Sunderland City Council

Local Air Quality Management

Updating and Screening Assessment

In fulfillment of Part IV of the Environment Act 1995

Date April 2012

Local Authority Officer	Marion Dixon
Department	City Services
Address	Jack Crawford House, Commercial Road, Sunderland, SR2 8QR.
Telephone	0191 561 1696
e-mail	marion.dixon@sunderland.gov.uk
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Executive Summary

The Air Quality Strategy establishes the framework for air quality improvements. Measures agreed at the national and international level are the foundations on which the strategy is based. It is recognised, however, that despite these measures, areas of poor air quality will remain, and these will best be dealt with using local measures implemented by the LAQM regime. The role of the local authority review and assessment process is to identify those areas where the air quality objectives are being or are likely to be exceeded. Experience has shown that such areas may range from single residential properties to whole town centres.

Sunderland City Council have been assessing the air quality in their area for over 10 years through the Review and Assessment framework and this is the fourth Updating and Screening Assessment that has been undertaken. A major change to the approach to Updating and Screening Assessment is that the assessment is now carried out on a source-by-source basis, rather than considering each pollutant in turn.

Sunderland City Council takes a pro-active stance on LAQM and although we have not had to declare an Air Quality Management Area within our boundaries, considerable effort and funding has been put into monitoring the air quality in Sunderland. We were also very pleased to have one of our automatic monitoring stations adopted into the National Automatic Urban Network in 2004. The station which is situated at the Tennis centre on the Silksworth Sports Complex now monitors NO_x, Ozone and $PM_{2.5}$ for the AUN along with SO_2, CO and PM_{10} for the purposes of LAQM.

This Updating and Screening Assessment has identified the need to proceed to a Detailed Assessment for Nitrogen Dioxide.

Sunderland City Council's next course of action will therefore be to proceed to a Detailed Assessment for Nitrogen Dioxide at relevant locations.

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1 Introduction

1.1 Description of Local Authority Area

Sunderland is one of five Local Authorities making up the conurbation of Tyne & Wear that covers an area of 54,006 hectares, with a population of 1.134 million. The conurbation centres around two major rivers with a mixture of large urban and rural areas.

A substantial rail and road network covers the region, which includes a number of motorways and trunk roads, primary roads, principal roads and other classified and non-classified routes. A comprehensive network of bus services operates in Tyne & Wear, as well as a Metro light rail network. Both regional and national rail systems and freight also operate. Passenger ferries and freight shipping services operate from the Port of Tyne and cargo traffic enters and leaves the Port of Sunderland.

Cars form the bulk of traffic on the roads - car ownership in Tyne & Wear increased by about 44% between 1980 and 1996, broadly in line with national trends. If existing trends continue, further substantial increases in car ownership can be anticipated. This, together with the expected increase in commercial traffic will lead to greater pressure on the road system. As car ownership grows congestion becomes worse. Businesses are especially concerned about rising expenses caused by traffic jams. Regions remote from London, like the North-East, are particularly affected. As a result, large urban areas – including Tyne and Wear – have been instructed by the Department of Transport to set congestion targets. The target for Tyne and Wear is to limit congestion so that, by 2011, travellers experience a maximum 7% increase in average journey time per person mile on 16 key corridors throughout Tyne and Wear. This compares with an expected 12% growth in traffic on these roads during this period.[1]

Air quality in Tyne & Wear may also be influenced by sources external to the region, notably power generation and metal refining activities. The region is bounded to the east by the North Sea, which is considered to be a source of natural particulates - sea salt- that contribute to the overall particulate level in the region.

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 microgram's per cubic metre $\mu g/m^3$ (milligram's 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 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Table 1.2 Summary of Previous Review and Assessments carried out.

Name of Report	Date Produced	Brief Outcome
First Stage Air Quality Review & Assessment for Tyne & Wear *(jointly with the Tyne & Wear authorities)*	1998	Identified that 6 of the 7pollutants with Air Quality Objectives needed further investigation. 1, 3 Butadiene was eliminated.
Final Stage Review and Assessment (*stages 2 & 3 jointly with South Tyneside Council*)	2000	Undertook an Urban Emissions Inventory and a computer model using ADMS- Urban. Concluded all objectives will be met by the specified dates.
Updating & Screening Assessment 2003 (*Sunderland only*)	2003	Proceeded to a detailed assessment for NO2 based on NO2 diffusion tubes and DMRB screening model.
Detailed Assessment of Air Quality (All Tyne & Wear Authorities)	Jan 2005	Concluded that AQMA's should be declared at two sites in Sunderland.
Supplementary Detailed Assessment of Air Quality (Sunderland only)	June 2005	Reversed findings of DA and concluded the AQMA's were not required due to new continuous analyser data and removal of a receptor due to redevelopment.
Updating & Screening Assessment 2006 (*Sunderland only*)	2006	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.
Progress Report (*Sunderland only*)	2007	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.
Progress Report (*Sunderland only*)	2008	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.
Updating & Screening Assessment 2009 *(Sunderland only)*	2009	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.
Progress Report *(Sunderland only)*	2010	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.
Progress Report *(Sunderland only)*	2011	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.

The Updating and Screening Assessments (USA) carried out as part of the second round of Review and Assessment of air quality in the Sunderland region identified a number of locations where the UK Air Quality Objectives were at risk of being exceeded. In 2005, a Detailed Assessment (DA) was carried out to determine whether it was likely that the objectives will be exceeded at these locations, in order to determine the need for any Air Quality Management Areas (AQMA's).

The DA concluded that there was a risk of the annual mean objective for nitrogen dioxide to be exceeded at two locations, Trimdon Street Roundabout and Chester Road/Ormonde Street, and that Air Quality Management Areas (AQMA's) should be declared. Since publication of the Detailed Assessment report, additional information on measured nitrogen dioxide concentrations at the Chester Road/Ormonde Street junction was made available. The results from three months continuous monitoring at this location, along with the full 12 months data from a diffusion tube monitoring site indicated that the annual mean nitrogen dioxide objective would be achieved by a reasonable margin in 2005.

In addition, further information was obtained relating to the second potential area of exceedence of the annual mean nitrogen dioxide objective at Trimdon Street Roundabout. The area of potential exceedence covered one receptor known as Embassy House. The property was purchased by the City of Sunderland as part of a large development plan and was demolished soon after. Since there were no receptors in the area of potential exceedence there was no requirement for the declaration of an Air Quality Management Area.

