020 it was the same, at 9.0 µg/m^3
- We are anticipating an increase in solid fuel burning in 2022, due to the high cost of heating houses, caused by the reduction in gas supply from Russia. The permanent $PM_{2.5}$ monitor at the AURN Station at Brintons Road and hopefully the low cost monitors yet to be deployed and funding confirmed, will monitor if there is an increase in $PM_{2.5}$ over the coming winter.

$PM_{2.5}$ 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 8.5% attributable to particulate air pollution. This was slightly higher than the Southeast England figure of 7.5% and Hampshire at 8.1%[7]. 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

[7] Public health profiles - OHID (phe.org.uk) – please note these stats refer to the new method of calculation, as such they will differ to previously reported statistics.

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 2021 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 2017 and 2021 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 2021. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The 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 82 sites during 2021. Table A.2 in Appendix A presents the details of the non-automatic sites.

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

Individual Pollutants

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

than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.1.3 Nitrogen Dioxide (NO_2)

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

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

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There were no exceedances of the annual mean NO_2 objective monitored in 2021, the second time this has happened since Review and Assessment began. The highest monitored mean concentration of NO_2 in Southampton was

36.9 µg/m^3 on the residential façade of 66 Burgess Road in 2021. Very close behind this was the second highest, 36.7 µg/m^3 on the residential façade of 367A Millbrook Road in 2021. 367A Millbrook Road monitored the highest NO_2 in the city in 2020 as well. These locations are both within existing AQMAs.

There were a couple of higher results monitored, but these were not at relevant receptors. For instance, Redbridge Causeway at 38.9 µg/m^3 and Vincents Walk Bus Stop at 36.6 µg/m^3 ,but these were still below 40 µg/m^3 . Both of these locations are outside the AQMAs.

2021 monitoring results showed a small increase of NO_2 levels, compared 2020. This was to be expected, as the severe lockdowns of 2020 were more muted and less rigorous in 2021. People became used to living with COVID. The rapid deployment of life saving vaccines in early 2021 facilitated everyday life returning to some semblance of normality.

The COVID19 pandemic and subsequent “lockdowns”, played an important part in reducing vehicle movements in the city during 2020 and to a lesser extent in

2021. 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 2020/21.

In summary, exceedances halved from 8 in 2018 to only 4 in 2019 at relevant receptors, with no monitored exceedances recorded in 2020 and 2021. SCC will consider revoking all 10 of the AQMAs in the future once the medium to long-term trend of NO_2 concentrations is confirmed in future ASRs, including the impact COVID19 has had on trends. SCC will follow the LAQM TG 22 Guidance on when to revoke the AQMAs. As the highest NO_2 annual means are monitored with diffusion tubes at residential facades, SCC need to achieve NO_2 means below 36 µg/m^3 for a minimum of 3 consecutive years. SCC also needs to take into account that 2020 in particular and 2021 to a lesser extent, were not typical years, due to Pandemic lockdowns; more people working from home, resulting in less traffic.

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 2021. PM_{10} stayed broadly similar to previous years. At CM7 Redbridge AURN Automatic Monitoring Station, the annual average for PM_{10} was the same as 2020, at 17µg/m^3 . At CM1, PM_{10} reduced slightly to 14 µg/m^3 in 2021 from 15 µg/m^3 in 2020.

The 2 Automatic AURN Monitoring Stations will continue monitoring PM_{10} in future years, dependent upon national government funding. In addition, SCC were successful in a bidding for 8 new low-cost monitors through the 2020/21 Defra Air Quality grant scheme which can monitor several PM fractions and other pollutants which will support the monitoring network. These are expected to be in place in 2022.

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 remained the same at CM1, Brintons Road in 2021 as in 2020 at 9ug/m^3 .

3.1.6 Sulphur Dioxide (SO_2)

Table A.9 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2021 with the air quality objectives for SO_2.

There were no exceedances of the UK objectives for SO_2 in 2021.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
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

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)
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

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)
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

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)
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

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)
N178	2 Gover Road	Roadside	437265	113682	NO2	No	0.0	8.8	No	2.1
N184A, N184B, N184C	Redbridge AMS (C)	Roadside	437811	113557	NO2	8	16.0	14.6	No	2.4
N185	Redbridge Causeway 1	Roadside	437167	113713	NO2	No	29.2	2.4	Yes	2.7
N186	Redbridge Causeway 2	Roadside	437126	113701	NO2	No	7.5	2.9	No	2.5
N187	Cobden Avenue	Roadside	444102	113872	NO2	No	0.0	7.0	No	2.3
N188	Blechynden Terrace, Taxi	Roadside	441300	112233	NO2	No	NA	4.0	No	0.8
N189	Cumberland House	Roadside	441790	112465	NO2	No	0.0	2.1	No	2.4
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	2.5
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	2.6
N195	Bargate Street	Roadside	441945	111655	NO2	No	NA	0.7	No	2.7

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)
N197	351 Winchester Road	Roadside	440957	115151	NO2	No	0.0	5.5	No	2.5
N198A, N198B, N198C	Onslow Road (C)	Roadside	442304	112771	NO2	3	NA	2.6	No	2.7
N199	Dorset Street/Charlottes Place Crossing	Roadside	442210	112583	NO2	1	16.5	3.5	Yes	1.8
N200	Northam Bridge South	Roadside	443160	112765	NO2	1	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	2.0
N204	6 Lodge Road	Roadside	442542	113261	NO2	No	2.2	2.1	No	2.2
N205	Stags Gate, Lodge Road	Roadside	442101	113438	NO2	No	4.1	2.0	No	2.6
N206	Charlottes Place	Kerbside	442265	112516	NO2	No	5.0	2.2	No	2.4
N207	205 Waterhouse Lane	Roadside	439698	112806	NO2	No	3.5	4.0	No	2.0
N208	Sherwood Close	Roadside	441365	115202	NO2	No	11.7	1.9	No	2.5
N209	40 Burgess Road	Roadside	441246	115138	NO2	No	2.2	1.6	No	1.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
N210	18 Burgess Road	Roadside	441122	115118	NO2	No	4.0	1.7	No	2.5
N211	4 Coniston Road	Roadside	437332	113873	NO2	No	0.0	4.2	No	4.5
N213	277 Portswood Road	Roadside	442935	114374	NO2	No	0.0	9.5	No	1.5
N214	64 Burgess Road 2019	Roadside	441677	115280	NO2	No	0.0	5.2	No	2.2
N216	73 Lodge Road	Roadside	442352	113486	NO2	No	1.4	4.3	No	2.1
N217	11 Saxon Road	Roadside	440751	112188	NO2	No	3.0	1.3	No	2.5
N218	112 St Denys Road	Roadside	443547	114101	NO2	No	0.5	1.2	No	2.0

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	442579	112248	Urban Background	Automatic	79.6%	29.6	28.9	27.8	22.5	25.0
CM4	442304	112771	Roadside	Automatic	99.8%	**43**	39.9	**41.4**	31.0	32.0
CM6	443751	111123	Roadside	Automatic	92.4%	**42.2**	37	36	27.3	33.0
CM7	437809	113560	Roadside	Automatic	99.2%	39.9	35	32.5	26.8	26.0

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

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

Notes:

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

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

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

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

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

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

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
N100	444387	114453	Urban Background	100	100.0	16.7	17.1	18.1	13.3	16.8
N101	437548	113719	Roadside	100	100.0	**48.2**	**42.4**	39.2	30.6	34.0
N103	438808	112903	Roadside	100	100.0	31.5	32.0	29.8	23.5	23.6
N104	439222	112850	Roadside	100	100.0	35.6	36.4	34.0	30.4	28.6
N106	439752	113984	Roadside	91	92.3	36.3	37.0	35.4	27.7	29.3
N107	442364	112890	Roadside	91	92.3	**45.3**	**48.0**	**46.5**	32.4	35.7
N109	442585	113248	Roadside	83	84.6	36.6	39.3	38.0	25.9	30.5
N110, N111, N112	442579	112248	Urban Background	94	100.0	27.7	29.3	28.2	21.9	23.8
N113	444124	113288	Roadside	100	100.0	35.2	32.9	32.7	25.9	29.4
N114	444131	113322	Roadside	100	100.0	34.4	33.7	32.8	25.0	27.1
N115	437939	113474	Roadside	91	92.3	35.9	34.4	32.8	26.0	27.1
N116	437952	113407	Roadside	100	100.0	34.3	34.3	32.5	25.9	27.1
N117	443752	111121	Roadside	100	100.0	34.2	33.3	33.7	27.0	29.2

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
N118	442472	113065	Roadside	83	84.6	34.1	36.2	35.0	25.2	27.8
N120	442716	111019	Roadside	91	90.4	**40.0**	37.2	35.8	26.4	30.9
N122	440000	112633	Roadside	91	92.3	31.6	28.2	31.2	23.8	25.7
N123	442348	112305	Roadside	100	100.0	30.3	34.2	32.7	24.2	25.4
N124	439741	112753	Roadside	75	75.0	35.5	34.8	34.7	27.5	27.7
N125	443125	112641	Roadside	100	100.0	34.5	36.2	37.0	26.9	28.7
N126	442365	112286	Roadside	100	100.0	32.3	35.9	32.4	25.0	27.7
N129	442554	111021	Roadside	100	100.0	30.2	28.9	29.5	22.0	25.1
N130	439346	112821	Roadside	100	100.0	**40.8**	**42.3**	39.2	34.2	36.7
N131	439378	114185	Roadside	100	100.0	35.2	37.8	36.5	28.7	29.6
N133	438609	113020	Roadside	100	100.0	29.4	27.7	28.0	23.2	22.6
N134	438980	112861	Roadside	100	100.0	36.1	38.0	33.8	27.4	28.4
N138	441697	115288	Roadside	100	100.0	**40.4**	**47.3**	**43.1**	33.6	36.9
N140	441628	112332	Roadside	100	100.0	**45.4**	**45.2**	**44.5**	33.3	35.7

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
N141	441923	110990	Roadside	100	100.0	33.0	35.2	33.2	25.0	27.5
N143	439457	114150	Roadside	100	100.0	36.2	35.5	35.0	27.6	28.3
N144	443147	112709	Roadside	100	100.0	36.4	32.5	30.3	23.7	25.8
N146	443164	112741	Roadside	100	100.0	30.2	27.8	28.1	21.8	23.4
N149	441552	115247	Roadside	91	90.4	28.5	31.5	29.7	26.5	29.6
N151	439394	114176	Roadside	83	82.7	37.6	37.0	36.7	29.2	30.8
N152	437327	113848	Roadside	100	100.0	**45.8**	**42.2**	39.9	34.1	33.3
N158	443807	111123	Roadside	100	100.0	36.6	34.8	34.6	29.3	30.7
N159	443740	111147	Roadside	100	100.0	31.9	32.1	32.1	27.5	30.0
N161	442705	114129	Roadside	100	100.0	30.4	33.0	28.5	24.1	25.0
N162	442872	114336	Roadside	75	75.0	37.4	37.5	35.1	26.3	28.1
N164	442809	114241	Roadside	100	100.0	32.4	34.2	29.5	23.8	26.3
N165	442766	114181	Roadside	100	100.0	31.4	32.6	30.9	25.3	27.9
N166	442251	112129	Roadside	83	84.6	36.0	35.9	33.7	24.9	29.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
N167	439759	114011	Roadside	100	100.0	34.5	35.1	35.0	27.7	27.7
N168	439737	114025	Roadside	100	100.0	35.9	36.5	35.1	26.5	27.9
N169	439361	114195	Roadside	83	82.7	**43.0**	**42.8**	38.9	33.5	32.8
N170	442482	111003	Roadside	91	90.4	**40.1**	39.0	37.0	26.8	32.6
N172	442207	112126	Roadside	100	100.0	**42.1**	**41.3**	**40.2**	30.8	31.7
N174	443959	113315	Roadside	100	100.0	**41.2**	**41.5**	**40.7**	31.6	33.5
N175	439959	113737	Roadside	100	100.0	38.9	38.3	35.5	29.5	28.1
N176	439772	113952	Roadside	100	100.0	35.5	35.6	32.1	25.5	26.8
N177	439844	113907	Roadside	91	90.4	37.5	38.6	35.2	26.6	28.8
N178	437265	113682	Roadside	91	92.3	24.5	24.3	24.0	19.2	19.2
N184A, N184B, N184C	437811	113557	Roadside	100	100.0			34.7	29.6	28.5
N185	437167	113713	Roadside	100	100.0	**50.2**	**53.9**	**43.0**	37.7	38.9
N186	437126	113701	Roadside	66	67.3	39.0	39.0	35.2	28.5	29.9
N187	444102	113872	Roadside	100	100.0			32.7	26.4	26.1

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
N188	441300	112233	Roadside	100	100.0			32.6	27.1	26.5
N189	441790	112465	Roadside	100	100.0			36.3	27.6	30.4
N190	442024	112553	Roadside	100	100.0			39.0	30.4	31.0
N191	441915	112097	Roadside	100	100.0			**42.5**	33.5	33.8
N192	441961	112029	Roadside	100	100.0			**41.9**	32.9	33.7
N193	441975	112031	Roadside	100	100.0			35.3	26.3	26.8
N194	442090	111775	Roadside	91	92.3			**43.6**	38.4	36.6
N195	441945	111655	Roadside	100	100.0			37.7	31.8	31.9
N197	440957	115151	Roadside	100	100.0			37.5	24.2	27.1
N198A, N198B, N198C	442304	112771	Roadside	100	100.0			33.4	26.2	28.5
N199	442210	112583	Roadside	91	92.3			35.8	30.9	33.5
N200	443160	112765	Roadside	100	100.0			30.2	26.9	28.3
N201	439759	112738	Roadside	91	90.4			**55.9**	39.6	**44.0**
N202	437166	113755	Roadside	83	84.6			**46.5**	37.8	37.8

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
N204	442542	113261	Roadside	100	100.0			35.6	25.2	29.7
N205	442101	113438	Roadside	66	67.3			38.4	26.5	28.7
N206	442265	112516	Kerbside	100	100.0			39.4	30.8	32.5
N207	439698	112806	Roadside	100	100.0			33.5	27.8	26.7
N208	441365	115202	Roadside	100	100.0			32.6	23.8	27.7
N209	441246	115138	Roadside	100	100.0			31.7	25.2	26.3
N210	441122	115118	Roadside	100	100.0			38.1	27.7	30.2
N211	437332	113873	Roadside	100	100.0			26.5	21.4	21.1
N213	442935	114374	Roadside	100	100.0			28.8	22.7	24.8
N214	441677	115280	Roadside	100	100.0			33.0	25.5	27.0
N216	442352	113486	Roadside	100	100.0			37.8	25.1	28.2
N217	440751	112188	Roadside	100	100.0			33.6	28.2	26.9
N218	443547	114101	Roadside	100	100.0			36.4	26.9	30.4

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

☒ **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

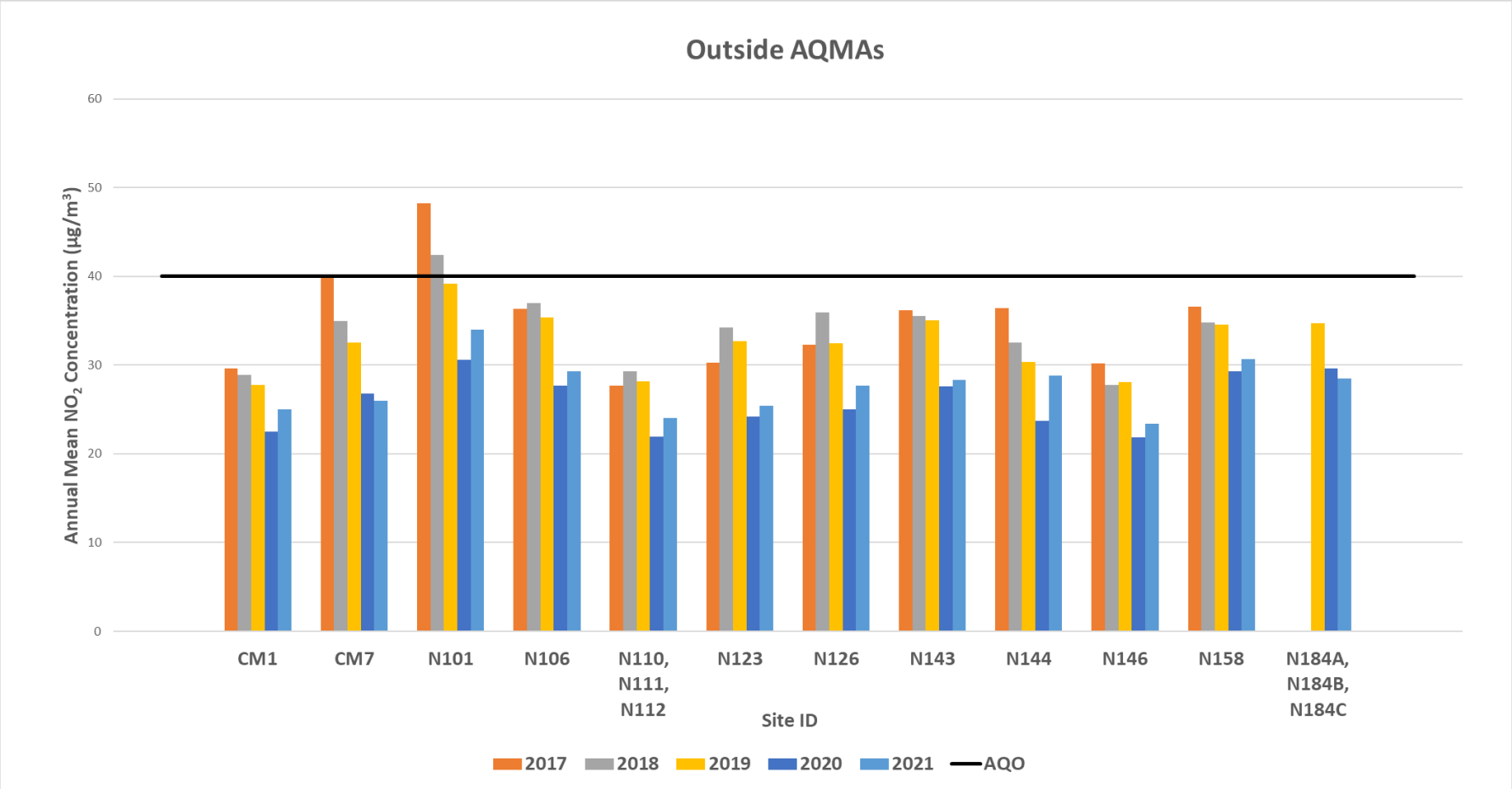


Figure A.1 presents NO_2 annual mean concentrations for sites CM1 to N184 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2020 and 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

