Sunderland City Council Air Quality Annual Status Report (ASR)

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

Date May 2016

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Report Reference number	ASR 2016
Date	MAY 2016

Executive Summary: Air Quality in Our Area

Headlines

We are pleased to be able to report that the Air Quality in Sunderland is good. Health based objectives known as the Air Quality Objectives are being met across the City and we have seen a general decline in some of the pollutants measured. We have not declared any Air Quality Management Areas in our City.

However, Sunderland City Council is committed to try to reduce levels further and to support initiatives that will improve air quality and well-being in Sunderland. We are continuing to monitor the levels of air quality and if you are interested in reading about this in more detail please turn to Appendix A of this report which contains a summary of air quality data collected in 2015. We also look at new sources such as new roads or industrial sites to assess their impact on the City's air quality. Our real time monitoring data as well as data from other sites across the region can be accessed by going to http://www.airqualityengland.co.uk/local-authority/?la_id=348

Together with our partners in Transport and Public Health we aim to work together to try to improve air quality and there are ways that Sunderland's residents and businesses can get involved.

How you can get involved in Air Quality

There are ways in which we can all make small changes in our daily lives that will benefit the air quality in Sunderland. Things like walking instead of taking your car for short distances, car-sharing to get to work and driving carefully can all make a difference.

Sunderland City Council is part of the Department for Transport funded 'Go Smarter' sustainable transport programme launched three years ago, to promote more environmentally friendly ways of travelling than over-reliance on the car.

The Go Smarter to Work team at Sunderland City Council works with local businesses and employees to provide the practical help, advice and encouragement needed to walk, cycle or use public transport of car share for the journey to work.

Sunderland residents and businesses can get more information by visiting http://gosmarter.co.uk/ where you can:

- Plan your journey using public transport, walking or cycling
- Get advice on smarter ways to travel to work
- Get information for parents and pupils travelling to school.

Businesses can benefit too. Making smarter travel choices in your business can have vast benefits for your employees and your business.

Did you know?

- Urban congestion costs the economy £11bn per year, with the British Chambers of Commerce estimating that the annual cost of congestion was £17,350 per business in 2008. The cost of lost employee time is £331 per commuter per year, while holdups to business and freight vehicles total £1.1 billion annually.
- Putting measures in place, to help you employees travel to work more sustainably, can contribute towards Corporate Social Responsibility targets particularly those related to the environment, sustainability and health & wellbeing.
- Encouraging your employees to be more active can have real benefits for your business. People who are physically active for 20 minutes a day take less than half the sick leave of those who are active for 10 minutes; this can equate to significant savings in terms of productivity and lost time.

Sunderland City Council were recently awarded a Gold Award by the GO Smarter campaign for their work and you can read about this in the Air Quality Initiatives section below.

Air Quality Initiatives

Here are a few examples of initiatives taking place in Sunderland.

On right roads to cleaner transport

In 2014, Sunderland City Council and Durham County Council lodged a successful joint bid to the Department for Transport's Clean Bus Technology Fund (CBTF), which was set up to support efforts across the country to reduce emissions from buses and improve air quality.

The money has been used to help bus operator Go North East refit 19 buses operating on routes between the two cities.

The routes are the 'Prince Bishops' buses which operate the 20, 20A and X20 routes between each city centre, and the X35 'Fast cats' which run between Sunderland and Hartlepool via Peterlee. Each of the 19 buses will now be refitted with the latest Selective Catalytic Reduction (SCRT) technology to reduce the exhaust emissions which contribute to air pollution.

Gold award for Sunderland.

In March 2016, Sunderland City Council received Gold accreditation for promoting the Go Smarter sustainable transport campaign.

Go Smarter Team with Cllr Michael Mordey.

Sunderland City Council is part of the Department for Transport funded 'Go Smarter' sustainable transport programme launched three years ago, to promote more environmentally friendly ways of travelling than over-reliance on the car.

Efforts in Sunderland have earned the City Council a Gold Accreditation award from the DfT campaign, which has been accepted on the city's behalf by Portfolio Holder for City Services, Councillor Michael Mordey.

"Getting people to consider these as viable and hopefully preferred travelling options is not easy. You have to provide the practical help, advice and resources to make that possible.

"We have listened to what local people and businesses have told us was needed, and tried to make that possible with things like improved cycle routes and changing facilities, designated walking routes and partnerships with public transport to offer reduces fares and improved services."

Cycling in the city

Improvements for cycling into and around Sunderland city centre are being proposed.

The proposals from the City Council come after it was awarded a £800,000 grant from the North East Combined Authority's Sustainable Transport Fund.

This fund helps schemes that encourage walking, cycling, using public transport, or car sharing.

Cycle routes to be added to existing roads and footways

Proposals include introducing more cycle lanes, shared spaces, and improvements to help encourage city centre cycling. In total, improvements to 4.3km or 2.6 miles of routes are proposed.