Currently Sunderland City Council has no AQMA's within its boundary.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Pollutants are automatically monitored at 2 sites within Sunderland.
Details of the two stations are shown below in table 2.1. Maps of the 2 locations have also been provided as Fig 2.1-2.2. These stations were running at the time of the previous Updating and Screening report and no new stations have been commissioned since although two stations have been decommissioned. QA/QC procedures for these sites are detailed in Appendix 1 of this report. PM_{10} is measured at two locations using Tapered Element Oscillating Microbalances (TEOM's).

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
Trimdon Street	Kerbside	X438928 Y557151	NO_x,PM_{10} (no data)	N	Yes 3m	0.5m	Y
Puma Centre	Urban Back-ground	X438116 Y554462	NO_x,SO_2 O_3 $PM_{10(no\ data)}$, ,	N	No	0.5m but approx 10m to nearest 'busy' road	N

Figure 2.1 Location of Trimdon St Automatic Monitoring Station

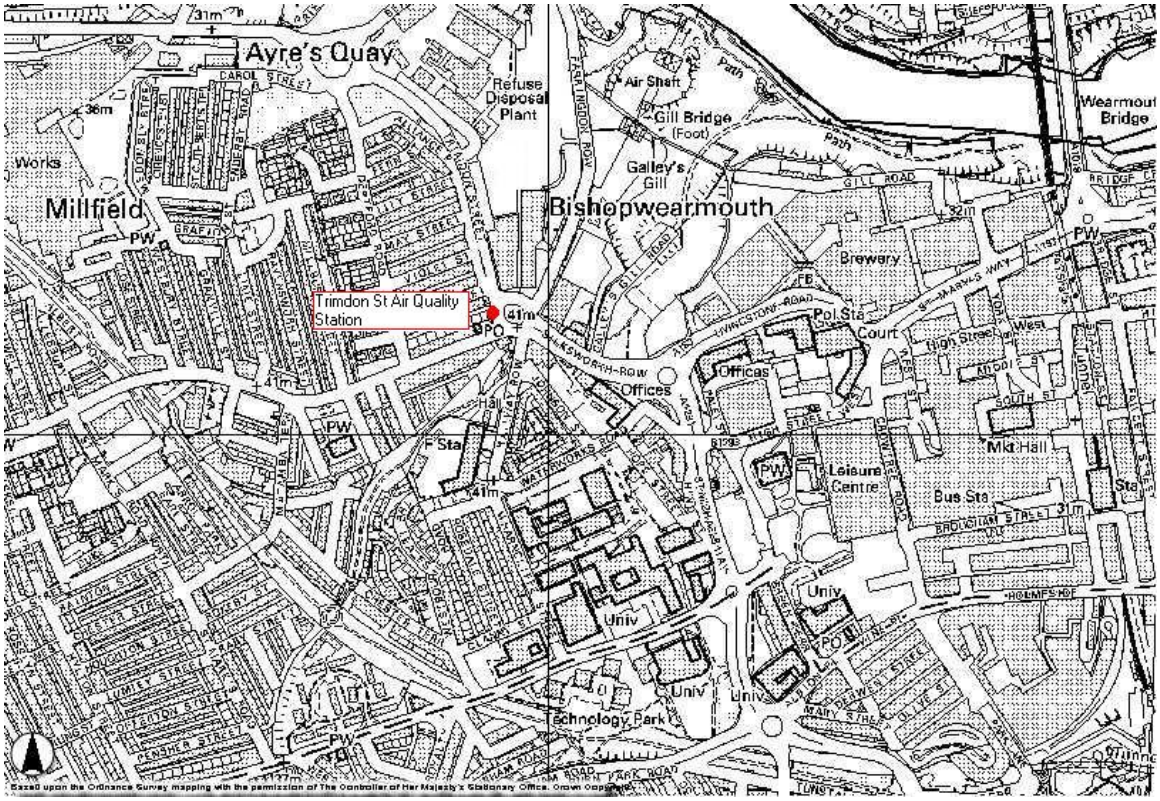
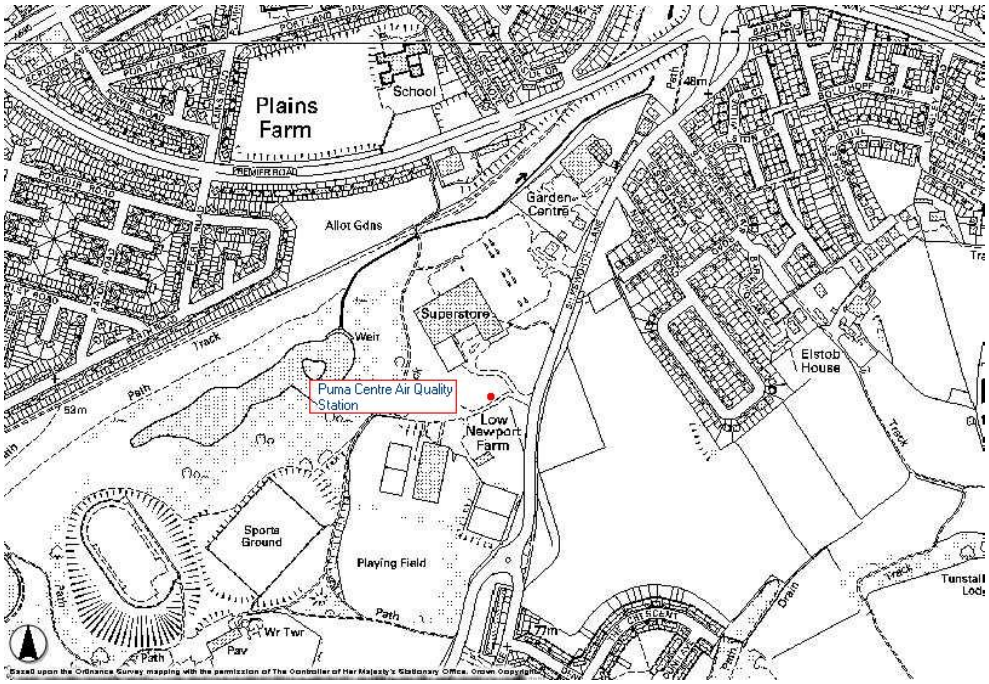


Figure 2.2 Location of Puma Centre Automatic Monitoring Station.



