SOUTHAMPTON
CITY COUNCIL

2019 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the
Environment Act 1995
Local Air Quality Management

June 2019

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Executive Summary: Air Quality in Our Area

Air Quality in Southampton

The City of 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 254,275 (Mid-Year Estimate 2016). The city is served by numerous transport infrastructure links, including a regional airport just outside the city's northern boundary, the M3 and M27 Motorways, a major cruise, container and vehicle port and a main line railway to London and along the south coast.

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

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 $PM_{2.5}$), 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.

http://www.southampton.gov.uk/planning/air-quality-planning/air-quality-management-areas.aspx

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

[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

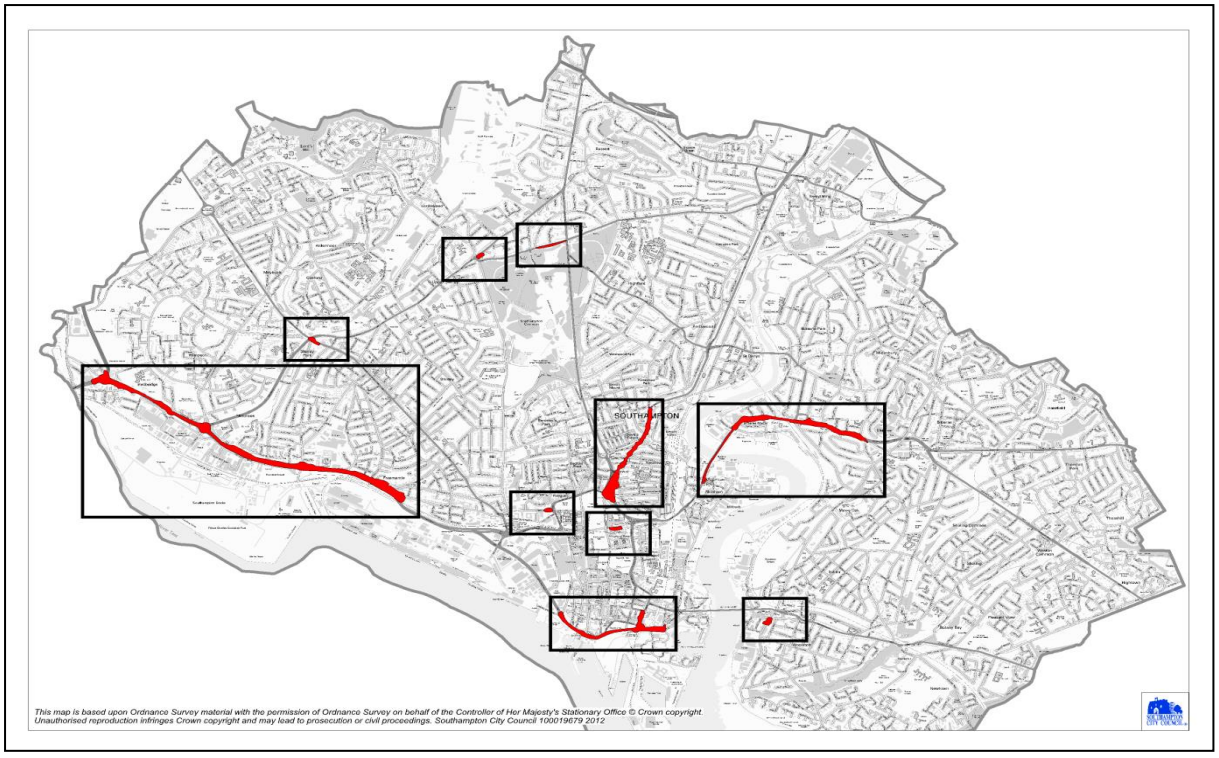


Figure 1 SCC Air Quality Management Areas

Air Quality Management in Southampton

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

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

Sources of Pollution

In 2018, SCC undertook a Clean Air Zone feasibility study which identified the sources that contribute to nitrogen oxide concentrations at various locations across the city. Figure 2 demonstrates how the contribution to road transport NO_x emissions, a precursor for the pollutant nitrogen dioxide (NO_2), varies across the city. Private diesel vehicles contribute most significantly across the city, therefore enabling and encouraging people to walk and cycle, use public transport or low emission vehicles will therefore contribute the most to improving local air quality in

Southampton. Improvements from other sources can also be achieved through reduction in emissions from other transport modes such as shipping and rail and reducing emissions from industry, cleaning the local bus fleet, encouraging freight consolidation and more sustainable logistics practices and a drive toward low emission business fleets in the city.

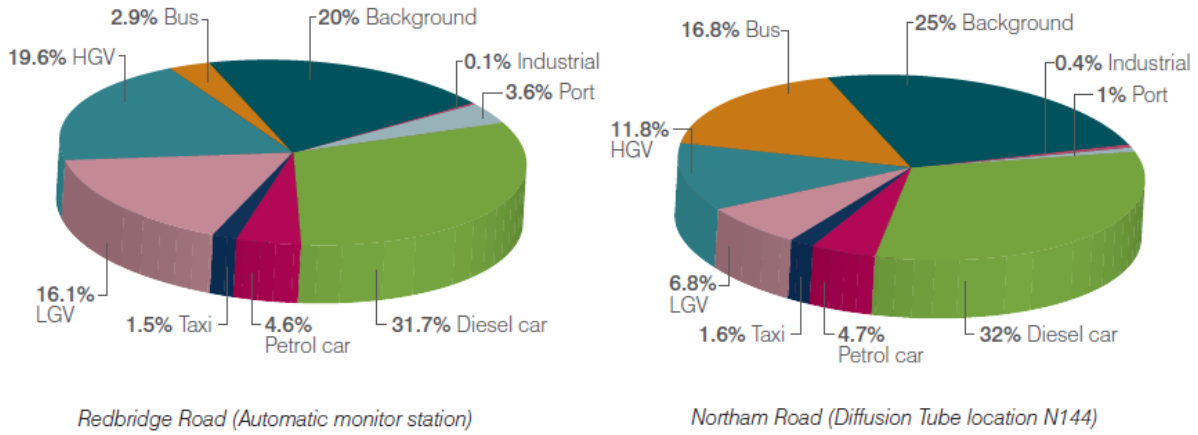


Figure 2 Modelled NO_x source apportionment at two monitoring locations (% contribution, 2015)

Strategies

Clean Air Strategy

SCC introduced the Clean Air Strategy 2016-2025 in November 2016. The strategy details the ways SCC works together with partners including neighbouring local authorities, public transport operators and local businesses and organisations to identify ways to improve air quality and support ongoing improvements in air quality across the city. This Strategy was updated in January 2019 to account for the completion of the Local NO_2 Plan.

Cycling Strategy

In 2017, a ten year strategy to improve cycling rates in Southampton was launched. The SCC Cycling Strategy 2017-2027. The strategy outlines the work that has already been undertaken, sets out a plan of proposed improvements to the cycle network and identifies initiatives to realise the benefits that cycling can bring to the city. This

strategy is accompanied by a three year delivery plan, this sets out how SCC intends to spend confirmed funds and resources on the activities and schemes in the Strategy.

Electric Vehicle Action Plan

SCC are implementing an electric vehicle action plan which will see a citywide network of electric vehicle charging infrastructure deployed at key locations to support and facilitate the use of electric vehicles by the public. 30 charge points have been installed in city centre multi-storey car parks in 2018. SCC are also replacing diesel vehicles with electric where possible in the city's fleet.

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

Local Transport Plan

In 2018, SCC consulted on the next Local Transport Plan, Connected Southampton 2040. This plan identifies three strategic goals:

- A Successful Southampton – improving transport to support the sustainable economic growth of Southampton. Investing in transport will enable people and goods to get around more easily
- A System for Everyone – making Southampton a safe and attractive place to live to improve quality of life. Ensuring everyone is included with access to transport
- A Better Way to Travel – supporting people to change how they move around the city by widening their healthy and clean travel choices by encouraging them to get around actively and healthily, and helping Southampton become a zero emission city

The plan includes aspirations to transform public transport in the city and create active travel zones where it short journeys made by walking and cycling will be the norm. It will also explore opportunities for park and ride, continue development of the Southampton Cycle Network and work toward a zero emission city. More information can be found at the Southampton transport website[4].

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

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

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

Actions to Improve Air Quality

Local NO_2 Plan

In 2017, SCC received a Ministerial Direction requiring the council to submit to the Secretary of State a full business case, as part of the UK Plan for tackling roadside nitrogen dioxide concentrations, to ensure the EU legal limit for nitrogen dioxide is achieved in the shortest possible time (the Local NO_2 Plan). Air quality modelling demonstrated NO_2 compliance will be achieved at all locations in Southampton in 2020. The highest baseline (i.e. no intervention) concentration of NO_2 on the A3024 Northam Bridge is modelled to be 38 µg/m^3 in 2020. To support the CAZ feasibility study, SCC undertook as 12 week consultation which received over 9,300 responses and helped to refine the feasibility study prior to submission of the Full Business Case to the Secretary of State[5]. Measures are to be implemented in 2019 that can achieve reductions in NO_x emissions, and can be delivered in 2019, to increase the likelihood of compliance and reduce exposure of residents to pollutants. These are:

- Support for delivery service planning and freight consolidation for Heavy Goods Vehicle and logistical operations in Southampton.
- Introduction of citywide traffic regulation condition requiring a minimum euro VI standard for all operational buses.
- The introduction of new taxi and private hire vehicle licensing conditions requiring a minimum euro 6 diesel/euro 4 petrol for newly licensed vehicles in 2020 and for all licensed taxis and private hire vehicles to meet this standard by 2023.
- Targeted promotion of active and sustainable travel on the A3024 (location of highest modelled NO_2 concentrations in 2020) through MyJourney.
- Expansion of low emission taxi incentive scheme for Southampton licensed taxi and private hire vehicles.
- A free trial scheme for taxi and private hire operators to consider the benefits of electric vehicles.
- Introduction of rapid charging points to support uptake of electric vehicles within the taxi and private hire fleet.

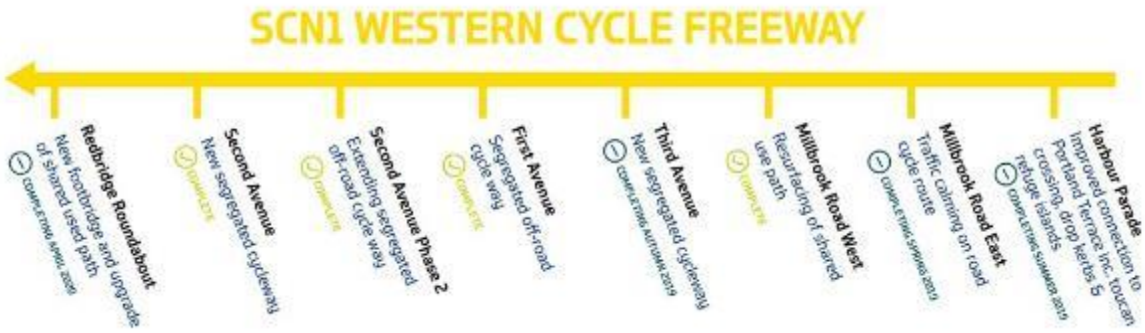
[5] https://www.southampton.gov.uk/images/clean-air-zone-consultation-feedback_tcm63-404512.pdf

The Local NO_2 Plan was approved by the Secretary of State in early 2019 and is being delivered in accordance with the implementation plan. It will include further monitoring and evaluation of air quality and improvement measures to ensure that the NO_2 plan achieves the desired outcomes and risks to delivery of these outcomes are identified and mitigated against.

Other Measures

In addition to the Local NO_2 Plan, SCC has implemented a number of other measures to improve air quality in the city, including:

- Funding secured to deliver SCN5, 8 and 10 cycle routes and significant progress with SCN1 in accordance with the cycling strategy.



- Successfully secured £2.7m funding to retrofit Southampton's operational buses with Clean Vehicle Retrofit Accreditation Scheme (CVRAS) accredited technology. Bus operators in the city have match funded this work with £815,680.
- Undertaking a communications campaign including National Clean Air Day 2018, no-idling, "lunch and learn events" and a 12 week consultation on the Local NO_2 Plan Clean Air Zone proposal.
- Launching the Low Emission Taxi Incentive Scheme in partnership with Eastleigh Borough Council, replacing older, more polluting taxis with hybrid and electric vehicles.
- Replacing 8 diesel vehicles with electric in SCC's own fleet and installed EV charging infrastructure to accommodate these.
- Installing 30 public EV charge points in city centre multi-storey car parks.

- Offering charging for electric vehicles on the public network free of charge.
- 90% discount on city centre parking season ticket.
- Free passage on the Itchen Toll Bridge for EVs.
- Extending the age limit for hybrid private hire and hackney carriage vehicles licensed in Southampton from 9 years to 12.
- Allowing smaller electric vehicles to be licensed as private hire and hackney carriages to encourage uptake of EV's in the city's fleet.
- Continuation of the air alert pollution forecasting and alert system.
- MyJourney engagement with communities, businesses and residents throughout 2018 to encourage active and sustainable travel.
- Monitoring air quality at sites across the city.

Conclusions and Priorities

Conclusion of ASR 2019 - Air Quality Monitoring

The 2019 Annual Status Report concludes there were eight exceedances of the annual mean NO_2 objective, six of which are within existing AQMAs. Two persistent exceedances of the annual mean NO_2 objective are not within an AQMA and therefore SCC will consider the amendment of AQMA No. 5 Redbridge Road to Millbrook Road West and AQMA No. 10 New Road. No exceedance of any other UK objective has been identified.

Priorities for 2019

In 2019, SCC will revise the existing AQAP to account for the progress made in developing the Local NO_2 Plan, and to develop measures specific for individual AQMAs.

A priority for 2019 also includes successfully implementing the Local NO_2 Plan measures to ensure compliance with the EU Ambient Air Quality Directive within the shortest possible time.

SCC will also focus on maintaining the positive momentum from the Local NO_2 Plan Clean Air Zone consultation that engaged stakeholders across the city and expand

that to encompass wider environmental issues through the Green City Charter and the development of a Green City delivery and engagement plan.

Transforming Cities

The Southampton City Region has been successful in becoming one of the Transforming Cities Fund (TCF) City Regions. This means we are able to receive a share of £1.28bn funding over the next five years to allow us to progress our transport plans. SCC plan to do this by:

- Accelerating the delivery of the Southampton Cycle Network so that cycle routes are safe and convenient and we can become a true cycling city
- Developing the Southampton Mass Transit System so we can encourage people to use public transport with priority for buses, new Park & Rides and reducing delays for everyone by using smart technology
- Starting to change the city centre by making it a better place to walk and cycle, and by creating our gateways into the city at stations, the airport and ferry terminals. This will mean people can easily get between train, ferry, bus, plane, car and cycles.

SCC are developing the business case for a programme of schemes worth up to £100m that will deliver on those areas ready to submit to the Government later in 2019. If successful, this will help Southampton deliver on its plans to think differently about transport and meet the challenges of the future. More information can be found here: https://transport.southampton.gov.uk/transforming-cities/

Local Engagement and How to get Involved

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 and 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:

- Clean Air Network CleanAirNetwork@southampton.gov.uk
- 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/

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1 Local Air Quality Management

This report provides an overview of air quality in Southampton City Council during 2018. 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 can be found in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 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. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=252 – see full list at http://uk-air.defra.gov.uk/aqma/list. Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

SCC will consider:

- Expanding AQMA No.10 New Road to incorporate the receptor associated with N172 4 New Road which has exceeded annual mean NO_2 concentrations for the previous four years. The receptor at 10 4 New Road is currently a commercial premises. However, as a result of changes to permitted development rule, the location could become residential properties. Therefore it may be appropriate to proactively include it within the AQMA.
- Due to the possible expansion in AQMA No 10's size and its proximity to AMQA No. 1, SCC will consider whether there is benefit in merging both AQMAs so that more effective mitigation opportunities can be pursed to address both areas.
- Expanding AQMA No. 5 Redbridge Road to Millbrook Road West to incorporate the school as a result of three years exceedance at N101 Redbridge School Fence.

Over the next 12 months, SCC will deploy additional diffusion tubes at locations across the city. This provide additional monitoring outside of AQMAs and recommence monitoring within AQMA No. 3 Winchester Road. If any hotspots identified SCC will consider in 2019 whether to fast track the introduction of new AQMAs.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
No. 1 Bevois Valley	Declared July 2005	NO2 Annual Mean	Southampton	An area including a number of properties from Charlotte Place Roundabout to Bevois Valley Road	NO	50	µg/m3	46.9	µg/m3	SCC AQAP	Adopted 2008	Link
No. 2 Bitterne Road West	Declared July 2005, extended in 2012	NO2 Annual Mean	Southampton	An area including a number of properties from Northam Road and along Bitterne Road West	NO	37	µg/m3	41.5	µg/m3	SCC AQAP	Adopted 2008	Link

No 3. Winchester Road	Declared July 2005, reduced in size in 2006 after Further Assessment	NO2 Annual Mean	Southampton	An area including residential properties at the Winchester Road/Hill Lane Junction	NO	35	µg/m3	-	µg/m3	SCC AQAP	Adopted 2008	Link
No. 4 Town Quay to Platform Road	Declared July 2005, increased in size in 2006 after Further Assessment	NO2 Annual Mean	Southampton	An area including a number of properties from Town Quay to Platform Road	NO	48	µg/m3	37.2	µg/m3	SCC AQAP	Adopted 2008	Link
No. 5 Redbridge to Millbrook Road West	Declared July 2005, merged into one AQMA in 2012 after Further Assessment	NO2 Annual Mean	Southampton	An area including a number of properties along Redbridge/ Millbrook Road	YES	45	µg/m3	42.3	µg/m3	SCC AQAP	Adopted 2008	Link

No. 6 Romsey Road	Declared July 2005, increased in size in 2012 after a Detailed Assessment	NO2 Annual Mean	Southampton	An area including a number of properties along Romsey Road from Teboura Way to Shirley High Street	NO	44	µg/m3	42.8	µg/m3	SCC AQAP	Adopted 2008	Link
No. 8 Commercial Road	Declared July 2008	NO2 Annual Mean	Southampton	An area including a number of properties along Commercial Road at the junction with Cumberland	NO	45	µg/m3	42.8	µg/m3	SCC AQAP	Adopted 2008	Link
No. 9 Burgess Road	Declared April 2012	NO2 Annual Mean	Southampton	An area including a number of properties along Burgess Road at the junction with The Avenue	NO	47	µg/m3	47.3	µg/m3			

No. 10 New Road	Declared April 2012	NO2 Annual Mean	Southampton	An area including a number of properties along New Road	NO	42	µg/m3	35.9	µg/m3			
No. 11 Victoria Road	Declared April 2012	NO2 Annual Mean	Southampton	An area encompassing a number of properties along Victoria Road at the junction with Portsmouth Road	NO	43	µg/m3	37	µg/m3			

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

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

Southampton City Council has taken forward a number of direct measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

2018 was a significant year for air quality in Southampton due to the formal public consultation on the CAZ proposals. This galvanised the city community to take an interest in air quality and resulted in the highest number of responses to a consultation for Southampton City Council.

Key completed measures in 2018 are:

- Funding secured to deliver SCN5, 8 and 10 cycle routes and significant progress with SCN1.
- Successfully secured £2.7m funding to retrofit Southampton's operational buses with Clean Vehicle Retrofit Accreditation Scheme (CVRAS) accredited technology.
- Undertook a communications campaign including National Clean Air Day 2018, no-idling, "lunch and learn events" and a Clean Air Zone 12 week consultation.
- Launched the Low Emission Taxi Incentive Scheme in partnership with Eastleigh Borough Council, replacing older, more polluting taxis with hybrid and electric vehicles.
- Replaced 8 diesel vehicles with electric in SCC's own fleet and installed EV charging infrastructure to accommodate these.
- Installed 30 public EV charge points in city centre multi-story car parks and offered the charging for free.
- Other EV incentives including 90% discount on city centre parking season ticket and free passage on the Itchen Toll Bridge for EVs.

The continuation of MyJourney through the Access Fund engaged residents, business and communities throughout 2018, including:

- The inaugural Sustainable City Expo at NST City Theatre. The event brought local businesses together to be inspired by the opportunities for transformation in our towns and cities. 76% of delegates surveyed agreeing that the expo inspired them in getting their organisation to be more sustainable.
- Cycle September - A corridor focussed campaign which aimed to encourage residents to start cycling or increase the amount they cycled during September. Promoted through a month-long challenge with the incentive of giveaways and prizes for workplaces, individuals and those who support/encourage their colleagues, friends and families to take part. The campaign saw 736 individuals and 41 organisations sign up to the Love to Ride app and events. Six months after the challenge behaviour change has been sustained. 70% of those classed as new riders increased how often they ride six months after the challenge. 42% of those who were occasional riders at baseline reported riding regularly six months after the challenge.
- Big Pedal - 21 schools participated in the Big Pedal in April 2018, recording 25,114 active journeys (not including walking).
- A timed road closure - Introduced in November 2018 on French Street outside St John's Primary & Nursery School. The scheme was trialled on an 18 month basis to help reduce local air pollution, improve road safety and encourage families to travel actively to and from school. Access Funding has supported us to work with the school to prepare and support parents and pupils to use active travel.
- Air quality exhibits and workshops - Delivery of a package of activities designed to educate pupils and residents about the health impact of air pollution. Event is tailored to the needs of group but tools used include lungs which respond when users turn various dials to answer travel related questions, a specially designed reading book, testing local air quality using diffusion tubes alongside creative activities designed to complement the wider curriculum.
- School travel plan engagement - 49 schools on the transport corridor have been supported with training and resources to plan and deliver events to help their pupils travel actively. In the last year, 368 events including scooter

training, assemblies, cycle training, competitions and lessons have been delivered by the team, engaging with 13,130 individual pupils.

- Bike-it - 32 schools are currently engaged in Bike IT activities; in the last 12 months, there have been 287 events and 20,991 engagements.

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

- Implementation of the Local NO_2 Plan measures
- Completion of cycle routes: SCN1, 5, 8 and 10
- Introduction of Air Quality planning guidance to deliver air quality improvements through development control

Southampton City Council's priorities for the coming year are to introduce the CAZ measures and ensure legal compliance with the EU Ambient Air Quality Directive is achieved within the shortest possible time, and to monitor and evaluate its success.

In light of the non-charging CAZ being identified as SCC's Local NO_2 Plan, it is essential that the council continues to maintain momentum that has been demonstrated by the city's residents and businesses towards improving air quality. SCC will use this as an opportunity to review and update the Air Quality Action Plan to identify measures that were not included with the CAZ non-charging scheme, but may be more appropriate for delivery on a more localised scale to ensure improvements are delivered across the 10 AQMAs.

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

A further challenge is ensuring all residents and organisations in Southampton understand the role that they play in reducing air pollution. Whilst the council are able to influence air quality to some extent, it is important that the population seek active and sustainable travel options where possible to reduce their impact.

Table 2.2 – Progress on Measures to Improve Air Quality

No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Clean Air Zone (Local NO_2 Plan)	Promoting Low Emission Transport	Low Emission Zone (LEZ)	SCC, Defra, JAQU, DfT, New Forest District Council. Funded by JAQU	2018-2019	2019-2020	1. Achieve EU Directive 2. Accelerated uptake vehicles compliant with euro 6 emission standard	Compliance annual mean EU Ambient Air Quality Directive (40 µg/m3 at EU Directive locations)	Feasibility study and consultation complete. Full Business Case submitted to Defra Jan 19 for non-charging CAZ.	2020	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	Minimum emission standard for buses	Promoting Low Emission Transport	Low Emission Zone (LEZ)	SCC, Local bus operators, DfT	2017 - 2019	2019	"Compliant" operation buses (meeting minimum Euro VI engines or Clean Vehicle Retrofit Accredited equivalent)	Up to 99 % reduction in NOx and PM emissions. Source apportionment of bus/coach estimated up to 38% in some locations with the highest bus movements (based on CBTF upgrades to SCC vehicle fleets). Purpose of condition is to maintain these	Included within CAZ Full Business Case. Scheme would ensure that improvements achieved through CBTF success will continue beyond 2020 by preventing operators licensing older, more polluting vehicles and ensuring the Euro 6 minimum standard is achieved. Will also provide opportunity to explore progressive	2020	

								improvements beyond 2020.	improvements over time.		
3	My Journey	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	DfT, SCC, Hampshire County Council, Portsmouth City Council, Eastleigh Borough Council	2016	2017-2020	Reduction in car journeys in the city	Indiscernible (note: work is underway to develop a method of estimating AQ improvement from Access Fund measures with the University of Southampton)	see details above	2020	see details above
4	Local planning policies (citywide)	Policy Guidance and Development	Air Quality Planning and Policy Guidance	SCC	August 2016 – March 2017	April –May 2017	Impact of development on local air quality	Indiscernible (note: Aim to reduce emissions and concentrations from future development)	Funding received to implement. Draft air quality planning document complete, currently consulting internally and with neighbouring authorities.	Summer 2019	Continued progress in air quality policy at central government (e.g. Clean Air Strategy) and locally (i.e. CAZ feasibility) has delayed publication to ensure document is up to date and robust.
5	Cycle Lane/ Routes Provision	Transport Planning and Infrastructure	Cycle network	SCC	2012	2013-2018	Use of cycle route, private vehicles removed from road	< 1µgm3	SC1, 5, 8 and 10 received funding through CAZ Early Measures programme. Routes to be completed prior to end of 2019. Work on SCN1 underway and due for completion mid-2019.	Routes SCN1, 5, 8 and 10 2019, Cycle Strategy - 2025	A 10 year cycle strategy has been adopted identifying the investment required along the key cycle commuter routes into the city centre. First Avenue and Third Avenue and the Avenue cycle lanes completed
6	Freight consolidation and efficiency	Freight and Delivery Management	Freight Consolidation Centre	SCC, JAQU	2012	2014-2020	Reduction in HGV movements in the city. Use of SDC. Reduction in emissions from HGVs operating in Southampton.	Approx. 0.68 tonnes of NOx in 2020 if CAZ feasibility study consolidation is implemented. Approx. 0.18 tonnes of PM in 2020. Emission reductions would continue beyond 2020.	Freight consolidation, delivery and service planning and fleet accreditation included in the Clean Air Zone preferred option submitted to Secretary of State	2022-2029 (dependent on funding)	Existing framework ends from 2019. A long term framework (up to 10 years) should be established to provide confidence to users that long term provision is available. Additional costs for double-handling of some goods will require subsidy to encourage uptake.