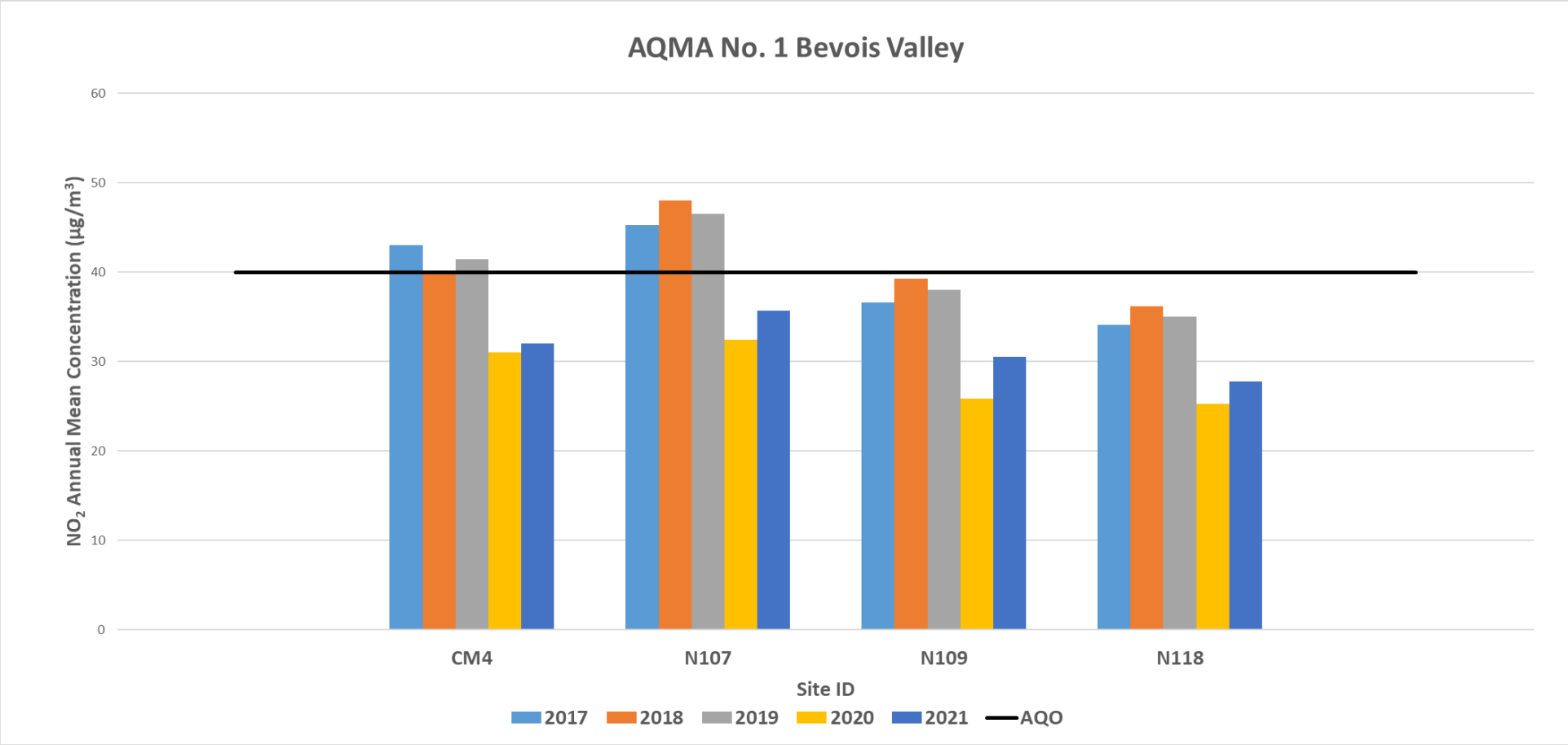


Figure A.2 presents NO_2 annual mean concentrations for sites CM4 to N118 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2020 and 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic.

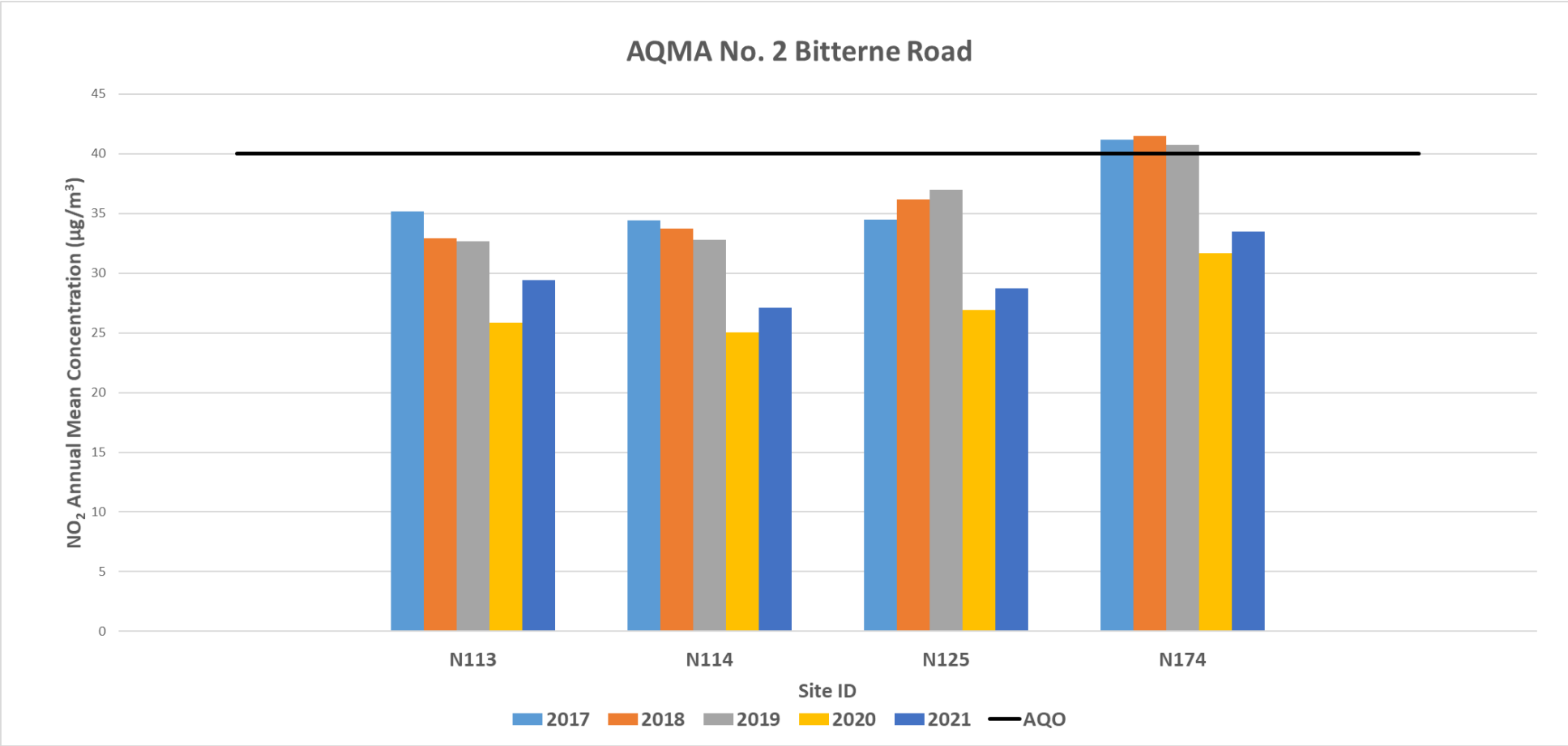


Figure A.3 presents NO_2 annual mean concentrations for sites N113 to N174 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2020 and 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

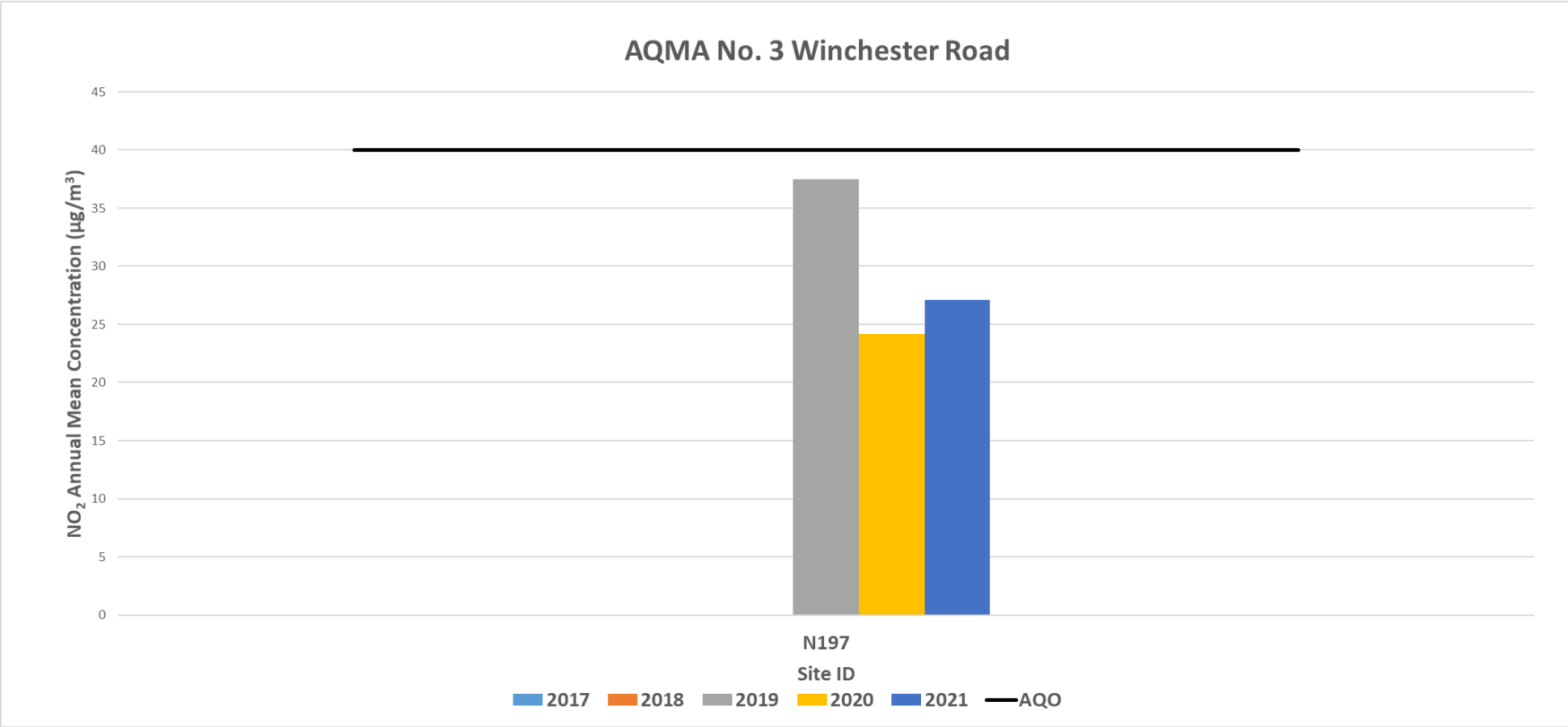


Figure A.4 presents NO_2 annual mean concentrations for site N197 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2019,2020 and 2021. there is a general trend of reduction experienced across the site, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

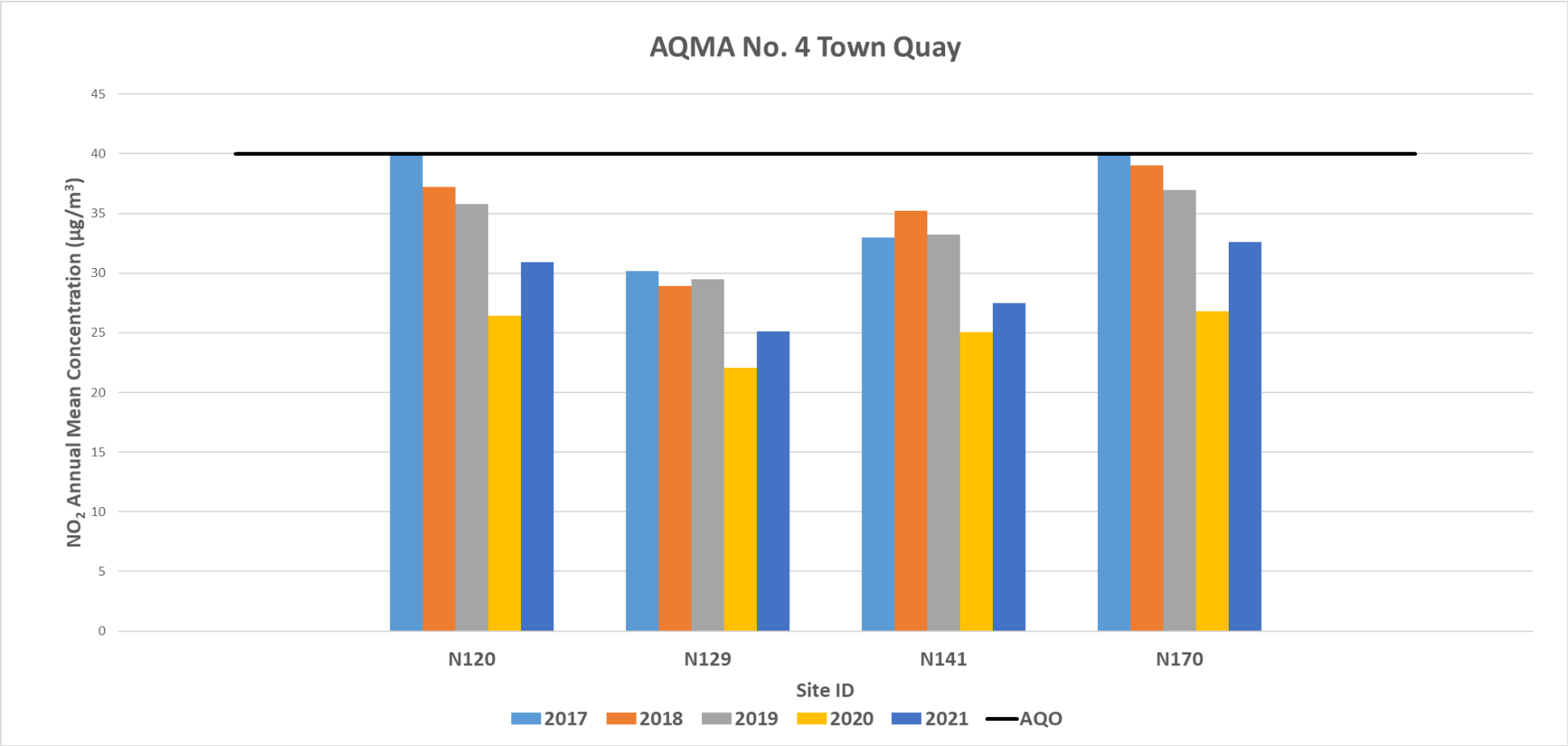


Figure A.5 presents NO_2 annual mean concentrations for sites N120 to N170 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2018- 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

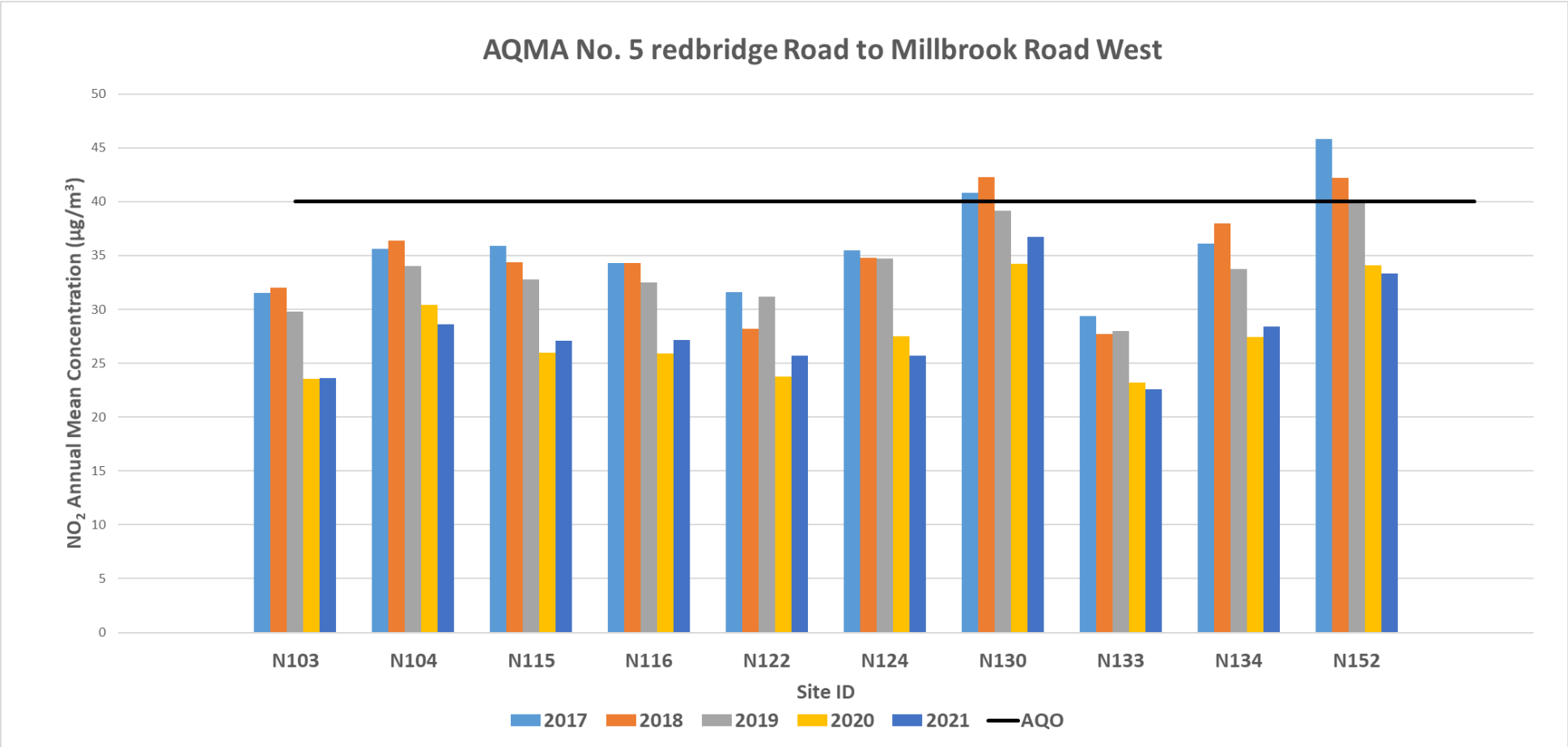


Figure A.6 presents NO_2 annual mean concentrations for sites N103 to N152 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2020 and 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