2.1.2 Non-Automatic Monitoring Sites

Nitrogen Dioxide has been measured using passive diffusion tubes for several years throughout Sunderland and the number of sites is currently 33. The vast majority of the tubes are located on busy roads and there are two co-located sites where diffusion tubes in triplicate are sited at automatic stations. These are at Trimdon Street and the Puma Centre. Wherever possible the tubes are located on the façade of buildings that are relevant receptors such as residential properties.

The monitoring of Benzene concentrations has ceased due to continually insignificant results

Details of the QA/QC procedures and the laboratory used to analyse the tubes are contained in Appendix 1.

Sunderland City Council has calculated the precision and bias of the NO_2 diffusion tubes to evaluate their performance. Diffusion tube precision can be described as the ability of a measurement to be consistently reproduced, i.e., how similar the results of duplicate or triplicate are to each other. Bias represents the overall tendency of the diffusion tubes to depart from the true value, i.e., to under or over-read relative to the reference method (the chemiluminescence analyser).

The precision and bias have been calculated for the Trimdon Street station using the excel spreadsheet provided on the UK air quality archive website. The results of the precision analysis were good with 12 out of 12 periods having a confidence interval smaller than 20%. The bias was calculated to be 0.85 at this site. Data capture for each of the 12 periods was good for the co located analyser.

Table 2.2 Details of non-automatic monitoring sites

Site Number	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
29	Arndale House, St Mary's Way	Roadside	X439508 Y557151	NO_2	No	0.5m	Y
38	17 Parkside Sth, E. Herrington	Roadside	X435714 Y552473	NO_2	Yes 0m	10m	Y
39	15 John Street	Urban Centre	X439835 Y556978	NO_2	No	3m	N
53	166 Chester Road	Roadside	X438568 Y556566	NO_2	Yes 0m	4m	Y
55	25 Eden Vale	Roadside	X438690 Y556135	NO_2	Yes 0m	2m	Y
56	101 Southwick Road	Roadside	X439101 Y553282	NO_2	Yes 0m	2m	Y
57	5/6 Nbridge St, Monkwearmouth	Kerbside	X439664 Y557829	NO_2	Yes 0m	1m	Y
58	6 Beatrice Tce, Shiney Row	Kerbside	X432634 Y552616	NO_2	Yes 0m	1m	Y
86	2 Alice Street	Roadside	X439466 Y556484	NO_2	Yes 0m	2m	Y
88	Hinds Street	Roadside	X439160 Y556995	NO_2	No	1m	Y
94	Chaplin's PH, Mary St.	Kerbside	X439423 Y556738	NO_2	Yes 0m	0.5m	Y
100	Trimdon St AQ Station	Kerbside	X438927 Y557151	NO_2	Yes 3m	0.5m	Y
101	Puma Centre, Silksworth Ln	Urban Background	X438116 Y554462	NO_2	No	0.5m	N
103	Trimdon St AQ Station	Kerbside	X438927 Y557151	NO_2	Yes 3m	0.5m	Y
104	Trimdon St AQ Station	Kerbside	X438927 Y557151	NO_2	Yes 3m	0.5m	Y
105	Puma Centre, Silksworth Ln	Urban Background	X438116 Y554462	NO_2	No	0.5m	N
106	Puma Centre, Silksworth Ln	Urban Background	X438116 Y554462	NO_2	No	0.5m	N
109	23 Newcastle Rd	Roadside	X439648 Y558120	NO_2	Yes 0m	2m	Y
111	237 Queen Alexandra Rd,	Roadside	X438453 Y555507	NO_2	Yes 0m	5m	Y
113	181 Durham Road	Roadside	X437446 Y554989	NO_2	Yes 0m	5m	Y
116	9 Derwent St	Urban Centre	X439451 Y556718	NO_2	Yes 0m	1m	Y
117	3, Holmeside	Roadside	X439495 Y556795	NO_2	No	1m	N
118	27 Bridge St	Roadside	X439696 Y557205	NO_2	Yes 0m	2m	Y
119	4 Athenaeum St	Roadside	X439792 Y556921	NO_2	Yes 0m	2m	Y
120	Gillespie's PH	Roadside	X439806 Y557063	NO_2	No	2m	N

Site No	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location
121	16 Windsor Tce, Grngetwn	Roadside	X440702 Y554722	NO_2	Yes 0m	3m	Y
123	263 Chester Rd	Roadside	X437943 Y556341	NO_2	Yes 0m	4m	N
125	45 Station Rd	Roadside	X435417 Y547025	NO_2	Yes 0m	1m	Y
128	Echo Building	Roadside	X439707 Y557312	NO_2	Yes 10m	10m	Y
129	West Sunniside	Roadside	X439938 Y557089	NO_2	Yes 5m	1m	Y
130	St Mary's Car Park	Roadside	X439538 Y557292	NO_2	No	1m	Y
131	Chaplin's PH 2nd Tube	Kerbside	X439397 Y556666	NO_2	Yes 3m	0.5m	Y
132	Dunn House, N Bridge St.	Kerbside	X439661 Y557901	NO_2	Yes 3m	1m	Y
133	26 Northern Way	Roadside	X438153 Y558344	NO_2	Yes 3m	2m	Y
134	Southwick Road /Thompson Rd	Roadside	X438563 Y558517	NO_2	Yes 3m	2m	Y
135	Merle Terrace	Roadside	X437561 Y557538	NO_2	Yes 3m	2m	Y
136	1 Morningside Rickleton	Roadside	X428269 Y553809	NO_2	Yes 5 m	0.5m	Y

2.2 Comparison of Monitoring Results with AQ Objectives

Automatic Monitoring Data

2.2.1 Nitrogen Dioxide

Nitrogen dioxide was monitored at two locations across the city. The annual mean objective was met at both sites (table 2.3a). Data capture was very good at Trimdon Street and at Puma Centre. There were no exceedences of the hourly NO_2 objectives at either site.