7	Shore power for cruise ships	Promoting Low Emission Transport	Other	SCC, ABP	2018/19	2019/20	Number of cruise ships using facility. Pollutant emissions from cruise ships at berth.	If 20% cruise ships plug in by 2020, 12.1% reduction in NOx emissions estimated (based on 90% reduction in NOx emissions when ships accessing shore power), saving 8.34 tonnes of NOx and 0.31 tonnes of PM in 2020.	Initial market testing undertaken has allowed costing and project planning. Scheme directly modelled as part of CAZ feasibility study demonstrating emission reductions. Included a business case for shore power as an appendix to the CAZ Full Business Case. ABP have agreed a Memorandum of Understanding committing to introducing shore power should the bid be successful.	2020	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. Should this route be unsuccessful, SCC will seek other opportunities to implement in partnership with ABP.
8	Electric Vehicle Action Plan (EVAP)	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	SCC, DfT	2016	2017	Number of new public charging points installed over life of programme. Number of electric vehicles in SCC Fleet	Private vehicle and SCC fleet NOx, PM emission reductions	6 x 22kW 32A Type 2 Mennekes installed at 5 multi-storey car parks in city centre (free charging). Charging currently free. First fleet vehicles delivered and operational. CAZ plan includes provision of 2x rapids dedicated for taxi and private hire vehicles. Electric vehicles receive 90% discount in city centre car parks. Itchen Toll bridge free for electric vehicles.	2019/20	City wide Electric Vehicle Action Plan will see a network of charge points installed at city car parks, destinations and SCC properties throughout 2019. Will be accompanied by communications campaign to drive uptake.
9	Taxi licensing conditions	Promoting Low Emission Transport	Taxi Licensing conditions	SCC	2018/19	2019 - 2023	Number of licensed taxi and private hire vehicles	Approx. 1.24 tonnes of NOx emissions reduced in 2020. Emission reductions would continue beyond 2020.	Newly licensed vehicles must meet Euro 6 diesel/4 petrol by 2020 and all vehicles by 2023. This will be consulted on in 2019 if the CAZ FBC is approved.	2019/20 (phase 1), 2022/23 (phase 2)	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.
10	Low emission taxi incentive scheme	Promoting Low Emission Transport	Taxi emission incentives	SCC, Eastleigh Borough Council, Defra AQ Grant	2015/16	2016 - 2020	Alternatively fuelled vehicles in SCC and EBC fleet	The existing scheme has £254,880 of Defra Air Quality Grant funding which at the time of scheme inception was anticipated to deliver 1681.5 Kg of NOx per year across Southampton and Eastleigh (£151,624 per tonne NOx per year), a total of 19.2% reduction in estimated total taxi emissions. If the award of £164,250 was successful we could expect (based on the existing scheme assumptions) to achieve 1.08 tonnes of NOx per year reduced emissions.	58 grants issued in 2018 to SCC drivers for hybrid electric vehicles replacing euro 5 or older diesel vehicles. 12 grants issued in Eastleigh. Additional £164k sought to expand the scheme to all vehicles likely to be non-compliant in 2020 and to allow vehicles carrying 5-8 passengers or wheel chair accessible to upgrade to Euro 6 diesel (SCC only).	2020	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 taken into account meaning incentives can only be offered for operating costs rather than to contribute toward the purchase cost of a vehicle.
11	Support ABP's Clean Air Strategy	Policy Guidance and Development Control	Low Emissions Strategy	Associated British Ports Southampton	2018	2018-2023	Emissions from activity within the Port (i.e. shipping, NRMM) and traffic accessing the Port (i.e.	Measures within strategy have significant potential to deliver emissions reductions for NOx and PM.	ABP supported in developing a port emissions inventory for the Clean Air Zone feasibility study. ABP have published their own Clean Air Strategy listing 19	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

							freight, cruise traffic).		measures that they aspire to implement by 2023.		for emissions reductions. Implementing measures is beyond SCC's control and relies on partnership work with ABP.
12	Straddle Carrier to Trial and monitor hybrid power	Promoting Low Emission Plant	Other measure for low emission fuels for stationary and mobile sources	SCC	2015	2016-17	1 Straddle Carrier fitted with hybrid technology, report produced	Allows DP World to target fleet of straddle carriers for NOx, NO2, PM emission reductions	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 the CAZ feasibility study. From these measurements it generated total annual emission estimates for the fleet, accounting for each emission standard of straddle carrier.	Complete	Used portable emission measurement to understand emissions from various straddle carrier engines/technologies.
13	Cleaner Air Strategy publication	Policy Guidance and Development Control	Low Emissions Strategy	SCC	2016	2016	Publication date	N/A	Clean Air Strategy adopted in November 2016 and published on the council website.	2016	Published
14	Port booking scheme to incentivise low emission trucks	Promoting Low Emission Transport	Priority parking for LEV's	ABP.DP world	2017	2018-20	Emissions reductions from port related HGVs	CAZ feasibility study will establish concentrations attributable to HGV's associate with port activity.	Memorandum of Understanding agreed with DP World outlining a desire to utilise the port booking system to incentivise lower emission vehicles	2020	

									(aligned with CAZ requirements).		
15	Eastern Access Highway Scheme	Transport Planning and Infrastructure	Other	SCC, DfT	2016-18	2020-22	Scheme complete	TBC	Due to commence in 2019	Q4 2022	
16	Millbrook Round about A33/ A35 Capacity	Transport Planning and Infrastructure	Other	SCC. DfT	20	2017/18	Traffic flow/capacity in roundabout vicinity. Monitored NO2 levels.	TBC	Bid submitted to improve capacity at A33/A35 Millbrook roundabout at the Redbridge Road/Millbrook Road AQMA on the Western Approach with anticipated benefits for air quality.	2018/20	
17	Bus Priority measures	Traffic Management	Bus route improvements	SCC	2014	2015-2017	Bus patronage	Indiscernible	Bus priority programme in progress with 42 junction improvements identified continue to be delivered. Junction improvements along A3024 eastern access to Southampton will incorporate virtual priority measures.	Ongoing	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.
18	Improving Bus Journey Time Reliability	Traffic Management	Bus route improvements	SCC	2014	2015-2018	Bus time reliability/ Bus patronage	Indiscernible	Bus lane enforcement cameras installed in 2016	ongoing	Alongside targeted interventions to deliver journey time savings of 9.5 seconds per bus per junction, cameras have been installed to penalise motorists using dedicated bus lanes in the city, slowing up buses along key routes. Delivering economic benefit, improving punctuality and journey times, whilst reducing emissions.

19	Retrofit for buses: SCRT for older buses. Thermal management for Euro 5	Vehicle Fleet Efficiency	Vehicle	SCC, DfT/JAQU	2015-16	2019	Trial result published, commitment from bus operators to retrofit	Up to 99 % reduction in NOx and PM emissions. Source apportionment of bus/coach estimated up to 38% in some locations with the highest bus movements.	Clean Bus Technology Fund successful. SCC will provide grants to bus operators to upgrade vehicles to Euro VI equivalent (according to Clean Vehicle Retrofit Accreditation Scheme standards).	2019	CAZ plan will ensure these standards are maintained by introducing a traffic regulation condition requiring all operational buses in Southampton to meet Euro VI.
20	Procure low emission vehicles in Council and partner fleets	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising uptake of low emission vehicles	SCC	Oct-Dec 2016	2017-20	Number of Low Emission Vehicles in council Fleet	Reduce NOx/PM emissions from SCC fleet vehicles	First SCC Fleet vehicles delivered in 2018. 8x EV charge points installed at West Park Car Park for SCC EV Fleet vehicle use.	Ongoing replacement	SCC properties located across Southampton with differing power/capacity availability and requirements. Site surveys due to commence in 2019 to accommodate EV chargers for further fleet procurements.
21	Low emission vehicles supported in DSP work	Freight and Delivery Management	Delivery and Service plans	SCC	2016	2017	Electric delivery vehicle in use	Dependent on uptake	DSPs included in CAZ Full Business Case. The specification will require potential operators to demonstrate how they will promote the use low emission vehicles and cargo-bikes. Tender commenced at the end of 2018 with appointment expected following CAZ FBC outcome confirmation.	2018/19	Funding requested through CAZ Full Business Case to deliver 10 DSPs per year for 3 years in combination with fleet accreditation and freight consolidation.
22	Establish Clean Air Network	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce	SCC, The Port, business stakeholders, Southampton University, local air pollution pressure groups,	December 2016-July 2017	2018	Organisations signed-up to CAN and pledges made and delivered. Events held.	Indiscernible	Clean Air Network launched in February 2018. Events to be held throughout the year. Clean Air Network supported CAZ feasibility study consultation.	Completed. Continued promotion and activity throughout 2018/19.	

			emissions and improve air quality	Environment Centre							
23	National Clean Air Day	Public Information	Other	SCC, Global Action Plan	Jan-June 2017	2018	Number of engagements during campaign	Private vehicle NOx, PM emission reductions	SCC hosted activities for the second National Clean Air Day on 21st June 2018.	2017 (First NCAD), 2018 (Second NCAD)	
24	airAlert	Public Information	Other	SCC, Sussex-air, Kings College London	2009	2010-2016	Users, alerts issued, satisfaction survey.	Reduced exposure by susceptible and/or vulnerable service users	553 users subscribed to the service by the end of 2018 (increase in 72 users in 2018), 40 airAlerts issued in 2018, 1 "High", 39 "Moderate".	Complete. Ongoing promotion.	
25	M271 Redbridge junction capacity work	Traffic Management	Strategic highway improvements	Highways England	2016	2019	Traffic flow improved		Scheme to commence mid-2019.	2019	
26	EV parking discounts	Promoting Low Emission Transport	Other	SCC	2017/18	2018	Number of EV parking permits issued	Reduced emissions from private vehicles	Discounts launched in 2018. 14 permits issued by December 2018.	Ongoing	
27	Itchen Toll EV Concessions	Promoting Low Emission Transport	Other	SCC	2017/18	2018	Number of EV pass transactions and smart cities cards issued for EV use	Reduced emissions from private vehicles	As of Q2 2018 41 smart cities cards were issued for EVs (dedicated SCC smart card for transport). EV pass was used on 542 occasions.	Ongoing	
28	EV car clubs	Alternatives to private vehicle use	Car Clubs	SCC	2016	2017-18	Usage of cars	Dependent on uptake	Discussion with Enterprise Car Rentals over the deployment of EV's as part of the existing car club fleet continue. SCC seeking opportunities to align EV car club with internal car rental requirements for staff.	2019/20	On street infrastructure will need to be provided and managed. This is planned as part of EVAP for 2019.
29	ULEV Trials for Taxi and Private	Promoting Low Emission Transport	Taxi emission incentives	SCC	2018/19	2019/20	Number of ULEV trial participants	Reduced emissions from taxi and private hire vehicles	Included as measure within CAZ Full Business Case. Partner identified.	2019/20	2x rapid charge points included within CAZ full business case dedicated for taxi use

	Hire Vehicles										will support ULEV taxi trials.
30	Anti-idling campaign / enforcement	Traffic Management	Anti-idling enforcement	SCC, The Environment Centre, JAQU/Defra	2017	2018	Number of engagements during campaign	Emissions reduced at point of idling (indiscernible reduction)	Campaign held in February - May 2018.	Ongoing (2018 Campaign complete)	Exploring options to implement no idling policy and enforcement supported by additional communication campaign.
31	Eco Driver Training and telematics for Council Fleet	Vehicle Fleet Efficiency	Driver training and ECO driving aids	SCC	2016	2017-19	reduce fuel usage by 10%	TBC following scheme design/planning	Planning phase continues due to increase in EV fleet vehicles to determine whether EV training is more effective use of funding.	2019	SCC fleet upgrades will require drivers to operate electric vehicles. It is considered more effective to align this proposal with EV training rather than focus on diesel efficiency given this direction.
32	City Car Club	Alternatives to private vehicle use	Car Clubs	SCC	2014	2015-2018	usage of car club	Indiscernible	Over the course of the My Journey programme 3 separate direct mail promotional campaigns advertising the Car Club and offering discounted membership have been run. Workplace travel officer is working to promote car club to employers	Ongoing	
33	Workplace and School Travel Plan	Promoting Travel Alternatives	School Travel Plans	SCC	2010	ongoing	100% of schools have travel plans in place	< 1µgm3	2 FTE workplace travel advisors in post from October 2017 1.6 FTE School Travel Plan Coordinators in post from July 2017 developing, monitoring and evaluating school travel plans using the STARS accreditation online toolkit.	Ongoing	30 schools have signed up to the STARS school travel plan programme Through this programme over 1400 bikes have been fixed, 230 Bike-it events have been staged, and 35,000 positive cycling and scooting experiences have been delivered. 23,000 pupils walk to school at least once a week and

											a 12% increase in cycling to school rates for those schools participating in 'Bike-it'. Lordshill school closed off a road to simulate traffic free environment.
34	Website and comms	Public Information	Via the Internet	SCC	2016	2017	Comms plan published	N/A	Clean Air Network launched in February 2018. Clean Air Zone consultation for 12 weeks June - September recorded most responses to a consultation at SCC to date. Significant public engagement on CAZ and wider AQ issues.	Ongoing	Events, leaflets, radio advertising, billboards, website update, social media and posters all used to promote CAZ and Clean Air Network throughout 2018.
35	City-wide fleet composition survey	Vehicle Fleet Efficiency	Other	SCC	Q1-3 2016	December 2016	Survey completion	N/A	ANPR camera survey completed in December 2016 to calculate emission standard of current vehicles using main roads	Complete (2017)	Survey has informed CAZ feasibility study.
36	Green Wall Alongside A33	Other	Other	SCC, Freight Liner	2016	2018-20	Impact on cycle rates (due to improved aesthetics). NO2 concentrations.	Indiscernible	Options still being considered by SCC and adjacent land owner.	2019	Barrier to implementation: Land ownership issues. Resource dedicated to overcoming this issue.

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

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

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

- The airAlert 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 Sussex Air and Kings College London, with the support of our public health colleagues and the NHS.
- Southampton also works closely with the Port operator and its customers to identify and support initiatives that will reduce emissions. The Clean Air Network will develop over the coming years to engage with the key stakeholders in the city, including the port.
- The Clean Air Zone feasibility study will include estimated emissions for larger particulates (PM_{10}) from activity in the city which can be used as a proxy for determining the scale of $PM_{2.5}$ emissions.
- $PM_{2.5}$ is monitored in Southampton at the City Centre AURN Urban Centre station. $PM_{2.5}$ decreased substantially in 2016 compared to previous years. In 2011 it was 16 µg/m^3 but it has decreased steadily to 13.3 µg/m^3 in 2018.

$PM_{2.5}$ and Health

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

In Southampton Public Health England estimated the fraction of mortality at 6.2% attributable to particulate air pollution. This was slightly higher than the South East

England figure of 5.2% and Hampshire at 5%. As a regional city the slightly higher figure is to be expected, compared to rural Hampshire.

Local hot-spots

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

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

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Southampton City Council undertook automatic (continuous) monitoring at 4 sites during 2017. Table A.1 in Appendix A shows the details of the sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. National monitoring results are available at https://uk-air.defra.gov.uk/.

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.

Data from the automatic monitoring sites in Southampton can be found at: www.southampton.my-air.uk

3.1.2 Non-Automatic Monitoring Sites

Southampton City Council undertook non- automatic (passive) monitoring of NO_2 at 64 sites during 2018. Table A.2 in Appendix A shows the details of the 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.

One tube was removed from the diffusion tube survey in 2018 (N171 132 Newton Road).

Additional monitoring sites will be established in Lodge Road, Portswood, to assess the need to amend AQMA No. 1 Bevois Valley.

A new site close to the M27 will be established in 2019, recognising the need to investigate the high concentrations identified along the M27 north of Southampton

during the CAZ feasibility study to determine whether there is an exceedance relevant to Local Air Quality Management.

The CAZ will also require monitoring and therefore an additional five diffusion tubes will be established at the five roads with the highest annual mean NO_2 concentrations at locations close to EU relevance (i.e. 2m height, 4m from the road).

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There were 8 exceedances of the annual mean NO_2 objective in 2018 at relevant, sensitive receptors. One of these exceedances is at N172 4 New Road which is currently outside of any AQMAs (41.3 µg/m^3). A second exceedance outside of existing AQMAs is at N101 Redbridge School Fence (42.4 µg/m^3). Due to persistent exceedance at these locations, SCC will consider amending the existing AQMAs to include N179 (AQMA No. 10 New Road) and N101 (AQMA No. 5 Redbridge to Millbrook Road West).

The remaining six exceedances are within existing AQMAs, and are as follows:

- N107 Cranbury Place – AQMA No. 1 Bevois Valley (corrected for distance, 46.9 µg/m^3)
- N130 367A Millbrook Road – AQMA No. 5 Redbridge to Millbrook Road West (42.3 µg/m^3)

- N138 66 Burgess Road – AQMA No. 9 Burgess Road (47.3 µg/m^3)
- N140 5 Commercial Road – AQMA No. 8 Commercial Road (corrected for distance, 42.8 µg/m^3)
- N169 150 Romsey Road – AQMA No. 6 Romsey Road (42.8 µg/m^3)
- N174 166A Bitterne Road West – AQMA No. 2 Bitterne Road West (41.5 µg/m^3)

Other locations that exceed 40 µg/m^3 but are not considered representative of relevant receptors is N152 M271 and N185 Redbridge Causeway 1.

N180 Opposite 5 Commercial Road does not exceed following correction for distance to nearest sensitive receptor. It measures 40.5 µg/m^3 at the monitor and 39.6 µg/m^3 following correction. This site is also annualised which introduces additional uncertainty.

No annual means greater than 60µg/m^3 were measured, which is used to indicate that an exceedance of the 1-hour mean objective is likely at the sites.

There were no exceedances for the NO_2 1-hour mean at any automatic monitoring sites in 2018.

All monitoring data presented has been ratified and corrected for bias. See appendix C for further inforamtion on quality assurance/quality control.

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year. There are no exceedances of the UK objective for annual or daily mean PM_{10} in 2018. All monitoring data presented has been ratified and corrected for bias. See appendix C for further inforamtion on quality assurance/quality control.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.7 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years. The annual mean $PM_{2.5}$ concentration in 2018 was 13.3 µg/m^3. All monitoring data presented has been ratified and corrected for bias. See appendix C for further inforamtion on quality assurance/quality control.

3.2.4 Sulphur Dioxide (SO_2)

Table A.8 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2018 with the air quality objectives for SO_2. There were no exceedances of the UK objectives for SO_2 in 2018.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In 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 Centre	442579	112248	NO2, PM10 (FDMS), PM2.5 (FDMS), SO2, Benzene, O3	NO	Chemiluminescence (NO2), FDMS (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, FDMS TEOM	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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
N100	6 Sandringham Road	Urban Background	444387	114453	NO2	NO	n/a	n/a	NO	1
N101	Redbridge School Fence	Roadside	437548	113719	NO2	NO	0	6.3	NO	2.3
N102	64 Burgess Road	Roadside	441676	115280	NO2	YES	0	7.1	NO	1.6
N103	485 Millbrook Road	Roadside	438808	112903	NO2	YES	0	12.1	NO	1.6
N104	Regents Park Junction	Roadside	439222	112850	NO2	YES	2.4	12	NO	3
N106	2 Romsey Road, Oakhill	Roadside	439752	113984	NO2	NO	0	4.4	NO	2.6
N107	Cranbury Place	Roadside	442364	112890	NO2	YES	0.5	1.8	NO	2.1
N109	72 Bevois Valley	Roadside	442585	113248	NO2	YES	0.5	3.6	NO	2.4
N110	Brintons Road 1	Urban Background	442579	112248	NO2	NO	27	20.7	YES	3.2
N111	Brintons Road 2	Urban Background	442579	112248	NO2	NO	27	20.7	YES	3.2
N112	Brintons Road 3	Urban Background	442579	112248	NO2	NO	27	20.7	YES	3.2
N113	206 Bitterne Road	Roadside	444124	113288	NO2	YES	0.7	5.1	NO	2.2
N114	Bitterne Library	Roadside	444131	113322	NO2	YES	1.9	3.2	NO	3.2
N115	54 Redbridge Road	Roadside	437939	113474	NO2	YES	0	8.7	NO	1.7

N116	57 Redbridge Road	Roadside	437952	113407	NO2	YES	0	12.9	NO	1.8
N117	Victoria Road (Lamp Post)	Roadside	443752	111121	NO2	YES	0.8	2.8	YES	2.7
N118	3 Rockstone Lane	Roadside	442472	113065	NO2	YES	3.7	3.8	NO	2.4
N120	6-9 Canute Road	Roadside	442716	111019	NO2	YES	0	3.8	NO	2.6
N122	151 Paynes Road	Roadside	440000	112633	NO2	YES	0	12.7	NO	1.7
N123	102 St Andrews Road	Roadside	442348	112305	NO2	NO	0	3.5	NO	3.3
N124	305 Millbrook Road	Roadside	439741	112753	NO2	YES	0	9.5	NO	2
N125	Princes Court	Roadside	443125	112641	NO2	YES	0	5.7	NO	2.5
N126	107 St Andrews Road	Roadside	442365	112286	NO2	NO	1.7	2	NO	2.7
N129	South West House	Roadside	442554	111021	NO2	YES	0	2.5	NO	2.9
N130	367A Millbrook Road	Roadside	439346	112821	NO2	YES	0	8.1	NO	2.3
N131	142 Romsey Road	Roadside	439378	114185	NO2	YES	0	4.8	NO	2.1
N133	539 Millbrook Road	Roadside	438609	113020	NO2	YES	0	33	NO	1.8
N134	435 Millbrook Road West Ladbrokes	Roadside	438980	112861	NO2	YES	0	11.5	NO	3.2
N138	66 Burgess Road	Roadside	441697	115288	NO2	YES	0	2.3	NO	1.5
N140	5 Commercial Road	Roadside	441628	112332	NO2	YES	1.7	1.9	NO	3.2
N141	Town Quay Road	Kerbside	441923	110990	NO2	YES	0	3.2	NO	2.6
N143	102 Romsey Road	Roadside	439457	114150	NO2	NO	0	5.8	NO	1.9

N144	208 Northam Road	Roadside	443147	112709	NO2	NO	0	5	NO	2.5
N146	222 Northam Road	Roadside	443164	112741	NO2	NO	0	11.5	NO	1.8
N149	44B Burgess Road	Roadside	441552	115247	NO2	YES	0	2.6	NO	2.2
N151	134 Romsey Road	Roadside	439394	114176	NO2	YES	0	5	NO	1.8
N152	M271	Roadside	437327	113848	NO2	YES	N/A	4.8	NO	2.5
N153	Coniston Road	Roadside	437324	113859	NO2	YES	n/a	16	NO	1.8
N154	Oceana Boulevard DG5	Roadside	442240	111087	NO2	NO	0.9	1.5	NO	2.4
N157	Admiralty House	Roadside	442375	110970	NO2	NO	0	17.1	NO	2.5
N158	24 Portsmouth Road	Roadside	443807	111123	NO2	NO	0	4.7	NO	2.6
N159	35 Portsmouth Road	Roadside	443740	111147	NO2	NO	0	3.2	NO	2.7
N160	2 Dorset Street	Roadside	442218	112881	NO2	NO	0.3	2.2	NO	2.9
N161	30 Addis Square	Roadside	442705	114129	NO2	NO	0	6	NO	2.7
N162	263A Portswood Road	Roadside	442872	114336	NO2	NO	0	3.7	NO	2.6
N163	285 Portswood Road	Roadside	442948	114381	NO2	NO	0	9.5	NO	2
N164	168 Portswood Road(Int.Food)	Roadside	442809	114241	NO2	NO	0	5.3	NO	2.9
N165	8 The Broadway	Roadside	442766	114181	NO2	NO	0	5.5	NO	2.6
N166	14 New Road	Roadside	442251	112129	NO2	YES	0	1.5	NO	2.8
N167	13 Romsey Road	Roadside	439759	114011	NO2	NO	0	5.8	NO	2.5

N168	23 Romsey Road	Roadside	439737	114025	NO2	NO	0	4.5	NO	1.8
N169	150 Romsey Road	Roadside	439361	114195	NO2	YES	0	4.4	NO	0.9
N170	Union Castle House (2)	Roadside	442482	111003	NO2	YES	n/a	2.6	NO	2.5
N172	4 New Road	Roadside	442207	112126	NO2	NO	0	2	NO	2.9
N173	19A Burgess Road	Roadside	440962	115112	NO2	NO	0	6.9	NO	1.4
N174	166A Bitterne Road West	Roadside	443959	113315	NO2	YES	0	6.7	NO	2.7
N175	38 Shirley High Street	Roadside	439959	113737	NO2	NO	0	8.8	NO	2.6
N176	Salisbury Arms, Shirley High Street	Roadside	439772	113952	NO2	NO	0	13.3	NO	2.2
N177	95 Shirley High Street (Windsor Castle Pub)	Roadside	439844	113907	NO2	NO	0	4.5	NO	2.6
N178	2 Gover Road	Roadside	437265	113682	NO2	NO	0	8.8	NO	2.1
N180	Opposite 5 Commercial Road	Roadside	441633	112318	NO2	YES	1	2.9	NO	2.4
N184	Redbridge New AMS	Roadside	437809	113560	NO2	NO	15	5.3	YES	2.7
N185	Redbridge Causeway 1	Roadside	437167	113713	NO2	YES	29.2	2.4	NO	2.5
N186	Redbridge Causeway 2	Roadside	437126	113701	NO2	YES	7.5	2.9	NO	2.3

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration (µg/m³) [3]				
					2014	2015	2016	2017	2018
CM1	Urban Centre	Automatic	95	95	31.6	32.0	33.0	29.6	28.9
CM4	Roadside	Automatic	98	98	**41.3**	39.6	**45.7**	**43.0**	39.9
CM6	Roadside	Automatic	88	88	**43.9**	**42.0**	**43.4**	**42.2**	37.0
CM7	Roadside	Automatic	99	99			**43.0**	39.9	35.0
N100	Urban Background	Diffusion Tube	100	100	20.5	17.2	18.6	16.7	17.1
N101	Roadside	Diffusion Tube	92	92			**54.3**	**48.2**	**42.4**
N102	Roadside	Diffusion Tube	100	100	33.3	29.8	33.5	30.9	33.1
N103	Roadside	Diffusion Tube	83	83	34.9	31.7	33.7	31.5	32.0
N104	Roadside	Diffusion Tube	100	100	**42.3**	38.4	**40.3**	35.6	36.4
N106	Roadside	Diffusion Tube	100	100	**43.6**	37.9	39.9	36.3	37.0
N107	Roadside	Diffusion Tube	75	75	**50.5**	**53.7**	**52.7**	**45.3**	**48.0**
N109	Roadside	Diffusion Tube	100	100	38.9	37.2	**40.0**	36.6	39.3
N110	Urban Background	Diffusion Tube	100	100	29.2	25.4	26.5	27.7	29.5
N111	Urban Background	Diffusion Tube	100	100	29.2	25.9	27.0	27.5	29.5
N112	Urban Background	Diffusion Tube	100	100	29.2	26.1	26.2	27.8	28.8
N113	Roadside	Diffusion Tube	100	100	37.9	34.9	38.2	35.2	32.9

N114	Roadside	Diffusion Tube	100	100	39.5	32.8	35.9	34.4	33.7
N115	Roadside	Diffusion Tube	100	100	**40.5**	36.4	38.4	35.9	34.4
N116	Roadside	Diffusion Tube	100	100	**41.9**	38.1	**40.5**	34.3	34.3
N117	Roadside	Diffusion Tube	100	100	**42.5**	36.4	36.1	34.2	33.3
N118	Roadside	Diffusion Tube	100	100	38.2	34.8	37.1	34.1	36.2
N120	Roadside	Diffusion Tube	100	100	**43.8**	38.0	**40.3**	**40.0**	37.2
N122	Roadside	Diffusion Tube	100	100	32.6	31.5	32.8	31.6	28.2
N123	Roadside	Diffusion Tube	100	100	36.2	32.8	35.5	30.3	34.2
N124	Roadside	Diffusion Tube	100	100	**41.1**	37.3	**40.2**	35.5	34.8
N125	Roadside	Diffusion Tube	92	92	**40.7**	35.3	38.7	34.5	36.2
N126	Roadside	Diffusion Tube	100	100	36.9	32.8	36.4	32.3	35.9
N129	Roadside	Diffusion Tube	83	83	32.0	28.8	30.7	30.2	28.9
N130	Roadside	Diffusion Tube	92	92	**46.6**	**44.8**	**44.9**	**40.8**	**42.3**
N131	Roadside	Diffusion Tube	100	100	**41.6**	37.9	38.2	35.2	37.8
N133	Roadside	Diffusion Tube	100	100	32.4	30.7	31.4	29.4	27.7
N134	Roadside	Diffusion Tube	92	92	39.6	37.6	**41.2**	36.1	38.0
N138	Roadside	Diffusion Tube	100	100	**49.8**	**43.8**	**46.8**	**40.4**	**47.3**
N140	Roadside	Diffusion Tube	92	92	**55.6**	**49.6**	**49.0**	**45.4**	**45.2**