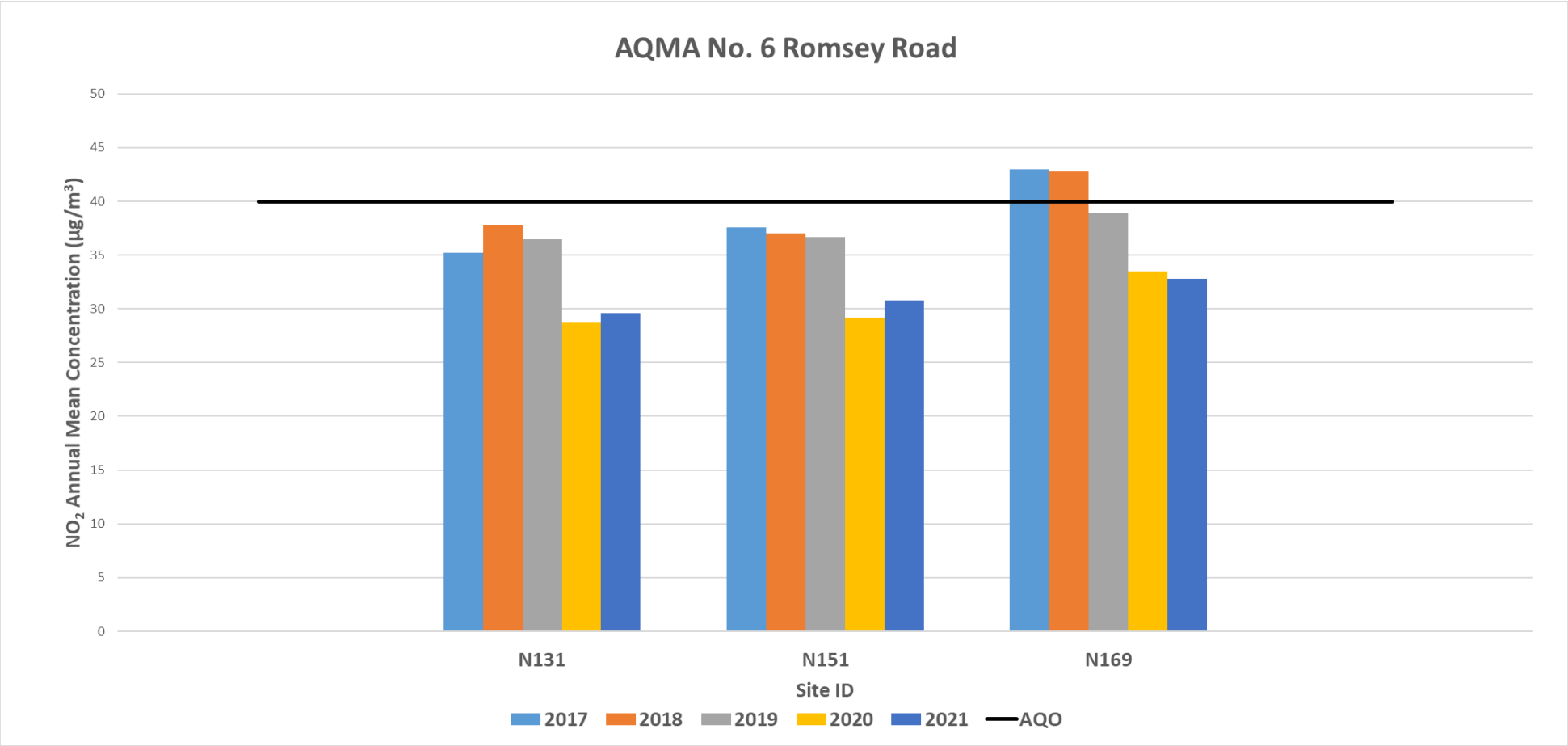


Figure A.7 presents NO_2 annual mean concentrations for sites N131 to N169 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2019,2020 and 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

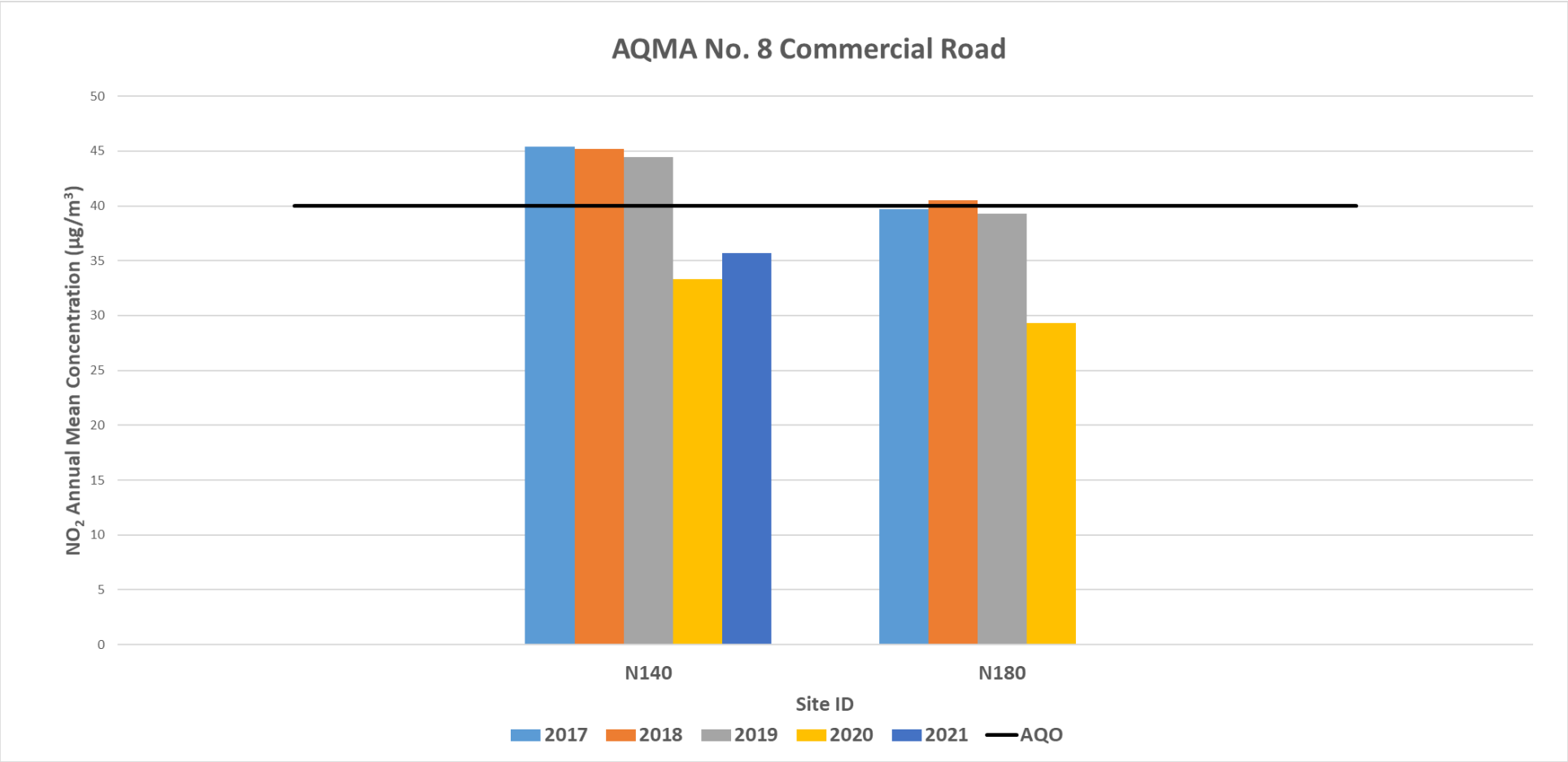


Figure A.8 presents NO_2 annual mean concentrations for sites N140 to N180 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2020 and 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

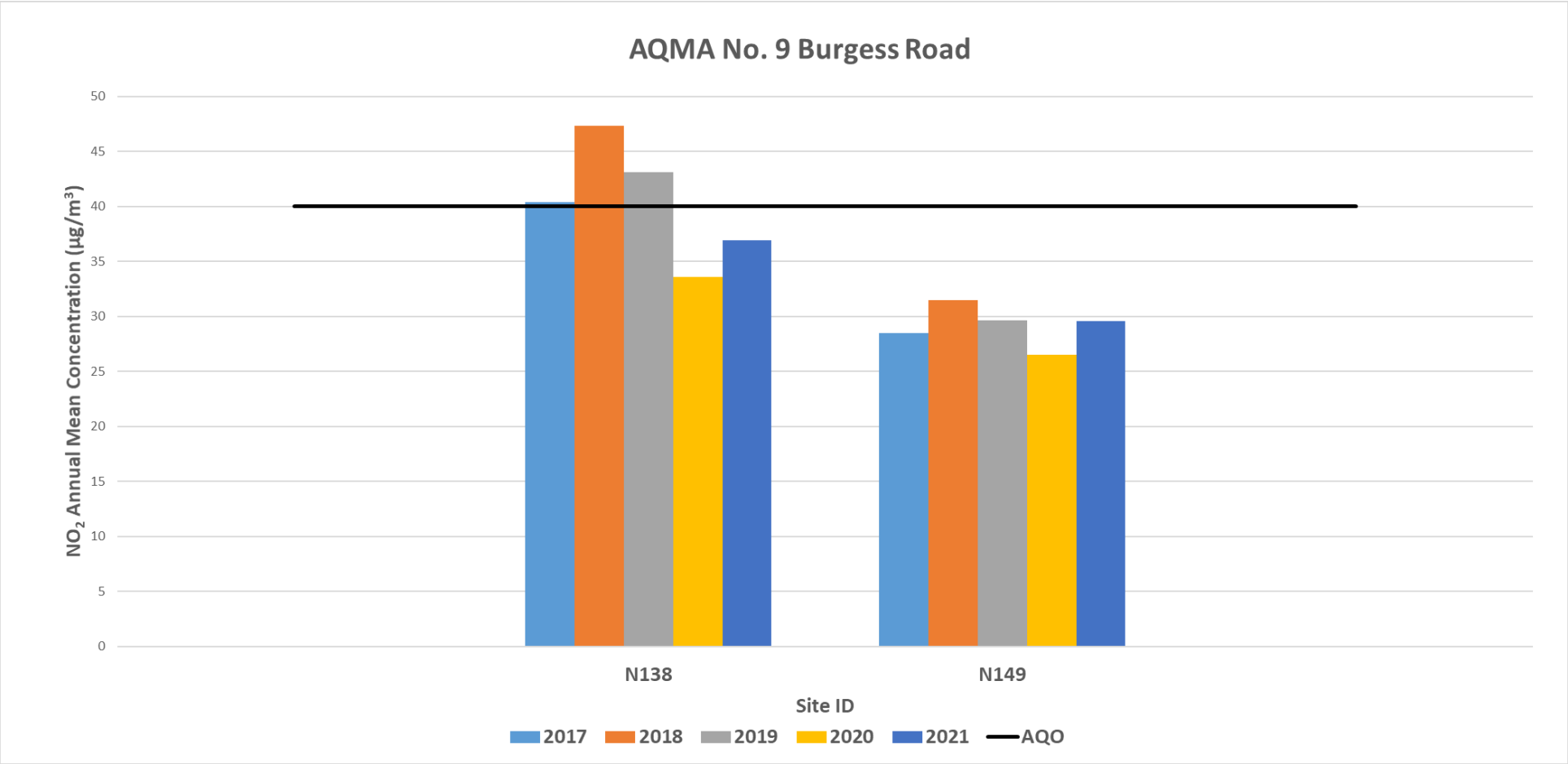


Figure A.9 presents NO_2 annual mean concentrations for sites N138 to N149 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2020 and 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

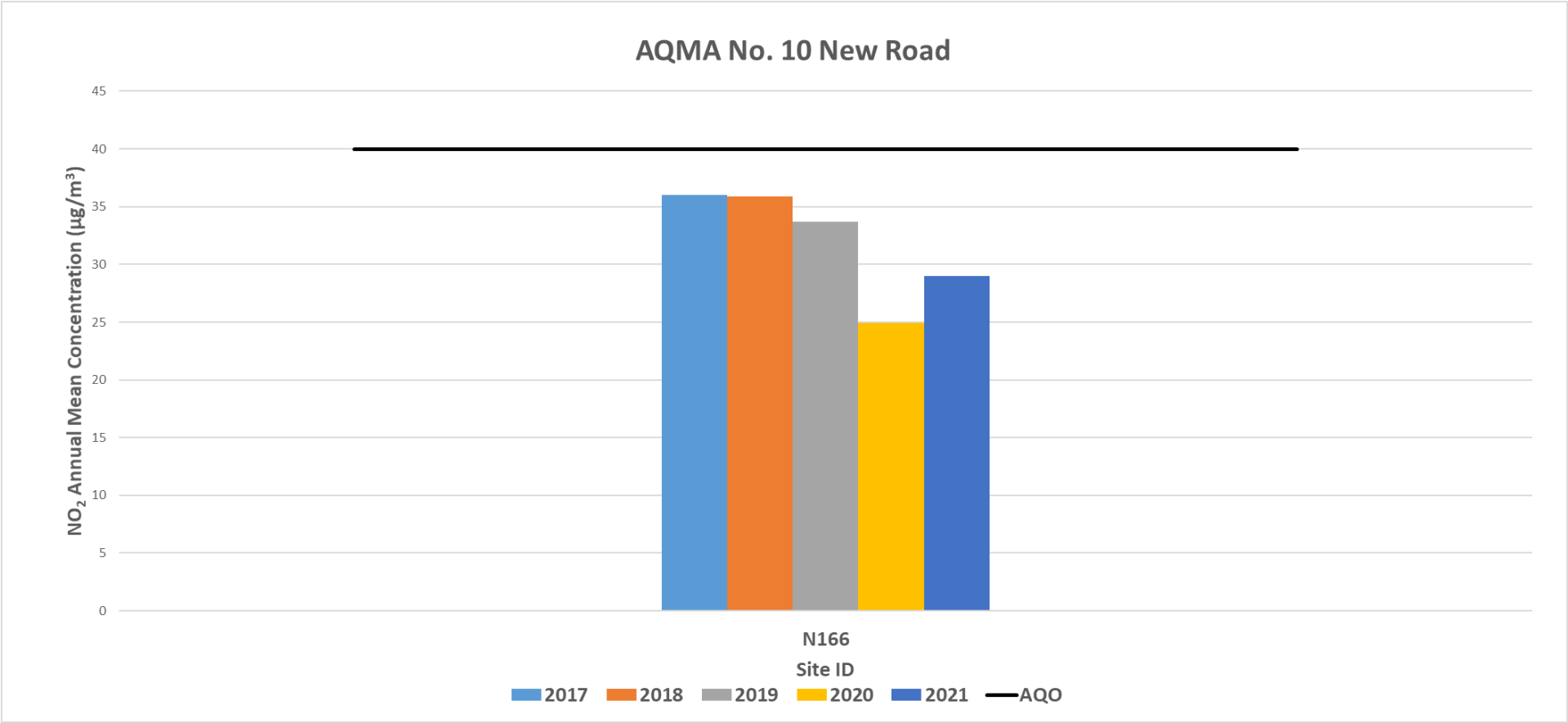


Figure A.10 presents NO_2 annual mean concentrations for site N166 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2017 to 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

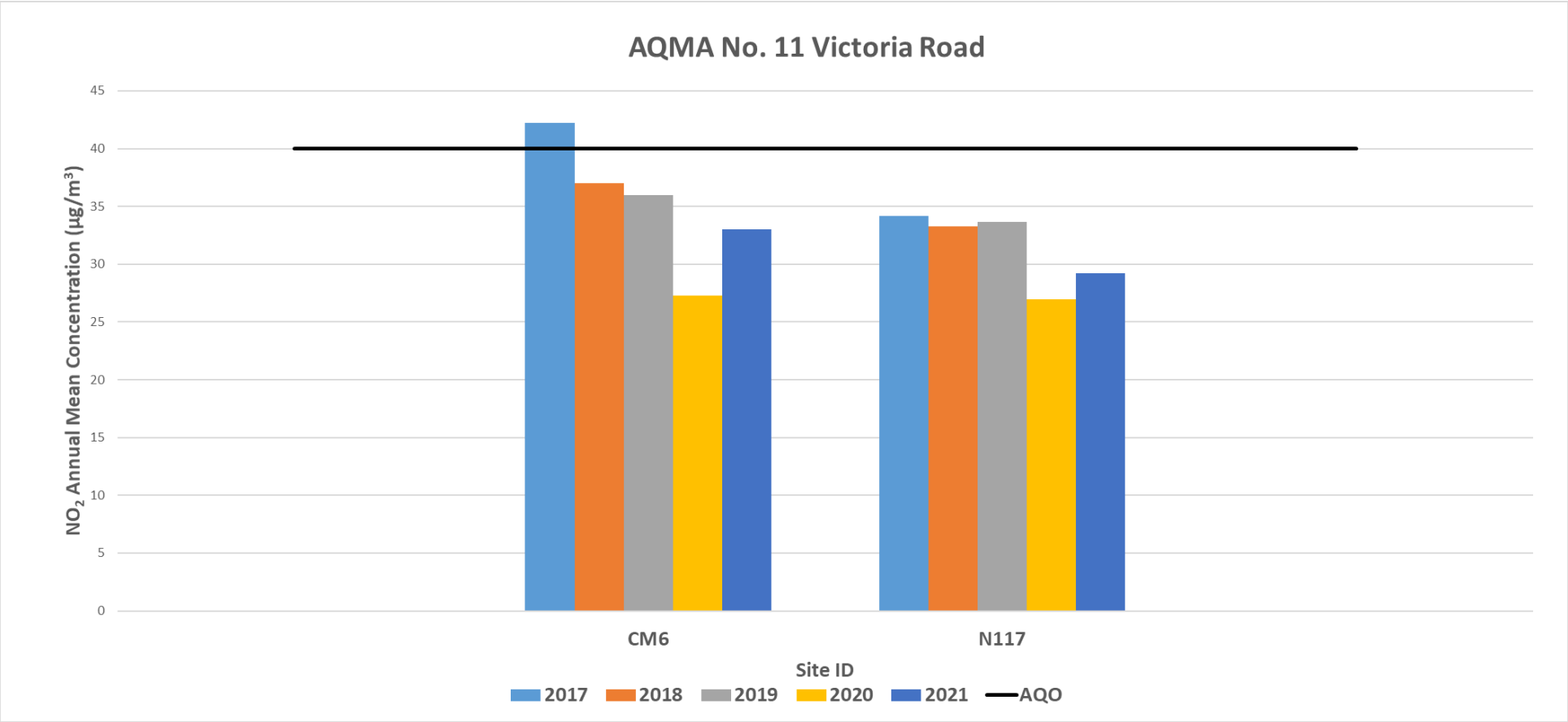


Figure A.11 presents NO_2 annual mean concentrations for sites CM6 to N117 between years 2017 to 2021. There are no exceedances of the annual mean objective in 2018- 2021. there is a general trend of reduction experienced across the sites, except for a small increase in 2021 due to covid restrictions reducing, which caused an increase in traffic

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	442579	112248	Urban Background	79.6%	79.6%	0	0	0	**0(96)**	0
CM4	442304	112771	Roadside	99.8%	99.8%	0	0	0	0	0
CM6	443751	111123	Roadside	92.4%	92.4%	**9 (178)**	0	**0(133)**	0	0
CM7	437809	113560	Roadside	99.2%	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.12 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

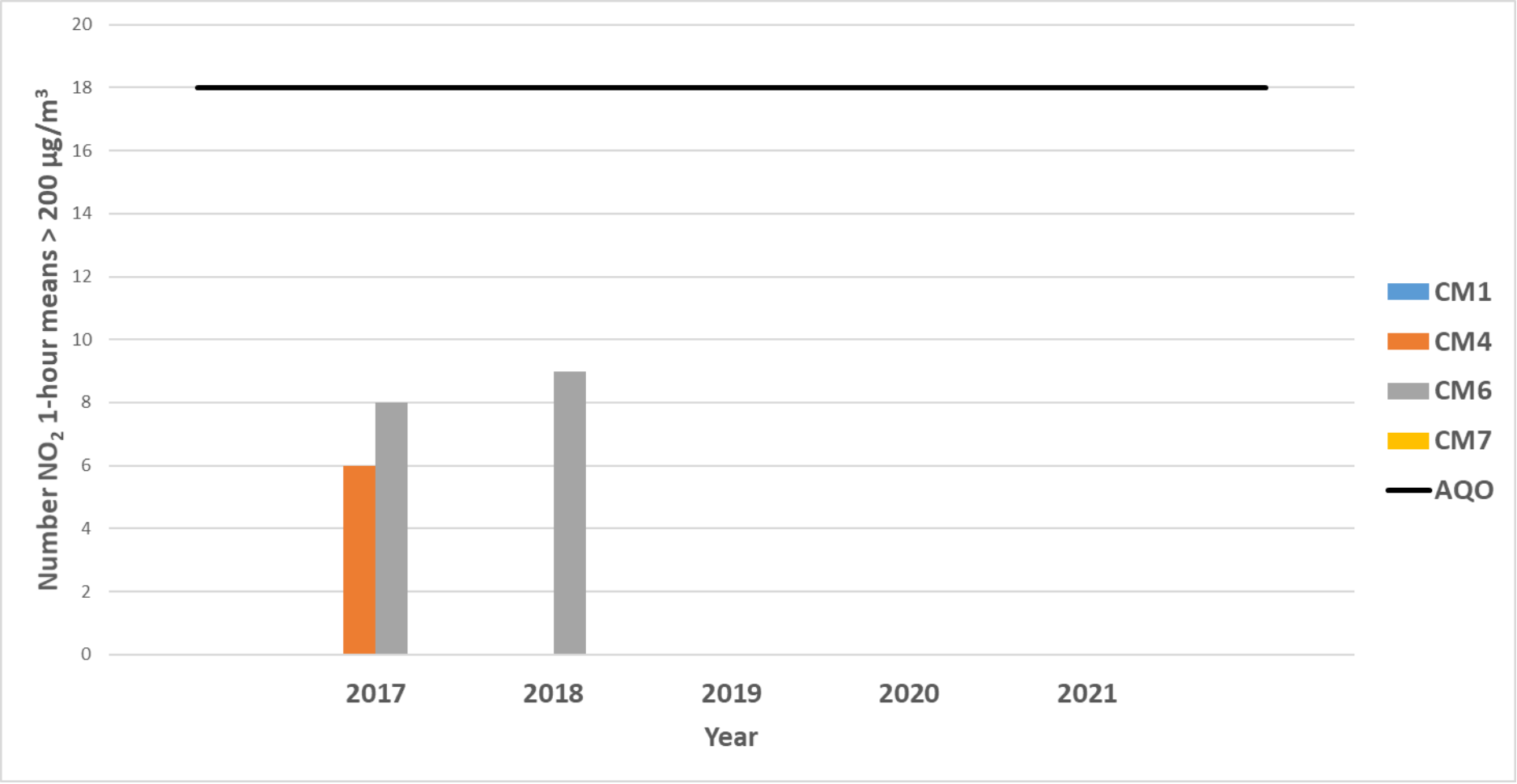


Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	442579	112248	Urban Background	98.7%	98.7%	16.8	19.5	17.1	15	14
CM7	437809	113560	Roadside	93.2%	93.2%	19.4	17.4	16.6	17	17

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

Notes:

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

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold**.