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

Location	Site Type	Within AQMA?	Proportion of year with valid data 2011 %	Annual mean concentrations (μg/m^3) 2011
Trimdon Street	Kerbside	N	98.66	36.43
Puma Centre	Urban Background	N	96.97	16.0

Table 2.3c Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Location	Site Type	Within AQMA?	Data Capture 2011 %	Number of Exceedences of hourly mean (200 μg/m^3) *If the period of valid data is less than 90% of a full year, include the 99.8th %ile of hourly means in brackets.* 2011
Trimdon Street	Kerbside	N	98.66	0
Puma Centre	Urban Background	N	96.97	0

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2011

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	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 = 0.85 2011 (μg/m^3)
29	Arndale House, St Mary's Way	Roadside	N	N	92	N	N	28.31
38	17 Parkside Sth, E. Herrington	Roadside	N	N	100	N	N	28.54
39	15 John Street	Urban Centre	N	N	83	N	N	26.64
53	166 Chester Road	Roadside	N	N	100	N	N	28.34
55	25 Eden Vale	Roadside	N	N	100	N	N	32.69
56	101 Southwick Road	Roadside	N	N	100	N	N	26.73
57	5/6 Nbridge St, Monkwearmouth	Kerbside	N	N	92	N	N	33.66
58	6 Beatrice Tce, Shiney Row	Kerbside	N	N	100	N	N	33.71
86	2 Alice Street	Roadside	N	N	92	N	N	20.35
88	Hinds Street	Roadside	N	N	83	N	N	30.67
94	Chaplin's PH, Mary St.	Kerbside	N	N	34	N	N	35.54
100	Trimdon St AQ Station	Kerbside	N	T and C	100	N	N	37.83
103	Puma Centre, Silksworth Ln	Urban Background	N	T and C	92	N	N	36.89
104	Trimdon St AQ Station	Kerbside	N	T and C	100	N	N	37.38
101	Trimdon St AQ Station	Kerbside	N	T and C	100	N	N	18.19

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	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 = 0.85 2011 (μg/m^3)
105	Puma Centre, Silksworth Ln	Urban Background	N	T and C	100	N	N	17.69
106	Puma Centre, Silksworth Ln	Urban Background	N	T and C	92	N	N	16.33
109	23 Newcastle Rd	Roadside	N	N	58	N	N	15.27
111	237 Queen Alexandra Rd,	Roadside	N	N	92	N	N	19.66
113	181 Durham Road	Roadside	N	N	67	N	N	29.37
116	9 Derwent St	Urban Centre	N	N	92	N	N	26.25
117	3, Holmeside	Roadside	N	N	75	N	N	33.28
118	27 Bridge St	Roadside	N	N	92	N	N	29.88
119	4 Athenaeum St	Roadside	N	N	83	N	N	32.00
120	Gillespie's PH	Roadside	N	N	75	N	N	30.66
121	16 Windsor Tce, Grngetwn	Roadside	N	N	33	N	N	25.05
123	263 Chester Rd	Roadside	N	N	92	N	N	34.28
125	45 Station Rd	Roadside	N	N	92	N	N	26.41
128	Echo Building	Roadside	N	N	75	N	N	36.10
129	West Sunniside	Roadside	N	N	92	N	N	24.36
130	St Mary's Car Park	Roadside	N	N	67	N	N	26.40
131	Chaplin's PH 2nd Tube	Kerbside	N	N	67	N	N	40.80
132	Dunn House, N.Bridge Street	Kerbside	N	N	100	N	N	42.21
133	26 Northern Way	Roadside	N	N	100	N	N	32.85

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	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 = 0.85 2011 (μg/m^3)
134	Southwick/Thompson Rd	Roadside	N	N	100	N	N	32.80
135	Merle Terrace	Roadside	N	N	83	N	N	22.15
136	1, Morningside Rickleton	Roadside	N	N	75	N	N	21.72

Diffusion Tube Monitoring Data

The results of the 2011 Sunderland NO_2 diffusion tube data were that the annual objective of 40µg/m^3 was met apart from two locations. The first location is Tube 131 and is situated in Stockton Road and mounted on a road sign close to Chaplin's Public House. Tube 131 has an annual average of 40.8µg/m^3 for 2011.There is also another tube situated close by to the rear of Chaplin's (tube 94) which has an annual mean of 35.54 µg/m^3 for the same period. During the period 2005 To 2010 there was also an automatic monitoring station (Mary Street Station) situated in close proximity which was placed there to monitor levels of NO_2 when diffusion tube results in 2004 showed the location was close to exceeding the objective. The data from this station showed that the NO_2 annual objective was met at the location during the 5 years of monitoring. Since 2010 the station has been relocated and monitoring will start in a new location soon as part of the new Wear Crossing Development.

Tube 131 is not representative of the closest receptor which is a residential flat above Chaplin's public house. It is much closer to the roadside. The tube also unfortunately does not have 100% data capture as it one that it often stolen. It has 8 months worth of data but these months do not run consecutively so it is not possible to annualise the data which means that the data is less reliable as it does not contain an average of a full 12 months. LAQM (TG/09) provides a method to predict concentrations at different distances from the same road. Using Box 2.3: *Predicting Nitrogen Dioxide concentrations at different distances form the roads* the predicted annual mean concentration at the receptor above Chaplin's Public House was calculated to be 34.9 µg/m^3. Therefore Sunderland City Council has taken the decision not to proceed to a detailed assessment for this location.

The second tube reporting an exceedence is tube no. 132 located on a lamp post adjacent to Dunn House which is a large block of apartments approximately 5 storeys high. Dunn House is situated on North Bridge Street a four-laned road that leads from the Wearmouth Bridge, 3 lanes flow northwards away from the city centre and one lane carries buses and taxis towards the city. Tube 132 had an annual average of 42.21 µg/m^3. The tube is positioned on a lamp post on the path adjacent to the building and adjacent to Northbridge Street. The residents do not live on the ground

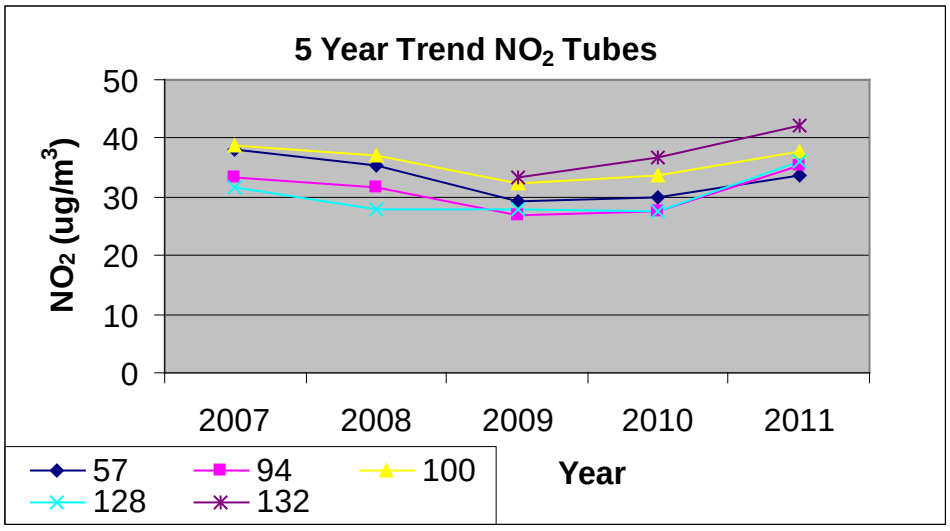
floor of the premises and the first level is at approximately 5 metres above street level.