N141	Kerbside	Diffusion Tube	100	100	**43.9**	30.5	36.8	33.0	35.2
N143	Roadside	Diffusion Tube	100	100	**40.1**	34.4	37.3	36.2	35.5
N144	Roadside	Diffusion Tube	100	100	33.5	31.8	36.4	36.4	32.5
N146	Roadside	Diffusion Tube	100	100	31.1	28.7	30.5	30.2	27.8
N149	Roadside	Diffusion Tube	100	100	36.1	32.5	31.4	28.5	31.5
N151	Roadside	Diffusion Tube	100	100	**42.8**	37.4	40.0	37.6	37.0
N152	Roadside	Diffusion Tube	100	100	**56.9**	**49.1**	**52.2**	**45.8**	**42.2**
N153	Roadside	Diffusion Tube	92	92	37.7	31.2	33.7	29.8	29.7
N154	Roadside	Diffusion Tube	92	92	**40.8**	32.9	33.9	33.8	30.1
N157	Roadside	Diffusion Tube	92	92	34.8	27.8	28.5	27.8	26.4
N158	Roadside	Diffusion Tube	100	100	37.6	36.6	**40.4**	36.6	34.8
N159	Roadside	Diffusion Tube	100	100	29.3	25.9	32.7	31.9	32.1
N160	Roadside	Diffusion Tube	100	100	32.0	32.6	33.0	32.6	30.4
N161	Roadside	Diffusion Tube	100	100	35.2	32.5	35.4	30.4	33.0
N162	Roadside	Diffusion Tube	92	92	**41.9**	37.7	37.1	37.4	37.5
N163	Roadside	Diffusion Tube	100	100	32.6	27.8	31.4	28.7	29.7
N164	Roadside	Diffusion Tube	100	100	39.0	32.3	35.7	32.4	34.2
N165	Roadside	Diffusion Tube	100	100	**57.2**	32.3	34.0	31.4	32.6

N166	Roadside	Diffusion Tube	92	92		38.1	39.8	36.0	35.9
N167	Roadside	Diffusion Tube	100	100	38.0	33.5	36.3	34.5	35.1
N168	Roadside	Diffusion Tube	100	100	**43.3**	36.4	**40.6**	35.9	36.5
N169	Roadside	Diffusion Tube	100	100	36.6	**40.6**	**42.5**	**43.0**	**42.8**
N170	Roadside	Diffusion Tube	100	100	**43.8**	38.7	**41.7**	**40.1**	39.0
N172	Roadside	Diffusion Tube	100	100		**42.9**	**45.1**	**42.1**	**41.3**
N173	Roadside	Diffusion Tube	100	100		27.3	31.0	28.1	31.4
N174	Roadside	Diffusion Tube	100	100		37.6	**42.8**	**41.2**	**41.5**
N175	Roadside	Diffusion Tube	100	100		39.0		38.9	38.3
N176	Roadside	Diffusion Tube	100	100		38.0	**43.1**	35.5	35.6
N177	Roadside	Diffusion Tube	100	100		36.7	38.8	37.5	38.6
N178	Roadside	Diffusion Tube	100	100		25.9	27.0	24.5	24.3
N180	Roadside	Diffusion Tube	67	67			39.0	39.7	**40.5**
N184	Roadside	Diffusion Tube	92	92			**42.7**	**41.8**	38.8
N185	Roadside	Diffusion Tube	83	83			53.9	50.2	53.9
N186	Roadside	Diffusion Tube	83	83			39.4	39.0	39.0

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

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

Notes:

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

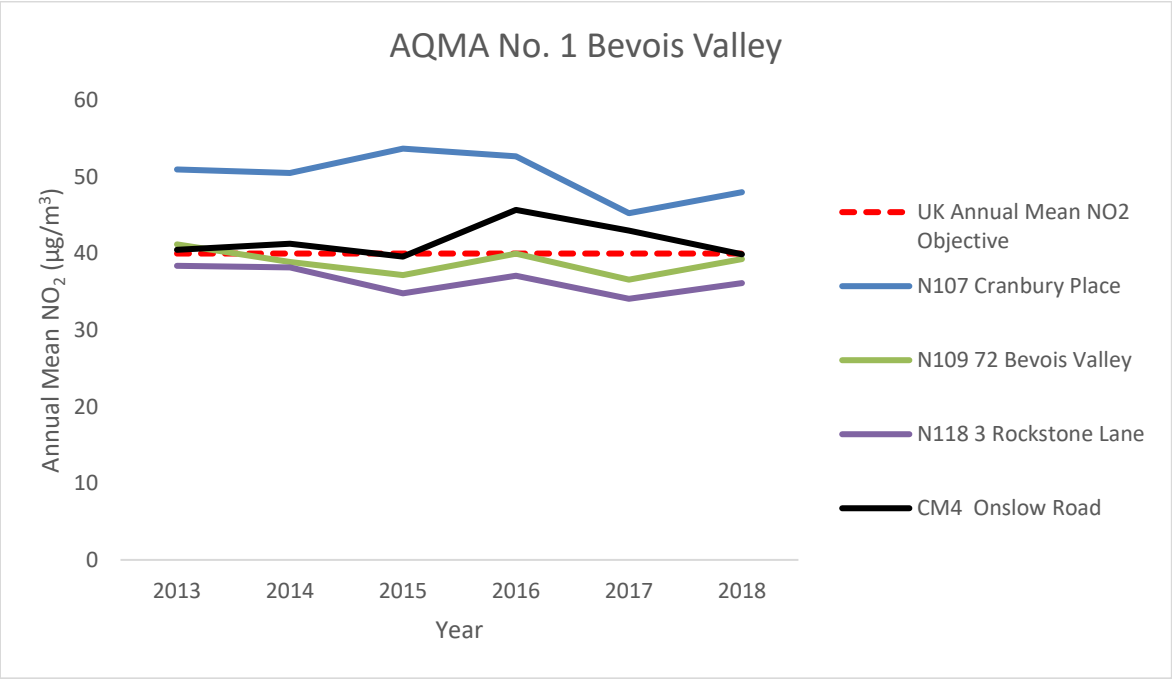
NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

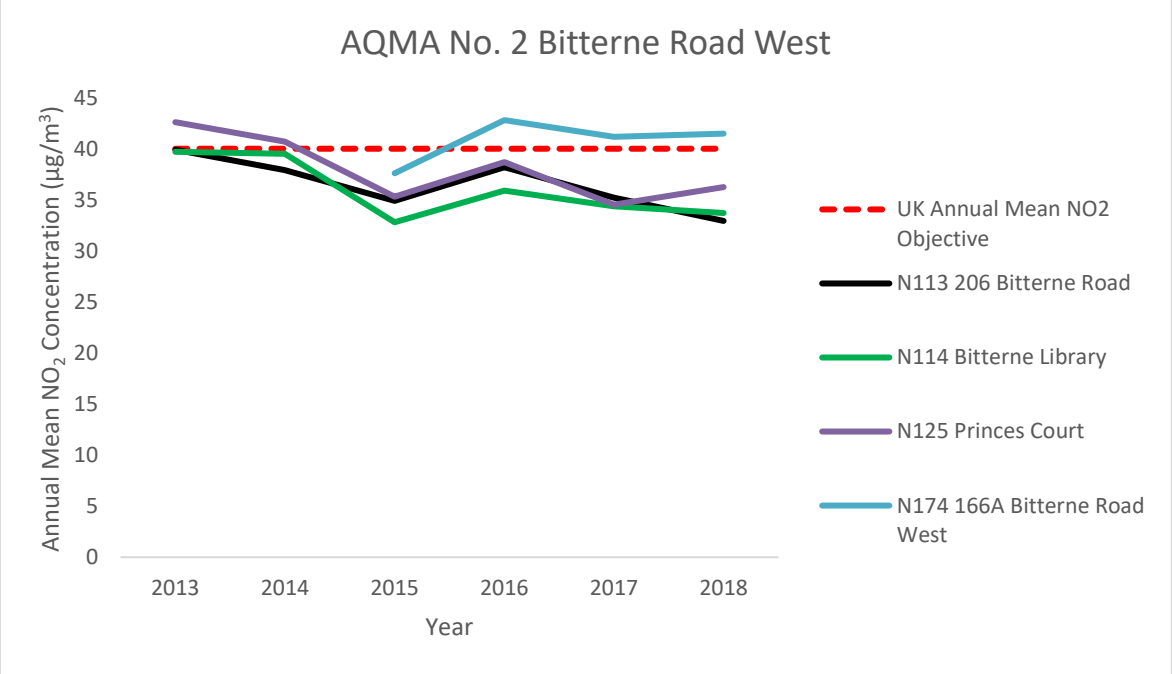
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

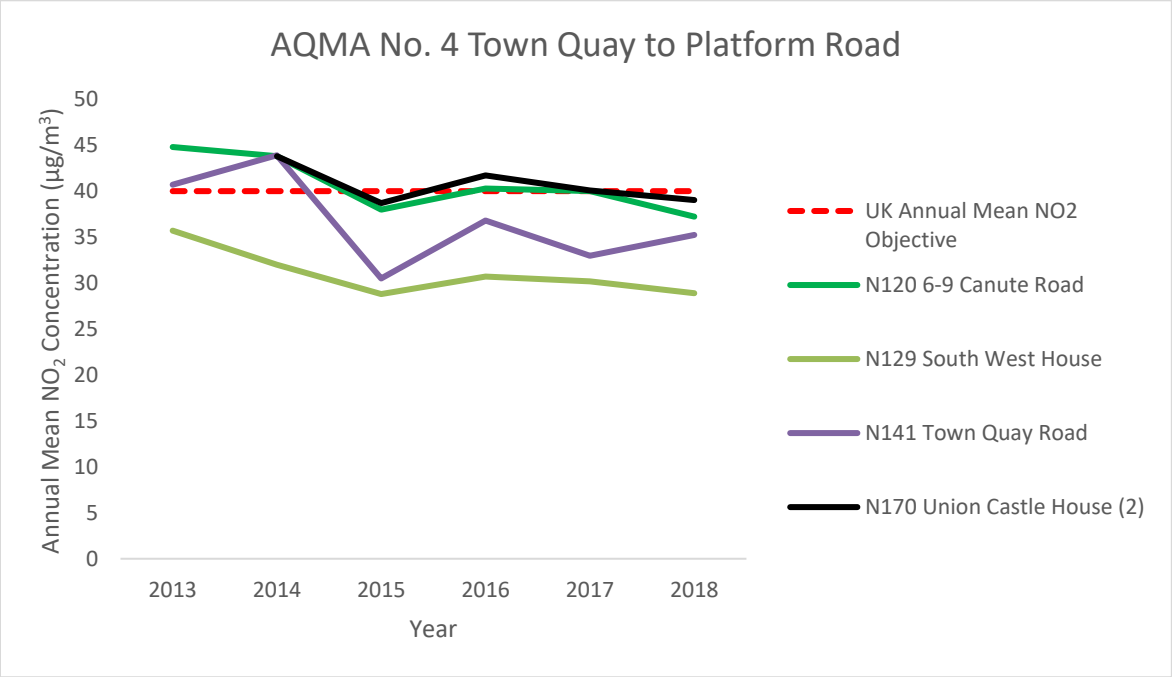
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

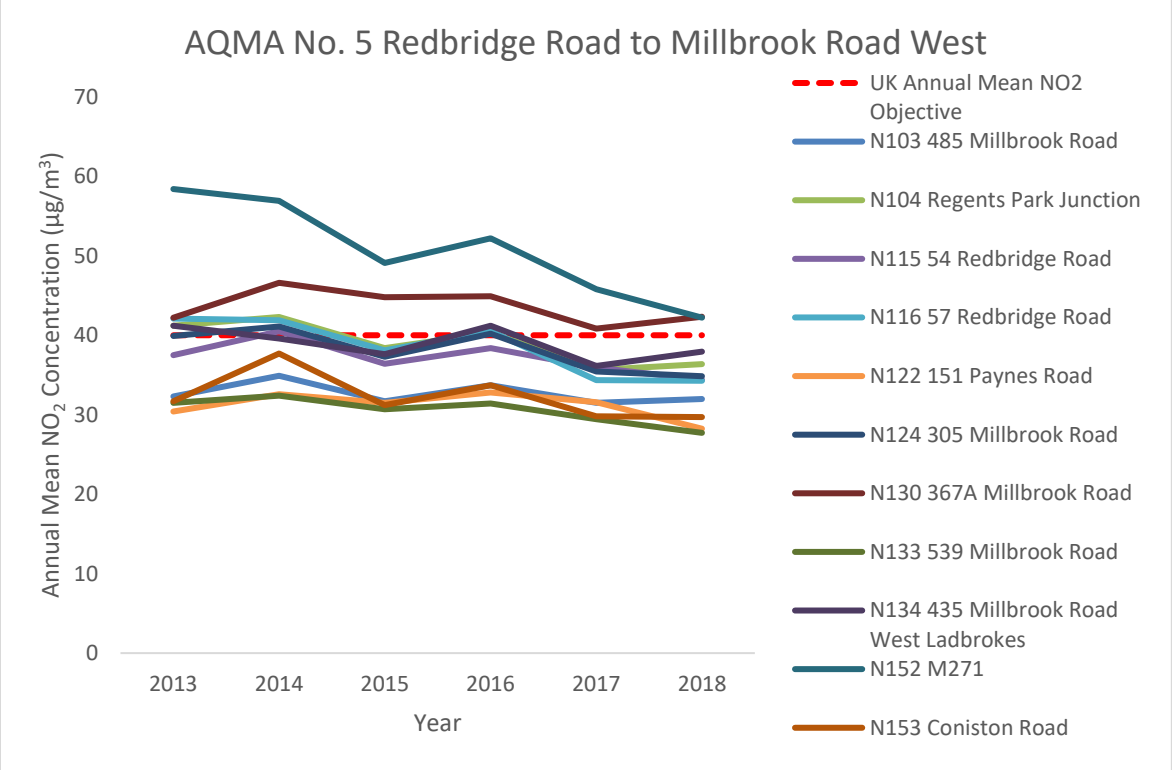
(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

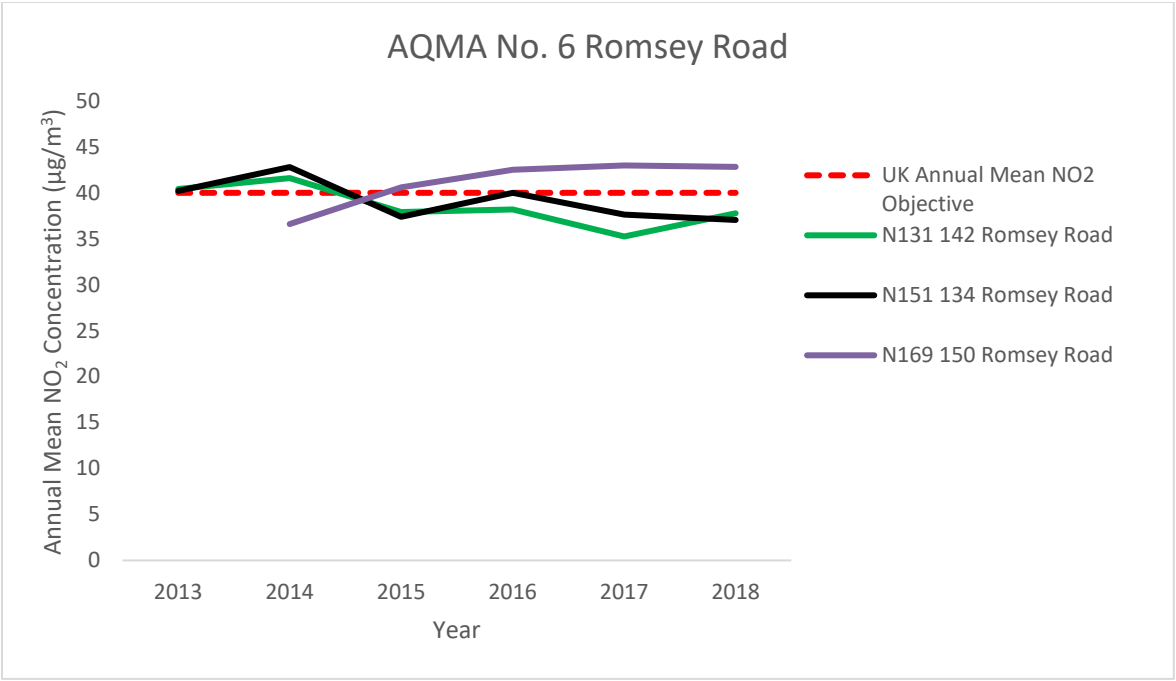
Figure A.1 – Trends in Annual Mean NO_2 Concentrations

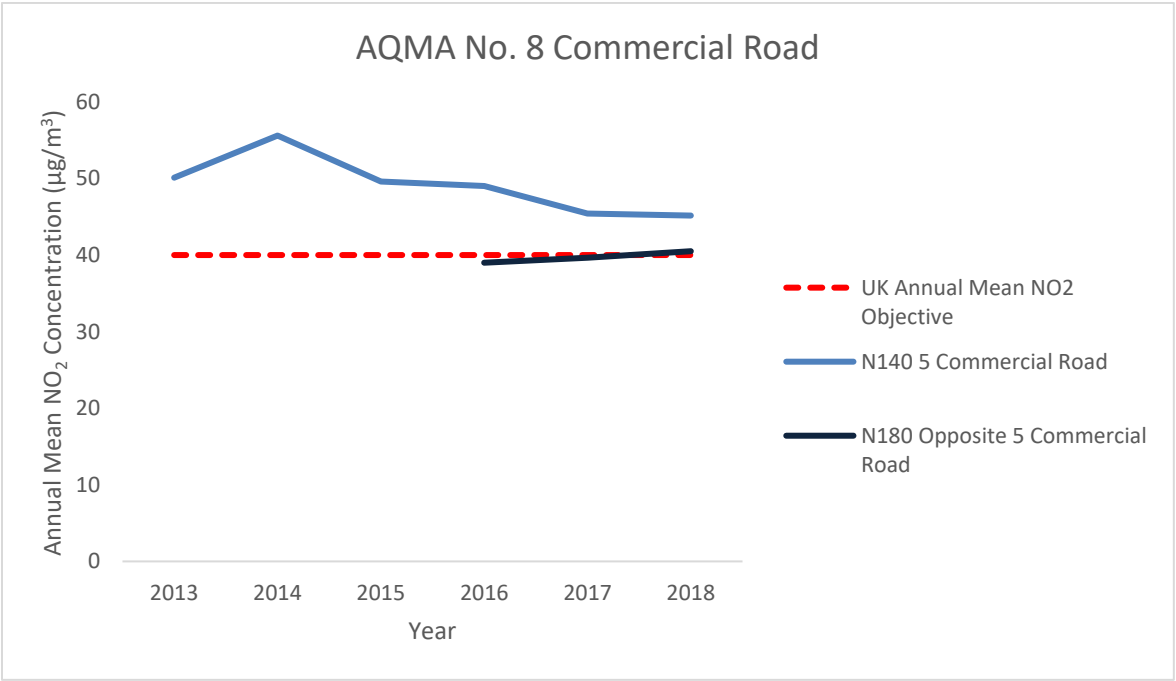


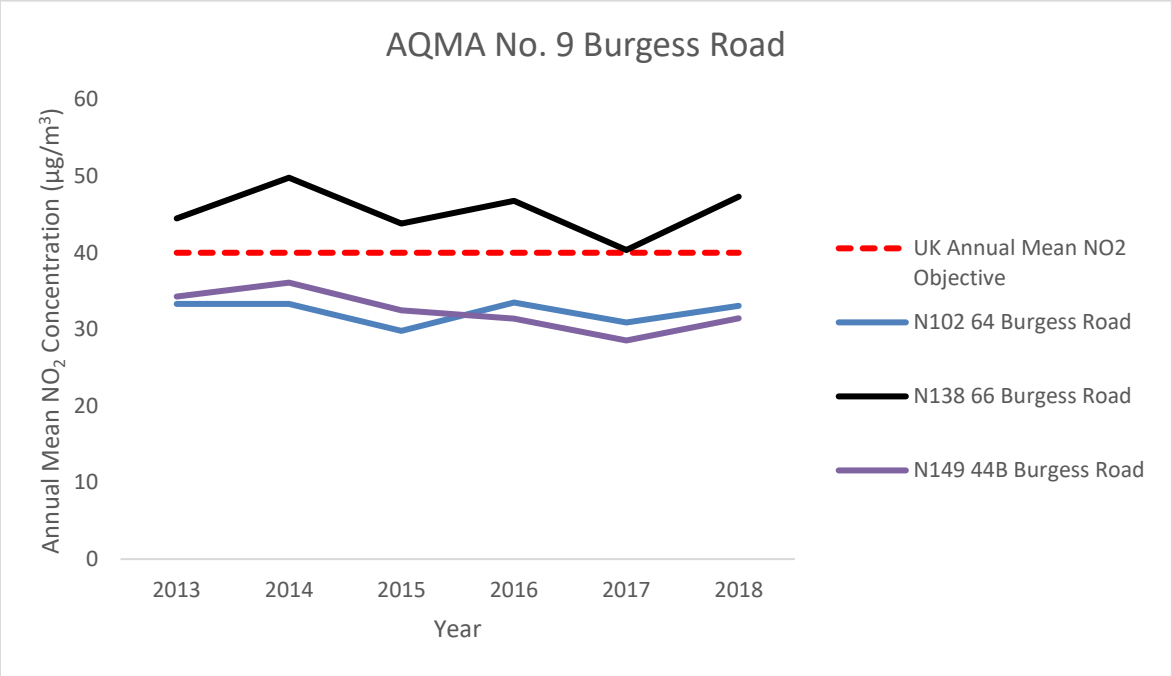


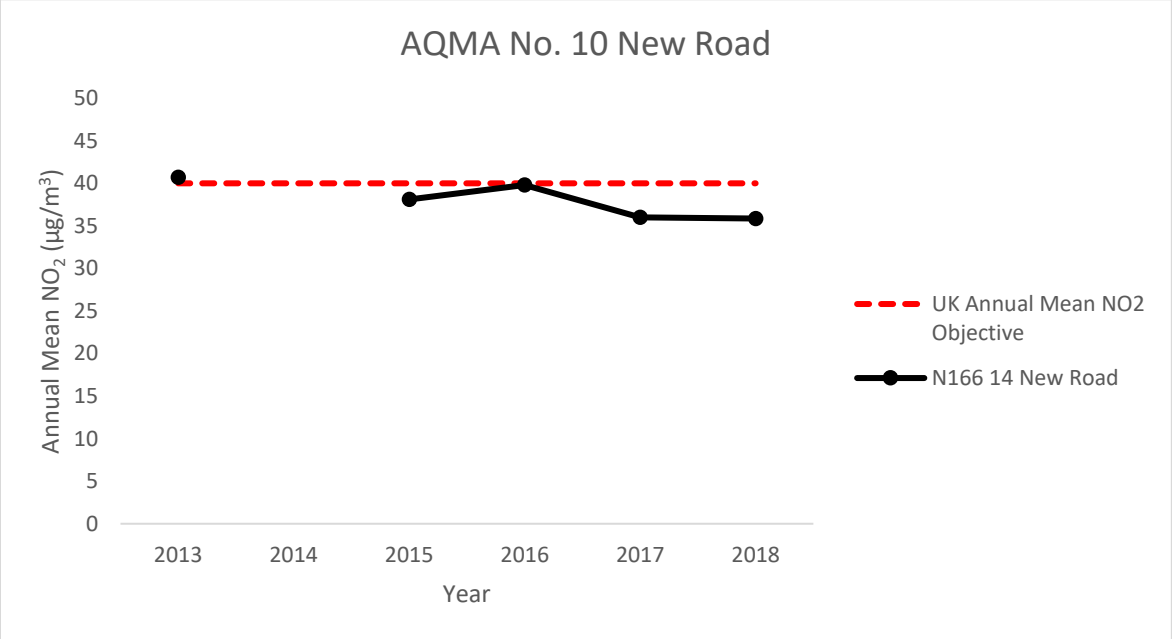

AQMA No. 4 Town Quay to Platform Road
Annual Mean NO2 Concentration (µg/m3)
50
45
40
35
30
25
20
15
10
5
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N120 6-9 Canute Road
N129 South West House
N141 Town Quay Road
N170 Union Castle House (2)

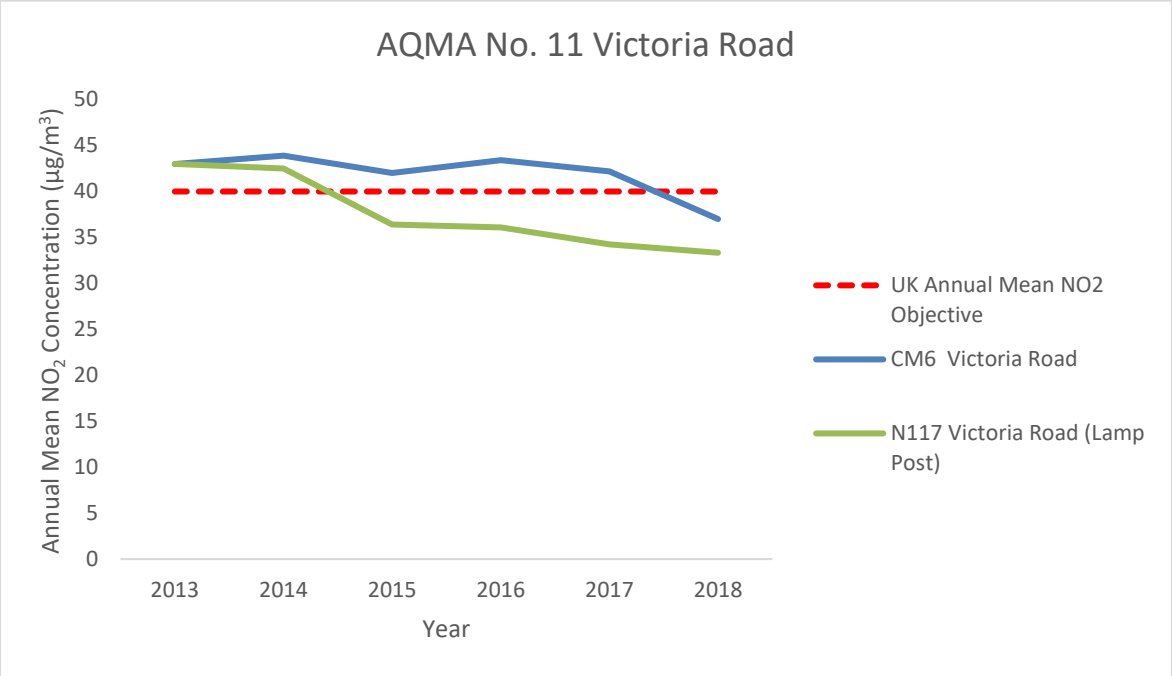

AQMA No. 5 Redbridge Road to Millbrook Road West
Annual Mean NO2 Concentration (µg/m3)
70
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N103 485 Millbrook Road
N104 Regents Park Junction
N115 54 Redbridge Road
N116 57 Redbridge Road
N122 151 Paynes Road
N124 305 Millbrook Road
N130 367A Millbrook Road
N133 539 Millbrook Road
N134 435 Millbrook Road West Ladbrokes
N152 M271
N153 Coniston Road