More than 800 consultation forms have been distributed to businesses and residents in and around the city centre.

Proposals include:

- Improvements for cycling in Park Lane, Olive and Derwent streets
- Improvements for cyclists along the north side of St Mary's Boulevard
- A new route through Borough Road, Laura, Murton and Tatham streets for cycling in Sunniside and Hendon
- An improved route for cycling into the city centre in Borough Road and Fawcett Street
- Improvements for cycling into the city centre along St Thomas Street
- Secure cycle parking, changing and storage facilities at St Mary's Multi-storey Car Park.

Progress of this scheme will be reported in 2017’s Annual Status Report.

Air Quality in Sunderland City Council

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Pollutants can come from a variety of man-made sources such as industry, combustion of fuels, traffic engines and building heating. Some can come from natural sources such as the North Sea which adds to particulate levels. Air Quality in Sunderland is most heavily influenced by traffic emissions. The pollutant of most concern to Sunderland is Nitrogen Dioxide (NO_2) caused by road traffic.

Levels of pollution across Sunderland, indicated by the latest monitoring data, are falling and Sunderland has not had to declare an AQMA within its boundary

Sunderland City Council's Public Protection and Regulatory Services Team are responsible for overseeing the air quality monitoring network and reporting the data to DEFRA. We work together with other Local Authorities in our region as Air Pollution is trans boundary in nature. Many of the improvements to the road network or fitting buses with pollution reducing technology will have positive benefits in more than one local authority region in our area. The GoSmarter project mentioned earlier operates across all of the Tyne & Wear Authorities and Northumberland.

We also work closely with our partners in Transport, Public Health and Planning as well as partners outside the Local Authority such as the Environment Agency to improve air quality standards.

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[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

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1 Local Air Quality Management

This report provides an overview of air quality in Sunderland during 2015 It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Sunderland to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

Public Transport Improvements

This past year, Go North East (one of the main bus operators in Sunderland) has invested circa £10m in 100 new Euro 6 standard vehicles across the north east region to meet the particulates and emissions requirements, and to enable the withdrawal of a similar number of older Euro 2 vehicles. The vehicles are also fitted with the latest micro hybrid engine technology which recovers braking energy to power on board systems that would otherwise require power from the engine, thus reducing fuel consumption and improving emissions.

Low Emission Vehicles

There are approximately 4000 Ultra Low Emission Vehicles registered in the north east, with a large proportion in Sunderland. There is an established public charging point network which we are looking to improve and expand where necessary as part of a developing regional EV strategy.

Major Transport Schemes

The second phase of the Sunderland Strategic Transport Corridor is currently on site which comprises of a new bridge crossing over the River Wear. This project, while providing strategic links will also benefit air quality by diverting traffic from urban centre residential areas, which in turn will bring health and wellbeing benefits.

Go Smart projects

Funding provided by the Local Sustainable Transport Fund to deliver the Go Smarter to School and Work projects has now ended. Other funding opportunities are being explored to enable the continued delivery of our sustainable transport priorities.

Local Priorities and Challenges

Public Transport Improvements

Sunderland has been successful in securing £280,000 from the Department for Transport's latest round of Clean Bus Technology Fund to upgrade 14 buses on urban routes. This project is to be delivered jointly with Gateshead and Go North East to upgrade 34 in total.

Low Emission Vehicles

Sunderland are a lead partner in the recent Go Ultra Low (GUL) City scheme and have received development funding to deliver a GUL Filling Station in Sunderland. This proposal is currently at the development and outline design stage.

Major Transport Schemes

The third phase of the Sunderland Strategic Transport Corridor linking the new Wear Crossing and the completed phase 1 in the City Centre is being progressed towards planning consent stage. This is one of a number a major transport projects under development which are aimed to meet a number of objectives including supporting economic development, as well as being environmentally beneficial by reducing traffic congestion at pinch points and bringing local air quality benefits and a reduction in noise levels.

Go Smart projects

The North East Combined Authority area which includes Sunderland is seeking transition funding to continue with elements of both the Go Smarter to School and Work initiatives for the remainder of 2016/17. An announcement of this funding bid is expected May 2016.

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

Sunderland City Council currently does not have any AQMAs.

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

Sunderland City Council has taken forward a number of general measures during the current reporting year of 2015 in pursuit of improving local air quality as reported in the executive summary. We will evaluate the impact of such measures by continuing to monitor and report Air Quality levels across Sunderland.

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

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

Background on the impacts on health outcomes and rationale:

The people of Sunderland have lower life expectancy at birth than the England average, with a gap of 2.2 years for males and 2.4 years for females. Data published this week shows that:

- 17.1% of the gap for males and 24.1% of the gap for females is due to deaths from respiratory diseases;
- 13.4% of the gap for males and 16.2% of the gap for females is due to deaths from circulatory diseases;
- 28.1% of the gap for males and 34.3% of the gap for females is due to deaths from cancer.