Sunderland City Council will proceed to a Detailed Assessment for this location.

Figure 2.1 Map showing Location of Tube 132 in North Bridge Street

Figure 2.2 below shows the annual averages for tubes from various locations across the city. These have been plotted for the last 5 years to investigate trends in NO_2 within Sunderland. The 5 sites chosen are all roadside sites that are in either in or in close proximity to the city centre. The sites show a strong visible correlation with all sites decreasing in concentrations between 2007 and 2009 and then increasing over 2010 to 2011. The annual averages can be seen to increase and decrease quite substantially over the monitored period which would indicate that NO_2 levels are being affected by additional factors apart from traffic for which there should have been only a steady increase in the averages.

Figure 2.2 5 Year Trend of Diffusion Tubes



2.2.2 PM_{10}

PM_{10} is measured at two locations in Sunderland at present. Both sites use a TEOM to collect these measurements. The data has been corrected for both sites using the Volatile Correction Model. Data Capture at both sites was good and was at or over 90%. Both sites met the annual objective of 40 µg/m^3 and the 24-hour mean of less than 35 exceedences of 50 µg/m^3 per year.

Table 2.7 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 2011 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
						2007*[c]	2008*[c]	2009*[c]	2010*[c]	2011[c]
Trimdon Street	Kerbside	N		90%	Y		21	18	18	20
Puma Centre	Urban Background	N		97%	Y		13	12	15	15

[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.
* Optional

Table 2.8 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 2011 %[b]	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 μg/m^3)				
						2007*	2008*	2009*	2010*	2011
Trimdon Street	Kerbside	N		90%	Y		5	4	0	16
Puma Centre	Urban Background	N		97%	Y		0	0	0	0

2.2.3 Sulphur Dioxide

Sulphur dioxide has been monitored for many years within Sunderland and the results have shown ambient concentrations have declined. A major factor in this decline has been a reduction of the use of coal due to implementation of Smoke Control Orders within the City. An AURN site measuring SO_2 was located in John Street in the City Centre for 15 years but this site was decommissioned in 2007. Sulphur Dioxide is measured at the Puma Centre site and has been adopted for SO_2 as an AURN site since 2004.

Data capture for 2010 for the Puma Centre site was 77% .The annual mean using 15-minute means was 4µg/m^3. There were no exceedences of the 15-minute, one-hour or 24-hour mean. Therefore all of the objectives were met at this location.

Table 2.9 Results of Automatic Monitoring of SO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2011 %[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)
Puma Centre	Urban Background	N		77	0	0	0

2.2.4 Benzene

Due to consistently low levels in previous years, Benzene monitoring is no longer undertaken.

2.2.5 Summary of Compliance with AQS Objectives

Sunderland has measured concentrations of Nitrogen Dioxide above the annual mean objective at relevant locations and **will need to proceed to a Detailed Assessment**, for the North Bridge Street/ Roker Avenue junction also known as the Wheatsheaf Gyratory.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Sunderland confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

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

Sunderland 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 HGV's.

Sunderland confirms that there are no newly identified road(s) with high flows of buses or HGV's in a busy street where people may spend 1 hour or more close to traffic.

3.4 Junctions

Sunderland confirms 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

A new link road development between Ryhope and Doxford Park is planned as part of the Southern Radial Route in Sunderland. An Air Quality Assessment has been submitted by URS in support of the application (**reference 12/00572/FUL which can be accessed by going to http://www.sunderland.gov.uk/online-applications/**). The assessment has used traffic data derived from the Transport Assessment (also submitted in support of the application) together with local air quality data, measured data and proposed engineering designs. The assessment of the operational phase of the development identifies residential properties and other potentially sensitive receptors located within the vicinity of the proposed development and has used the assessment methodology contained within the Design Manual for Roads and Bridges (DMRB) which is a suitable method for an assessment of this type.
The assessment of local air quality as a result of the development found that overall there would be an imperceptible change in pollutant concentrations at the identified receptors and as such no mitigation is required.

Planning permission has been granted for Phase 2 of the Sunderland Strategic Transport Corridor which related to the construction of a new road bridge across the River Wear. An Air Quality Assessment has been carried out as part of the planning application (**reference 09/04661/LAP which can be accessed by going to http://www.sunderland.gov.uk/online-applications/**). The AQA concluded that AQ Objectives would not be exceeded at relevant receptors. However the concentrations of NO2 at two receptors were approaching the annual objective and further monitoring was deemed necessary by this department to verify the model. A condition to this effect was placed on the planning consent requiring one year of data to be collected before the bridge construction begins and one year after it is completed.

Sunderland has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG (09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.6 Roads with Significantly Changed Traffic Flows

Sunderland City Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

The number of bus movements was calculated during the 2003 USA and it was found to be above the threshold of 2500 movements per day. However there were no relevant receptors within 10 metres of any part of the bus station so there was no need to proceed further with this assessment. This situation has not changed.

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

4 Other Transport Sources

4.1 Airports

Sunderland City Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Sunderland 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

Table 5.1 of LAQM.TG (09) provides a list of lines with a substantial number of diesel passenger trains per day. None of these locations fall within Sunderland so this assessment need go no further.

Sunderland 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 number of ship movements at the port of Sunderland falls below the criteria of more than 5,000 movements per year.

Sunderland City Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

Since the last round of Review and Assessment in 2009 several new industrial installations have begun to operate within the Sunderland City Council district. Some of these have been noted in previous Progress Reports and will now be assessed in this report. A summary of the installations is shown in Table 5.1.