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

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

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

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

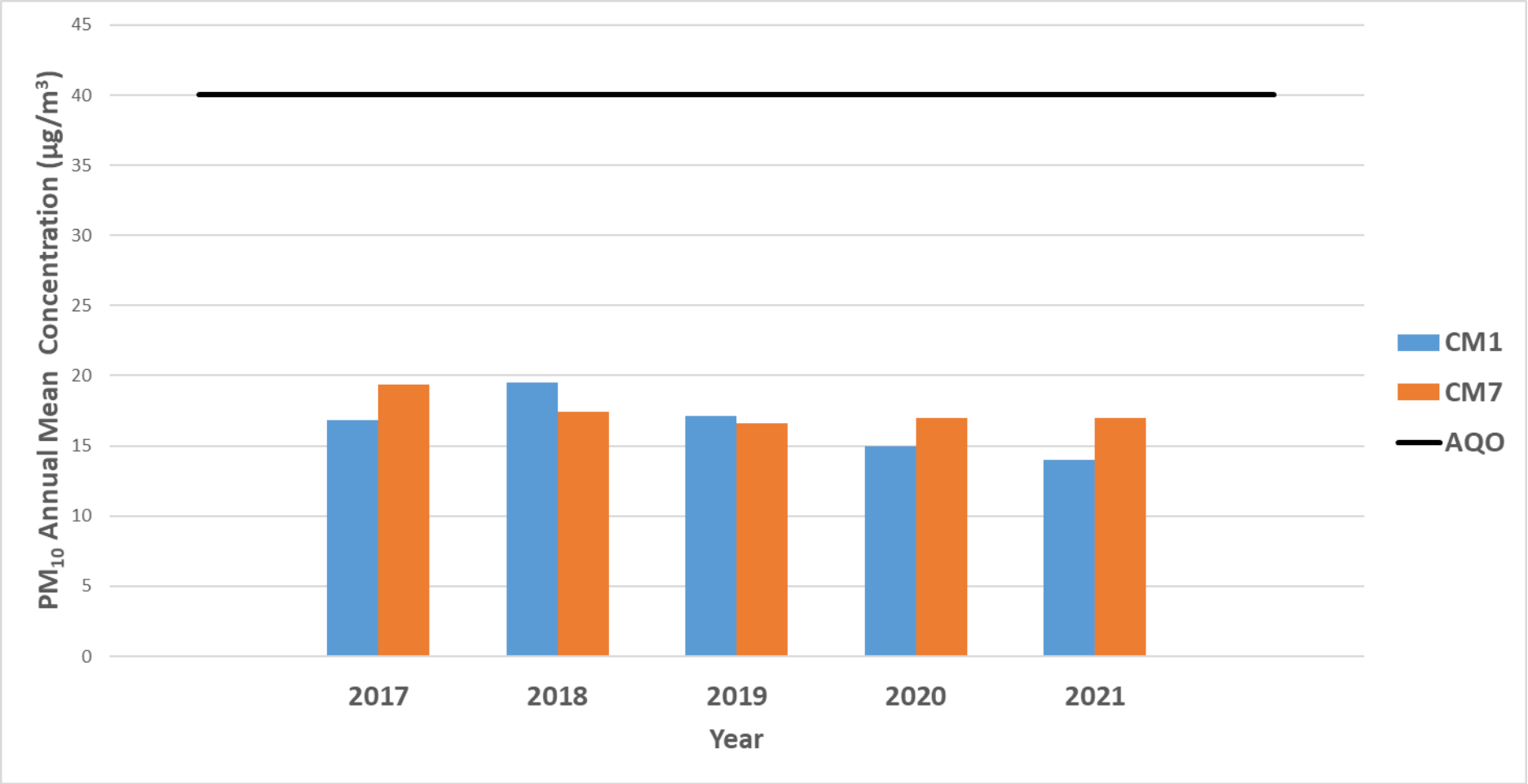


Figure A3 *presents PM_{10} annual mean concentrations for sites CM1 to CM7 between years 2017 to 2021. There are no exceedances of the annual mean objective. there is a general trend of reduction experienced across the sites*

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	442579	112248	Urban Background	98.7%	98.7%	1	1 (31.0)	2	1	3
CM7	437809	113560	Roadside	93.2%	93.2%	2	0 (27.8)	2	2	2

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

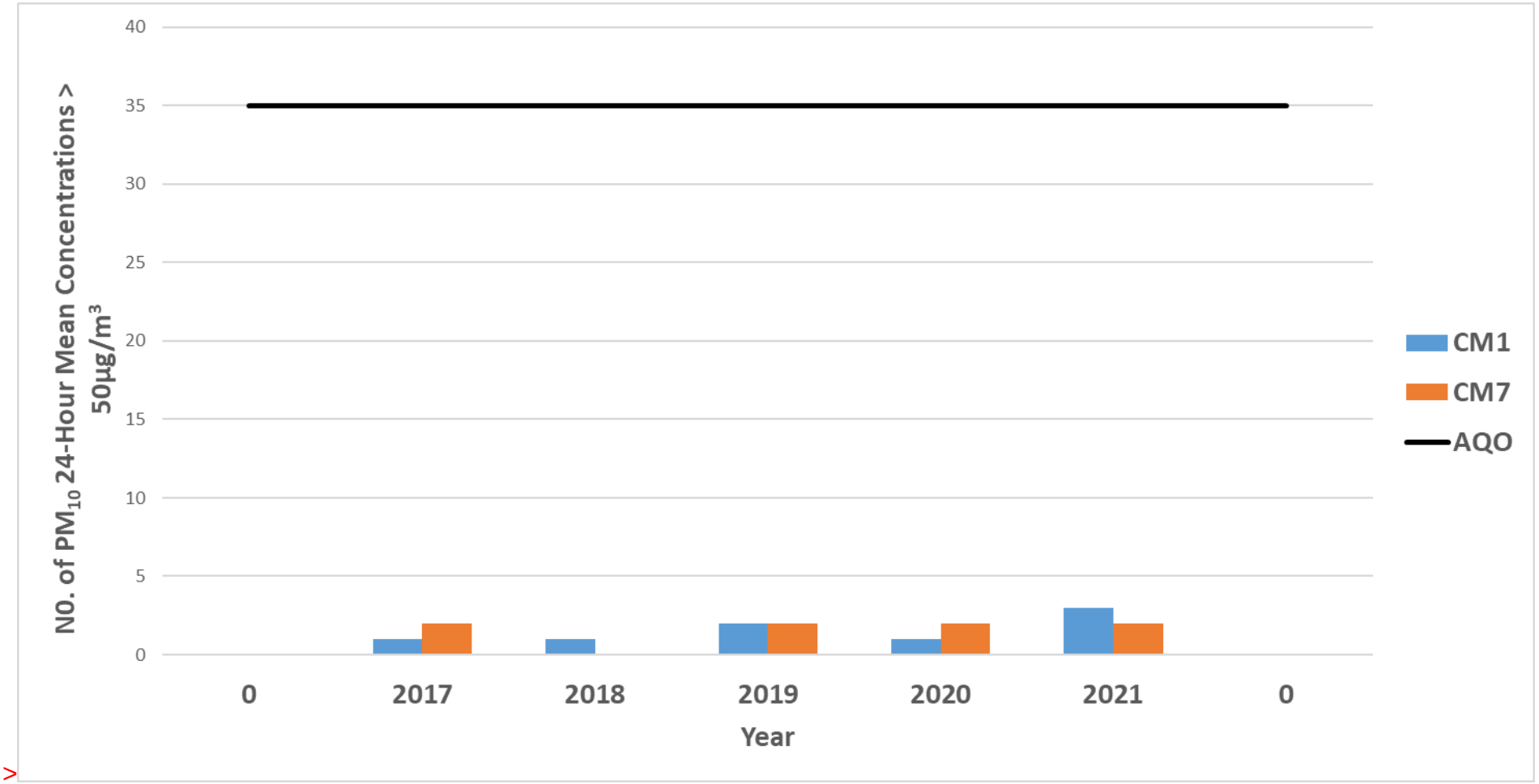
Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

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

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

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



>

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
CM1	442579	112248	Urban Background	98.7%	98.7%	11.2	13.3	9.6	9	9

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

Notes:

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

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

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

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

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

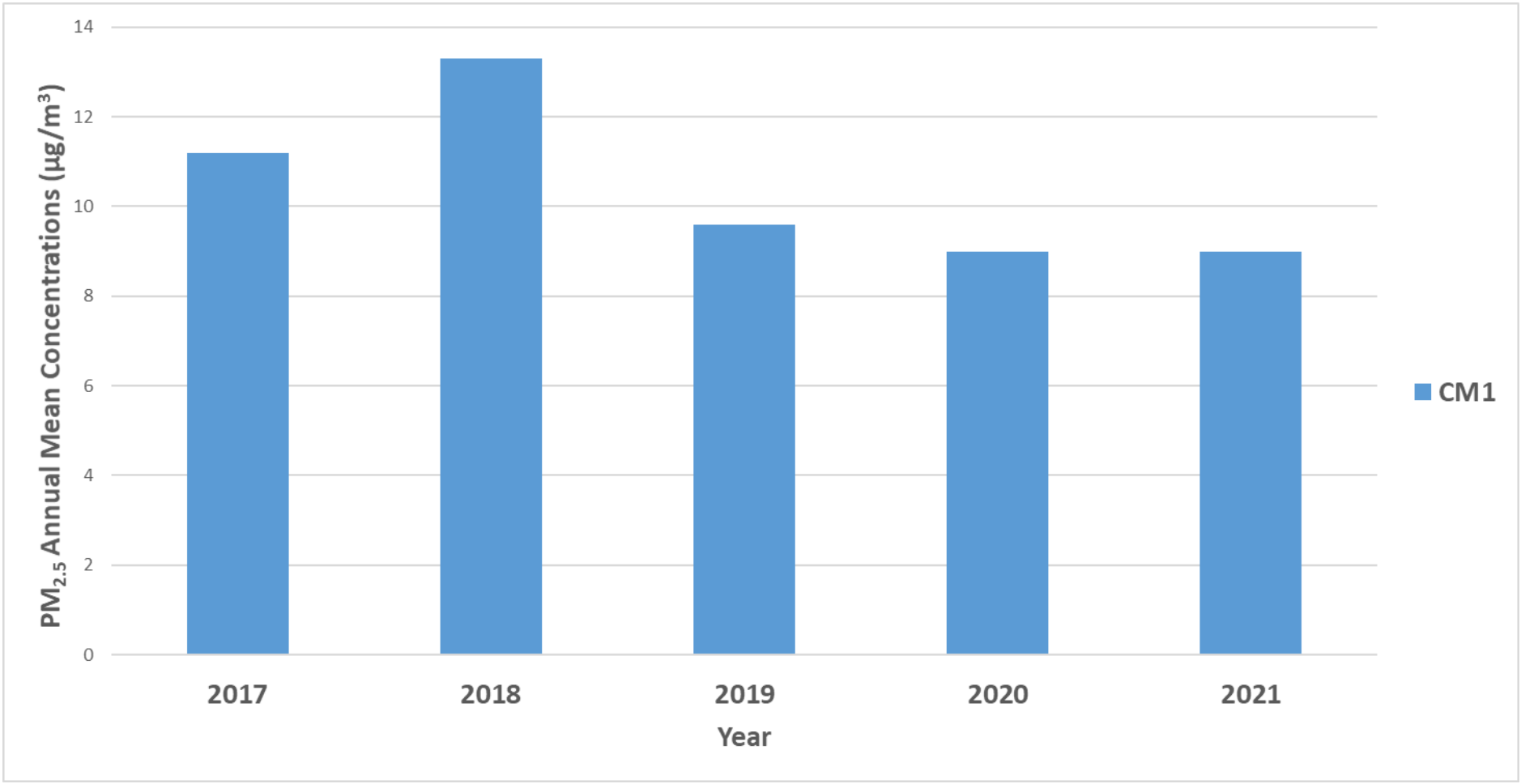


Table A.9 – SO_2 2021 Monitoring Results, Number of Relevant Instances

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [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	88.8%	88.8%	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 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
N100	444387	114453	26.7	24.7	22.1	19.4	15.3	16.2	15.9	14.0	18.1	22.9	25.9	21.1	19.9	16.8	-	
N101	437548	113719	44.8	43.7	34.4	36.8	36.3	40.2	39.8	30.6	44.5	46.5	46.1	42.1	40.5	34.0	-	
N103	438808	112903	31.0	33.0	28.8	23.4	26.2	26.5	27.0	21.5	30.8	30.0	31.0	28.7	28.1	23.6	-	
N104	439222	112850	33.8	43.1	32.7	29.3	31.5	31.7	30.4	27.2	39.9	33.5	32.1	41.5	34.0	28.6	-	
N106	439752	113984	36.9	37.4	30.2	31.2	33.8	30.0	33.2		35.6	38.5	34.8	38.5	34.9	29.3	-	
N107	442364	112890	48.8	43.3	39.4	42.0		40.1	43.7	40.7	39.9	48.3	55.0	32.4	42.4	35.7	-	
N109	442585	113248	38.0	43.2	33.2	37.7			38.0	30.2	33.8	38.0	37.3	32.5	36.3	30.5	-	
N110	442579	112248	33.9	32.9	28.9	27.9			24.1	21.6	27.6	32.3	34.7	28.0	-	-	-	Triplicate Site with N110, N111 and N112 - Annual data provided for N112 only
N111	442579	112248	32.7	32.8	29.9	27.0	26.0	22.1	24.7	24.4	29.1	33.5	32.9	27.5	-	-	-	Triplicate Site with N110, N111 and N112 - Annual data provided for N112 only
N112	442579	112248	37.1	30.2	25.7	26.7	26.0	22.9	26.4	22.6	27.3	32.5	32.4	27.6	28.3	23.8	-	Triplicate Site with N110, N111 and N112 - Annual data provided for N112 only
N113	444124	113288	38.2	32.5	40.0	32.5	34.1	31.1	32.8	29.1	35.5	40.2	45.1	33.8	35.0	29.4	-	
N114	444131	113322	32.8	33.8	31.1	28.9	35.1	31.3	34.3	26.1	33.5	33.2	35.6	33.3	32.2	27.1	-	
N115	437939	113474	32.7	39.7	30.8	27.8	35.5	30.7	30.1	23.8	36.0	33.8	30.4	34.5	32.3	27.1	-	
N116	437952	113407	32.2	38.5	33.5	34.2	30.8	27.7	30.5	25.2	35.8	33.8	33.1	31.7	32.3	27.1	-	
N117	443752	111121	37.8	35.8	36.3	33.3	33.6	32.7	29.5	26.5	36.5	38.8	38.3	37.0	34.7	29.2	-	
N118	442472	113065	33.3	40.0	30.0	34.9	30.3		29.9	24.5		34.3	36.2	39.6	33.1	27.8	-	
N120	442716	111019	37.2	40.1	35.9	33.1	36.2	33.0		31.8	36.4	41.1	40.7	38.3	36.7	30.9	-	
N122	440000	112633	30.7	32.0	28.4	24.9	30.8	27.5	28.2		45.6	30.2	31.9	28.3	30.6	25.7	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
N123	442348	112305	36.8	33.3	29.7	33.0	29.5	25.5	30.8	26.9	31.6	33.8	36.1	18.3	30.3	25.4	-	
N124	439741	112753		39.7	33.1	30.3	35.6	28.8	28.6	26.2	38.7			35.8	33.0	27.7	-	
N125	443125	112641	35.2	39.4	33.5	34.7	38.0	28.8	37.3	29.9	35.4	30.7	37.1	36.7	34.2	28.7	-	
N126	442365	112286	37.0	35.2	30.8	33.8	30.1	27.8	31.5	29.0	33.7	37.5	37.5	32.3	33.0	27.7	-	
N129	442554	111021	33.7	38.0	29.5	27.1	32.1	27.2	29.2	22.1	29.4	31.4	31.5	28.0	29.9	25.1	-	
N130	439346	112821	36.9	46.2	37.6	38.8	55.8	46.0	41.9	37.8	49.4	44.9	43.0	43.4	43.6	36.7	-	
N131	439378	114185	36.8	38.8	30.9	38.5	33.4	33.8	33.6	24.3	39.7	35.8	36.8	41.2	35.2	29.6	-	
N133	438609	113020	29.4	31.1	27.4	23.0	25.3	23.3	24.9	19.2	28.2	31.2	31.3	29.2	26.9	22.6	-	
N134	438980	112861	34.5	37.5	32.0	31.7	31.4	33.6	32.2	28.5	39.0	33.9	35.7	37.4	33.8	28.4	-	
N138	441697	115288	39.2	52.2	41.3	57.0	44.5	38.8	42.7	39.2	43.3	44.2	40.6	40.5	43.9	36.9	-	
N140	441628	112332	43.7	47.2	39.6	38.5	37.8	42.0	41.3	35.3	46.9	45.0	49.6	47.3	42.5	35.7	-	
N141	441923	110990	30.1	33.8	35.1	37.3	32.1	34.6	31.5	28.2	31.1	32.8	41.4	33.0	32.7	27.5	-	
N143	439457	114150	36.1	34.3	30.6	33.7	31.1	31.9	32.3	24.1	36.5	38.1	39.4	37.9	33.7	28.3	-	
N144	443147	112709	35.6	32.0	31.0	29.0	32.4	27.1	30.1	23.7	31.7	32.7	36.0	30.0	30.7	25.8	-	
N146	443164	112741	32.2	29.5	27.2	26.1	28.2	23.4	26.0	20.2	28.8	32.0	32.9	28.3	27.8	23.4	-	
N149	441552	115247	39.0	42.8	36.6	36.3	30.5	31.0		27.5	31.8	40.1	39.3	32.6	35.3	29.6	-	
N151	439394	114176	37.5	38.0	31.6			34.8	32.9	28.1	40.0	40.9	37.4	42.5	36.7	30.8	-	
N152	437327	113848	39.7	47.0	36.2	39.1	39.8	32.1	38.9	26.7	40.9	45.9	44.1	43.9	39.7	33.3	-	
N158	443807	111123	41.5	36.7	36.7	35.1	37.1	36.1	32.4	27.9	39.5	38.0	39.4	39.5	36.5	30.7	-	
N159	443740	111147	40.2	35.4	36.3	38.5	29.7	35.9	31.0	30.4	38.7	38.1	42.9	36.8	35.8	30.0	-	
N161	442705	114129	33.6	36.1	29.6	34.7	23.8	27.2	28.5	26.6	26.4	29.1	34.5	33.0	29.8	25.0	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
N162	442872	114336	37.4	34.5	31.2	36.0	33.5	31.0	33.5	28.6			37.8	35.3	33.5	28.1	-	
N164	442809	114241	32.9	39.8	27.9	32.4	31.6	26.7	31.2	24.3	27.7	33.7	31.4	34.3	31.3	26.3	-	
N165	442766	114181	33.2	32.6	27.8	36.1	32.3	31.2	35.3	27.0	34.4	36.1	33.2	36.3	33.2	27.9	-	
N166	442251	112129	39.9	37.5		35.1		29.8	33.3	30.5	32.9	37.8	36.8	30.4	34.5	29.0	-	
N167	439759	114011	36.6	38.2	33.7	34.4	31.2	30.2	28.5	25.2	33.4	34.8	41.7	34.6	33.0	27.7	-	
N168	439737	114025	35.6	39.4	32.3	35.5	27.6	32.1	31.4	23.8	36.3	33.7	40.7	36.9	33.2	27.9	-	
N169	439361	114195	38.4	39.6	33.7	38.5	41.0	37.5	37.5	30.9	47.0		42.7	46.8	39.1	32.8	-	
N170	442482	111003	40.1	43.6	43.1		40.6	34.2	35.0	32.9	35.8	40.2	42.8	41.0	38.8	32.6	-	
N172	442207	112126	41.3	35.9	34.2	33.9	39.3	33.3	35.0	34.1	40.2	43.2	41.2	39.0	37.7	31.7	-	
N174	443959	113315	42.8	42.0	36.2	37.7	42.2	36.5	41.3	35.1	41.0	47.5	44.0	29.4	39.9	33.5	-	
N175	439959	113737	36.7	33.7	31.0	31.0	33.4	31.3	34.2	23.5	35.3	36.5	40.8	38.1	33.4	28.1	-	
N176	439772	113952	34.7	36.9	32.0	31.3	28.3	30.2	30.0	17.4	36.2	34.1	38.0	37.4	31.9	26.8	-	
N177	439844	113907	36.1	34.8	30.6		41.7	31.5	32.7	22.6	35.7	35.5	36.5	40.8	34.3	28.8	-	
N178	437265	113682	22.7	28.7	23.6	23.0	21.0	19.9	20.6	17.8		24.3	23.0	25.1	22.8	19.2	-	
N184 A	437811	113557	38.0	47.1	34.7	31.6	24.3	28.2	29.6	22.7	35.7	34.7	38.3	39.5	-	-	-	Triplicate Site with N184A, N184B and N184C - Annual data provided for N184C only
N184 B	437811	113557	36.2	44.5	33.1	28.0	40.6	29.1	28.9	21.7	36.7	37.8	39.0	39.5	-	-	-	Triplicate Site with N184A, N184B and N184C - Annual data provided for N184C only
N184 C	437811	113557	37.2	41.7	32.5	30.9	32.5	32.6	29.9	22.9	36.8	36.7	36.9	36.7	33.9	28.5	-	Triplicate Site with N184A, N184B and N184C - Annual data provided for N184C only
N185	437167	113713	52.4	45.7	43.6	44.8	50.1	40.5	43.8	40.9	50.5	44.9	55.3	53.8	46.3	38.9	25.0	
N186	437126	113701					34.4	35.9	35.0	29.6	36.1	30.8	38.9	35.5	33.5	29.9	-	
N187	444102	113872	35.2	28.8	32.1	28.7	31.6	27.6	27.8	25.2	29.7	36.3	38.8	33.3	31.0	26.1	-	
N188	441300	112233	35.9	37.6	31.3	30.6	29.4	28.9	28.4	24.6	34.6	31.3	34.2	35.3	31.6	26.5	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
N189	441790	112465	45.2	37.9	34.9	35.4	31.1	35.8	32.2	33.0	35.5	38.5	40.7	36.0	36.2	30.4	-	
N190	442024	112553	36.7	37.0	38.0	41.4	31.8	35.8	35.9	30.8	37.7	44.2	42.5	29.9	36.9	31.0	-	
N191	441915	112097	43.5	41.3	37.6	38.5	45.3	37.5	37.8	35.9	41.6	42.0	43.4	40.3	40.3	33.8	-	
N192	441961	112029	49.7	40.5	39.8	42.2	37.6	38.8	36.9	39.4	40.4	38.5	47.3	38.7	40.1	33.7	-	
N193	441975	112031	36.5	33.5	34.4	28.8	32.5	28.3	25.8	30.0	29.1	34.9	31.5	33.6	31.8	26.8	-	
N194	442090	111775	53.2	40.3	43.3	39.6	44.0	43.4	41.8		46.9	40.5	45.6	45.7	43.6	36.6	-	
N195	441945	111655	48.3	36.5	38.4	35.1	33.8	32.0	31.7	29.2	32.8	52.2	42.3	33.2	38.0	31.9	-	
N197	440957	115151	30.7	39.7	28.2	38.2	26.7	31.2	33.5	24.6	31.1	41.8	34.6	20.2	32.3	27.1	-	
N198 A	442304	112771	39.0	39.1	33.1	34.9	31.8	29.9	33.6	33.0	30.8	35.1	40.1	35.6	-	-	-	Triplicate Site with N198A, N198B and N198C - Annual data provided for N198C only
N198 B	442304	112771	34.9	38.7	33.8	33.6	30.0	28.5	33.0	28.8	31.9	35.8	41.0	35.7	-	-	-	Triplicate Site with N198A, N198B and N198C - Annual data provided for N198C only
N198 C	442304	112771	38.8	35.0	33.9	34.7	29.9	29.0	33.7	32.5	33.7	37.7	40.5	33.8	33.9	28.5	-	Triplicate Site with N198A, N198B and N198C - Annual data provided for N198C only
N199	442210	112583	47.7	47.5		45.8	39.8	37.9	43.7	31.0	33.3	37.6	37.9	37.1	39.9	33.5	-	
N200	443160	112765	39.9	36.7	34.9	31.5	36.0	30.1	32.3	30.2	33.8	33.2	43.4	32.9	33.7	28.3	-	
N201	439759	112738	54.7	53.2	51.5	47.3	48.4	49.1		46.4	65.4	55.0	65.8	60.3	53.3	**44.8**	33.7	
N202	437166	113755	48.1	43.7	41.9	36.2	35.1		42.7		39.0	57.2	47.5	48.2	44.9	37.8	-	
N204	442542	113261	38.9	40.0	33.3	40.1	34.2	28.8	33.7	28.2	34.4	37.9	38.6	36.6	35.3	29.7	-	
N205	442101	113438	36.1	39.6	31.7	33.7			34.6	24.5	35.6		39.8	39.2	34.4	28.7	-	
N206	442265	112516	40.2	42.5	35.6	38.8	33.3	31.8	36.4	41.4	41.7	40.8	41.0	40.3	38.6	32.5	-	
N207	439698	112806	37.7	38.9	32.0	26.7	31.6	26.7	30.4	22.0	35.5	35.7	33.1	27.8	31.7	26.7	-	
N208	441365	115202	37.3	41.4	26.7	34.1	30.4	28.2	30.7	21.1	31.9	38.9	33.7	35.9	33.0	27.7	-	
N209	441246	115138	35.0	39.1	29.3	32.2	27.6	25.9	26.8	23.8	29.8	35.6	32.7	34.4	31.3	26.3	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.84)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
N210	441122	115118	40.8	43.2	33.0	34.4	36.3	30.3	30.9	28.2	33.7	41.0	38.8	38.5	35.9	30.2	-	
N211	437332	113873	26.1	32.6	23.7	25.5	21.5	22.6	23.8	15.5	28.5	26.4	25.1	28.6	25.1	21.1	-	
N213	442935	114374	33.3	38.0	30.1	32.0	27.5	25.4	24.7	24.7	25.8	31.7	35.2	29.6	29.5	24.8	-	
N214	441677	115280	35.8	41.2	29.6	38.3	31.0	26.6	26.2	25.5	26.2	35.4	32.0	34.6	32.2	27.0	-	
N216	442352	113486	34.8	37.6	30.7	35.2	31.0	29.8	31.3	26.0	33.7	38.6	33.3	36.2	33.6	28.2	-	
N217	440751	112188	28.7	37.4	33.1	27.4	34.6	29.2	30.3	22.4	37.2	35.8	33.2	32.9	32.1	26.9	-	
N218	443547	114101	39.5	44.0	39.0	41.7	34.1	31.1	33.6	29.6	35.9	36.1	39.8	33.0	36.1	30.4	-	

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

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

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

☒ **Southampton City Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Southampton City Council During 2021

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

Additional Air Quality Works Undertaken by Southampton City Council During 2021

Southampton City Council has not completed any additional works within the reporting year of 2021.

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, CM7 Redbridge AURN Station and CM4 Onslow road.

Southampton use Gradko International Ltd for the supply and analysis of diffusion tubes. They are a UKAS accredited. SCC use the 20% TEA in water NOx tubes. No changes in tube or preparation method were made in 2021. The tubes were changed in accordance with the 2021 Diffusion Tube Monitoring Calendar, except for a very small number of occasions due to staffing issues around leave and sickness.

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 2021 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 annual 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

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

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 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 WCFA in 2021.

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 C2 below

Diffusion Tube ID	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)
N186	1.0446	1.0319	1.1125	1.0630	33.5	35.6
N205	1.0050	1.0103	0.9704	0.9952	34.4	34.2

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 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 0.84 to the 2021 monitoring data an average of co-location studies.,. A summary of bias adjustment factors used by Southampton City Council over the past five years is presented in Table C.1.

The use of the national bias adjustment was chosen as it is consistent with previous Southampton City Council ASR reporting. The 32 Studies include 2 of Southampton's studies.

The average local bias adjustment factor calculated using the CM7 Redbridge AURN and CM4 Onslow Road Station Co-Location Triplicate Tube Studies was 0.86, higher than the the National Factor. CM1 Brintons Road was omitted as the automatic analyser had poor data capture in 2021.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	09/22	0.84
2020	National	09/21	0.81
2019	National	06/20	0.93
2018	National	06/19	0.92
2017	National	09/18	0.87

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	Annualisation Factor Victoria Road AMS	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
N186		1.0446	1.0319	1.1125	1.0630	33.5	35.6	
N205		1.0050	1.0103	0.9704	0.9952	34.4	34.2	

Table C.3 – 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	38.9	16.8	25.0	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*
N194	4.0	n/a no receptors nearby	36.6	16.8	-	*Warning: Receptor to kerb must be between 0.1m and 50m to calculate concentration. Please check distances and update STEP 2 - Diffusion Tube Inputs tab Columns Distance to Relevant Exposure and Distance to Kerb of Nearest Road*

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
N201	1.2	8.0	44.8	16.8	33.7	
N202	1.2	n/a no receptors nearby	37.8	16.8	-	*Warning: Receptor to kerb must be between 0.1m and 50m to calculate concentration. Please check distances and update STEP 2 - Diffusion Tube Inputs tab Columns Distance to Relevant Exposure and Distance to Kerb of Nearest Road*