Evidence shows that long term exposure to poor air quality increases the risk of mortality from cardiovascular and respiratory diseases and also lung cancer. Sunderland has higher than England average rates of death for these causes as follows:

- Premature (under 75 years) mortality rates from cardiovascular disease of 93 per 100,000 compared to 76 per 100,000 for England; of this 62 per 100,000 were preventable.
- Premature (under 75 years) mortality rates from respiratory disease of 44 per 100,000 compared to 33 per 100,000 for England; of this 28 per 100,000 were preventable.

- Premature (under 75 years) mortality rates from lung cancer of 50 per 100,000 compared to 34 per 100,000 for England; around 89% of lung cancers are preventable.

Data from the Public Health Outcomes Framework suggests that man-made small particulate air pollution ($PM_{2.5}$) contributes to deaths in the City and the burden this create on our population is equivalent to 4.5% of all deaths at ages 30 years and over. This places Sunderland is the best performing quartile for this measure.

Levels of $PM_{2.5}$ in Sunderland (as measured by the Silksworth monitoring station) are generally relatively low and in line with the national trend are generally reducing. Data for 2015, at 7µg/m^3 are well below the EU target of 25µg/m^3; however it should be noted that there is no completely safe level of exposure.

Actions already being taken by Sunderland City Council to reduce pollutants such as PM_{10} and NO_x as reported in the executive summary will also reduce levels of $PM_{2.5}$ emissions.

Examples of measures to tackle $PM_{2.5}$ can be categorised into Mobile Sources, Stationary Sources and Area Sources.

Mobile Sources

Sunderland Council has recently secured funding for the retrofitting of diesel buses which will help to reduce primary and secondary sources of PM2.5.

Stationary Sources

Stationary sources of $PM_{2.5}$ can originate from industrial processes that use dusty raw materials and equipment such as electrostatic precipitators. The Environmental Health Team of Sunderland Council closely monitors dusty emissions from permitted processes and respond to any complaints regarding dust emissions from demolition and/or construction sites. We also control dust through the planning process by ensuring construction sites have a Construction Environmental Management Plan in place.

Area Source Measures

The whole of Sunderland City Council's boundary is a smoke control area and domestic coal is not permitted to be used as fuel. The Environmental Team investigates complaints of dark smoke or the use of unapproved appliances to minimise the emissions of $PM_{2.5}$ from these sources.

Sunderland City Council's Public Health Team are happy to support Environmental Health in promoting the importance of air quality in contributing to key priorities for the city and recommend that any actions that can reduce levels of $PM_{2.5}$ should be considered as part of the broad strategy to protect and promote the health of the Sunderland population.

As this is the first year that Sunderland City Council have reported $PM_{2.5}$ data it is thought that further discussions between our partners in Public Health and Transport are required to improve our understanding. Sunderland City Council will work towards reducing emissions and concentrations of $PM_{2.5}$ in their area as practicable.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

Sunderland City Council undertook automatic (continuous) monitoring at 3 sites during 2015. Table A.1 in Appendix A shows the details of the sites. Sunderland's monitoring results are available at http://www.airqualityengland.co.uk/local-authority/?la_id=348 . National monitoring results are available at https://uk-air.defra.gov.uk/ .

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

3.1.2 Non-Automatic Monitoring Sites

Sunderland City Council undertook non- automatic (passive) monitoring of NO_2 at 37 sites during 2015. Table A.2 in Appendix A shows the details of the sites.

Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. The data shows that there were no exceedences of the NO_2 Air Quality Objectives in 2015.

3.2.2 Particulate Matter (PM_{10})

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

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

The data shows that PM_{10} Air Quality Objectives were met at all locations in 2015.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.7 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years.

Although there is no regulatory standard applied to the PM2.5 role in England, there is an annual EU limit of 25µg/m^3 to be met by 2020 which we can compare the levels in Sunderland against. The monitoring site in Silksworth has monitored $PM_{2.5}$ for several years and levels are well below the EU limit.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Trimdon Street	Kerbside	438928	557151	NO_2; PM_{10}	N	Chemiluminescent; TEOM	3	0.5	2.0
CM2	Silks-worth	Urban background	438116	554462	NO_2; PM_{10}, $PM_{2.5}$	N	Chemiluminescent TEOM, FDMS	230	0.5	2.0
CM3	Dunn House	Roadside	439661	557921	NO_2	N	Chemiluminescent	1	4.5	1.5