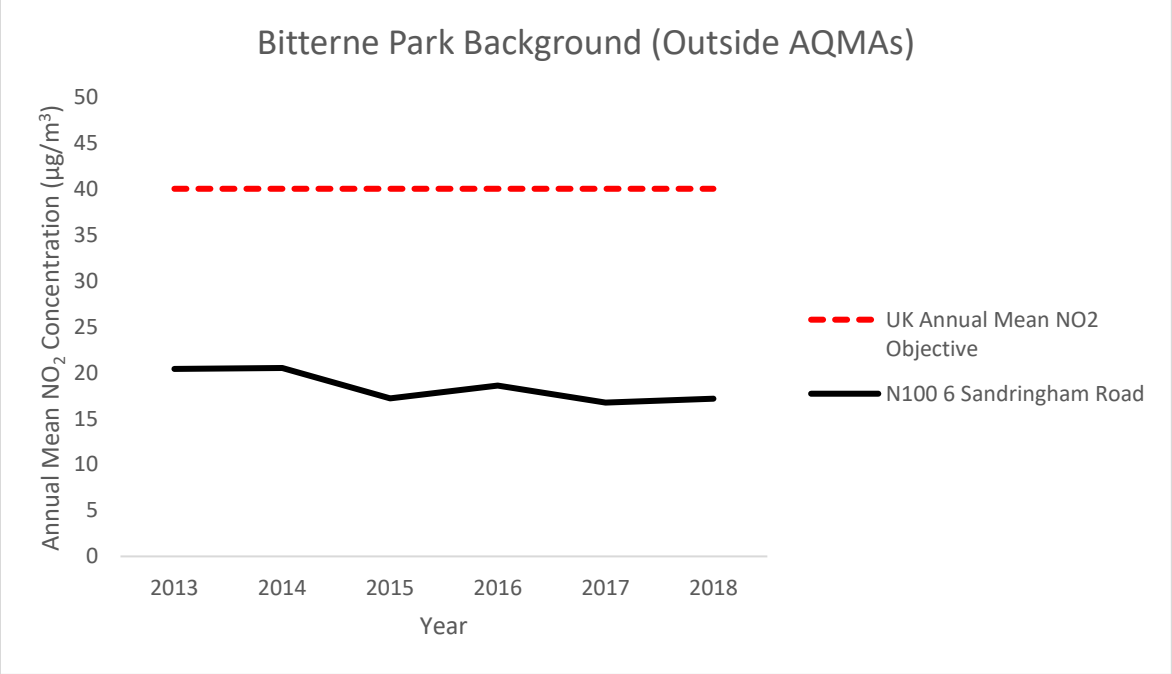

AQMA No. 6 Romsey Road
Annual Mean NO2 Concentration (µg/m3)
50
45
40
35
30
25
20
15
10
5
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N131 142 Romsey Road
N151 134 Romsey Road
N169 150 Romsey Road

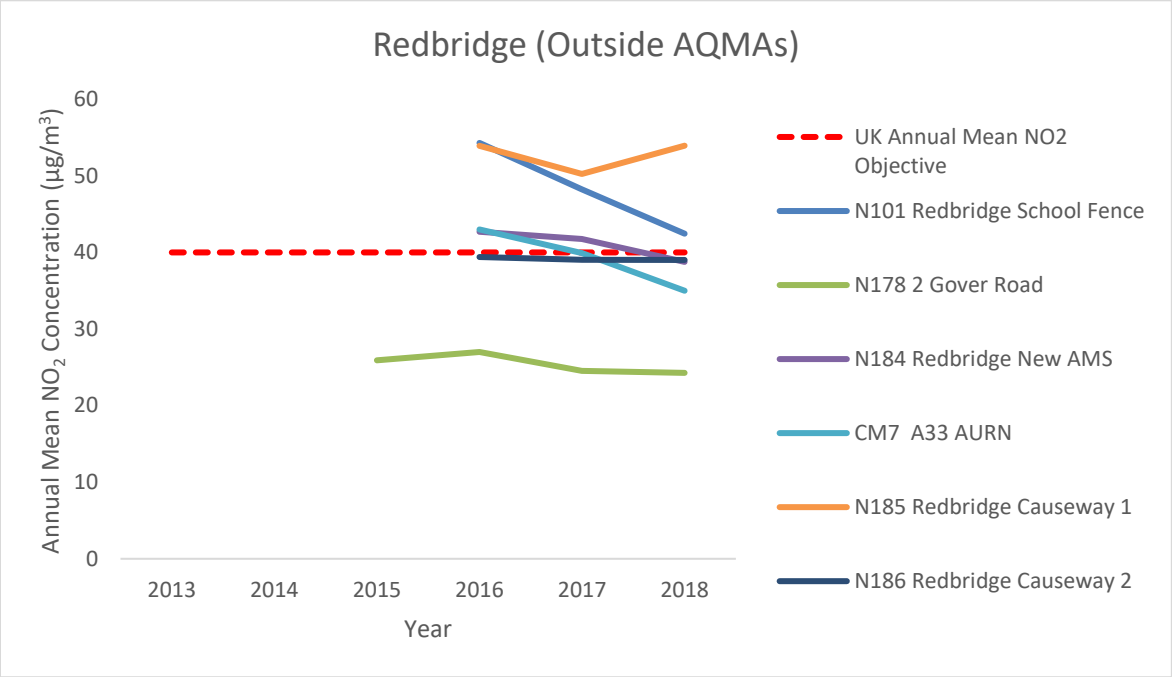

AQMA No. 8 Commercial Road
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N140 5 Commercial Road
N180 Opposite 5 Commercial Road

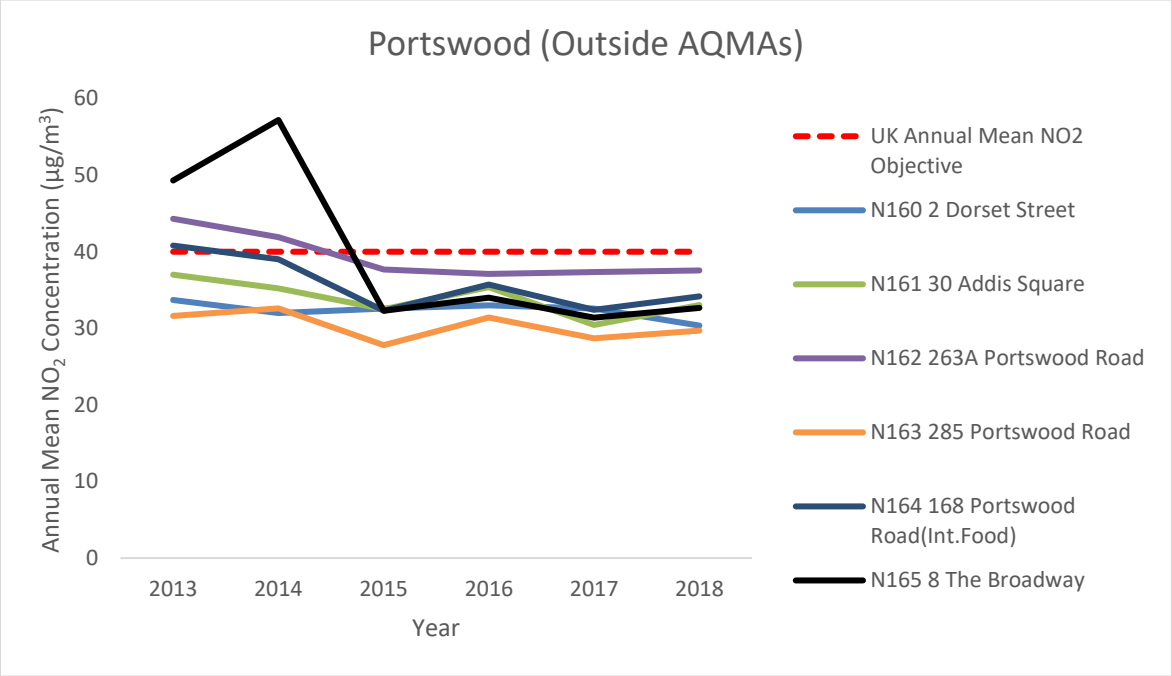

AQMA No. 9 Burgess Road
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N102 64 Burgess Road
N138 66 Burgess Road
N149 44B Burgess Road

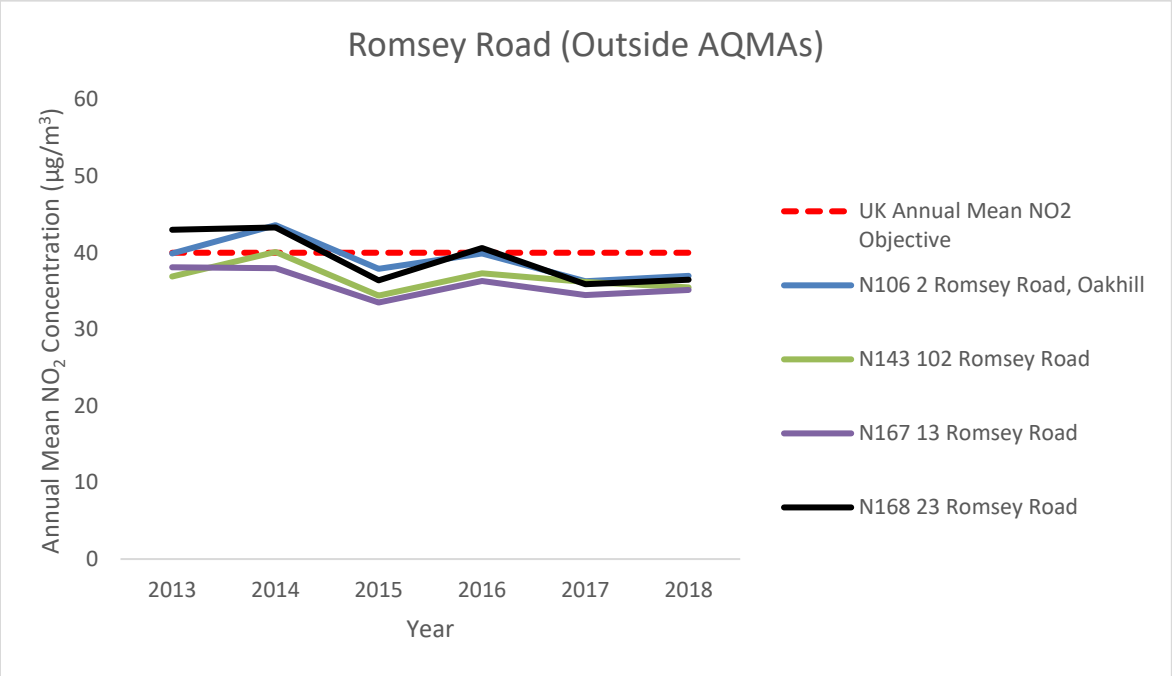

AQMA No. 10 New Road
Annual Mean NO2 (µg/m3)
50
45
40
35
30
25
20
15
10
5
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N166 14 New Road

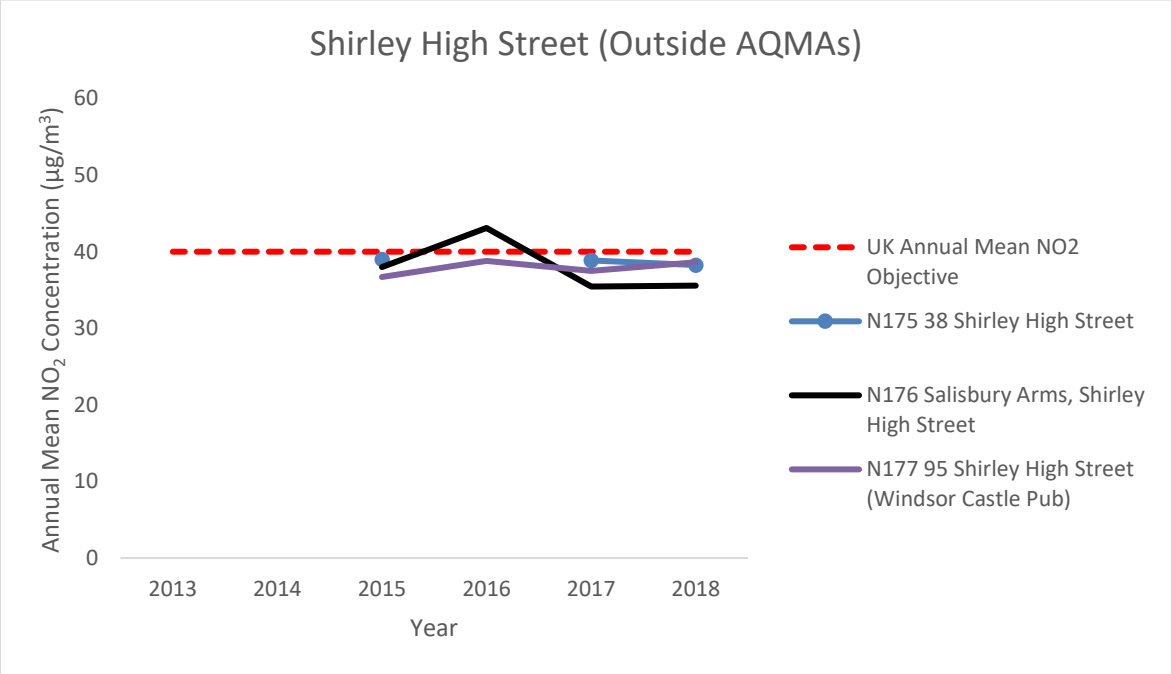

AQMA No. 11 Victoria Road
Annual Mean NO2 Concentration (µg/m3)
50
45
40
35
30
25
20
15
10
5
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
CM6 Victoria Road
N117 Victoria Road (Lamp Post)

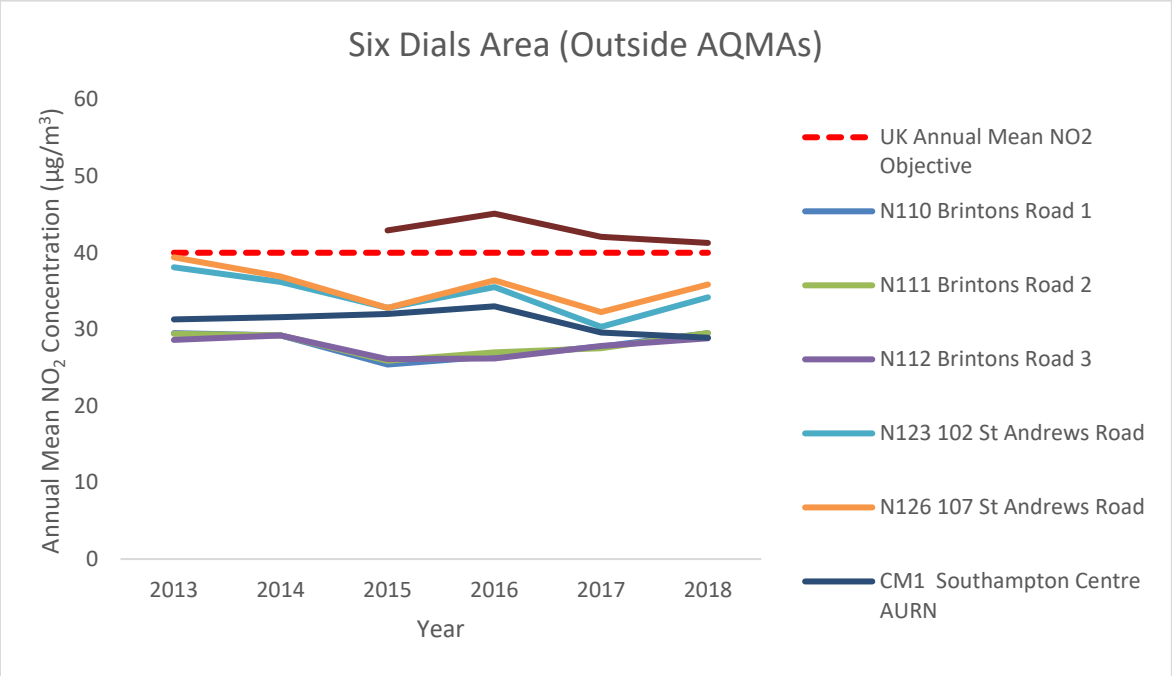

Bitterne Park Background (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
50
45
40
35
30
25
20
15
10
5
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N100 6 Sandringham Road

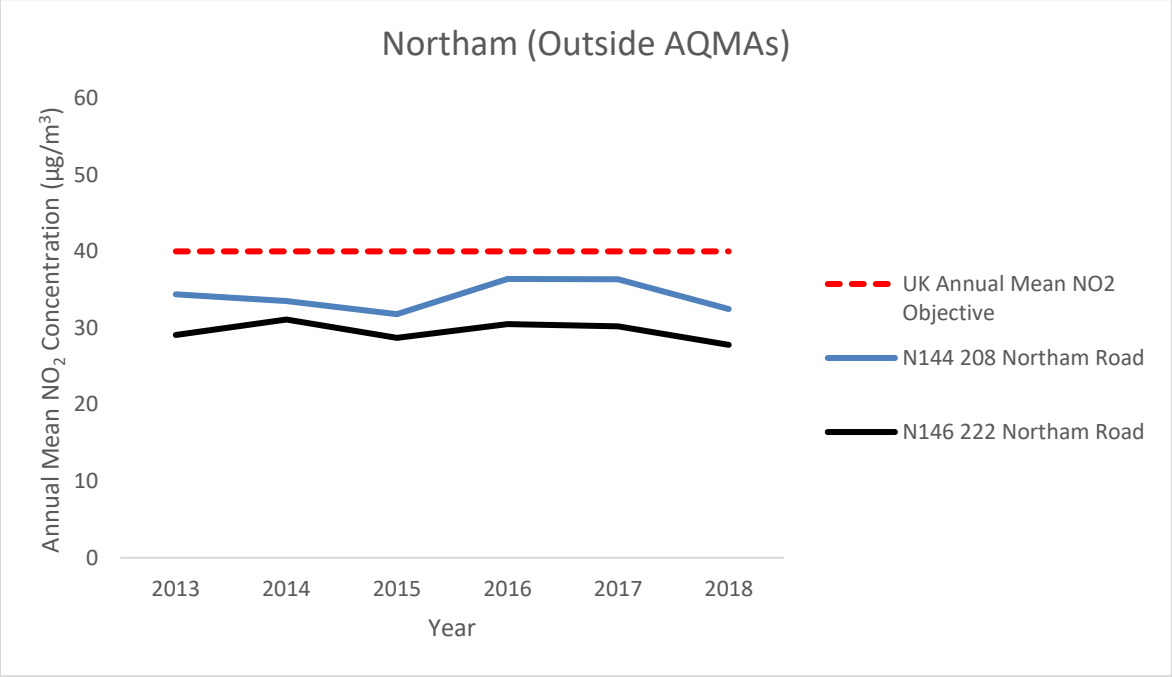

Redbridge (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N101 Redbridge School Fence
N178 2 Gover Road
N184 Redbridge New AMS
CM7 A33 AURN
N185 Redbridge Causeway 1
N186 Redbridge Causeway 2

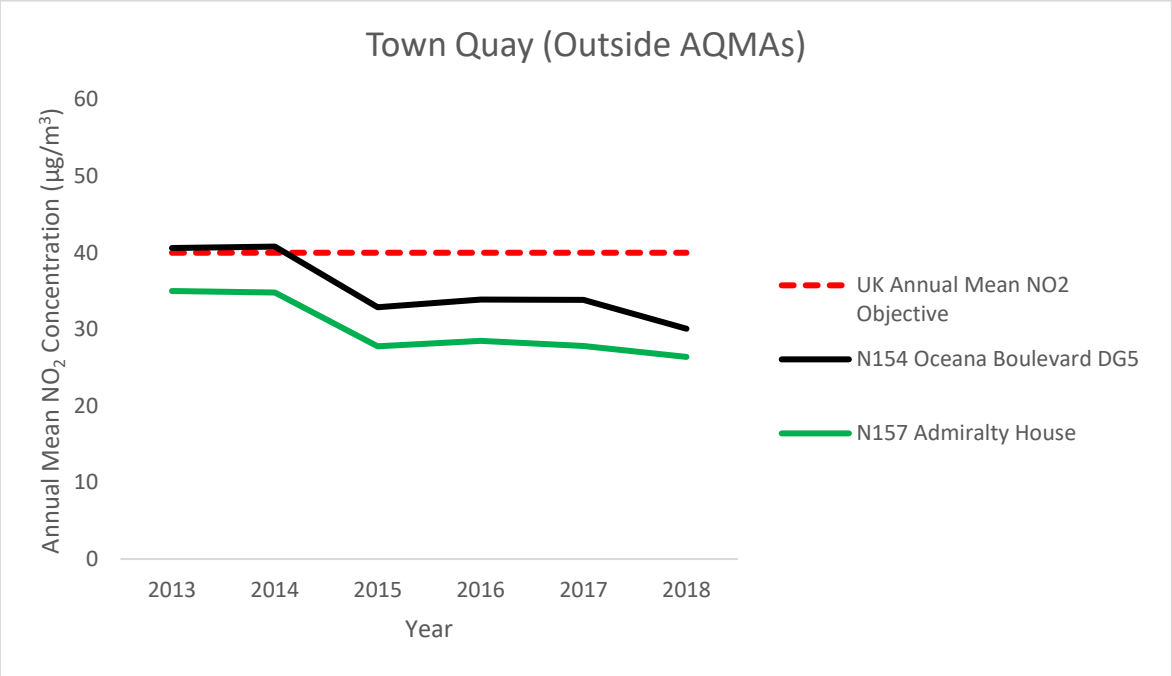

Portswood (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N160 2 Dorset Street
N161 30 Addis Square
N162 263A Portswood Road
N163 285 Portswood Road
N164 168 Portswood Road(Int.Food)
N165 8 The Broadway

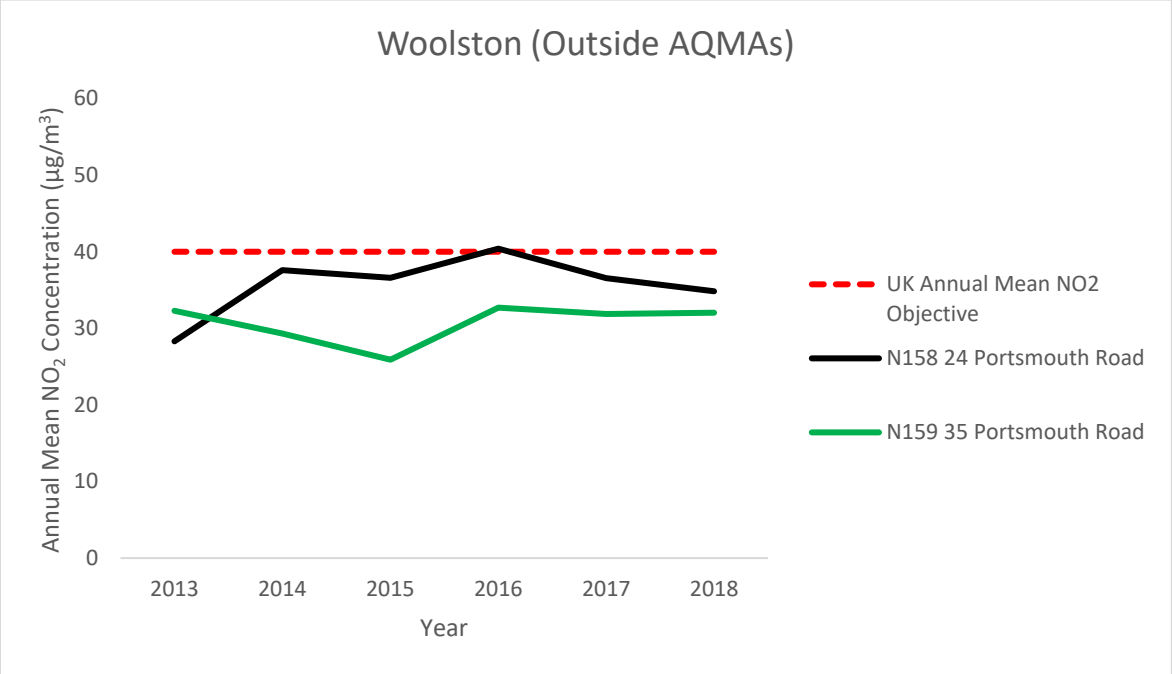

Romsey Road (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N106 2 Romsey Road, Oakhill
N143 102 Romsey Road
N167 13 Romsey Road
N168 23 Romsey Road


Shirley High Street (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N175 38 Shirley High Street
N176 Salisbury Arms, Shirley High Street
N177 95 Shirley High Street (Windsor Castle Pub)


Six Dials Area (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N110 Brintons Road 1
N111 Brintons Road 2
N112 Brintons Road 3
N123 102 St Andrews Road
N126 107 St Andrews Road
CM1 Southampton Centre AURN


Northam (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N144 208 Northam Road
N146 222 Northam Road


Town Quay (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N154 Oceana Boulevard DG5
N157 Admiralty House


Woolston (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N158 24 Portsmouth Road
N159 35 Portsmouth Road

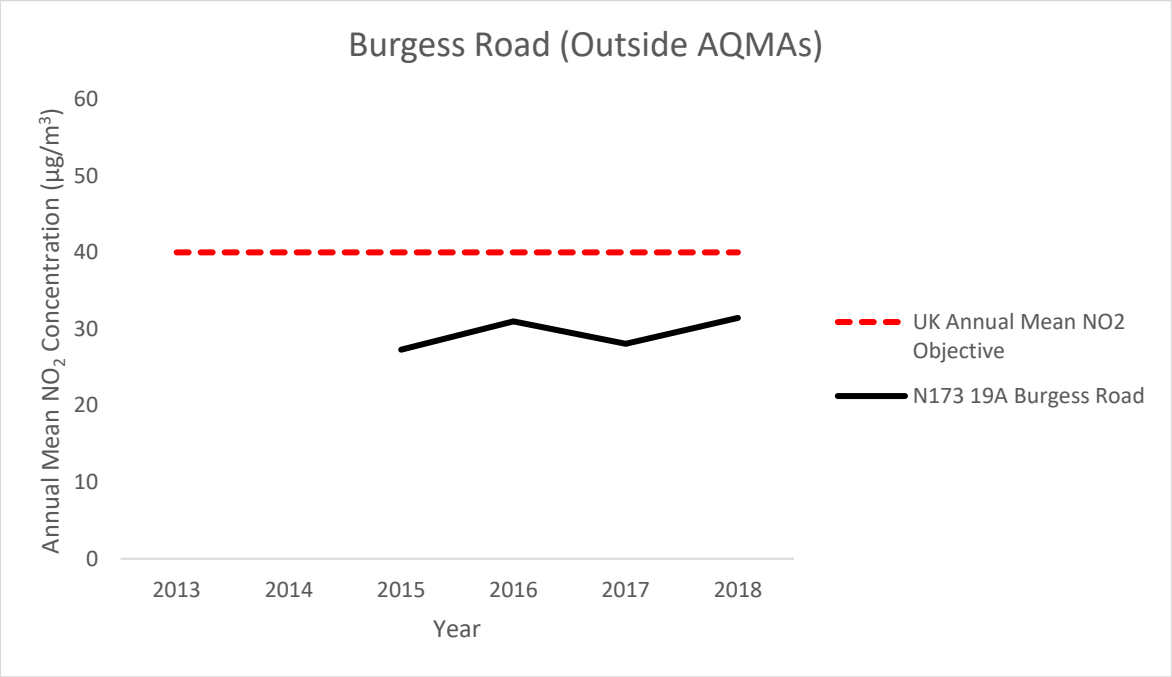

Burgess Road (Outside AQMAs)
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
Year
UK Annual Mean NO2 Objective
N173 19A Burgess Road

