Southampton City Council

2017 Air Quality Annual Status Report (ASR)

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

January 2018

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Executive Summary: Air Quality in Our Area

Air Quality in Southampton

Background

The City of Southampton is a major coastal port located on the South Coast of England. It is the largest city in Hampshire, covering an area of 5,181 hectares (Southampton City Council, 2011) and has a population of 245,300 (Office for National Statistics mid year estimate 2014). The city centre is located between two rivers, the River Test, which borders the city to the west and the River Itchen, which bisects central Southampton from the eastern wards. Both rivers converge into Southampton Water, a deep water estuary with a double tide that results in prolonged periods of high water. Southampton's excellent strategic position and channel characteristics have made it particularly good at facilitating the movements of large ships and has resulted in the city developing into a thriving cargo and cruise passenger port.

The Port of Southampton is run by Associated British Ports (ABP) and it is one of Southampton's biggest employers. The Port is the second largest seaport in the UK in terms of the value of trade with £71.4 billion worth of goods being exported or imported through the Port (MDS Transmodal 2016). The Port handled around 950,000 vehicles and 2.0 million cruise ship passenger movements in 2017 (source ABP) and is the UK's main export port. In addition, just under 2 million shipping containers were handled at the Port's dedicated container terminal in 2017. The average split of containers moved by road and rail over the last few years has been approximately 66% by road and 34% by rail. Southampton has the largest rail modal share of all UK ports with the capacity to grow. The terminal also has four weekly feeder services with containers being moved by short sea shipping to other UK ports such as Liverpool and Belfast. (source DP World).

Other significant employers include; the University of Southampton, NHS, Ikea, Carnival UK. Southampton's West Quay Shopping Centre, which opened in

September 2000, is also a major retail hub for the region, ranked 14th in the UK for retail space (Southampton City Council, 2011).

The city has very good transport infrastructure links, served by a regional airport just outside the city's northern boundary, the M3 and M27 Motorways and a main line railway to London and along the south coast.

Southampton lies at the western end of the South Hampshire sub-region. The wider urban South Hampshire area, consisting of Southampton, Eastleigh, Fareham, Gosport, Portsmouth and Havant, together with parts of the New Forest, Test Valley, Winchester and East Hampshire has a combined population of over a million people and is the largest urban area in the South East region outside of London. As a consequence, the area is also one of the South East's major economic centres and whilst other successful areas in the region depend upon linkages to London, South Hampshire operates in a distinct and largely separate manner, relying instead on connections with other regions and with Europe as a result of the presence of two major ports (Southampton and Portsmouth).

Southampton has a wealth of award winning parks, including Grade II listed parks within the city centre, making it is one of the greenest cities in Southern England. Of particular note is Southampton Common, a 362 acre wooded and grassy open recreational area just minutes from the city centre, which is designated a Site of Special Scientific Interest (SSSI).

Road transport emissions are the major source of air pollution in Southampton. Domestic gas boilers, industrial emissions, particularly from the waterside, and shipping emissions also significantly contribute towards the total.

The pollutants of concern in Southampton are nitrogen dioxide (NO_2) and particulates, PM_{10} and $PM_{2.5}$. As a result of identified local air quality issues, Southampton has declared 10 Air Quality Management Areas (AQMAs) to date.

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].

Southampton, like many other urban areas, has elevated levels of Nitrogen Dioxide (NO2) due mainly to road transport emissions. Emissions from the port contribute significantly in key locations.

Southampton City Council (SCC) has designated 10 Air Quality Management Areas (AQMA) across the City where concentrations of NO_2 breach Government, health-based Objectives and has undertaken reviews of current and predicted levels in the future, including assessments of measures to reduce pollution levels.

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

[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

Summary of previous air quality reports and AQMA declaration history

Report Date	Report Type	Report Outcome
June 2003	Updating & Screening Assessment 1	Detailed Assessment required for SO_2 and NO_2
December 2004	Detailed Assessment	Six AQMAs required for NO_2 (annual mean)
July 2005	Declaration of six AQMAs	AQMAs declared along Bitterne Road, Town Quay, Bevois Valley Road, Redbridge Road, Romsey Road / Winchester Road Junction and Hill lane / Winchester Road Junction
July 2005	Progress Report (2004)	No recommendations
March 2006	Climate Change and Air Quality Strategy	Published Climate Change & Air Quality Strategy
September 2006	Further Assessment	Recommended that one AQMA increased in size (Town Quay) and one AQMA decreased in size (Hill Lane / Winchester Road)
September 2007	Air Quality Action Plan (and subsequent annual progress reports)	Air Quality Action Plan published and incorporated into the Local Transport Plan
August 2006	Updating & Screening Assessment 2	Detailed Assessment required for NO_2 at six locations and PM_{10} at one location
December 2007	Detailed Assessment	Two additional AQMAs required

July 2008	Declaration of two AQMAs	AQMAs declared for Commercial Road and Millbrook Road
November 2008	2007 Progress Report	No recommendations
July 2009	Further Assessment	Confirmed the two AQMAs declared in 2008 as valid
November 2009	Updating and Screening Assessment 3	Identified five roads outside the existing AQMAs which are at risk of exceeding the NO2 annual mean. Proceeded to a Detailed Assessment
December 2011	2010 Progress Report	Identified three more areas that were at risk of exceeding the NO_2 annual mean
April 2012	Detailed Assessment	Recommended the declaration of 3 new AQMAs at New Road, Victoria Road and Burgess Road. Also recommended the extension of the existing Bitterne Road and Romsey Road / Winchester Road AQMAs and the merging of Redbridge Road and Millbrook Road AQMAs to form one larger AQMA
December 2012	Updating and Screening Assessment 4	Portswood Road and Millbrook Point Road were identified as areas requiring further investigation with NOx tube monitoring. Proceed to Detailed Assessment for Nitrogen Dioxide

December 2013	Progress Report	The southern end of Romsey Road was identified at risk of exceedance, 2 more NOx tubes to be deployed. Queens Terrace and Orchard Place adjacent to the Platform Road AQMA were identified at risk of exceedance
May 2015	2013 Progress Report and Detailed Assessment combined Report	The Report gave consideration to extending the existing AQMAs on Romsey Road and Bevois Valley Road to include receptor locations that were exceeding in 2013,
November 2015	Updating and Screening Assessment 5	Shirley High Street was identified as being at risk of exceedance, 3 NOx tubes were deployed in July 2015 to monitor. The AQMA amendments recommended in the May 2015 Report have been delayed pending the outcome of the Clean Air Zone consultation.
December 2016	Annual Status Report	Nitrogen Dioxide annual mean continued to reduce in most of the 10 AQMAs in 2015. The proposed Clean Air Zone will be the main mechanism for improving air quality in the future.

SCC work closely with our partners, which include neighbouring local authorities, Highways England, Hampshire County Council (HCC), bus and train companies, Southampton Universities and the Environment Agency. The SCC transport department meets regularly to coordinate sustainable transport measures in south Hampshire with neighbouring authorities and businesses, such as the Port and major employers in the city. The new Clean Air Partnership will bring all interested groups together to discuss measures to improve air quality in the city.

In general NO_2 levels are reducing in the city over the last 5 years, but not as fast as was expected. NO_2 monitoring shows a reduction at most of the automatic monitoring stations and 60 NO_2 diffusion tubes in the city. However in 2016 adverse weather conditions, (less wind) caused air pollution to increase compared to the previous year.

In 2016 Southampton City Council issued 32 moderate air alerts to users of the air alert service in the city. Mostly during the summer period for moderate levels of ozone. Although there were 9 alerts during the November/December period for moderate particle dust.

Actions to Improve Air Quality

In 2015, SCC commenced the development of a Low Emission Strategy (LES) aimed at reducing road transport emissions of Oxides of Nitrogen (NOx, a precursor of NO_2) and other key vehicle pollutants, including particulate matter (PM) and Carbon Dioxide (CO_2).

Southampton has massively boosted cycling to school by 320% (LTP 3).

Journeys to work by bike have risen by a quarter from 2001-2011.

Projects worth a total of £96.4million has been invested in the transport network in Southampton since 2011. Including £2.3 million Clean Bus/Vehicle Technology, £38.5 million Local Sustainable Transport Fund (LSTF). This included £3.96 million for its “Southampton Sustainable Travel City”. A package of targeted measures to encourage sustainable travel. £980,000 of funding has been allocated for electric vehicle charging points in the city from the £2.3 million Clean Bus/Vehicle Technology Grant.

Photo examples of recently built cycle infrastructure improvements in the city below

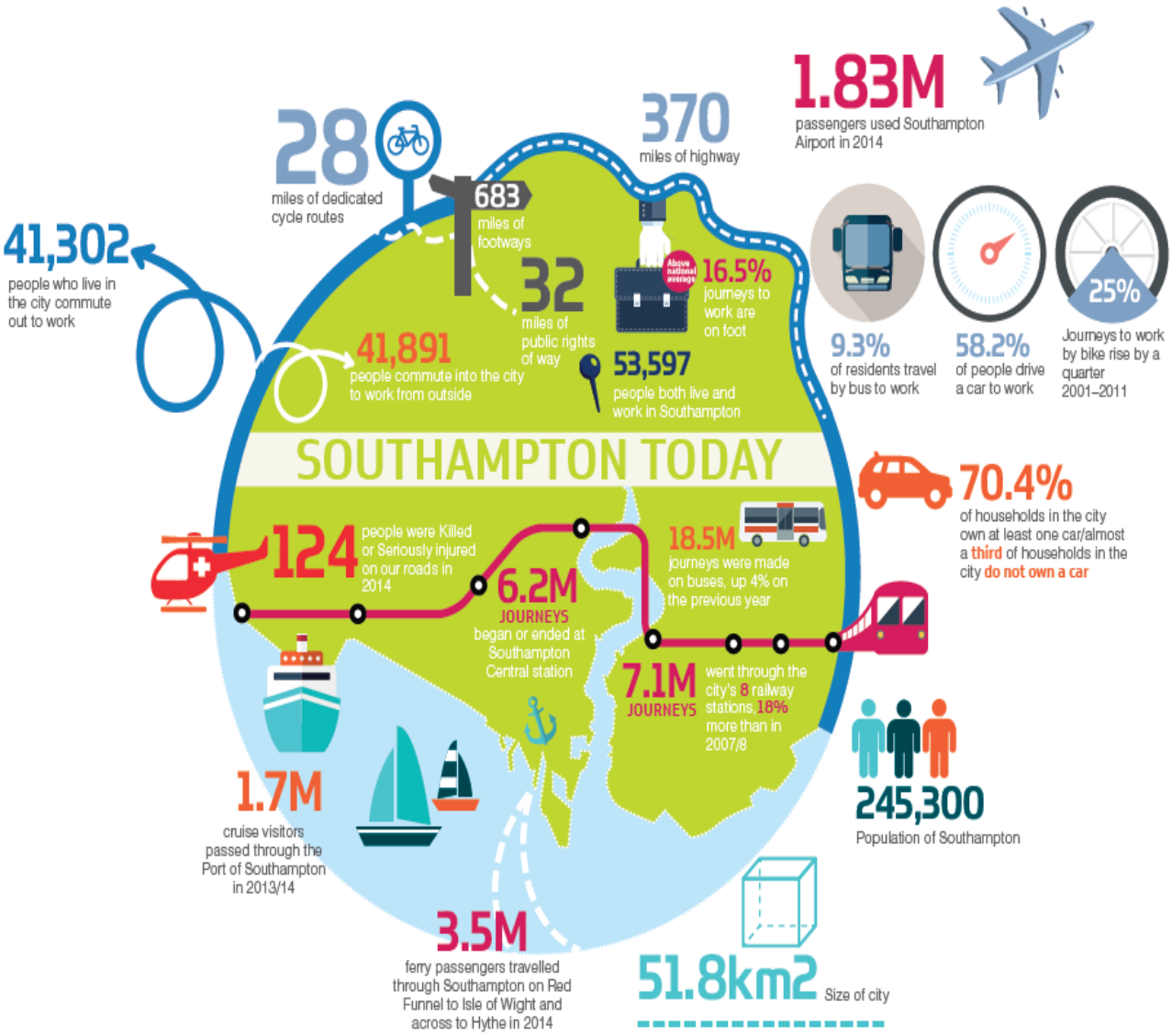
Figure 1 revamped cycle lane on the Itchen Bridge

Figure 2 new cycle lane at Central Bridge Junction

The Southampton Sustainable Travel City LSTF programme has delivered:

- Multiple projects implemented at businesses, schools, hospitals and in residential neighbourhoods to promote sustainable travel choices, which exceeded the target number of people engaged and led towards changes in travel behaviour.
- A Sustrans Bike It programme that has engaged with 32 primary and secondary schools over three years with over 350 activities and events held (9,000 children plus over 1000 parents and 600 staff). After the first three years of engagement hands-up surveys at 15 schools has seen a 3.2% reduction in car use and that levels of cycling to school have increased by 19.4% and walking by almost 7%.
- Over 18,000 pupils a year in the city took part in the Walk to School Weeks.
- At primary school level 73% of journeys are made by sustainable modes, walking, cycling, scooting, bus and park & stride; at secondary school this rises to 79% with walking, bus, cycling and scooting popular
- Station Travel Plans for Southampton Central Station and one covering the seven local stations completed, and a Brompton Dock cycle hire facility was opened at Southampton Central.
- High awareness of the My Journey brand with an estimated 53% of the public aware of the brand.
- 35,000 people a year receive some level of sustainable travel information and incentives through the workplace, with over 1,600 adults receiving detailed personal travel information via events held at workplaces in Southampton. A further 3,600 received information and incentives through the annual Commuter Challenges.
- 104 business were engaged with through the LSTF programme, with 28 of those having active Travel Plans. From staff surveys, while the car remains the primary way of getting to work (45%), other modes such as walking (16%) and public transport (24%) are popular.
- Community engagement programmes have been well received by the public and engagement targets continue to be exceeded with over 15,000 residents interacted with through sustainable travel roadshows, over 11,000 attending the annual SkyRide events, 1,900 through Bikeability, 2,215 via cycle training and 1,900 who received information on active travel.
- The annual Commuter Challenge engages with over 100 businesses and 2,000 employees competing to log their walking, cycling, public transport and car sharing journeys. So far over 264,000 miles were logged with almost 34,000kg of CO^2 saved and an estimated £71,000 saved.
- This intensive programme has seen car use decline, between 2010 and 2014, on all six key corridors entering the city centre, with the percentage of journeys made by car down by 3%, with cycle use almost doubling across all corridors. All traffic entering the city centre on primary corridors has decreased by 6%.
- The Sustainable Distribution Centre (SDC) scheme was launched with storage and consolidated delivery options made available to organisations.

Figure 3 Southampton Statistics



The infographic above shows some interesting transport related statistics for Southampton which have an impact on local air quality.

Monitoring – Key Successes

Monitoring data has shown a steady reduction in nitrogen dioxide within all of the AQMAs over the last 10 years. However in 2016 small increases were monitored at many sites. This is most likely due to adverse weather conditions in 2016, less windy conditions to disperse air pollution.

Implementation of the Victoria Road AQMA one way system has reduced air pollution. All 5 of the diffusion tubes in the AQMA were below the nitrogen dioxide annual mean standard in 2015 for the first time. However in 2016 the tube at 24 Portsmouth Road was 40.4 ug/m^3 the first time this tube has exceeded the standard, although only slightly.

All 6 of the diffusion tubes in the Bitterne Road AQMA were below the nitrogen dioxide annual mean standard in 2015. However in 2016, 166A Bitterne Road was above the standard.

The Platform Road scheme has reduced air pollution since completion. In 2015 all the diffusion tubes were below the nitrogen dioxide annual mean standard for the first time since monitoring began. However in 2016, 2 diffusion tubes were slightly above the standard.

The Romsey Road AQMA which has 7 diffusion tubes, showed a reduction in nitrogen dioxide. In 2014, 5 diffusion tubes were above the standard, but in 2015 only 1 was. In 2016, 2 diffusion tubes were slightly above the standard.

The Redbridge/Millbrook Road AQMA which has 12 diffusion tubes has showed a reduction in nitrogen dioxide over the last 10 years. In 2014, 6 diffusion tubes were above the standard, but in 2015 only 3 were. However in 2016, this trend reversed, with 8 diffusion tubes exceeding the standard, although this included 2 new sites on Redbridge Causeway, which are not representative of residential exposure. The Redbridge Causeway diffusion tubes are on the kerb of the main road, whereas the houses are well set back from the Road by 20-30metres.

Both Burgess Road and New Road AQMAs also monitored reductions in nitrogen dioxide over the last 10 years, although there were still some exceedances. In 2016 the downward trend reversed, with small increases monitored.

Grant funded projects update

The £20,000 DEFRA air quality grant project for a Clean Air Partnership will commence in 2017.

The £17,000 DEFRA air quality grant project Assessing the NO_2 compliance and health impacts of Clean Air Zone options has been completed.

The £50,000 DEFRA air quality grant project to undertake a full scale pilot study to assess the feasibility of reducing NOx emissions from diesel straddle carriers within the container port is ongoing. The Council is working with DP World and Ricardo.

The £99,000 DEFRA air quality grant project for Eco-safe driver training was awarded in early 2017. This project aims to reduce emissions and fuel costs for the Council's vehicle fleet. It will commence in 2018.

The £254,000 DEFRA air quality grant project to implement a low emission taxi scheme covering Southampton and Eastleigh was awarded in early 2017. The scheme will provide taxi operators with financial incentives to purchase low emission vehicles to replace eligible higher emission taxis in their current fleets, and to retain these for at least three years.

The £539,000 DEFRA air quality grant project to organise the first ever National Clean Air Day (NCAD) in June 2017 was awarded in early 2017. The project will see local schools, hospitals and communities in Birmingham, Derby, Leeds, Manchester, Nottingham and Southampton running events and inspiring other local residents to act for their own health and the health of local children.

Conclusions and Priorities

In December 2015, DEFRA published Plans to improve air quality in the UK. The Plans identify 5 cities outside Greater London that are not expected to meet the binding EU Limit Value for NO_2. The cities include Southampton, Birmingham, Derby, Leeds and Nottingham. The Plans state that each of the cities identified will be legally

required to introduce a Clean Air Zone (CAZ) for specified classes of vehicles and European Vehicle Emission Standards (Euro Standards) by 2020 or sooner.

SCC is committed to improving air quality and health in the City and, in light of the DEFRA Plans, will undertake the following:

- Re-designate the 10 AQMAs into one Clean Air Zone (CAZ) covering all main, radial roads and key pollution hotspots in the City.
- Introduce a voluntary CAZ in 2017 promoting interim standards that can be achieved quickly and wider measures aimed at changing vehicle purchase and use behaviour.
- Assess the need for a mandated CAZ in 2019 with enforced emission standards for buses, coaches, heavy goods vehicles (HGVs) and taxis in line with a National Clean Air Zone Framework. This is currently subject to review and dependent on DEFRA's most recent dispersion modelling and advice.
- Develop a Clean Air Network (CAN) in conjunction with neighbouring authorities and key stakeholders. The CAN will seek to develop common emission reduction policies and measures across the region to ensure that pollution problems are not displaced and the benefits of the CAZ are accrued over a wider area. The CAN will introduce a Clean Air Recognition Scheme (CARS) to promote the early uptake of cleaner fuels and technologies.
- The LES will be re-named as the Clean Air Strategy and will include high level messaging, health impact awareness and a comprehensive programme of measures to support the CAZ through behaviour change and sustainable transport modal shift . The CAZ, CAN and CAS will be supported and promoted through an effective communication strategy, which is central to achieving emission reduction aims in Southampton. This will include the development of the MyJourney portal as a one-stop-shop for information and advice.
- SCC will work with project partners to introduce mechanisms, including incentives,that will encourage all key stakeholders to aim higher than the mandated CAZ requirements and transition to the use of ultra-low emission vehicles (ULEVs).

- SCC, through the CAN, will develop a database of potential funding opportunities to be pursued in order to support the CAZ and CAS. It is believed that the CAZ plans will provide a significant platform for inward investment.
- SCC will continue ongoing discussions with DEFRA and DfT regarding the final scope and funding for the CAZ. This Implementation Plan outlines in detail the next steps that SCC will take in introducing a CAZ in the City.

Exceedances of the nitrogen dioxide annual mean were monitored within the Redbridge/Millbrook Road, Victoria Road, Romsey Road, Commercial Road, Town Quay, New Road, Bevois Valley, Burgess Road, and Bitterne Road AQMAs. The one diffusion tube within the Winchester Road AQMA did not monitor any exceedance. In fact it was well below at 31 µg/m^3 . Consideration will be given to revoking the AQMA in the future.

The highest nitrogen dioxide annual mean was monitored on the boundary fence of Redbridge Community School at 54.3 µg/m^3. Although the school buildings are well set back from the fence.

An Exceedance was monitored outside the AQMAs at one relevant receptor on Shirley High Street, the Salisbury Arms Pub. The other 2 diffusion tubes in Shirley High Street were compliant with the annual mean standard. Shirley High Street is likely to be included within the proposed Clean Air Zone. Shirley High Street has a high volume of buses. As the bus fleet is modernised and retrofitted with emission abatement it is likely emissions will reduce along Shirley High Street in the near future. Nitrogen Dioxide increased in 2016 compared to the previous year. This was most probably due to adverse weather conditions for air quality.

Local Engagement and How to get Involved

Southampton City Council will facilitate a Clean Air Network (CAN). This will provide an opportunity for stakeholders to:

- Shout about what they're doing to improve air quality.
- Ask for help when they encounter obstacles.