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

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) [(1)]	Distance to kerb of nearest road (m) [(2)]	Tube collocated with a Continuous Analyser?	Height (m)
29	Arndale House, St Mary's Way	Roadside	X439508	Y557151	NO_2	N	100	0	N	4
38	17 Parkside South	Roadside	X435714	Y552473	NO_2	N	0	18	N	2
39	15 John Street	Urban Centre	X439835	Y556978	NO_2	N	115	6	N	2
53	166 Chester Road	Roadside	X438568	Y556566	NO_2	N	0	4	N	2
55	25 Eden Vale	Roadside	X438690	Y556135	NO_2	N	0	3	N	2
56	101 Southwick Road	Roadside	X439101	Y553282	NO_2	N	0	2	N	4
57	5/6 Nbridge Street	Kerbside	X439664	Y557829	NO_2	N	0	2	N	4
58	6 Beatrice Tce, Shiney Row	Kerbside	X432634	Y552616	NO_2	N	0	3	N	2
86	2 Alice Street	Roadside	X439466	Y556484	NO_2	N	0	4	N	2

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) [(1)]	Distance to kerb of nearest road (m) [(2)]	Tube collocated with a Continuous Analyser?	Height (m)
88	Hinds Street	Roadside	X439160	Y556995	NO_2	N	145	1	N	4
94	Chaplin's PH, Mary St.	Kerbside	X439423	Y556738	NO_2	N	0	2	N	4
100	Trimdon St AQ Station	Kerbside	X438927	Y557151	NO_2	N	3	4	Y	2
101	Silksworth AQ Station	Urban Background	X438116	Y554462	NO_2	N	130	3	Y	2
103	Trimdon St AQ Station	Kerbside	X438927	Y557151	NO_2	N	3	4	Y	2
104	Trimdon St AQ Station	Kerbside	X438927	Y557151	NO_2	N	3	4	Y	2
105	Silksworth AQ Station	Urban Background	X438116	Y554462	NO_2	N	130	3	Y	2
106	Silksworth AQ Station	Urban Background	X438116	Y554462	NO_2	N	130	3	Y	2
109	23 Newcastle Rd	Roadside	X439648	Y558120	NO_2	N	0	3	N	2
111	237 Queen Alex Rd,	Roadside	X438453	Y555507	NO_2	N	0	9	N	2

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
113	181 Durham Road	Urban Centre	X437446	Y554989	NO_2	N	20	4	N	4
116	9 Derwent St	Roadside	X439451	Y556718	NO_2	N	0	2	N	4
117	3 Holmeside	Roadside	X439495	Y556795	NO_2	N	97	4	N	4
118	27 Bridge St	Roadside	X439696	Y557205	NO_2	N	0	2	N	4
119	Athenaeum St	Roadside	X439792	Y556921	NO_2	N	88	2	N	4
120	Gillespie's PH	Roadside	X439806	Y557063	NO_2	N	100	5	N	4
121	Windsor Tce, Grngetwn	Roadside	X440702	Y554722	NO_2	N	0	2	N	4
123	263 Chester Rd	Roadside	X437943	Y556341	NO_2	N	10	4	N	2
125	Station Rd	Roadside	X435417	Y547025	NO_2	N	0	2	N	2
128	Echo Building	Roadside	X439707	Y557312	NO_2	N	20	2	N	4

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
129	West Sunniside	Roadside	X439938	Y557089	NO_2	N	2	1	N	4
130	St Mary's Car Park	Roadside	X439538	Y557292	NO_2	N	177	3	N	4
131	Chaplin's PH 2nd Tube	Kerbside	X439397	Y556666	NO_2	N	3	1	N	3
132	Dunn House, N Bridge St.	Kerbside	X439661	Y557901	NO_2	N	0.5	3	N	4
133	Northern Way	Roadside	X438153	Y558344	NO_2	N	0	3	N	4
134	Southwick Rd	Roadside	X438563	Y558517	NO_2	N	0	2	N	4
135	Merle Terrace	Roadside	X437561	Y557538	NO_2	N	0	4	N	2
136	Morningside Rickleton	Roadside	X428269	Y553809	NO_2	N	0	9	N	2

