2015 Updating and Screening Assessment Report for Southampton City Council

In fulfillment of Part IV of the Environment Act 1995 Local Air Quality Management November 2015

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Executive Summary

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England 2007 and the relevant Policy and Technical Guidance documents.

This Report is Southampton City Council's fifth Updating and Screening Assessment. The Updating and Screening Assessment determines those changes since the last assessment, which could lead to the risk of an air quality objective being exceeded.

The Updating and Screening Assessment has not identified any significant changes in emission sources within Southampton. There have been no new relevant industrial installations, The Ford Transit Factory at Swaythling has closed since the last USA Report in 2012, reducing solvent emissions in the city.

Shirley High Street was identified as possibly being at risk of exceeding the nitrogen dioxide annual mean. 3 NOx tubes have been deployed in July 2015 to monitor at residential facades near the kerb.

Monitoring during 2014 has identified exceedances of objectives at relevant locations outside of the existing AQMAs. However these locations were already identified in the 2014 combined Progress and Detailed Assessment Report accepted by DEFRA in June 2015. It was proposed to extend the existing AQMAs at Romsey Road to include the southern section of Romsey Road that was exceeding, and extend the Bevois Valley AQMA to include Portswood Road. However the ongoing Low Emission Strategy is proposing to considerably expand the existing 10 AQMAs to cover all the main road corridors in the city and call it a Clean Air Zone. This takes into account the latest DEFRA draft guidance that is asking Southampton to declare a Clean Air Zone to improve air quality by 2020. Southampton is one of the eight cities in England that DEFRA is predicting will still exceed the nitrogen dioxide annual

mean standard. DEFRA's modelling identified the Western Approach, the main road into the Container Port as potentially exceeding in 2020.

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1 Introduction

1.1 Description of Local Authority Area

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 handles around 820,000 vehicles per annum, 41.0 million tonnes of goods per year (ABP) making it the 16th busiest port in Europe. A total of 1.57 million cruise ship passengers (includes arrivals & departures) passed through the port in 2014, (source ABP). In 2014, just over 1 million shipping containers were handled, 625,000 were moved by Road, and 317,000 by Rail. Containers moved by Road represents 66%, and by Rail 34% of inland container movements. In addition, 125,000 containers were moved by feeder ship 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.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre μg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 μg/m^3	Running annual mean	31.12.2003
	5.00 μg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 μg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 μg/m^3	Annual mean	31.12.2004
	0.25 μg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 μg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 μg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 μg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 μg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 μg/m^3, not to be	1-hour mean	31.12.2004

	exceeded more than 24 times a year		
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

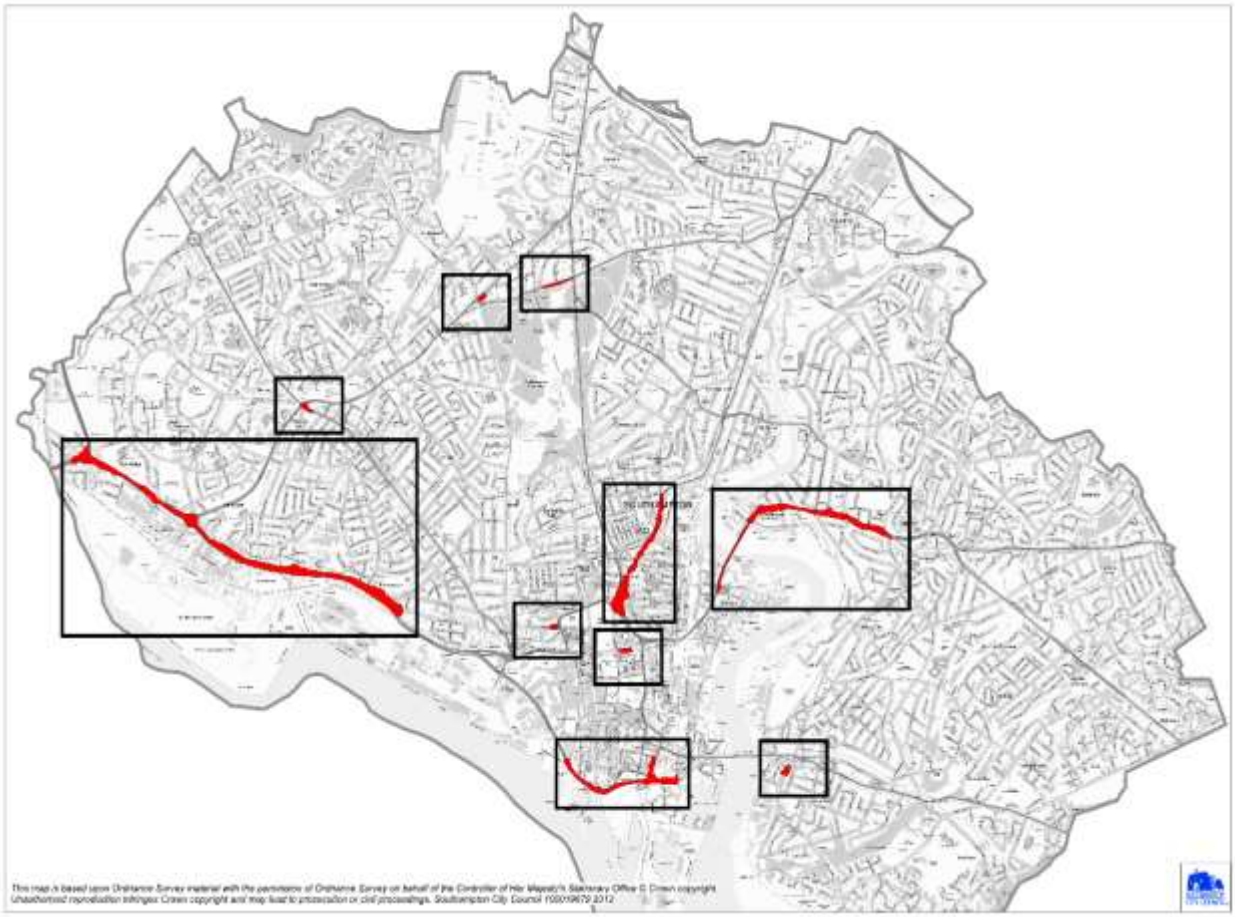
Report Date	Report Type	Report Outcome
June 2003	Updating & Screening Assessment 1	Detailed Assessment required for SO2 and NO2
December 2004	Detailed Assessment	Six AQMAs required for NO2 (annual mean)
July 2005	Declaration of six AQMAs	AQMAs declared along Bitterne Road, Town Quay, Bevois Valley Road, 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 NO2 at six locations and PM10 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 NO2 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

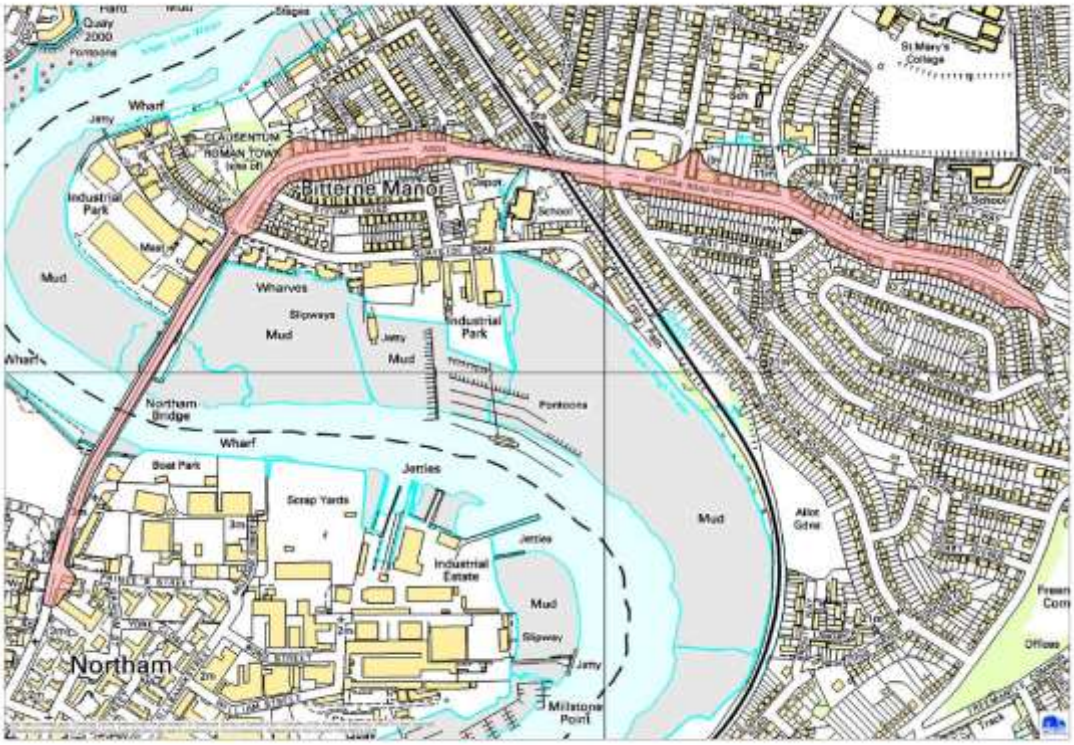
December 2013	Progress Report	The southern end of Romsey Road was identified at risk of exceedance, 2 more NOx tubes to be deployed. Queens Terrace and Orchard Place adjacent to the Platform Road AQMA were identified at risk of exceedance
May 2015	2013 Progress Report and Detailed Assessment combined Report	The Report recommended extending the existing AQMAs on Romsey Road and Bevois Valley Road to include receptor locations that were exceeding, proven by NOx tube monitoring