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

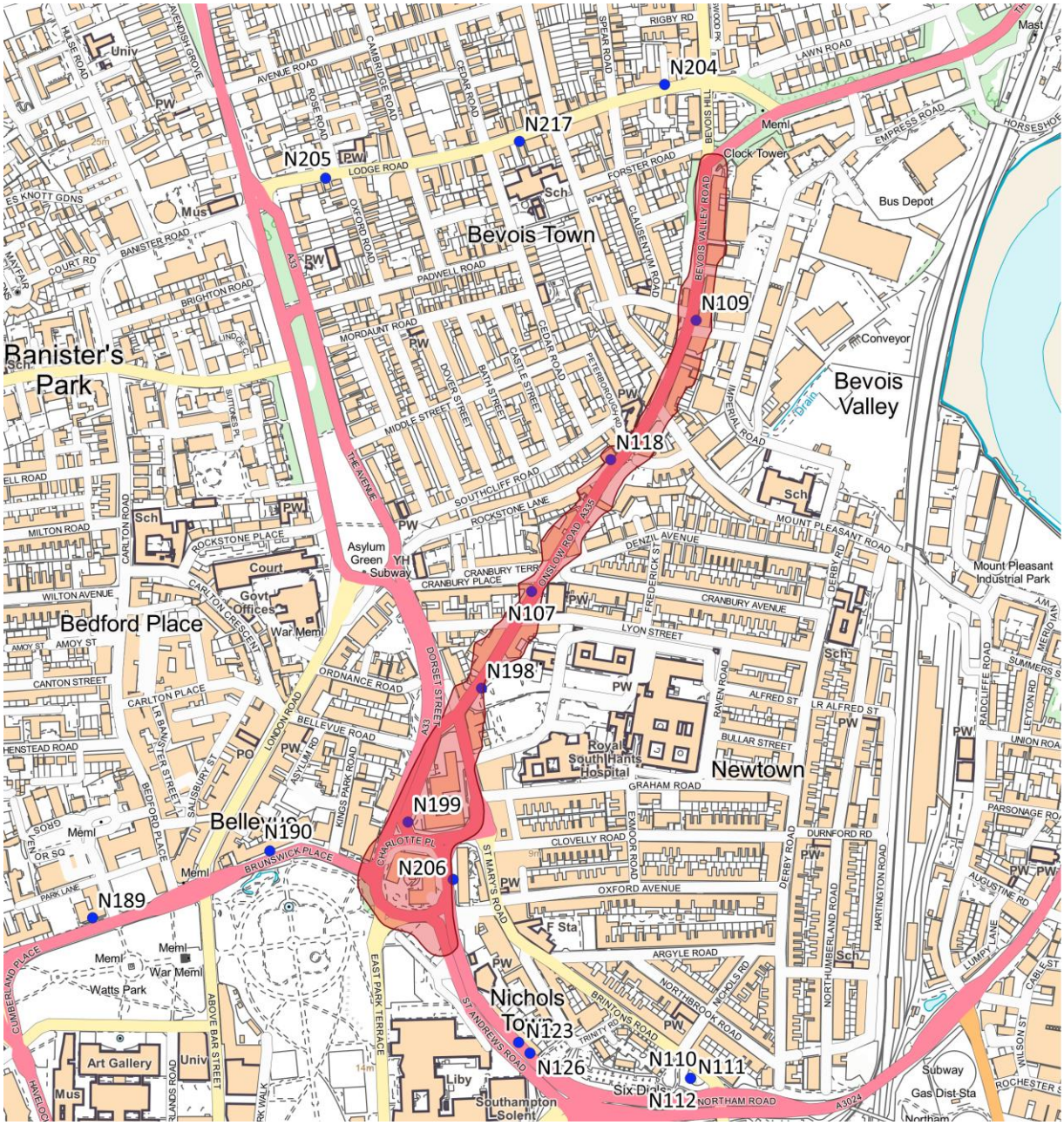


Figure D.1 – AQMA 1 Bevois Valley and NO2 diffusion tube monitoring locations

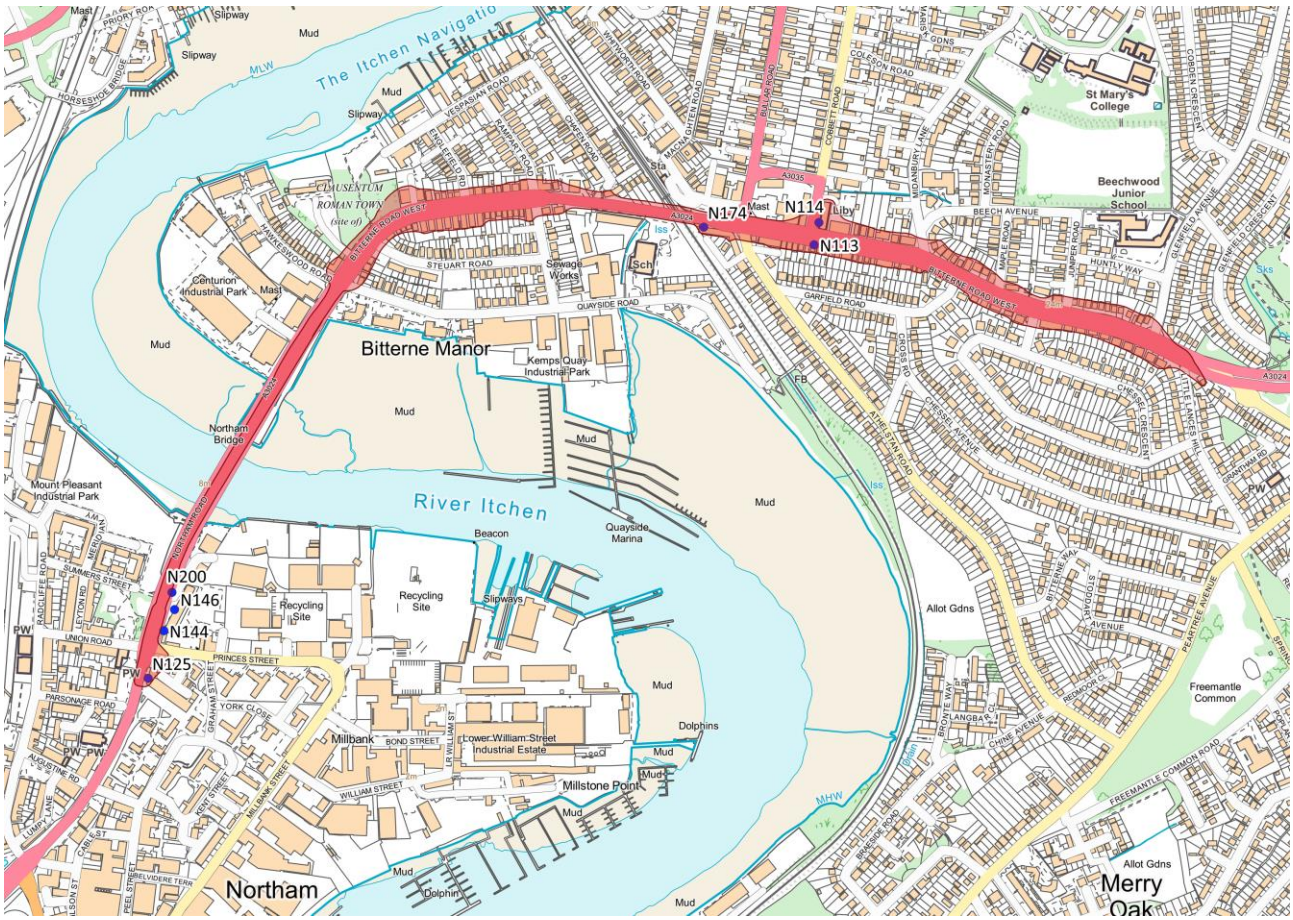


Figure D.2 – AQMA 2 Bitterne Road and NO2 diffusion tube monitoring locations

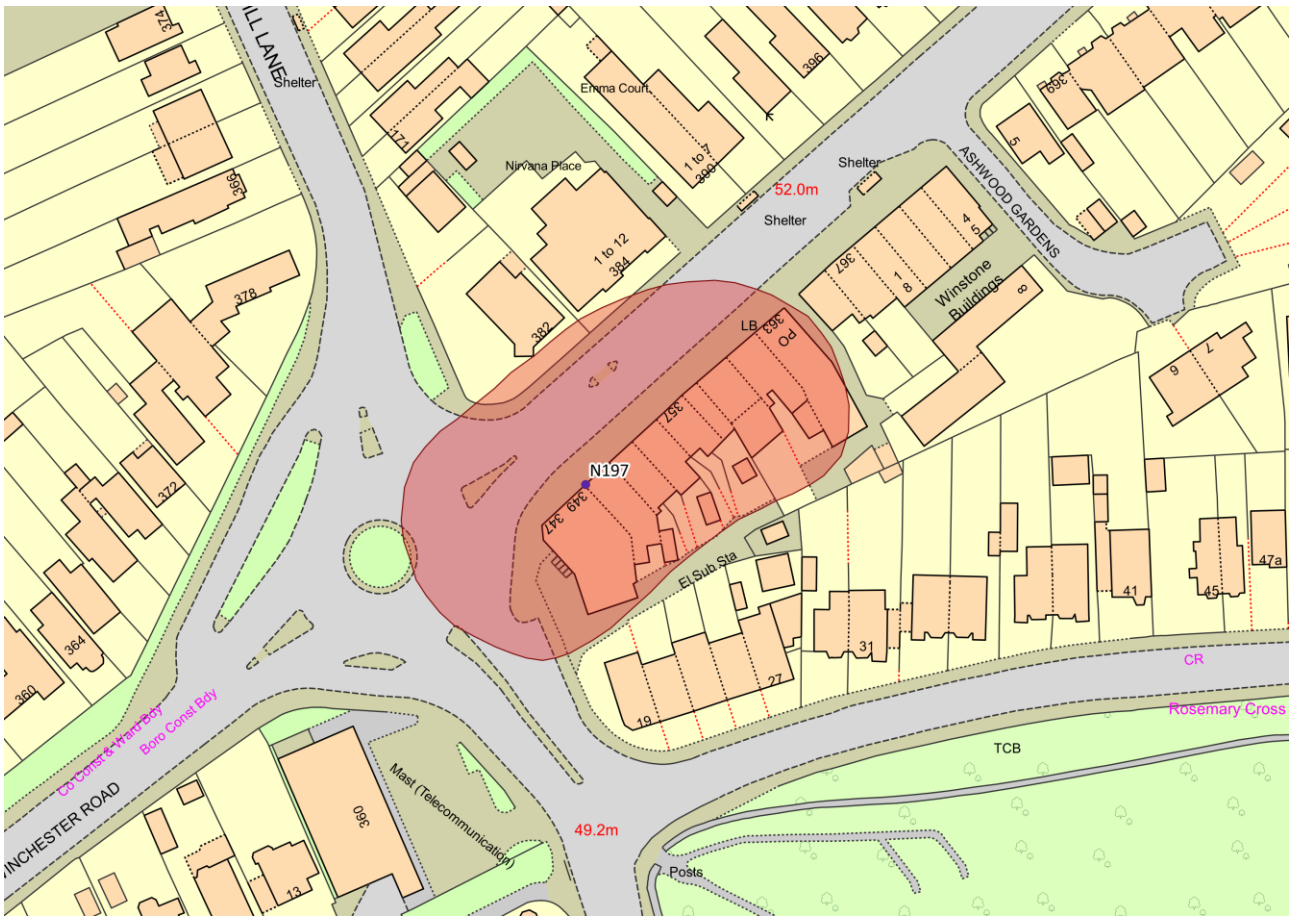


Figure D.3 – AQMA 3 Winchester Road and NO2 diffusion tube monitoring locations

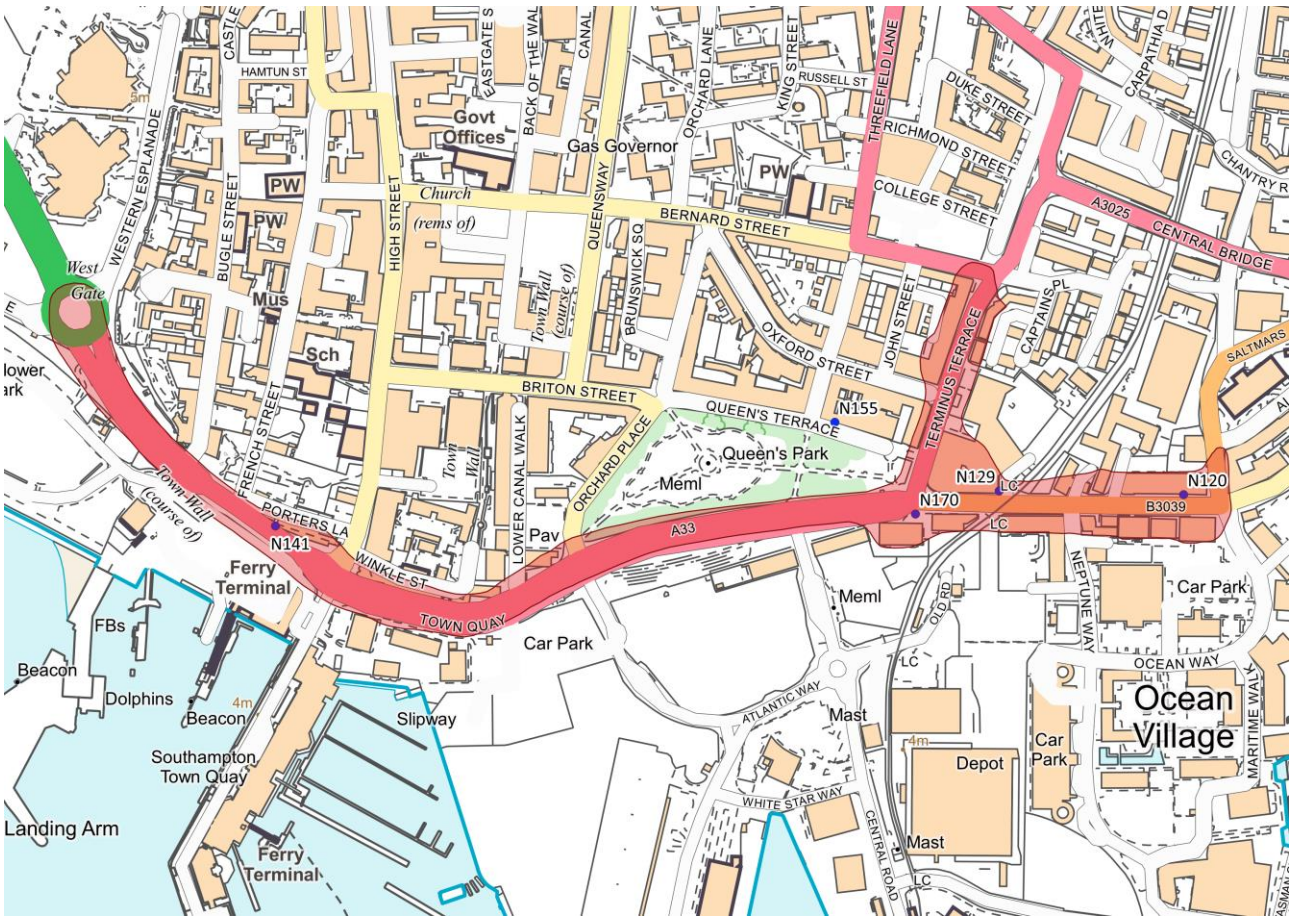


Figure D.4 – AQMA 4 Town Quay Road and NO2 diffusion tube monitoring locations

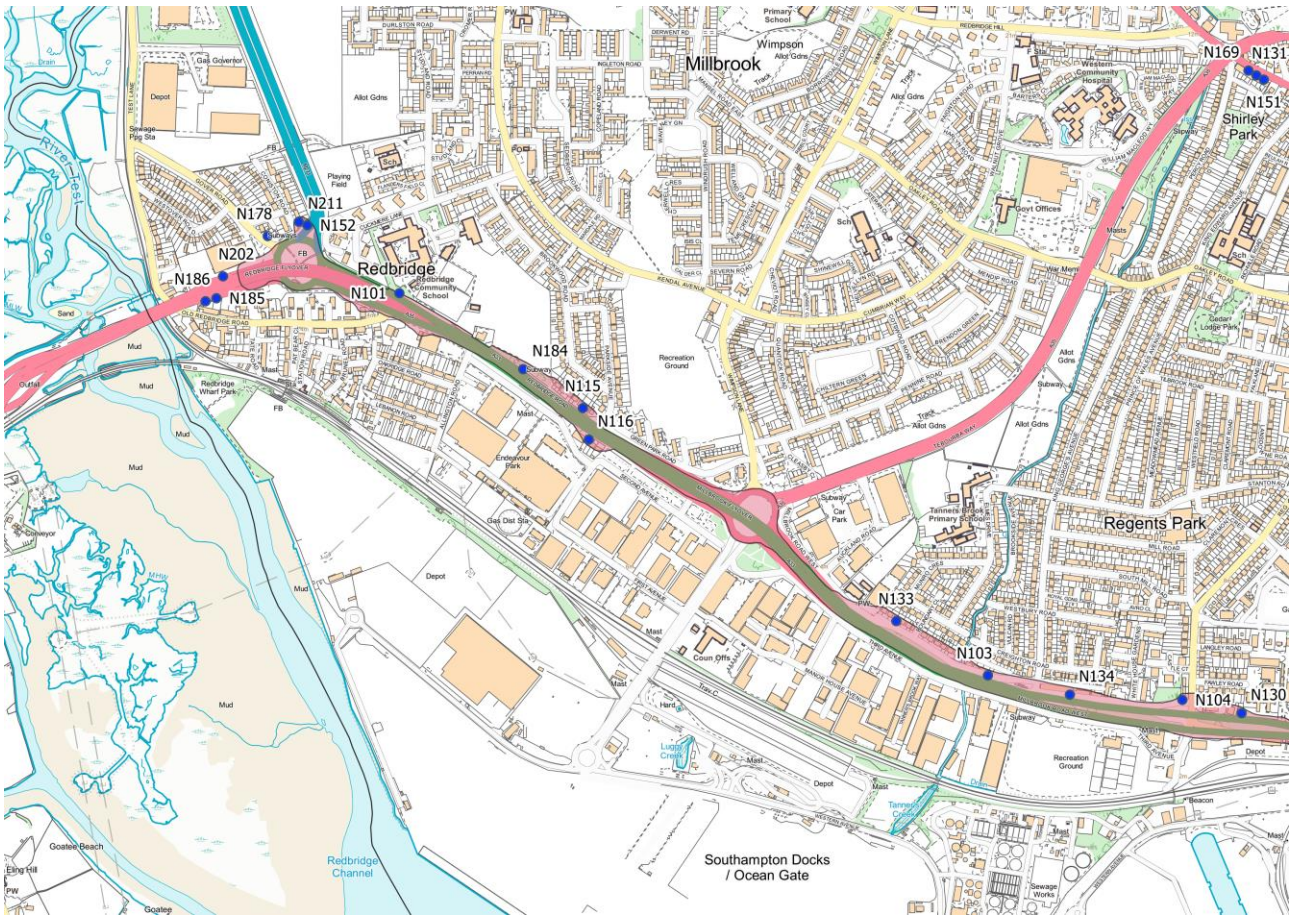


Figure D.5 – AQMA 5a (western section) Redbridge Road and NO2 diffusion tube monitoring locations

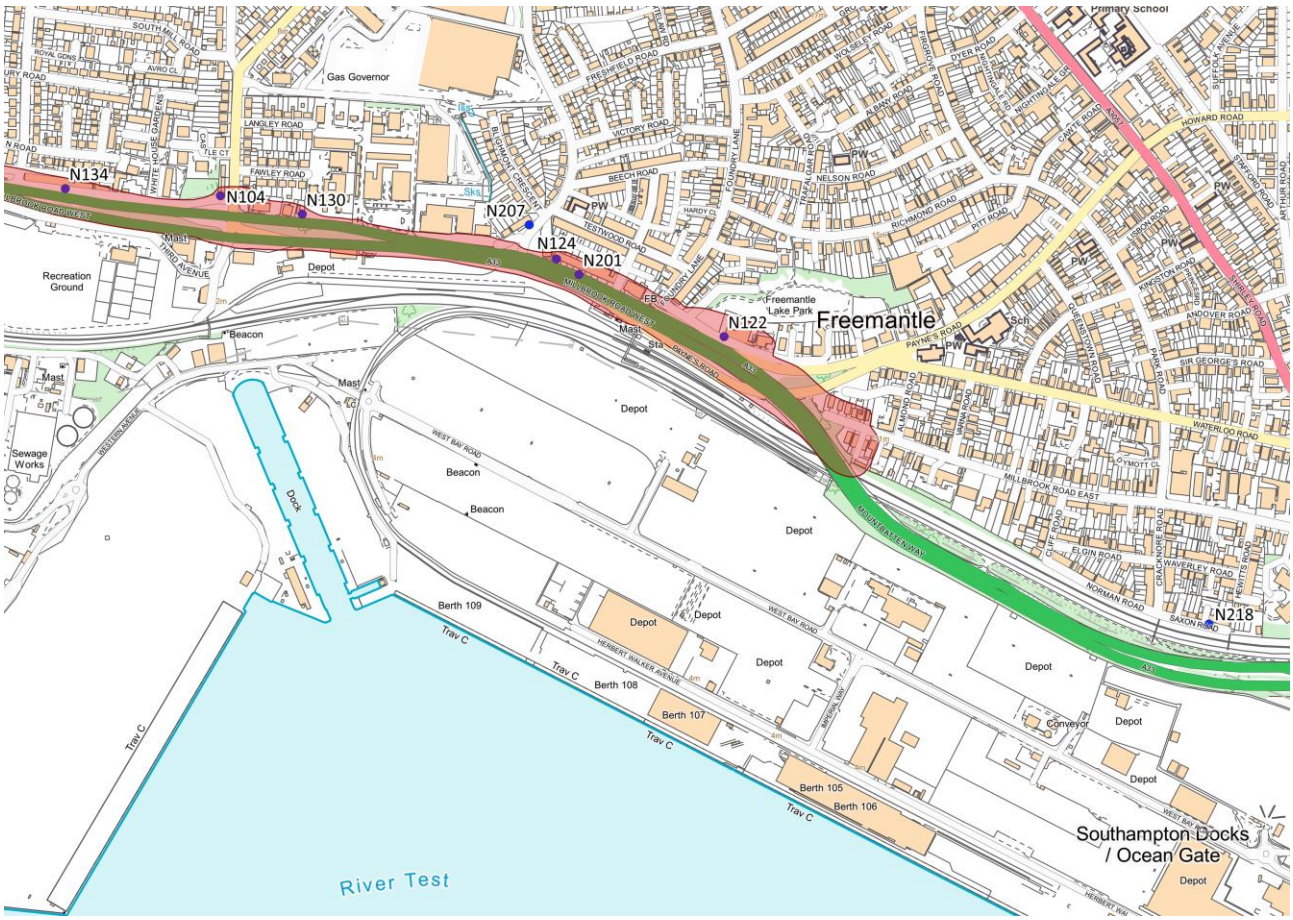


Figure D.6 – AQMA 5b (eastern section) Redbridge Road and NO2 diffusion tube monitoring locations