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 1 Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
CM1	Urban Centre	Automatic	95	95	0	3	0 (111)	0	0
CM4	Roadside	Automatic	98	98	2	0 (118)	6	0	0
CM6	Roadside	Automatic	88	88	5 (152)	5	8 (185)	9 (178)	0
CM7	Roadside	Automatic	99	99			0	0	0

Notes:

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.**

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

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

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

Figure A.2 – Trends in Number of NO_2 1-Hour Means > 200 µg/m³

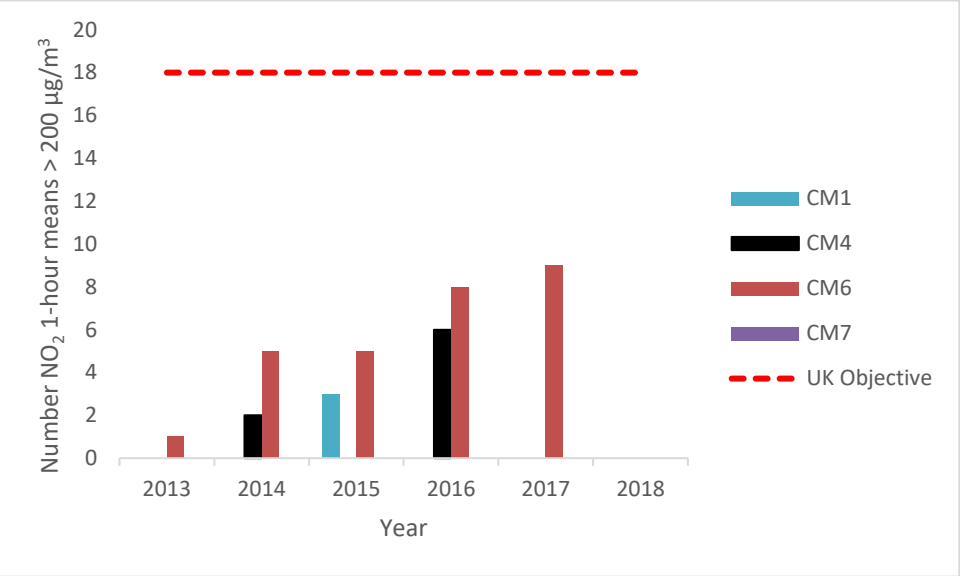


Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
CM1	Urban Centre	73	73	20.9	16.4		16.8	19.5
CM7	Roadside	72	72			21.7	19.4	17.4

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

Notes:

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

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

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

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

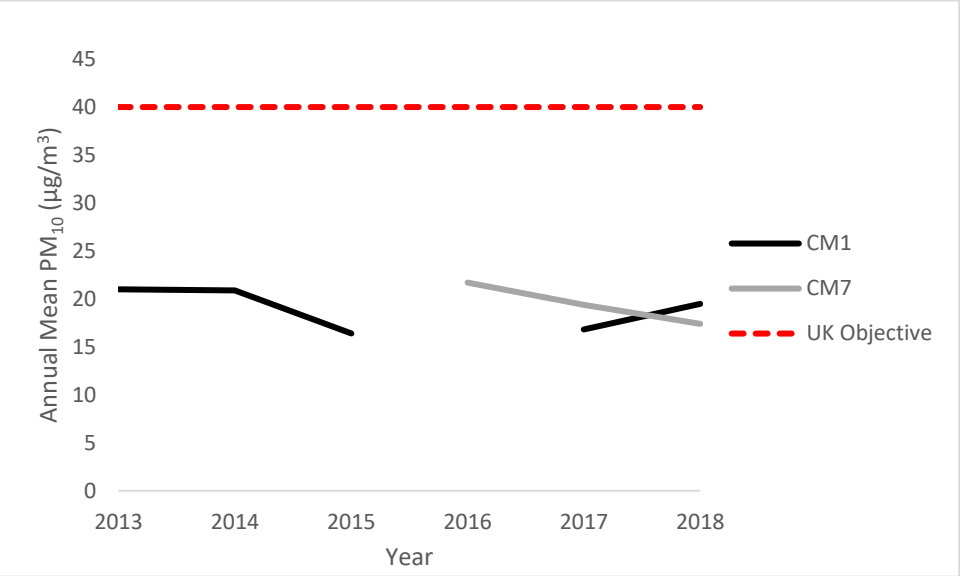


Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} 24 Hour Means > 50µg/m^3 (3)				
				2014	2015	2016	2017	2018
CM1	Urban Centre	71	71	5	4	0 (26.6)	1	1 (31.0)
CM7	Roadside	72	72			2 (33.3)	2	0 (27.8)

Notes:

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.**

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

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

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

Figure A.4 – Trends in Number of 24-Hour Mean PM_{10} Results >50µg/m³

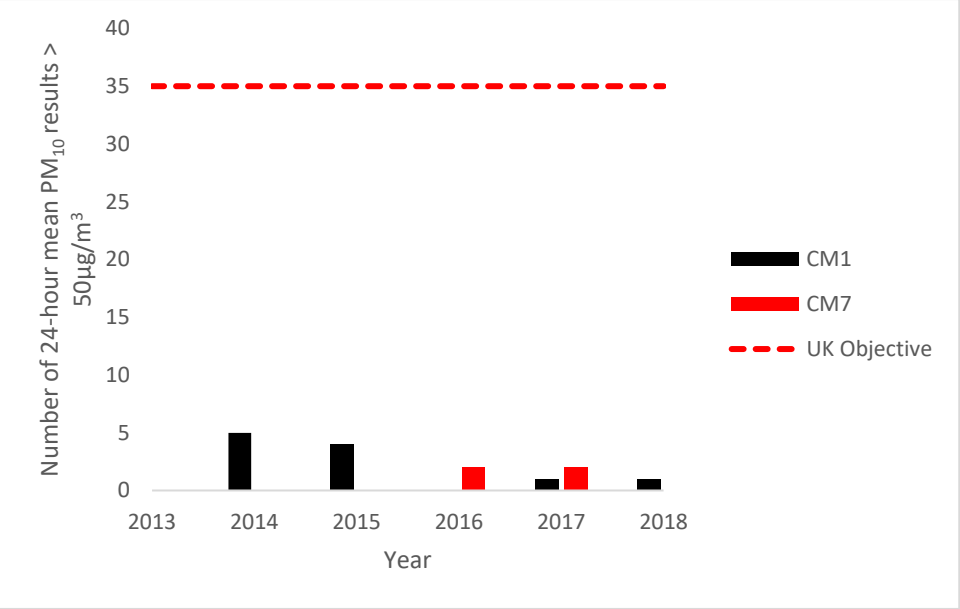


Table A.7 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
CM1	Urban Centre	87	87	14.7	10.0	-	11.2	13.3

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

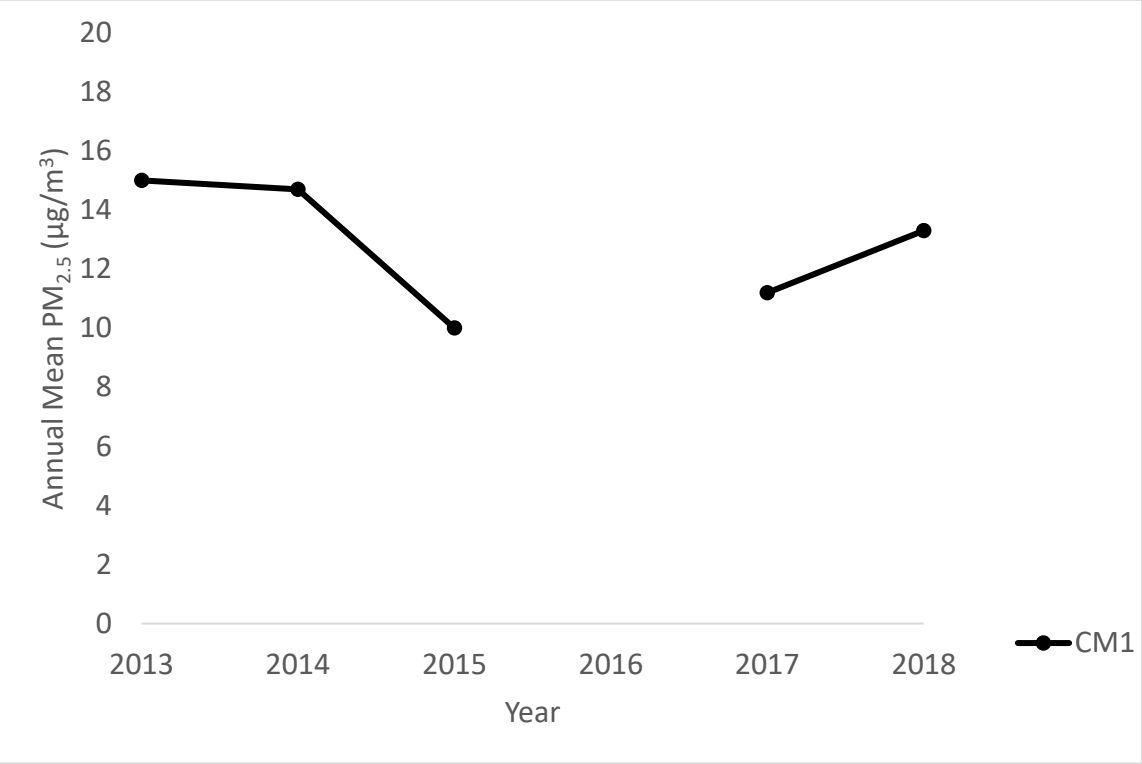
Notes:

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

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

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.5 – Trends in Annual Mean $PM_{2.5}$ Concentrations



Note: Insufficient data for 2016

Table A.8 – SO_2 Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) [1]	Valid Data Capture 2018 (%) [2]	Number of Exceedances 2018 (percentile in bracket) [3]		
				15 minute Objective (266 µg/m^3)	1 hour Objective (350 µg/m^3)	24 hour Objective (125 µg/m^3)
CM1	Urban Centre	90	90	0	0	0

Notes:

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)

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

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

(3) If the period of valid data is less than 85%, the relevant percentiles are provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2018

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.93) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
N100	23.4	21.0	18.6	16.6	18.1	15.4	16.5	13.6	16.8	19.9	20.8	20.6	18.4	17.1	
N101	51.9	39.6	47.0	47.5	48.0	41.8	47.1		43.7	40.1	47.0	48.4	45.6	**42.4**	
N102	37.6	39.3	36.4	32.2	28.5	33.9	31.2	24.6	34.9	36.4	56.9	34.7	35.5	33.1	
N103	33.8	27.1	30.2	35.3	31.3		29.2		30.5	35.0	59.3	32.1	34.4	32.0	
N104	36.3	34.8	39.6	45.8	42.6	32.8	41.9	35.3	33.4	40.3	47.0	39.5	39.1	36.4	35.8
N106	41.2	38.2	36.1	43.5	41.7	40.3	39.5	36.7	39.1	36.8	43.8	39.9	39.7	37.0	
N107	54.1	52.4			55.8	50.5		40.7	53.2	51.5	51.9	54.5	51.6	**48.0**	**46.9**
N109	45.0	46.1	48.4	38.0	46.9	42.7	41.2	29.1	40.2	45.6	42.3	41.5	42.2	39.3	38.9
N110	42.0	31.2	35.0	26.9	29.2	26.4	29.4	26.9	30.8	35.7	34.2	33.0	31.7	29.5	
N111	38.2	31.0	34.5	32.0	28.3	25.8	29.5	23.5	30.6	36.1	37.4	34.0	31.7	29.5	
N112	38.5	31.8	36.6	22.8	26.5	27.0	29.4	27.6	31.4	33.9	33.4	32.9	31.0	28.8	
N113	41.2	39.6	36.4	28.5	35.2	36.9	35.9	35.3	35.8	35.9	31.9	32.3	35.4	32.9	
N114	43.4	34.3	44.6	31.2	32.9	37.4	39.2	36.1	35.1	28.6	36.5	35.7	36.3	33.7	
N115	38.1	34.0	40.8	41.0	37.7	38.2	44.5	28.9	33.1	34.4	42.7	30.6	37.0	34.4	
N116	30.5	40.1	36.1	39.1	42.6	41.6	41.6	28.8	32.7	39.7	37.5	32.1	36.9	34.3	

N117	35.4	31.8	37.4	36.9	37.3	36.5	30.6	33.0	35.3	40.6	38.7	36.6	35.8	33.3	
N118	37.6	43.2	41.7	33.9	42.3	41.5	35.1	28.8	35.2	41.3	47.2	38.8	38.9	36.2	34.8
N120	41.1	40.9	42.3	36.8	41.8	46.1	33.8	35.0	45.8	44.2	35.6	36.9	40.0	37.2	
N122	30.0	29.6	29.3	30.5	31.9	28.6	31.3	27.8	33.2	29.7	32.6	29.9	30.4	28.2	
N123	38.6	35.2	37.7	33.0	36.3	41.0	34.1	29.9	31.1	41.9	39.7	42.3	36.7	34.2	
N124	40.2	37.3	31.3	39.2	40.8	40.6	38.3	32.8	34.6	38.2	40.8	35.5	37.5	34.8	
N125	36.7	33.4	34.5		44.1	47.5	41.5	35.0	39.3	41.7	37.3	37.6	39.0	36.2	
N126	42.9	38.2	39.2	32.8	39.3	39.2	36.5	33.1	37.1	45.9	41.6	36.8	38.6	35.9	
N129	29.6	29.5	35.7	30.9	29.2	31.0	33.4	23.8			36.0	31.8	31.1	28.9	
N130	48.8	34.8	41.3	44.7	43.8	41.3	45.4	35.6	82.2	42.4		40.4	45.5	**42.3**	
N131	35.1	39.4	39.8	44.5	43.2	39.9	41.7	37.0	38.9	42.3	43.0	42.6	40.6	37.8	
N133	30.8	26.2	32.7	31.9	27.2	23.8	29.8	26.8	29.4	31.4	35.7	32.0	29.8	27.7	
N134	42.5	35.7	35.2	40.9	40.9		36.4	33.2	60.2	44.1	43.9	35.9	40.8	38.0	
N138	51.3	52.5	55.5	46.5	55.3	59.9	49.6	45.9	49.7	54.5	42.7	47.5	50.9	**47.3**	
N140	46.8	48.7	46.4	51.0	54.7	50.8	52.2	40.2	44.9	51.3		47.2	48.6	**45.2**	**42.8**
N141	29.2	37.5	43.6	36.8	50.9	45.1	31.8	32.0	37.6	39.7	35.5	35.1	37.9	35.2	
N143	38.9	32.3	36.2	39.7	42.0	36.4	38.7	41.1	33.8	34.5	42.2	42.3	38.2	35.5	
N144	42.6	35.1	35.5	34.0	31.3	32.8	35.9	32.6	36.1	36.2	32.9	34.1	34.9	32.5	
N146	32.7	30.7	35.3	26.9	28.1	27.7	32.8	23.5	31.7	28.5	32.1	28.6	29.9	27.8	
N149	35.8	37.8	30.8	30.6	30.6	31.5	33.4	27.3	39.7	29.2	40.7	38.5	33.8	31.5	
N151	39.6	34.5	39.4	40.9	41.4	39.4	36.5	38.4	37.1	44.8	45.0	41.1	39.8	37.0	
N152	48.5	40.9	24.0	52.0	53.4	49.9	45.2	41.8	44.1	48.5	50.4	46.1	45.4	**42.2**	
N153	27.1	28.7	33.5	36.9	36.6	36.1	34.2	18.2		37.8	32.1	30.2	31.9	29.7	
N154		28.2	28.5	31.0	35.3	34.3	34.7	33.7	34.6	35.0	32.7	27.9	32.3	30.1	
N157	29.3	32.8	30.1	25.9		29.2	27.2	24.9	30.3	27.4	26.9	28.3	28.4	26.4	
N158	35.1	33.4	35.1	41.8	38.7	40.0	39.7	33.3	35.8	40.7	39.3	36.6	37.5	34.8	
N159	29.8	35.8	34.3	31.3	39.7	37.8	27.4	31.6	35.5	42.7	31.3	36.4	34.5	32.1	

N160	37.5	32.1	36.1	31.9	31.4	27.8	26.7	26.4	30.5	36.1	40.2	35.2	32.6	30.4	
N161	38.6	40.5	40.3	30.3	37.0	35.1	31.5	28.3	33.8	39.5	34.7	36.8	35.5	33.0	
N162	49.2	41.8	39.6	36.9	36.1	40.5	44.2	35.9	39.8		40.4	39.7	40.4	37.5	
N163	34.6	33.9	34.0	27.0	28.7	40.2	29.4	26.7	29.2	34.0	32.6	32.5	31.9	29.7	
N164	37.1	38.9	41.5	35.6	38.0	40.5	40.7	27.7	30.8	33.6	41.2	35.3	36.7	34.2	
N165	36.3	39.9	36.6	33.0	38.5	32.1	37.7	31.7	32.4	33.4	34.5	35.1	35.1	32.6	
N166		35.9	42.9	36.5	36.2	40.5	34.1	35.0	42.0	42.6	44.1	34.4	38.6	35.9	
N167	28.8	40.6	37.5	38.0	49.5	40.0	32.7	32.1	29.1	46.1	40.1	39.0	37.8	35.1	
N168	35.4	40.8	37.8	41.0	49.7	44.0	33.4	34.1	33.4	43.1	40.3	37.8	39.2	36.5	
N169	41.2	42.3	42.6	50.9	48.5	46.6	50.9	42.6	43.2	48.6	48.9	46.4	46.1	**42.8**	
N170	42.3	38.6	37.0	40.7	48.7	46.0	46.9	37.0	44.1	43.5	36.0	43.0	42.0	39.0	
N172	45.0	38.0	48.5	43.0	44.8	47.1	53.8	39.5	39.2	45.1	46.9	41.7	44.4	**41.3**	
N173	42.1	35.0	35.8	29.1	31.1	34.9	30.5	28.4	34.4	34.3	35.1	35.1	33.8	31.4	
N174	47.7	43.8	48.4	38.7	43.6	44.7	53.7	39.7	44.3	42.7	48.8	39.1	44.6	**41.5**	
N175	39.9	38.4	38.8	43.5	42.4	37.8	39.9	39.8	42.0	44.9	42.3	43.9	41.1	38.3	
N176	31.4	33.9	39.1	37.5	47.2	44.8	37.8	21.7	26.6	42.6	60.4	35.8	38.2	35.6	
N177	35.4	42.5	46.2	46.7	47.2	42.4	33.6	37.1	35.5	45.1	45.1	41.9	41.5	38.6	
N178	25.4	25.1	27.5	30.6	27.5	27.8	23.9	17.8	20.4	27.8	35.2	24.3	26.1	24.3	
N180		38.6	44.3		48.1	44.1	42.5	31.7	40.1	42.5			41.5	**40.5**	39.6
N184	54.6	39.1	47.2	51.2	38.9	34.5	38.9	34.9	35.6		47.0	36.6	41.7	38.8	
N185	54.3	55.3	50.0	59.8	68.1	64.1	58.2			57.5	57.4	55.4	58.0	**53.9**	
N186	36.7	48.5	37.6	31.4	60.5	58.5			33.4	45.3	33.6	34.0	42.0	39.0	

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

☒ **Where applicable, data has been distance corrected for relevant exposure**

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.**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

Tubes N152 and N185 have not been distance corrected as they are located over 50m from the site of relevant exposure, making distance correction unreliable.

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

QA/QC of Diffusion Tube Monitoring

The determination of NO_2 diffusion tube precision is usually obtained from the triplicate site on the sample inlet roof of the Brintons Road AURN Station.

Southampton use Gradko International Ltd for the supply and analysis of diffusion tubes. They are a UKAS accredited laboratory and has been rated 'good' through the Workplace Analysis Scheme for Proficiency (WASP) as determined by the health and safety laboratory. Gradko International Ltd. also follows procedures set out in the Technical Guidance LAQM.TG16.

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[6].

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

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

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.

KCL 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 on site fault investigation.

Data is disseminated via www.southampton.my-air.uk. AURN data and information can be found here: https://uk-air.defra.gov.uk/networks/network-info?view=aurn.

Diffusion Tube Bias Adjustment Factors

The nitrogen dioxide diffusion tubes were supplied and analysed by Gradko International Ltd. The preparation method used for the diffusion tubes was 20% TEA (triethanolamine) in water. The national bias adjustment factor for Gradko using the preparation method of 20% TEA in water (2018) was 0.93. The use of the national bias adjustment was chosen at it is consistent with previous Southampton City Council ASR reporting.

The Southampton City Council bias adjustment factor was calculated from the Southampton Centre AURN urban centre location as 0.92 (without periods with Coefficient of Variation larger than 20%) and 0.93 (with all periods). This was not considered representative of the wider survey that is primarily roadside locations (LAQM technical guidance paragraph 7.198). It was also noted that two months reported poor precision or poor data capture.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/19

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

This spreadsheet will be updated at the end of June 2019

LAQM Helpdesk Website

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

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

Step 1:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[5]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2018		Overall Factor[3] (30 studies)				Use		0.93

Figure 5 National diffusion tube bias adjustment factor spreadsheet 2018, 20% tea in water, Gradko (03/19)

Annualisation

Sites where there is less than 75% data capture require annualisation. This is therefore required for the following sites:

- N180 Opposite 5 Commercial Road NO2 annual mean (66% data capture)
- CM1 PM_{10} annual mean (73% data capture)
- CM7 PM_{10} annual mean (72% data capture)

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

N180 Opposite 5 Commercial Road annual mean NO_2

Only 66% data capture is available for N180 during 2018 and therefore requires annualisation. The automatic stations selected are Southampton Centre AURN (CM1), Portsmouth and Bournemouth AURN background sites. All sites are within 50 miles and have sufficient data capture (>85%).

Table 3 N180 Opposite 5 Commercial Road annualisation NO_2 (µg/m^3)

Site	Site Type	Data Capture*	Annual Mean 2018 (Am)	N166 Period Mean (Pm)	Ratio (Am/Pm)
Southampton Centre AURN[7]	Urban Centre	94.7%	28.9	27.5	1.050
Portsmouth AURN[8]	Urban Background	99.5%	19.0	18.4	1.033
Bournemouth AURN[9]	Urban Background	96.0%	11.7	10.9	1.068
Average (R_a)					1.050

*Data capture for 2018 LAQM diffusion tube calendar

Annual average NO_2 concentration:	41.5		
Annualised:	41.5	x 1.050	= 43.5
Bias adjusted:	43.5	x 0.93	= **40.5 µg/m^3**

CM1 Southampton Centre AURN PM_{10}

Only 73% data capture is available for CM1 in 2018 and therefore it requires annualisation. The automatic station selected for this site is the Chilbolton Observatory. No other PM_{10} AURN background locations had sufficient data capture within 50 miles (i.e. Portsmouth and Reading New Town). It is also no appropriate to annualise with roadside locations as CM1 is an Urban Background site. Oxford St Ebbes is beyond 50 miles but the annual mean/period mean ratio is not significantly different from Chilbolton and is therefore deemed appropriate for use in this annualisation calculation.

[7] https://uk-air.defra.gov.uk/networks/site-info?site_id=SOUT
[8] https://uk-air.defra.gov.uk/networks/site-info?site_id=PMTH
[9] https://uk-air.defra.gov.uk/networks/site-info?uka_id=UKA00429

Table 4 CM1 Southampton Centre AURN annualisation PM_{10}

Site	Site Type	2018 Data Capture	Annual Mean 2018 (Am)	CM1 Period Mean (Pm)	Ratio (Am/Pm)
Chilbolton Observatory[10]	Rural Background	93%	12.3	11.7	1.04
Oxford St Ebbes	Urban Background	97%	12.2	12.2	1.00
Average (R_a)					1.02

Annual average PM10 concentration: 19.1
Bias adjusted: 19.1 x 1.02 = **19.5 µg/m^3**

CM7 A33 AURN PM_{10}

Only 72% data capture is available for CM7 in 2018 and therefore it requires annualisation. The automatic station selected for this site is the Chilbolton Observatory. No other PM_{10} AURN background locations had sufficient data capture within 50 miles (i.e. Portsmouth and Reading New Town). Oxford St Ebbes is beyond 50 miles but the annual mean/period mean ratio is not significantly different from Chilbolton and is therefore deemed appropriate for use in this annualisation calculation. The ratio when roadside sites are also included does not change from 1.04 and it was therefore deemed appropriate to remain with only background sites.

Table 5 CM7 A33 AURN annualisation PM_{10}

Site	Site Type	2018 Data Capture	Annual Mean 2018 (Am)	CM7 Period Mean (Pm)	Ratio (Am/Pm)
Chilbolton Observatory	Rural Background	93%	12.3	11.5	1.06
Oxford St Ebbes	Urban Background	97%	12.2	12.0	1.02
Average (R_a)					1.04

Annual average PM_{10} concentration: 16.7
Bias adjusted: 16.7 x 1.04 = **17.3 µg/m^3**

[10] https://uk-air.defra.gov.uk/networks/site-info?uka_id=UKA00614

Distance Correction

Paragraph 7.78 of the LAQM technical guidance requires the use of the NO_2 fall-off with distance from calculator available at the LAQM website[11] where diffusion tubes do not represent exposure. All locations that are above annual objective and are not representative of exposure should be corrected for distance. It is also recommended that locations within 10% of the annual objective (i.e. above 36 µg/m^3) and are not representative of exposure should be corrected for distance. The following sites for 2018 require correction for distance:

- N104 Regents Park Junction - Within 10% of the annual objective and not representative of exposure.
- N107 Cranbury Place - Above annual objective and not representative of exposure.
- N109 72 Bevios Valley – Within 10% of the annual objective and not representative of exposure.
- N118 3 Rockstone Lane - Within 10% of the annual objective and not representative of exposure.
- N140 5 Commercial Road - Above annual objective and not representative of exposure.
- N180 Opposite 5 Commercial Road - Above annual objective and not representative of exposure (note: this location also required annualisation introducing additional uncertainty).

N152 M271 has not been corrected for distance to relevant exposure as the distance is above 20m and between the two locations is a verge, fence and trees. It is therefore not considered appropriate to apply this calculation.