Maps of existing AQMAs in Southampton

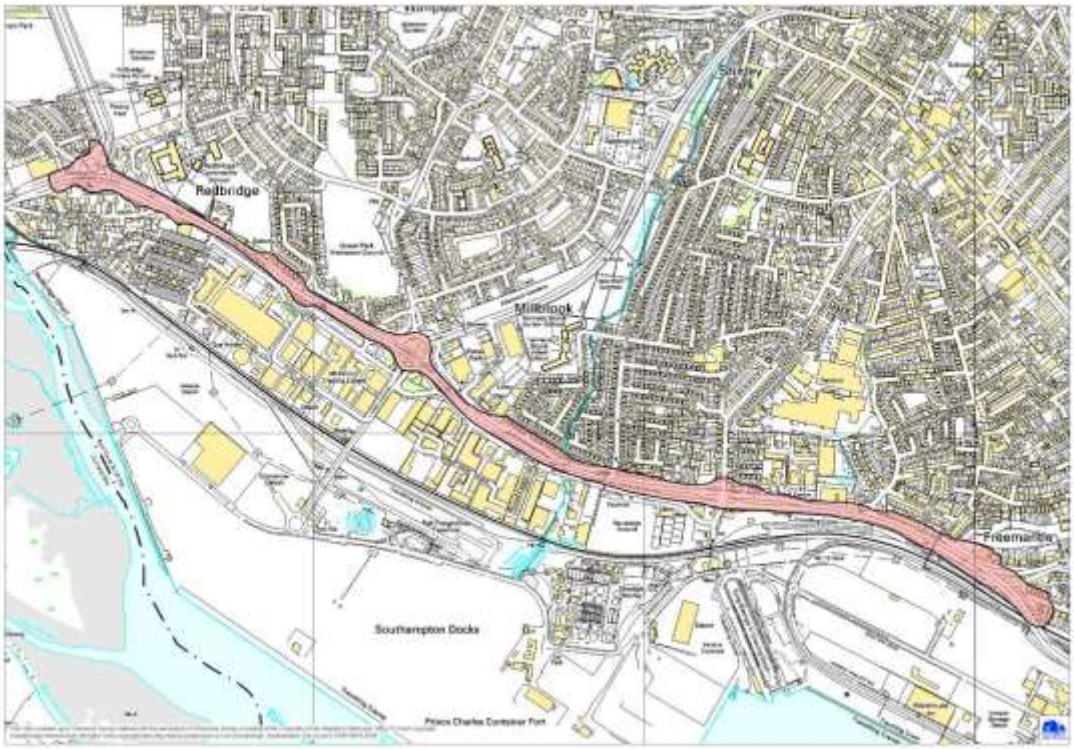
Figure 1.1 Maps of AQMA Boundaries



Bitterne/Northam Road AQMA



Redbridge/Millbrook Road AQMA

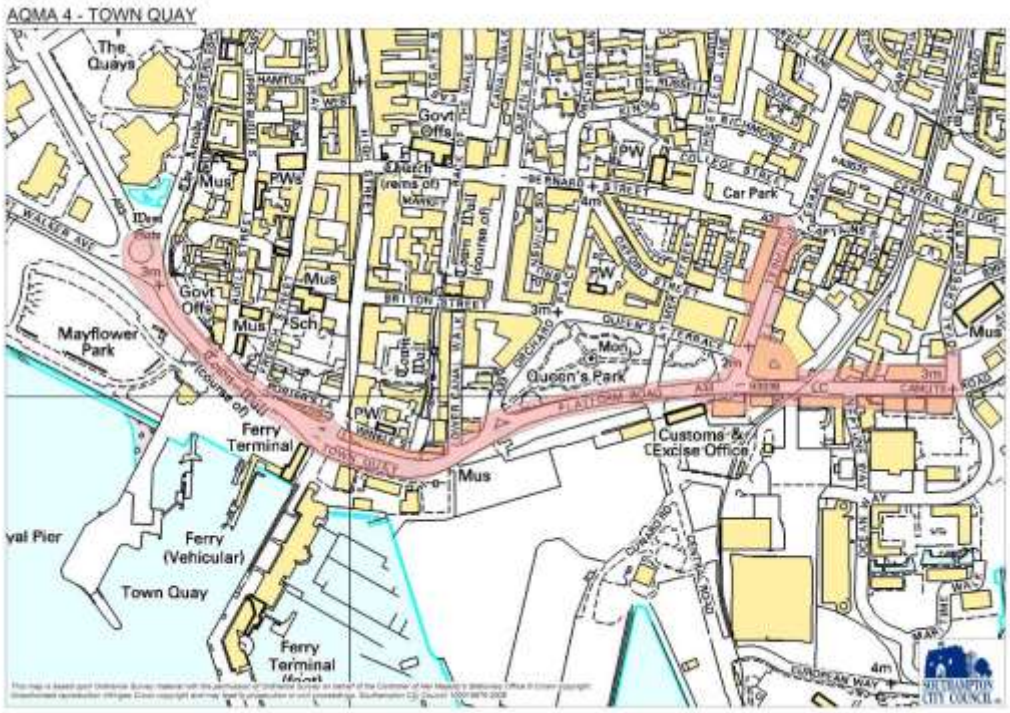


Victoria Road AQMA

New Road AQMA

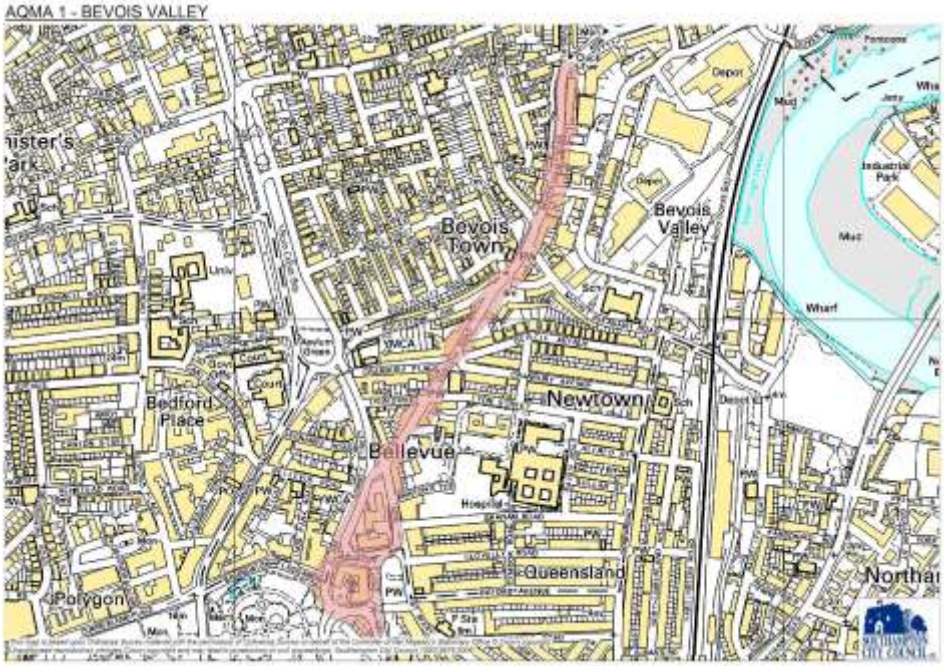
Commercial Road AQMA

Town Quay AQMA



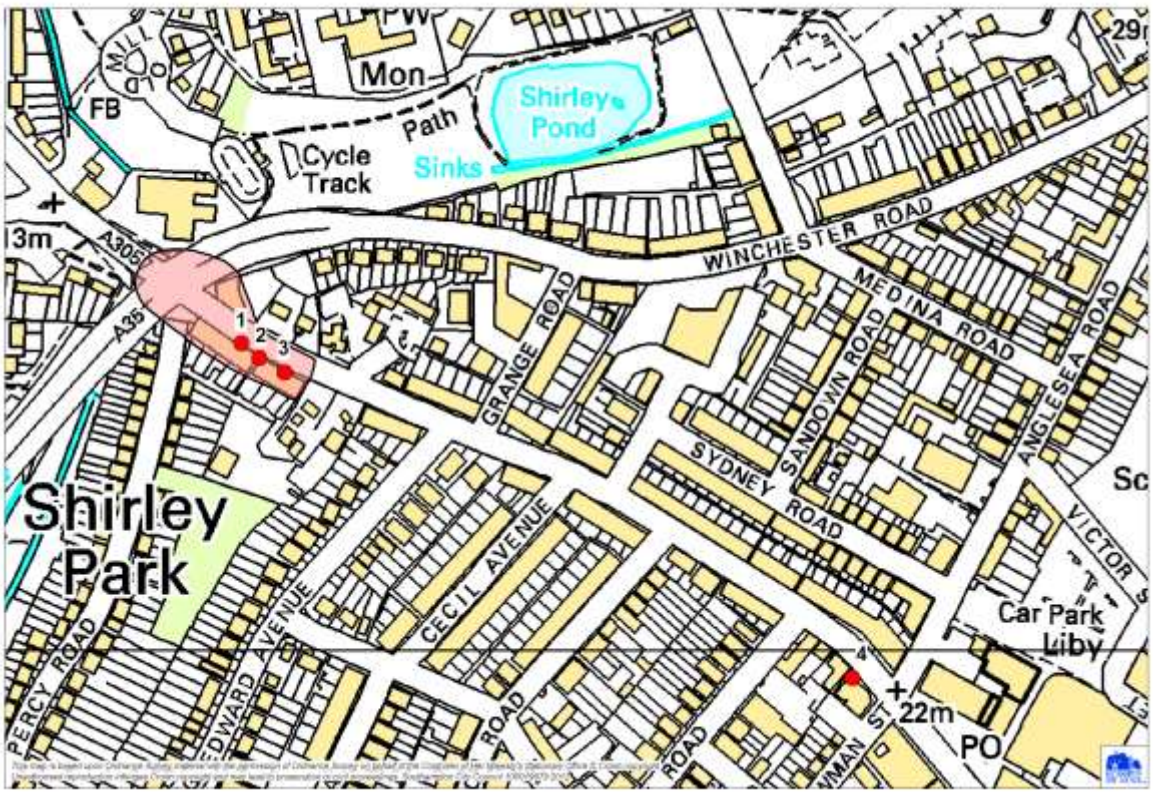
Winchester Road AQMA

Bevois Valley AQMA



Burgess Road AQMA

Romsey Road AQMA

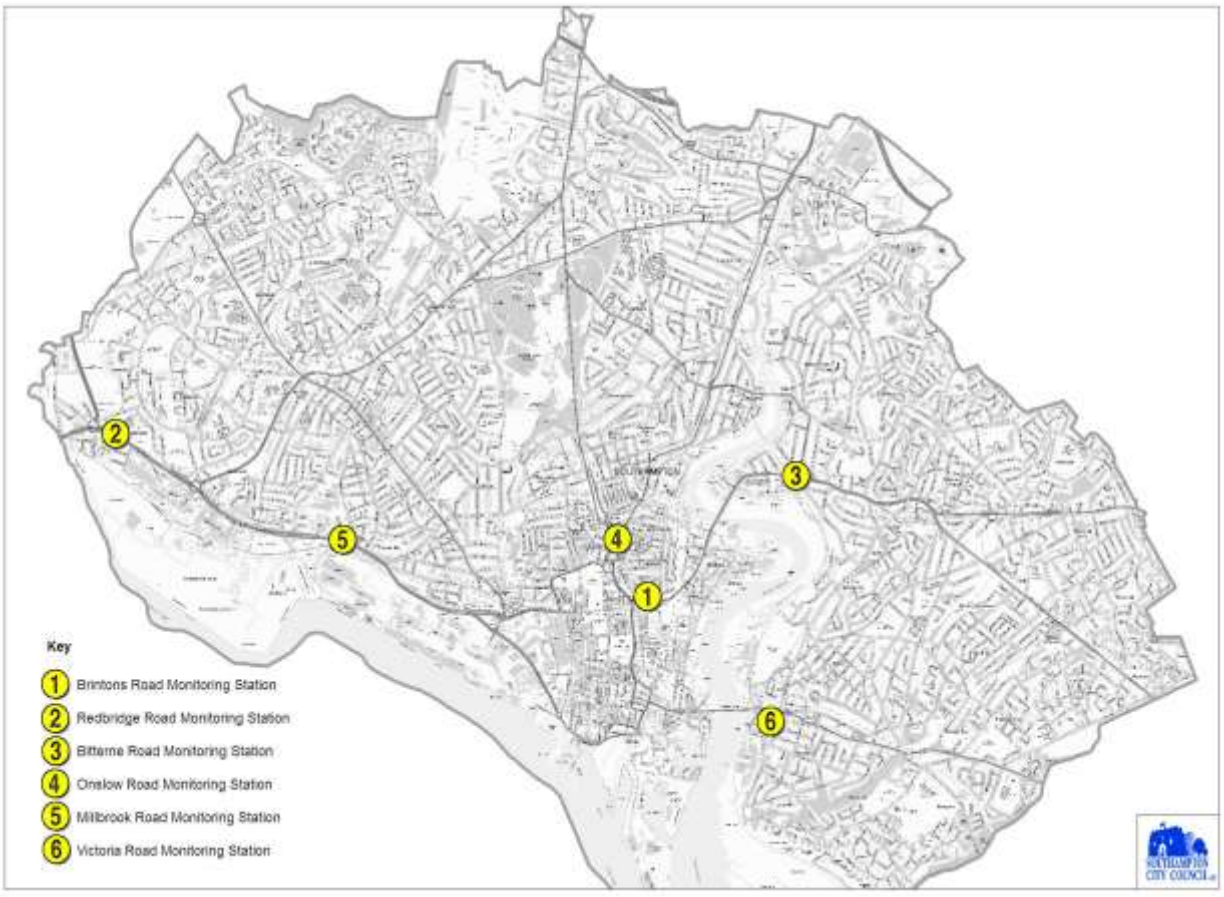


2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Figure 2.1 Map(s) of Automatic Monitoring Sites (if applicable)



Site 2, Redbridge Road closed in January 2014
Site 3, Bitterne Road closed at the end of 2013
Site 5, Millbrook Road closed at the end of 2014

Table 2.1 Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
CM1	AURN Brintons Road	Urban Centre	442583	112248	2.5m	NO_2, PM_{10} (FDMS), $PM_{2.5}$ (FDMS), SO_2, CO, benzene, O3	N	Chemiluminescence (NO_2), FDMS (PM_{10} and $PM_{2.5}$), ultra-violet fluorescence (SO_2), infra-red absorption (CO), pumped diffusion tube sampler (benzene)	Y (18 m)	8m	N
CM2	Redbridge School **Closed January 2014**	Roadside	437549	113721	2.5m	NO2, PM10 (TEOM)	Y	Chemiluminescence (NO_2), TEOM (corrected using VCM) (PM_{10})	Y adjacent to school football pitch 0m	8m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	**Relevant Exposure?** (Y/N with distance (m) from monitoring site to relevant exposure)	**Distance to Kerb of Nearest Road (m)** (N/A if not applicable)	**Does this Location Represent Worst-Case Exposure?**
CM3	Bitterne Road **Closed end of 2013**	Roadside	443987	113340	2.5	NO_2, PM_{10} (TEOM)	Y	Chemiluminescence (NO_2), TEOM (corrected using VCM) (PM_{10})	Y (some houses are closer to the road than the station 10m)	8m	N
CM4	Onslow Road	Roadside	442304	112771	1.3	NO_2	Y	Chemiluminescence (NO_2),	Y (houses similar distance to the road as station 10m)	2m	Y
CM5	Millbrook road **Closed end of 2014**	Roadside	439702	112248	1.3	NO_2 O3	Y	Chemiluminescence	Y (houses similar distance to the road as station 20m)	6m	Y
CM6	Victoria Road	Roadside	443751	111121	1.3	NO_2	Y	Chemiluminescence (NO_2)	Y (1m)	3m	Y

2.1.2 Non-Automatic Monitoring Sites

Figure 2.2 Map(s) of Non-Automatic Monitoring Sites

Southampton City Council has a comprehensive network of approx 60 diffusion tubes in the City details below. Figures 2.2 – 2.5 show the locations of the tubes within the City, alongside the 6 automatic stations. SCC also monitors benzene through a pumped tube located at the Brinton's Road AURN site. Full details of the location of the diffusion tubes can be found in Table 2.2

Figure 2.2 Map of Non-Automatic Monitoring Sites (in red) across the city, yellow numbered dots indicate automatic stations

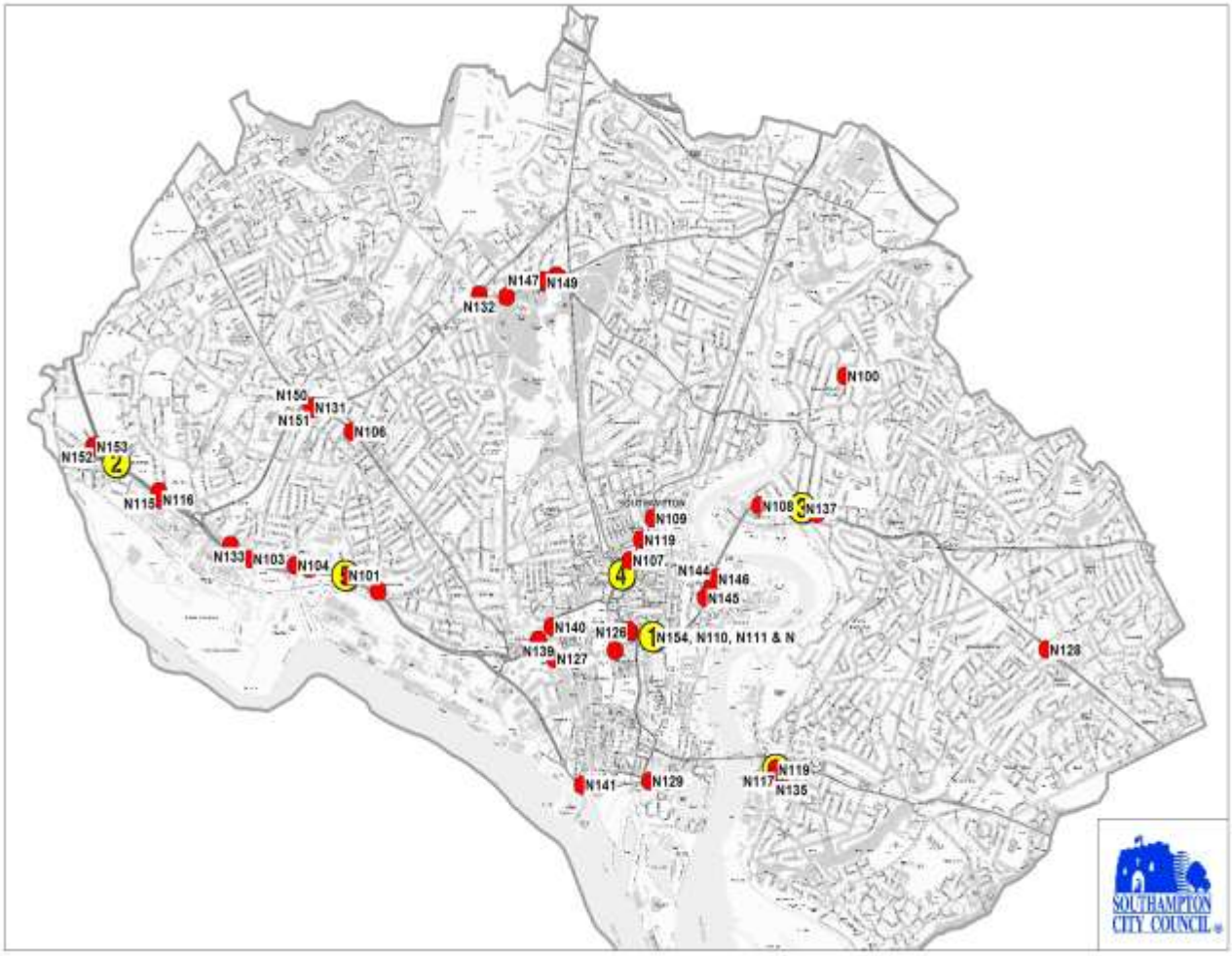


Figure 2.3 Map of diffusion tube locations on A33 Redbridge/Millbrook Road

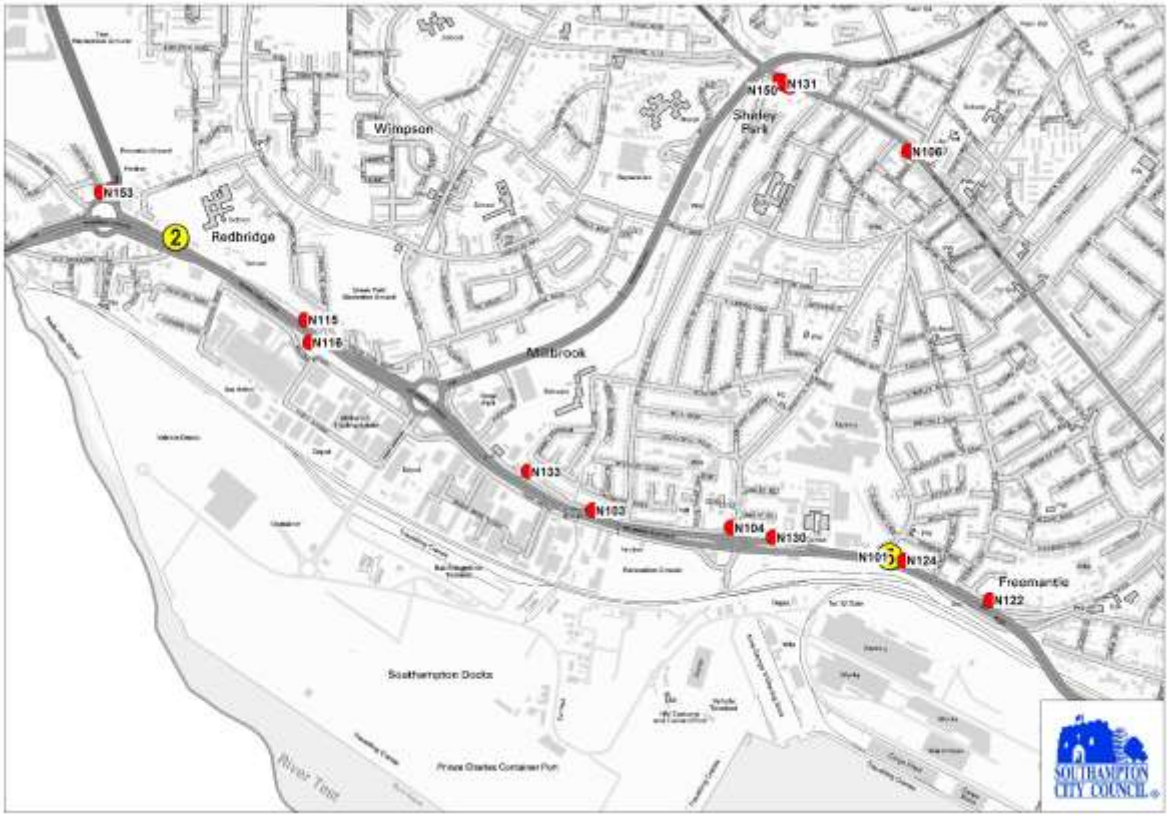


Figure 2.4 Map of diffusion tube locations on Burgess Road

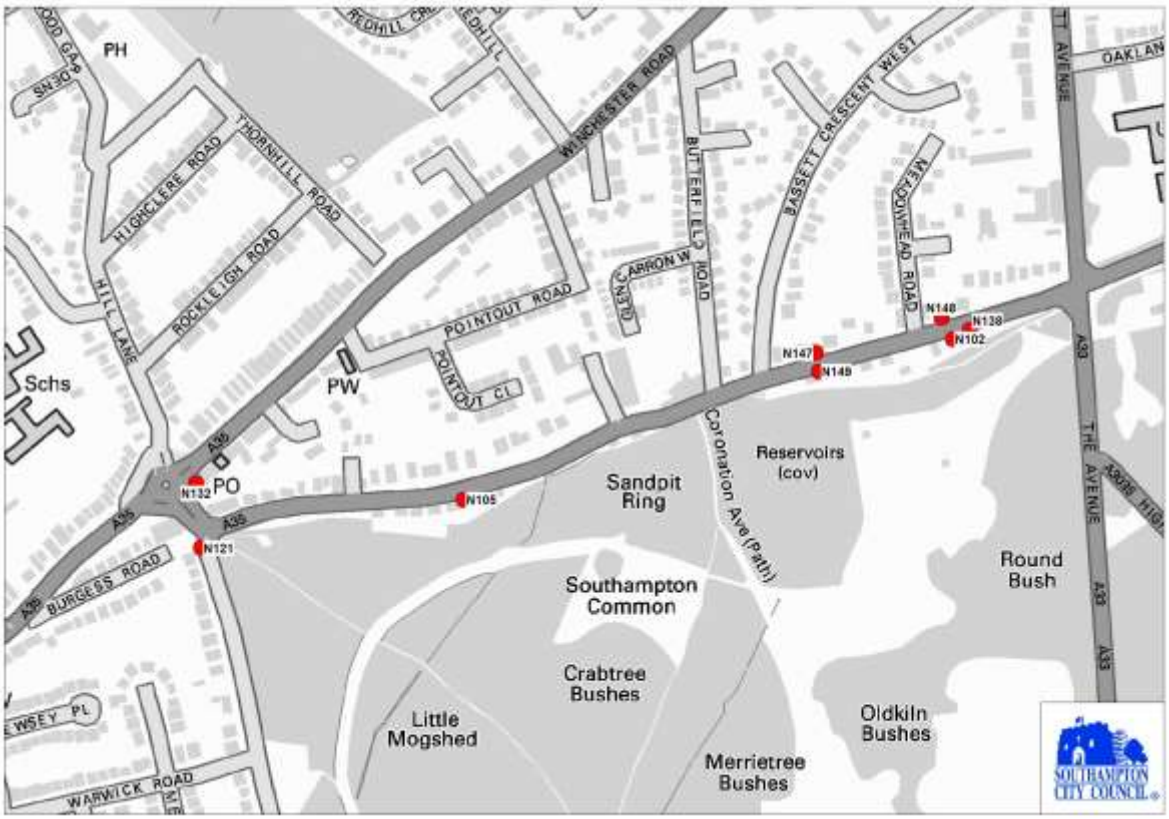


Figure 2.5 Map of diffusion tube locations in central Southampton, Bevois Valley and Northam

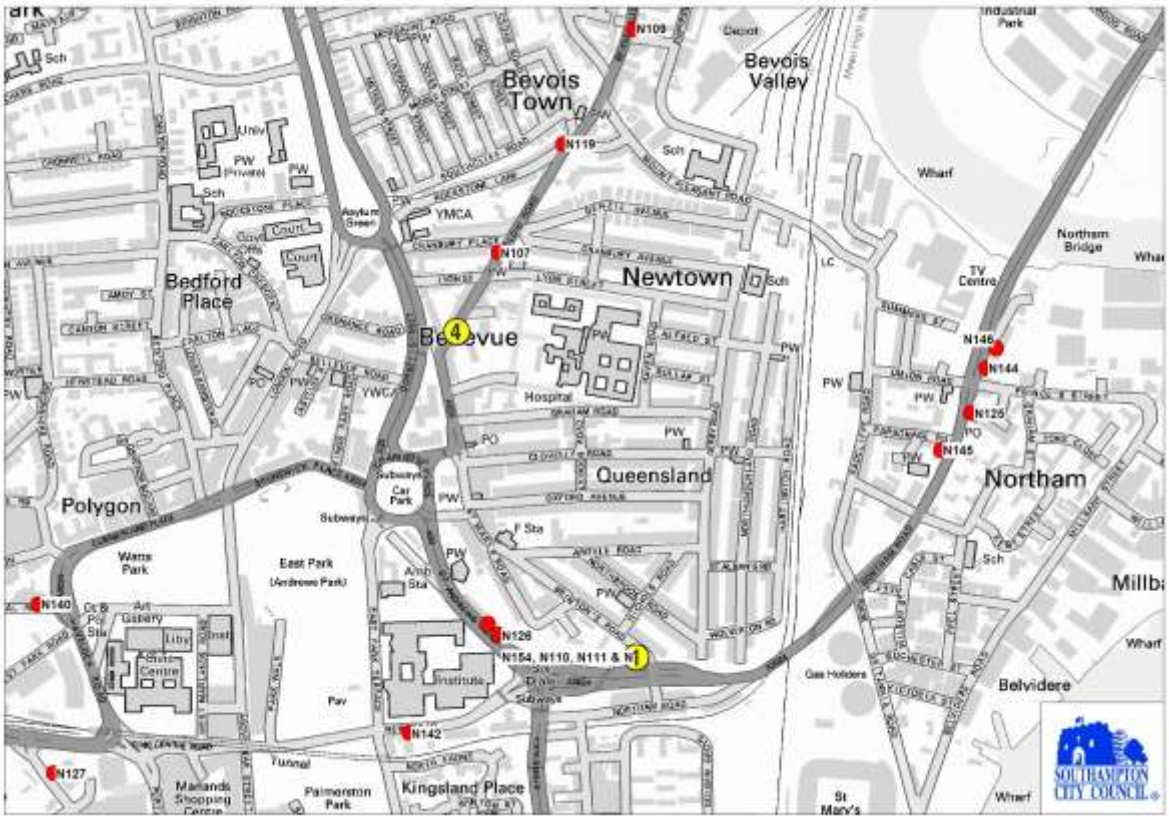


Table 2.2 Details of Non-Automatic Monitoring Sites

Site Address	Site ID	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case exposure?
6 Sandringham Road	N100	Background	444386	114450	NO2	N	N	Y(0m)	N/A	N/A
Redbridge School AMS	N101	Roadside	437543	113726	NO2	Y Redbridge /Millbrook Road	Y	Y(0m)	8m	Y
64 Burgess Road	N102	Roadside	441678	115278	NO2	Y Burgess Road	N	Y(0m)	6m	N
485 Millbrook Road	N103	Roadside	438807	112908	NO2	Y Redbridge /Millbrook Road	N	Y(0m)	13m	Y
Regents Park Junction	N104	Roadside	439218	112850	NO2	Y Redbridge /Millbrook Road	N	Y(2m)	24m	N
32 Burgess Road	N105	Roadside	441210	115124	NO2	N	N	Y(0m)	5m	Y
2 Romsey Road, Oakhill	N106	Roadside	439754	113982	NO2	N	N	Y(0m)	5m	Y
Cranbury Place	N107	Roadside	442367	112896	NO2	Y Bevois Valley	N	Y(0.5m)	2m	Y
81 Bitterne Road	N108	Roadside	443581	113359	NO2	Y Bitterne Road	N	Y (0m)	5m	Y