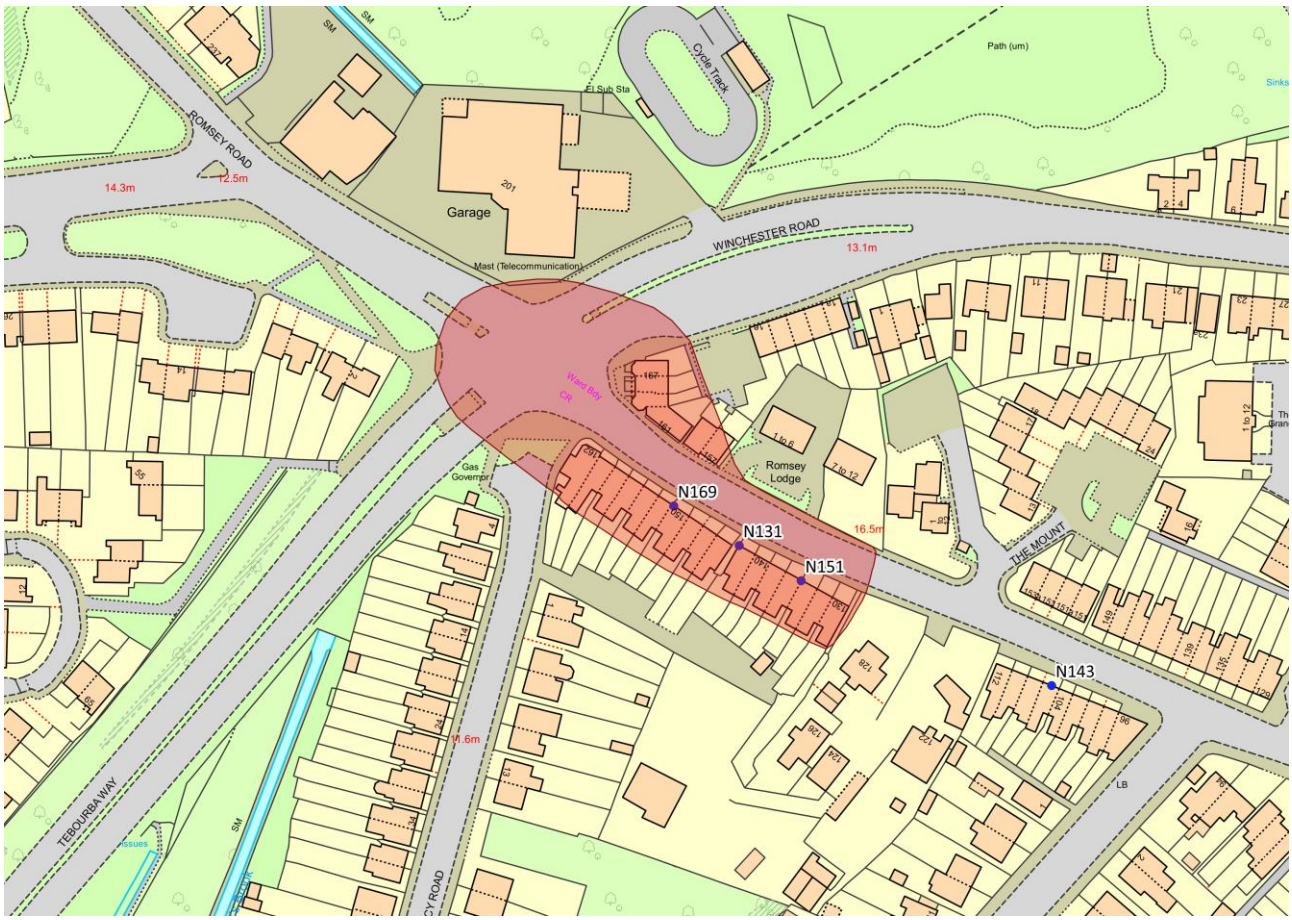


Figure D.7 – AQMA 6 Romsey Road and NO2 diffusion tube monitoring locations

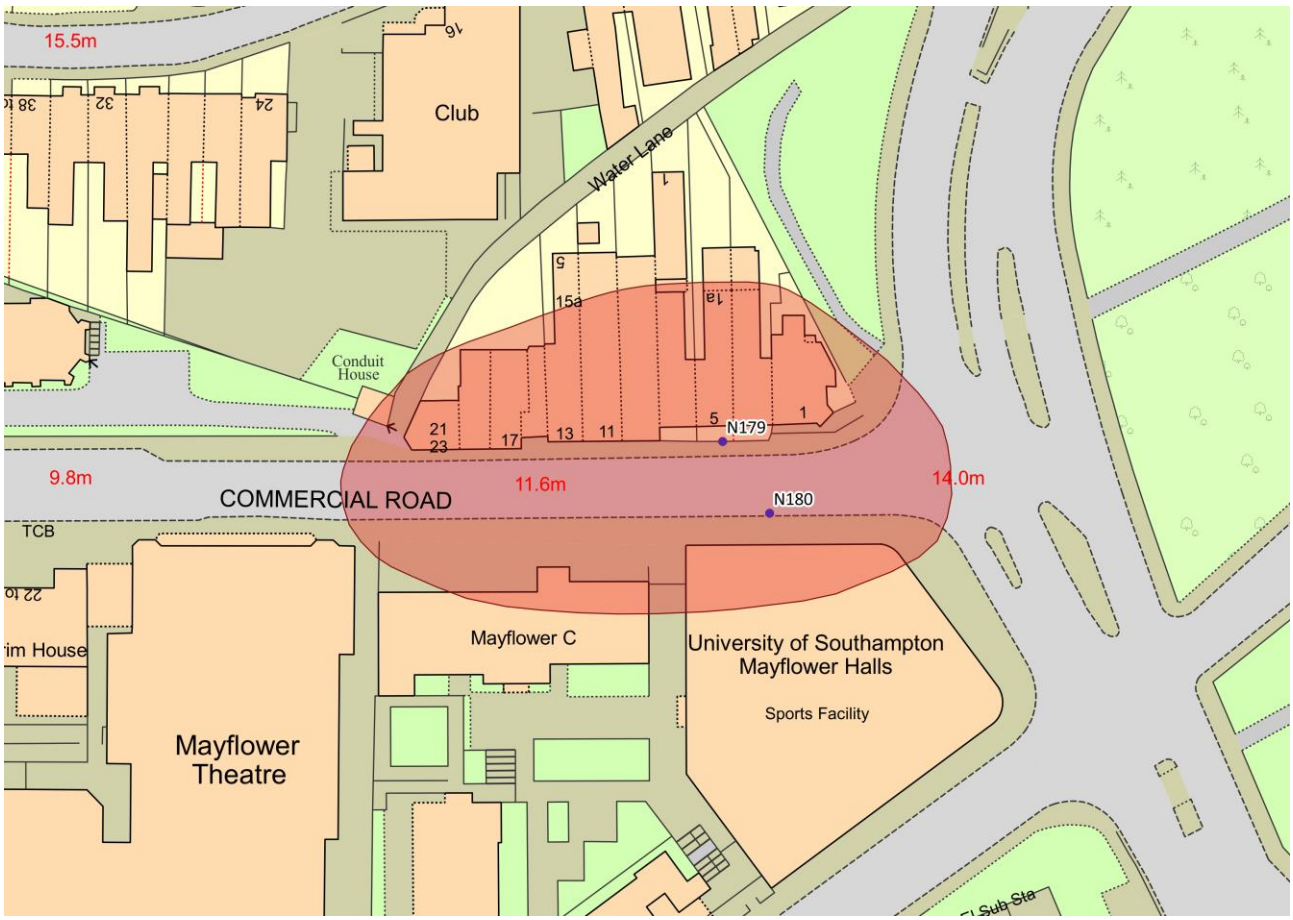


Figure D.8 – AQMA 8 Commercial Road and NO2 diffusion tube monitoring locations

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

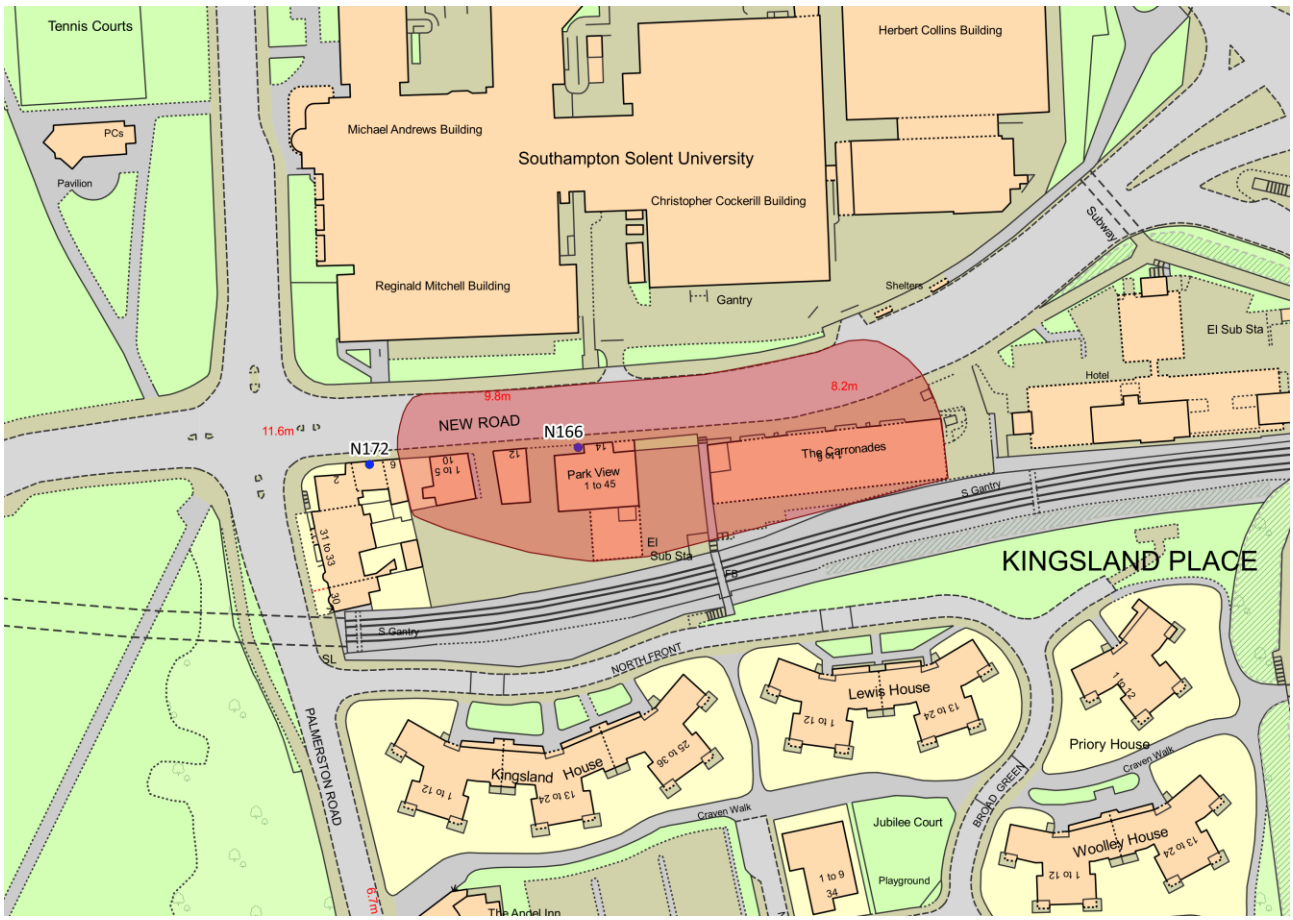


Figure D.10 – AQMA 10 New Road and NO2 diffusion tube monitoring locations

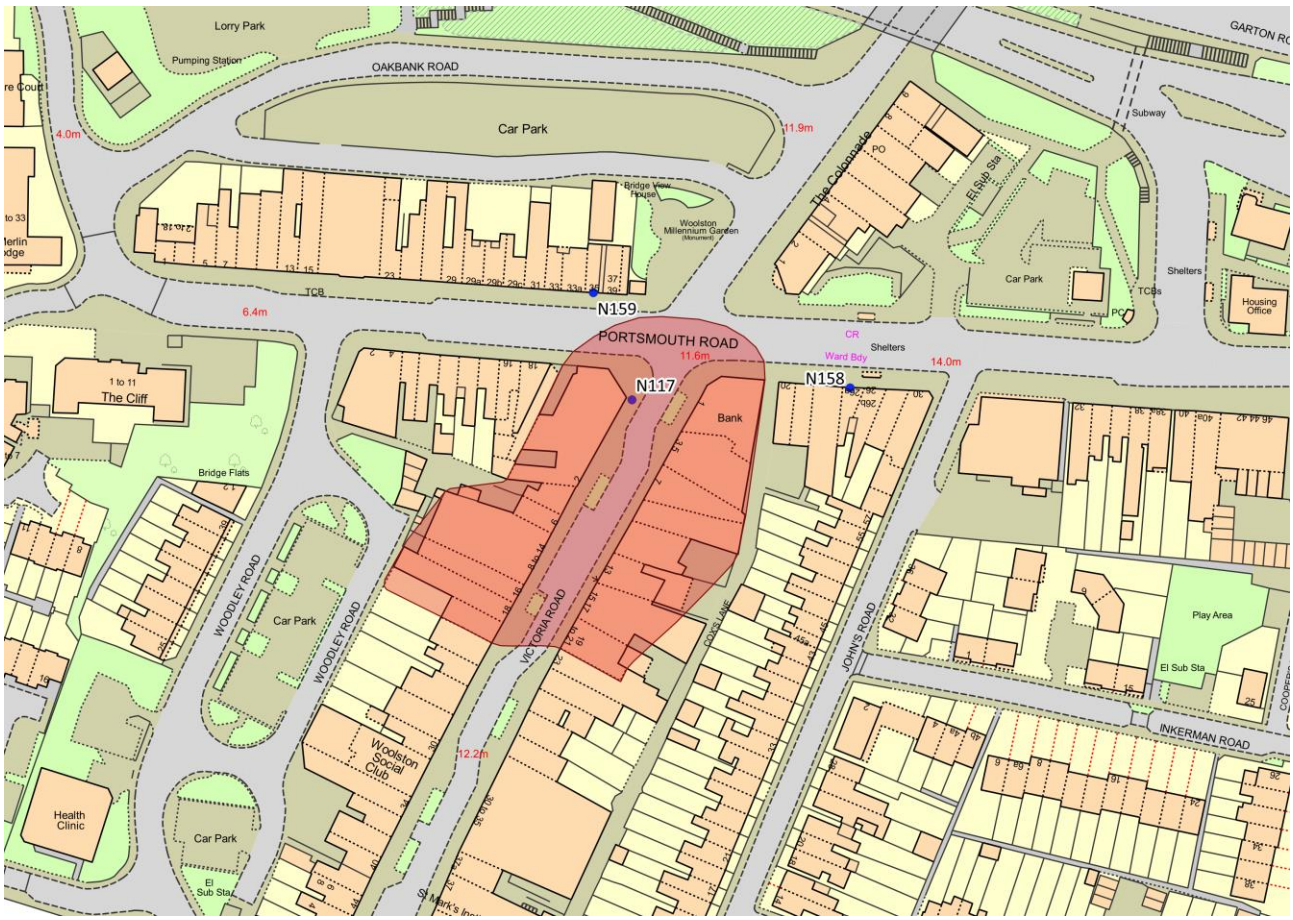


Figure D.11 – AQMA 11 Victoria Road and NO2 diffusion tube monitoring locations

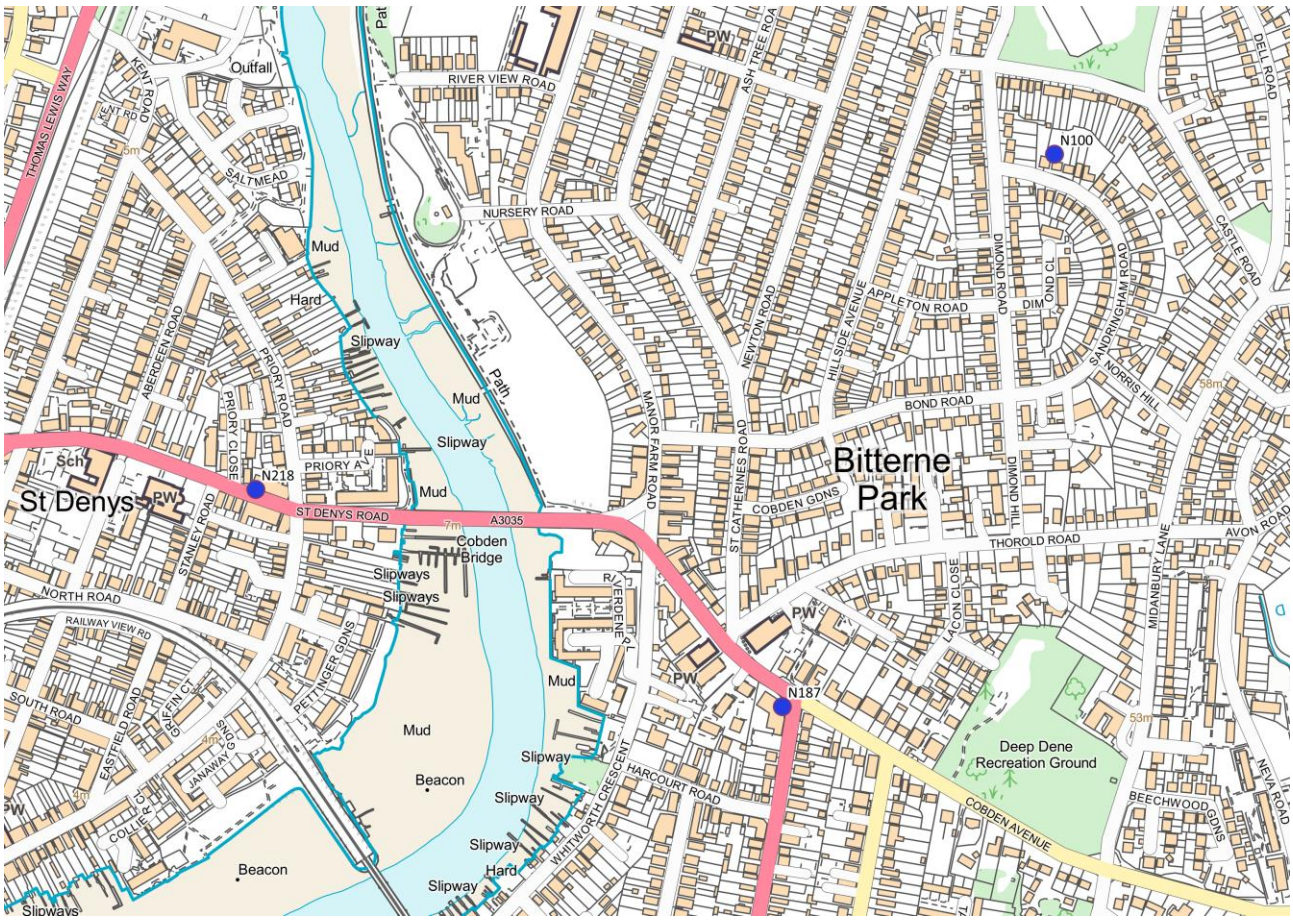


Figure D.12 – Bitterne Park and NO2 diffusion tube monitoring locations

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

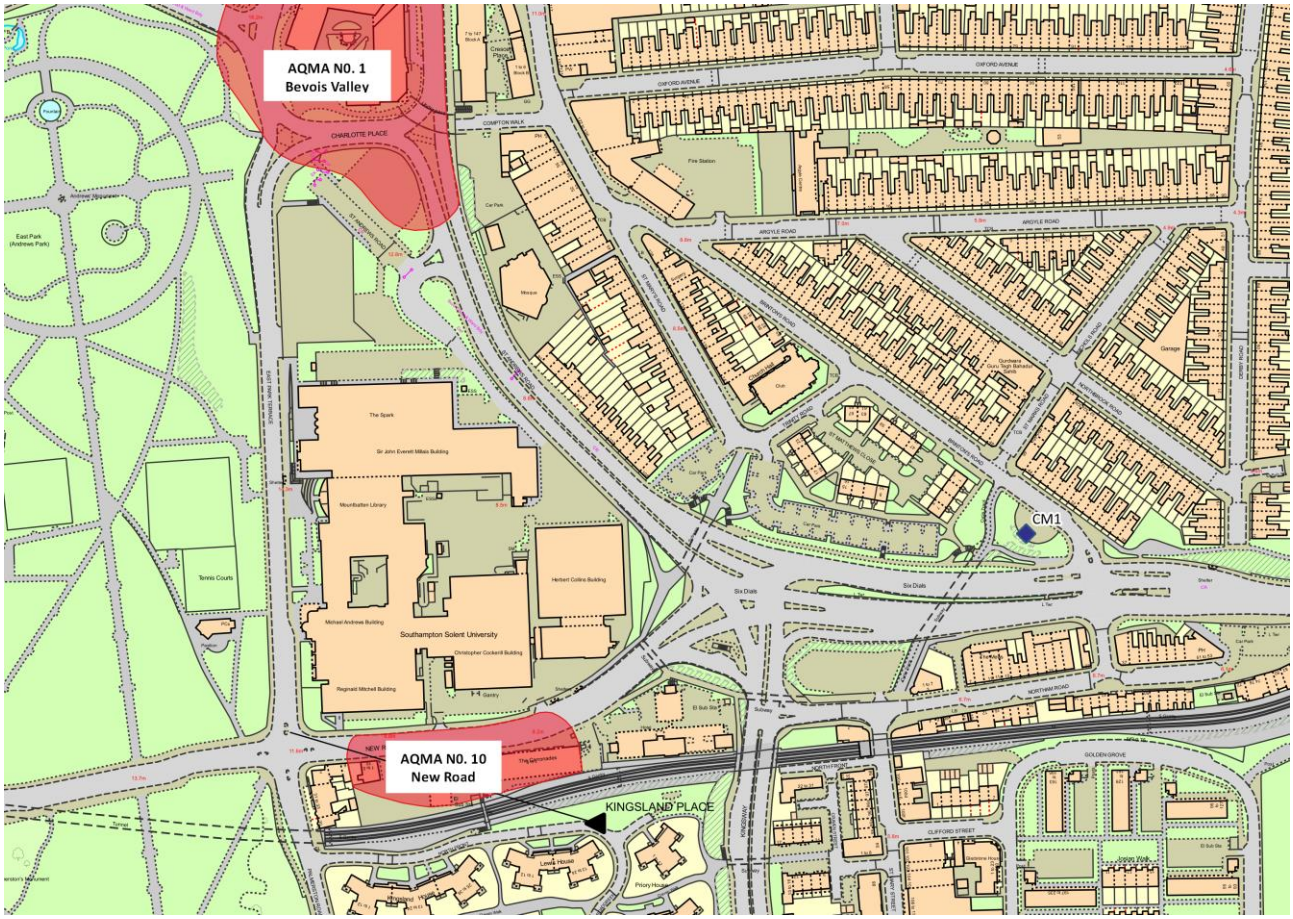


Figure D.14 – City Centre and Continuous Monitoring Station (CM1) location