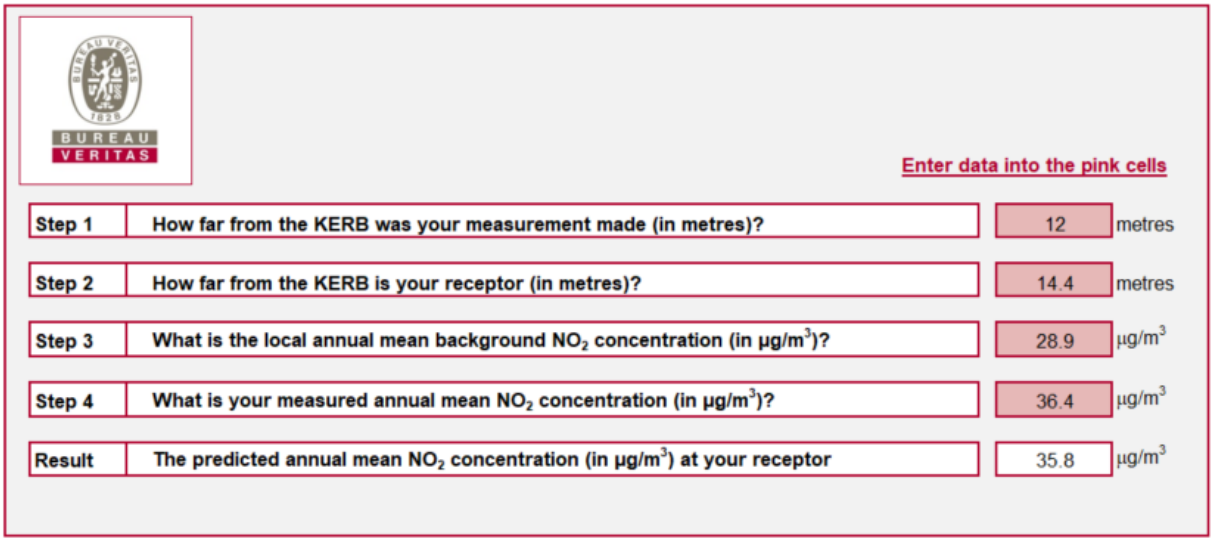
N170 Union Castle House and N184 Redbridge Road Automatic Monitoring Station have not been corrected for distance as there is no relevant exposure with in 20m.

N185 Redbridge Causeway 1 has not been corrected for distance as the relevant exposure is at a different elevation to the diffusion tube and is beyond 20m.

[11] https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

N186 Redbridge Causeway 2 has not been corrected for distance due to the difference in elevation of the tube and the relevant exposure. There is also a row of trees between the two locations.

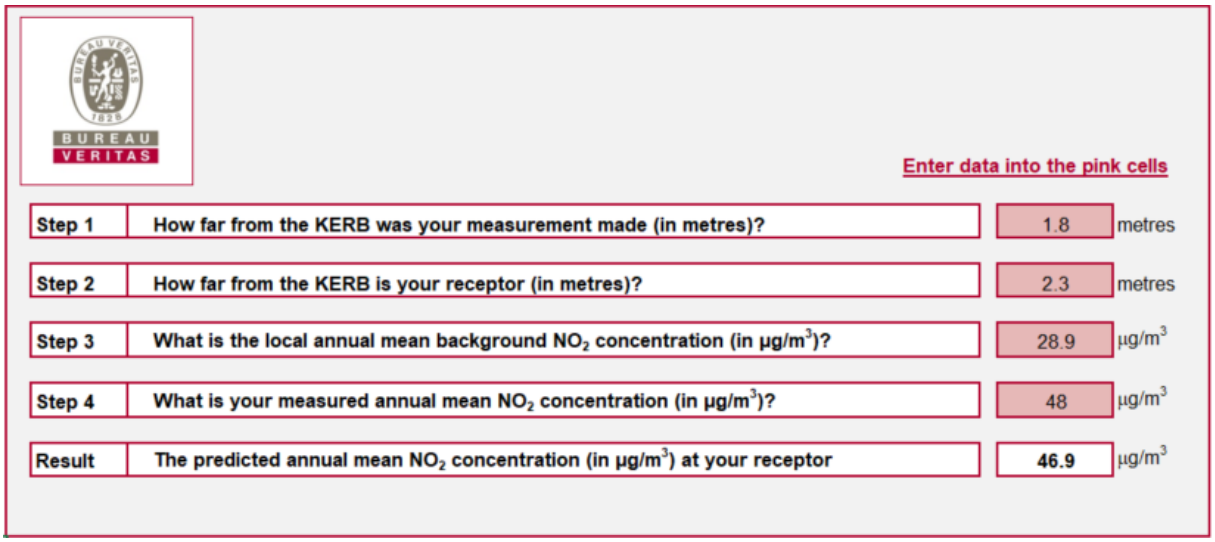
The background value used for the corrections is 28.9 µg/m^3 (95% data capture) from the City Centre AURN urban background 2018 annual mean as this site is similarly located on the west side of Southampton and best represents background conditions. The AURN background NO_2 concentration is higher than the LAQM background maps for all locations corrected and therefore also represents a worst case scenario.



Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	12	metres
Step 2	How far from the KERB is your receptor (in metres)?	14.4	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	28.9	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	36.4	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	35.8	µg/m^3

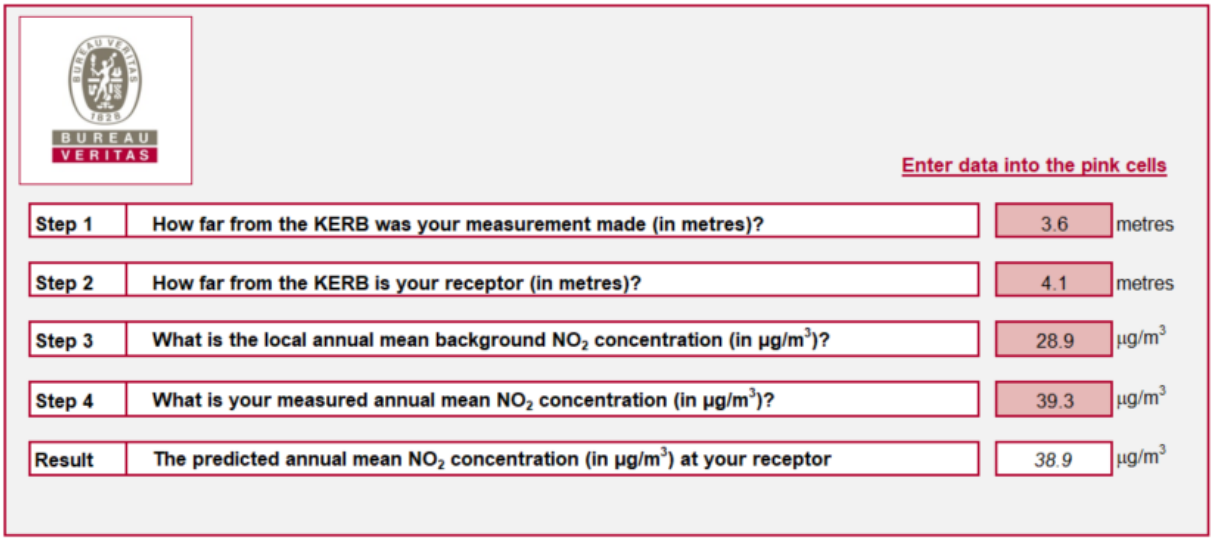
Figure 6 N104 Regents Park Junction NO_2 fall off with distance from road calculation



Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	1.8	metres
Step 2	How far from the KERB is your receptor (in metres)?	2.3	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	28.9	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	48	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	46.9	µg/m^3

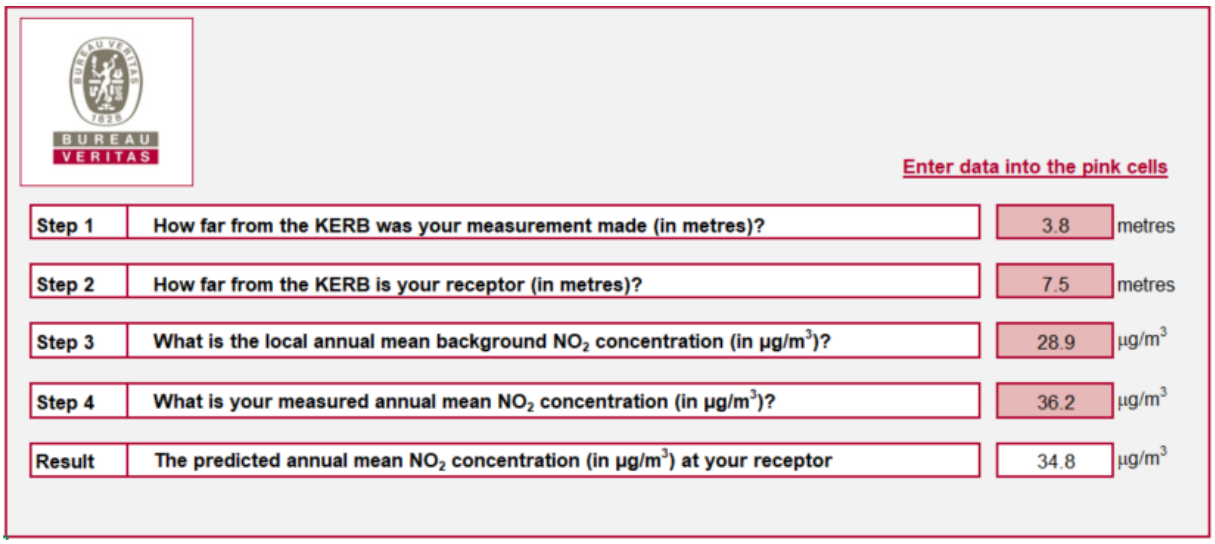
Figure 7 N107 Cranbury Place NO_2 fall of with distance from road calculation



Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	3.6	metres
Step 2	How far from the KERB is your receptor (in metres)?	4.1	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	28.9	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	39.3	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	*38.9*	$\mu g/m^3$

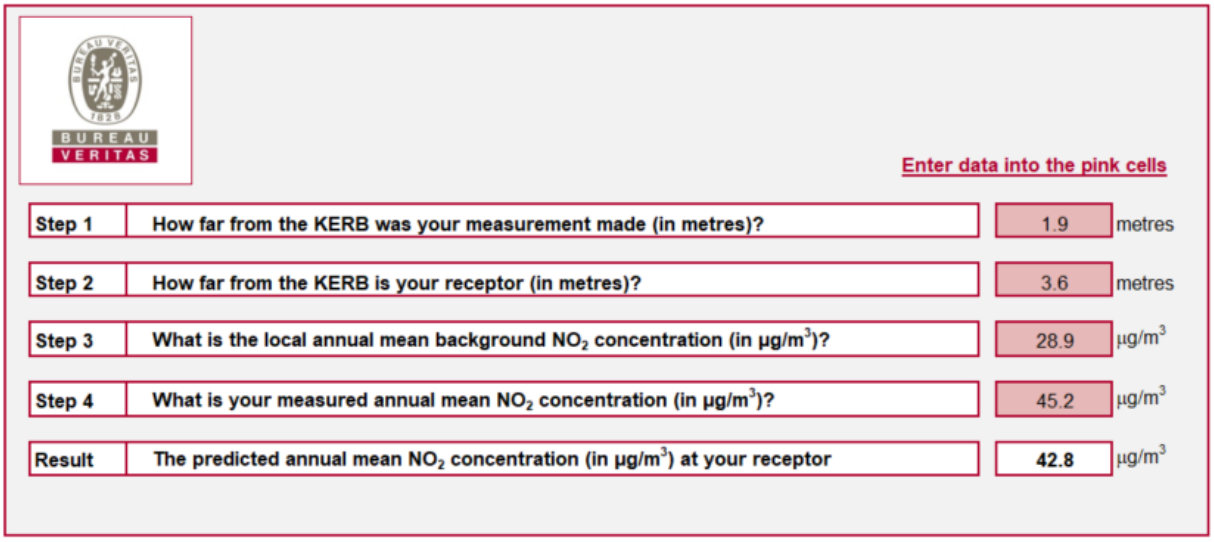
Figure 8 N109 72 Bevois Valley NO_2 fall of with distance from road calculation



Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	3.8	metres
Step 2	How far from the KERB is your receptor (in metres)?	7.5	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	28.9	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	36.2	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	34.8	$\mu g/m^3$

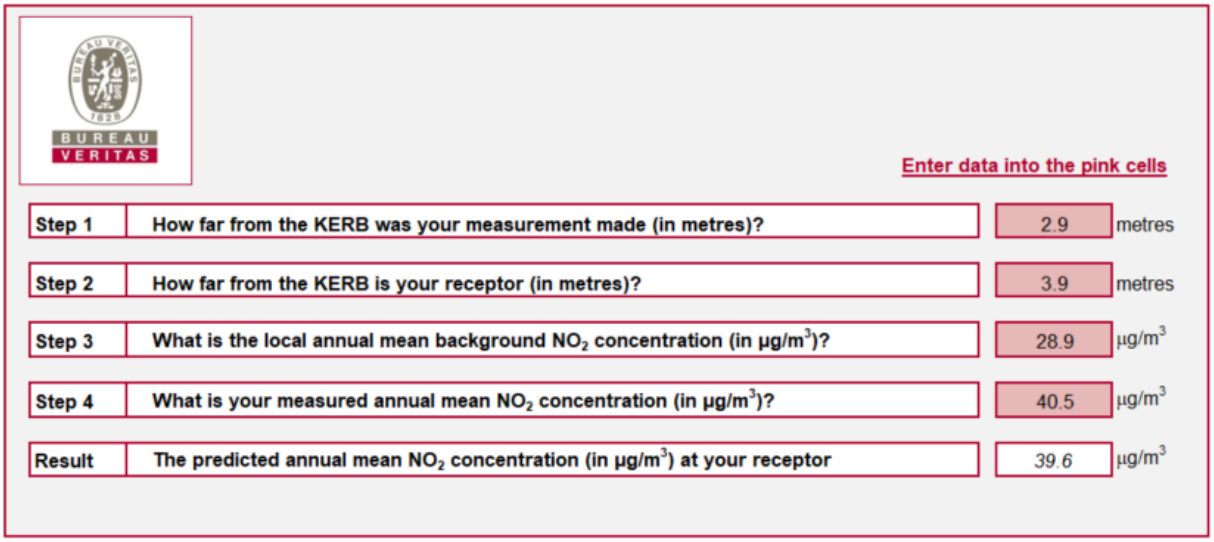
Figure 9 N118 3 Rockstone Lane NO_2 fall of with distance from road calculation



Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	1.9	metres
Step 2	How far from the KERB is your receptor (in metres)?	3.6	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	28.9	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	45.2	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	42.8	$\mu g/m^3$

Figure 10 N140 5 Commercial Road NO2 fall of with distance from road calculation



Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	2.9	metres
Step 2	How far from the KERB is your receptor (in metres)?	3.9	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	28.9	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	40.5	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	39.6	$\mu g/m^3$