Site Address	Site ID	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case exposure?
72 Bevois Valley	N109	Roadside	442585	113251	NO2	Y Bevois Valley	N	Y(0.5m)	5m	Y
Brinton's Road 1	N110	Urban Centre	442591	112240	NO2	N	Y	Y(18m)	10m	N
Brinton's Road 2	N111	Urban Centre	442591	112240	NO2	N	Y	Y(18m)	10m	N
Brinton's Road 3	N112	Urban Centre	442591	112240	NO2	N	Y	Y(18m)	10m	N
206 Bitterne Road	N113	Roadside	444124	113290	NO2	Y Bitterne Road	N	Y(0m)	5m	Y
Bitterne Library	N114	Roadside	444131	113326	NO2	Y Bitterne Road	N	Y(1m)	3.5m	Y
54 Redbridge Road	N115	Roadside	437939	113473	NO2	Y Redbridge /Millbrook Road	N	Y(0m)	11m	Y
57 Redbridge Road	N116	Roadside	437951	113407	NO2	Y Redbridge /Millbrook Road	N	Y(0m)	11m	Y
Victoria Road (lamp post)	N117	Roadside	443751	111122	NO2	Y Victoria Road	Y	Y(0.3m)	3m	Y
3 Rockstone Lane	N118	Roadside	442472	113068	NO2	Y Bevois Valley	N	Y(2.5m)	2.5m	Y

Site Address	Site ID	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	Relevant Exposure ? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case exposure?
6-9 Canute Road	N120	Roadside	442555	111021	NO2	Y Town Quay	N	Y(0m)	4 m	Y
Hill Lane (closed)	N121	Kerbside	440958	115068	NO2	N	N	Y(7 m)	1 m	Y
151 Paynes Road	N122	Roadside	439998	112634	NO2	N Redbridge /Millbrook Road	N	Y(0 m)	12 m	N
102 St. Andrews Road	N123	Roadside	442351	112302	NO2	N	N	Y(0 m)	4 m	Y
305 Millbrook Road	N124	Roadside	439741	112746	NO2	Y Redbridge /Millbrook Road	N	Y(0 m)	10 m	Y
Princes Court	N125	Roadside	443126	112645	NO2	Y Bitterne Road	N	Y(0 m)	5.5 m	Y
107 St Andrew's Road	N126	Roadside	442369	112283	NO2	N	N	Y(2 m)	2 m	Y
Western Esplanade (closed)	N127	Roadside	441656	112065	NO2	N	N	Y(2 m)	2.8 m	Y
290 Bursledon Road (closed)	N128	Roadside	446283	112145	NO2	N	N	Y(0 m)	4.8 m	Y

SW House	N129	Roadside	442554	111022	NO2	Y Town Quay	N	Y(0 m)	3.1 m	Y
367A Millbrook Road	N130	Roadside	439346	112821	NO2	Y Redbridge /Millbrook Road	N	Y(0 m)	9 m	Y
142 Romsey Road	N131	Roadside	439378	114185	NO2	Y Romsey Road	N	Y(0 m)	5m	Y
347A Winchester Road	N132	Kerbside	440950	115138	NO2	Y Wincheste r Road	N	Y(3 m)	1 m	Y
539 Millbrook Road	N133	Roadside	438608	113018	NO2	Y Redbridge /Millbrook Road	N	Y(0 m)	33 m	Y
Ladbrokes	N134	Roadside	438953	112866	NO2	Y Redbridge /Millbrook Road	N	Y(0 m)	12 m	Y
24 Victoria Road	N135	Roadside	443714	111052	NO2	N	N	Y(0 m)	4 m	N
23 Victoria Road	N136	Roadside	443731	111053	NO2	N	N	Y(0 m)	3.2 m	N
Bitterne AMS	N137	Roadside	443990	113340	NO2	Y Bitterne Road	Y	Y(5 m)	10 m	N
66 Burgess Road	N138	Roadside	441694	115288	NO2	Y Burgess Road	N	Y(0 m)	3 m	Y
Wyndham Court (closed)	N139	Urban Centre	441506	112223	NO2	N	N	Y(0 m)	8 m	Y
5 Commercial Road	N140	Roadside	441629	112332	NO2	Y Commerci al Road	N	Y(2 m)	2 m	Y

Site Address	Site ID	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	Relevant Exposure ? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case exposure?
Town Quay Road	N141	Kerbside	441915	110993	NO2	Y Town Quay	N	Y(1 m)	0.8 m	Y
10 New Road	N142	Roadside	442225	112127	NO2	Y New Road	N	Y(0 m)	2 m	Y
102 Romsey Road	N143	Roadside	439468	114146	NO2	N	N	Y(0 m)	6 m	Y
208 Northam Road	N144	Roadside	443147	112709	NO2	N	N	Y(0 m)	5 m	Y
145 Northam Road (closed)	N145	Roadside	443076	112579	NO2	N	N	Y(0 m)	12 m	N
222 Northam Road	N146	Roadside	443164	112741	NO2	N	N	Y(0 m)	10 m	N
123 Burgess Road (closed)	N147	Roadside	441548	115266	NO2	N	N	Y(0 m)	7 m	Y
143 Burgess Road (closed)	N148	Roadside	441669	115300	NO2	N	N	Y(0 m)	10 m	Y
44B Burgess Road	N149	Roadside	441552	115247	NO2	Y Burgess Road	N	Y(0 m)	2 m	Y
148 Romsey Road (tube relocated Sept 2014 to façade of 150, due to lamp post removal)	N150	Roadside	439368	114193	NO2	Y Romsey Road	N	Y(3 m)	2 m	Y

Site Address	Site ID	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	Relevant Exposure ? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case exposure?
134 Romsey Road	N151	Roadside	439396	114176	NO2	Y Romsey Road	N	Y(0 m)	5 m	Y
M271 (b)	N152	Roadside	437353	112645	NO2	Y Redbridge /Millbrook Road	N	Y(14 m)	4 m	Y
Coniston Road	N153	Roadside	437325	113860	NO2	Y Redbridge /Millbrook Road	N	Y(3 m)	14 m	Y
Oceana Boulevard DG5	N154	Roadside	442234	111081	NO2	N	N	Y (0m)	1m	Y
24 Queens Terrace	N155	Roadside	442405	111083	NO2	N	N	Y (0m)	1m	Y
Union Castle House (1) relocated July 2014 due to post being moved to (2)	N156	Roadside	442461	110996	NO2	Y Town Quay	N	Y (0m)	9m	Y
Admiralty House	N157	Roadside	442375	110970	NO2	N	N	Y	1m to Dock Gate 4, 35m to Platform Road	Y
24 Portsmouth Road	N158	Roadside			NO2	N	N	Y (0m)	2m	Y
35 Portsmouth Road	N159	Roadside			NO2	N	N	Y (0m)	2m	Y

Site Address	Site ID	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	Relevant Exposure ? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case exposure?
2 Dorset Street	N160	Roadside	442218	112890	NO2	N	N	Y (0m)		Y
30 Addis Square	N161	Roadside	442703	114127	NO2	N	N	Y (0m)	4m	Y
263A Portswood Road	N162	Roadside	442877	114342	NO2	N	N	Y (0m)	4m	Y
285 Portswood Road	N163	Roadside	442950	114381	NO2	N	N	Y (0m)	9m	Y
164-166 Portswood Road	N164	Roadside	442796	114258	NO2	N	N	Y (0m)	4m	Y
8 The Broadway	N165	Roadside	442767	114184	NO2	N	N	Y (0m)	4m	Y
14 New Road	N166	Roadside	442210	112140	NO2	Y New Road	N	Y (0m)	1m	Y
13 Romsey Road	N167	Roadside	439757	114013	NO2	N	N	Y(0m)	6m	Y
23 Romsey Road	N168	Roadside	439736	114025	NO2	N	N	Y(0m)	5m	Y
150 Romsey Road (moved from lamp post at 148 Romsey Road Sept 2014	N169	Roadside	439368	114193	NO2	Y	N	Y(0m)	5m	Y

Site Address	Site ID	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Co-located with a Continuous Analyser? (Y/N)	Relevant Exposure ? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case exposure?
Union Castle House (2)	N170	Roadside	442461	110996	NO2	Y	N	Y(6m)	2.5m	Y
132 Newton Road	N171	background								
Brintons Road AURN	B1	Urban Centre	442591	112240	Benzene	N	N	Y(10 m)	10m	N

b - these sites were run by the Highways Agency until April 2009.

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

2.2.2 Automatic Monitoring Data

Table 2.3 shows that monitored nitrogen dioxide concentrations at Onslow Road, Victoria Road and Millbrook Road (within AQMAs) have exceeded the annual mean objective in 2014.
The annual mean objective has been met in every year from 2010-2014 at the Brinton's Road AURN site, which is outside of the AQMAs.

Table 2.4 shows that monitored nitrogen dioxide concentrations have exceeded the one hour objective once at Onslow Road and five times at Victoria Road in 2014. However 18 exceedances of the one hour are allowed per annum.

Table 2.3 Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2014 % [b]	Annual Mean Concentration μg/m^3				
					2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014 [c]
CM1 AURN	Urban Centre	N		96%	35	35	32	30	32
CM2 Redbridge School	Roadside	Y		-	**41**	**48**	**-**	**45a**	Ceased operation
CM3 Bitterne	Roadside	Y		-	36	35	32	32	Ceased operation
CM4 Onslow Road	Roadside	Y		89%	**46**	**46**	**44**	**40**	**41**
CM5 Millbrook Road	Roadside	Y		79%	**51.5**	**50**	**43**	**41**	**42**
CM6 Victoria Road	Roadside	Y		84%	-	**47**	**44**	**43**	**44**

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.
*Annual mean concentrations for previous years are optional.

Figure 2.6 Trends in Annual Mean Nitrogen Dioxide Concentrations measures at Automatic Monitoring Sites

The overall trend is slightly downwards, except for Redbridge, which has increased since 2007.

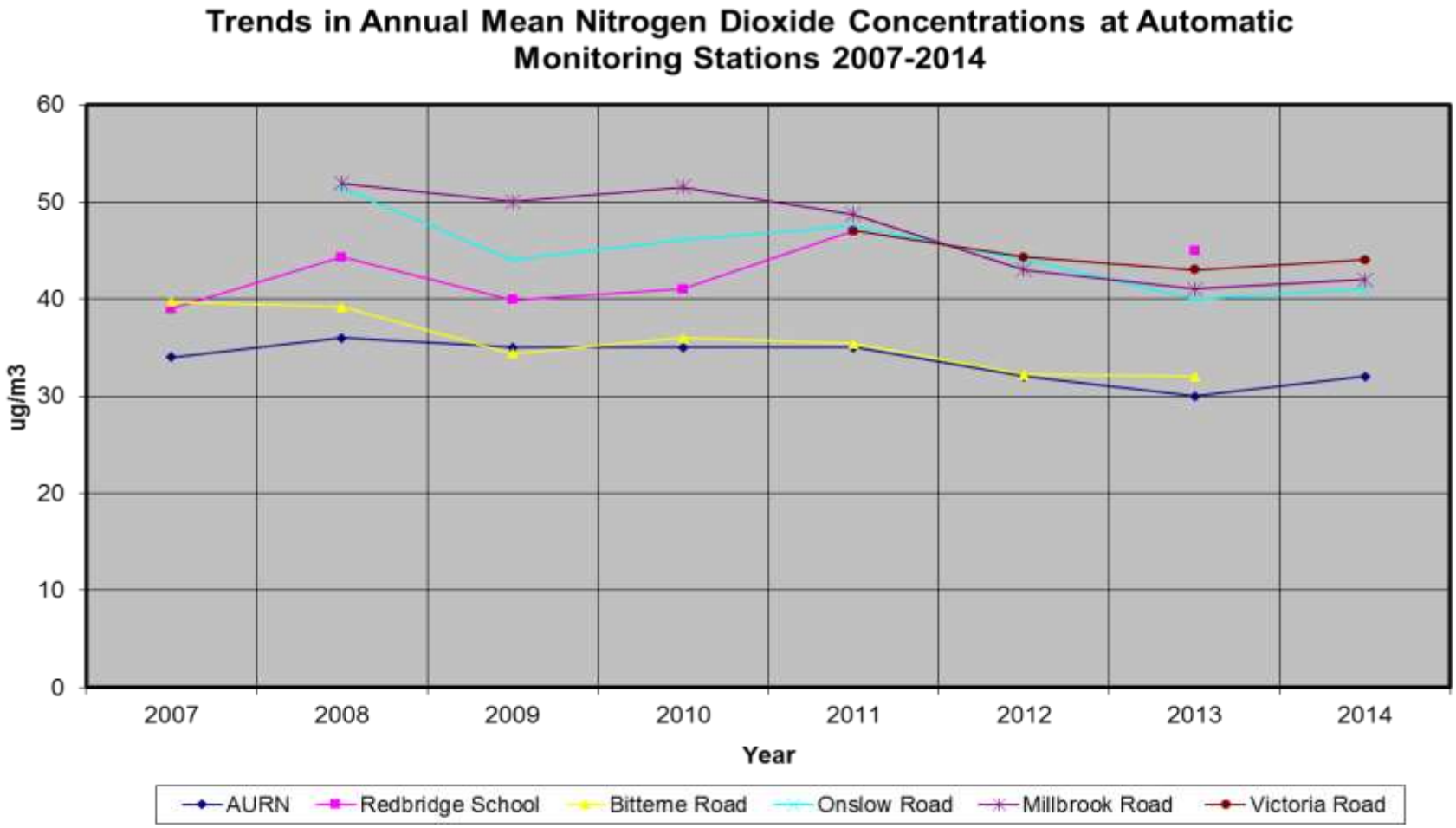


Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2014 % [b]	Number of Exceedences of Hourly Mean (200 μg/m^3)				
					2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014 [c]
CM1 AURN	Urban Centre	N		96%	0	0	0	0	0
CM2 Redbridge School	Roadside	Y		-	0	3	-	0	-
CM3 Bitterne	Roadside	Y		-	0	0	0	0	-
CM4 Onslow Road	Roadside	Y		89%	1	1	1	2	1
CM5 Millbrook Road	Roadside	Y		79%	0	0	0	0	0
CM6 Victoria Road	Roadside	Y		84%	-	0(124)	0(146)	1	5

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] If the period of valid data is less than 90%, include the 99.8th percentile of hourly means in brackets
*Number of exceedences for previous years are optional.

Diffusion Tube Monitoring Data

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2014

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.92) 2014 (μg/m^3)
N100	6 SANDRINGHAM ROAD	Background	N	N	92%		N	20.5
N101	REDBRIDGE SCHOOL AMS	Roadside	Y	N	100%		N	**41.7**
N102	64 BURGESS ROAD	Roadside	Y	N	83%		N	33.3
N103	485 MILLBROOK ROAD	Roadside	Y	N	100%		N	34.9
N104	REGENTS PARK JUNCTION	Roadside	Y	N	92%		N	**42.3**
N106	2 ROMSEY ROAD	Roadside	N	N	92%		N	**43.6**
N107	CRANBURY PLACE	Roadside	Y	N	92%		N	**49.1**
N109	72 BEVOIS VALLEY	Roadside	Y	N	92%		N	38.9
N110	BRINTONS ROAD 1	Roadside	N	Y	92%		N	29.2
N111	BRINTONS ROAD 2	Roadside	N	Y	92%		N	29.2
N112	BRINTONS ROAD 3	Roadside	N	Y	92%		N	29.2
N113	206 BITTERNE ROAD	Roadside	Y	N	100%		N	37.9

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.92) 2014 (μg/m^3)
N114	BITTERNE LIBRARY	Roadside	Y	N	92%		N	39.5
N115	54 REDBRIDGE ROAD	Roadside	Y	N	100%		N	**40.5**
N116	57 REDBRIDGE ROAD	Roadside	Y	N	100%		N	**41.9**
N117	VICTORIA ROAD (LAMP POST)	Roadside	Y	N	100%		N	**42.5**
N118	3 ROCKSTONE LANE	Roadside	Y	N	83%		N	35.8b
N119	PORTSMOUTH ROAD (DENTIST)	Roadside	Y	N	83%		N	31.9
N120	6-9 CANUTE ROAD	Roadside	Y	N	100%		N	**43.8**
N122	151 PAYNES ROAD	Roadside	Y	N	100%		N	32.6
N123	102 ST ANDREWS ROAD	Roadside	Y	N	100%		N	36.2
N124	305 MILLBROOK ROAD	Roadside	Y	N	100%		N	**41.1**
N125	PRINCES COURT	Roadside	Y	N	100%		N	**40.7**
N126	107 ST ANDREWS ROAD	Roadside	N	N	100%		N	36.9
N129	SW HOUSE	Roadside	Y	N	92%		N	32.0
N130	367A MILLBROOK ROAD	Roadside	Y	N	100%		N	**46.6**
N131	142 ROMSEY ROAD	Roadside	Y	N	100%		N	**41.6**

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.92) 2014 (μg/m^3)
N132	347A WINCHESTER ROAD (lamp post removed mid year)	Roadside	Y	N	50%	Y	Y	**40.4 b**
N133	539 MILLBROOK ROAD	Roadside	Y	N	100%		N	32.4
N134	LADBROKES	Roadside	Y	N	100%		N	39.6
N135	24 VICTORIA ROAD	Roadside	Y	N	100%		N	35.6
N136	23 VICTORIA ROAD	Roadside	Y	N	92%		N	36.0
N137	BITTERNE AMS	Roadside	Y	N	100%		N	34.6
N138	66 BURGESS ROAD	Roadside	Y	N	92%		N	**49.8**
N140	5 COMMERCIAL ROAD	Roadside	Y	N	100%		Y	**50.5b**
N141	TOWN QUAY	Roadside	Y	N	92%		N	**43.9**
N142	10 NEW ROAD	Roadside	Y	N	50%		N	**43.7a**
N143	102 ROMSEY ROAD	Roadside	N	N	100%		N	**40.1**
N144	208 NORTHAM ROAD	Roadside	Y	N	100%		N	33.5
N146	222 NORTHAM ROAD	Roadside	Y	N	100%		N	31.1
N149	44B BURGESS ROAD	Roadside	Y	N	100%		N	36.1