- Work together.
- The CAN will be overseen by the Environment Centre who will compile and disseminate activity across the network which will include.
- Local and National Business
- Community
- Charity
- Academic
- Private and Public Sector
- Education
- Health
- Campaign Groups
- Everyone interested in improving air quality

Figure 4 Clean Air Network

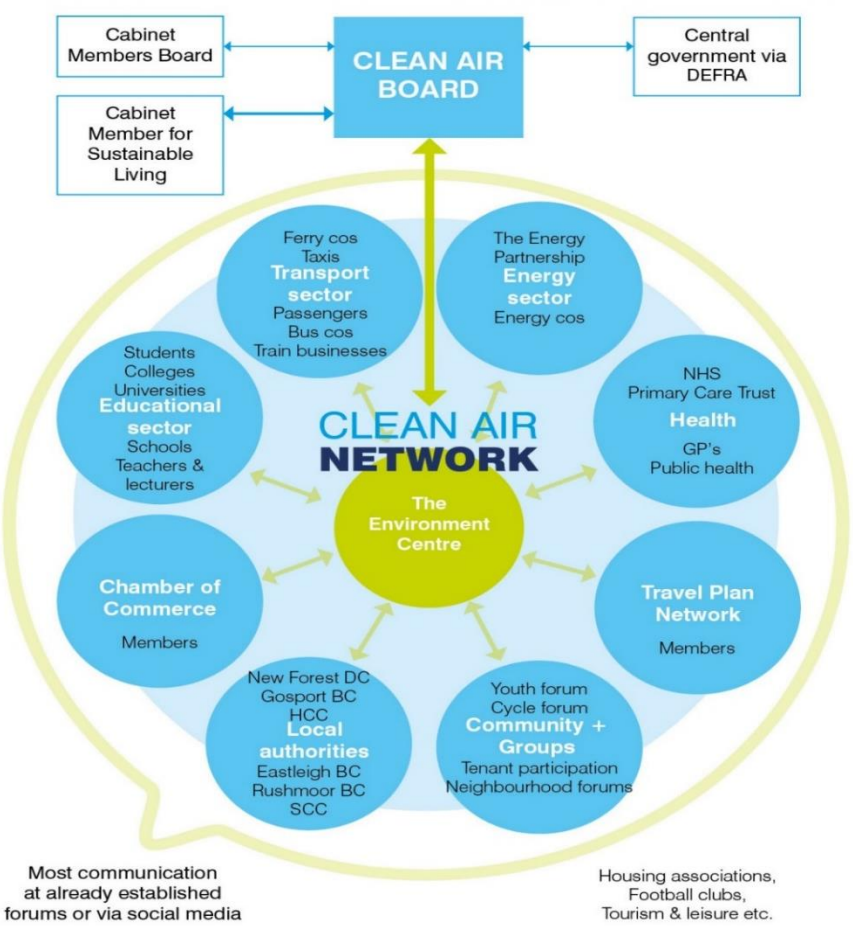
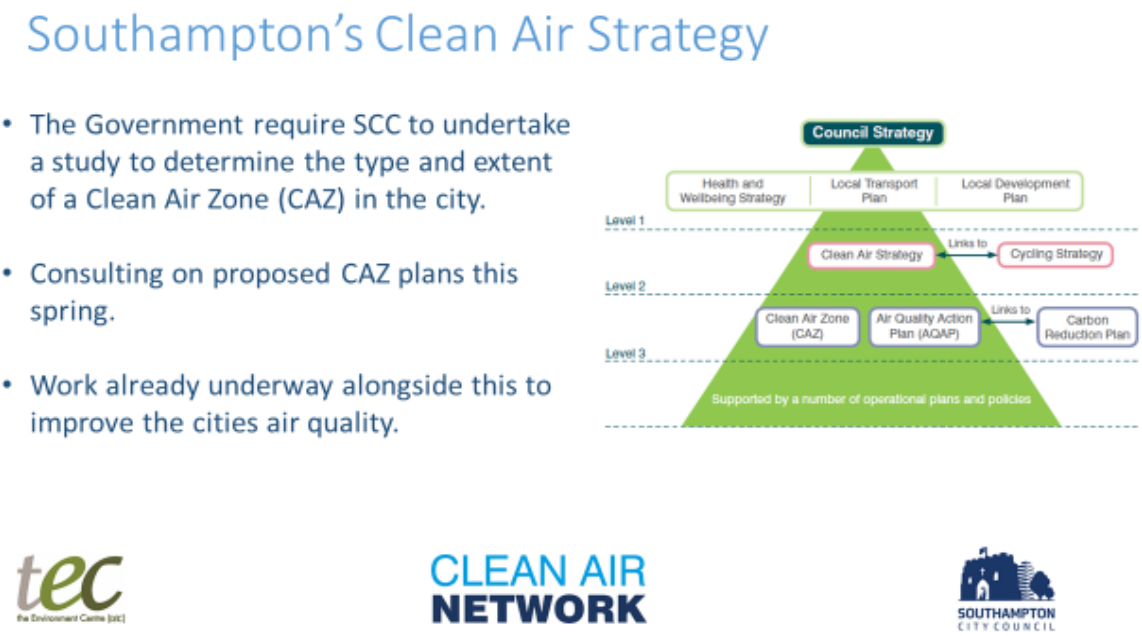


Figure 5



Everybody can "do their bit" to improve local air quality and improve their health.

Road Transport

- For short journeys, walking, cycling and public transport can be the best and cheapest option.
- Find out about car sharing and car club schemes http://myjourneysouthampton.com/drive/city-car-club
- Find out about local bus services that may suit your travel needs in Southampton. http://myjourneysouthampton.com/
- Find out about the city cycle routes and use the cycle route map

  http://www.myjourneysouthampton.com/sites/default/files/Southampton%20Cycle%20Map%202012-13.pdf?_ga=1.214224145.72651337.1475835148
- Turn off your car engine when waiting at traffic lights, traffic jams and closed level crossings

- Become an eco-driver by anticipating traffic flow, keeping in the highest gear possible and maintaining a steady speed at a low revs per minute (RPM). This will help to reduce pollution from your car, and save on fuel consumption.
- Consider purchasing a cleaner electric, hybrid vehicle or one that meets the euro 6 emission standard.
- Maintain your vehicle regularly, if a diesel, make sure the oil and filters are changed frequently. If you notice sooty emissions from the exhaust, take your vehicle to a servicing garage as soon as possible. Ensure your tyres are maintained at the optimum pressure to achieve the best fuel consumption and save you money.

Get Active

- Leave your car at home and try walking/cycling to the local shops, even if it is only once or twice a week. If you can make it part of your normal routine, not only will you be reducing air pollution, you will be more active and healthy.

Plan ahead

- Take some time to plan ahead and consider the small steps you can take to reduce pollution, for example planning journeys that you can leave your car at home or car share.
- When taking a walk, consider the route. It may be possible to take footpaths and streets away from busy roads or areas of local traffic congestion therefore avoiding areas of higher air pollution.

Raising air quality concerns

Southampton City Council residents and businesses can raise concerns about air pollution directly with the Regulatory Services department or their local Councillor, details and links listed below. Officers may be able to offer advice or investigate your concerns further.

Contacts

- Local Councillors

  Your local councilor details can be found on this link:
  http://www.southampton.gov.uk/council-democracy/councillors/default.aspx

- Southampton City Council

  Your contact with regard to local air quality issues at the Council is:

  Simon Hartill or Steve Guppy
  Regulatory Services
  Civic Centre
  Southampton
  SO14 7FP

  E mail: environmental.health@southampton.gov.uk

  Telephone: 023 80832531

Southampton Local Residents Air Quality Campaign Groups

- Western Docks Consultative Forum http://www.wdcf.org/

- Clean Air Southampton www.cleanairsouthampton.wordpress.com

- https://www.facebook.com/cleanairsouthampton/

Table of Contents

List of Tables

List of Figures

1 Local Air Quality Management

This report provides an overview of air quality in Southampton City Council during 2016 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.

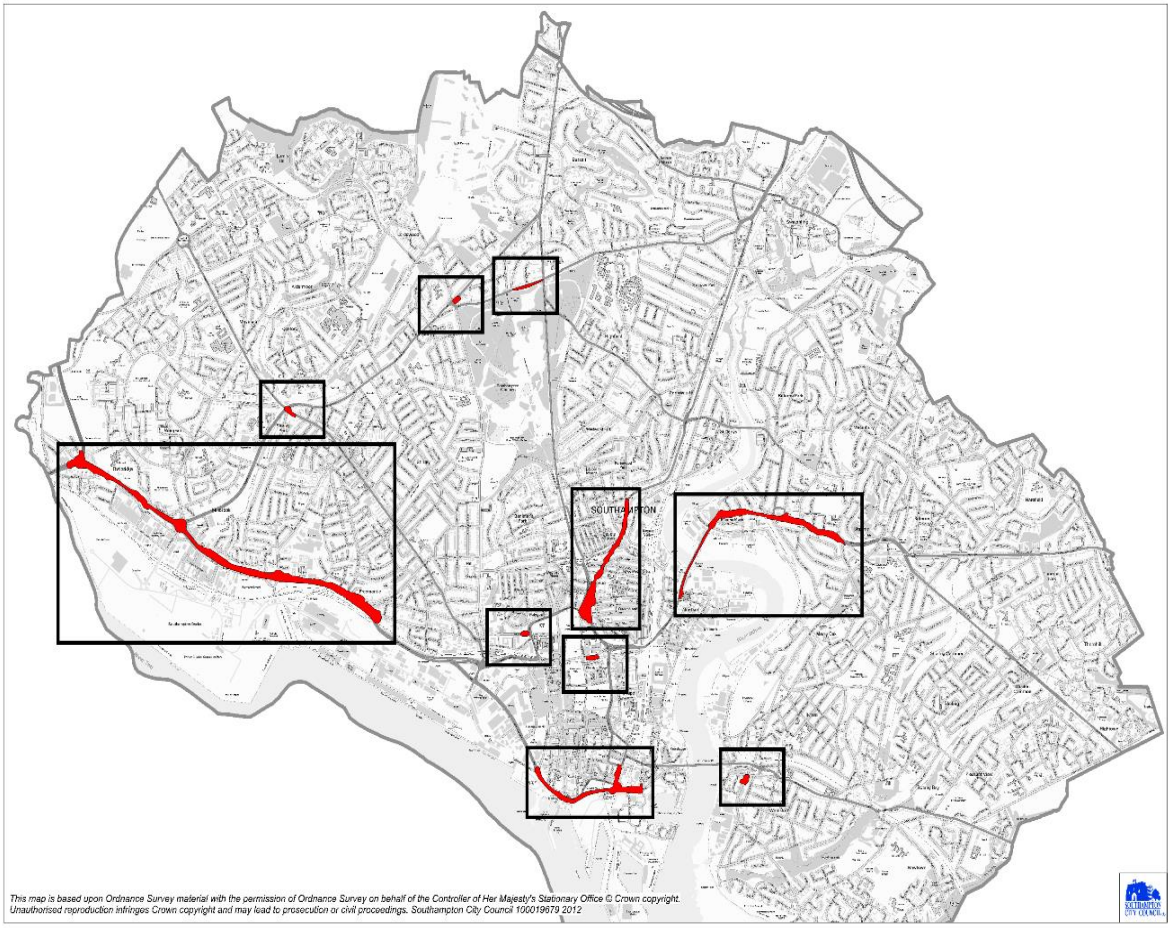
The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

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) within12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

Figure 6 showing the locations of the 10 AQMAs in Southampton



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

management-areas.aspx 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).

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 (inc. date of publication)
						At Declaration	Now	
AQMA Bevois Valley	Declared July 2005	NO2 Annual Mean	Southampton	An area encompassing a number of properties from Charlotte Place Roundabout to Bevois Valley Road	NO	50 µg/m^3	51 µg/m^3	Southampton City Council has one Action Plan for the entire city, first published in 2007 soon to become a Clean Air Zone http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx
AQMA Bitterne Road West	Declared July 2005, extended in 2012	NO2 Annual Mean	Southampton	An area encompassing a number of properties from Northam Road and along	NO	43 µg/m^3	42 µg/m^3	http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx

				Bitterne Road West				
AQMA Winchester Road	Declared July 2005, reduced in size in 2006 after Further Assessment	NO2 Annual Mean	Southampton	An area encompassing residential properties at the Winchester Road/Hill Lane Junction	NO	35 µg/m^3	31 µg/m^3	http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx
AQMA Town Quay to Platform Road	Declared July 2005, increased in size in 2006 after Further Assessment	NO2 Annual Mean	Southampton	An area encompassing a number of properties from Town Quay to Platform Road	NO	44 µg/m^3	40 µg/m^3	http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx
AQMA Redbridge to Millbrook Road	Declared July 2005, merged into one AQMA in 2012 after Further Assessment	NO2 Annual Mean	Southampton	An area encompassing a number of properties along Redbridge/Mill brook Road	YES	45 µg/m^3	45 µg/m^3	http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx
AQMA Romsey Road	Declared July 2005, increased in size in 2012 after a Detailed Assessment	NO2 Annual Mean	Southampton	An area encompassing a number of properties along Romsey Road from Teboura Way to Shirley High Street	NO	44 µg/m^3	42.5 µg/m^3	http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx

AQMA Commercial Road	Declared July 2008	NO2 Annual Mean	Southampton	An area encompassing a number of properties along Commercial Road at the junction with Cumberland	NO	45 µg/m^3	45 µg/m^3	http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx
AQMA Burgess Road	Apr-12	NO2 Annual Mean	Southampton	An area encompassing a number of properties along Burgess Road at the junction with The Avenue	NO	47 µg/m^3	47 µg/m^3	http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx
AQMA New Road	Apr-12	NO2 Annual Mean	Southampton	An area encompassing a number of properties along New Road	NO	46 µg/m^3	45 µg/m^3	http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx
AQMA Victoria Road	Apr-12	NO2 Annual Mean	Southampton	An area encompassing a number of properties along Victoria Road at the junction with Portsmouth Road	NO	43 µg/m^3	40 µg/m^3	http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/default.aspx

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

Defra's appraisal of last year's ASR concluded the conclusions reached are acceptable for all sources and pollutants, Southampton City Council has taken forward a number of direct measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

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

- Establish the Clean Air Network
- Adopt a 10 Year Cycle Strategy
- Low Emission Taxi Incentive Scheme launched
- Installation of 30 electric vehicle charge points into SCC owned multiple storey car parks
- Continuation of air alert service and partnership with Eastleigh BC.
- Design planning on Western Approach enhanced cycling infrastructure
- Installation of Variable Message Signs to inform journey planning and air quality messaging at locations across the city
- No Idling Campaign

Southampton City Council's priorities for the coming year are to assess and develop the options for the Clean Air Zone in partnership with DEFRA's Joint Air Quality Unit. To establish a Clean Air Network of stakeholders in the City.

The principal challenges and barriers to implementation that Southampton City Council anticipates facing are financial pressure and possible resistance from some of the business community.

Progress on the following measures has been slower than expected:

- Shore side electric supply to ships at berth, enabling ship's engine to be turned off. Technical infrastructure issues, lack of mandatory international standard and cost.
- Unsuccessful bid for £5 million Go Ultra Low City Status.
- Unsuccessful Trial of innovative retrofit Flywheel Technology for buses. Funded by a DEFRA grant, after the initial trials on retrofitted buses it proved too technically challenging. The remaining £980,000 funding was reallocated to electric vehicle charging infrastructure, with DEFRA's permission.
- The age limit of the taxi fleet has been raised from 10 to 12 years after a Taxi Licensing Panel Decision, 3 years ago. The Taxi Drivers Association lobbied hard for this change. The likely Clean Air Zone euro 6 standard will reverse this decision in 2019.
- DEFRA Grant and DP World funded gas trial for Straddle Carriers in the Port. DP World decided not to go ahead with this trial. As an alternative, a trial is being undertaken on emission reduction technologies for retrofitting diesel straddle carriers using portable emission testing with DEFRA's permission.

Southampton City Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in most of the AQMAs by 2020/21.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure 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	Promoting Low Emission Transport	Low Emission Zone (LEZ)	SCC, Defra , DfT. Funding from Defra	2017-2018/19	2019/2020	1. Achieve EU Directive 2. Accelerated Uptake of new and low emission vehicles	Achieve 40 µgm3 at EU Air Quality Directive locations	1. Working group with DEFRA/DfT, established. 2. Funding for CAZ Feasibility Studies secured 3. ANPR Fleet composition survey funding secured 4. Specification for study drafted	Before 2020	Southampton was identified as one of five cities required to implement a mandatory CAZ no later than 2020. Resources will need to be secured for the delivery of the CAZ infrastructure
2	My Journey	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	SCC, DfT, £2.1 million awarded from DfT Access Fund, HCC, Sustrans , neighboring local authorities Residual LSTF funding being used.	2012	2013-2018	Reduction in car journeys in the city	1-3 µgm^3	The 'My Journey' active travel behaviour change programme has run for 6 years. It has achieved a 52% awareness of the MyJourney brand based upon 2500 survey responses. The campaign has won 2 national communications awards. 45 events roadshows have been staged. The My	ongoing	SCC have been awarded £2.1 million from the DfT Access Fund to deliver the My Journey sustainable travel behaviour change programme for the next 3 financial years.

									Journey website continues to offer a multi-modal journey planning tool and live bus and train travel information with over 1,100,000 site visits to date.		
3	Workplace travel planning	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	SCC internal revenue budget	2010	ongoing	Membership of travel plan network	< 1µgm3	Engaged with over 25 employers	ongoing	Funding and lack of interest/buy in from employers
4	Schools engagement	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	SCC internal revenue budget	2010	ongoing	Number of school travel champions	< 1µgm3	Engaged with 40 schools	ongoing	Funding and lack of interest/buy in from schools
5	Cycling and walking	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	SCC internal revenue and capital budget	2010	ongoing	Pedestrian and cycle count survey data. Number of new kms of cycle route constructed	< 1µgm3	Legible cycle network design ongoing. A pipeline of schemes in the design stage	ongoing	Funding is the main barrier
6	Freight consolidation and efficiency	Freight and Delivery Management	Freight Consolidation Centre	SCC	2012	2014-2020	Reduction in HGV movements in the city.	< 1µgm3	Meachers have been operating the SDC with public sector support for over 3 years with 6 consistent public sector delivery contracts utilising storage space and consolidated load deliveries into and out of the city centre. The facility is the first in the UK to operate independent of subsidy as a stand alone and profitable	ongoing	Work is ongoing to increase uptake of the service. University is continuing to roll out delivery servicing plans for major organisations in the city

									venture. SCC are committed to the ongoing promotion of the SDC and the roll-out of Delivery Service Plans, identifying sustainable freight strategies for individual organisations in the citiy. All companies within or adjacent to an AQMA will be engaged with to develop a DSP to identify logistics efficiencies.		
7	Establish Clean Air Partnership	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	Funded by Defra Grant. SCC, The Port, business stakeholders, Southampton University, local air pollution pressure groups, Environment Centre	December 2016-July 2017	Dec-17	First partnership meeting of LA stakeholders held. Wider stakeholder agreement published and members signed-up to pledge.	tbc	The governance arrangements for the Clean Air Partnership are in the process of being pieced together. Outline operating model established A third party, the Environment Centre, has been commissioned to deliver the CAP. Draft terms of reference have been provided.	2017-2018	Partnership of LAs, private sector companies pledging to deliver improvements and demonstrate progress by achieving agreed targets
8	Cycle Lane/Routes Provision.	Transport Planning and Infrastructure	Cycle network	SCC	2012	2013-2018	tbc	< 1µgm3	Route development on northern cycle route. A draft 10 year cycle strategy has been produced identifying the investment required along the key cycle	Ongoing as and when funding allows	A draft 10 year cycle strategy has been produced which was adopted in March 2017. DfT Funding has been secured to improve the western approach cycle route

									commuter routes into the city centre		
9	City Car Club	Alternatives to private vehicle use	Car Clubs	SCC	2014	2015-2018	Usage of car club	< 1µgm3	3 separate promotional campaigns advertising the car club and offering discounted membership have been run	ongoing	Enterprise Car Rental have taken over the club with work being undertaken to expand the number of car available and number of registered users. Limited promotional activity was undertaken in 2016 due to lack of resource.
10	Air alert	Public Information	Other	SCC	2009	2010-2016	customer satisfaction survey	na	390 users subscribed to the service December 2016, 178 air alerts issued since 2010	completed	Eastleigh council joined air alert in November 2016, high customer satisfaction with the service
11	Electric Vehicle Action Plan (EVAP),	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	SCC	2016	2017	Number of new public charging points installed over life of programme. Number of electric vehicles in SCC Fleet.	tbc	£980k funding secured for recharge infrastructure, council fleet upgrades and promotional activity around EV's in the city.	tbc	£980k reallocated from CBTF Grant to fund electricvehicle recharge points in the city at council owned car parks, taxi ranks and SDC.
12	National Clean Air Day June 2017	Public Information	Other	SCC, Global Action Plan	Jan-June 2017	Jun-17	public awareness raising	na	Air Quality Events to take place at the General Hospital, Westquay Shopping Centre, Schools and Sure Start Centres	Jun-17	Confirmation of funding for local and national events received in March 2017 limiting time to organise the events.