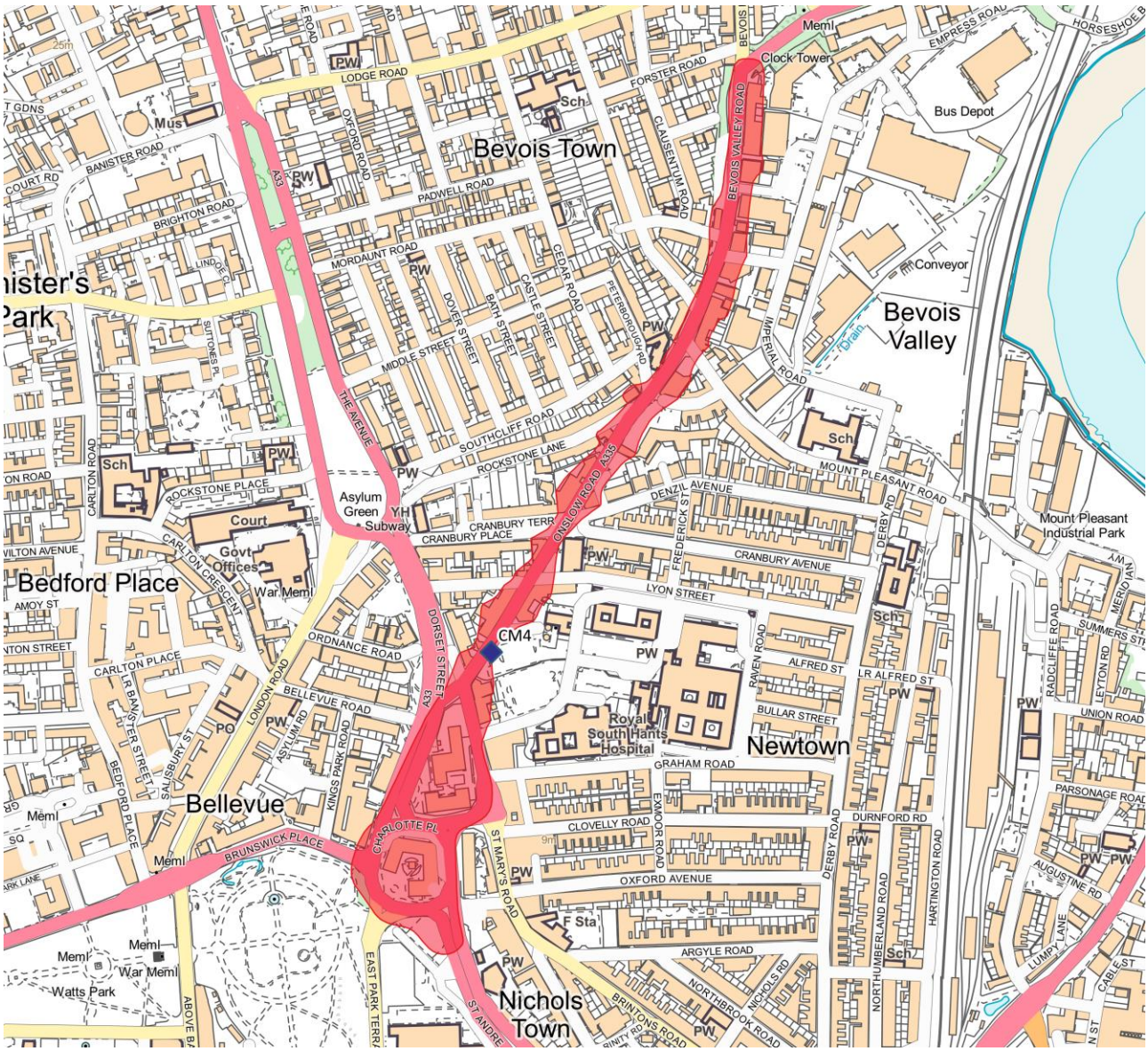


Figure D.15 – Bevois Valley and Continuous Monitoring Station (CM4) location

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

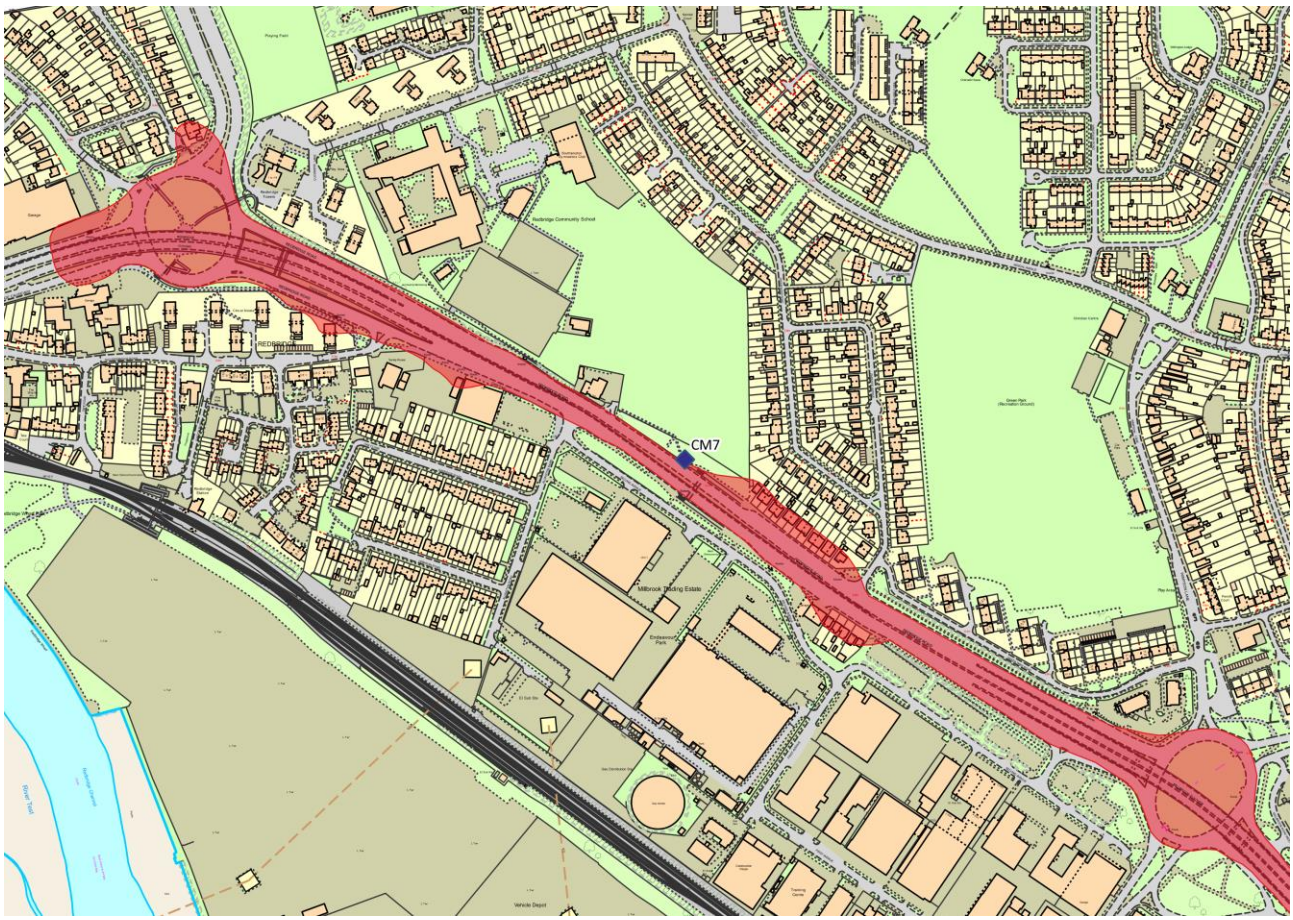


Figure D.17 – Redbridge Road and Continuous Monitoring Station (CM7) location

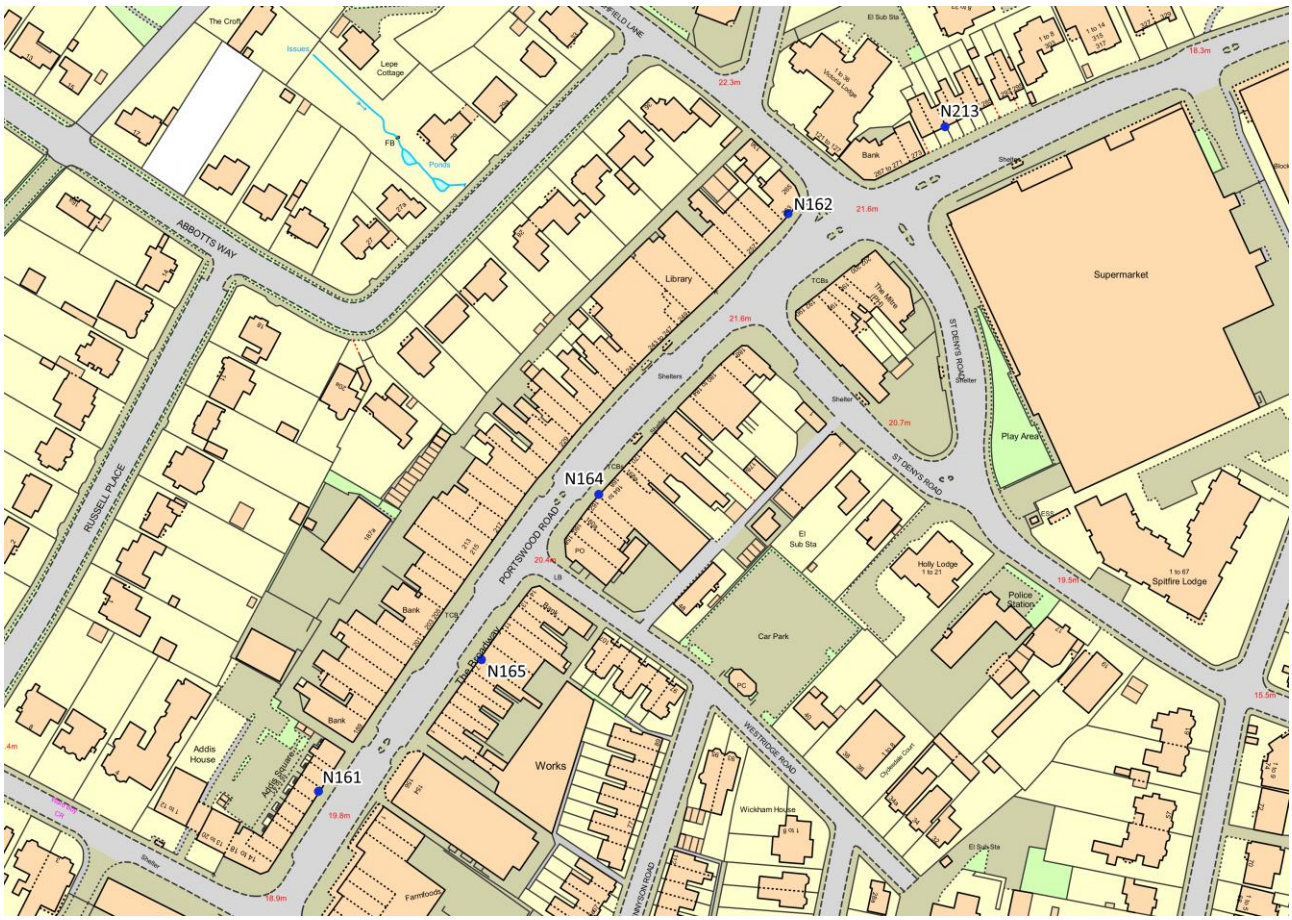


Figure D.18 – Portswood Road NO2 diffusion tube monitoring locations

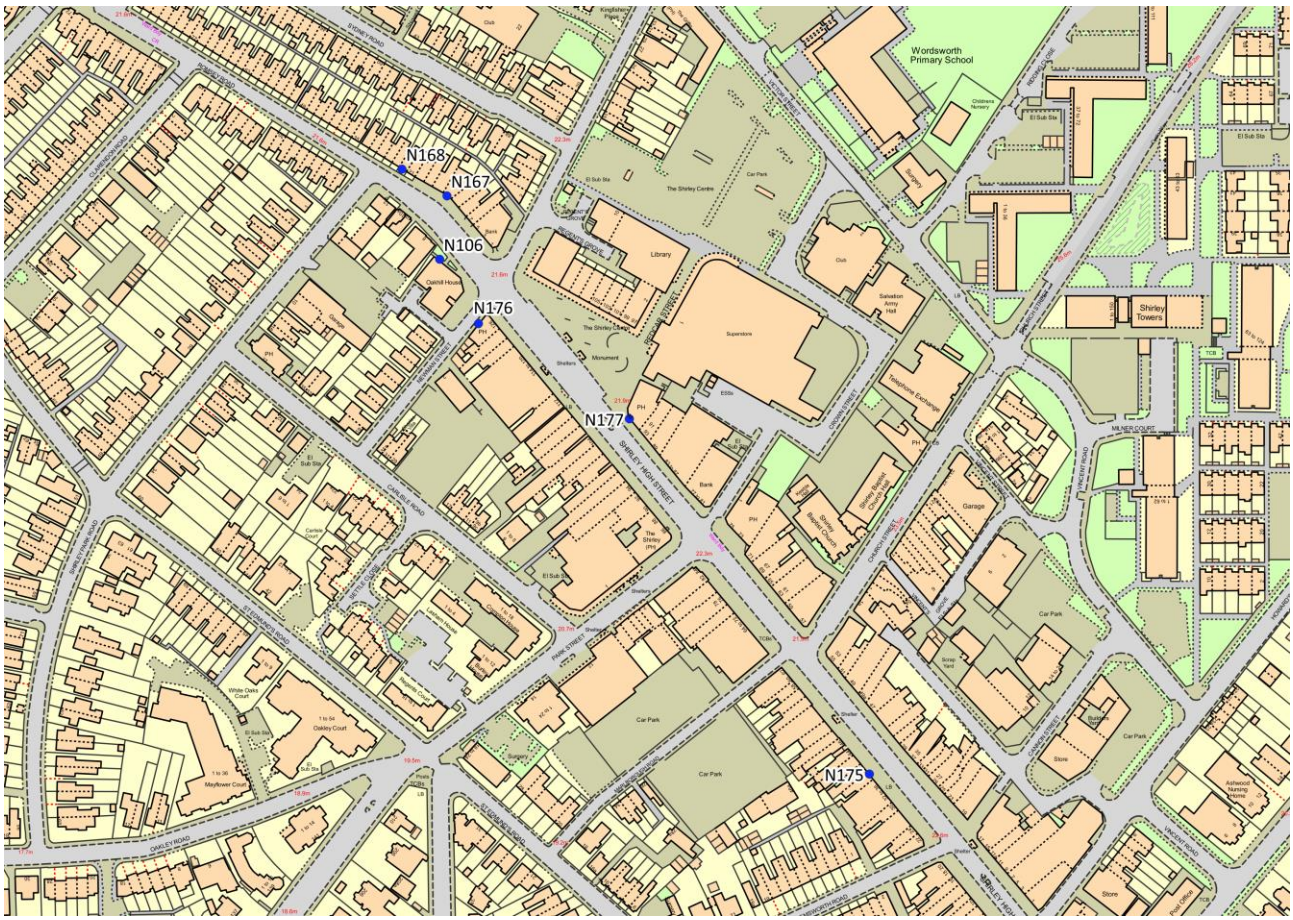


Figure D.19 – Shirley High Street/Romsey Road NO2 diffusion tube monitoring locations

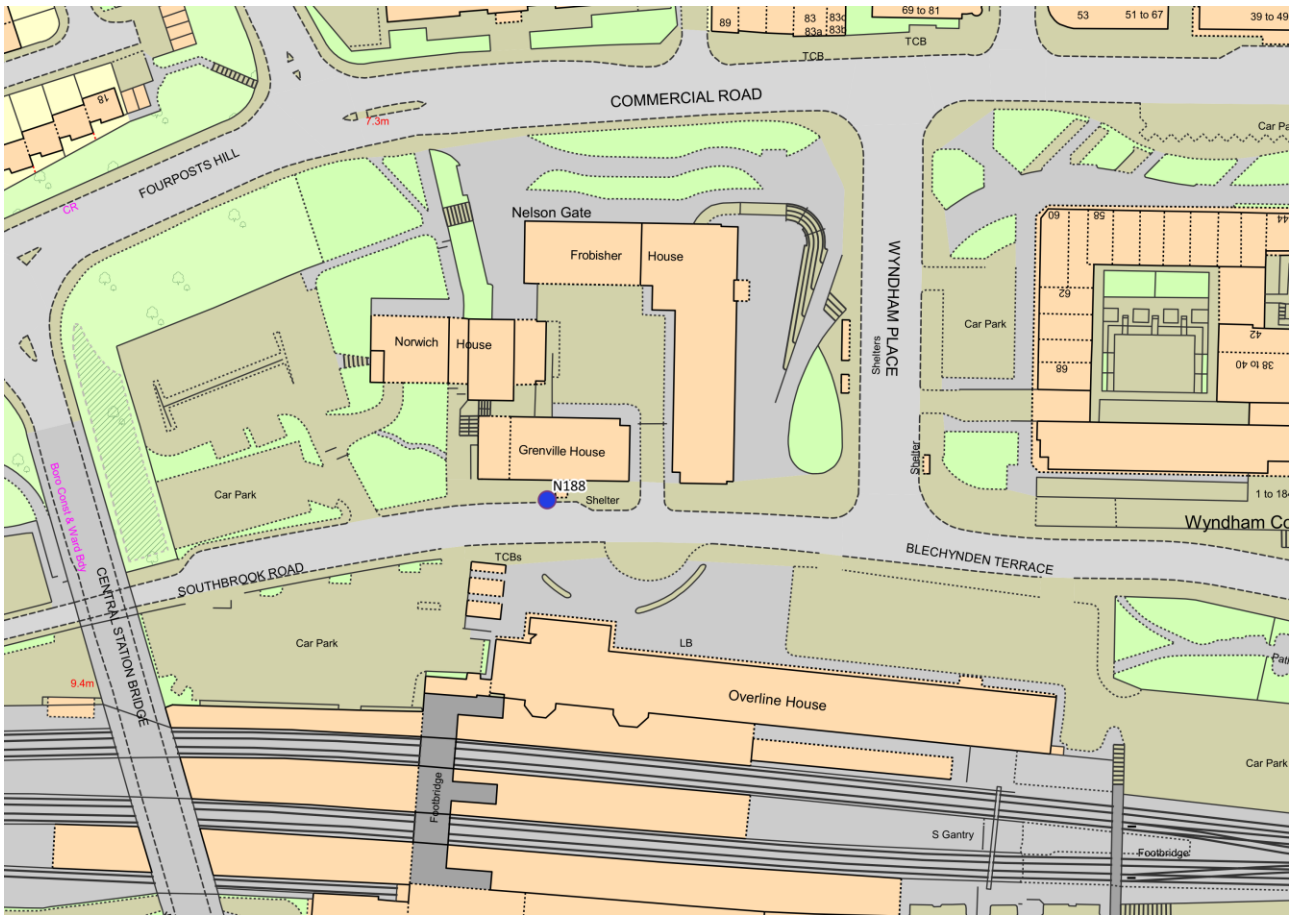


Figure D.20 – Blechynden Terrace (Central Train Station) NO2 diffusion tube monitoring locations

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).

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 National Highways
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)