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
CM1	Kerbside	Automatic	87.5	33	36.4	35.3	33.5	38.9	34.2
CM2	Urban background	Automatic	N/A	78	16	18	16	16	14
CM3	Roadside	Automatic	99.7	25	N/A	N/A	N/A	34.7	36
29	Roadside	Diffusion Tube		33	28.3	34.9	28.0	23.6	18.6
38	Roadside	Diffusion Tube		92	28.5	32.4	31.0	28.9	28.9
39	Urban Centre	Diffusion Tube		83	26.6	25.5	23.8	22.2	20.2
53	Roadside	Diffusion Tube		83	28.3	33.3	32.3	27.1	28.1
55	Roadside	Diffusion Tube		92	32.7	37.8	33.3	30.6	30.1
56	Roadside	Diffusion Tube		75	26.7	32.4	28.7	25.8	22.1
57	Kerbside	Diffusion Tube		83	33.7	36.8	34.6	35.4	29.0
58	Kerbside	Diffusion Tube		92	33.7	35.8	32.8	32.7	32.4
86	Roadside	Diffusion Tube		83	20.4	22.9	21.3	20.7	18.0
88	Roadside	Diffusion Tube		42	30.7	34.4	36.8	28.3	27.7
94	Kerbside	Diffusion Tube		58	35.5	37.8	37.0	35.1	31.7
100	Kerbside	Diffusion Tube		92	37.8	40.8	40.0	36.9	33.4
101	Urban Background	Diffusion Tube		92	18.19	18.8	**40.2**	16.7	34.0
103	Kerbside	Diffusion Tube		83	36.9	40.0	39.0	37.2	34.2
104	Kerbside	Diffusion Tube		92	37.4	40.1	16.7	37.1	15.0
105	Urban Background	Diffusion Tube		92	17.7	19.1	16.3	16.2	14.7
106	Urban Background	Diffusion Tube		75	16.3	18.9	16.0	15.3	14.5
109	Roadside	Diffusion Tube		67	15.3	34.4	29.1	32.3	31.7

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
111	Roadside	Diffusion Tube		92	19.7	23.7	21.8	19.3	18.1
113	Roadside	Diffusion Tube		83	29.4	33.2	29.5	27.0	26.3
116	Urban Centre	Diffusion Tube		92	26.3	27.7	26.6	25.9	22.6
117	Roadside	Diffusion Tube		83	33.3	41.1	35.8	35.7	33.9
118	Roadside	Diffusion Tube		92	29.9	30.4	26.4	24.0	24.2
119	Roadside	Diffusion Tube		92	32.0	33.5	30.3	26.1	26.6
120	Roadside	Diffusion Tube		67	30.7	30.0	25.9	29.9	22.1
121	Roadside	Diffusion Tube		92	25.1	21.4	28.3	26.2	25.3
123	Roadside	Diffusion Tube		92	34.3	39.4	35.0	35.6	34.0
125	Roadside	Diffusion Tube		75	26.4	29.5	26.7	25.8	22.5
128	Roadside	Diffusion Tube		75	36.1	32.2	31.2	30.8	28.3
129	Roadside	Diffusion Tube		92	24.4	27.1	22.2	20.2	21.1
130	Roadside	Diffusion Tube		75	26.4	27.9	25.3	24.0	21.4
131	Kerbside	Diffusion Tube		58	**40.8**	39.3	35.4	33.0	31.5
132	Kerbside	Diffusion Tube		67	**42.2**	**46.2**	**46.0**	39.1	36.2
133	Roadside	Diffusion Tube		92	32.9	32.2	31.5	31.3	28.9
134	Roadside	Diffusion Tube		67	32.8	35.2	31.9	30.3	28.3
135	Roadside	Diffusion Tube		67	22.2	25.1	25.9	24.1	20.7
136	Roadside	Diffusion Tube		92	21.7	24.7	24.8	21.9	21.0

Notes: Exceedences of the NO_2 annual mean objective of $40\mu g/m^3$ are shown in **bold**.

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

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
CM 1	Kerbside	Automatic	87.5	33	0	0	0	0	0(92)
CM2	Urban Background	Automatic	N/A	78	0	0(80)	0(80)	0(76)	0(67)
CM3	Roadside	Automatic	99.7	25	N/A	N/A	N/A	0	0

Notes: Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

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

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

(3) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2011	2012	2013	2014	2015
CM1	Kerbside	91.7	45.9	20	22.1	21.6	21.3	20.9
CM2	Urban Background	98.4	44.7	15	15.6	15.3	13.9	14.6

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

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

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} 24-Hour Means > 50µg/m³ (3)				
				2011	2012	2013	2014	2015
CM1	Roadside	91.7	45.9	16	10	3	6	1
CM2	Urban Background	98.4	44.7	0	0	3	2	1

Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold.**

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

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

(3) If the period of valid data is less than 90%, the 90.4th percentile of 24-hour means is provided in brackets.

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
CM2	Urban Background	N/A	95	15	10	9	10	7