13	M271 Redbridge Junction capacity design improvement	Traffic Management	Strategic highwqy Improvements	Highways Agency (HA)	2016	2018	Traffic Flow inproved	< 1µgm3	Outline Proposal produced, diffusion survey in progress. Liasing with HA on mitigation measures	2019	Multi million pound infrastructure project with changes modelled to improve traffic flow
14	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%	< 1µgm^3	£99k grant applied for November 2016	2019	Grant funding awarded by Defra 31.1.17. Scheme to be rolled out for the next 3 financial years. Requires careful consultation to ensure Union support of drivers
15	Bus Priority measures	Traffic Management	Bus route improvements	SCC	2014	2015-2017	tbc	< 1µgm^3	Bus priority programme in progress with 42 junction improvements identified continue to be delivered	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.
16	Improving Bus Journey Time Reliability	Traffic Management	Bus route improvements	SCC	2014	2015-2017	tbc	< 1µgm^3	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. This will deliver an economic benefit, improve punctuality and journey

											times, whilst reducing emissions.
17	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	Delivery of project plan in accordance with milestones	tbc	funding secured, Ricardo appointed	ongoing	Trial timeframe to be agreed with DP World. Project review meetings to be convened. MoU between partners to be agreed.
18	Eastern Access Highway Scheme	Transport Planning and Infrastructure	Strategic highway Improvements	SCC, DfT	2016-18	2020-22	Scheme complete	< 1µgm3	Highways England design work underway	Q4 2022	Funding may not be secured. Objections during consultation.
15	City-wide fleet composition survey	Vehicle Fleet Efficiency	Other	SCC	Q1-3 2016	December 2016	Data delivered	na	ANPR camera survey completed in December 2016 to calculate emission standard of current vehicles using main roads	Q4 2016	Preparatory survey for implementation of CAZ. Project to be used to support the CAZ
16	Clean Air Strategy	Policy Guidance and Development Control	Low Emissions Strategy	SCC	2016	2016	To be adopted by Q4 2016	< 1µgm3	Clean Air Strategy adopted in November 2016 and published on the council website.	Sep-16	The strategy outlines the councils commitment to addressing poor air quality and supports the CAZ
17	Website and communications	Public Information	Via the Internet	SCC	2016	2017	Comms plan to be established Q2 2017	na	Webpages updated with CAZ information	ongoing	A communications and marketing strategy for Clean Air to be developed. 2 AQ Communications Strategy workshops held with key stakeholders to begin to shape this strategy. Recruiting to the new Comms Officer post to

											support air quality and sustainable transport
19	Anti-idling campaign / enforcement	Traffic Management	Anti-idling enforcement	SCC	2017	2018	tbc	tbc	Campaign being planned, funding secured via the DEFRA National Air Quality Grant fund	By Q2 2018/19	Campaign being planned, funding secured via the DEFRA National Air Quality Grant fund for the National Clean Air Day
20	Retrofit for buses: SCRT for older buses. Thermal management for Euro 5	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	SCC	2015-16	tbc	trial result published, commitment from bus operators to retrofit	tbc	Funding bids to be submitted to future rounds of clean bus technology fund	tbc	assess effectiveness of technlogies using PEMS, thermal management and micro hybrid for reducing tailpipe emissions. Barrier: funding unsuccessful
22	EV car clubs	Alternatives to private vehicle use	Car Clubs	SCC	2016	2017-18	Usage of cars	tbc	Discussion with Enterprise Car Rentals over the deployment of EV's as part of the existing car club fleet		On street infrastructure will need to be provided
23	Encourage freight consolidation	Freight and Delivery Management	Delivery and Service plans	SCC	2016	2017	Number of freight trips prevented	< 1µgm^3	DSPs conducted for major organisations in the city identify and advocate electric vehicles where appropriate as a means of achieving commercial efficiencies	tbc	Delivery and Servicing Plans to continue to be on offer to local organisations
24	Encourage Port to utilize vehicle booking system to	Promoting Low Emission	Priority parking for LEV's	ABP/DP World	2017	2018-2020	Vehicle survey in favour of latest euro engine	< 1µgm^3	Discussion ongoing with Port community	tbc	Ensuring sufficient interest from business. The currently vehicle booking charge is minimal and would

	encentivise cleaner vehicles	Transport					emission standard				require a significant overhaul to be effective
25	Green Wall alongside A33	Transport Planning and Infrastructure	Other	SCC, The Port	2016	2018-2020	Number of trees planted	tbc	In the planning phase	tbc	Land ownership issues, finding space to plant trees

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 $PM_{2.5}$

Current Measures

A number of schemes that are being progressed through the Air Quality Action Plan to reduce nitrogen dioxide will also have a positive impact on reducing $PM_{2.5}$. These measures are shown in Table 2.2.

New Measures

The proposed Clean Air Zone with a Euro 6 emission standard for HGVs, buses and taxis will help to reduce $PM_{2.5}$ along the main road corridors and city centre. The likely reduction impact is currently being modelled.

The Clean Air Strategy has a target to reduce the fraction of mortality attributable to particulate pollution, see next page for more details.

A Clean Air Strategy for Southampton 2016-2025

Clean air is essential for good quality of life, yet every day people living in our urban centres can be exposed to potentially harmful levels of pollutants.

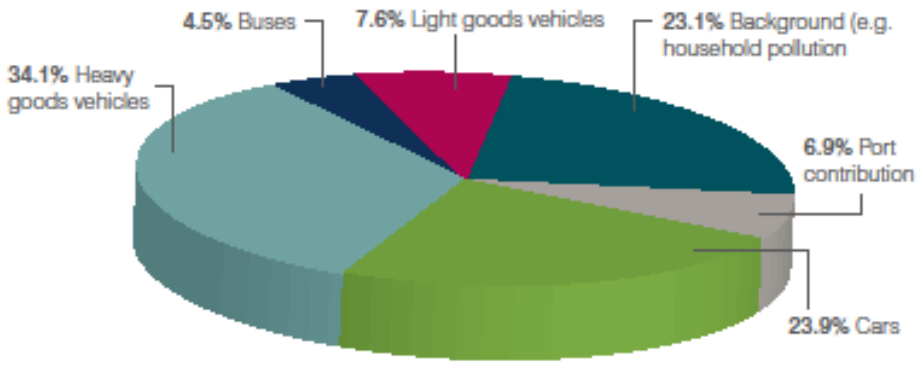
Southampton City Council is committed to improving the city's air quality. Reducing emissions and air pollution now will have lifelong, lasting benefits for the city's population, remove barriers to further economic development and make the city a more attractive place to work, live and visit. Improvements in air quality can deliver ongoing improvements in public health and wellbeing. To protect our residents' health we want to make the city's air as clean as we can.

The Council cannot improve air quality on its own. This strategy details the key ways in which we will work together with our partners to make improvements to air quality across the city.

AIR QUALITY IN SOUTHAMPTON

- There are many different pollutants that can affect the quality of the air we breathe. Nitrogen dioxide and Particulate Matter are the main concern in the UK.
- The negative effects of exposure to air pollutants occur at every stage of life, from early stages of development through to old age. Those with existing cardiovascular and respiratory disease are most at risk, but a wide range of health effects have been linked to the wider population including stroke, heart disease, obesity, lung cancer and asthma. Reducing the health impacts of local air pollution is identified as a priority by Public Health England in its Strategic Plan (2016 to 2020).
- The Council has a statutory duty to assess and review air quality in its area and make reasonable efforts achieve statutory thresholds. DEFRA have set limits for key pollutants. Monitoring and modelling in Southampton suggests levels of nitrogen dioxide could exceed that level beyond 2020, unless additional efforts are made.
- In the UK, up to 50,000 early deaths each year can be attributed to Particulate Matter and Nitrogen Dioxide exposure. Costs to society, businesses and NHS services due to poor air quality exceed £30 billion a year.
- Exposure to Particulate Matter alone is estimated to contribute to 110 early deaths in Southampton each year.
- Road transport is the biggest contributor to pollution across the city followed by industry. Port operations are also significant in certain areas of the city.
- Diesel cars have been encouraged by national policy to reduce carbon dioxide emissions. However, they generate significantly higher emissions of Particulate Matter and Nitrogen Dioxide than petrol cars. In 2001, 18% of all new cars registered were diesel. By 2012, this increased to 50%.
- Air quality is a consideration for the Planning Authority and the Council is obliged to ensure that impacts on air quality are taken into account when approving developments.

Causes of pollution in Southampton



Source apportionment (% of modelled nitrogen dioxide) at M271 and A33 junction, Redbridge

WHAT ARE WE GOING TO DO?

- The Council is committed to improving Southampton's air quality, reducing health impacts, and fulfilling our legal obligations. The national Air Quality Plan for Nitrogen Dioxide in UK (2015) sets out targeted local, regional and national measures to meet these goals.
- This includes implementing a new programme of Clean Air Zones in Southampton, Birmingham, Leeds, Nottingham and Derby. Under this Plan, by 2020 the most polluting vehicles - older buses, coaches, taxis and lorries - will be discouraged in Southampton through the levying of a penalty charge. Newer vehicles that meet the latest emission standards, and private cars will not be subject to the statutory penalty charges.
- The Council will develop a package of measures as part of the city's Air Quality Action Plan and Clean Air Zone implementation plan to encourage behaviours which support improvements in air quality.

We have identified four priorities for improving air quality in the city:

PRIORITY	WHY THIS IS IMPORTANT
Improve air quality in the city	• Air pollution has an adverse effect on people's health. Reducing levels of pollutants below statutory levels and beyond is key to improving the health and wellbeing of Southampton's residents of all ages. • The threshold level for nitrogen dioxide (annual average) is exceeded in a number of key locations across the city and the Council has a statutory duty to make reasonable efforts to reduce levels below this. • If air quality does not improve it could become a significant barrier to further economic growth.
Supporting businesses and organisations	• The Council cannot deliver improvements in air quality on its own - we will need to work with our local businesses and organisations to promote the benefits of change in term of both health and prosperity. • The Council will need to engage with residents, visitors, businesses and other organisations to encourage the use of low emission technologies, public transport and the take up of active travel such as cycling and walking.
Collaborating with communities and residents	• Cleaner air in Southampton can only be achieved if individuals and organisations take responsibility and change their current behaviours. • These measures can provide direct benefits to the health and wellbeing of everyone in the city. If our residents and visitors embrace this positive message we can expect to see improvements sustained for future generations. • Our communities and residents will need support to ensure they are able to deliver the changes they want.
Promoting sustainability	• It is important that measures to improve air quality in Southampton are sustainable and do not create a negative impact elsewhere. This might happen if the most polluting vehicles are displaced from the city or alternative fuels are not from a sustainable source. • The Council will promote sustainable change – as well as making sure that, when providing advice and promoting change to others, it can demonstrate its own efforts and the positive differences it is making.

WHAT DO OUR RESIDENTS SAY ABOUT AIR QUALITY IN SOUTHAMPTON?

In 2014, a survey of residents' views on air quality was undertaken:

- Of the 291 responses, 36% felt that air quality in the city was a "significant issue". Only 7% felt it was not an issue.
- Cars and HGVs were felt to be the main contributors to pollution, with buses, industry, shipping and other port-based activities also selected.
- Residents suggested a wide range of measures that would be needed to help improve the city's air quality including promoting public transport, cycling and walking, traffic improvements, low emission vehicles, penalty charging and port improvements.

OUR CHALLENGES

- Air pollution is linked to many major health problems facing cities like Southampton. Estimates suggest that 6.2% of early deaths in Southampton in 2010 were attributable to long term Particulate pollution alone.
- Those who live in deprived areas or have existing medical conditions are disproportionately affected by poor air quality.
- Between 2008/9 and 2012/13, Southampton has become relatively more deprived – of the 326 Local Authorities in England, Southampton is now ranked 54th (previously 72nd) most deprived.
- Southampton's port is the busiest cruise terminal and second largest container port in the UK. Its continued success is vital to the city's economy
- As a regional retail and economic centre, Southampton's economy is heavily reliant upon its transport links.

OUR SUCCESSES

- The Council introduced its first Air Quality Action Plan in 2007. At its last review, it identified 48 individual activities delivering improvements in local air quality.
- The city has a long established air monitoring network that provides robust data on current and historical pollution levels. Four continuous monitoring stations and 60+ passive sampling sites currently provide data on current levels and ongoing trends.
- Our air monitoring network has been able to demonstrate a steady statistical improvement in the city's air quality since 2007.
- Both the existing Local Transport Plan and Local Development Plan recognise the health impact of air quality and identify how improvements can be achieved.
- The Council was amongst the first authorities to offer an Air Alert service. This is free to anyone but is particularly valued by those with respiratory illnesses who can be more sensitive to air pollution.
- The My Journey campaign has achieved significant success in promoting public transport and active travel choices across the city. Over 100 events were delivered in 2015. More than 25% of the city's adult population have been engaged via one or more of the promotional activities. Over the programme period car journeys have reduced by 3% and cycling has almost doubled.
- The Council is working closely with key partners and has assisted and supported local bus operators, port operators and the University of Southampton in seeking and acquiring funding for activities to assess and improve air quality.

PRIORITY	OUTCOME	WHAT ARE WE GOING TO DO?
Improve air quality in the city	Adopt an effective programme of measures to reduce emissions of nitrogen dioxide, particulates and other pollutants in Southampton	• Establish the Southampton Clean Air Zone (CAZ) on a voluntary basis, with no charging, by 2017 and deliver an associated package of measures. • Fulfil our statutory requirements and introduce penalty charges in 2019/20 for the most polluting commercial vehicles entering the CAZ. • Ensure future revisions of our Local Transport Plan, Local Development Plan and all other Council and city plans and strategies provide suitable and adequate policies to reduce emissions and deliver cleaner air. • Improve transport and freight delivery systems through efficient infrastructure, uptake of new and innovative technologies and increased uptake of public transport, cycling and walking. • Encourage the uptake of low emission technologies and vehicles. • Identify where alternative fuels and innovative solutions might deliver positive outcomes and support their assessment and introduction.
Supporting businesses and organisations	Work with businesses and organisations to promote the uptake of low emission technology and change travel behaviours	• Develop a Clean Air Partnership with key stakeholders in the city and region. • Work with the Port of Southampton to identify and support initiatives that will reduce their emissions. • Continue to promote sustainable travel through maintaining the "My Journey" campaign and explore options for further development. • Empower businesses to take responsibility for their contributions to air pollution and implement improvements. • Implement schemes to support taxi operators, other businesses and public services in reducing the emissions relating to their activities. • Strengthen shared learning via networks including representatives from academia, community groups and expert groups.
Collaborating with communities and residents	Work with and support the education of communities and individuals to identify and support behaviours which improve air quality	• Develop a role for residents and community groups in our Clean Air Partnership. • Support the education sector to rais awareness of air polution and how to reduce emissions. • Incentivise the use of public transport, cycling and walking. • Empower communities and individuals to take responsibility for their contributions to air pollution. • Provide good quality, timely information and data on local levels of pollution to enable residents to adopt behaviours to maintain their own health.
Promoting sustainability	Southampton City Council will be an exemplar of sustainable working practices in relation to reducing emissions and improving local air quality	The Council will: • Lead by example, ensuring our plans, policies and working practices support and promote an improvement in local air quality whilst delivering wider environmental and economic benefits locally, regionally and nationally. • Introduce a programme of measures to reduce its emissions and act as a key partner, sharing best practice on reducing emissions and promoting sustainable working methods whenever it can. • Use its influence on the local supply chain to ensure impacts on air quality are considered when making procurement decisions, including in the procurement and operation of its own fleet.

HOW WILL WE MEASURE SUCCESS?

We will:

- Achieve all statutory air quality standards by 2020.
- Deliver an ongoing reduction in Nitrogen Dioxide and Particulate Matter levels, to include those arising from Southampton City Council activities.
- Reduce the fraction of mortality attributable to particulate air pollution.
- Implement the Southampton Clean Air Zone by April 2017, and penalty charging for the most polluting commercial vehicles by 2019/20.
- Increase the proportion of journeys to work and school made by public transport or active methods.
- Increase the uptake and use of ultra-low and zero emission vehicles in the city.

This Clean Air Strategy will also contribute to wider improvements in the health of the Southampton population and we anticipate improvements in key indicators for public health in the city.

More detail about how we intend to achieve our targets or monitor progress is included in our Air Quality Action Plan which will be reviewed and updated annually for the duration of this strategy.

LINKS TO OTHER STRATEGIES AND PLANS

Working with Public Health colleagues

- Environmental Health have regular meetings with our public health colleagues within Southampton City Council. The Health and Wellbeing Board that oversees the Strategy is attended by both Environmental Health and Public Health. Air quality and particulate pollution is regularly discussed by the Board and measures to reduce particulates is progressed. Recent work has included a collaboration with Southampton University to use particulate NASA satellite maps. A grant application will be made by the University to the ESRC funding body for this project named SPHERE (Satellite-based Pollution Health and Exposure) It is anticipated to use the smart phone technology of Google location history to track Southampton residents exposure to particulate pollution throughout the day. This project is being supported by Public Health England.
- The air alert service that warns registered users of predicted moderate/high air pollution alerts helps Southampton residents with respiratory disease to reduce their exposure to particulates. The service was developed with Sussex Air and Kings College London, with the support of our public health colleagues and the NHS.

Working with other partners

- Neighbouring Authorities, New Forest District Council, Eastleigh Borough Council. Southampton works with our neighbouring authorities to improve air quality at a regional level. An air quality regional meeting takes place every year and we have regular contact by e mail and phone to discuss issues of mutual concern. A recent example being planning applications for short term operating reserve diesel generators with cross boundary air pollution issues. We will need to liase very closely over the mandatory Clean Air Zone designation to ensure it runs smoothly.
- The Port of Southampton, Associated British Ports (ABP), DP World, the container terminal operator, Cruise Ship companies, Carnival and Royal Caribbean. Southampton works closely with the Port operator and its customers to identify and support initiatives that will reduce their emissions. The Clean Air Partnership will develop over the coming years to engage with the key stakeholders in the city, including the port.

- The Council engages with community pressure groups such as Clean Air Southampton and the Western Docks Consultative Forum. They will be invited to participate in the Clean Air Partnership.

In Summary

The following actions are proposed:

- Determine local concentrations of $PM_{2.5}$ using current monitoring data, and data from Public Health England (health indicators) and Defra (background maps).
- Identify potential local hot spots areas for $PM_{2.5}$
- Raise awareness of air quality (including particulate emissions) with partners (Public Health, Health and Well-being Board, Clean Air Partnership.
- Work with partners to identify and forward feasible schemes to reduce particulate emissions, through the Clean Air Partnership to produce a structured work plan.
- Consider the setting of a target for reductions in particulate emissions for Southampton. To be monitored using the $PM_{2.5}$ monitor at the AURN station in Brintons Road.
- **Annual Mean**
- $PM_{2.5}$ is monitored in Southampton at the Brintons Road, AURN Urban Centre station. $PM_{2.5}$ decreased substantially in 2016 compared to previous years. In 2011 it was 16 ug/m^3 but it has decreased steadily to 11 ug/m^3 in 2016. Although annual variations due to weather conditions may have played a part in the decrease.

  $PM_{2.5}$ 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 (Defra,2016(c)) 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 2016 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 http://uk-air.defra.gov.uk/data/

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Southampton City Council undertook non- automatic (passive) monitoring of NO_2 at 65 sites during 2016 Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided online at

http://www.southampton.gov.uk/environmental-issues/pollution/air-quality/monitoring/nitrogen-dioxide-diffusion-tubes.aspx

Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” 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 2016 dataset of monthly mean values is provided in Appendix B.

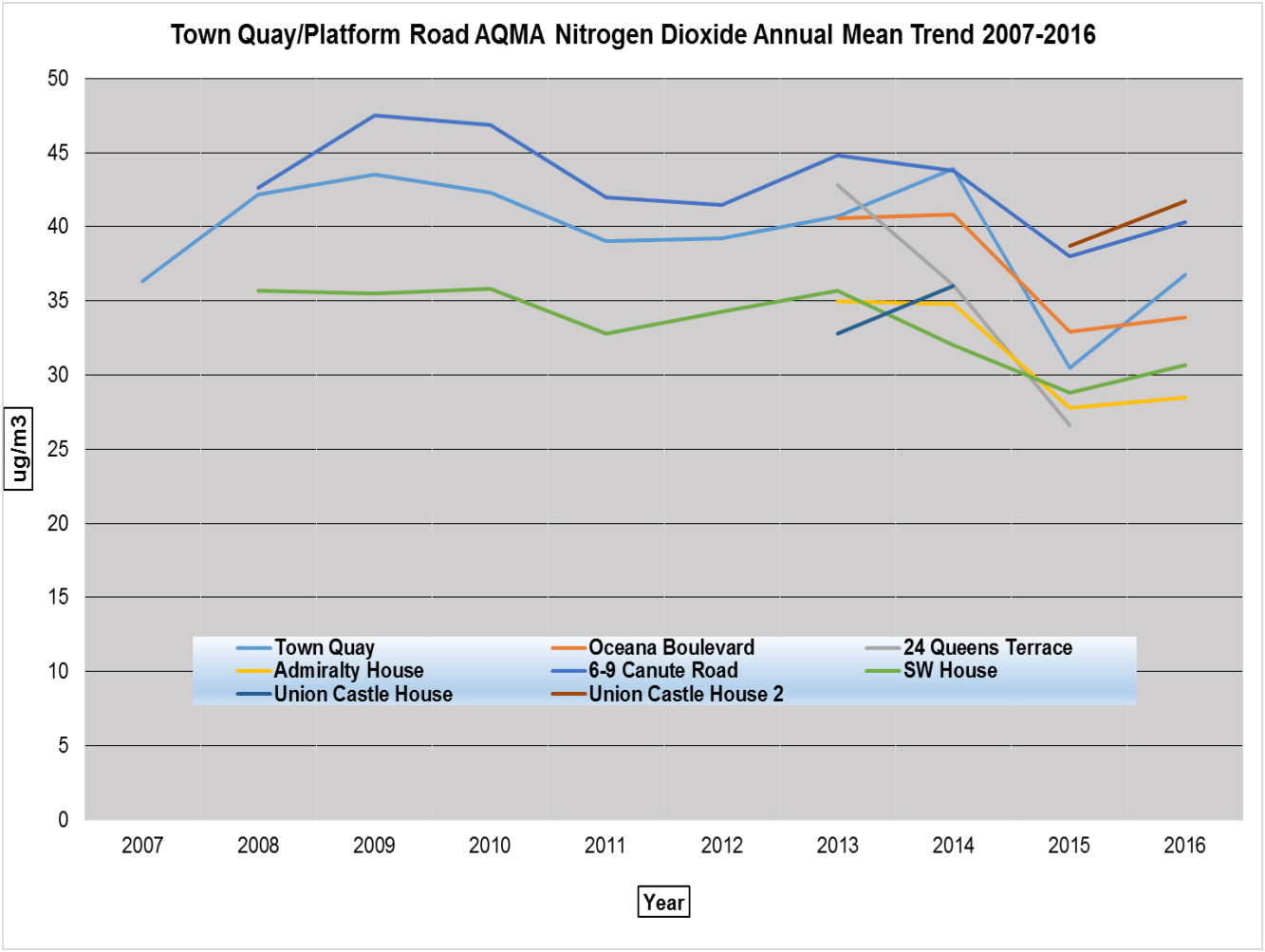
Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There was no exceedance of the NO_2 hourly mean concentration air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. There were no monitored annual means greater than 60µg/m^3 at any site, which could indicate the hourly mean objective could be breached.

Nitrogen dioxide concentrations at the automatic stations in 2016 showed some increases compared to 2015, probably due to adverse weather conditions. The new AURN A33 Redbridge Road Station commenced operation in 2016. Recording exactly 40 µg/m^3 in 2016.