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.92) 2014 (μg/m^3)
N150	148 ROMSEY ROAD (relocated to façade of 150 after lamp post removed)	Roadside	Y	N	42%	Y	Y	**48.7 a b**
N151	134 ROMSEY ROAD	Roadside	Y	N	92%		N	**42.8**
N152	M271	Roadside	Y	N	92%		Y	**40.9 b**
N153	CONISTON ROAD	Roadside	Y	N	100%		N	37.7
N154	OCEANA BOULEVARD (GATE 5)	Roadside	N	N	92%		N	**40.8**
N155	24 QUEENS TERRACE	Roadside	N	N	92%		N	36.1
N156	UNION CASTLE HOUSE 1 (relocated close by after lamp post removed)	Roadside	Y	N	58%	Y	N	36.0 a
N157	ADMIRALTY HOUSE	Roadside	Y	N	92%		N	34.8
N158	24 Portsmouth Road	Roadside	Y	N	100%		N	37.6
N159	35 Portsmouth Road	Roadside	Y	N	100%		N	29.3
N160	2 DORSET STREET	Roadside	N	N	100%		N	32.0
N161	30 ADDIS SQUARE	Roadside	N	N	100%		N	35.2

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.92) 2014 (µg/m^3)
N162	263A PORTSWOOD ROAD	Roadside	N	N	100%		N	**41.9**
N163	285 PORTSWOOD ROAD	Roadside	N	N	100%		N	32.6
N164	164 PORTSWOOD ROAD	Roadside	N	N	100%		N	39.0
N165	8 THE BROADWAY	Roadside	N	N	75%		N	**57.2**
N166	14 NEW ROAD	Roadside	Y	N	17%	N (only 2 months data)	N	**(50.5)**
N167	13 ROMSEY ROAD	Roadside	N	N	100%		N	38.0
N168	23 ROMSEY ROAD	Roadside	N	N	100%		N	**43.3**
N169	150 ROMSEY ROAD (relocated from 148)	Roadside	Y	N	42%	Y	N	**36.6a**
N170	UNION CASTLE HOUSE (2)	Roadside	Y	N	42%	Y	N	37.5b
N171	132 NEWTON ROAD (new site)	background	N	N	33%	Y	N	23.1

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

[a] Means "annualised" as in Box 3.2 of TG(09)(http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if full calendar year data capture is less than 75%

[b] If an exceedence is measured at a monitoring site not representative of public exposure, NO_2 concentration at the nearest relevant exposure should be estimated based on the "NO_2 fall-off with distance" calculator (http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html)

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Location	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m³				
			2010* (Bias Adjustment Factor = 0.92)	2011* (Bias Adjustment Factor = 0.9)	2012* (Bias Adjustment Factor = 0.97)	2013* (Bias Adjustment Factor = 0.95)	2014 (Bias Adjustment Factor = 0.92)
N100	6SANDRINGHAM ROAD	N	21.5	19.8	19.0	20.4	20.5
N101	REDBRIDGE SCHOOL AMS	Y	**41.6**	**42.6**	**44.6**	**42.7**	**41.7**
N102	64 BURGESS ROAD	Y	-	-	32.0	33.3	33.3
N103	485 MILLBROOK ROAD	Y	32.0	33.6	34.7	32.3	34.9
N104	REGENTS PARK JUNCTION	Y	38.3	**42.4**	**41.6**	**41.2**	**42.3**
N106	2 ROMSEY ROAD	N	36.7	37.5	**40.0**	39.9	**43.6**
N107	CRANBURY PLACE	Y	**50.0**	**50.4**	**51.2**	**51.0**	**50.5**
N109	72 BEVOIS VALLEY	Y	**41.7**	37.4	38.7	**41.2**	38.9
N110	BRINTONS ROAD 1	N	32.3	27.2	29.1	29.5	29.2
N111	BRINTONS ROAD 2	N	32.1	28.1	29.1	29.4	29.2
N112	BRINTONS ROAD 3	N	31.3	28.2	29.6	28.6	29.2
N113	206 BITTERNE ROAD	Y	38.2	34.9	38.9	39.9	37.9
N114	BITTERNE LIBRARY	Y	36.6	37.2	39.5	39.7	39.5
N115	54 REDBRIDGE ROAD	Y	**42.8**	**40.2**	**43.3**	37.5	**40.5**
N116	57 REDBRIDGE ROAD	Y	**42.7**	**40.3**	**43.2**	**42.1**	**41.9**

Site ID	Location	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2010* (Bias Adjustment Factor = 0.92)	2011* (Bias Adjustment Factor = 0.9)	2012* (Bias Adjustment Factor = 0.97)	2013* (Bias Adjustment Factor = 0.95)	2014 (Bias Adjustment Factor = 0.92)
N117	VICTORIA ROAD (LAMP POST)	Y	**42.9**	**40.0**	**44.2**	**43.0**	**42.0**
N118	3 ROCKSTONE LANE	Y	**40.2**	34.8	35.2	38.4	35.8b
N119	PORTSMOUTH ROAD (DENTIST)	Y	33.8	32.1	34.0	33.6	31.9
N120	6-9 CANUTE ROAD	Y	**46.9**	**42.0**	**41.5**	44.8	**43.8**
N122	151 PAYNES ROAD	Y	33.5	33.4	36.3	30.4	32.6
N123	102 ST ANDREWS ROAD	Y	-	-	34.1	38.1	36.2
N124	305 MILLBROOK ROAD	Y	**42.3**	**40.1**	**43.1**	39.9	**41.1**
N125	PRINCES COURT	Y	**41.7**	38.4	39.4	**42.6**	**40.7**
N126	107 ST ANDREWS ROAD	N	39.1	37.4	35.2	39.4	36.9
N129	SW HOUSE	Y	35.8	32.8	34.3	37.7	32.0
N130	367A MILLBROOK ROAD	Y	**41.6**	**45.6**	**47.9**	**42.2**	**46.6**
N131	142 ROMSEY ROAD	Y	38.4	38.3	39.2	**40.4**	**41.6**
N132	347A WINCHESTER ROAD	Y	**43.0**	**40.8**	39.6	**46.5**	**44.5**
N133	539 MILLBROOK ROAD	Y	32.1	33.3	34.5	31.5	32.4
N134	LADBROKES	Y	**40.6**	**40.3**	39.2	**41.2**	39.6

Site ID	Location	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2010* (Bias Adjustment Factor = 0.92)	2011* (Bias Adjustment Factor = 0.9)	2012* (Bias Adjustment Factor = 0.97)	2013* (Bias Adjustment Factor = 0.95)	2014 (Bias Adjustment Factor = 0.92)
N135	24 VICTORIA ROAD	Y	35.9	33.5	38.4	36.7	35.6
N136	23 VICTORIA ROAD	Y	36.0	31.9	34.6	35.7	35.6
N137	BITTERNE AMS	Y	34.8	32.5	32.8	32.7	36.0
N138	66 BURGESS ROAD	Y	**46.7**	**41.9**	**45.5**	**44.5**	**49.8**
N140	5 COMMERCIAL ROAD	Y	**51.5**	**47.5**	**43.5**	**50.1**	**55.6**
N141	TOWN QUAY	Y	**42.3**	39.0	39.2	**40.7**	**43.9 a**
N142	10 NEW ROAD	Y	**42.1**	**40.0**	39.7	**42.6**	38.3
N143	102 ROMSEY ROAD	N	-	37.1	34.1	36.9	**40.1**
N144	208 NORTHAM ROAD	Y	-	35.8	35.6	34.4	33.5
N146	222 NORTHAM ROAD	Y	-	31.4	31.7	29.1	31.1
N149	44B BURGESS ROAD	Y		28.9	33.1	34.3	36.1
N150	148 ROMSEY ROAD (relocated to façade of 150 after lamp post removed)	Y	**47.5**	**49.0**	**51.6**	**52.0**	**48.7 a b**
N151	134 ROMSEY ROAD	Y	-	**44.5**	38.8	**40.2**	**42.8**
N152	M271	Y		**61.9**	**59.7**	**57.2**	**56.9**
N153	CONISTON ROAD	Y	-	**42.3**	35.5	31.7	37.7
N154	OCEANA BOULEVARD (GATE 5)	N	-	-	**44.2**	**40.6**	**40.8**

Site ID	Location	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2010* (Bias Adjustment Factor = 0.92)	2011* (Bias Adjustment Factor = 0.9)	2012* (Bias Adjustment Factor = 0.97)	2013* (Bias Adjustment Factor = 0.95)	2014 (Bias Adjustment Factor = 0.92)
N155	24 QUEENS TERRACE	N	-	-	**43.8**	**42.8**	36.1
N156	UNION CASTLE HOUSE 1 (relocated close by after lamp post removed)	Y	-	-	32.8	32.8	36.0 b
N157	ADMIRALTY HOUSE	Y		-	34.6	35.0	34.8
N158	24 Portsmouth Road	Y	-	-	39.3	38.3	37.6
N159	35 Portsmouth Road	Y	-	-	30.2	32.3	29.3
N160	2 DORSET STREET	N	-	-	-	33.7	32.0
N161	30 ADDIS SQUARE	N	-	-	-	37.0	35.2
N162	263A PORTSWOOD ROAD	N	-	-	-	**44.3**	**41.9**
N163	285 PORTSWOOD ROAD	N	-	-	-	31.6	32.6
N164	164 PORTSWOOD ROAD	N	-	-	-	**40.8**	39.0
N165	8 THE BROADWAY	N	-	-	-	**49.3**	**57.2**
N166	14 NEW ROAD	Y	-	-	**46.2**	**40.7**	**-**
N167	13 ROMSEY ROAD	N	-	-	34.0	38.1	38.0
N168	23 ROMSEY ROAD	N	-	-	35.9	**43.0**	**43.3**

Site ID	Location	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2010* (Bias Adjustment Factor = 0.92)	2011* (Bias Adjustment Factor = 0.9)	2012* (Bias Adjustment Factor = 0.97)	2013* (Bias Adjustment Factor = 0.95)	2014 (Bias Adjustment Factor = 0.92)
N169	150 ROMSEY ROAD (relocated from 148)	Y	-	-	-	-	36.6
N170	UNION CASTLE HOUSE (2)	Y	-	-	-	-	**43.8**
N171	132 NEWTON ROAD (new site)	N	-	-	-	-	23.1

Table 2.7 Estimated Nitrogen Dioxide at receptor façade, scaled for distance calculation

Most of Southampton City Council's diffusion tubes are located at residential facades, however the 7 sites listed in table 2.7 below, are located on posts closer to the kerb than the relevant receptor. The "NO_2 fall-off with distance" calculator (http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html was used to calculate the estimated concentration at the receptor as detailed in box 3.2 of the Technical Guidance. All the predicted exceedences above 40 are already within existing AQMAs.

Site ID	Location	Tube	Distance between receptor and tube	Estimated mean at receptor
N132	347A Winchester Road	**44.5**	3m	**40.0**
N140	5 Commercial Road	**55.6**	2m	**50.5**
N150	148 Romsey road	**59.1**	3m	**51.3**
N152	M271	**56.9**	14m	**40.9**
N107	Cranbury Place	**50.5**	0.5m	**49.1**
N118	3 Rockstone Place	38.2	2.5m	35.8
N117	Victoria Road	**42.5**	0.3m	**42.0**
N170	Union Castle House 2	**43.8**	6m	37.5

Table 2.8 Estimation of annual mean from short-term monitoring N142 10 New Road April-September 2014

Automatic Station	Annual Mean 2014 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
CM1 AURN Southampton (0.25 miles from tube)	32	27.8	1.15
CM4 Onslow Road (0.5 miles from tube)	41	36.1	1.13
		Average Ratio	**1.14**

38.3 * 1.14 = 43.7 μg/m^3 equivalent 2014 annual mean

Table 2.9 Estimation of annual mean from short-term monitoring N150 148 Romsey Road January – May 2014

Automatic Station	Annual Mean 2014 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
CM1 AURN Southampton (miles from tube)	32	34.6	0.92
CM4 Onslow Road (miles from tube)	41	41.5	0.98
		Average Ratio	**0.95**

51.3 * 0.95 = 48.7 μg/m^3 equivalent 2014 annual mean

Table 2.10 Estimation of annual mean from short-term monitoring N156 Union Castle House 1 January – July 2014

Automatic Station	Annual Mean 2014 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
CM1 AURN Southampton (1 mile from tube)	32	32.1	0.99

CM4 Onslow Road (1.5 miles from tube)	41	39	1.05
		Average Ratio	**1.02**

35.3 * 1.02 = 36.0 μg/m^3 equivalent 2014 annual mean

Table 2.11 Estimation of annual mean from short-term monitoring N169 150 Romsey Road September – December 2014

Automatic Station	Annual Mean 2014 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
CM1 AURN Southampton (3.5 miles from tube)	32	35.2	0.9
CM4 Onslow Road (3 miles from tube)	41	49.6	0.82
		Average Ratio	**0.86**

42.6 * 0.86 = 36.6 μg/m^3 equivalent 2014 annual

Table 2.12 Estimation of annual mean from short-term monitoring N170 Union Castle House 2 September – December 2014

Automatic Station	**Annual Mean 2014 (Am)**	**Period Mean (Pm)**	**Ratio (Am/Pm)**
CM1 AURN Southampton (1 mile from tube)	32	35.2	0.9
CM4 Onslow Road (1.5 miles from tube)	41	49.6	0.82
		Average Ratio	**0.86**

37.5 * 0.86 = 32.3 μg/m^3 equivalent 2014 annual

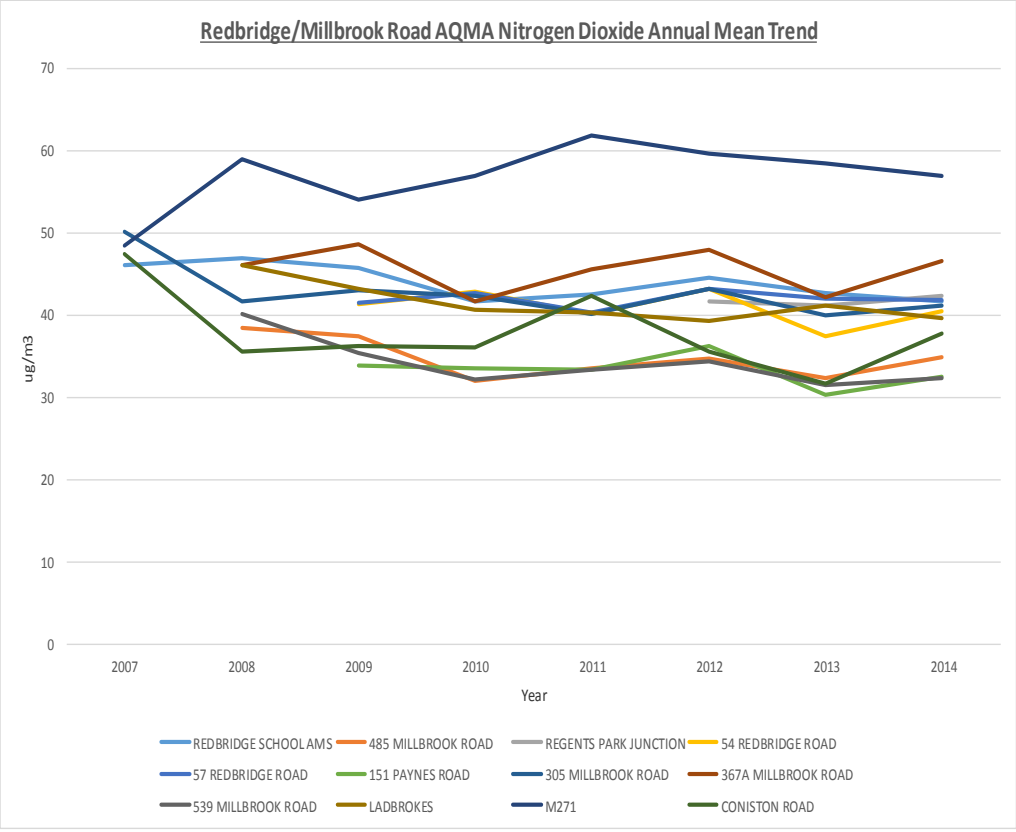
Table 2.13 Estimation of annual mean from short-term monitoring N132 347A Winchester Road January – June 2014

Automatic Station	Annual Mean 2014 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
CM1 AURN Southampton (3 mile from tube)	32	32.1	0.99
CM4 Onslow Road (3.5 miles from tube)	41	39.2	1.04
		Average Ratio	**1.01**

40.0 * 1.01 = 40.4 μg/m^3 equivalent 2014 annual

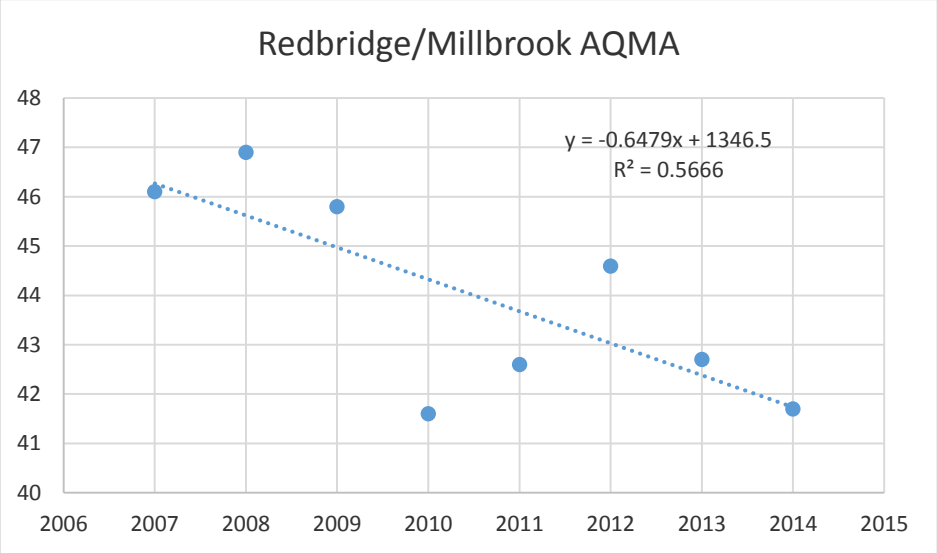
Figures 2.7 – 2.16 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites

Figure 2.7 shows annual mean trend in nitrogen dioxide from 2007-2014, with commentary below for Redbridge/Millbrook Road



7 locations out of 12 exceeded the nitrogen dioxide annual mean in 2014 within the Redbridge/Millbrook Road AQMA. The M271 tube was the highest by some margin, although this has not been scaled for distance to the nearest receptor on the graph. 3 out of the 4 tubes that have been operating since 2007 till 2014 have decreased, the M271 being the exception. Figure 2.5 below shows linear regression statistical analysis of this data, proving there is an overall downward trend.

Figure 2.8 Linear Regression Analysis of the 8 NOx tube sites along Redbridge/Millbrook Road AQMA.