Table 5.1 Summary of new Installations

Name of Installation	Address	Type of Industry	Potential Pollutant Releases	Part A/ Part B
Hi-Performance Auto Centre	Humbledon Park, Sunderland, SR3 4AA.	Waste Oil Burner	NO_x and PM_{10}	B
Ian's Auto Repair	Tintern Street, Sunderland, SR4 7EJ	Waste Oil Burner	NO_x and PM_{10}	B
CF Motoring Services	Brussels Road, Sunderland SR4 6SJ	Vehicle Resprayer	VOC's	B
Wilf Husband	Murton Lane, Houghton Le Spring, DH5 0JG.	Mobile Crusher	PM_{10}	B
Lear Corporation	Phoenix Way, Houghton Le Spring, DH4 5PH	Di-isocyanate	Di-isocyanate	B
KB Tyres Ltd	Houghton Le Spring, DH4 4ES	Waste Oil Burner	NO_x and PM_{10}	B
Port of Sunderland	Barrack St, Sunderland, SR1 2BU	Coal	PM_{10}	B

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

Sunderland City Council confirms that there are new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority that have had an air quality assessment carried out. Sunderland City Council concludes that it will not be necessary to proceed to a Detailed Assessment for these sources.

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

An assessment of existing installations has been carried out using information from process operators and Sunderland City Council Officers that visit industrial processes as part of the LA-PPC and LA-IPPC regime.

Sunderland 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

The new installations which have begun to operate within Sunderland City Council since the last round of Review and Assessment are detailed in Table 5.1. Under the Environmental Permitting Regulations 2010 these installations have applied for and received a permit from Sunderland City Council who deemed their applications to be duly made.

Three on the list are for Waste Oil Burners which are used in vehicle repair shops to reuse old engine oil to create a source of heat. The appliances are inspected annually by Sunderland City Council and any complaints of dark smoke investigated promptly. Due to the size of these appliances and the quantities of oil used it is not considered that these will give rise to significant pollutant emissions.

CF Motoring Services have begun to operate a vehicle respraying process. Emissions associated with this type of activity are Volatile Organic Compounds (VOC's) and Particulate Matter. The operation is small scale and uses paints that meet the relevant VOC limit values set down in Directive 2004/42/CE, all spraying is carried on in enclosed spray booths designed to meet a particulate matter emission limit. This is certified by the booth manufacturer. It is therefore not considered that this process will give rise to significant pollution emissions.

Emissions from Wilf Husband are considered to be fugitive PM_{10} only. This source has therefore been assessed under section 7 on Fugitive and Uncontrolled Sources.

Lear Corporation operates a di-isocyanate process. This site holds a permit issued by Sunderland City Council and a condition of the permit is to undertake annual

extractive stack testing. As the site is new they have not yet undertaken any annual monitoring. The company have provided data to support their application from operating an identical plant in Poland. The site uses Methyl Di-isocyanate (MDI) which has a very low vapour pressure and the use in manufacture of flexible foam generally leads to very small amounts of emissions. Data from the sister plant in Poland identify that concentrations emitted from the process are so low as to be below relevant occupational hygiene limits. It is therefore not considered that this process will give rise to significant pollution emissions.

The Port of Sunderland has applied for a permit to operate a coal process. Unfortunately the coal process was never initiated on site although the Port is keeping the permit for the foreseeable future. If the process begins to operate in the future then the emissions will be considered.

Sunderland 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

The major fuel (petrol) storage depot in Sunderland was assessed during previous rounds of Review and Assessment and it was concluded that it was not necessary to proceed to a detailed assessment.

There are major fuel (petrol) storage depots within the Local Authority area, but these have been considered in previous reports.

5.3 Petrol Stations

There were no new petrol stations opening in the Sunderland area since the last round of review and assessment. It has been concluded that there are no petrol stations within Sunderland that have an annual throughput of more than 2000m^3 of petrol and are near a road with more than 30,000 vehicles per day and have relevant exposure within 10m of the pumps.

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

5.4 Poultry Farms

Sunderland confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

During the last round of R & A three biomass boilers were identified and assessed. The conclusions were that it was not necessary to proceed to a detailed assessment.

Sunderland has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

Apart from the Biomass appliances identified above there are thought to be very few small biomass combustion appliances throughout Sunderland and those that do exist are not located in one high density area but spread throughout the Local Authority area. It is therefore not necessary to proceed to a detailed assessment for this source.

Sunderland has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.3 Domestic Solid-Fuel Burning

Since April 1995, Smoke Control Orders have been in place throughout the City of Sunderland meaning smokeless fuel has replaced coal burning. The number of properties using smokeless fuel has declined rapidly as residents have switched to natural gas as a fuel source.

There are no areas within Sunderland City Council where significant smokeless fuel burning takes place.

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

7 Fugitive or Uncontrolled Sources

Table 7.1 Summary of new fugitive or uncontrolled Sources

Site Name	Has an AQ Assessment been carried out?	Local Background PM_{10} conc. $\mu g/m^3$	Is there "near" relevant exposure?	Are there any dust concerns?	Proceed to a DA?
Wilf Husband	N	14.6	No	No	No

Since the last round of review and assessment there has been one new fugitive source of PM_{10} source which is a mobile crusher situated in Houghton Le Spring.

Sunderland City Council has identified potential sources of fugitive particulate matter emissions in the Local Authority area. An assessment has been carried out and it was concluded that there is no need to proceed to a detailed assessment for any of the sources.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

Sunderland City Council has no existing AQMA's within its boundary. Monitoring has continued across the city focusing on potential known hotspots and areas where new development could introduce new receptors.

The results from the automatic NO_2 monitoring data were that both the annual and hourly mean was met at both sites. The results from the non-automatic monitoring were that the annual mean was met at all sites apart from two.

The first site located on the roadside on Stockton Road and numbered as Tube 131 is not representative of the closest receptor which is a residential flat above nearby Chaplin's Public House. Tube 131 is much closer to the roadside. LAQM (TG/09) provides a method to predict concentrations at different distances from the same road. Using Box 2.3: *Predicting Nitrogen Dioxide concentrations at different distances form the roads* the predicted annual mean concentration at the receptor above Chaplin's Public House was calculated to be 34.9 µg/m^3. Therefore Sunderland City Council has taken the decision not to proceed to a detailed assessment for this location.