Figure 11 N180 Opposite 5 Commercial Road NO_2 fall of with distance from road

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

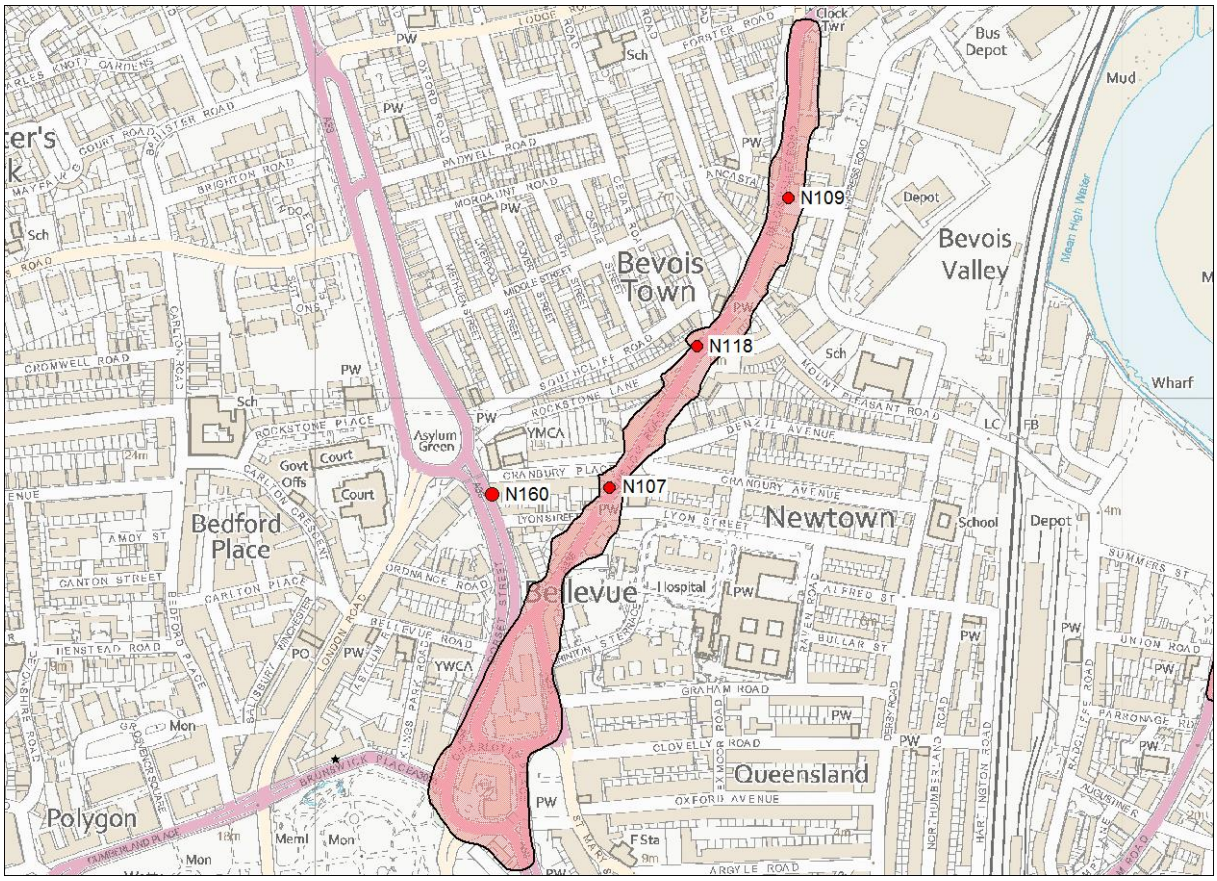


Figure 12 AQMA No. 1 Bevois Valley boundary and NO_2 diffusion tube locations

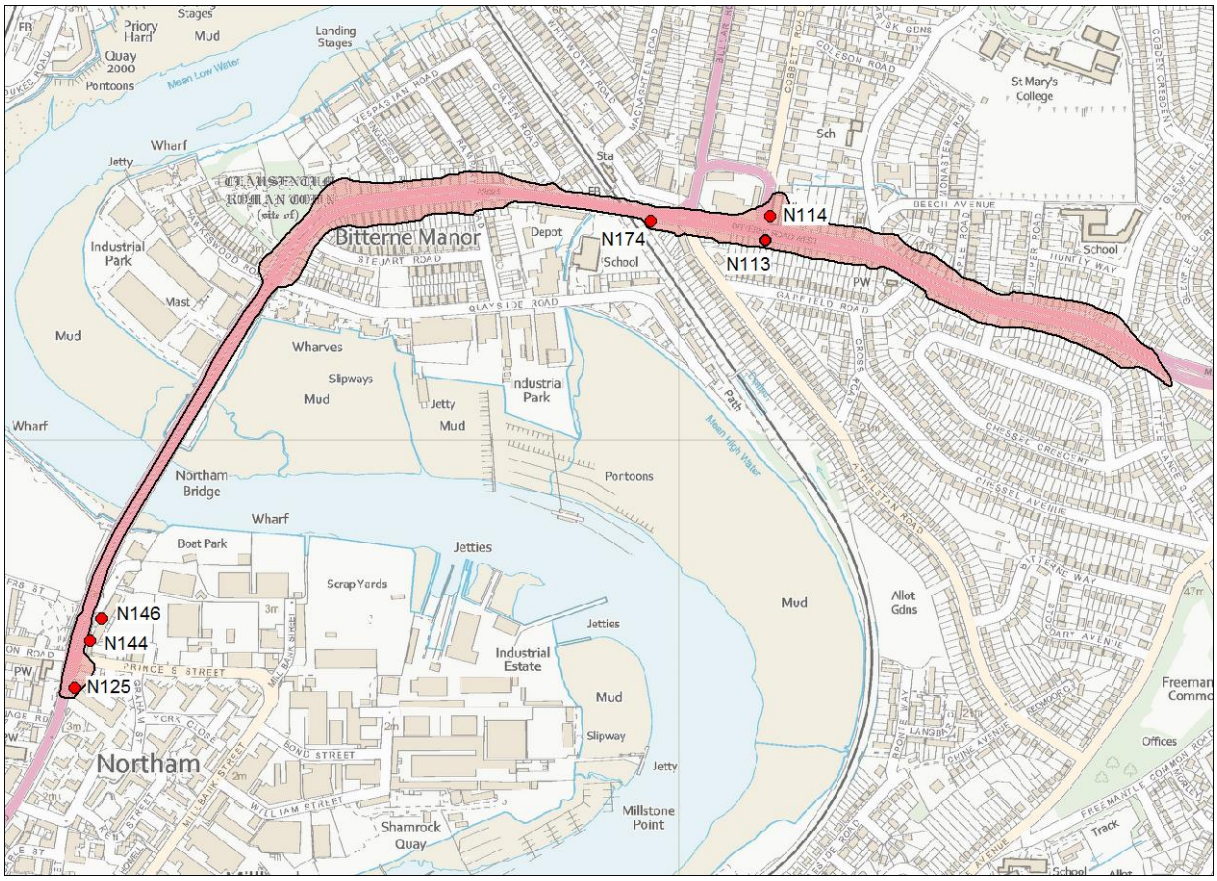


Figure 13 AQMA No. 2 Bitterne Road boundary and NO_2 diffusion tube locations

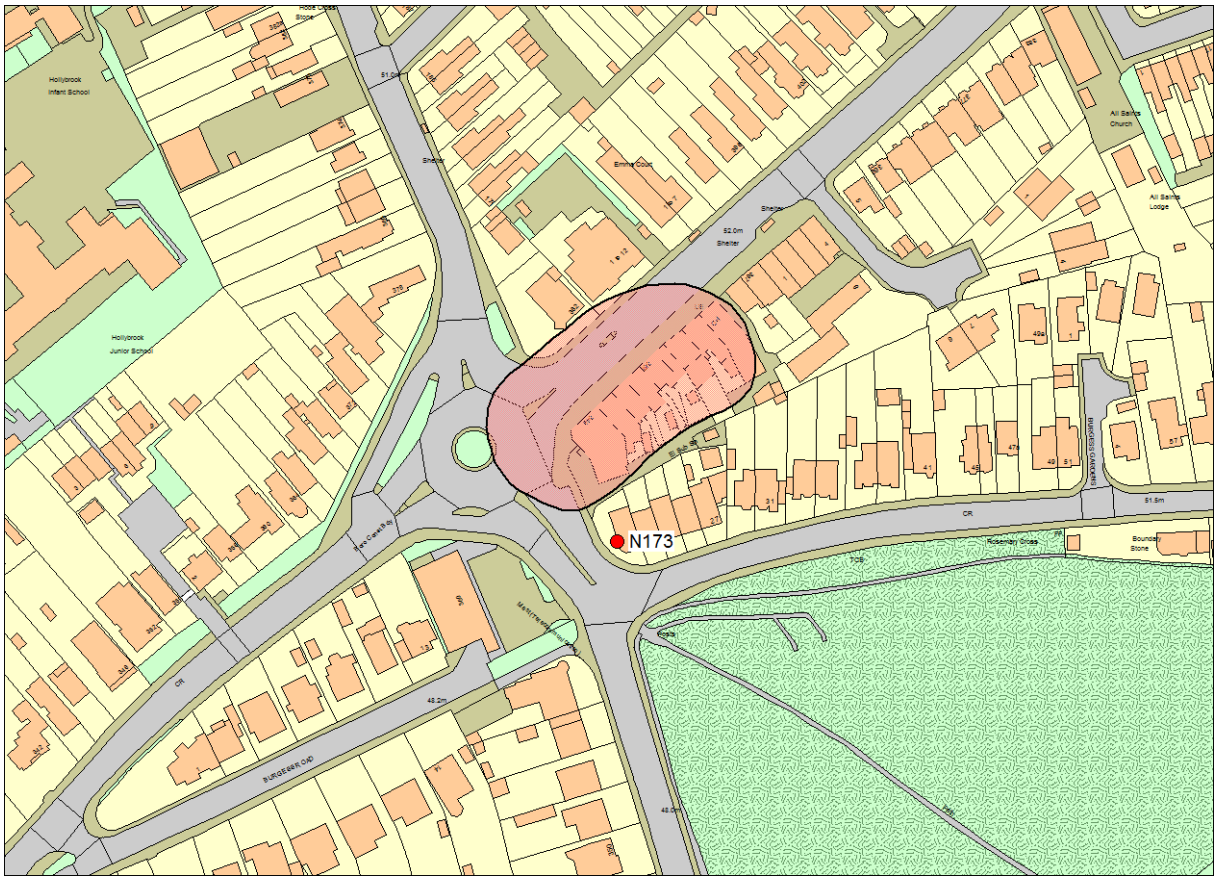


Figure 14 AQMA No. 3 Winchester Road boundary and NO_2 diffusion tube locations

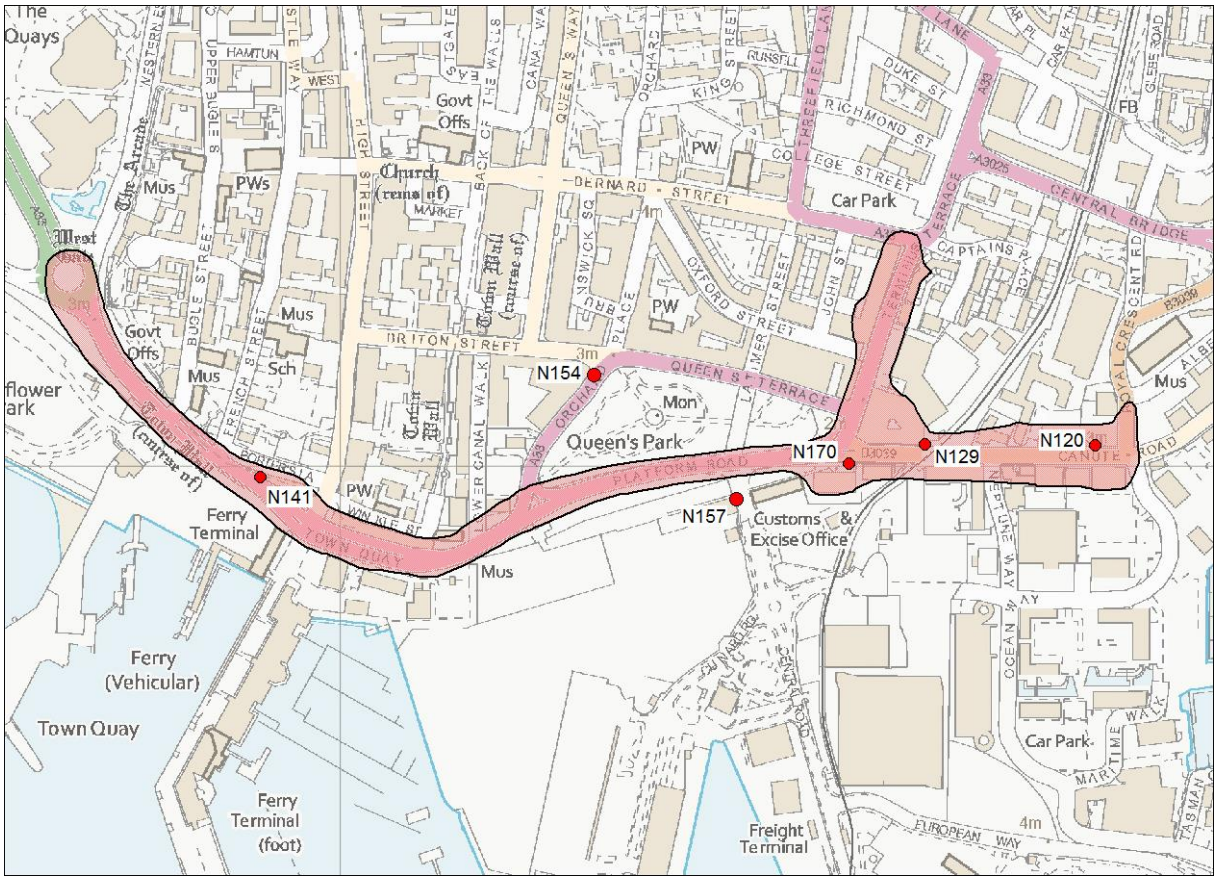


Figure 15 AQMA No. 4 Town Quay boundary and NO_2 diffusion tube locations

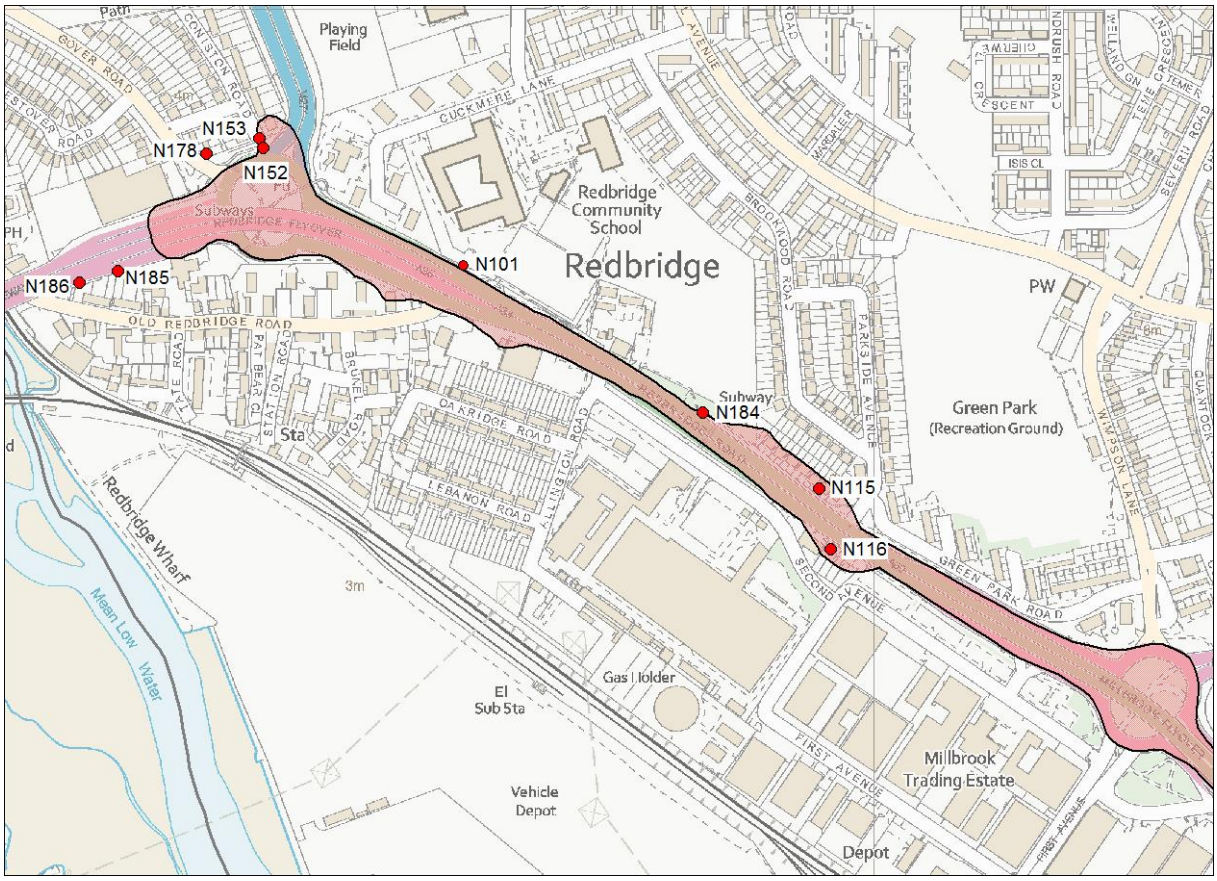


Figure 16 AQMA No. 5 (1) Redbridge Road to Millbrook Flyover boundary and NO_2 diffusion tube locations

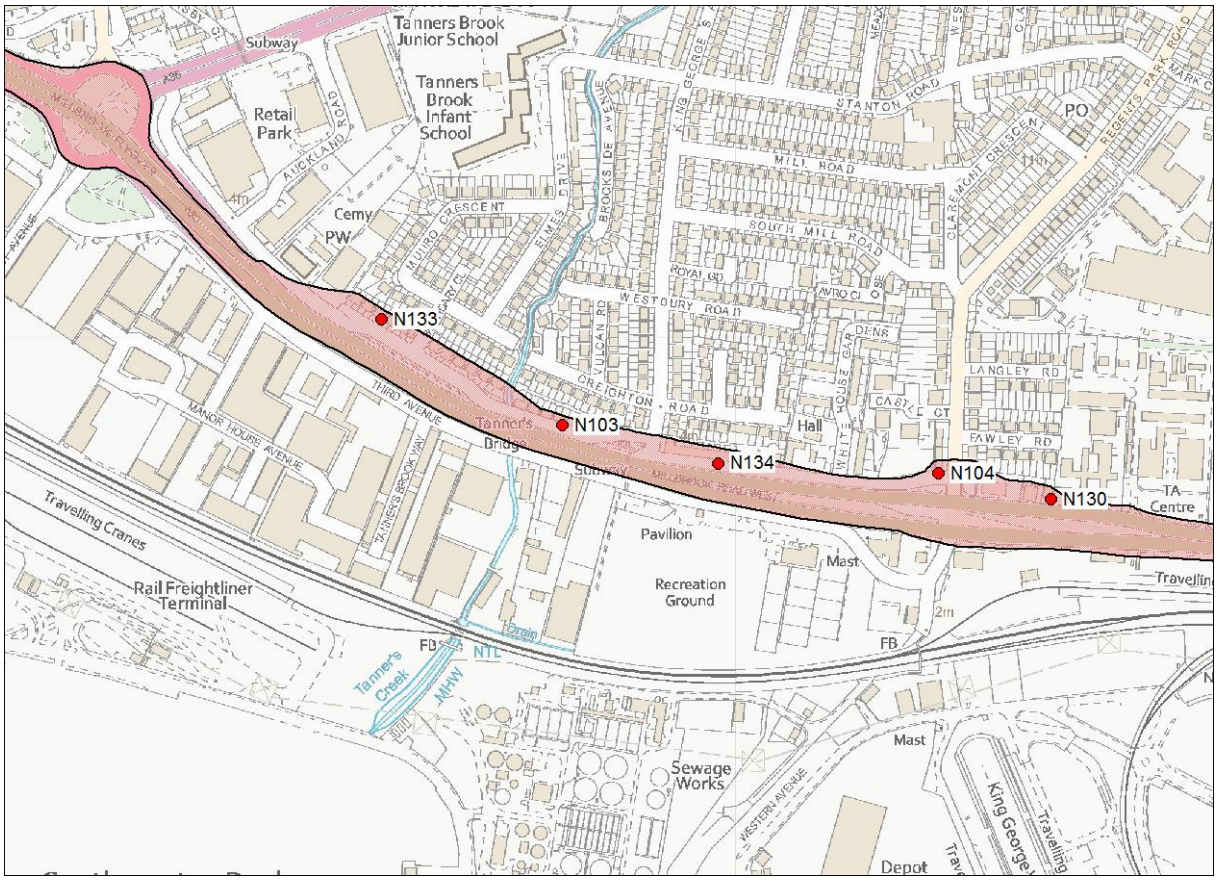


Figure 17 AQMA No. 5 (2) Millbrook Flyover to Millbrook Road West boundary and NO_2 diffusion tube locations

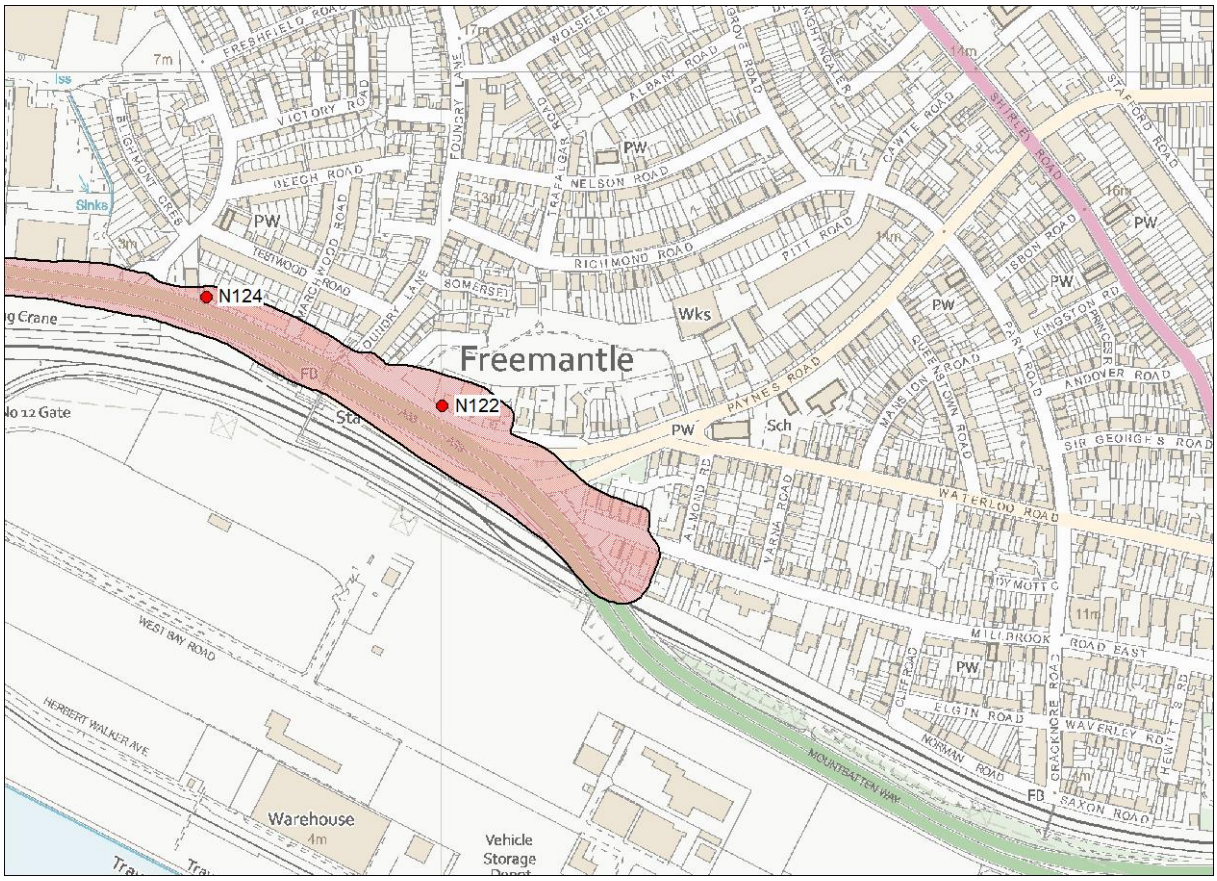


Figure 18 AQMA No. 5 (3) Millbrook Road West to Mountbatten Way boundary and NO_2 diffusion tube locations