Figures 7-13 NO_2 trends in AQMAs using diffusion tube monitoring

Figure 7



Most sites have decreased from 2013 -2015. All tubes were below the 40 ug/m^3 annual mean standard in 2015 for the first time. However in 2016 this trend reversed and Canute Road and Union Castle House were slightly above the annual mean standard.

Figure 8

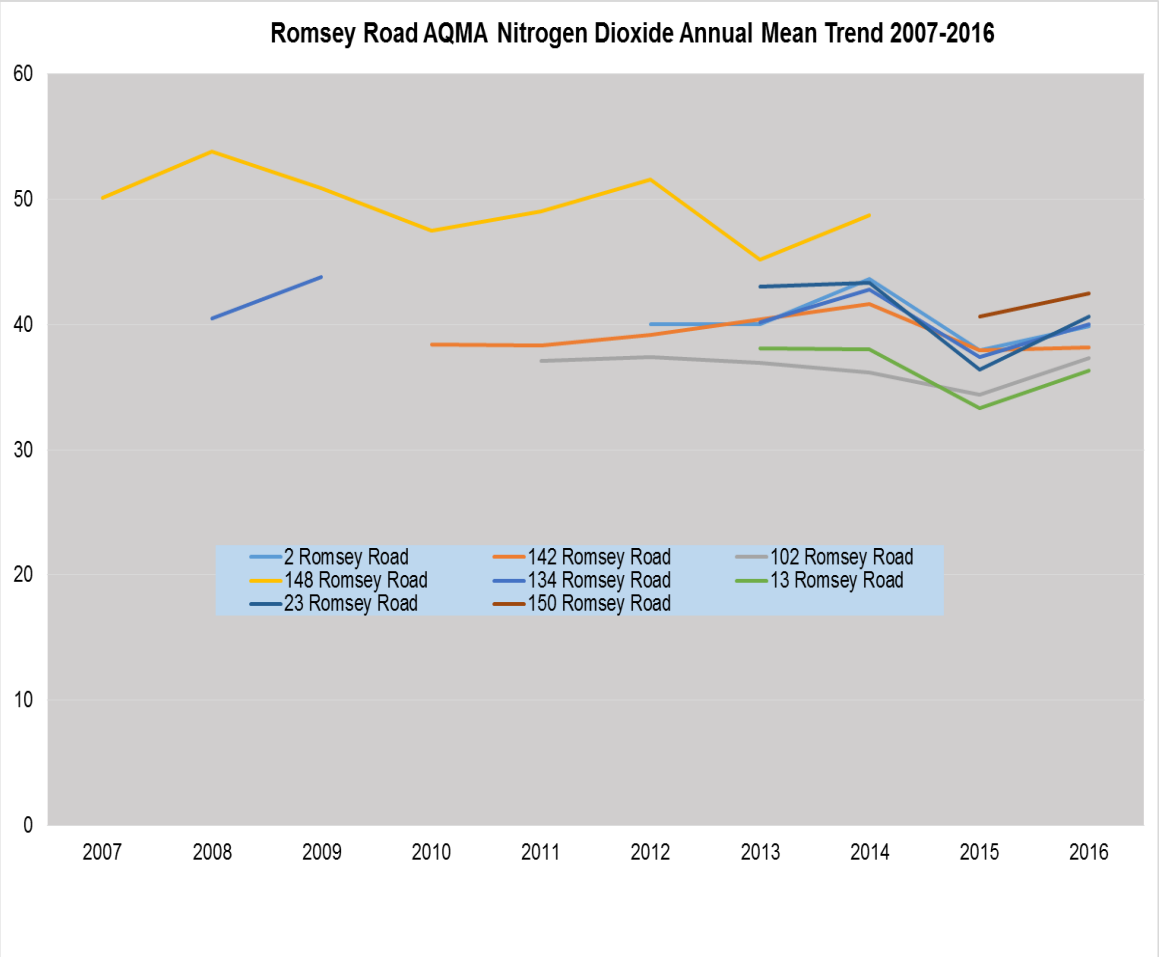


Figure 8 above shows an increase in nitrogen dioxide annual mean in 2016 at all of the sites monitored compared to the previous year. In 2016, 3 sites were at or slightly above the annual mean standard. In 2014, 5 sites monitored levels above the annual mean standard. In 2015 only 1 site, 150 Romsey Road was above the standard. This tube is on the façade of a terraced house close to the junction with Teboura Way. The tube at 150, replaced the nearby tube on a lamp post on the pavement outside 148. The lamp post had been removed, so it was decided to relocate it onto the façade of 150 which is representative of residential exposure. The tube at 148 always had to be scaled for distance to the receptor, increasing the uncertainty in the measurement.

Figure 9

Western Approach Redbridge/Millbrook Road Air Quality Management Area
Nitrogen Dioxide Diffusion Tube Annual Mean Trend 2007-2016

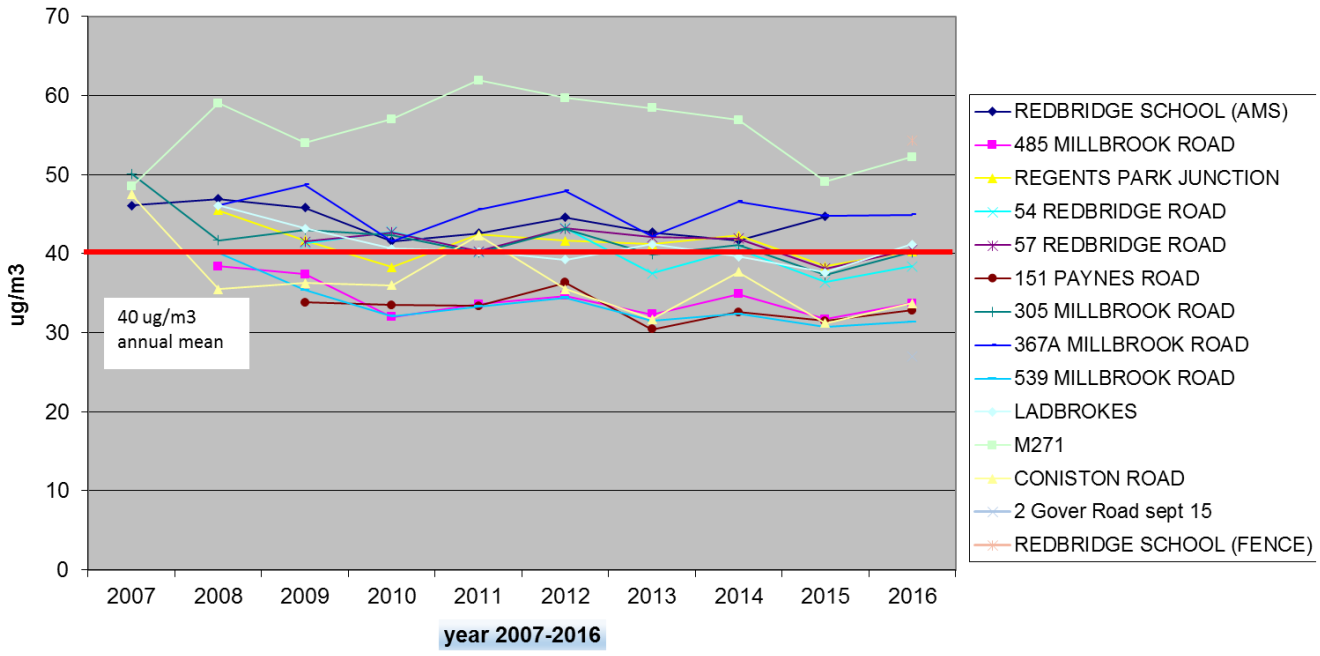
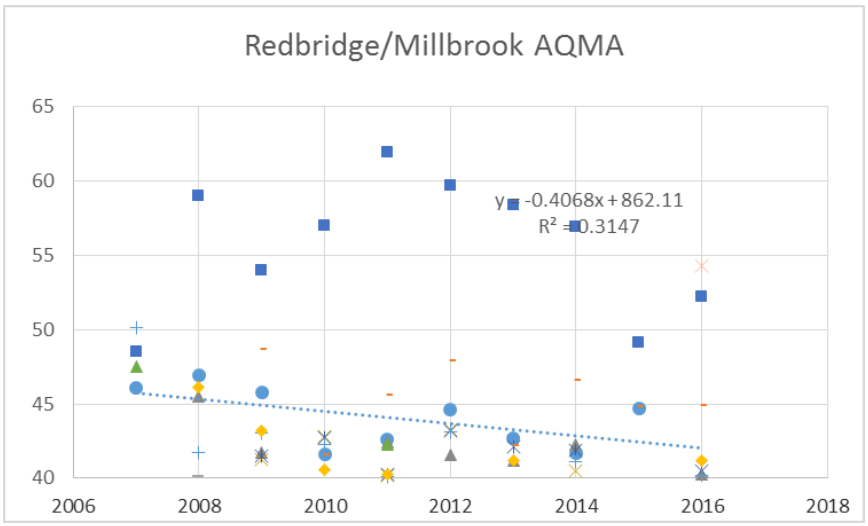


Figure 9 above shows an increase in nitrogen dioxide annual mean in 2016 at all of the sites monitored compared to the previous year of 2015. The overall trend though over the last 10 years is downwards, as shown by the linear regression graph below. The P value is 0.31. Linear regression indicates that every year, annual mean NO_2 reduces by about 0.3 ug/$m^{3.}$ The M271 diffusion tube has not been corrected for distance to the nearest relevant receptor. All the other diffusion tubes are on residential facades, except for Redbridge School which is on the boundary fence, nearest Redbridge Road.

Figure 10



The graph above shows linear regression, indicating a long term downward trend.

Figure 11

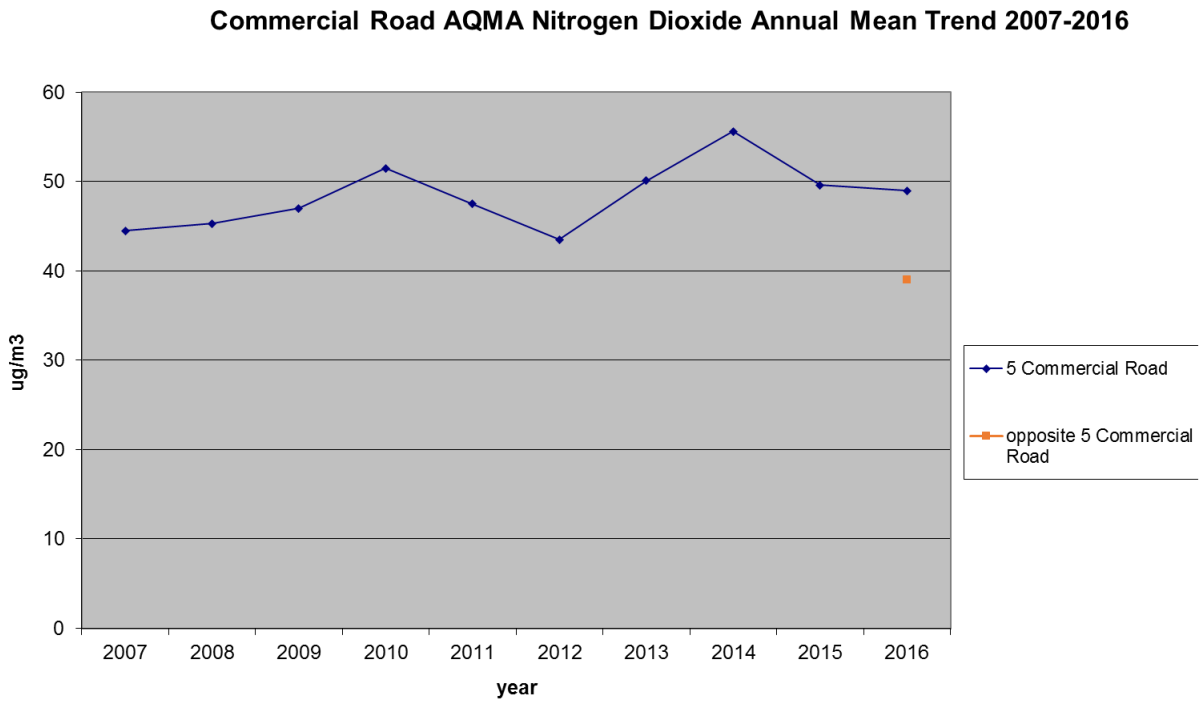


Figure 11 above, shows the annual mean trendline for the diffusion tube on the pavement lamp post directly outside 5 Commercial Road, near the Mayflower Theatre in the city centre. The data in this graph has not been adjusted for distance

to the residential receptor. In 2016, once scaled for the 2 metre distance to the nearest terraced house façade it reduced from 49 μg/m^3 to 44.5 μg/m^3, still well above the annual mean standard. The new 2016 NOx tube directly opposite, on the other side of the road, outside the new Student Halls of Residence was 39 μg/m^3. The queuing traffic at the traffic lights going uphill is a few metres further away than the NOx tube on the lamp post opposite.

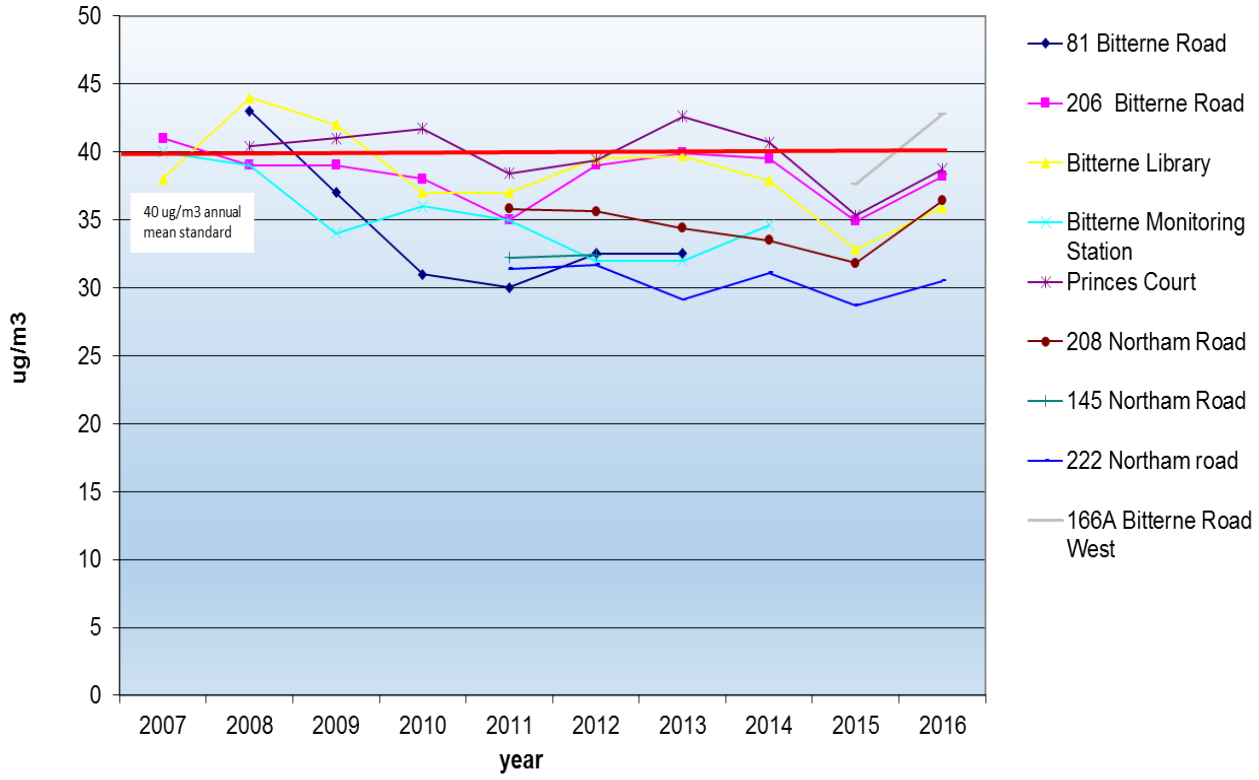
From 2013-2014, the graph above shows a marked increase in nitrogen dioxide annual mean from 43.5 μg/m^3 to 55.6 μg/m^3. This increase is highly likely to have been caused by the recent construction of the 12 Storey Mayflower Student Halls of residence. It is likely that the tall building has created a “street canyon effect” and reduced dispersion of tail pipe emissions from the queuing traffic on Commercial Road waiting to turn onto Havelock Road. The temporary construction activity is also likely to have increased congestion, as there was a contraflow in operation and a narrowing of the road, with high hoardings protecting the construction site. There is very little parking associated with the student halls. The Halls are well served by the Unilink bus service to enable students to travel to the various University campuses.

The developer contributed £10,000 towards the City Council Air Quality Action Plan to help mitigate the adverse impact. The ground floor level of the student halls are commercial with residential above.

In 2015, this upward trend reversed, probably as a result of the construction work completing and traffic returning to normal.

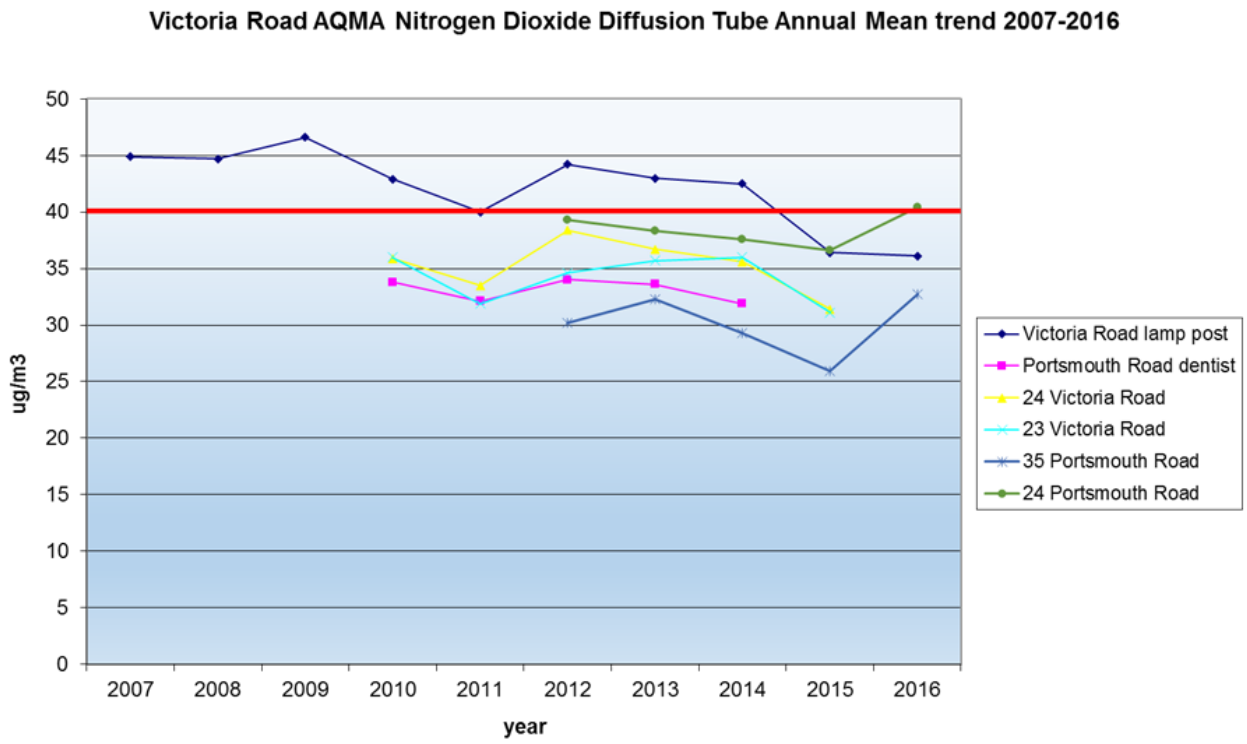
Figure 12

Bitterne Road AQMA Nitrogen Dioxide Annual Mean trend 2007-2016



The long term trend is downwards, all diffusion tubes in 2015 were below the nitrogen dioxide annual mean standard for the first time. However in 2016 this trend reversed, all diffusion tubes increased in the Bitterne Road AQMA. 166A Bitterne Road West monitored the highest annual mean at 42.8 ug/m^3 of all the 6 sites.