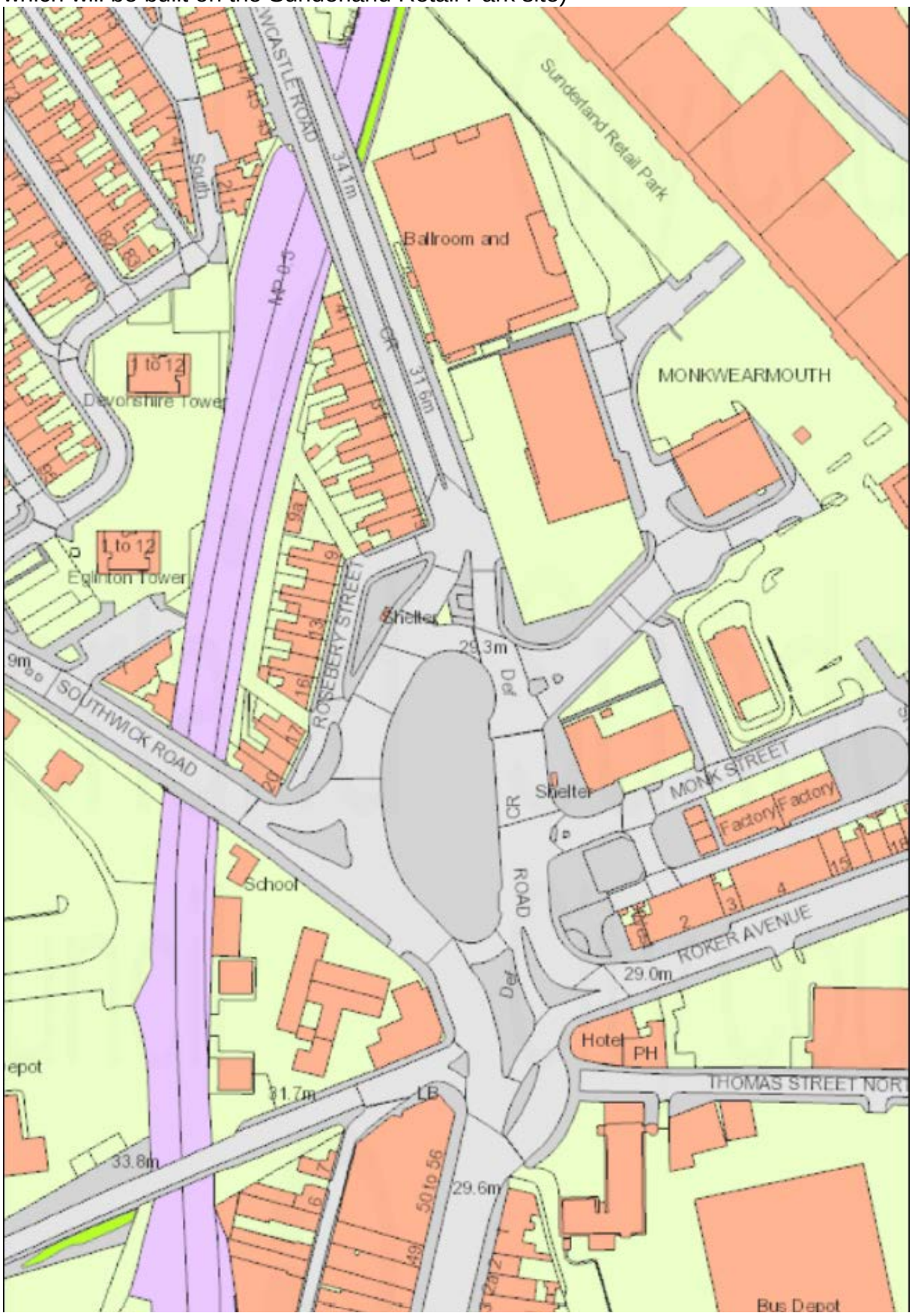
The second site where an exceedence was recorded was tube no. 132 located on a lamp post in North Bridge Street adjacent to Dunn House which is a large block of apartments approximately 5 storeys high. North Bridge Street is a four-laned road that leads from the Wearmouth Bridge, 3 lanes flow northwards away from the city centre and one lane carries buses and taxis towards the city. Tube 132 had an annual average of 42.21 µg/m^3 after bias adjustment. The tube is positioned on a lamp post on the path adjacent to the building and adjacent to Northbridge Street. The residents do not live on the ground floor of the premises and the first level is at approximately 3 metres above street level.
Sunderland City Council will proceed to a Detailed Assessment for this location. However, there are some additional factors to take into account when assessing this area. Directly to the North of Tube 132's location is a large junction known as the Wheatsheaf Gyratory. This is the junction between 4 busy roads:

1. Northbridge Street A1018
2. Southwick Road B1289
3. Newcastle Road A1018
4. Roker Avenue A1018.

At present there are major road works being undertaken on the Wheatsheaf Gyratory to change the layout of the junction and the improvements should relieve congestion. In addition to this a large retail development of a new Tesco Supermarket is being constructed close by See Fig 8.1 below.

The junction improvements are now underway and are due to be completed in February 2013. The Tesco development is due to be completed in spring 2013.
It is therefore Sunderland City Council's opinion that to start a Detailed Assessment of this area immediately would not be conducive to collecting meaningful data. At present there are diversions in place and one lane of the Gyratory is closed. Any data collected would not represent an accurate picture of the air Quality as it will be once the road works have ceased and the Tesco Store completed.
It is therefore proposed to begin one year's monitoring of NOx at the receptor location at the start of March 2013. After a year's data has been collected Sunderland City Council believe they will have a much clearer picture of the air quality at this location and be able to come to a decision on whether an AQMA should be declared.

Fig 8.1 Map of Wheatsheaf Gyratory (also shows location of new supermarket which will be built on the Sunderland Retail Park site)



Conclusions from New Monitoring Data contd.

Both sites monitoring PM_{10} automatically met the objectives fro the annual and 24-hour mean.

The results from automatic monitoring of SO_2 concluded that the 15-minute, 1-hourly and 24-hourly mean would be met.

Sunderland City Council concludes that it is necessary to proceed to a detailed assessment on the basis of new monitoring data.