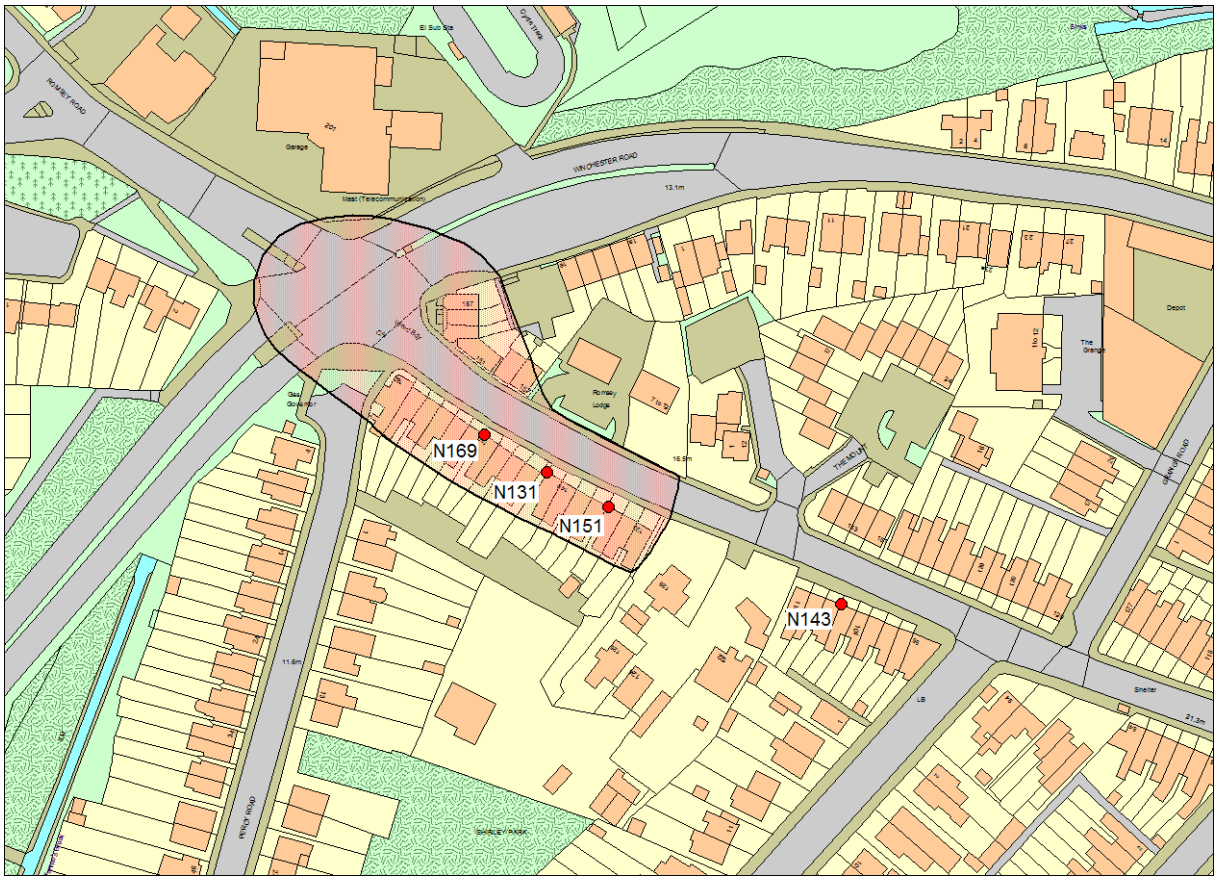


Figure 19 AQMA No. 6 Romsey Road boundary and NO_2 diffusion tube locations

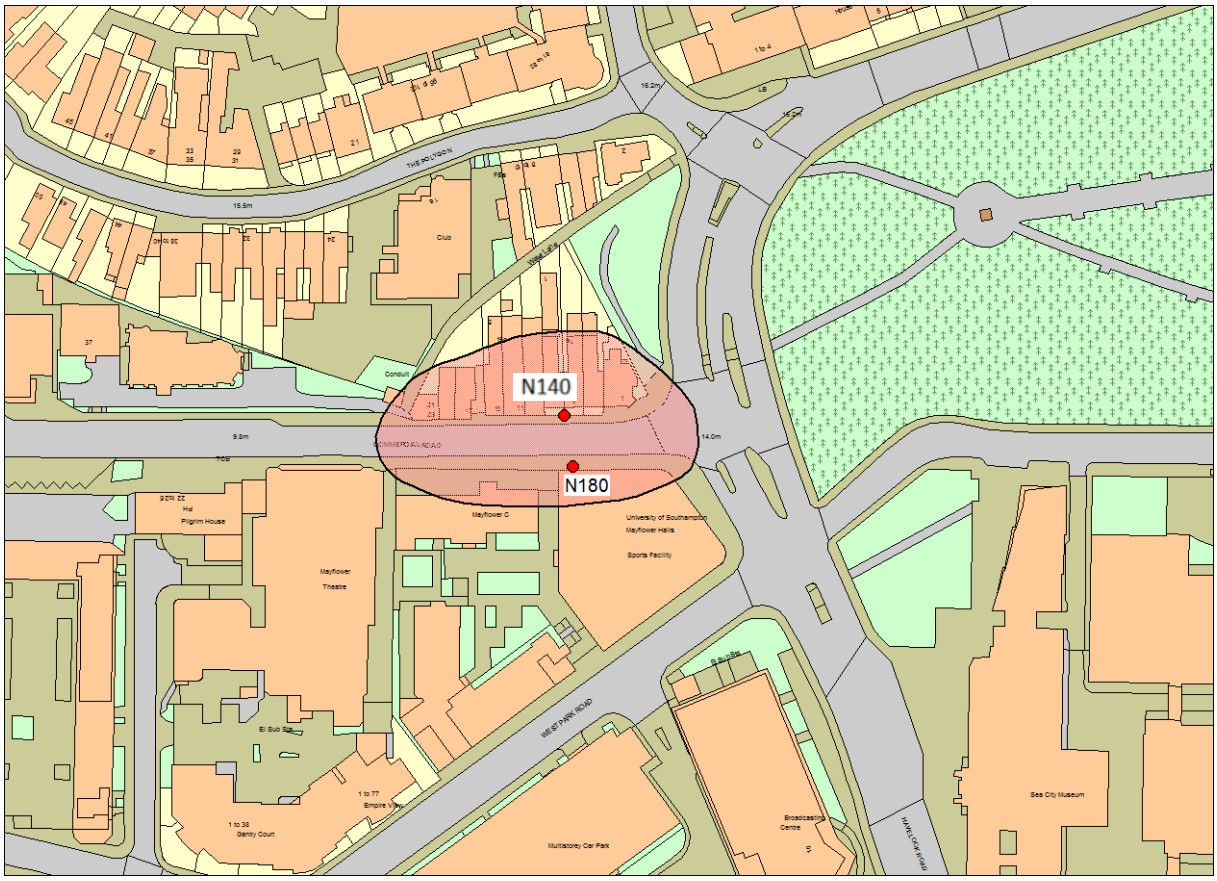


Figure 20 AQMA No. 8 Commercial Road boundary and NO_2 diffusion tube locations

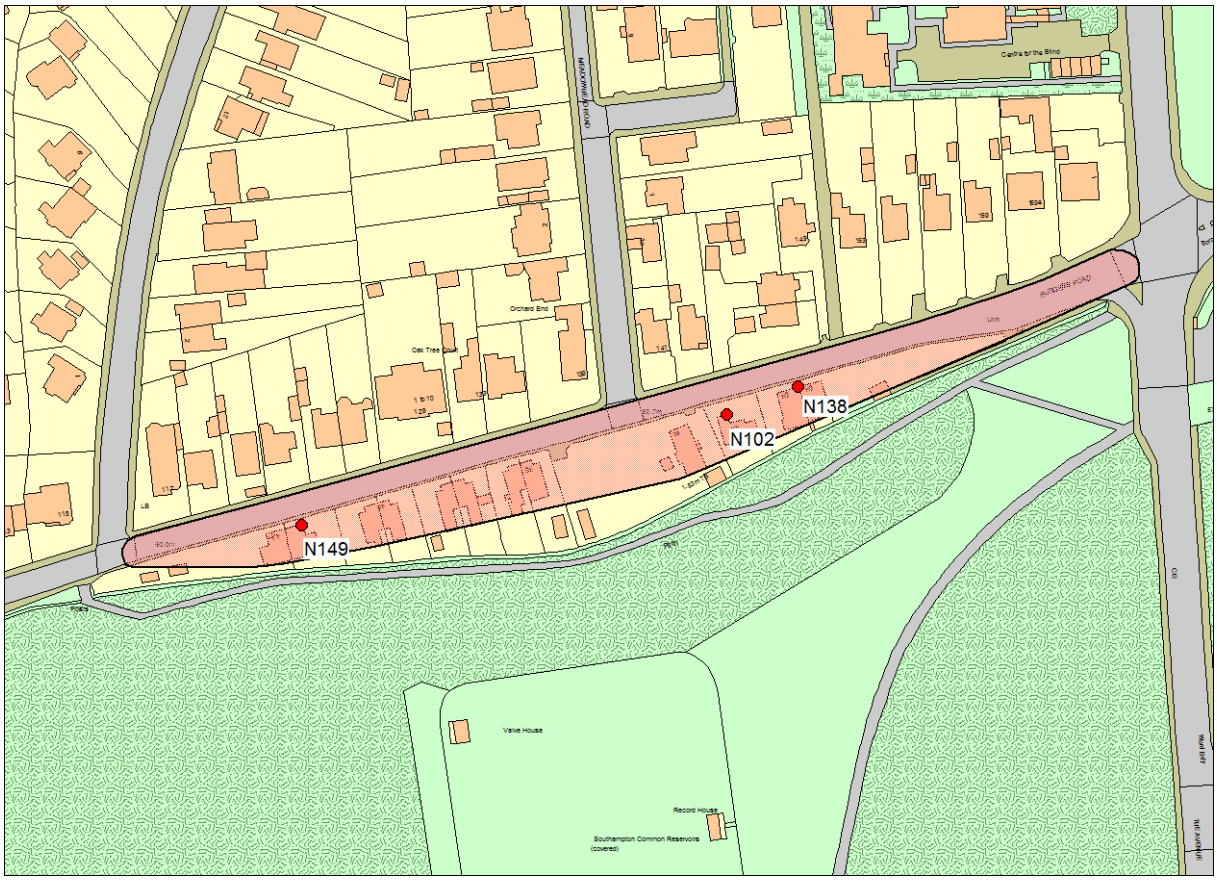


Figure 21 AQMA No. 9 Burgess Road boundary and NO_2 diffusion tube locations

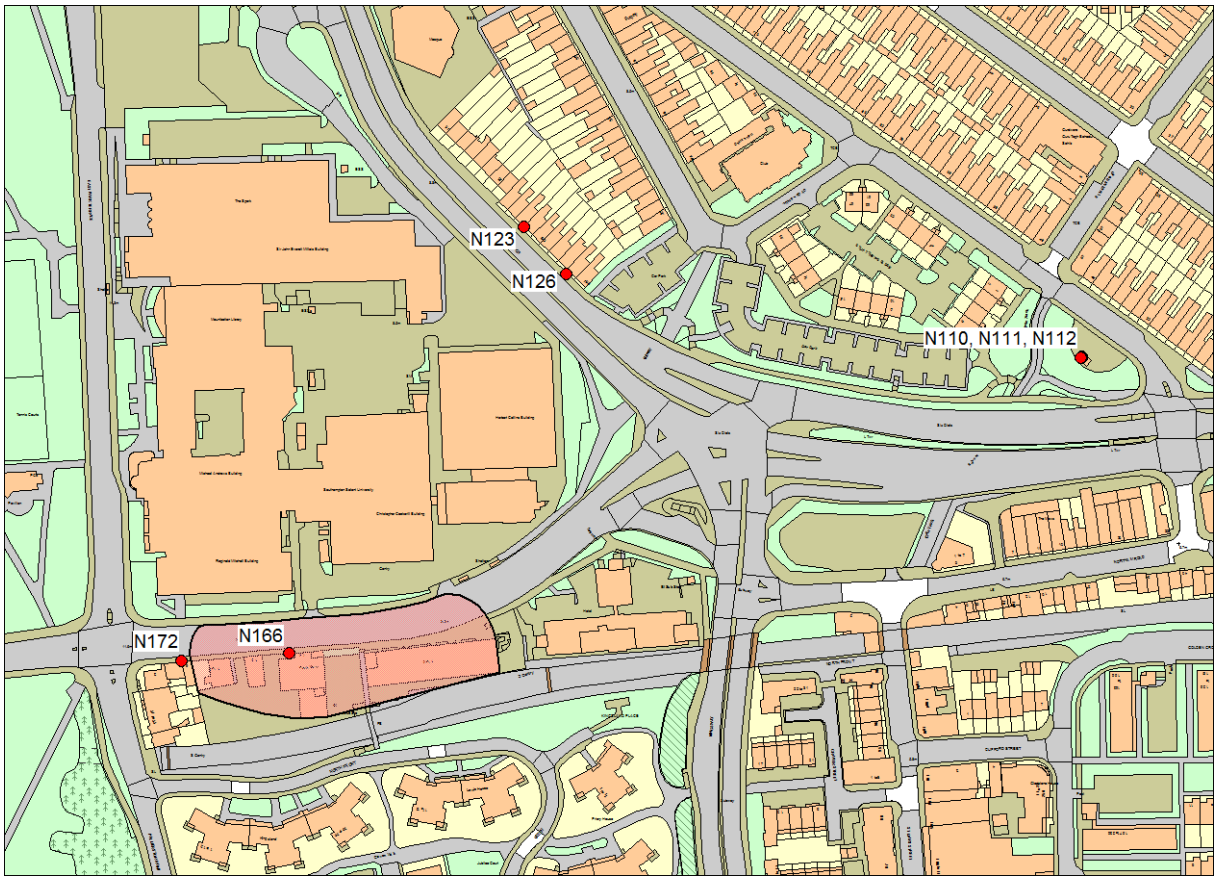


Figure 22 AQMA No. 10 New Road boundary and NO_2 diffusion tube locations

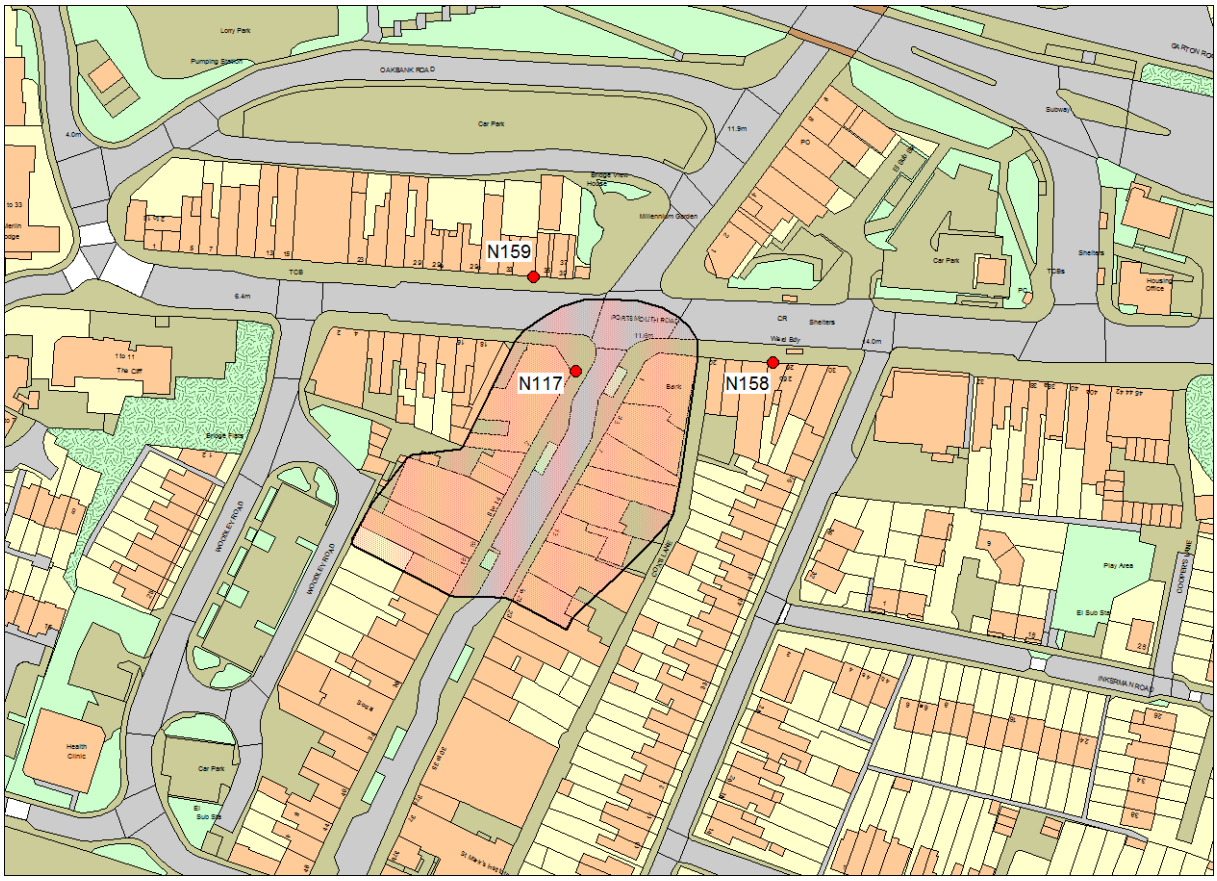


Figure 23 AQMA No. 11 Victoria Road boundary and NO_2 diffusion tube locations

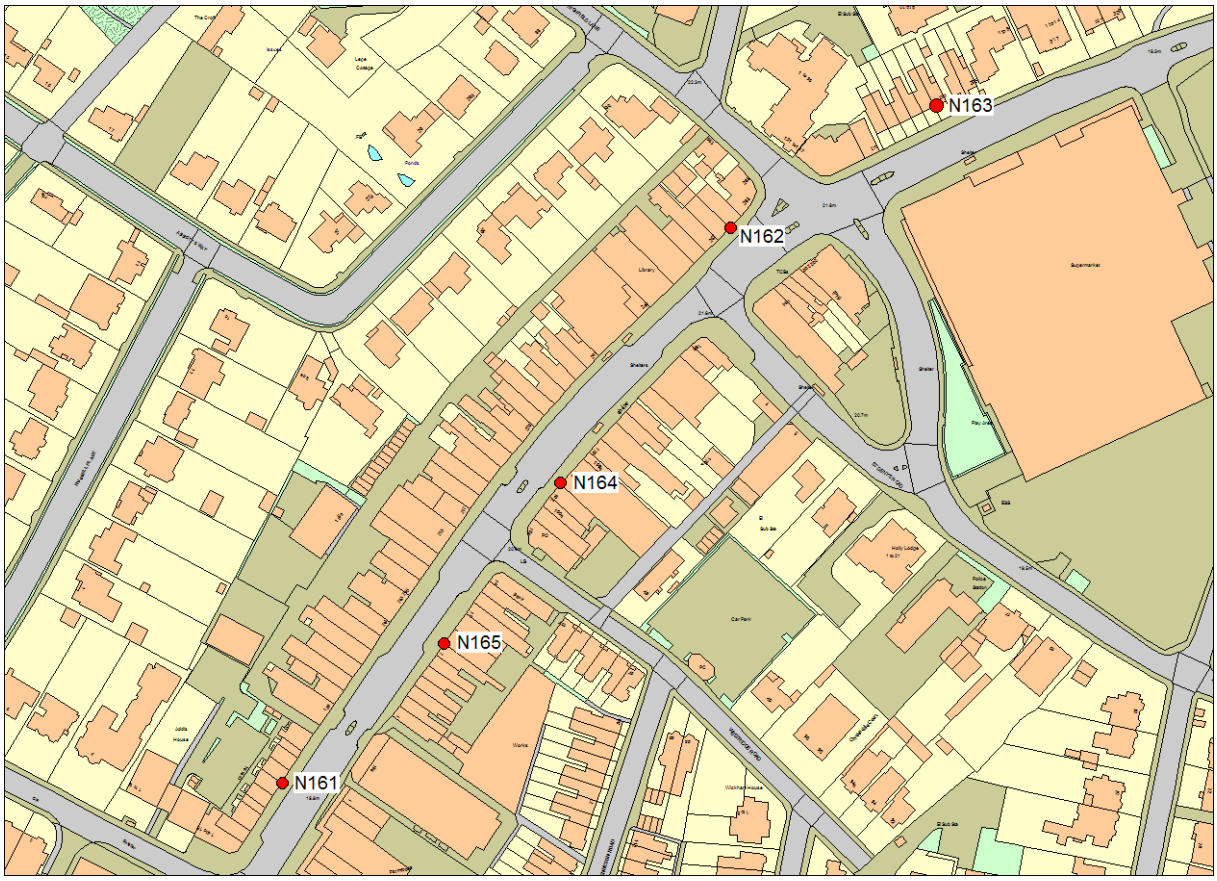


Figure 24 Portswood High Street NO_2 diffusion tube locations

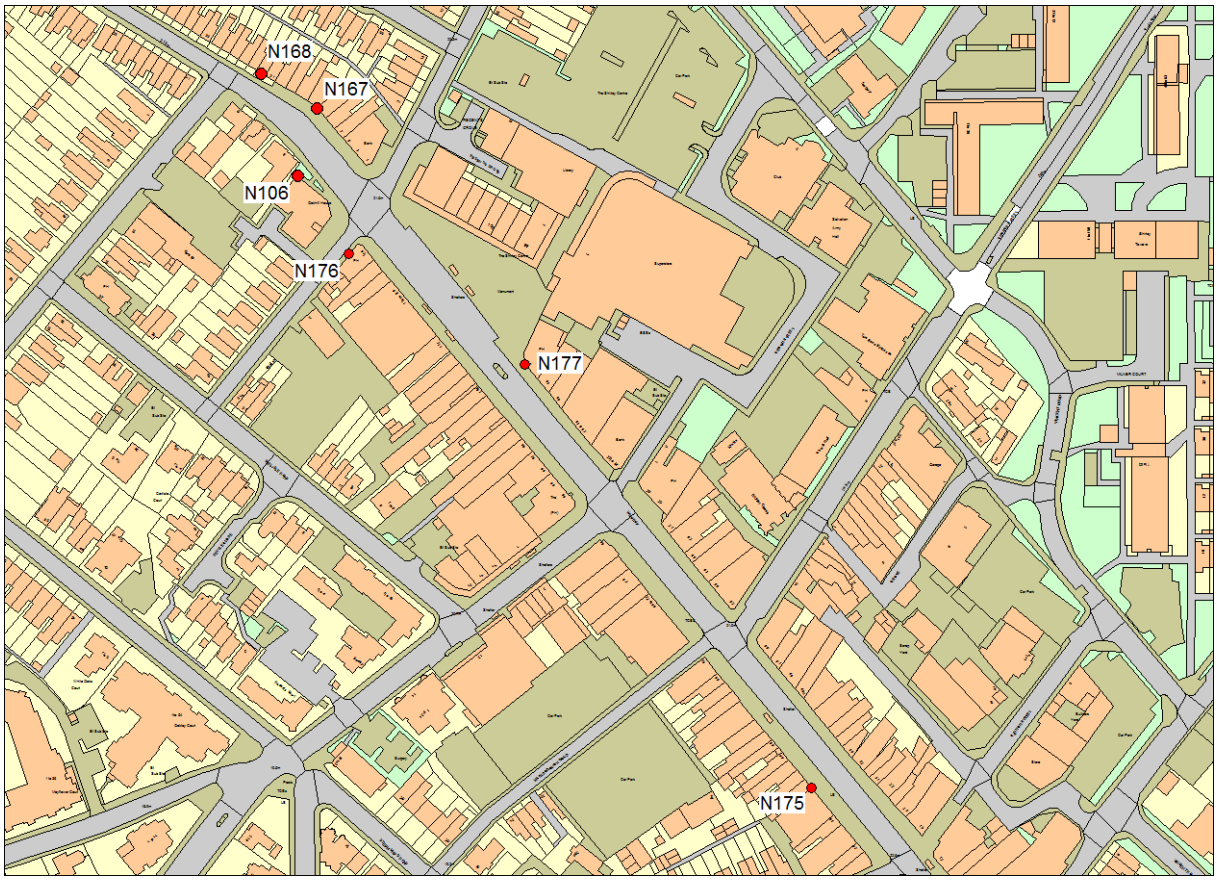


Figure 25 Shirley High Street NO_2 diffusion tube locations

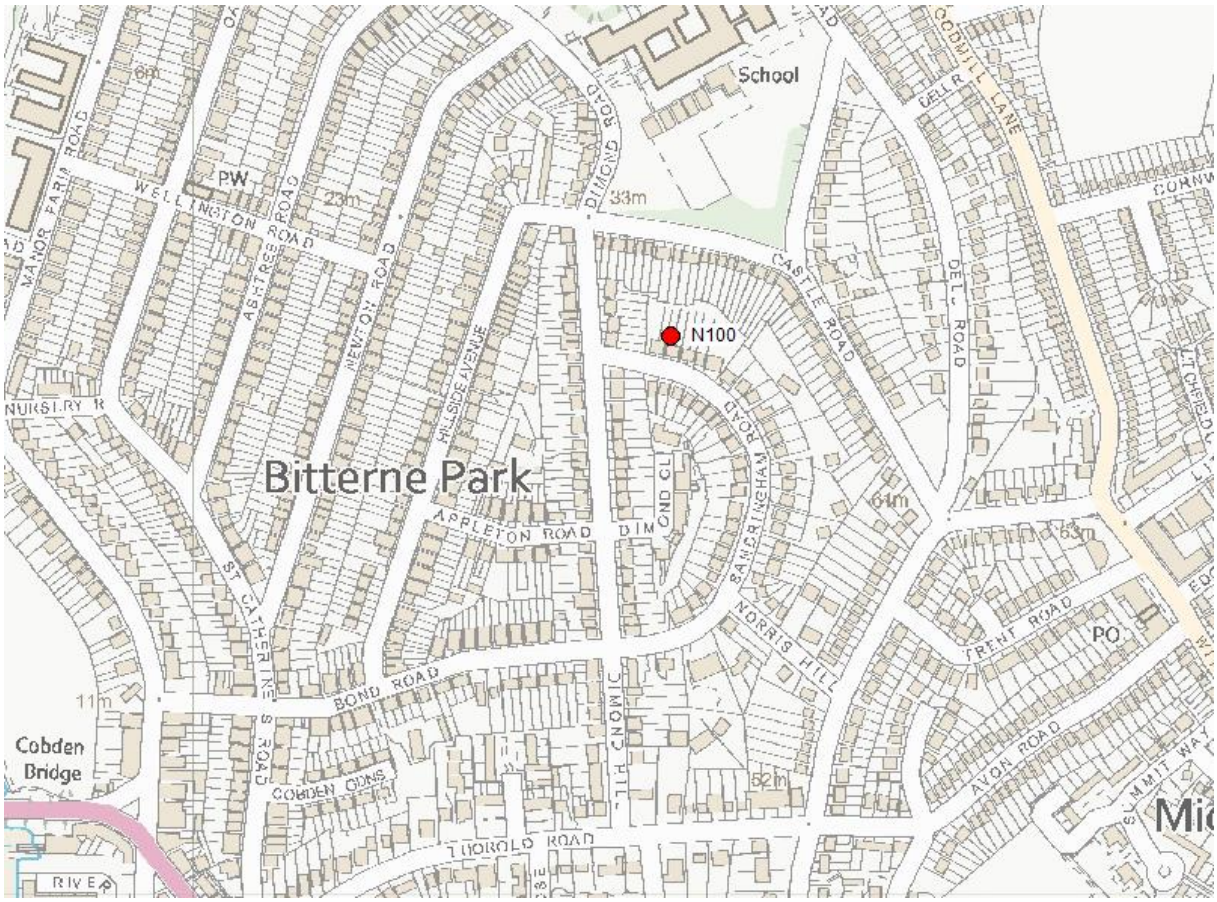


Figure 26 Bitterne Park NO_2 diffusion tube locations

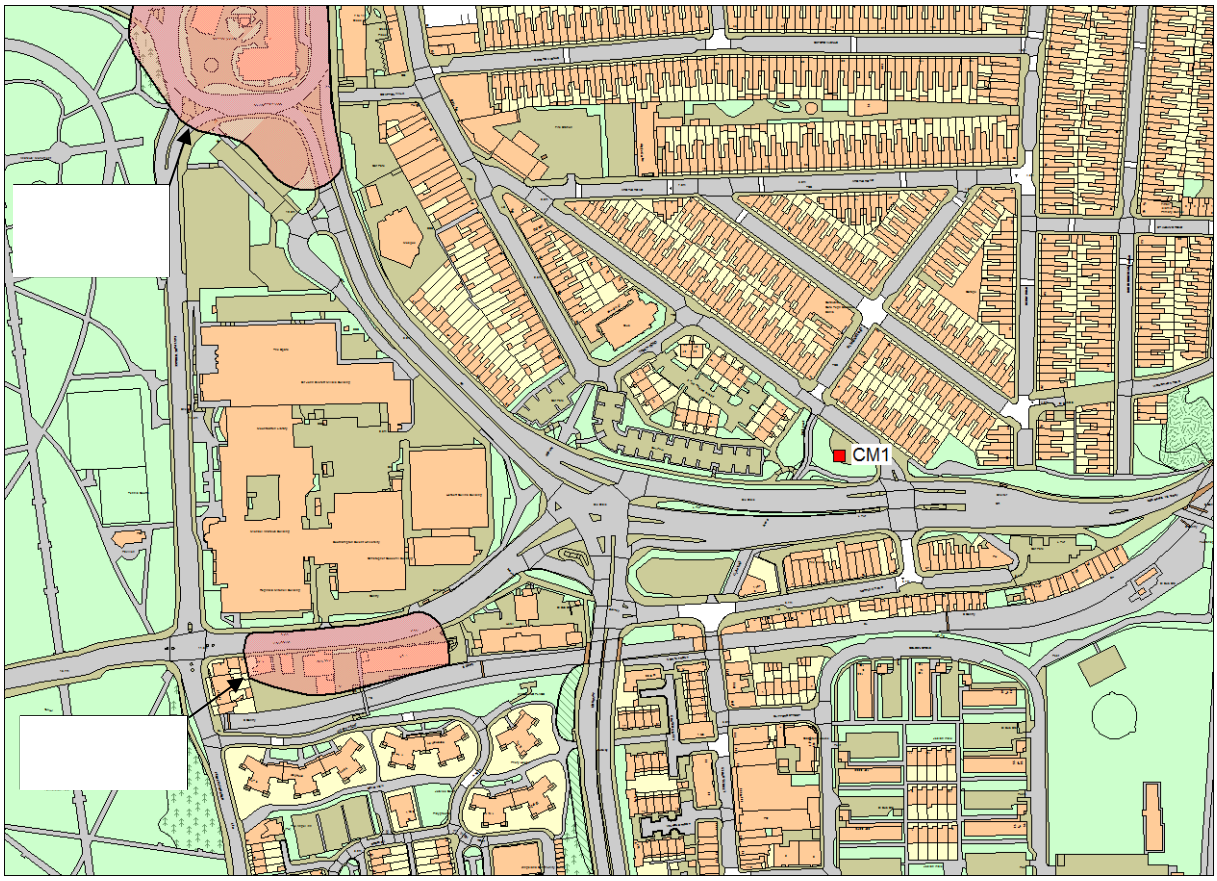


Figure 27 CM1 Brintons Road AURN automatic monitoring station with AQMA No. 10 New Road boundary and south boundary of AQMA No. 1 Bevois Valley

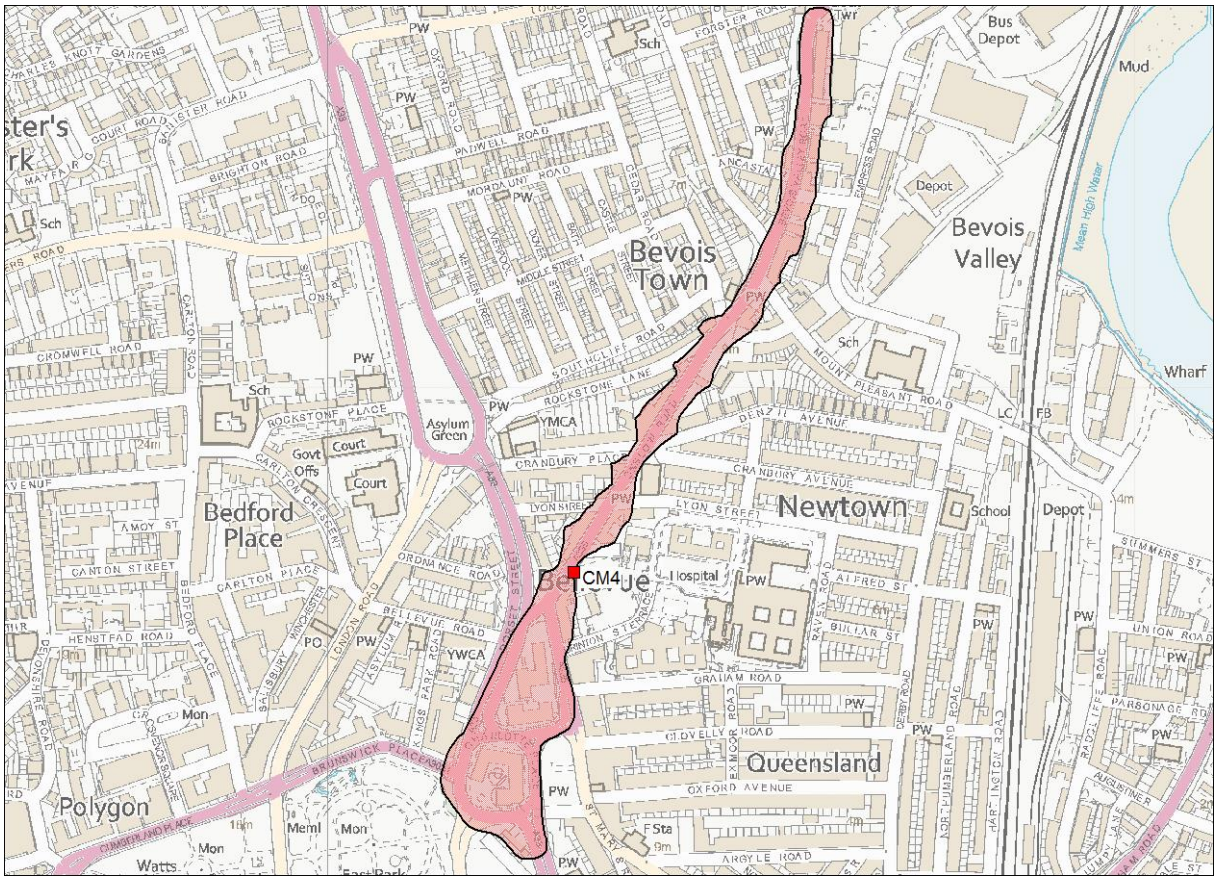


Figure 28 CM4 Onslow Road automatic monitoring station and AQMA No. 1 Bevois Valley boundary

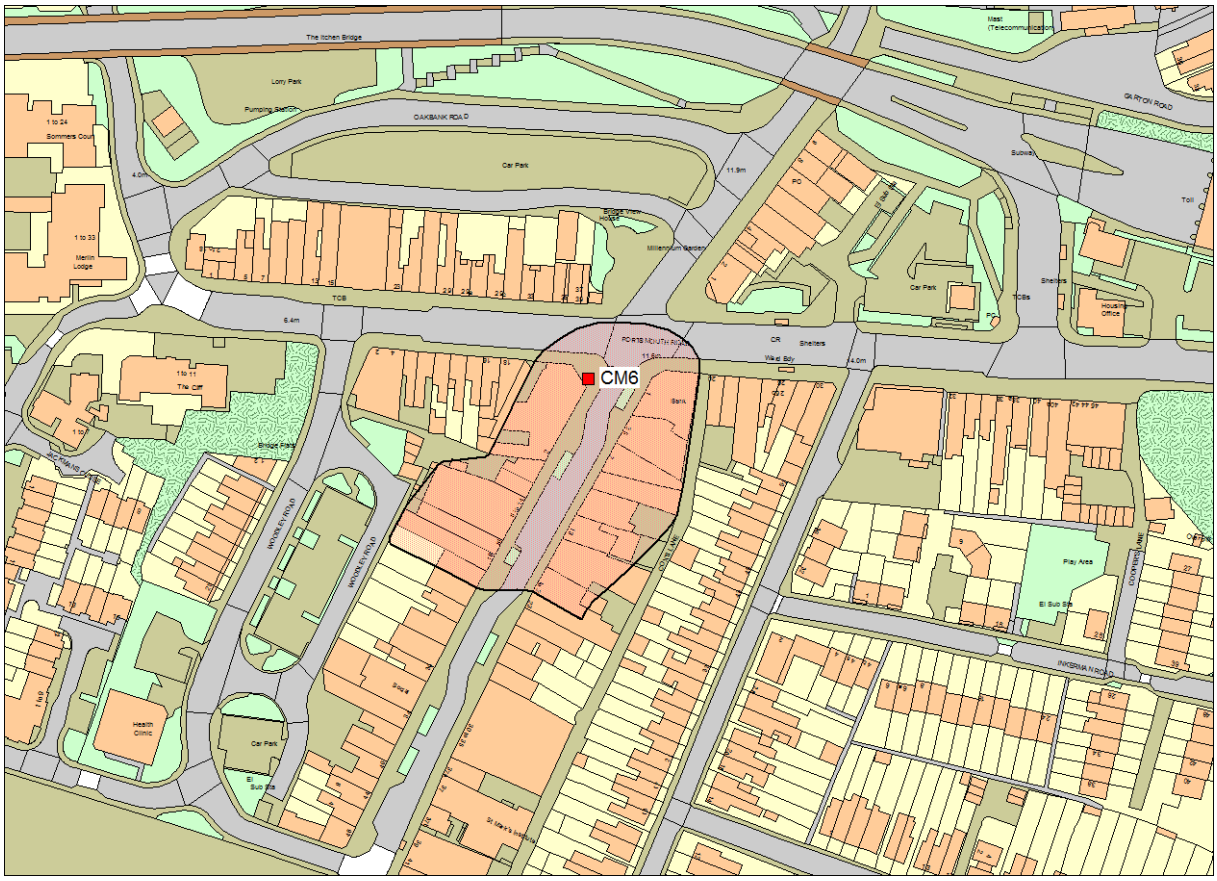


Figure 29 CM6 Victoria Road automatic monitoring station and AQMA No. 11 Victoria Road boundary

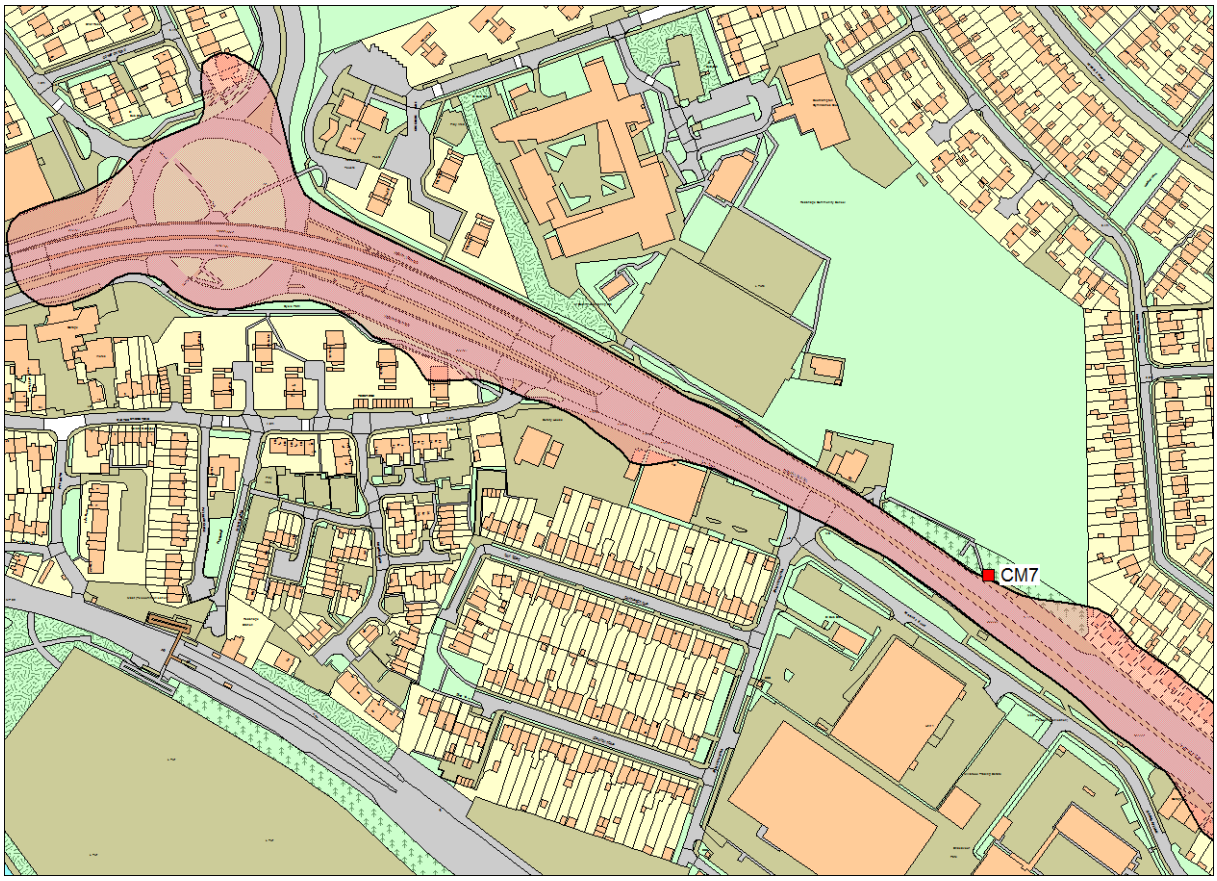


Figure 30 CM7 A33 AURN automatic monitoring station and west boundary of AQMA No. 5 Redbridge Road to Millbrook Flyover

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[12]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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

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	Air quality Annual Status Report
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
EU AAQD	European Union Ambient Air Quality Directive
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 (micrometres or microns) 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