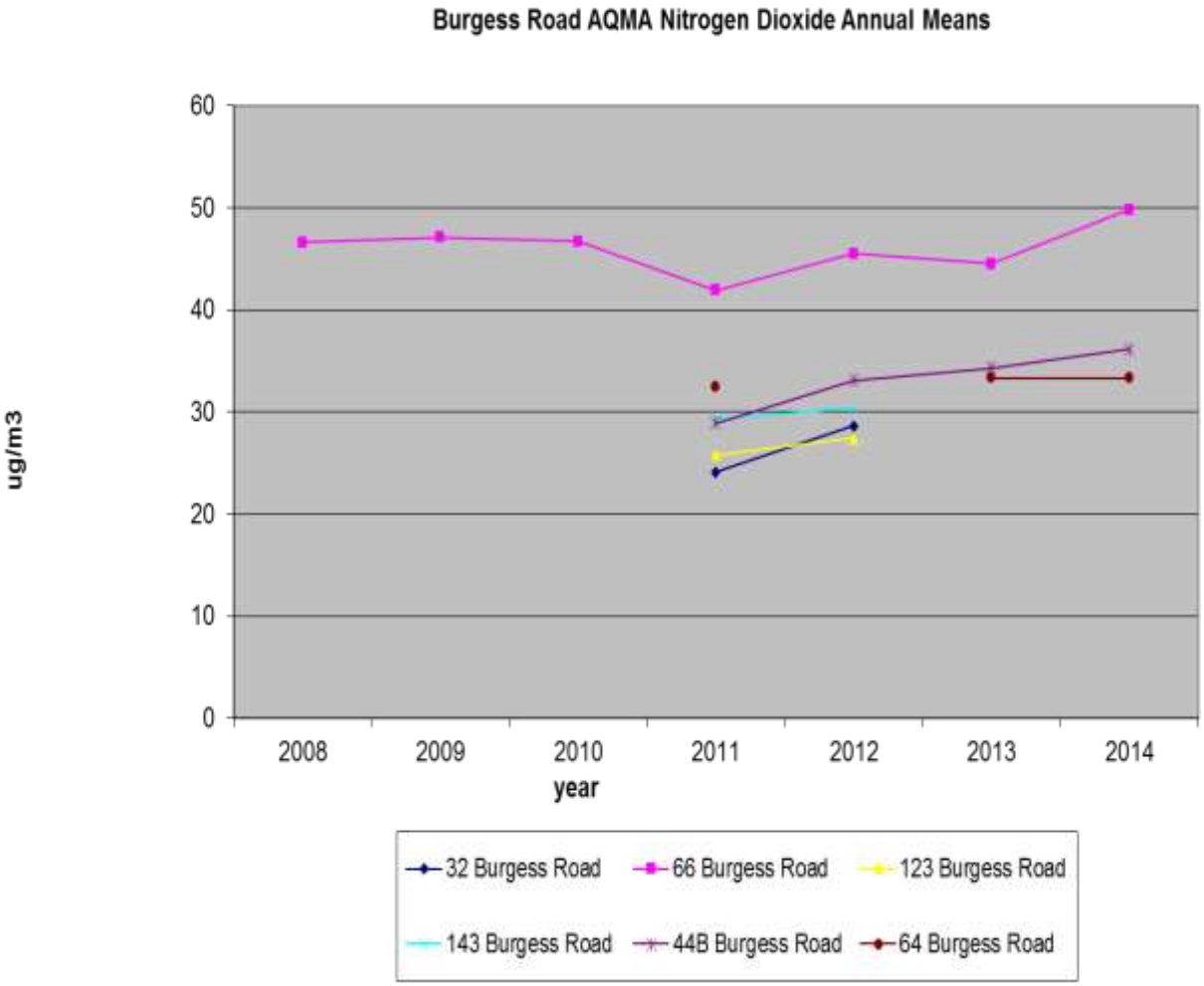
P value = 0.031

Linear regression indicates that for every increase of 1 year, annual mean nitrogen dioxide reduces by 0.65ug/m^3. P value = 0.031.

The linear model in Figure 2.8 above, explains 57% of the total variation in ug/m^3

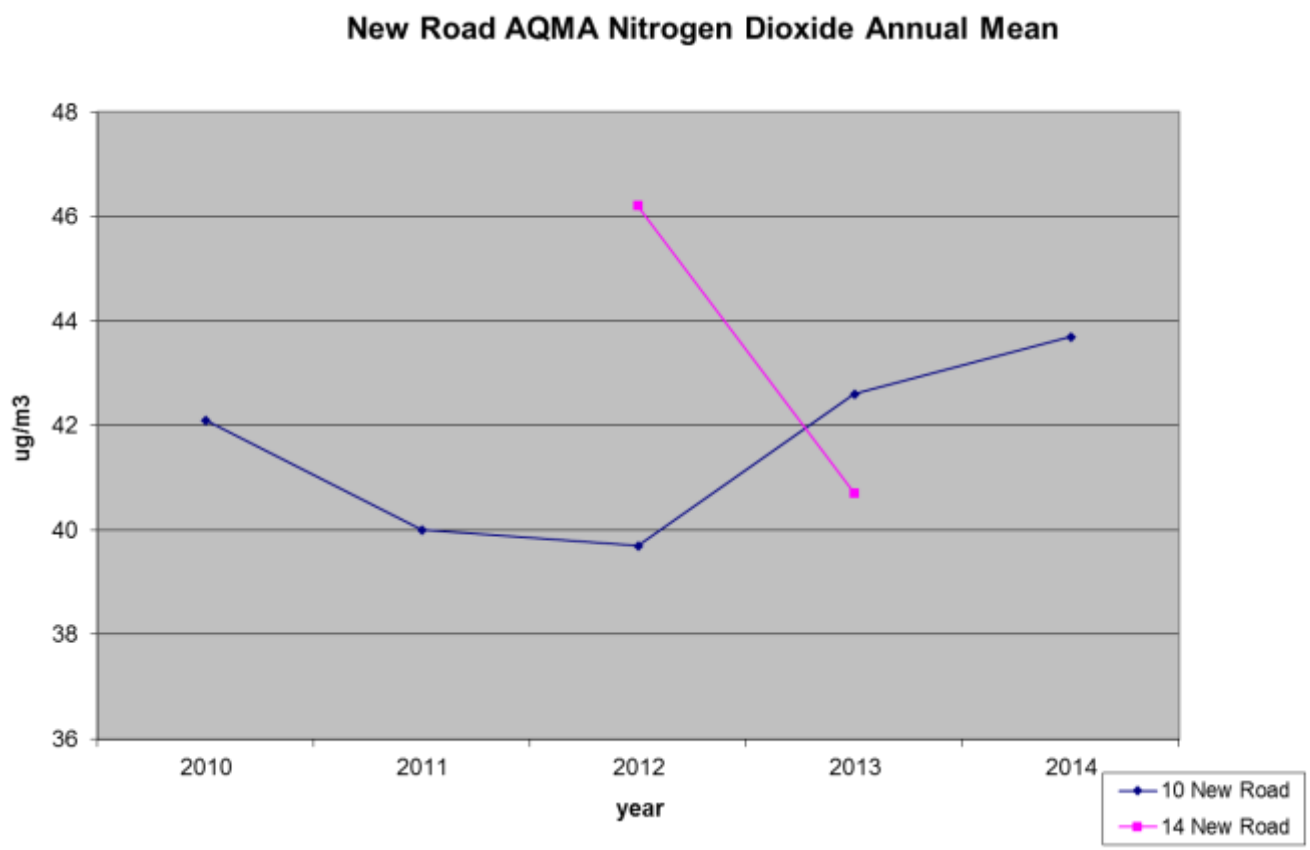
A p-value less than 0.05 ($p<0.05$) is statistically significant and thus the null hypothesis that there is no trend can be rejected.

Figure 2.9



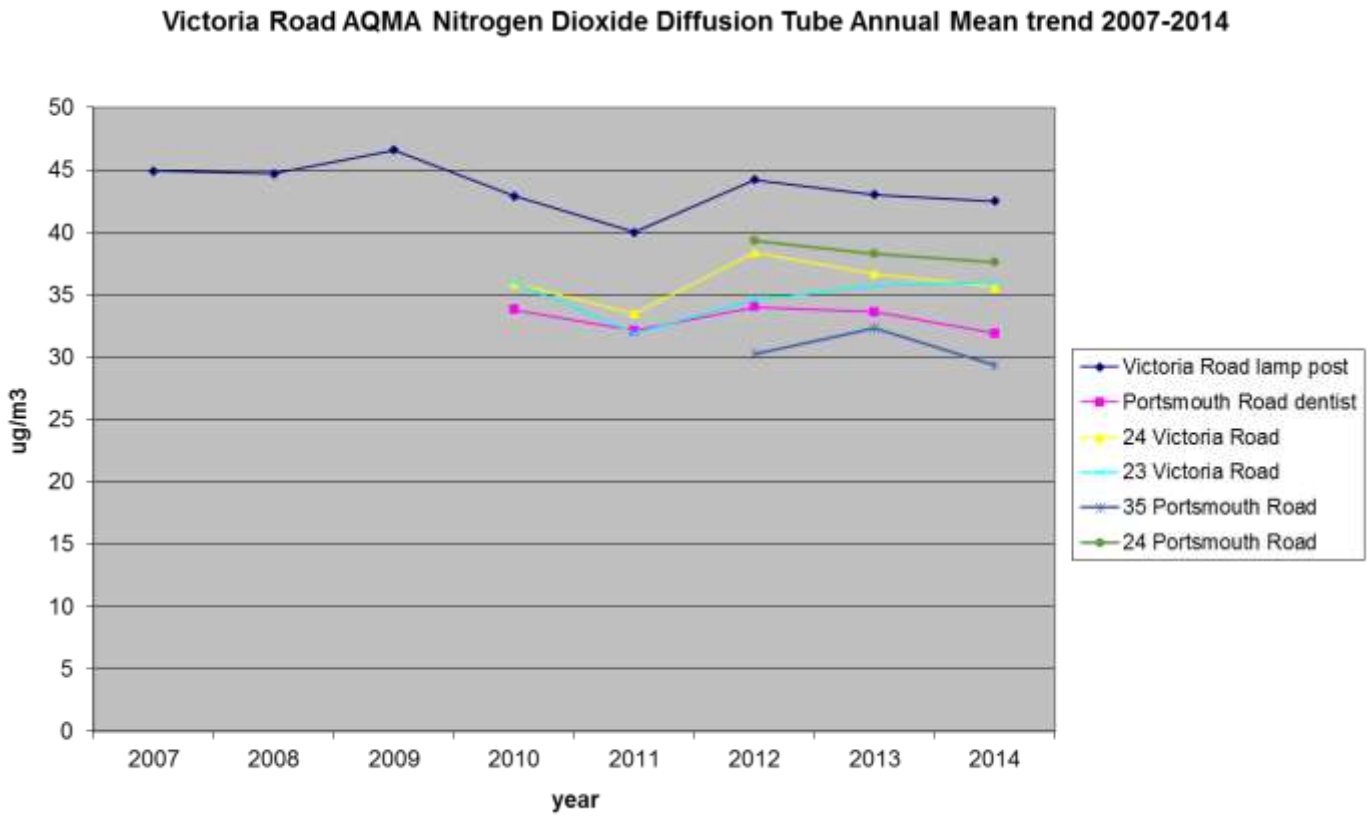
The only NOx tube that is exceeding is 66 Burgess Road. It is located on the façade of a house very close to the kerb. 66 Burgess Road is close to the junction of the Avenue. There is queuing traffic for much of the day. At 50 $\mu g/m^3$ it is significantly above the annual mean standard. 44B is further away from the junction and 64 is further from the kerb of Burgess Road on a house façade.

Figure 2.10



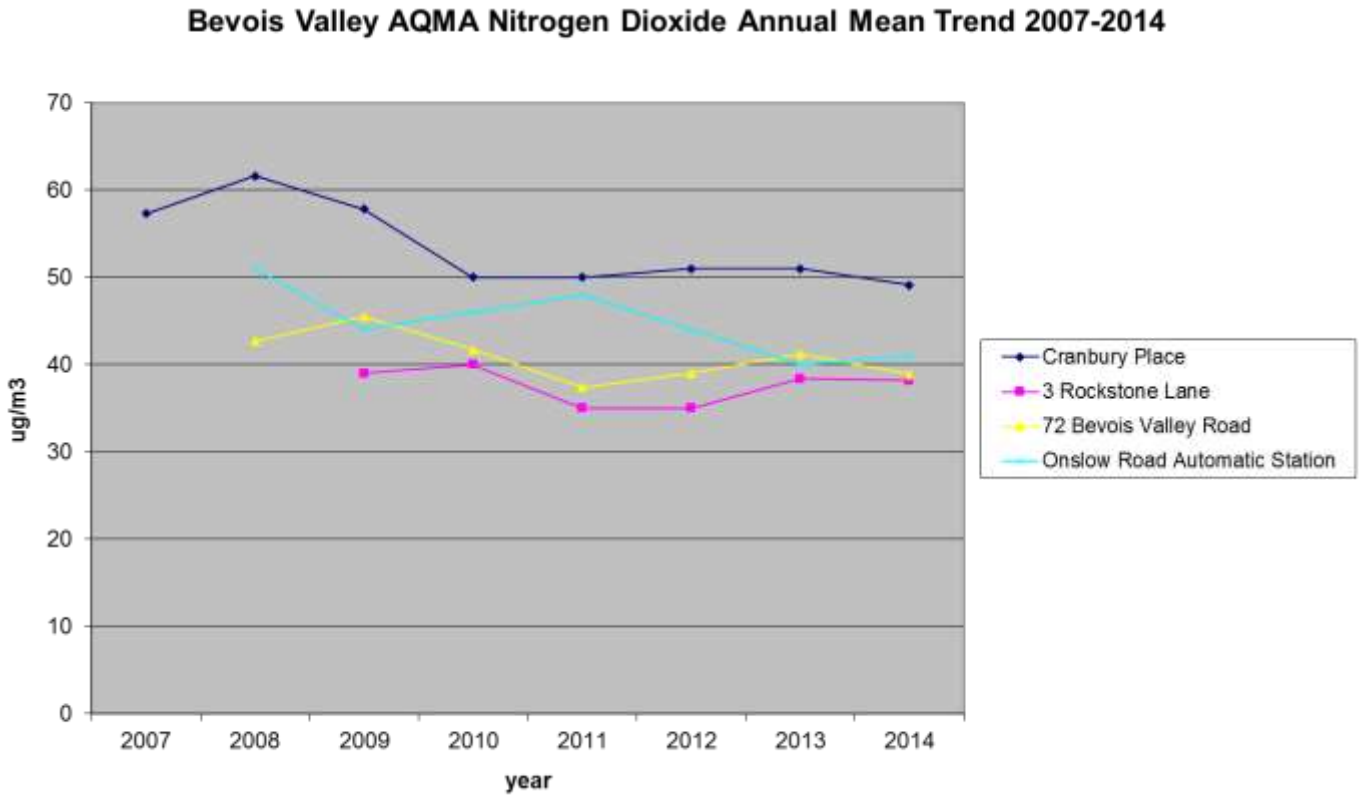
10 New Road appears to have decreased slightly from 2010 -2012 and then increased from 2012 to 2014. 14 New Road showed a sharp reduction between 2012 and 2013. Unfortunately the lamp post was removed in early 2014, it was relocated nearby in 2015.The Graph shows that the annual mean is above the standard and the AQMA is still valid.

Figure 2.11



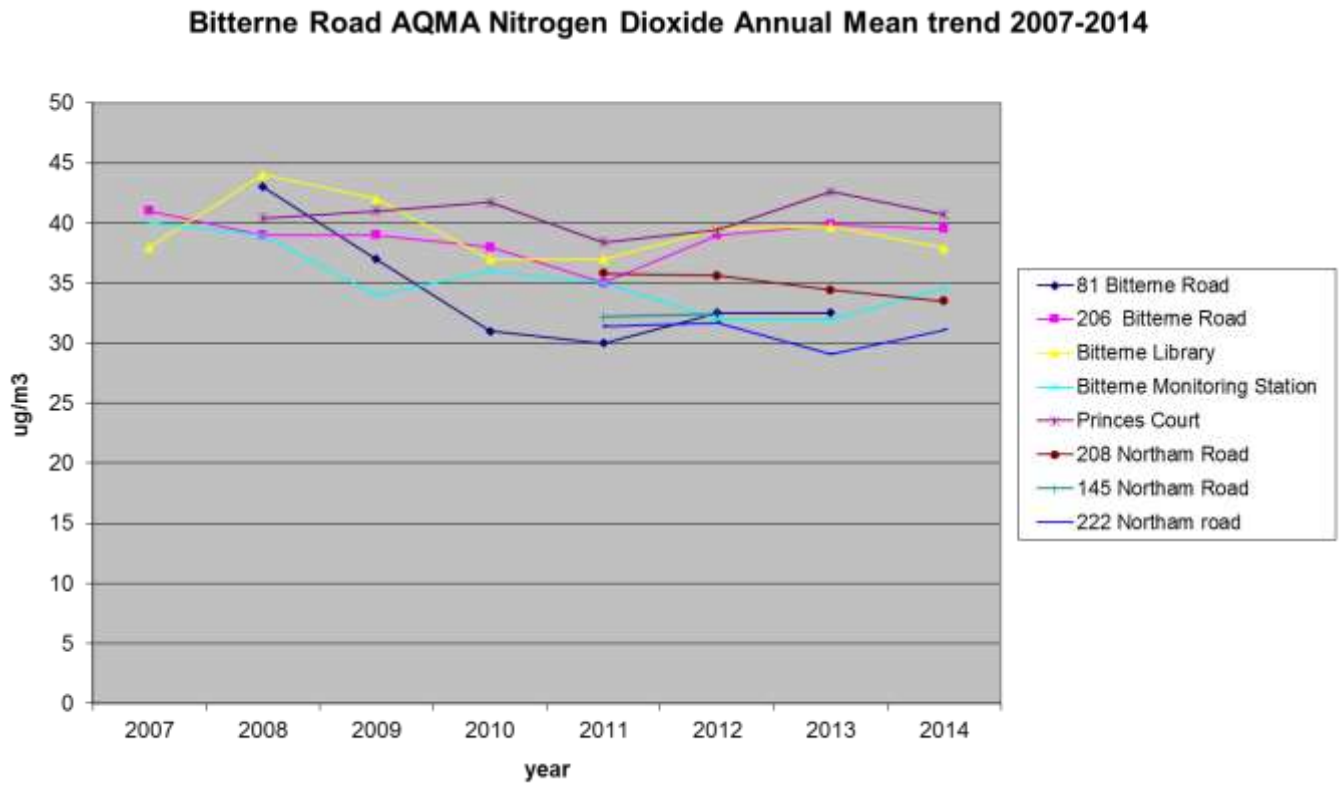
The NOx tube on the lamp post at the Victoria Road/Portsmouth Road junction is the only tube exceeding the annual mean standard. Most of the NOx tubes show a slight reduction. Victoria Road is currently being made a one way street (September 2015), this should reduce traffic congestion and improve air quality in the future.

Figure 2.12



Cranbury Place (residential flats) has consistently exceeded the annual mean by about 10 $\mu g/m^3$ since 2010. The automatic station has marginally exceeded in 2014. Most sites have shown a reduction in nitrogen dioxide over the years. This AQMA is characterised by a narrow pavement and flats that front straight onto the pavement, with no front garden. During the rush hour and for much of the day, queuing traffic at the traffic light controlled junction on Onslow Road, significantly elevates nitrogen dioxide levels at residential facades.

Figure 2.13



In 2014 only Princes Court marginally exceeded the nitrogen dioxide annual mean, with 206 Bitterne Road and the Library just below the standard. Most NOx tubes have shown a small reduction over the years. It may be possible to revoke this AQMA within 2-3 years if the downward trend continues.