Figure 13

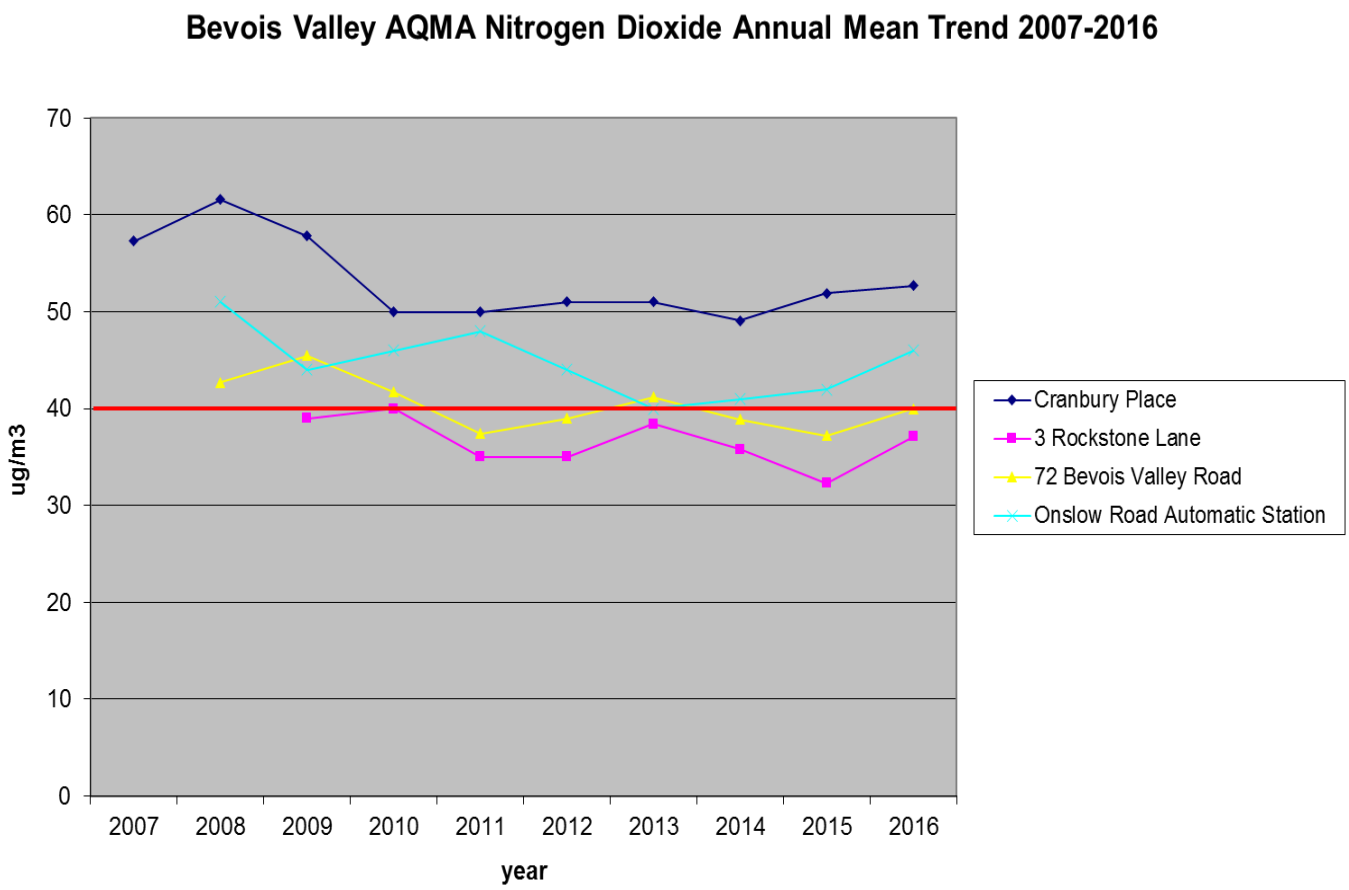


The long term trend is downwards, all diffusion tubes in 2015 were below the nitrogen dioxide annual mean standard for the first time. However this trend reversed in 2016.

24 Portsmouth Road increased from 36.6 ug/m^3 in 2015 to 40.4 ug/m^3 in 2016, just above the annual mean standard.

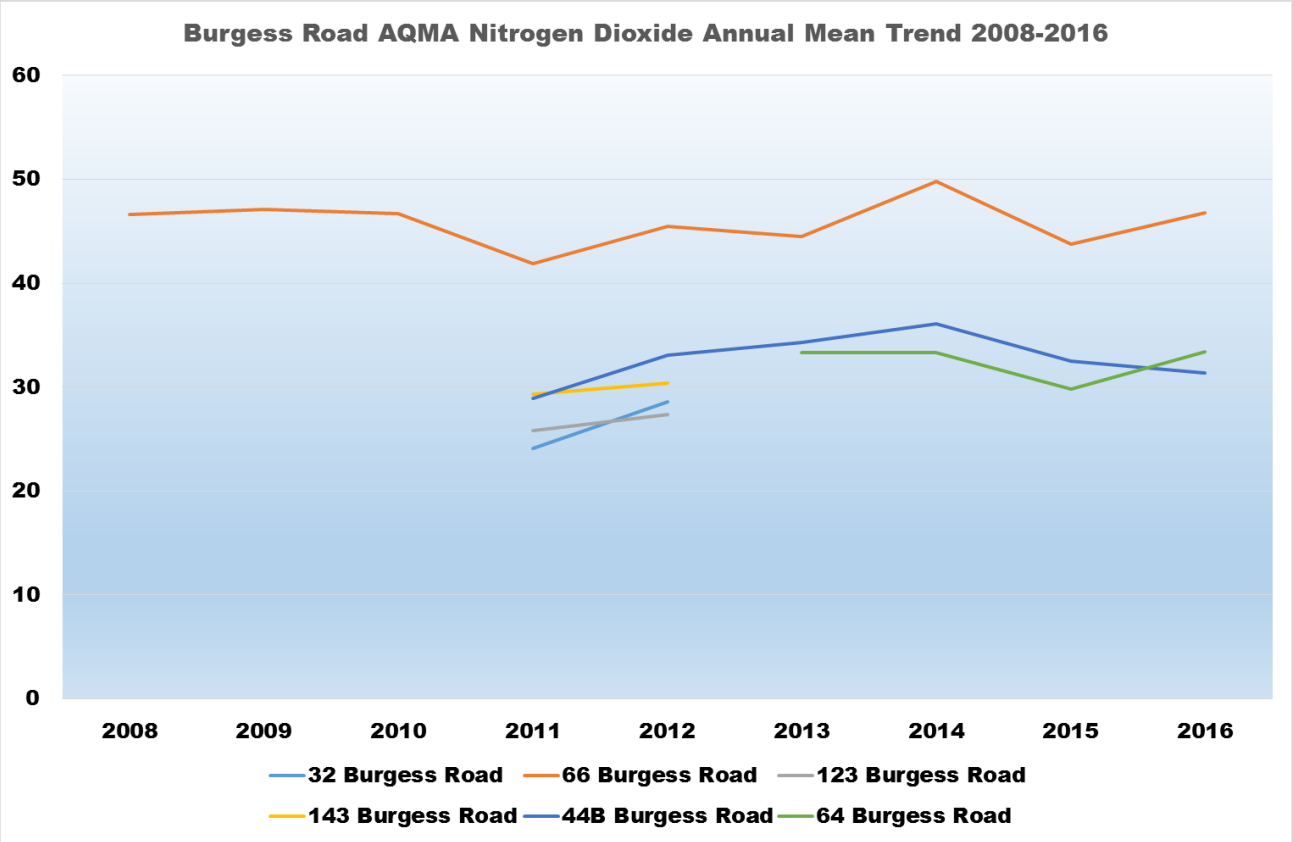
The creation of a one way system on Victoria Road in 2014 and improvements to the street scene has reduced the traffic flow, benefitting local air quality. However, the automatic station at the same location as the Victoria Road lamp post NOx tube was still above in 2016 at 43 ug/m^3 .The sampling inlet is much lower at 1metre, than the NOx tube height on the lamp post of 2.3metres. Height does affect the level of pollution monitored. Diffusion tubes usually have to be located higher on downpipes/lamp posts to reduce the risk of vandalism.

Figure 14



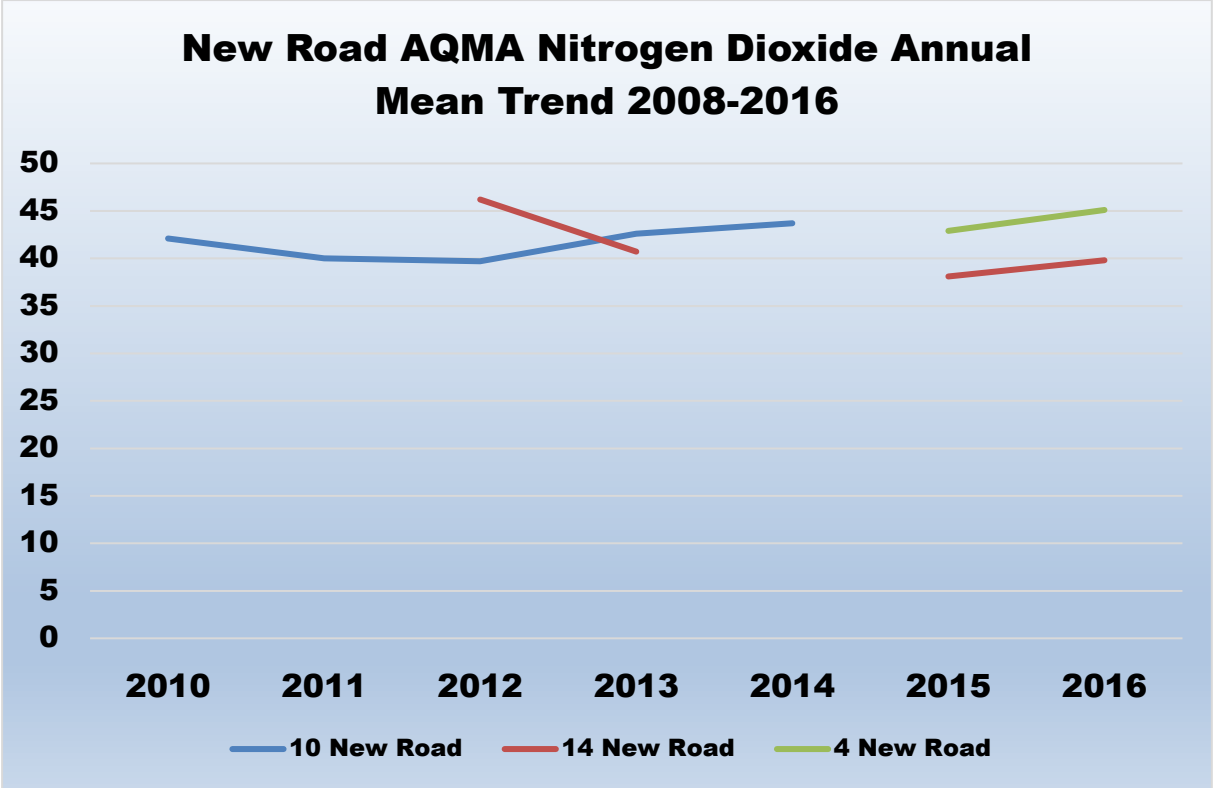
The overall trend since 2007 is downwards, but in 2015, both Cranbury Place diffusion tube and the automatic station monitored a small increase compared with 2014, both locations were above the annual mean standard. In 2016 all 4 sites increased. The automatic montoring station recorded 46 ug/m^3 and Cranbury Place diffusion tube 52.7 ug/m^3 , both well above the annual mean standard.

Figure 15



2 out of the 3 diffusion tube sites in 2016 increased, compared to the previous year. 66 Burgess Road has not shown a reduction in nitrogen dioxide since 2008, just annual fluctuations. It monitored 46.8 ug/m^3 in 2016, well above the annual mean standard. This diffusion tube is on the porch of a house very close to the kerb. There is no proper pavement in-between the house and the queuing traffic on Burgess road. The houses on the other side of Burgess Road are well set back from the kerb. 123 and 143 Burgess Road were monitored at the façade in 2011 and 2012. Both diffusion tubes were well below the annual mean standard.

Figure 16



Both diffusion tubes monitored an increase in nitrogen dioxide in 2016, compared to 2015. 4 New Road increased from 42.9 ug/m^3 in 2015 to 45.1 ug/m^3 in 2016. Well above the annual mean standard.14 New Road was just below the standard at 39.8 ug/m^3 in 2016. Queuing vehicles at the traffic lights are responsible for the elevated levels, in this city centre location. Monitored levels of nitrogen dioxide have remained stubbornly high since 2010. The removal of the lamp posts caused a break in monitoring in 2014.

3.2.2 Particulate Matter (PM_{10})

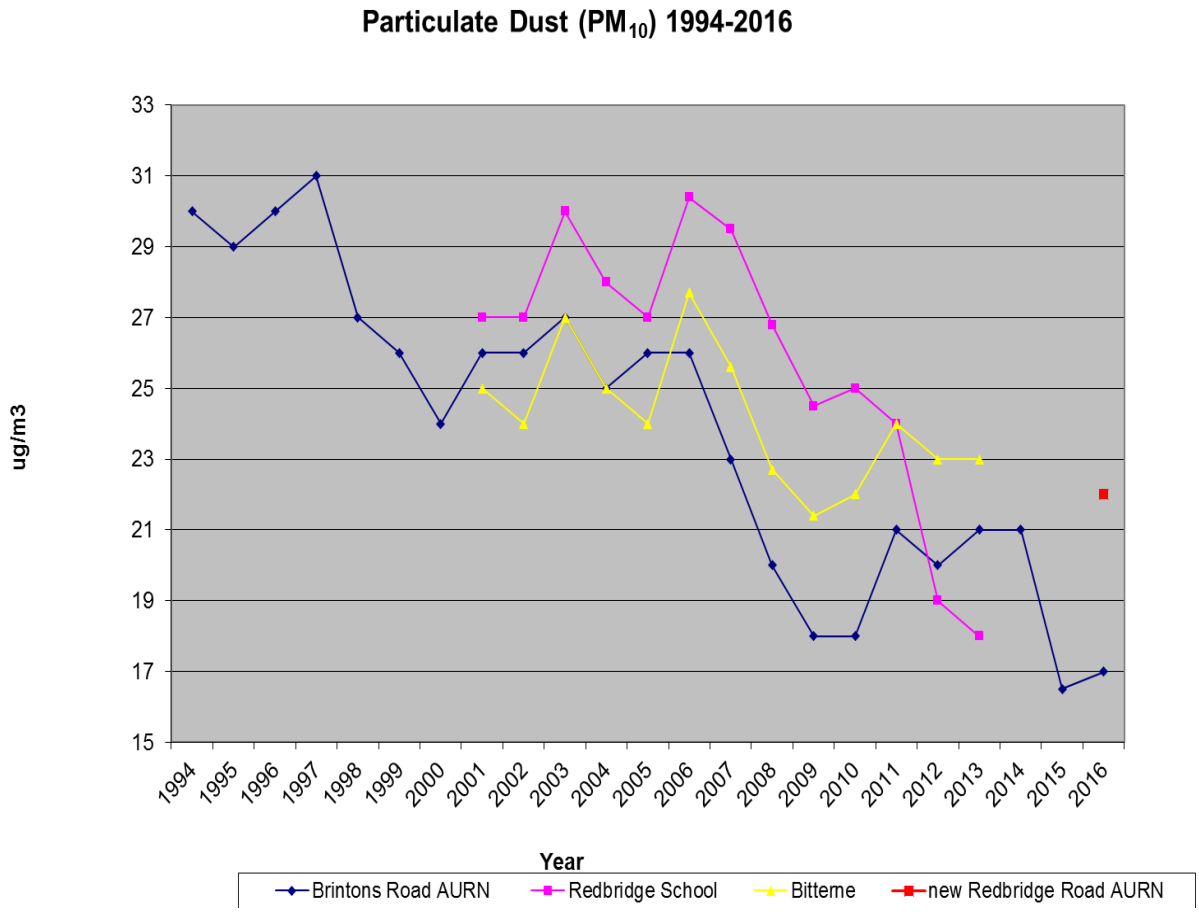
Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

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 were no exceedances of the PM_{10} annual mean or hourly mean objective standard in 2016. There were 2 days above the PM_{10} 24-hour mean objective of 50µg/m^3, however it was well below the 35 days per year allowed.

There has been significant reductions in PM_{10} since monitoring began in Southampton in 1994 as shown by Figure 16 . No AQMAs have been declared with regards to PM_{10} in Southampton, however monitoring will continue at the existing stations, including the new Redbridge AURN station that commenced monitoring in 2016.

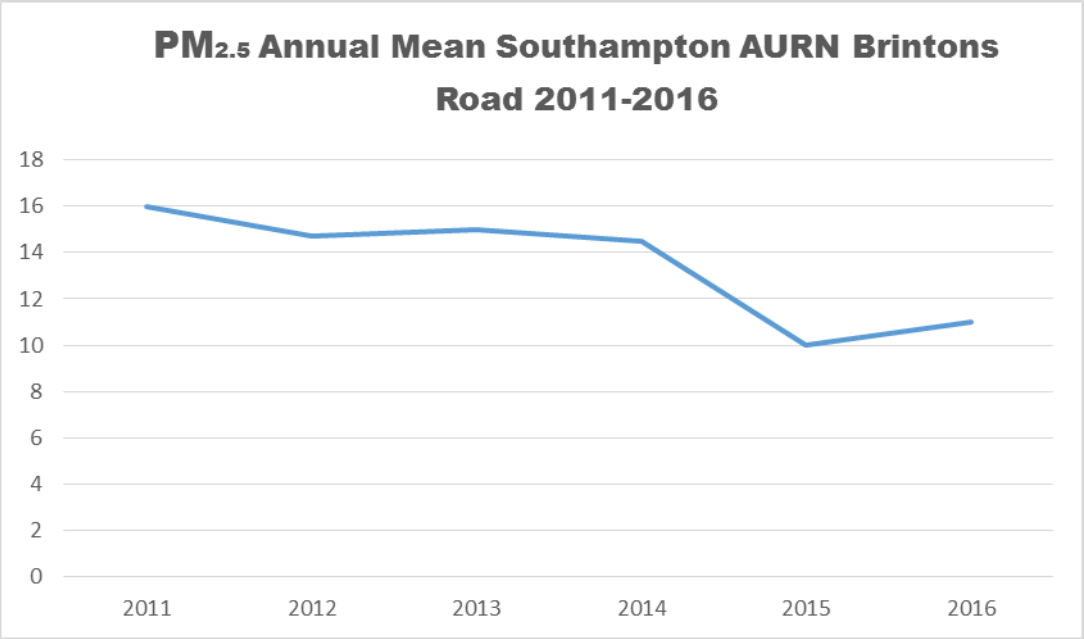
Figure 17



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. $PM_{2.5}$ has decreased substantially since 2011 when it was 16 µg/m^3 to an annual mean of 11 µg/m^3 in 2016 at the ratified Brintons Road AURN Monitoring Station. The maximum daily mean was 65 µg/m^3 in 2016.

Figure 18



3.2.4 Sulphur Dioxide (SO_2)

Table A.8 in Appendix A compares the ratified continuous monitored SO_2 concentrations for year 2016 with the air quality objectives for SO_2.

No exceedance of the SO_2 15 minute mean, hourly mean or 24 hour mean objective was monitored in 2016. Monitoring will continue at Brintons Road as part of the national monitoring network into the future.

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	AURN Brintons Road	Urban Centre	442583	112248	NO_2, PM_{10} (FDMS), $PM_{2.5}$ (FDMS), SO_2, benzene, O_3	NO	Chemiluminescence (NO_2), FDMS (PM_{10} and $PM_{2.5}$), ultra-violet fluorescence (SO_2), pumped diffusion tube sampler (benzene)	Y (18 m)	8m	2.5m
CM2	Redbridge School, closed 2014	Roadside	437549	113721	NO_2, PM_{10} (TEOM)	YES	Chemiluminescence (NO_2), TEOM (corrected using VCM) (PM_{10})	Y adjacent to school football pitch	8m	2.5m
CM3	Bitterne Road closed 2013	Roadside	443987	113340	NO_2, PM_{10} (TEOM)	YES	Chemiluminescence (NO_2), TEOM (corrected using VCM) (PM_{10})	Y (some houses are closer to the road than the station 10m)	8m	2.5m
CM4	Onslow Road	Roadside	442304	112771	NO_2	YES	Chemiluminescence	Y (houses similar distance to the road as station 10m)	2m	1.3m

CM5	Millbrook road. Closed end of 2104	Roadside	439702	112248	O_3	YES	Chemiluminescence	Y (houses similar distance to the road as station 20m)	6m	1.3m
CM6	Victoria Road	Roadside	443751	111121	NO_2	YES	Chemiluminescence	Y (1m)	3m	1.3m
CM7	NEW Redbridge Road AURN	Roadside	437798,	113594	NO_2 PM_{10}	YES	Chemiluminescence, FDMS TEOM	Y (2m)	4m	2.5m

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	Background	444386	114450	NO_2	N	0	NA	N	1
N101	Redbridge School (Fence)	Roadside	437543	113726	NO_2	Y	0	8	N	1.8
N102	64 Burgess Road	Roadside	441678	115278	NO_2	Y	0	6	N	1.6
N103	485 Millbrook Road	Roadside	438807	112908	NO_2	Y	0	13	N	1.2
N104	Regents Park Junction	Roadside	439218	112850	NO_2	Y	2	24	N	2.3
N106	2 Romsey Road	Roadside	439754	113982	NO_2	N	0	5	N	1.6
N107	Cranbury Place	Roadside	442367	112896	NO_2	Y	0.5	2	N	2.5
N109	72 Bevois Valley	Roadside	442585	113251	NO_2	Y	0.5	5	N	2.5
N110	Brintons Road 1	Roadside	442591	112240	NO_2	N	18	10	Y	3.2
N111	Brintons Road 2	Roadside	442591	112240	NO_2	N	18	10	Y	3.2
N112	Brintons Road 3	Roadside	442591	112240	NO_2	N	18	10	Y	3.2
N113	206 Bitterne Road	Roadside	444124	113290	NO_2	Y	0	5	N	1.8
N114	Bitterne Library	Roadside	444131	113326	NO_2	Y	1	3.5	N	2.5

N115	54 Redbridge Road	Roadside	437939	113473	NO_2	Y	0	11	N	1.4
N116	57 Redbridge Road	Roadside	437951	113407	NO_2	Y	0	11	N	1.2
N117	Victoria Road/Portsmouth Road Jnc.	Roadside	443751	111122	NO_2	Y	0.3	3	Y	2.3
N118	3 Rockstone Lane	Roadside	442472	113068	NO_2	Y	2.5	2.5	N	2.3
N120	6-9 Canute Road	Roadside	442555	111021	NO_2	Y	0	4	N	2.5
N122	151 Paynes Road	Roadside	439998	112634	NO_2	Y	0	12	N	1.5
N123	102 St Andrews Road	Roadside	442351	112302	NO_2	N	0	4	N	1.5
N124	305 Millbrook Road	Roadside	439741	112746	NO_2	Y	0	10	N	1.5
N125	Princes Court	Roadside	443126	112645	NO_2	Y	0	5.5	N	2.5
N126	107 St Andrews Road	Roadside	442369	112283	NO_2	N	2	2	N	1.5
N129	SW House	Roadside	442554	111022	NO_2	Y	0	3.1	N	2.5
N130	367a Millbrook Road	Roadside	439346	112821	NO_2	Y	0	9	N	2
N131	142 Romsey Road	Roadside	439378	114185	NO_2	Y	0	5	N	1.6