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2015

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
29					19.1	17.69	17.51		27.53				20.5	18.6
38	30.94	37.04	30.88	35.88	28.06	26.30	25.54	27.35	38.42		35.27	34.07	31.8	28.9
39	26.39	24.39	21.65	21.55	17.31	17.87	20.13	20.58			25.82	25.82	22.2	20.2
53	34.04	30.56	30.32	30.04	22.95	24.54	24.10	23.97	34.45		53.82		30.9	28.1
55	39.77	32.82	33.34	30.72	24.26	27.74	29.37	29.05	36.17		39.51	40.72	33.0	30.1
56	27.07	28.62	23.42	25.25	12.15		19.63	19.76	30.31		32.45		24.3	22.1
57	28.83	29.42		35.03	30.15	28.46	32.30	26.27	41.13		40.75	26.43	31.9	29.0
58	38.86	39.51	37.41	37.50	29.06	30.83	32.43	24.01	43.92		41.64	36.93	35.6	32.4
86	24.12	23.87	21.70	25.06	13.75	16.48	15.03	14.81	23.15			19.50	19.7	18.0
88	43.90	31.90	25.31	29.11	22.19								30.5	27.7
94		36.89		38.05	24.25	27.88	35.53	34.18	47.18				34.9	31.7
100	34.55	41.49	30.98	43.11	30.58	31.74	36.54	31.85	45.64		38.85	38.26	36.7	33.4
103	31.63	42.98	34.52	40.14	28.62	33.95	34.94	31.57	47.30		43.55	41.28	37.3	34.0
104	38.25	38.31	34.98	36.70	29.24	30.98	34.97	32.35	44.96		54.81		37.6	34.2
101	16.27	20.32	17.96	15.62	10.37	11.69	14.32	12.18	19.08		21.95	21.48	16.5	15.0
105	16.27	20.07	19.15	15.82	11.26	12.05	12.80	12.65	18.24		21.72	17.38	16.1	14.7
106		20.15	16.27	17.23	11.23	11.87	13.02	12.76	18.32		22.32		15.9	14.5
109		37.94	37.81		31.35		31.04	31.21	38.66		39.56	31.41	34.9	31.7
111	22.55	22.30	22.98	21.05	14.61	15.61	16.05	16.32	22.65		25.46	19.06	19.9	18.1
113	37.24	29.69	30.71	30.40	21.93	22.60	25.09	24.82	35.55		30.71		28.9	26.3

Site ID	NO_2 Mean Concentrations (µg/m³)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
116	33.81	29.01	28.01	26.88	21.9	21.59	21.98	20.67	33.20		32.25	4.41	**24.9**	22.6
117	39.88	37.92	39.32	38.26	30.83	29.41	36.98	33.14	46.07		40.88		**37.3**	33.9
118	32.56	29.84	29.10	26.89	20.51	22.78	22.54	22.28	28.95		29.87	27.52	**26.6**	24.2
119	34.75	34.70	27.67	27.51	25.15	23.91	23.25	25.94	34.76		33.91	30.41	**29.3**	26.6
120		29.36		24.91	18.74	19.98	21.64	22.41	32.51		24.33		**24.2**	22.1
121	31.46	33.56	29.03	27.65	21.28	23.39	24.73	25.93	33.52		31.52	24.13	**27.8**	25.3
123	41.75	38.61	34.25	38.28	15.46	34.89	37.64	29.52	47.03		44.61	48.99	**37.4**	34.0
125		28.00	28.32	29.17	17.14	23.37	22.85	19.96	31.31			22.72	**24.8**	22.5
128	33.06	41.97	31.96	32.07	25.21	24.63	26.56	25.75	38.47				**31.1**	28.3
129	33.69	27.81	24.29	23.74	16.76	16.80	15.54	17.18	26.15		26.67	25.84	**23.1**	21.1
130		27.85	23.47	25.52	16.36	15.59	17.67	18.77	28.63		37.87		**23.5**	21.4
131		38.94		35.97		28.04	30.86	27.88	43.88		36.48		**34.6**	31.5
132		48.96		38.44	34.53	33.90	34.13	33.81	46.49		47.70		**39.7**	36.2
133	35.02	35.05	28.71	28.41	26.01	26.30	30.38	26.91	39.77		41.61	31.68	**31.8**	28.9
134	30.86	32.13	31.00	34.68	24.21		29.95	24.45			41.82		**31.1**	28.3
135		24.60	23.71	22.53	29.74	18.88	18.42	17.07	26.93				**22.7**	20.7
136	27.53	30.92	25.56	22.38	20.28	19.12	17.64	18.83	22.67		26.88	21.82	**23.1**	21.0

(1) See Appendix C for details on bias adjustment

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

New or Significant Changes to Sources of Pollution

Sunderland City Council continues to assess new sources of pollution and since the last report there have been two new industrial processes that have required an Environmental Permit (details in Table C1 below).. These installations have applied for and received a permit to operate from Sunderland City Council under the Environmental Permitting Regulations 2010. Sunderland City Council has deemed their applications duly made and they are now subject to the inspection regime of LA-IPPC or LA-PPC as applicable. The permit conditions for both installations ensure that emissions to air are compliant with Process Guidance notes for the relevant industry sector.

The impact on local air quality was assessed using the TG (16) guidance and it was concluded that with suitable controls and site management that these new sources are unlikely to make a significant impact on local air quality.

Table C1

Name of Installation	Address	Type of Industry	Potential Pollutant Releases	Part A/B
Grab & Deliver	Freezemoor Rd, New Herrington, DH4 7BH.	Mobile Crusher	NO_x and PM_{10}	B
Sci-Grip	Bentall Business Park, Washington, NE37 3JD.	Manufacture of Adhesive Products	VOC’s	B

Details of Dun House Monitoring Programme to determine whether an AQMA needs to be declared.