Figure 2.14

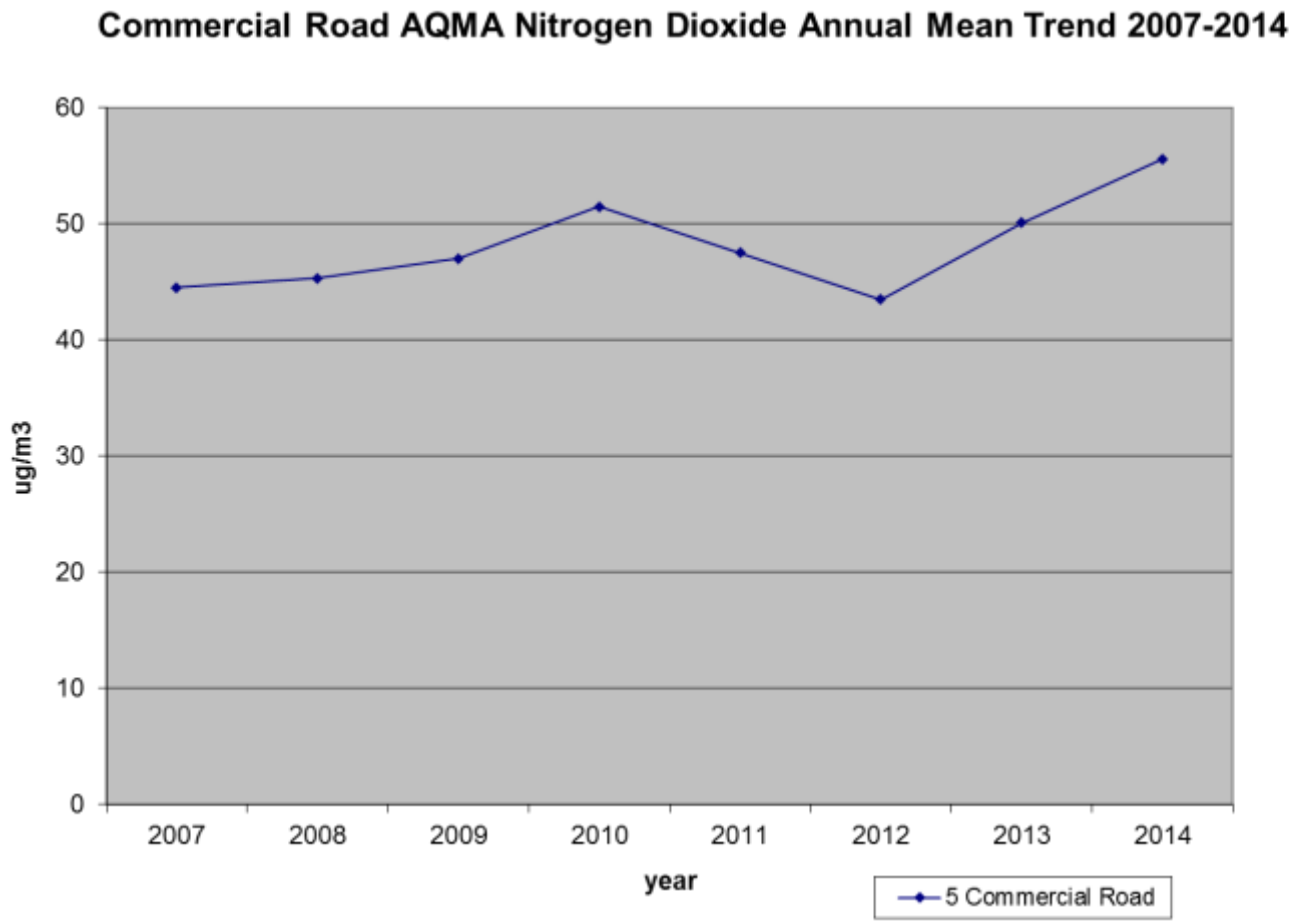
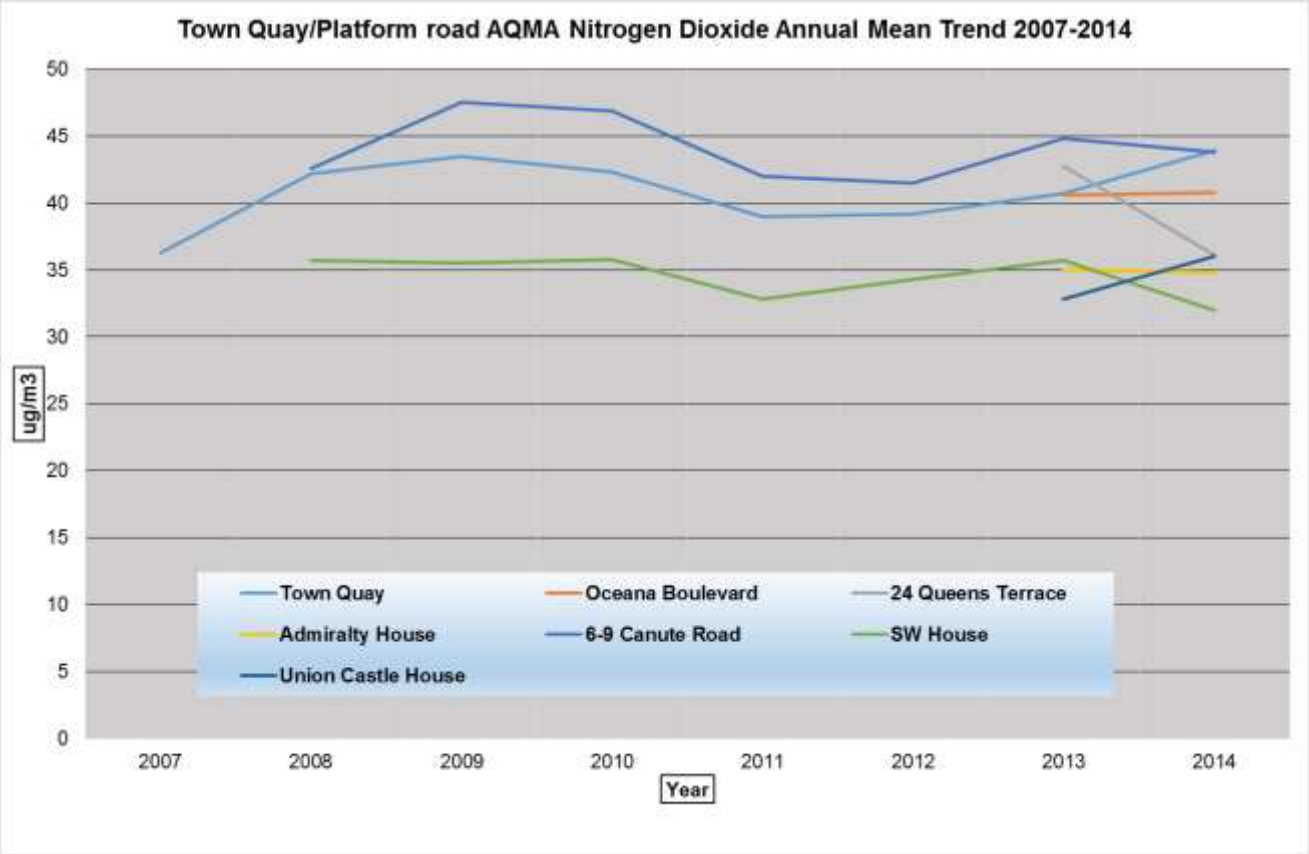


Figure 2.14 above, shows data for the NOx tube on the lamp post directly outside 5 Commercial Road, near the Mayflower Theatre in the city centre. The data in this graph has not been adjusted for distance to the residential receptor. In 2014, once scaled for the 2 metre distance to the nearest terraced house façade it reduced from 55.6 μg/m^3 to 50.5 μg/m^3, still well above the annual mean standard.

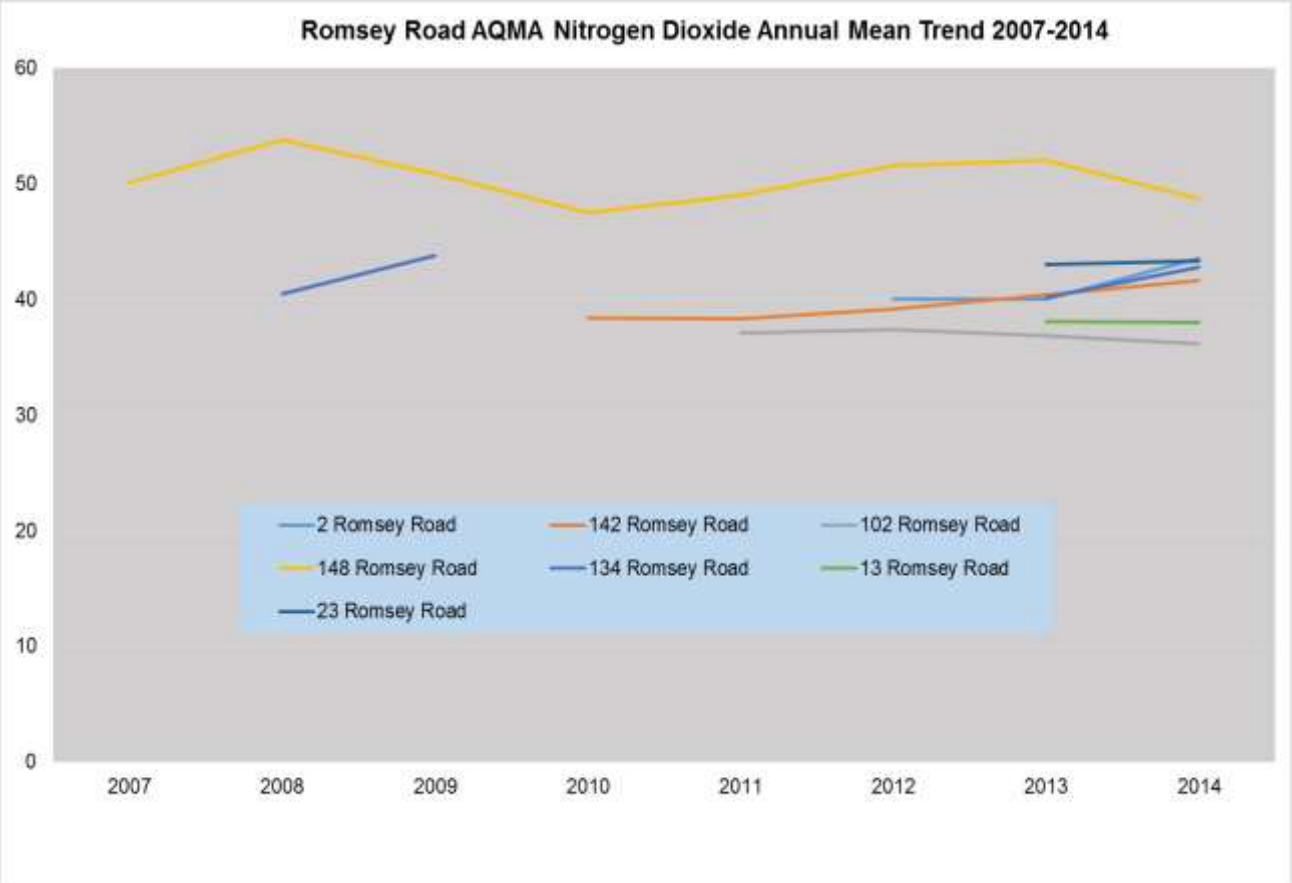
In the last two years, the graph above shows a marked increase in nitrogen dioxide annual mean from 43.5 μg/m^3 to 55.6 μg/m^3. This increase is highly likely to have been caused by the recent construction of the 12 Storey Mayflower Student Halls of residence. It is likely that the tall building has 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.

Figure 2.15



The longest running NOx tube, at Town Quay appears to have increased slightly in the last couple of years. This tube is directly opposite the Isle of Wright Ferry Terminal. Union Castle House has increased from 2013-2014, this is due to the road layout changing, with more traffic near the NOx tube. Conversely 24 Queens Terrace has decreased from 2013 -2014 as the nearby road has changed from a significant through traffic flow to just local traffic. This AQMA and Orchard Place was subject to a detailed assessment in May 2015, following major road layout changes in 2014.

Figure 2.16



There doesn't appear to be any real trend shown in figure 2.16 above.
148 Romsey Road has stayed persistently well above the annual mean standard, although this hasn't been scaled for distance from the lamp post to the residential façade in the graph above. In late 2014 this NOx tube was relocated to the façade of 150 Romsey Road after the lamp post outside 148 was removed as part of a street lighting renewal programme. 150 Romsey Road (not shown in graph above) recorded 42.6 ug/m^3 from September 2014 to December 2014, but once scaled for short term monitoring reduced to 36.6 ug/m^3 , see table 2.11.

2.2.2 PM_{10}

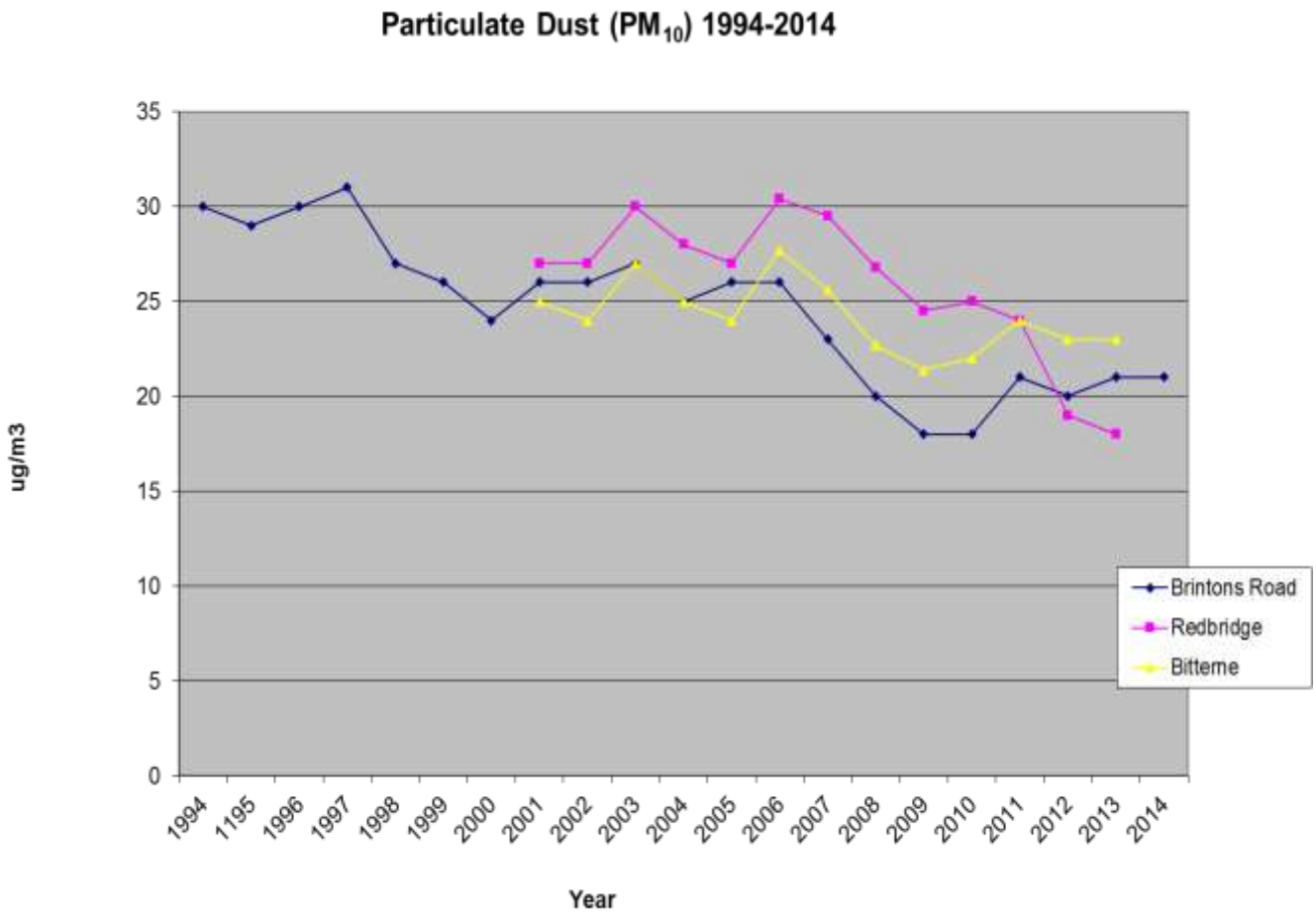
Automatic monitoring of PM_{10} is carried out by SCC at the AURN Brinton's Road monitoring station. The AURN station has stabilised around 20-21 $\mu g/m^3$ since 2010. PM_{10} monitoring ceased in 2014 at Redbridge and Bitterne Monitoring Stations. Table 2.7 below provides a comparison with the annual mean objective of 40 $\mu g/m^3$. All the monitoring stations in Southampton since the first was installed in 1994 have been below the annual mean objective in every year.

Table 2.14 Results of Automatic Monitoring of PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration $\mu g/m^3$				
						2010*[c]	2011*[c]	2012*[c]	2013*[c]	2014[c]
CM1	Urban Centre	N		97.5%	Y	18	21	20	21	21
CM2	Roadside	Y		na	Y	25	24	19	18	Ceased operation
CM3	Roadside	Y		na	Y	22	24	23	23	Ceased operation

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year

Figure 2.17 Trends in Annual Mean PM_{10} Concentrations



There has been a significant reduction in PM_{10} annual mean since monitoring began in 1994. It has reduced from 30 $\mu g/m^3$ in 1994 and seems to have stabilised around 20-21 $\mu g/m^3$ since 2010 at the AURN. PM_{10} monitoring ceased in 2014 at Redbridge and Bitterne Monitoring Stations.

A new AURN Station that will monitor PM_{10} is planned to commence operation in late 2015, alongside Redbridge Road, very close to the old Redbridge School station that closed in 2014. This station will be funded by central government.

Table 2.15 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA ?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 μg/m^3)				
						2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014 [c]
CM1	Urban Centre	N		97.5%	Y	1	9	11	3	5
CM2	Roadside	Y		na	Y	4	15	6	0	Ceased operation
CM3	Roadside	Y		Na	Y	0	13	9	6	Ceased operation

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] if data capture is less than 90%, include the 90th percentile of 24-hour means in brackets
* Optional

There have been no exceedances of the 24 hour mean objective in excess of 35 days per annum at any of the 3 monitoring stations. There were five, 24 hour periods above 50 μg/m^3 at CM1, the AURN Brinton's Road station in 2014.

2.2.3 Sulphur Dioxide

- There were no 15-minute periods greater than 266 μg/m^3
- There were no 1-hour means greater than 35 μg/m^3
- There were no 24-hour means greater than 125 μg/m^3.

Table 2.16 Results of Automatic Monitoring of SO_2: Comparison with Annual Mean Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Number of Exceedences (percentile in bracket μg/m^3)[c]		
					15-minute Objective (266 μg/m^3)	1-hour Objective (350 μg/m^3)	24-hour Objective (125 μg/m^3)
CM1	Urban Centre	N	96		0	0	0
Objective					**35**	**24**	**3**

2.2.4 Benzene

- There were no running annual means greater than 16.25 μg/m^3
- There were no running annual means greater than 5.00 μg/m^3
- In 2014, the Brinton's Road AURN Station (CM1) measured an annual mean of 0.82 μg/m^3 using a pumped diffusion tube. This was well below the annual mean standard of 5 μg/m^3. The monitoring station is representative of relevant public exposure.

2.2.5 Other pollutants monitored

2.2.5.1 $PM_{2.5}$

$PM_{2.5}$ was monitored at the CM1, Brintons Road AURN Station. Using an FDMS TEOM instrument.

Table 2.17 below gives the results for 2014

Maximum Hourly Mean	147 µg/m^3
Maximum Daily Mean	71 µg/m^3
Annual Average	15 µg/m^3
Data Capture	96%

2.2.5.2 Ozone

Ozone was monitored at the CM1, Brintons Road AURN Station.

Table 2.18 below gives the results for 2014

Max 8 Hour Ozone	112
Annual Mean	37
8 Hour running mean > 100 µg/m^3	11 exceedances, 2 days
Max Daily Mean	76

2.2.6 Summary of Compliance with AQS Objectives

Southampton City Council has examined the results from monitoring. Concentrations outside of the AQMAs are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

4 Detailed Assessments (based on NOx Tube monitoring) were recently completed this year and incorporated into the 2014 Progress Report. Recommendations were made in this Report to extend 2 existing AQMAs.