N133	539 Millbrook Road	Roadside	438608	113018	NO_2	Y	0	33	N	1.6
N134	Ladbrokes Millbrook Road	Roadside	438953	112866	NO_2	Y	0	12	N	2.8
N138	66 Burgess Road	Roadside	441694	115288	NO_2	Y	0	3	N	2
N140	5 Commercial Road	Roadside	441629	112332	NO_2	Y	2	2	N	2.8
N141	Town Quay Road	Roadside	441915	110993	NO_2	Y	1	0.8	N	2.2
N143	102 Romsey Road	Roadside	439468	114146	NO_2	N	0	2	N	2.5
N144	208 Northam Road	Roadside	443147	112709	NO_2	N	0	6	N	1.5
N146	222 Northam Road	Roadside	443164	112741	NO_2	N	0	5	N	3
N149	44b Burgess Road	Roadside	441552	115247	NO_2	Y	0	2	N	1.8
N151	134 Romsey Road	Roadside	439396	114176	NO_2	Y	0	5	N	1.4
N152	M271	Roadside	437353	112645	NO_2	Y	14	4	N	2.5
N153	Coniston Road	Roadside	437325	113860	NO_2	Y	3	14	N	2.2
N154	Oceana Boulevard (Gate 5)	Roadside	442234	111081	NO_2	N	0	1	N	2.4
N157	Admiralty House	Roadside	442375	110970	NO_2	N	0	1	N	2

N158	24 Portsmouth Road	Roadside	443801	111111	NO_2	N	0	2	N	2.3
N159	35 Portsmouth Road	Roadside	443745	111151	NO_2	N	0	2	N	2.3
N160	2 Dorset Street	Roadside	442218	112890	NO_2	N	0	2	N	2.3
N161	30 Addis Square	Roadside	442703	114127	NO_2	N	0	3	N	2.6
N162	263a Portswood Road	Roadside	442877	114342	NO_2	N	0	4	N	3
N163	285 Portswood Road	Roadside	442950	114381	NO_2	N	0	9	N	2
N164	168 Portswood Road (Int.Food)	Roadside	442796	114258	NO_2	N	0	4	N	2
N165	8 The Broadway	Roadside	442767	114184	NO_2	N	0	4	N	2.6
N166	14 New Road	Roadside	442210	112140	NO_2	Y	0	1	N	3
N167	13 Romsey Road	Roadside	439757	114013	NO_2	N	0	6	N	2.6
N168	23 Romsey Road	Roadside	439736	114025	NO_2	N	0	5	N	4
N169	150 Romsey Road	Roadside	439368	114193	NO_2	Y	0	5	N	2
N170	Union Castle House (2)	Roadside	442461	110996	NO_2	Y	6	2.5	N	2
N171	132 Newton Road	Roadside	444211	114669	NO_2	N	0	12	N	2
N172	4 New Road	Roadside	442203	112125	NO_2	Y	0	2.5	N	2

N173	19a Burgess Road New June 15	Roadside	440962	115112	NO_2	N	0	6	N	2.4
N174	166a Bitterne Road West	Roadside	443955	113315	NO_2	Y	0	5	N	1.5
N175	Windsor Castle Pub, 95 Shirley High St	Roadside	439845	113906	NO_2	N	0	5	N	2.4
N176	Salisbury Arms, Shirley High St	Roadside	439773	113954	NO_2	N	0	12	N	2.4
N178	2 Gover Road (New Sept 15)	Roadside	437266	113685	NO_2	N	0	10	N	1.4
N179	38 Old Redbridge Road (New Nov 15)	Roadside	437160	113687	NO_2	N	0	24	N	1.4
N180	Opposite 5 Commercial Road halls of residence	Roadside	441633	112318	NO_2	Y	0	2.5	N	2.4
N182	Archers Road/Hill Lane (New Jan 16)	Roadside	441218	112981	NO_2	N	0	7	N	1.4
N183	206 Bitterne Road	Roadside	444124	113288	NO_2	Y	0	5	N	1.5
N184	Redbridge New AMS	Roadside	437802	113565	NO_2	Y	0	5	Y	2.8

N185	Redbridge Causeway 1	Roadside	437166	113713	NO_2	N	25	2	N	2.4
N186	Redbridge Causeway 2	Roadside	437129	113700	NO_2	N	25	2	N	2.4
B1	Brintons Road AURN	Urban Centre	442591	112240	Benzene	N	10	10	N	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 2016 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2012	2013	2014	2015	2016
CM1 (AURN)	Urban Centre	Automatic	98%	42% (station replaced due to leaky roof)	32	30	32	32	32.3 (short term adjusted)
CM2 (Redbridge School)	Roadside	Automatic				**45**	**Ceased Operation**		
CM3 (Bitterne)	Roadside	Automatic			32	32	**Ceased Operation**		
CM4 (Onslow Road)	Roadside	Automatic	97%	97%	**44**	**40**	**41**	**42**	**46**
CM5 (Millbrook Road)	Roadside	Automatic			**43**	**41**	**42**	**Ceased Operation**	
CM6 (Victoria Road)	Roadside	Automatic	79%	79%	**44**	**43**	**44**	**42**	**43**
CM7 (new Redbridge Road)	Roadside	Automatic	93%	93%					**40**
N100, 6 Sandringham Road	Urban Background	Diffusion Tube	83	83	19	20.4	20.5	17.2	18.6

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
N101, Redbridge School (Fence)	Roadside	Diffusion Tube	92	92					**54.3**
N102, 64 Burgess Road	Roadside	Diffusion Tube	100	100	32	33.3	33.3	29.8	33.5
N103, 485 Millbrook Road	Roadside	Diffusion Tube	92	92	34.7	32.3	34.9	31.7	33.7
N104, Regents Park Junction	Roadside	Diffusion Tube	100	100	**41.6**	**41.2**	**42.3**	38.4	**40.3**
N106, 2 Romsey Road	Roadside	Diffusion Tube	83	83	**40**	39.9	**43.6**	37.9	39.9
N107, Cranbury Place	Roadside	Diffusion Tube	92	92	**51.2**	**49.4**	**49.1**	**51.9**	**51**
N109, 72 Bevois Valley	Roadside	Diffusion Tube	83	83	38.7	**41.2**	38.9	37.2	**40**
N110, Brintons Road 1	Urban Centre	Diffusion Tube	83	83	29.1	29.5	29.2	25.4	26.5
N111, Brintons Road 2	Urban Centre	Diffusion Tube	83	83	29.1	29.4	29.2	25.9	27
N112, Brintons Road 3	Urban Centre	Diffusion Tube	83	83	29.6	28.6	29.2	26.1	26.2

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
N113, 206 Bitterne Road	Roadside	Diffusion Tube	83	83	38.9	39.9	37.9	34.9	38.2
N114, Bitterne Library		Diffusion Tube	92	92	39.5	39.7	39.5	32.8	35.9
N115, 54 Redbridge Road	Roadside	Diffusion Tube	92	92	**43.3**	37.5	37.9	36.4	38.4
N116, 57 Redbridge Road	Roadside	Diffusion Tube	100	100	**43.2**	**42.1**	**41.9**	38.1	**40.5**
N117, Victoria Road/Portsmouth Road Jnc.	Roadside	Diffusion Tube	100	100	**44.2**	**42.5**	**42**	35.9	35.7
N118, 3 Rockstone Lane	Roadside	Diffusion Tube	100	100	35.2	35.3	35.8	32.3	34.3
N120, 6-9 Canute Road	Roadside	Diffusion Tube	92	92	**41.5**	**44.8**	**43.8**	38	**40.3**
N122, 151 Paynes Road	Roadside	Diffusion Tube	100	100	36.3	30.4	326	31.5	32.8
N123, 102 St Andrews Road	Roadside	Diffusion Tube	100	100	34.1	38.1	36.2	32.8	35.5
N124, 305 Millbrook Road	Roadside	Diffusion Tube	100	100	**43.1**	39.9	**41.1**	37.3	**40.2**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
N125, Princes Court	Roadside	Diffusion Tube	100	100	39.4	**42.6**	**40.7**	35.3	38.7
N126, 107 St Andrews Road	Roadside	Diffusion Tube	100	100	35.2	36.3	36.9	32.8	33.9
N129, SW House	Roadside	Diffusion Tube	92	92	34.3	37.7	32	28.8	30.7
N130, 367a Millbrook Road	Roadside	Diffusion Tube	100	100	**47.9**	**42.2**	**46.6**	**44.8**	**44.9**
N131, 142 Romsey Road	Roadside	Diffusion Tube	100	100	39.2	**40.4**	**41.6**	37.9	38.2
N133,539 Millbrook Road	Roadside	Diffusion Tube	100	100	33.3	34.5	31.5	32.4	30.7
N134, Ladbrokes Millbrook Road	Roadside	Diffusion Tube	100	100	**40.3**	39.2	**41.2**	39.6	37.6
N138, 66 Burgess Road	Roadside	Diffusion Tube	100	100	**45.5**	**44.5**	**49.8**	**43.8**	**46.8**
N140, 5 Commercial Road	Roadside	Diffusion Tube	100	100	**43.5**	**45.3**	**50.5**	**44.8**	**44.5**
N141, Town Quay Road	Roadside	Diffusion Tube	100	100	39.2	**40.7**	**43.9**	30.5	36.8

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
N143, 102 Romsey Road	Roadside	Diffusion Tube	100	100	34.1	36.9	**40.1**	34.4	37.3
N144, 208 Northam Road	Roadside	Diffusion Tube	100	100	35.6	34.4	33.5	31.8	36.4
N146, 222 Northam Road	Roadside	Diffusion Tube	92	92	31.7	29.1	31.1	28.7	30.5
N149, 44b Burgess Road	Roadside	Diffusion Tube		67	33.1	34.3	36.1	32.5	31.4
N151, 134 Romsey Road		Diffusion Tube	92	92	38.8	**40.2**	**40.9**	37.4	**40**
N152, M271	Roadside	Diffusion Tube	100	100	**44**	**40.9**	**40.9**	36.9	**41.6**
N153, Coniston Road	Roadside	Diffusion Tube	100	100	35.5	31.7	37.7	31.2	33.7
N154, Oceana Boulevard (Gate 5)	Roadside	Diffusion Tube	92	92	**44.2**	**40.6**	**40.8**	32.9	33.9
N157, Admiralty House	Roadside	Diffusion Tube	83	83	34.6	35	34.8	27.8	28.5
N158, 24 Portsmouth Road	Roadside	Diffusion Tube	100	100	39.3	28.3	37.6	36.6	**40.4**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
N159, 35 Portsmouth Road	Roadside	Diffusion Tube	100	100	30.2	32.3	29.3	25.9	32.7
N160, 2 Dorset Street	Roadside	Diffusion Tube	100	100		33.7	32	32.6	33
N161, 30 Addis Square	Roadside	Diffusion Tube	92	92		37	35.2	32.5	35.4
N162, 263a Portswood Road	Roadside	Diffusion Tube	92	92		**44.3**	**41.9**	37.7	37.1
N163, 285 Portswood Road	Roadside	Diffusion Tube	100	100		31.6	32.6	27.8	31.4
N164, 168 Portswood Road (Int.Food)	Roadside	Diffusion Tube	100	100		**40.8**	39	32.3	35.7
N165, 8 The Broadway	Roadside	Diffusion Tube	100	100		**49.3**	**57.2**	32.3	34
N166, 14 New Road	Roadside	Diffusion Tube	83	83	**46.2**	**40.7**		38.1	39.8
N167, 13 Romsey Road	Roadside	Diffusion Tube	100	100	34	38.1	38	33.5	36.3
N168, 23 Romsey Road	Roadside	Diffusion Tube	100	100	35.9	**43**	**43.3**	36.4	**40.6**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
N169, 150 Romsey Road	Roadside	Diffusion Tube	100	100			36.6	**40.6**	**42.5**
N170, Union Castle House (2)	Roadside	Diffusion Tube	100	100			37.5	38.7	37.6
N171, 132 Newton Road	Urban Background	Diffusion Tube	100	100			23.1	17.2	20.1
N172, 4 New Road	Roadside	Diffusion Tube	100	100				**42.9**	**45.1**
N173, 19a Burgess Road	Roadside	Diffusion Tube	100	100				27.3	31
N174, 166a Bitterne Road West	Roadside	Diffusion Tube	100	100				37.6	**42.8**
N175, Windsor Castle Pub, 95 Shirley High St	Roadside	Diffusion Tube	100	100				38	38.8
N176, Salisbury Arms, Shirley High St	Roadside	Diffusion Tube	83	83				38	**43.1**
N178, 2 Gover Road (New Sept 15)	Roadside	Diffusion Tube	100	100				25.9	27

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
N179, 38 Old Redbridge Road (New Nov 15)	Roadside	Diffusion Tube	100	100					30.2
N180, Opposite 5 Commercial Road halls of residence	Roadside	Diffusion Tube	83	83					39
N182, Archers Road/Hill Lane (New Jan 16)	Roadside	Diffusion Tube	100	100	-				33
N184, Redbridge New AMS	Roadside	Diffusion Tube	100	33	-				**42.7**
N185, Redbridge Causeway 1	Roadside	Diffusion Tube	83	83	-				34.9 (corrected for distance)
N186, Redbridge Causeway 2	Roadside	Diffusion Tube	100	42	-				29 (corrected for distance)

☒ **Diffusion tube data has been bias corrected (confirm by selecting in box)**

☒ **Annualisation has been conducted where data capture is <75% (confirm by selecting in box)**

☒ **If applicable, all data has been distance corrected for relevant exposure (confirm by selecting in box)**

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.

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 2016 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2012	2013	2014	2015	2016
CM1 (AURN)	Urban Centre	Automatic	98	42	0	0	0	3	0 (111)
CM2 (Redbridge School)	Roadside	Automatic		NA	0	NA			
CM3 (Bitterne)	Roadside	Automatic		NA	0	0			

CM4 (ONSLOW ROAD)	Urban Centre	Automatic	97	97	**1**	**2**	**1**	0	**6**
CM5 (Millbrook Road)	Roadside				0	0	0		
CM6 (Victoria road)	Roadside	Automatic	98	79	0	**1**	**5**	**5**	**8** (161)
CM7 (new AURN REDBRIDGE	Roadside	Automatic	93	93	**-**	-	-		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.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2012	2013	2014	2015	2016
CM1 (AURN)	Urban Centre		31	19.8	21	20.9	16.5	17
CM2 (Redbridge School)	Roadside			18.8	17.6			
CM3 (Bitterne)	Roadside			21.6	22.8			
CM7 (new Redbridge AURN)	Roadside	92	68%					22

☒ **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.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2012	2013	2014	2015	2016
CM1 (AURN)	Urban Centre	95	31	11	4	5	4	0(27)
CM2 (old redbridge school)	Roadside			6	0			
CM3 (Bitterne)	Roadside			9	6			
CM7 (new Redbridge Road AURN)	Roadside	97	68					2

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.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
				2012	2013	2014	2015	2016
CM1 (AURN)	Urban Centre	96	39	14.7	15	14.5	10	11

☒ **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.

Table A.8 – SO_2 Monitoring Results

Site ID	Site Type	Valid Data Capture for monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	Number of Exceedances 2016 (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 (AURN)	Urban Centre	94	42	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 2016

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2016

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.94) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
N100	22.3	20.2			15	13.03	11.13	17.6	19.5	24.2	25.8	29	19.8	18.6	18.6
N101	61.80	55.20	42.40	55.70	50.40		57.72	68.00	63.90	48.70	66.00	65.50	57.8	**54.3**	**54.3**
N102	39.70	39.80	33.5	31.70	31.00	30.00	27.67	30	38.70	37.30	39.20	48.50	35.6	33.5	33.5
N103	44.00		30.70	33.70	32.40	28.72	31.84	33.00	36.10	34.10	41.70	47.90	35.8	33.7	33.7
N104	56.30	43.70	32.50	40.80	42.70	39.49	37.37	41	41.10	40.00	45.70	53.70	42.9	**40.3**	**40.3**
N106	49.70		36.00	40.80	38.00	39.53	43.96	40.30		40.30	46.50	49.40	42.4	39.9	39.9
N107	62.00	62.00	49.10	53.80	58.10		55.02	51.50	51.9	49.40	59.30	65.00	56.1	**52.7**	**51.0**
N109	43.70	41	38.3	39.6			37.49	41.80	32.30	46.40	51.00	54.10	42.6	**40.0**	**40.0**
N110	35.70	28.5	29.1	25.2	28.00	21.85	22.89	30.60	27.30	33.00			28.2	26.5	26.5
N111	33.40	31	27.3	23	28.10	23.52	22.48	30.60	32.40	35.70			28.8	27.0	27.0
N112	33.10	32	26.5	24.2	26.50	25.13	21.78	30.40	26.60	32.60			27.9	26.2	26.2

N113	42.00	39.70	35.00	40.00	40.40	37.36		37.10		42.20	46.40	45.70	40.6	38.2	38.2
N114	39.60	39.8	33.60	37.90	42.40	30.28	29.86		40.40	38.00	37.00	51.70	38.2	35.9	35.9
N115	42.70		31.80	41.10	43.40	36.71	38.15	43.60	38.60	37.20	45.50	50.50	40.8	38.4	38.4
N116	43.30	44.00	41.00	41.20	45.30	39.33	38.09	46.30	39.20	43.60	48.60	47.20	43.1	**40.5**	**40.5**
N117	45.30	38.40	35.20	34.90	34.10	34.66	35.48	33.60	35.80	41.30	43.00	49.30	38.4	36.1	35.7
N118	37.00	37.00	40.30	36.80	40.20	26.2	31	40.30	38.60	49.30	50.40	47.00	39.5	37.1	34.3
N120	46.70	45.40	42.50	32.70	45.00	38.50		40.10	39.20	44.00	47.30	50.60	42.9	**40.3**	**40.3**
N122	47.70	34.00	27.40	30.30	31.80	30.79	32.20	34.70	34.10	32.10	40.90	42.20	34.8	32.8	32.8
N123	42.50	35.40	38.50	32.30	39.90	30.54	25.98	32.80	38.60	39.00	47.10	50.60	37.8	35.5	35.5
N124	47.00	47.30	36.70	40.50	45.50	36.28	36.04	38.50	35.60	47.40	50.50	52.10	42.8	**40.2**	**40.2**
N125	45.00	38.80	38.20	39.20	47.00	36.60	28.92	41.00	37.90	43.70	45.80	52.40	41.2	38.7	38.7
N126	43.20	39.10	35.40	34.50	43.00	31.08	26.60	31.20	36.90	42.30	45.80	55.70	38.7	36.4	33.9
N129	36	35.3	33.8	29.6	33.4	27.6	18.37	32.9	31.5	36	45.3		32.7	30.7	30.7
N130	57.70	47.70	38.60	45.00	45.80	45.48	45.67	46.60	50.30	44.70	49.40	56.50	47.8	**44.9**	**44.9**
N131	40.00	44.70	35.00	40.00	42.10	38.56	33.86	38.50	40.10	44.10	41.30	49.80	40.7	38.2	38.2
N133	40.80	32.20	29.60	30.40	31.80	27.10	32.21	32.50	32.90	32.50	37.60	41.80	33.5	31.4	31.4
N134	50.00	46.00	38.60	39.40	43.40	37.77	37.43	37.20	43.70	42.00	52.60	57.50	43.8	**41.2**	**41.2**
N138	54.10	47.30	42.60	48.90	50.00	44.68	38.93	41.8	55.70	53.70	55.00	64.60	49.8	**46.8**	**46.8**
N140	47.50	54.30	46.00	49.50	51.50	51.82	41.05	47.10	50.00	61.00	62.80	62.60	52.1	**49.0**	**44.5**
N141	35.40	35.20	39.80	33.00	52.10	34.74	26.88	39.00	34.50	44.00	45.70	49.00	39.1	36.8	36.8
N143	46.00	39.30	32.60	33.30	36.90	38.75	40.22	39.50	39.50	41.20	43.50	46.00	39.7	37.3	37.3

N144	48.3	42.6	33.1	35.8	36.9	36.23	30.12	39.5	42.1	35.2	39	45.6	38.7	36.4	36.4
N146		35.5	30.5	29.8	32.5	28.97	24.71	33	30.4	31.5	37.1	43	32.5	30.5	30.5
N149	42.10	38.30	31.80	33.80		29.27	28.90				41.40	46.20	36.5	31.4 (1)	34.3
N151	36.40	46.60	38.80	43.20	38.70	41.24	42.40	43.60		43.50	46.40	47.5	42.6	**40.0**	**40.0**
N152	57.70	53.00	49.30	52.60	54.30	47.79	49.81	48.00	65.2	59.80	67.70	61.60	55.6	**52.2**	**41.6**
N153	41.00	36.70	33.20	30.00	40.70	32.58	28.39	31.20	35.20	38.30	34.60	48.90	35.9	33.7	33.7
N154	40	37.8	30.2	31.2	38	31.08	31.93	38.6	35		43.4	39.6	36.1	33.9	33.9
N157	35	30.5	31.2	28.4	32.2	26	20.72	30	27.2			42.5	30.4	28.5	28.5
N158	37	69.3	38.7	36.9	38.6	38.93	38.78	34.8	39.5	42.3	50	50.5	42.9	**40.4**	**40.4**
N159	34.7	34.2	33.3	33.8	35.9	30.83	27.23	27.8	30.2	43.1	44.9	41.4	34.8	32.7	32.7
N160	43.1	36.9	32.9	32.6	32.6	25.58	24.29	32.7	35.8	34.6	45.5	44.8	35.1	33.0	33.0
N161	35.9	38.7	37.5	35.3	38.9	27.68		46.4	30	37.8	45	40.8	37.6	35.4	35.4
N162	37.2	46.5	35.1	29	37.8		37.04	43	43.5	35.8	44.1	45.3	39.5	37.1	37.1
N163	36.5	31.4	35	41.9	30	28.92	24.72	30	31.7	34.3	39.3	37.6	33.4	31.4	31.4
N164	42.9	33.5	40	37.6	36	33.71	28.11	37.2	41.4	41.5	40.8	43.4	38.0	35.7	35.7
N165	42.9	34	34.6	35.3	34.3	29.51	26.44	33.7	38.7	38.8	37.7	48.6	36.2	34.0	34.0
N166	56.6			37.2	40	35.55	29.92	43.1	35.8	44.3	50.6	50.6	42.4	39.8	39.8
N167	42.3	39.6	35	38.2	40	36.39	30.13	33.5	34.9	40.6	46.9	46.4	38.7	36.3	36.3
N168	41	46.2	40.6	41.1	49.9	37.39	32.47	35.2	36.6	48.3	52.4	56.70	43.2	**40.6**	**40.6**
N169	41.7	46	34.2	43.8	47.3	47.09	40.47	45.1	48.1	46.7	46.1	55.9	45.2	**42.5**	**42.5**
N170	51.7	43.7	42	39.2	45.2	39.78	31.68	47.3	44.6	47.6	52.6	47.5	44.4	**41.7**	37.6

N171	23.4	24.6	20.8	17.8	17.9	14.07	13.49	17.5	23.3	25.7	28.8	29	21.4	20.1	20.1
N172	47	51	44.8	43.6	49.4	43.46	40.15	48.2	47	48.3	52.8	60.3	48.0	**45.1**	**45.1**
N173	36.9	19.2	33.6	33.9	32.1	28.2	26.08	31.4	38.4	34.6	38.5	43.2	33.0	31.0	31.0
N174	51.7	46.6	40.7		45.8	39.69	33.32	46.3	49.3	38.5	45.7	62.9	45.5	**42.8**	**42.8**
N175	39	43.2	36.4	39.8	48.5	34.49	31.81	40.5	40.7	43.1	48.3	48.9	41.2	38.8	38.8
N176	40.4		38.6	42.8		42.55	37.09	43.6	43.6	52.8	53.7	63.7	45.9	**43.1**	**43.1**
N178	33.8	26	26.8	24.6	28.7	21.64	19.34	25.6	30.7	32	34.2	41.3	28.7	27.0	27.0
N179	32	34.5	28.6	28	36	24.75	21.87	35.7	26.6	38.5	42.1	36.6	32.1	30.2	30.2
N180			37.00	36.20	43.70	32.89	33.88	39.00	42.40	43.10	48.30	57.90	41.4	39.0	39.0
N182	45.5	33.7	30.2	29	28.1	32.09	28.17	38.6	32.4	36.5	43.2	43.2	35.1	33.0	33.0
N183		39.7	34.9		40.4	37.36	39.55	37	41	42.2	46.4	45.7	40.4	38.0	38.0
N184									47.9	35.9	47	51	45.5	**42.7**	**42.7**
N185			60.5	66.2	57	48.3	51.37	51.9	46.7	58.7	69.1	64	57.4	**53.9**	34.9 (2)
N186					46.7	36				64.2	60.7	51.1	51.7	39.4 (1)	29 (2)

CLICK HERE THEN PASTE COMPLETED DATA ROWS FROM EXCEL TEMPLATE

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

☒ **National bias adjustment factor used (confirm by selecting in box)**

☒ **Annualisation has been conducted where data capture is <75% (confirm by selecting in box)**

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.