8.2 Conclusions from Assessment of Sources

The assessment of new sources has included two new roads, The Southern Radial Route (Phase II) and the new Wear Crossing both of which have had AQ Assessments carried out. In the case of the Southern Radial Route the Assessment concluded that there would be an imperceptible change in air quality and as concentrations are not close to the objectives it was concluded that mitigation would not be necessary. The new Wear Crossing Assessment did identify two locations where the concentration of Nitrogen Dioxide was approaching the annual objective and so further monitoring has been requested to verify the model at these locations.

The Vaux Site which has been mentioned in previous Review and Assessments has for a long time remained undeveloped with the previous occupier, The Vaux Brewery being demolished in 2003. At one time the owner of the land, Tesco proposed to build a new supermarket on the site but this development has been relocated to the Sunderland Retail Park on the North of the river. Currently no new planning applications have been granted for the site and it is likely to be developed in small parts rather than as a whole. The Environmental Health Department as consultee of the Development Control Team will provide comments and request Air Quality Assessments where deemed appropriate. These will be reported upon in future Review and Assessments

There have been several new Industrial Sources introduced to Sunderland but upon reflection there have probably been a similar number of industrial premises closing down. In summary none of the new industrial sources are likely to cause substantial amounts of pollution.

8.3 Proposed Actions

This Updating and Screening Assessment 2012 has identified the need to proceed to a Detailed Assessment. The objective that is likely to be breached is the Annual Nitrogen Dioxide Objective of 40µg/m^3. The location of the exceedence is at Dunn House which is located at the Northern end of North Bridge Street the A1018 near to the Wheatsheaf Gyratory.

Sunderland's next course of action will be to proceed to a Detailed Assessment for Nitrogen Dioxide for the Annual Objective but propose that the start of monitoring for this Assessment be delayed until March 2013 to allow major road works nearby to be completed.

9 References

Department for Environment, Food and Rural Affairs, 2009, *Local Air Quality Management Technical Guidance* LAQM.TG (09).

Appendices

Appendix A: QA/QC Data

Diffusion Tube Bias Adjustment Factors,

Sunderland City Council diffusion tubes are supplied and analysed by Gradko International Ltd, Winchester, Hampshire. The preparation method used is 50% TEA and acetone.

Sunderland City Council has calculated the precision and bias of the NO_2 diffusion tubes to evaluate their performance. Diffusion tube precision can be described as the ability of a measurement to be consistently reproduced, i.e., how similar the results of duplicate or triplicate are to each other. Bias represents the overall tendency of the diffusion tubes to depart from the true value, i.e., to under or over-read relative to the reference method (the chemiluminescence analyser).

The precision and bias have been calculated for Trimdon Street station using the excel spreadsheet provided on the UK air quality archive website. The results of the precision analysis were good with 11 out of 12 periods having a confidence interval smaller than 20%. The bias was calculated to be 0.85 at this site. It was decided to use this co location study as the bias of the assessment as it is a local site and representative of most of the other tube site which are largely roadside.

PM Monitoring Adjustment

PM_{10} is monitored at two locations using TEOM instruments. The data has been adjusted using the volatile correction model (VCM) accessed at http://www.volatile-correction-model.info/ .

QA/QC of automatic monitoring

The QA/QC procedures of Sunderland are based on the AUN Site Operator's manual along with training received from our equipment suppliers, Casella Measurement.

The fundamental aims of a quality assurance/ control programme are:

- The data obtained from measurement systems should be representative of ambient concentrations existing in each area.

- Measurements must be accurate, precise and traceable.
- Data must be comparable and reproducible.
- Results must be consistent over time.

An appropriate level of data capture is required throughout the year.

Equipment Maintenance

- Automatic analysers are serviced every 6 months by a qualified engineer under a contract with Casella Measurement.
- Local Authority staff visits the air quality sites at least once every 2 weeks during which a check of the equipment is made to ensure it is all working within normal parameters. Filters are also changed during this visit.
- If a problem occurs then a call-out is instigated to the service centre and an engineer will normally visit site within 48-hours to correct the fault.

Calibration

- Each day a calibration response check is undertaken by the logger, this check does not re-calibrate the instrument. The calibration system uses certified gas cylinders of a known concentration, to produce an expected response from the analyser.
- Calibration reports stored in the logger will retain expected zero and span gas responses and the actual measured zero and span gas responses.
- Computer software collects and stores these calibration reports and also calculates a zero correction and span response scaling factor which can be applied to the data if required.
- At the 6-month service the instruments are re-calibrated to the site cylinder certificated value.
- Gas cylinder pressures are regularly checked at routine visits to ensure they are replaced before they run out completely.

When a cylinder is replaced the new certified values are entered into the logger.

Data Validation

Data from all of Sunderland City Council's automatic monitoring sites are collected via modem by Casella Measurement. Casella are under contract with Sunderland City Council to validate and ratify the data. Monthly reports regarding the data are produced by Casella and disseminated to the five local authorities of Tyne & Wear. The data is also displayed on a website that members of the public can freely access. The website address is https://www.dataview247.com/Default.ltr.aspx Casella review data daily to ensure that

- Telecommunications to the station are operational
- The air quality station is operational
- Individual analysers are operational
- Air quality exceedences are identified
- Operational information such as TEOM filter loading, does not invalidate data
- Obvious data errors are identified

Data Ratification

In addition to the initial data screening process (validation), data are further scrutinised in monthly blocks in order to provide a final ratified data set.

The software that collects the data is used to rescale the data using the factor calculated from the fortnightly calibration check. Data is then reviewed for erroneous data such as:

- Daily calibration spikes
- Routine or service visit errors
- Analyser faults
- Site faults, such as power outages

When data is satisfactory, it is compared to other local sites. This provides a check to ensure data is realistic.

QA/QC of diffusion tube monitoring

Gradko has full U.K.A.S. accreditation for compliance with ISO-IEC 17025 for laboratory management system. Its accuracy and consistency of analytical methods is regularly monitored using external proficiency schemes such as

- Workplace analysis scheme for proficiency (W.A.S.P.)
- Laboratory Environmental Analysis Proficiency (L.E.A.P.)

In addition regular cross-checks are carried out with other U.K.A.S. accredited labs using certified standard solutions.

According to the *WASP – Annual Performance Criteria for NO_2 Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards, and Summary of Laboratory Performance in Rounds 97-101*, Gradko International were deemed to have a good performance. Gradko International also follows the procedures set out in the Harmonisation Practical Guidance

Details of the tube precision are provided in the section on Diffusion Tube Bias Adjustment Factors at the beginning of this section.