- To extend the existing Bevois Valley Road AQMA further north to include

receptors exceeding the NO_2 annual mean on Portswood Road.

- To extend the existing Romsey Road AQMA further south to include receptors exceeding the NO_2 annual mean on Romsey Road.

This is currently being discussed at the Low Emission Strategy Board. A much larger AQMA incorporating the city centre and main arterial road network may be declared instead, to give the Council greater control over new developments that may have an adverse impact on air quality.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Shirley High Street has a 12 hour traffic flow of 11,941 vehicles in 2014 with 1% HGV. There are not many residential receptors along Shirley High Street, as it is mostly shops. However there are 2 pubs with residential accommodation above and several residential flats above shops close to the busy congested junctions.
This Road was assessed in previous rounds of Review and Assessment, using DMRB modelling but the modelling did not highlight an exceedance. However NOx tube monitoring is likely to provide a better assessment of the local air quality than modelling.

Southampton City Council has identified a congested street with a flow above 5,000 vehicles per day and residential properties close to the kerb,that has not been adequately considered in previous rounds of Review and Assessment, and **will need to proceed to a Detailed Assessment.**

Shirley High Street has not been adequately considered in previous rounds of review and assessment. 3 NOx tubes have been deployed at worst case residential receptor facades in July 2015 to monitor nitrogen dioxide annual mean. Shirley High Street can experience high levels of congestion at traffic light controlled junctions. Shirley High Street continues north, where it becomes Romsey Road, an existing AQMA. There are not many residential receptors along Shirley High Street, as it is mostly shops. However there are 2 pubs with residential accommodation above and several residential flats above shops close to the busy congested junctions.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Southampton City Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

Southampton City Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

The criteria for assessing junctions are set out in Section A.4 of Box 5.3 of TG(09). Junctions were considered in detail in previous USAs and where relevant have been included in Detailed Assessments and subsequent AQMA declarations.

Southampton City Council confirm that there are no new/newly identified busy junctions/busy roads.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

The criteria for assessing new roads are set out in Box 5.3, section A5 of TG(09) and are unchanged from previous rounds of Review and Assessment.

Southampton City Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

Platform Road/Queens Terrace was subject to a Detailed Assessment appended to the 2014 Progress Report as appendix D. The traffic flow on these roads changed radically in June 2014. Southampton City Council is continuing to monitor nitrogen dioxide on these roads using 5 NOx tubes. 2015 annual mean results for these tubes will provide additional data to assess the impact of the road layout change. This Road Scheme was modelled using detailed dispersion modelling to identify the air quality implications before construction.

Victoria Road, which is an AQMA, is in the process of being made one way in late 2015 and the road narrowed. This will reduce the traffic flow along Victoria Road and should in theory reduce air pollution. The automatic monitoring station at the junction and 5 NOx tubes will be maintained to see if the anticipated benefits materialise in 2015/16.

Southampton City Council confirms that there are 2 newly identified roads with significantly changed traffic flows. Both of these roads are already designated AQMAs. These are being assessed using the existing NOx tube network. 2015 and 2016 monitoring data will provide insight into how the traffic flow changes have influenced air pollution.

3.7 Bus and Coach Stations

The criteria for assessing bus and coach stations are set out in Box 5.3 section A7 of TG(09). Bus and coach stations were considered in previous Updating and Screening Assessments.

Southampton City Council confirms that there are no new relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

The criteria for assessing airports are set out in Box5.4, section B1 of TG909).

Southampton City Council confirms that there are no airports in the Local Authority area. Southampton Airport in the adjacent Eastleigh Borough Council's area has been assessed previously in an Updating and Screening Assessment.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

The criteria for assessing stationary locomotives are set out in Box 5.4, section B2 of TG(09). In previous Updating and Screening Assessments, diesel trains have been reported to occasionally remain stationary at Southampton Central Railway Station, on the mainline just west of Central Station in Freemantle and at the Freightliner Rail Terminal in the docks. However, there are no locations where trains are stationary for 15 minutes or more, more than 3 times a day, with relevant exposure within 15m of the stationary locomotives.

Southampton City Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

The criteria for assessing moving locomotives are set out in Box 5.4, section B2 of TG(09) (Approach 2) SCC does not meet any of this criteria

Southampton City Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

The criteria for assessing ports are set out in Box 5.4, section B3 of TG(09). Details regarding ship movements and activity have been covered in previous Updating and Screening Assessments. The amount of sulphur within marine fuel has reduced to 0.1% in 2015.

Southampton City Council confirms although there is relevant exposure within 250m of the shipping berths at Southampton Docks, previous work undertaken shows that it is very unlikely that the sulphur dioxide objectives will be exceeded. The recent Low Emission Zone Study, some of which are shown below, modelled Port emissions in great detail.

The Low Emission Zone Study undertaken by Ricardo AEA Consultants (11) in 2014 on behalf of Southampton City Council, modelled the western container docks in great detail.

Table 4.1 (11) shows the modelled contribution to oxides of nitrogen concentrations at the locations of diffusion tubes close to the Western Approach Road. This highlights that ships hotelling (running their auxillary engines at the berth), is the most significant source of emissions at the Port.

Table 4.1: Modelled contribution to oxides of nitrogen concentrations at NO_2 monitoring sites, µg m^{-3}

Receptor name	Contribution to oxides of nitrogen concentrations, µg m^{-3}									
	Ships hotelling	Ships manoeuvring	Container handling	HGV container transfer	Rail terminals	Container lorries in container terminal	Vehicle delivery lorries	Mainline railways	Container lorries on dock road	total
M271	2.9	0.7	0.7	0.1	0.3	0.1	0.0	0.4	0.1	5.2
Coniston Road	3.0	0.7	0.7	0.1	0.2	0.1	0.0	0.4	0.1	5.2
38 Old Redbridge Rd	3.2	0.7	0.8	0.1	0.2	0.1	0.0	1.1	0.1	6.1
Redbridge School	3.1	0.8	0.9	0.1	0.4	0.1	0.0	0.4	0.1	5.9
AUTO_Redbridge School	3.1	0.8	0.9	0.1	0.4	0.1	0.0	0.4	0.1	6.0
54 Redbridge Road	3.9	1.0	1.5	0.3	0.9	0.4	0.0	0.4	0.3	8.7
57 Redbridge Road	4.1	1.1	1.7	0.3	1.1	0.5	0.0	0.5	0.4	9.6
539 Millbrook Road	7.4	1.9	3.7	0.9	4.2	0.8	0.0	0.5	0.7	20.0
485 Millbrook Road	7.7	2.3	4.1	0.7	2.0	0.8	0.0	0.6	0.3	18.4
Ladbrokes	7.7	2.4	3.9	0.6	1.5	0.6	0.0	0.6	0.2	17.5
Regent`s Park Junction	7.3	2.5	3.1	0.4	3.2	0.4	0.0	0.6	0.1	17.6
367A Millbrook Road	7.2	2.6	2.9	0.3	7.1	0.3	0.0	0.9	0.1	21.3

Receptor name	Contribution to oxides of nitrogen concentrations, µg m^{-3}									
	Ships hotelling	Ships manoeuvring	Container handling	HGV container transfer	Rail terminals	Container lorries in container terminal	Vehicle delivery lorries	Mainline railways	Container lorries on dock road	total
AUTO_Millbrook Road	6.5	2.7	2.1	0.2	5.2	0.2	0.0	1.4	0.1	18.4
151 Payne`s Road	6.2	3.2	1.5	0.1	1.4	0.1	0.0	1.6	0.0	14.2
303 Millbrook Road	6.5	2.8	2.0	0.2	3.6	0.1	0.0	1.7	0.1	16.9

The largest Port contribution to oxides of nitrogen (NOx) was 21.3 µg.m^{-3} at 367A Millbrook Road, where SCC has a NOx diffusion tube.

Fig. 4.1 (11)

Shows a map of the modelled contribution to oxides of nitrogen concentrations.

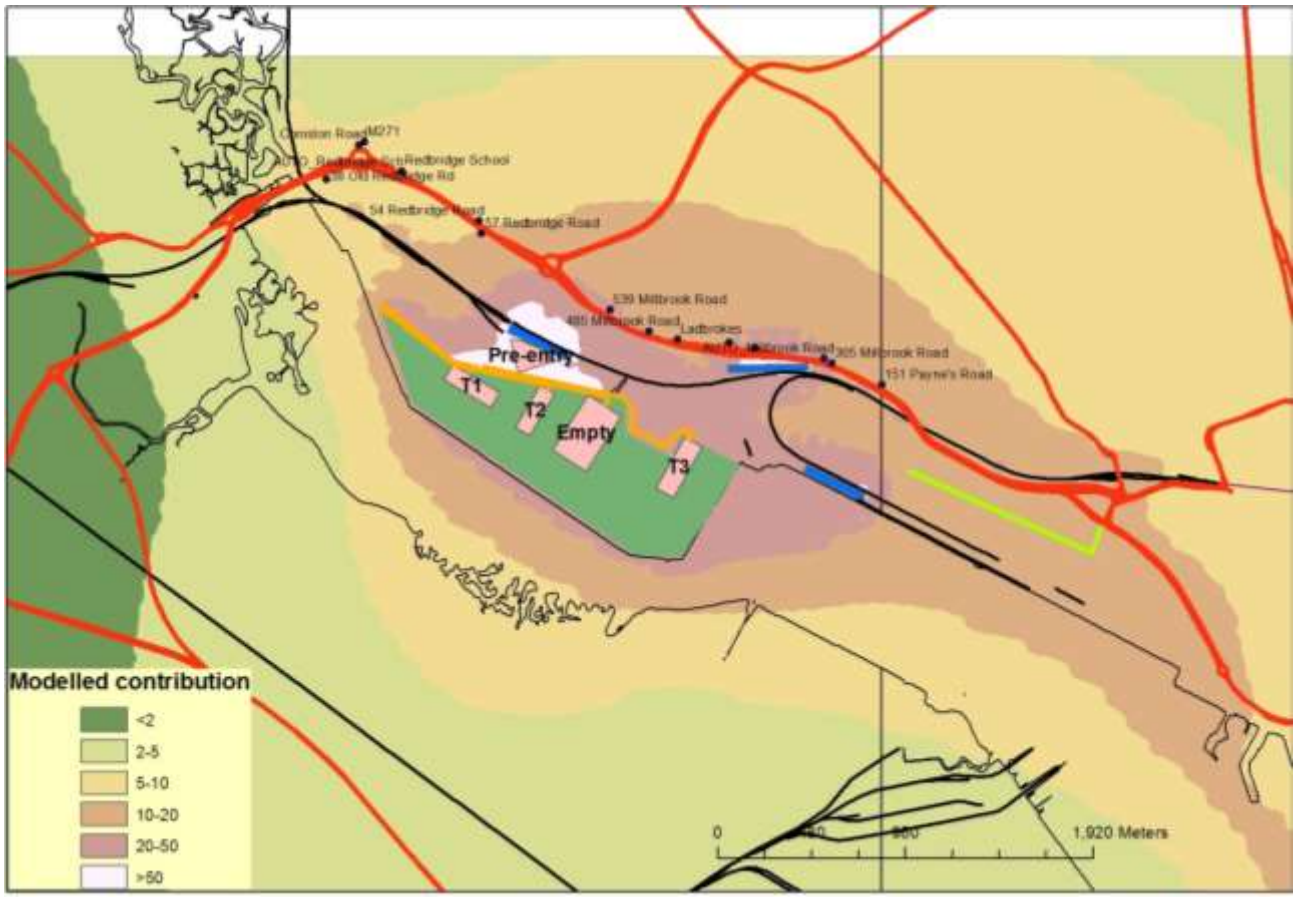


Figure 4.2 Total modelled NO_2 within the model domain (all sources, $\mu g.m^{-3}$) (11)

The plot shows the influence of the road, rail and port sources included in the model on local NO_2 concentrations.

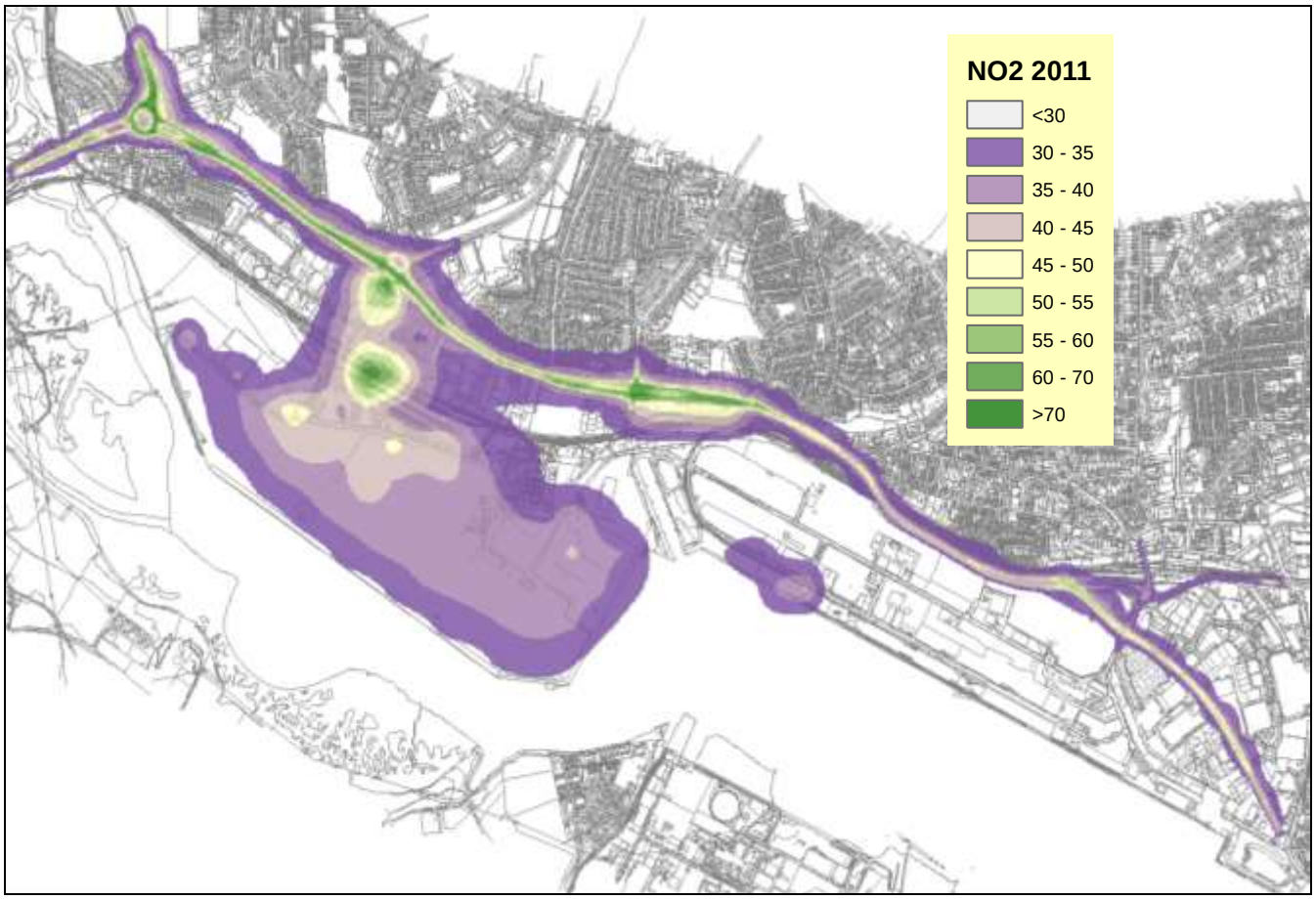


Figure 4.3 Source apportionment at West, Centre and East of Western Approach (% of modelled NOx) (11)

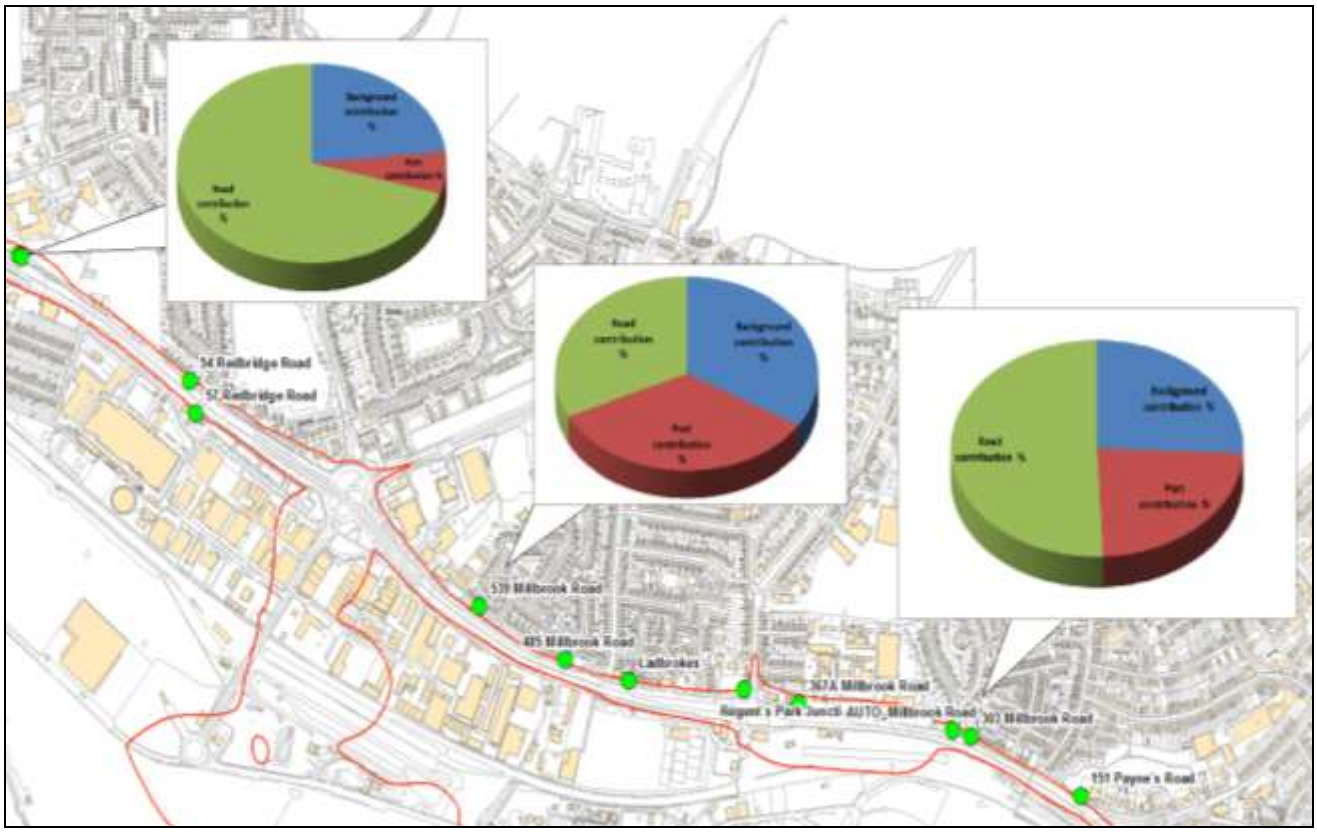


Figure 2.20 shows that at the western end of Redbridge Road, near the M271, the Port only contributes 6.9% of the modelled NOx. However at 539 Millbrook Road, where SCC has a NOx diffusion tube the model predicts the Port contributes 33.8% of the NOx emissions, similar to the Road contribution. At the Millbrook Road automatic monitoring station, at the eastern end, the Port contributes 23.6% of NOx emissions.

The road contribution emissions include HGVs accessing the Port. The Port clearly makes a significant contribution to nitrogen dioxide levels at residential receptors close to the Western Docks.