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

Industrial Sources

During 2016 there have been no significant changes to pollutant sources.

A Sulphur Pastillation Plant has been built in the western docks of Southampton for converting liquid sulphur waste from Fawley Oil Refinery into solid pellets by cooling. This plant does not require a permit, as there are virtually no emissions from the process. There is a minor risk of odour nuisance from the process in the event of a breakdown. However the operator will stop the process immediately if the odour control measures fail.

Additional Monitoring to assess potential AQMAs.

Diffusion tube monitoring has continued on Portswood Road, Romsey Road and Shirley High Street to assess whether the existing AQMAs need to be extended to incorporate the residential receptors on these roads. It is likely they will be extended and form part of the proposed mandatory Clean Air Zone.

Changes to Monitoring Regime

In December 2015 a new AURN station was installed on Redbridge Road, monitoring PM_{10} and NO_2 . It commenced monitoring in January 2016. Additional diffusion tubes were installed in June 2015 residential receptors at 19A Burgess Road and 166 Bitterne Road West. This new monitoring will assist the Council to assess NO_2 pollution along these busy roads. 2 new diffusion tubes were located on Redbridge Causeway A33 on the border of Southampton and the River Test. DEFRA national modelling had identified the kerb as exceeding the nitrogen dioxide annual mean standard. Although the nearest residential receptors are well set back from the kerb.

QA/QC of Automatic Monitoring

SCC undertakes manual calibrations and LSO duties at the continuous monitoring stations at Brintons Road AURN, Redbridge Road (AURN), Onslow Road and Victoria Road. SCC are the designated Local Site Operator (LSO) for the AURN. The Millbrook Road monitoring station which closed at the end of 2014 was owned by Marchwood Power Station. The LSO duties at the Millbrook Station were undertaken by Enviro Technology (ET).

Data ratification is undertaken by Kings College London (KCL) for Onslow Road, Victoria Road. KCL download data twice a day and notify SCC by email of any issues that may require a call out to check the equipment. ESU1 service and maintain the SCC owned stations. The Brinton's road and new Redbridge AURNs are ratified by Ricardo.

Calibrations are undertaken on a fortnightly basis for Onslow Road and Victoria Road. Onslow and Victoria road have overnight permeation tube internal calibrations every 3 days. The filters are changed every fortnight as well.

The Brintons AURN Station has a scheduled calibration and filter change every 4 weeks. The Redbridge AURN Station has a scheduled calibration and filter change every 2 weeks.

Annual audits are undertaken by the National Physical Laboratory (NPL). This process ensures quality assurance at the stations.

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. Unfortunately the automatic station had to be replaced during 2016 due to a leaky roof, resulting in poor data capture. The co-location study on the roof was therefore very poor and a local bias adjustment factor could not be calculated with any precision.

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 (Defra, 2016).

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 (2016) was 0.95. This was obtained from the Local Air Quality Management website (Defra, 2016) from database version 06/17.

Short-term to Long-term data adjustment (annualised data)

Estimation of annual mean from short term monitoring 44B Burgess Road NOx Tube 2016

Month	Automatic station B1 Portsmouth Urban Background	Bournemouth Urban Background Station	Diffusion tube D1	B1 when D1 is available For Portsmouth Station	B1 when D1 is available for Bournemouth
Jan	22.2	15	42.1	22.2	15
Feb	21.8	15.6	38.3	21.8	15.6
March	25.4	16.9	31.8	25.4	16.9
April	18.6	12.1	33.8	18.6	12.1
May	15.1	10.3			
June	12.8	-	29.3	12.8	
July	9.7	5.3	28.9	9.7	5.3
Aug	12.8	10.4			
Sep	15.5	9.5			
Oct	23.6	18.6			
Nov	30.2	22.3	41.4	30.2	22.3
Dec	34.1	24.5	46.2	34.1	24.5
average	20.15	14.6	36.5	21.85	15.95

Portsmouth Stn Annual Mean (Am) of B1 = 20.15 Period mean of B1 (Pm) = 21.85 Ratio =20.15/21.85 = 0.92

Bournemouth Stn Annual Mean (Am) of B1 = 14.6 Period mean of B1 (Pm) = 15.95

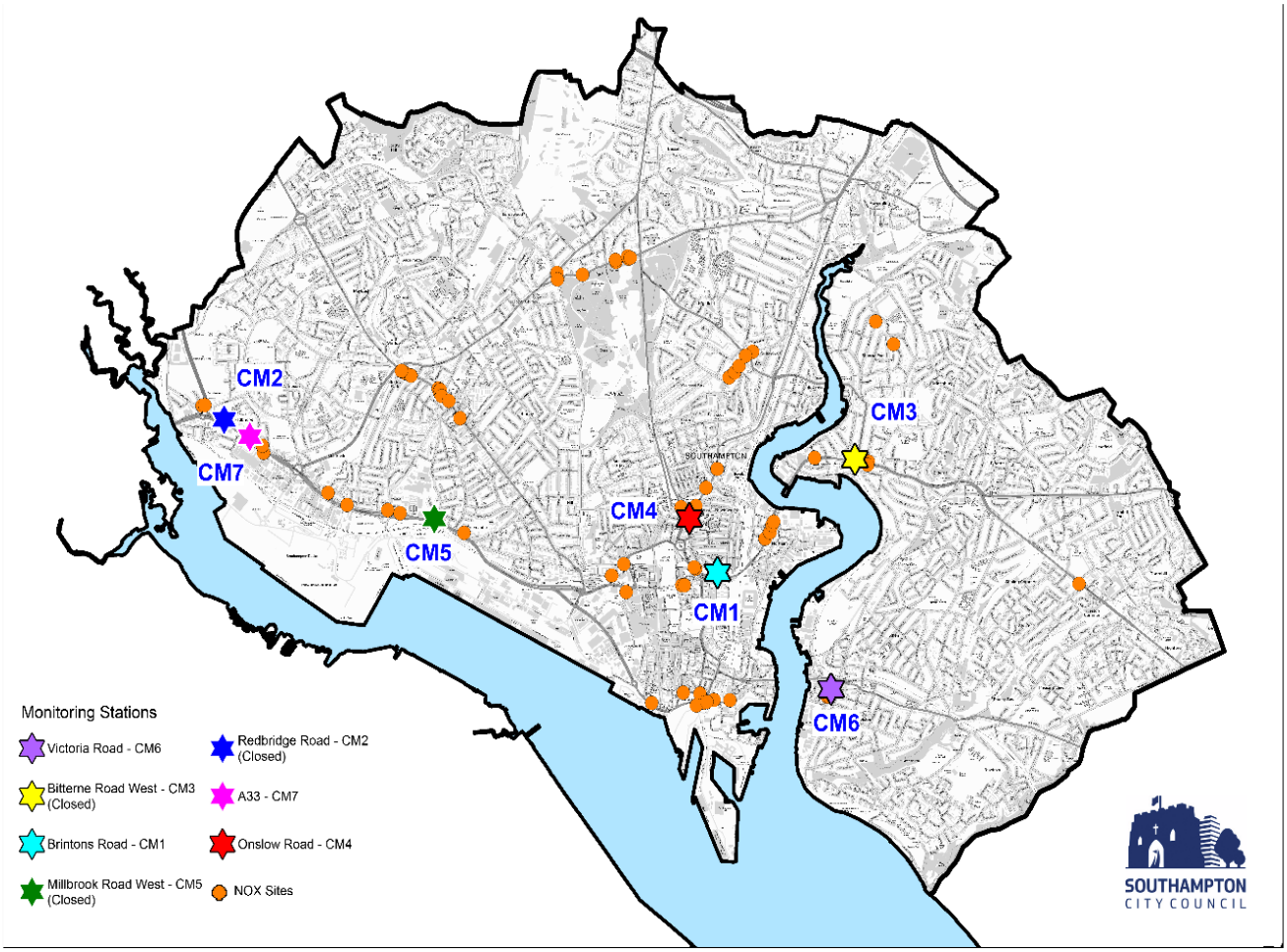
Ratio =14.6/ 15.95= 0.91

Average Ratio = 0.915**36.5 * 0.915 = 33.4**

Cannot use the Southampton AURN Urban Centre station as data capture only 42% (new cabin installed)

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

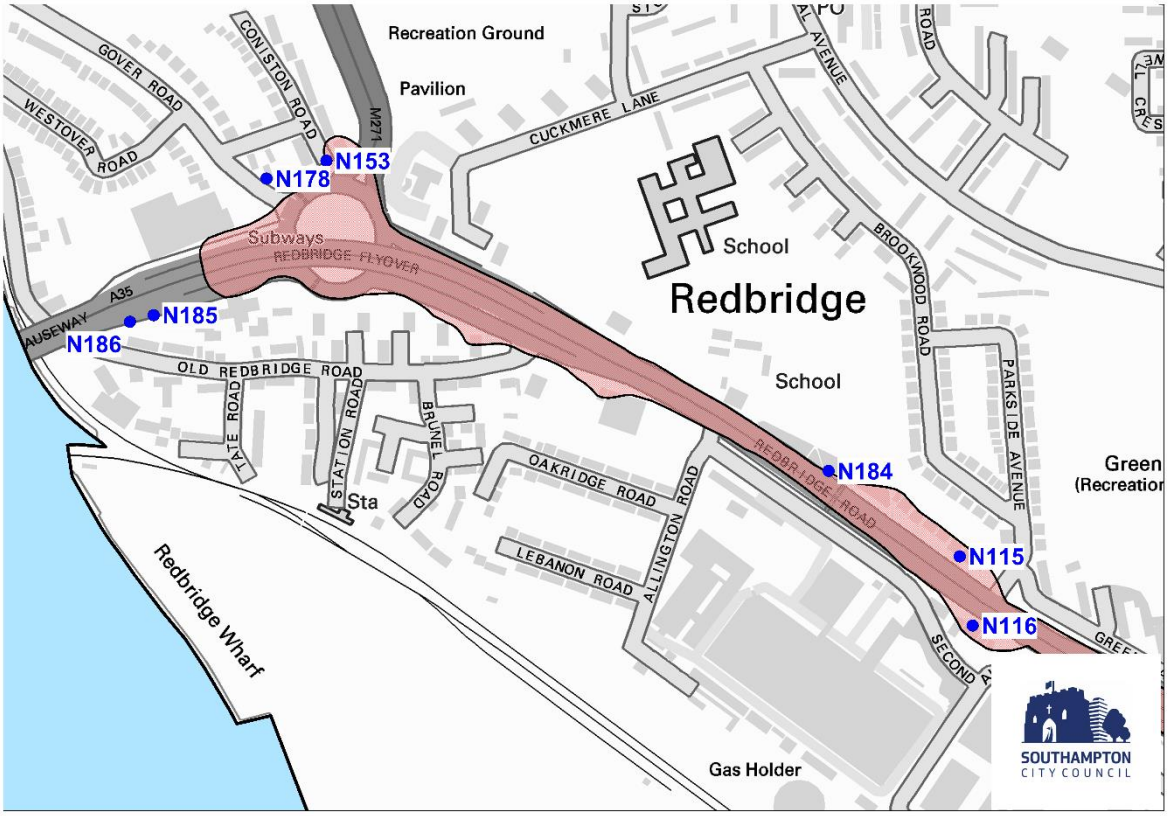
Figure D1: Map of Automatic Monitoring Sites (in blue) across the city and an overall view of the NOx Tube locations



Continuous Monitor CM2 was replaced with CM7.

CM3 and CM5 have closed

Figure D2: 2 Maps of diffusion tube locations on A33 Redbridge/Millbrook Road



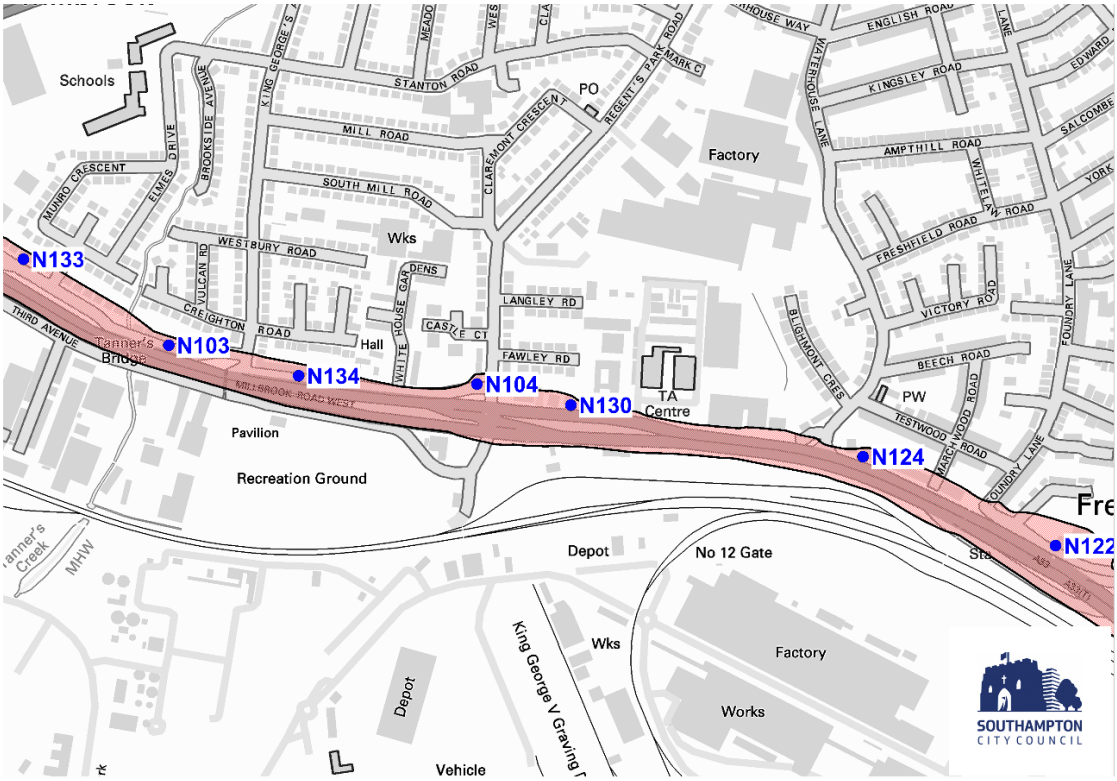


Figure D3: Map of diffusion tube locations on Burgess Road

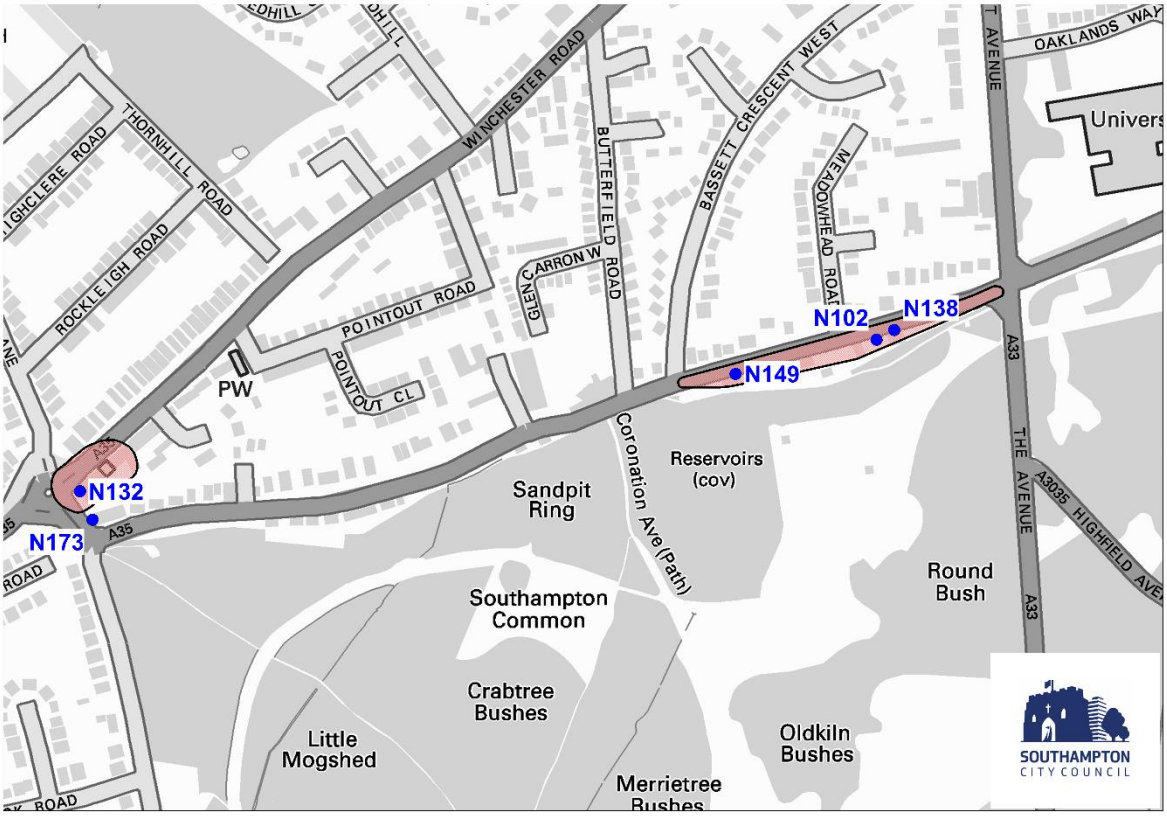


Figure D4: Map of diffusion tube locations in central Southampton, Bevois Valley and Northam