Previously, diffusion tube monitoring of Nitrogen Dioxide indicated that the Air Quality Objective for Nitrogen Dioxide was at risk of being breached at a location near to the Wheatsheaf Gyratory junction (Tube ID 132). Monitoring has been focused on the residents of Dunn House as a sensitive receptor.

Diffusion tube monitoring was followed up by a more detailed assessment using a real time automatic analyser and monitoring was carried out for 5 months during 2014 followed by a further 3 months in March to May 2015. Monitoring was carried out in two separate periods as data collection had to be suspended in 2014 due to contractual issues with our Equipment Support Unit and data management provider. It was considered that further monitoring was required to provide a robust assessment and hence a further three months was carried out in 2015. Sunderland City Council had been working towards producing the data in a Detailed Assessment however; due to the change in format of the Local Air Quality Management Reporting system it seemed more appropriate to report the results here within this report.

The data for the two separate monitoring periods was annualised according to the method described in LAQM (TG16) and is presented in Table A.8 – Annual Mean NO_2 Monitoring Results.

The results were an annual average of approx. 34.7µg/m^3 in 2014 and approx. 36µg/m^3 in 2015 which is comfortably below the annual objective of 40µg/m^3. Sunderland City Council has concluded that we do not need to declare an AQMA for this location.

The latest Diffusion Tube results for 2015 for the same site have also fallen below the objective supporting this conclusion with an annual mean of 36.2 µg/m^3. We will continue to monitor this location using diffusion tubes in the future.

New Roads Constructed or Proposed since the last round of review and assessment.

It was reported in the USA 2015 that Phase 3 of the Sunderland Strategic Transport Corridor (SSTC) was currently at the pre app stage of planning. It was hoped that an update regarding air quality assessments undertaken as part of the full planning application would have been able to be provided at this time. Unfortunately the planning process has not yet reached this stage and a further update will be given in 2017’s Annual Statement Report.

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 20% TEA and acetone.

The bias adjustment factor of 0.91 was obtained from the Spreadsheet version 03/16.

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/ .

Short-term to Long-term Data Adjustment

Some of the data collected during 2015 has had to be adjusted due to not having a full data set for the year. We were able to collect 3 months data, March to May for Dunn House and 4 months for Trimdon Street and Silksworth. I have chosen sites that are in the AURN network for this adjustment. The calculations are shown in the tables below.

Trimdon St (CM1) NO_2

Site	Site Type	Annual Mean	Period Mean	Ratio
Newcastle Centre	Urban Centre	29.4	30	0.98
Wessington Way S'land	Roadside	25	24.3	1.03
			Average	1.005

Trimdon St & Silksworth (CM1/2) PM_{10}

Site	Site Type	Annual Mean	Period Mean	Ratio
Leeds Centre	Urban Centre	16	15.8	1.01
Middlesborough	Urban Centre	17	15.8	1.08
			Average	1.045

Dunn House (CM3) NO_2

Site	Site Type	Annual Mean	Period Mean	Ratio
Newcastle Centre	Urban Centre	29.4	30.0	0.98
Wessington Way S'land	Roadside	25	24.3	1.03
			Average	1.005

QA/QC of Automatic Monitoring

The QA/QC procedures of Sunderland are based on the AURN Site Operator's manual along with training received from our original 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 SupportingU
- Local Authority staff visits the air quality sites at least once every 4 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 Ricardo-AEA who are under contract with Sunderland City Council to validate and ratify the data. Monthly reports of the data are produced by Ricardo - AEA and e-mailed to Sunderland City Council. The data is also displayed on a website that members of the public can freely access. The website address is http://www.airqualityengland.co.uk/site/graphing?site_id=SUN2

Ricardo-AEA 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 monthly 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.)

Although these have now been replaced with the Air PT scheme.
In addition regular cross-checks are carried out with other U.K.A.S. accredited labs using certified standard solutions.

Appendix D: Map(s) of Monitoring Locations

Figure D1 Location of Trimdon St Automatic Monitoring Station

Figure D2 Location of Silksworth (Puma Centre) Automatic Monitoring Station.