5 Industrial Sources

5.1 Industrial Installations

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

The Ford Transit Factory closed in July 2013. This was a large authorised process for paint spraying. There will be a VOC and CO_2 emission reduction in the City as a result.

Southampton City Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

None of the existing industrial installations identified in previous Updating and Screening Assessments have substantially increased emissions.

Southampton City Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

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.

Southampton City Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

5.2 Major Fuel (Petrol) Storage Depots

Southampton City Council confirms that there are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

There are 4 petrol stations in Southampton which have a throughput greater than 2 million litres of petrol per annum, beside a busy road with more than 30,000 vehicles AADT and relevant exposure. Of these 4, none have a residential receptor within 10 metres of the petrol pump. The nearest receptor to a pump is 14 metres. The Bursledon Road Garage and BP Garage on Portsmouth Road have the closest receptors at 14 metres but the roads are below the 30,000 vehicle threshold.
All these stations have Stage 2 Recovery Systems fitted.
Table 5.1 below shows the petrol stations with residential relatively close by.

Table 5.1

Petrol Station	Petrol Throughput p.a.	Distance from pump to nearest receptor	Traffic AADT
Clock Service Station Chilworth Roundabout	8 million litres	50 metres	44500 vehicles
Manor Service Station, Bitterne Road West	3 million litres	25 metres	42700 vehicles
Texaco Star Service Station Millbrook Road	8 million litres	80 metres	65700 vehicles

BP Garage, Bursledon Road	5.8 million litres	25 metres	20,000 vehicles
BP 170 Portsmouth Road	3.4 million litres	14metres (closest petrol station to residential)	13,000 vehicles
Shell Roselands Redbridge Road	6 million litres	50 metres	76,000 vehicles
Shell, 197 Burgess Road	5.2 million litres	15 metres	16,500 vehicles

Southampton City Council confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

Southampton City Council confirms that there are no poultry farms meeting the specified criteria within the City.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

A planning application is about to be lodged for a District Energy Centre in Tunstall Road, Thornhill, Southampton. This will provide cheaper more efficient heating for the Thornhill Council Estate. It is proposed to install 4 x 500KW biomass boilers and 6 x 543KW gas boilers. The developer will provide an air quality assessment and calculate the effective stack height required when the application is formally lodged in November/December 2015. It is currently at the pre-app stage.

Southampton City Council confirms that there are no new biomass combustion plant in the Local Authority area that have not been assessed before.

6.2 Biomass Combustion – Combined Impacts

The criteria for assessing biomass combustion (combined impacts) are set out in Box 5.8 section D2 of TG(09). The likelihood of areas of combined biomass combustion exceeding the criteria is considered highly unlikely.

Southampton City Council confirms that there are new no biomass combustion plant in the Local Authority area that have not been considered before in previous rounds of review and assessment.

6.3 Domestic Solid-Fuel Burning

The criteria for assessing domestic solid- fuel burning are set out in Box5.8, section D2 of TG(09). SCC has not identified any areas where significant coal burning takes place.

Southampton City Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

Complaints have been received about fugitive dust emissions from the EMR Metal Recycling Facility in Northam, on the quayside of the River Itchen in Spring 2015. It is a large metal recycling yard, where ships load metal waste for recycling. Some of the local businesses have complained of metal dust on their cars during strong wind. EMR have a waste permit from the Environment Agency. Since the initial complaints, there have been no further complaints. The Environment Agency visited and gave advice to the operator on how to reduce airborne dust during strong winds.

Southampton City Council confirms that although they have identified potential sources of fugitive particulate matter emissions, measures have been put in place to alleviate the emissions.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The only monitored exceedances identified outside of the existing AQMAs were already identified by the combined Progress Report and Detailed Assessment, accepted by DEFRA in June 2015. Portswood Road and the southern section of Romsey Road had nitrogen dioxide diffusion tubes exceeding the annual mean standard at residential facades in 2013 and 2014. It was proposed to extend existing AQMAs to include these areas of exceedance. However, the ongoing Low Emission Strategy Study is likely to recommend declaring a much larger AQMA, to be rebranded a Clean Air Zone, covering much of the city. This will encompass all the AQMAs and make it easier to condition new developments to mitigate adverse air quality impacts. All the 10 AQMAs still have exceedances within their areas, although some only marginally.

The Commercial Road AQMA has monitored increased levels of nitrogen dioxide, since a new high rise student hall of residence has been built. It is likely the tall building has created a “street canyon” reducing traffic fume dispersion. The construction activity including a temporary contraflow on Commercial Road and high hoardings may have elevated pollution during the building’s construction. The kerbside NOx tube at this location has increased from 43.5 µg.m^3 in 2012 to 50.1 µg.m^3 in 2013 to 55.6 µg.m^3 in 2014. The trend can be seen in Figure 2.14 on page 64.

Bitterne/Northam Road AQMA only had one NOx tube out of six that was above the nitrogen dioxide annual mean standard. Princes Court was 40.7 µg.m^3 in 2014.
However Bitterne Library was only just below 40 µg.m^3 at 39.5 µg.m^3 and 206 Bitterne Road at 37.9 µg.m^3. It may be possible to revoke this AQMA within 2-3 years if the downward trend continues.

Victoria Road AQMA only had one NOx tube out of six that was above the nitrogen dioxide annual mean standard. Victoria Road/Portsmouth Road junction was 42.0 µg.m^3 in 2014. However the automatic station, which is located within 2 metres of the

NOx tube recorded 44 µg.m^3 in 2014, 2 µg.m^3 more than the NOx tube. The NOx tube monitors at about 2.8metres in height. Whereas, the small roadside cabinet monitors at about 1metre in height. Further away from the busy traffic light controlled junction, the other 5 NOx tubes were all below the annual mean standard.

Hopefully the recent major road layout improvements on Victoria Road will begin to improve air quality in late 2015. Victoria Road has been made one way, with a widened pavement, less on street parking and flower/shrub beds next to the kerb.

Northbound traffic that used to use Victoria Road now uses Woodley Road, thus halving the traffic flow along Victoria Road. However this traffic will still use Portsmouth Road at the junction of Victoria Road, which may increase pollution levels at the 35 Portsmouth Road NOx tube location, on the north side of the junction. 2016 NOx tube data will show if the junction changes have worsened pollution on the north side of the junction, but improved it on the south side.

8.2 Conclusions from Assessment of Sources

Shirley High Street was identified as a potential exceedance, outside of the existing 10 AQMAs. 3 NOx tubes were deployed in July 2015 to monitor at residential facades close to the kerb.

A high level of brownfield development in the city will put additional pressure on Southampton's road network capacity. In 2014, 2089 student beds in new halls of residence had planning permission granted. 886 Flats and 251 Houses were also granted planning permission. Large development schemes are required to make financial contributions towards sustainable transport infrastructure improvements to mitigate the negative impacts. This is through planning conditions and Section 106 Agreements. The developing Low Emission Strategy, and potential clean air zone will require developers to invest in low emission technologies for new build. For instance, requiring a proportion of new parking spaces to have electric vehicle charging points.

`

8.3 Proposed Actions

A Detailed Assessment will be required on Shirley High Street for nitrogen dioxide annual mean. 3 NOx tubes have already been deployed in July 2015 to monitor at residential facades close to the kerb near at congested junctions.

The NOx tube network will be reviewed in December 2015 in readiness for 2016. SCC currently have 65 NOx tubes deployed around the city.

The Low Emission Strategy will make recommendations in early 2016. This is likely to recommend a larger Clean Air Zone linking up all the existing AQMAS.
A Progress Report will be undertaken in 2016.

9 References

(1) Port of Southampton Master Plan 2009

(2) LAQM Technical Guidance TG(09)

(3) LAQM Policy Guidance 2009

(4) Southampton Shipping Movements 1991 - 2011

(5) DEFRA Screening Assessment for Biomass Boilers Technical Guidance

(6) EP UK, Biomass and Air Quality Guidance for Local Authorities

(7) Further Assessment of Commercial and Millbrook Roads August 2008
(Air Quality Consultants)

(8) USA 2003, 2006, 2009 and 2012 Southampton City Council

(9) Detailed Assessments 2004 and 2007 AEA Consultants

(10) Progress Reports 2010, 2011, 2013,2014

(10) Platform Road air quality assessment, 2013 Mott MacDonald

(11) Southampton Western Approach Low Emission Zone Feasibility Study, 2014 Ricardo AEA

Review and Assessment Reports are available on Council's website
http://www.southampton.gov.uk/s-environment/pollution/airquality/review.aspx

Appendices

Appendix A: QA/QC Data

Appendix A: QA/QC Data

Factor from Local Co-location Studies (if available)

A local co-location study was undertaken with triplicate NOx tubes at CM1, the AURN monitoring station on Brintons Road, an urban centre site, in central Southampton. The results of the study was uploaded to defra website. The table on the next page shows the raw data inputted into the diffusion tube co-location data questionnaire for local authorities.
With 11 months of data the local bias adjustment factor was 0.97, a bias of 3.5%, with good precision. This compared to the 0.91 national bias adjustment factor (06/15) based on 21 studies of gradko 20% TEA in water.

Discussion of Choice of Factor to Use

It was decided to use the national factor of 0.91 to ensure consistency with previous review and assessments that have used the national factor. The local factor had one month of missing data, as the triplicate NOx tubes were missing. The local factor is more conservative, but the national factor, based on 21 studies has more robust data. The local co-location study is at an urban centre location, whereas most of Southampton's NOx tubes are located at roadside locations with residential exposure. The vast majority of co-location studies incorporated into the national factor are from roadside locations. It could be argued that roadside co-location studies will be more representative of the likely NOx tube bias, compared with an urban centre study that is further away from the roadside. If the local factor was used in the bias adjustment of the raw data, it would increase the measured nitrogen dioxide annual means at the NOx tube locations.

Diffusion Tube Collocation Data Questionnaire For Local Authorities

Please Read the "Notes" sheet and then fill in the white boxes of this questionnaire
Should you require assistance, email nick.martin@npl.co.uk or phone 020 8943 7088

	Date form filled in	Name of Local Authority	Your name	Phone number	Contact email
Your Details	30.6.15	Southampton City Council	Simon Hartill	2380917531	simon.hartill@southampton.gov.uk

	Distance from kerb (m)	Site type (e.g. roadside, background). Definitions of site types are given on the "Notes" sheet	Distance from diffusion tube(s) to continuous analyser inlet (m) (this should be less than 1m from the analyser inlet)	Location (site name or a brief description)	Grid Reference of Site (if available)
Site Details	**8m**	urban centre	0.5m	AURN Brintons Road, Southampton	442583,112248

	Prepared by	Analysed by	Example results sheet attached? (please attach a results sheet provided by the analysis laboratory)	Preparation method (e.g. 50% TEA in acetone; 50% TEA in water)	How are diffusion tubes deployed? (e.g. with a clip, spacer, shelter box, just tape)
Diffusion Tube Details	gradko	gradko		20% TEA in water	spacer

Continuous Analyser Details	Analyser type	QA/QC (e.g. local or network)
	chemiluminescence	AURN

Data from the Automatic Analyser (Matching Individual Diffusion Tube Periods)

Period	Start Date (dd/mm/yy)	End Date (dd/mm/yy)	% Data Capture	Ratified / Provisional	NOx (if available) (ug/m^3)	Nitrogen Dioxide (ug/m^3)
1	30/12/2013	03/02/2014	95	prov		35
2	03/02/2014	03/03/2014	95	prov		33.2
3	03/03/2014	01/04/2014	87	prov		36.8
4	01/04/2014	07/05/2014	96	prov		32.6
5	07/05/2014	04/06/2014	96	prov		29.7
6	04/06/2014	01/07/2014	96	prov		24.4
7	01/07/2014	05/08/2014	100	prov		21.3
8	05/08/2014	02/09/2014	91	prov		25.1
9	02/09/2014	08/10/2014	100	prov		33.4
10	08/10/2014	04/11/2014	100	prov		32.8
11	04/11/2014	04/12/2014	98	prov		37.1
12	04/12/2014	06/01/2015	99	prov		37.1
13						

Please express NOx as NO_2 (e.g. ppb x 1.913) or alternatively note the approach / units here:

When you are identifying the automatic monitoring periods that match your diffusion tube exposure periods, please be as precise as possible. It is not, however, necessary to match start times to the exact hour that you put out your tubes.

Individual Period (monthly) Mean Nitrogen Dioxide Data from the Diffusion Tubes (ug/m^3)

Period		Tube 1	Tube 2 (if available)	Tube 3 (if available)	Tube 4 (if available)
1		34.2	37.2	30.6	
2		33.4	33.6	missing	
3		missing	missing	missing	
4		32.4	31.4	missing	
5		31.6	35.8	34.1	
6		28.2	27.2	27	
7		26.3	21.5	23	
8		28.8	28.7	28.5	
9		33.8	31.7	34.4	
10		32.5	34.8	37.6	
11		35.6	32.9	38.1	
12		36.3	38.7	35.4	
13					

Other Information	Are the concentrations stated in ug/m^3?	Did the diffusion tube supply or analysis method change during the monitoring period? When, from what, to what?	Were there any significant problems with the continuous analyser during the monitoring period?	Are there any other relevant issues with your data?
	yes	no	no	

Please Return Completed Questionnaires to: nick.martin@npl.co.uk
This questionaire is now maintained and distributed by the National Physical Laboratory on behalf of Defra and the DAs

Gradko is a UKAS accredited laboratory and participates in the Workplace Analysis Scheme for Proficiency (WASP) for nitrogen dioxide diffusion tube analysis and the annual field comparison exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring the results reported are of a good quality. The laboratory follows the procedures set out in the Harmonisation Practical Guidance. The WASP intercomparison scheme for comparing spiked nitrogen dioxide tubes categorised the laboratory as satisfactory in 2014.

The WASP results are detailed on the next page.

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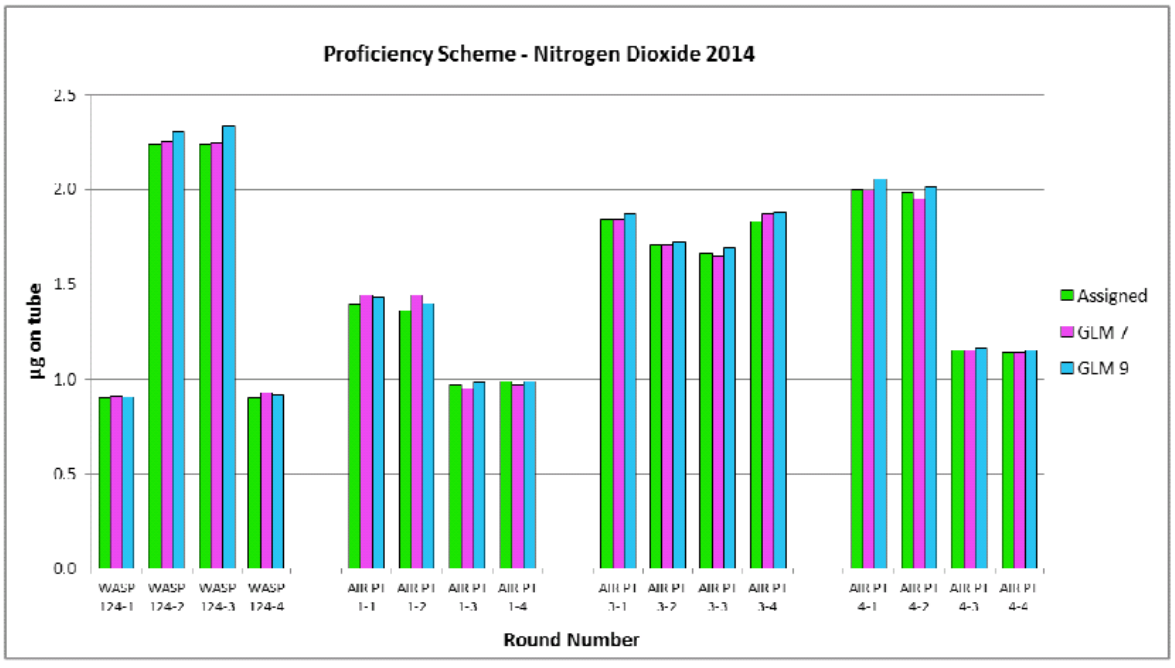
Nitrogen Dioxide Proficiency Scheme 2014

Methods: GLM 7 – Camspec M550 Spectrophotometer, GLM 9 – QuAAtro Continuous Flow analyser

Proficiency Scheme - Nitrogen Dioxide 2014								
Date	Round	Assigned value	Camspec M550 - GLM 7			QuAAtro - GLM 9		
			Measured concentration	z-Score	% Bias	Measured concentration	z-Score	% Bias
Feb-14	WASP 124-1	0.90	0.91	0.14	1.2%	0.91	0.06	0.6%
Feb-14	WASP 124-2	2.24	2.25	0.09	0.5%	2.31	0.41	2.9%
Feb-14	WASP 124-3	2.24	2.25	0.07	0.4%	2.33	0.58	4.2%
Feb-14	WASP 124-4	0.90	0.93	0.46	2.9%	0.92	0.32	1.9%
May-14	AIR PT 1-1	1.39	1.44	0.48	3.6%	1.43	0.38	2.9%
May-14	AIR PT 1-2	1.36	1.44	0.78	5.9%	1.40	0.39	2.9%
May-14	AIR PT 1-3	0.97	0.95	-0.27	-2.1%	0.98	0.14	1.0%
May-14	AIR PT 1-4	0.99	0.97	-0.27	-2.0%	0.99	0.0	0.0%
Aug-14	AIR PT 3-1	1.84	1.84	0.0	0.0%	1.87	0.22	1.6%
Aug-14	AIR PT 3-2	1.71	1.71	0.0	0.0%	1.72	0.08	0.6%
Aug-14	AIR PT 3-3	1.66	1.65	-0.08	-0.6%	1.69	0.24	1.8%
Aug-14	AIR PT 3-4	1.83	1.87	0.29	2.2%	1.88	0.36	2.7%
Nov-14	AIR PT 4-1	2	1.99	-0.07	-0.5%	2.05	0.33	2.5%
Nov-14	AIR PT 4-2	1.98	1.95	-0.2	-1.5%	2.01	0.2	1.5%
Nov-14	AIR PT 4-3	1.15	1.15	0	0.0%	1.16	0.12	0.9%
Nov-14	AIR PT 4-4	1.14	1.14	0	0.0%	1.15	0.12	0.9%



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tel.: 01962 860331 e-mail:diffusion@gradko.com

PM Monitoring Adjustment

The only PM monitoring undertaken in 2014 was at the AURN Station in Brintons Road. Both the PM_{10} and $PM_{2.5}$ monitoring is undertaken with FDMS TEOM requiring no adjustment.

Short-term to Long-term Data Adjustment

The short-term to long-term data adjustment has been detailed in Tables 2.8-2.15 starting on page 55, in the main body of the report.

QA/QC of Automatic Monitoring

SCC calibrates and maintains the continuous monitoring stations at the 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 and Millbrook Road. The Brinton's road AURN is ratified by AEA.
Calibrations are undertaken on a fortnightly basis for Onslow Road, Victoria Road and Millbrook Road. The filters are usually changed every fortnight as well.
KCL check the data every day and notify SCC by email of any issues that may require a call out to check the equipment.
The AURN Station has a scheduled calibration and filter change every 4 weeks.
Data capture at the SCC owned monitoring stations of Onslow Road and Victoria Road were just below the optimum 90%. Onslow was 89% and Victoria was 84%.
This was due to technical issues, mostly air conditioning failures.
The Millbrook Road Station managed by ET, reported 79% data capture due to equipment failures. The station was shut at the end of 2014, the analysers were quite old and beyond economic repair.