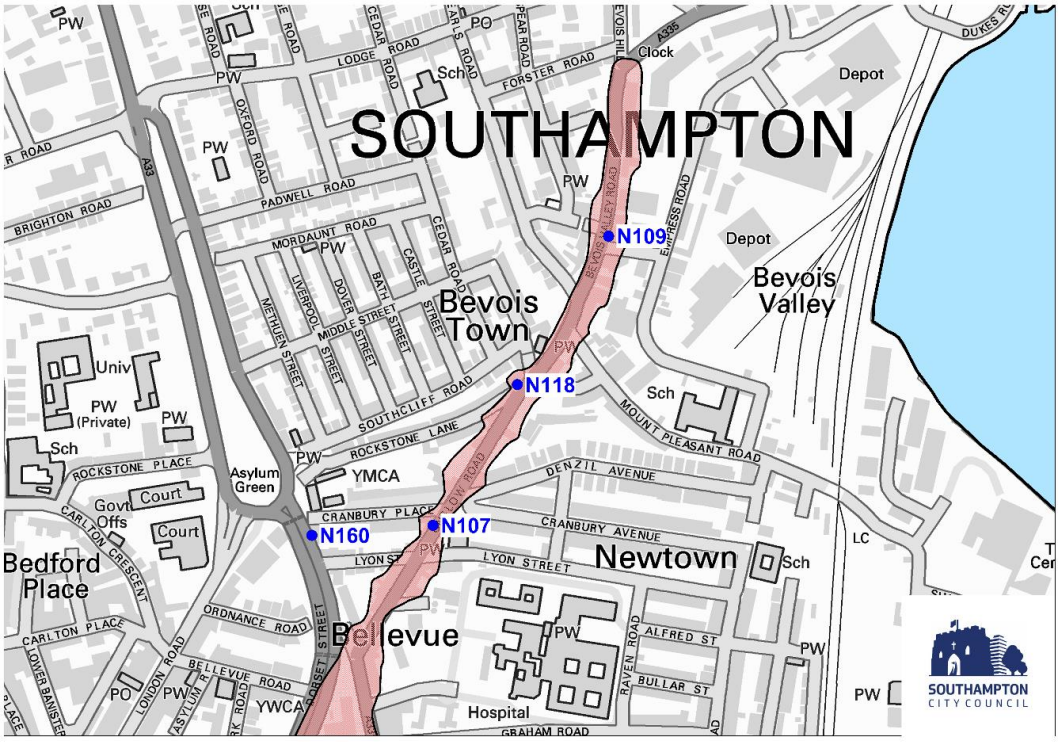


Figure D5 Romsey/Shirley Road NOx Tube Locations

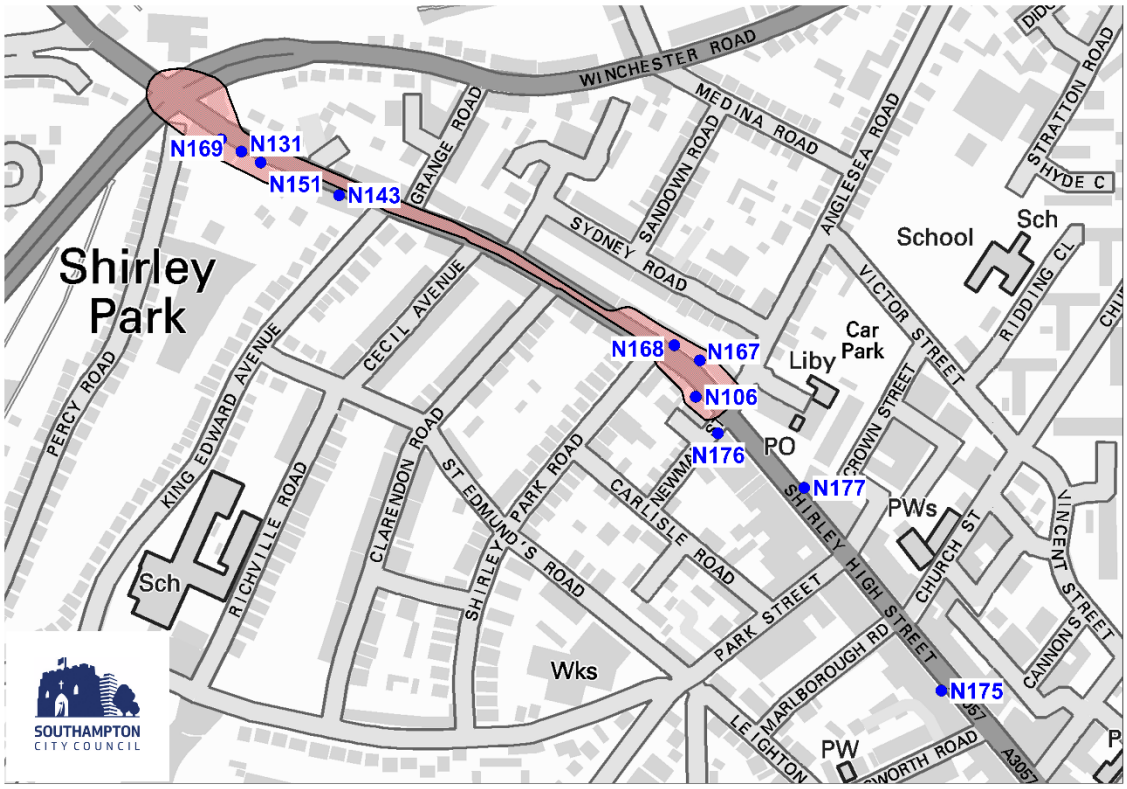


Figure D6 showing the 5 NOx tube locations on Portswood Road

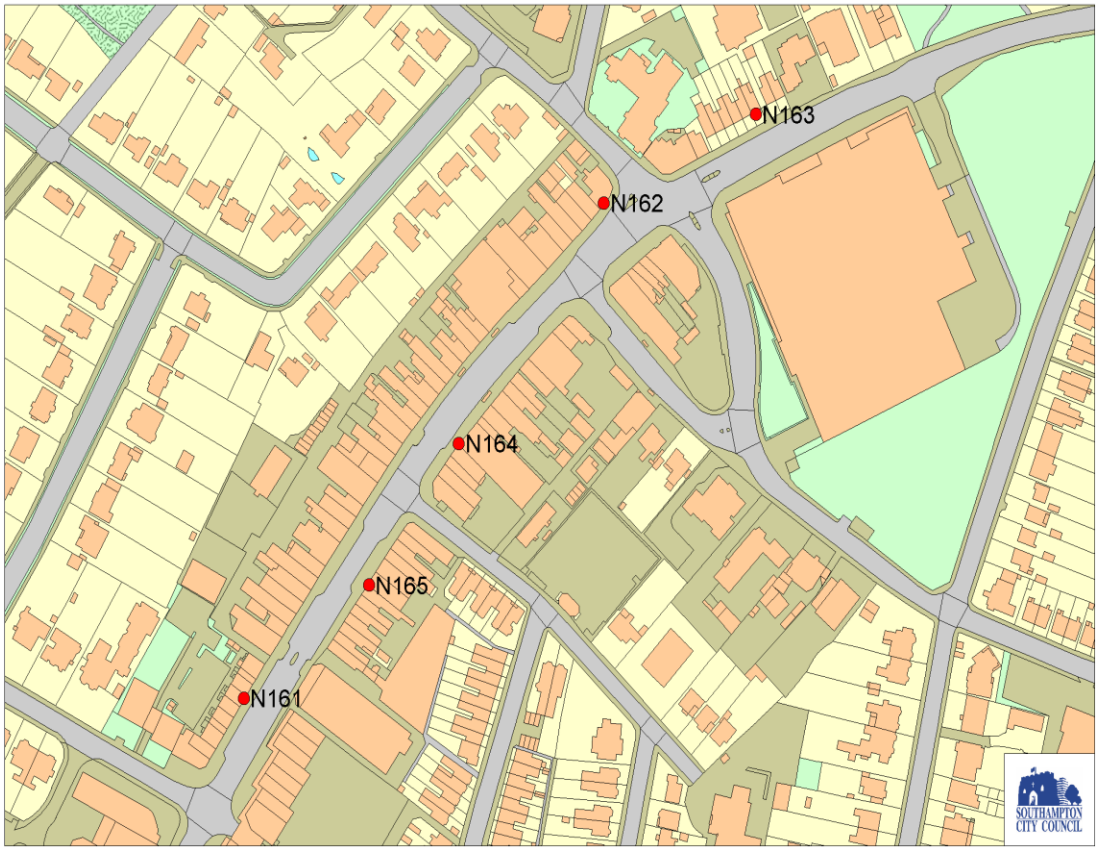


Figure D7 Town Quay/Platform Road NOx Tube locations

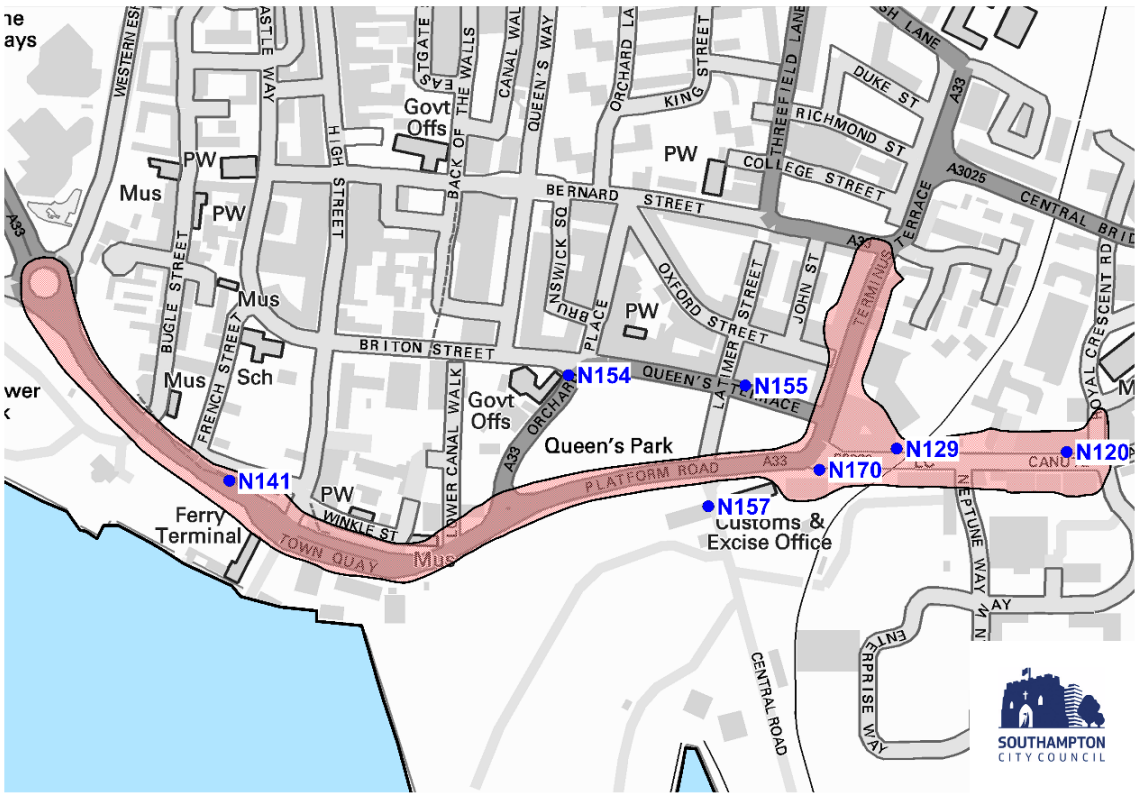


Figure D8 Woolston Road NOx Tube locations

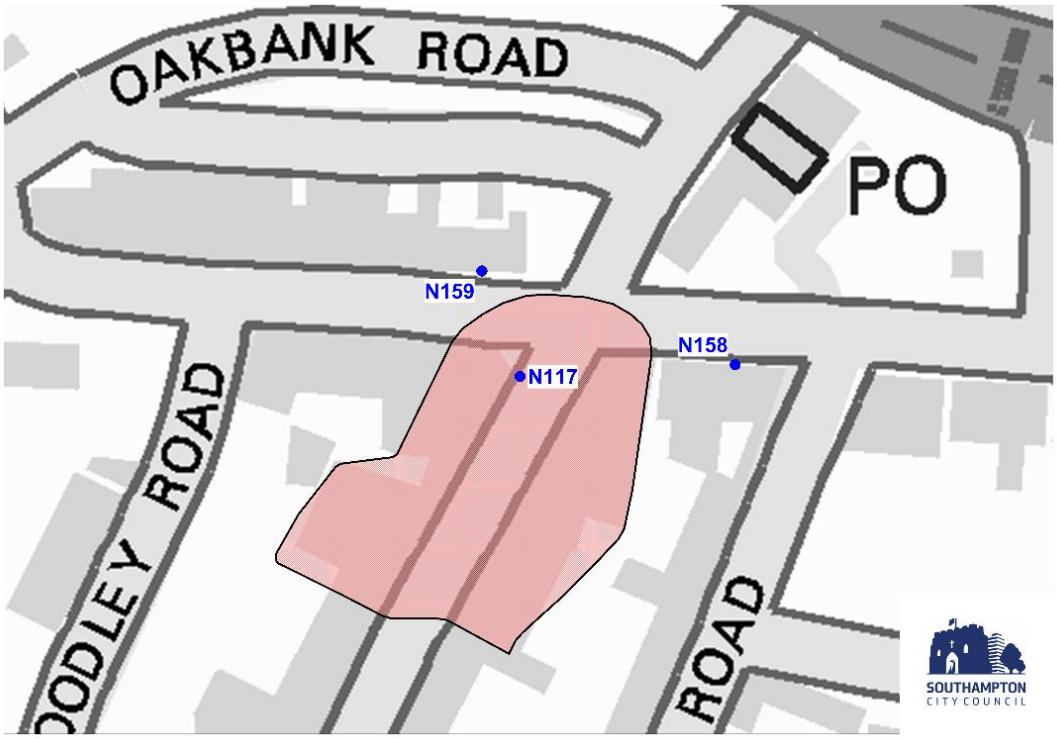


Figure D9 New Road NOx Tube locations

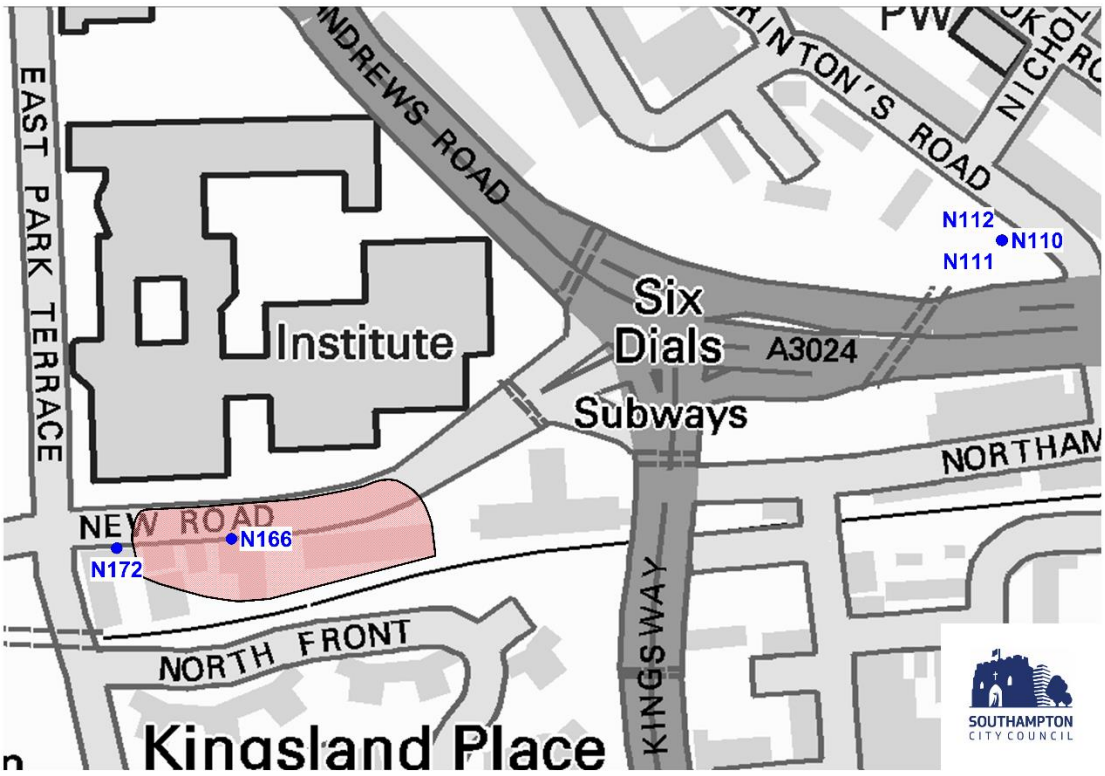


Figure D10 Commercial Road NOx Tube locations

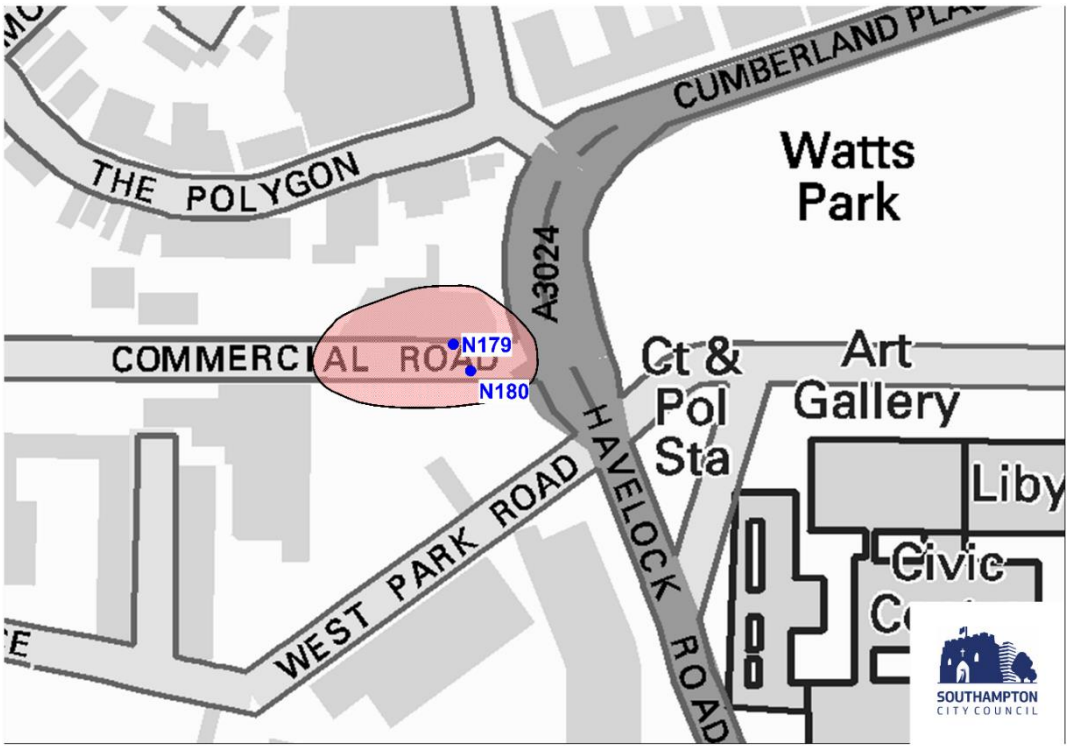
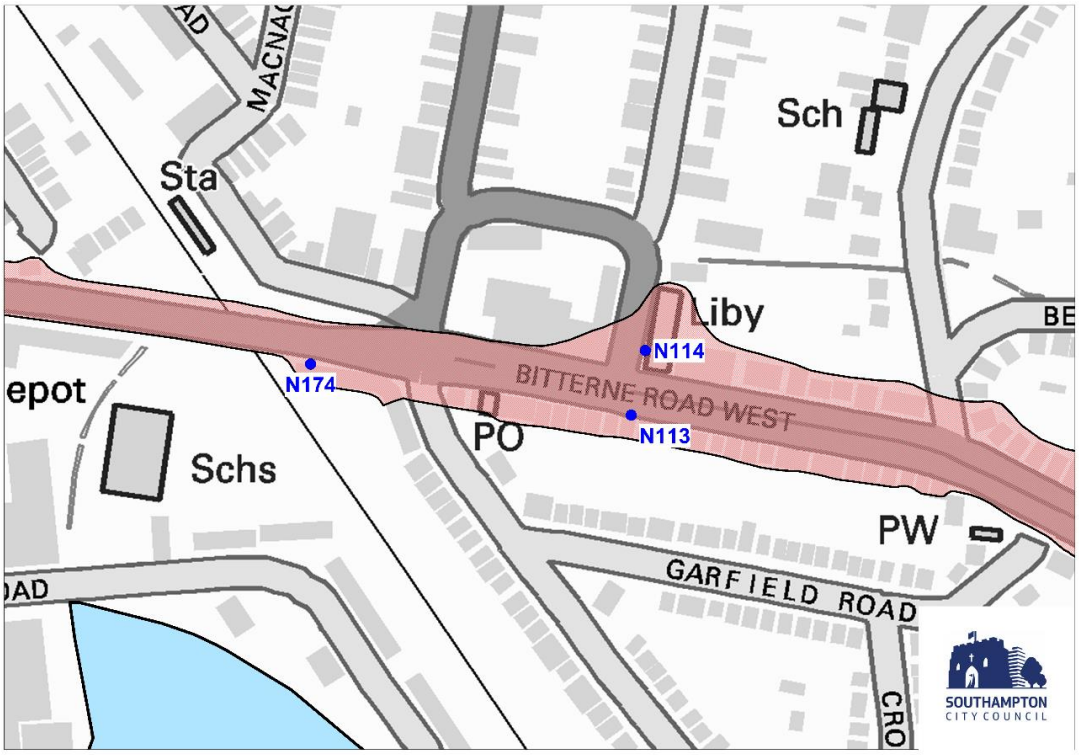
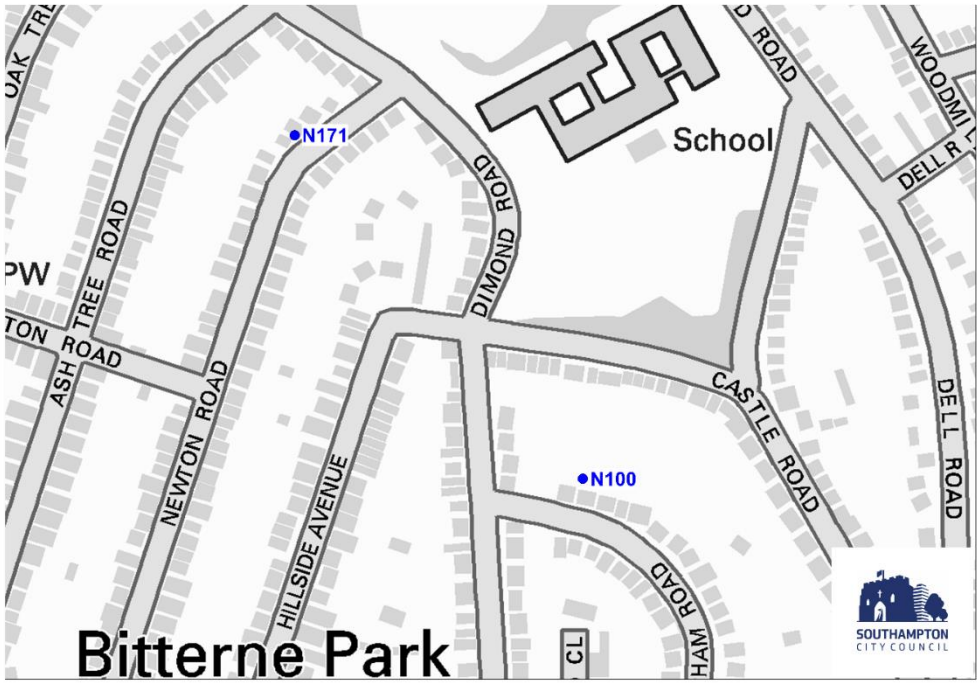


Figure D11 Bitterne Road



D12 Bitterne AQMA, Northam End

D13 Bitterne Park, background sites



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]	
	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

[4] The units are in micrograms 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
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (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
SCC	Southampton City Council

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