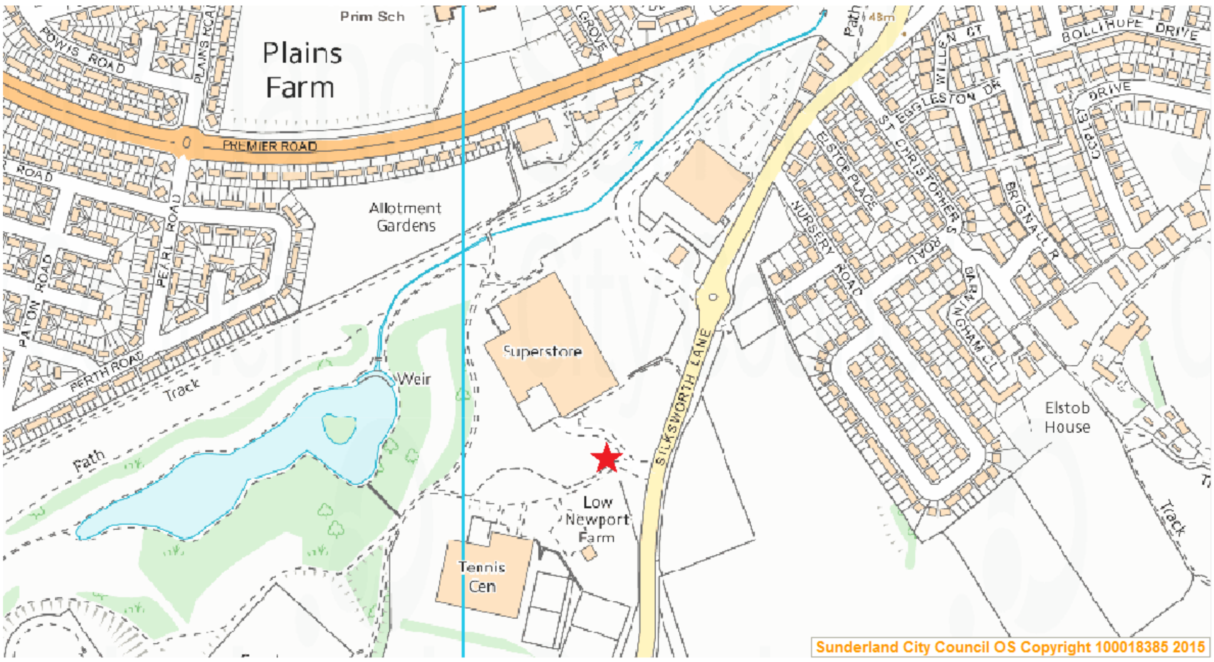
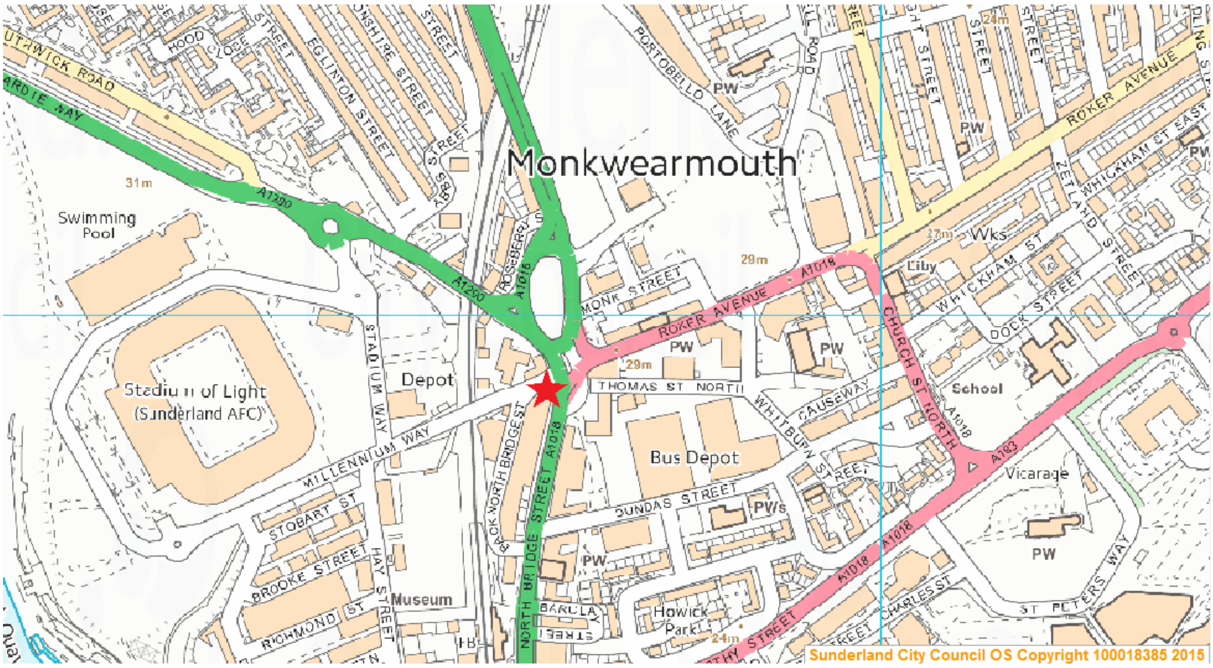


Figure D3 Location of Dunn House Automatic Monitoring Station.



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values’
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
…	…